

NARMADA CONTROL AUTHORITY

Environment Sub Group

Agenda and Minutes of Meetings

PART V

*35th to 38th Meeting of the Environment Sub-
Group (ESG)*

2001 to 2003

Table of Contents

		<i>Page</i>
2001	35 th meeting Agenda	1
2001	35 th meeting Minutes	145
2001	36 th meeting Agenda	200
2001	36 th meeting Minutes	411
2002	37 th meeting Agenda	453
2002	37 th meeting Minutes	669
2003	38 th meeting Agenda	723
2003	38 th meeting Minutes	923



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पर्यावरण उपदल
ENVIRONMENT SUB-GROUP

पैंतीसवीं बैठक की कार्यसूची
Agenda for the 35th Meeting

स्थान : केवडिया कॉलोनी, गुजरात
Venue : Kevadia Colony, Gujarat

दिनांक : 19 जनवरी, 2001, 7.00 बजे सांय
Date : 19th January, 2001, 7.00 P.M.

नर्मदा नियंत्रण प्राधिकरण
NARMADA CONTROL AUTHORITY

इन्दौर
जनवरी, 2001

Indore
January, 2001

ENVIRONMENT SUB-GROUP AGENDA FOR THE 35TH MEETING

I N D E X

ITEM NO	CONTENTS	PAGE NO.
XXXV-1(161)	CONFIRMATION OF MINUTES OF THE 34 TH MEETING	1
XXXV-2(162)	SARDAR SAROVAR PROJECT: REVIEW OF THE STATUS OF ENVIRONMENTAL CONSIDERATIONS IN RELATION TO THE PROPOSED RASING OF THE DAM HEIGHT AT RL 100M	2
	A. Progressive filling of the reservoir: Dam Construction vis a vis submergence schedule	3
	B. Review of the progress of works on the suggested parameters in relation to the proposed filling of the reservoir upto RL 100m by June 2002	3
	i. Phased Catchment Area Treatment	3
	ii. Compensatory Plantations	4
	iii. Survey of Flora, Fauna and Carrying Capacity Studies	5
	iv. Archaeological and Anthropological Survey	7
	v. Seismicity and Rim Stability of Reservoir	8
	vi. Health Aspects	9
	vii. Fisheries Conservation and Development	11
	viii. Command Area Development	12
	ix. Downstream environment	13
XXXV-3 (163)	REVIEW OF THE STATUS OF INDIRA SAGAR PROJECT MADHYA PRADESH	
	i. Catchment Area Treatment	14
	ii. Compensatory Plantations	14
	iii. Survey of Flora Fauna & Carrying Capacity studies	14
	iv. Archaeological & Anthropological Survey	14
	v. Seismicity and Rim Stability of Reservoir	14
	vi. Health Aspects	14
	vii. Command area Development.	15
XXXV-4(164)	REVIEW OF ACTION TAKEN ON THE DECISION OF THE PREVIOUS MEETINGS	
	I. Environmental Management of SSP and ISP	16
	II. Submission of Catchment Area Treatment Plans for freely draining critically degraded sub-watersheds (Item No.XXII-2(1122))	16
	III. Cost Estimates for preparation of Action Plans and implementation of Environmental Safeguard Measures	16
	IV. Monitoring works in Maharashtra	17
	V. Publication of Environment	17
XXXV-5(165)	Any other item Date and venue of the next meeting	18

ANNEXURES

ANNEX	CONTENTS	PAGE NO.
XXXV - (1)	A note on " <i>Pari-Passu</i> " : Regulatory regime.	1-2
XXXV - (2)	GIS Generated Map of the Reservoir at RL 100m.	3
XXXV - (3)	Status report - Environment Management : SSP & ISP, September, 2000.	4-101
XXXV - (4)	CAT : Map showing sub-watershed in the vicinity of the reservoir corresponding to RL 100 m.	102-103
XXXV - (5)	CAF : Map showing location where plantations have been raised.	104
XXXV - (6)	Flora Fauna & Carrying Capacity aspects - showing conservation measures along the periphery of the reservoir.	105
XXXV - (7)	Flora Fauna & Carrying Capacity aspects - Madhya Pradesh cost estimates of social forestry components.	106-115
XXXV - (8)	Map showing location of the cultural heritage along the periphery of the reservoir.	116
XXXV - (9)	Map showing location of seismic monitoring stations.	117
XXXV - (10)	SSP : Health Map - showing existing & proposed facilities.	118
XXXV - (11)	ISP : Health - Summary of the VIth report of Gandhi Medical College, Bhopal.	119-121
XXXV - (12)	Cost estimates & expenditure on SSP.	122

ENVIRONMENT SUB-GROUP AGENDA FOR THE 35TH MEETING

Item No. XXXV-1(161) : CONFIRMATION OF MINUTES OF THE 34TH MEETING

Minutes of 34th Meeting of Environment Sub-Group of Narmada Control Authority were circulated to all Members and Invitees vide NCA Office letter No.Env-3(34) /2000 / 3167 -3200 dated 29.12.2000.

No comments were received. The Minutes are put up for confirmation.

Item No. XXXV-2(162): SARDAR SAROVAR PROJECT: REVIEW OF THE STATUS OF ENVIRONMENTAL CONSIDERATIONS IN RELATION TO THE PROPOSED RASING OF THE DAM HEIGHT AT RL 100M

The Hon'ble Supreme Court, in its judgement given in civil Writ Petition No.319 of 1994 filed by Narmada Bachao Andolan (NBA) against the Sardar Sarovar Project (SSP), allowed the project to go ahead, as per the stipulations of NWDT Award.

In its Order dated 19.10.2000, the Hon'ble Supreme Court have permitted raising of the dam height up-to 90m., which has been achieved recently by the Project Authorities. The Hon'ble Court has also emphasised the followings :

- (i) The completion of the Project at the earliest and
- (ii) Ensuring compliances with conditions on which clearance of the Project was given including completion of relief and rehabilitation works and taking of ameliorative and compensatory measures for environmental protection.

Now, in light of above judgement, it has to be ensured that the Project is completed expeditiously, as per provisions of the Award, alongwith implementation of the, Relief and Rehabilitation works, ameliorative and compensatory measures for environmental protection.

In pursuance of the above, the NCA has evolved a time schedule for the construction programme of the SSP. This schedule was approved by the Authority in its 61st meeting held on 17.11.2000. The approved construction programme envisaged construction of dam in four stages namely - 100m (June, 2002) 110m (June, 2003), & 121m (June, 2004) and FRL 138.68m (June, 2005).

As per directions contained in the judgement the permission to raise the dam height beyond 90m., will be given by the NCA after obtaining necessary clearance, amongst other, by the Environment Sub-group also. The Environment Sub- Group of NCA, has to consider and give, at each stage of the construction of the dam, environmental clearance for further construction beyond 90m.

A request from the Govt. of Gujarat for raising the height of the dam to 110m. was received during the 34th meeting and was annexed with the Minutes of this meeting as Annex-XXIV-(9). But according to the decision of the NCA referred to above, the next stage of construction will be 100m. Therefore, it is desirable to review the progress of works on implementation of the suggested environment safeguard measures in the context of the pari-passu compliance with reference to dam construction of EL 100m. Accordingly, current status of the survey studies and

implementation of the suggested safeguard measures in relation to dam height of 100m. is presented below for a review by the Sub-group.

The linkage between progressive filling of the reservoir and implementation of the suggested safeguards has to be viewed in the context of the pari-passu clause contained in the clearance order of 1987. This clause has been defined by the Chairman of the sub-group from time to time and the same was also reiterated by the MOEF, during hearing in the apex court. During the last, the 34th meeting of the Environment Subgroup, the Chairman desired that a note on the past discussions of the Sub-group on application of pari-passu clause be presented for a ready reference of the members. Accordingly, a note prepared is annexed and is placed as **Annex – XXXV – (1) at Page- 1-2.**

As per this note submergence is the indicator of the progress of works on the project and that advance steps have to be taken for all that, which is affected adversely. The submergence to be caused during progressive filling of the reservoir vis a vis schedule of the construction programme is presented below.

A. Progressive filling of the reservoir:

Dam Construction vis a vis submergence schedule

As per the construction schedule approved by the NCA, the project authorities have plans to raise the dam height from the present height of RL 90m. to the proposed height of RL 100 m by the end of June, 2002. The resulting reservoir would extend upstream upto 105 Kms from the dam site. This would increase the area under pool submergence from the present 7200 ha to 8900. ha. This constitutes 24% of the submergence. A diagrammatic view of the proposed dam at RL 100 m to be achieved by June 2002, is at **Annex – XXXV-(2) at Page-3.**

B. Review of the progress of works on the suggested parameters in relation to the proposed filling of the reservoir upto RL 100m by June 2002

A copy of the Status Report on Environment Management of Sardar Sarovar Project for the quarter ending September, 2000 is placed at **Annex – XXXV – (3) at page 4-101** for a ready reference. Status of the works on suggested parameters vis a vis submergence at RL 100m is placed below for a review of the members.

I. Phased Catchment Area Treatment

For the Project as a whole, against a target of 1,79,180 ha. of CAT an area of 1,34,832 ha. i.e., 75.27% has been treated. Thematic maps generated through GIS containing sub-watershed wise details, vis a vis the proposed schedule of progressive filling, are presented at **Annex – XXXV – (4) at Page 102-103.** State-wise breakup of the targets and achievements is presented below.

Gujarat

As an area of 28,995 ha. was available for treatment against a target of 29,157 ha., works have been completed in the entire available area. Progress is stated to be about 100%.

Maharashtra

As the actual area available for treatment was found 23,295 ha, the same had been treated against the planned target of 24,298 ha. Therefore, the treatment work may be considered completed.

Madhya Pradesh

By the end of July, 2000, against a final target area of 1,25,725 ha. an area of 82,380 ha. has been treated i.e., 65.52% of the works have been completed. NVDA, during the last meeting, have assured to complete all the works in 2 years time i.e. by June 2002.

The progress on subwatersheds located in the vicinity of the proposed impoundment, by the end of September 2000 was 77493 ha against the desideratum of 92,529 ha i.e. 83.75%.

II. Compensatory Plantations

Against the usual requirement of raising equal area of plantation over non-forest land in lieu of the submergence of certain area of the forest land, the Project Authorities were required to raise plantation over an area of 3 ha. (equal area of non forest land plus double of the degraded forests) in lieu of each hectare of forest land submerged. Accordingly for the project as a whole the concerned states through their Forest Department, have prepared Action Plans to raise plantations over an area of 42,158 ha., against 13,786 ha of the forest land diverted for the purpose of submergence.

By the end of the July 2000, the planned targets were achieved ahead of the schedule. Besides in addition to the massive reforestation in the catchment, project authorities have also raised plantations over an area of 1,870 ha. along the Canal banks, 550 ha. in the vicinity of dam, 200 ha. on the left bank of the river Sabarmati. State wise targets and achievements are presented below. A diagrammatic view of the areas where plantations have been raised is placed at **Annex – XXXV – (5) at Page-104.**

Gujarat

By the end of September, 1994, Govt. of Gujarat had completed plantation works in the entire planned area of 13,950 ha. (including both non forest and degraded forest areas) i.e., 100% of the works were completed.

Maharashtra

For the land released for R&R works, progress achieved was 3,584 ha. against a target of 4,200 ha. However for the area getting submerged by the end of year 1998 targets of 19,468 ha were achieved fully, the progress achieved thus, was 100%.

Madhya Pradesh

By the end of July, 2000, Govt. of Madhya Pradesh have completed plantation works over the entire planned area of 8,737 ha. Progressed achieved was thus about 100%.

III. Survey of Flora, Fauna and Carrying Capacity Studies

The issues identified with respect to submergence area were identification of endangered species, rare & habitat sufficiency. Accordingly, the rehabilitation of flora fauna action plans were expected to cover the Surveys of flora & fauna in the region going to be affected due to implementation of the SSP with reference to the following :

- 1) Gene pool, if any, likely to be affected.
- 2) Details of wildlife habitat in the region
- 3) Measures proposed to rehabilitate endangered species of flora fauna, if any.
- 4) Assessment of the carrying capacity of the neighbouring areas wherein the wildlife would dispose if the scheme were implemented.
- 5) Plan for rehabilitation of endangered flora & fauna.

A series of studies have been conducted by the premier institutions, including Wildlife Institute of India, State Forest Research Institute, Zoological Survey of India, Botanical Survey of India and various Universities. These reports were assessed and reviewed from time to time. Impacts have been identified and mitigation measures suggested. Surveys of flora and fauna conducted in the submergence areas have revealed that there was no endemic endangered species of plant / animal in the submergence zone of the SSP and therefore, there was no possibility of loss of any gene pool.

In Maharashtra and Gujarat the forest getting submerged formed only a small part of the large contiguous tracts of forests, migratory corridors during progressive filling of the reservoir were not considered desirable. A map showing the Sardar Sarovar environment its submergence and impact areas is placed at **Annex – XXXV – (6) at Page-105.**

Carrying capacity of the impact areas in Gujarat, Maharashtra and Madhya Pradesh have been studied and ameliorative measures are being undertaken in the areas neighbouring submergence under the schemes of CAT. While 6,476 ha. of the forest land (in Gujarat 4,376 ha, in Maharashtra 2,300 ha, in Madhya Pradesh 1,900 ha) is to be submerged at an EL of 100m. entire works of the plantation have been completed.

Project Authorities in Madhya Pradesh. have also prepared plans for felling the forests in a manner to avoid trapping of the wild animals, besides schemes for social forestry plantations.

In view of the above the steps taken by the project authorities for completion of the survey of flora & fauna, studies on carrying capacity of the adjoining ecosystem & drawing up of the plans for rehabilitation of the wildlife during & after progressive filling, upto & beyond RL 100m and execution of felling in the proposed area of impoundment

The status of works in each state is given below

Gujarat

Details of wildlife habitat in the region have also been studied. The submergence area is scarce in wildlife resources. On the left bank of the SSP in Gujarat, one sanctuary, formerly known as Sloth Bear Sanctuary, has been enlarged four times of its original size of 157 sq.kms. to the present size of 607 sq.kms. This sanctuary is now known as Shoolpaneshwar Sanctuary and the area of this sanctuary has been extended up to shore line of the reservoir. Detailed studies and plans have been prepared for its development. The information on development works carried out in Shoolpaneshwar sanctuary was annexed at Annex.5 of the Minutes of the 34th meeting. During the last meeting of Flora and Fauna, GOG agreed to prepare a tabular statement to show clearly the actions proposed or taken by the State Govt. vis-a-vis the recommendations of the studygroup. This may please be presented for a review by the Sub-group.

According to the information available entire reservoir bowl in Gujarat was cleared of vegetation growth and even the coppice growth was removed upto 4 m below the FRL,

Maharashtra

Details of wildlife habitat in the region have also been studied. The submergence area is scarce in wildlife resources. Regarding preparation of the Action Plan based on the recommendations of the study group of Pune University, GOM was to prepare a plan covering Flora, Fauna and Carrying Capacity aspects. In the last meeting of Flora and Fauna, it was contemplated that creation of Wildlife Sanctuary may not be possible in Maharashtra and the State Forest Department has undertaken social forestry component in the areas on a larger scale. GOM was requested to expedite its response regarding actions by the State Govts. on the recommendations of the study in a tabular form. This may please be presented.

During the 34th meeting, GOM informed that out of 6,488 ha. of the forest land getting submerged and area of 748 ha. was clear felled. Further progress in this regard, may please be presented.

Madhya Pradesh

Details of wildlife habitat in the region have also been studied. The submergence area is scarce in wildlife resources. Based on the recommendations of the Study Group & State Forest Research Institute (SFRI), Jabalpur. Action Plan was submitted by the NVDA to NCA and MOEF. This plan comprised of five Chapters namely - (i) Introduction, (ii) Catchment Development, (iii) Wild Life Management, (iv) Social Forestry, (v) Implementation Schedule and Financial Outlay. According to this plan, Catchment Area Treatment works are already in progress and no works are proposed for Wild Life Sanctuary Development. For the third major component under the head Social Forestry, 185 villages falling under the impact zone are proposed to be taken up under the Social Forestry Plantations at an estimated cost of Rs.5,87,78,200/-. The Funds are proposed to be allotted to the Forest Department as per the annual demand received in the NVDA. The works shall be executed by the Forest Department subject to the availability of areas in the field. Summary of the cost estimates received from the NVDA under the Social Forestry component are enclosed at **Annex- XXXV - (7) at Page – 106-115.**

Status of felling in the submergence area may please be presented

IV. Archaeological and Anthropological Survey

The Sardar Sarovar Project had necessitated a fresh look at the archaeological and cultural heritage available in the Namada valley. The Government of India recognises the value of such cultural sites and has enacted a series of laws to maintain and protect them from decay, misuse or development activities. Sites are classified into three categories as follows:

- Type 1: Monuments of national importance which are protected by central government;
- Type 2: Monuments of religious or cultural importance which are protected by the State Governments;
- Type 3: Monuments which are neither centrally or State-protected but which are considered to be an Important part of cultural heritage.

In the case of SSP, where some sites may be submerged, the NWDT award stipulated that, the entire cost of relocation and protection should be chargeable to GOG. Relocation work is to be supervised by the Department of Archaeology under the provisions of the 1958 Act.

The three State governments carried out a complete survey of cultural and religious sites within the submergence zone under the direction of the project proponents. The principal aim of these studies was to list all archaeological sites, identify and name any sites under state-protection and further identify sites of religious or cultural significance which, although not protected under national law, are of sufficient value to merit relocation. The monuments identified for re-location / protection are shown on a GIS generated MAP at **Annex – XXXV – (8) at Page- 116..**

Gujarat

There is no State / Central protected monuments. However, there are two monuments for which GOG prepared plans for relocations. Out of these two monuments works on Shoolpaneshwar were completed earlier and it was reported during the last meeting that 87% of the works on relocations on Hampheshwar Temple whose plinth level is at 105m., 87% of the works were completed.

Further progress may please be reported to the Sub-group.

Madhya Pradesh

The State Department of Archaeology & Museum have revised their earlier Action Plan during January, 1999. This Action Plan referred to as Action Plan of 1997. Details of the plan are at page 59 of the status report annexed with the agenda. An updated progress may please be presented by NVDA.

Maharashtra

There is no identified monument of significance in Maharashtra

V. Seismicity and Rim Stability of Reservoir

Studies have been carried out by the Geological Survey of India, CWPRS, University of Roorkee and World Bank consultants and the recommendations for

modifications of the dam designs have been implemented which includes :

- adoption of horizontal design coefficient of 0.125 g,
- installation of stress monitors in the main body of the dam and
- increase of the depth of the foundation to 18 m below the riverbed.
- Rim stability studies have also been completed and
- well equipped 9 monitoring stations along the periphery of the reservoir have been established.

A map showing the locations of the Seismic Monitoring Stations is placed at **Annex – XXXV – (9) at Page-117**. All works in this regard have been completed.

Govt. of Gujarat

The GOG has identified 9 locations for the installation of Seismic Monitoring Stations, 4 each on either side and one at the downstream of the Sardar Sarovar reservoir, out of a total 9 Stations, 3 are in Madhya Pradesh, 1 in Maharashtra and 5 are in Gujarat. Construction and instrument installation works is completed at all the 9 Seismic Monitoring Stations.

Regarding analysis of data collected by these observatories and its application, it was suggested that SSNNL or NVDA may get in touch with Earthquake Research Institute, Roorkee or Indian Meteorological Department or GSI for analysis of the data.

Further progress may please be reported.

VI. Health Aspects

*Separate
organisation*
Health provisions in India are defined by the National Policy on Health, which entitles access to health facilities for all Indians and National Disease Survey Programmes such as the National Anti Malaria Programme of the Malaria Research Centre, Disease Surveillance Programmes of The National Institute of the Communicable Disease. Besides, line departments of the State Govts are equipped with the expertise in the control of diseases throughout the country. However, the project authorities were expected to prepare plans on public health aspects.

Studies on the disease profile in the SSP region and past experience with major water resources projects suggested that health Action Plans for the project should focus on the following:

- Provision of health care for displaced people and immigrant workers;
- Control of malaria and potential breeding sites for malarial vectors;
- Monitoring for the incidence of other water-related and waterborne diseases with a view of preventing their establishment.

In pursuance of the above project authorities have carried out detailed studies through premier institutions of like NICD, ICMR, MRC, reputed medical colleges including T. N. Medical College, Mumbai, Gandhi Medical College, Bhopal and line health departments of the State and Central Govt. besides experts from outside for assessing the impacts and suggesting the mitigation measures. These studies are reviewed and assessed from time to time. Last review of the reports/ action plan was held on 28.8.1999. Minutes of the review meeting were annexed with the agenda of the 34th meeting of the Env. Sub Group.

To take account of the expanding knowledge base, as a part of the dynamic and an ongoing process, based on the recommendations of the experts, the Action Plans drawn up by the project authorities were modified and updated from time to time. The updated plans are under implementation. State-wise position is presented at pages 53 of the status report annexed here with. A diagrammatic view of the Proposed and existing health facilities for the proposed progressive filling at RL 100 m and RL 110 m is placed at **Annex – XXXV – (10) at page – 118.**

Gujarat

It is clear from the 1986 GOG work plan for public health that a great deal of attention has been paid to the issue of malaria control. By the end of year 2000, the intensified malaria control programme was underway in several villages impacted by the project in Gujarat and the construction of a 25-bed hospital at Kevadia was complete.

However, based on the recommendation of the experts Govt of Gujarat have updated its plan. This plan would be reviewed in the meeting of the experts to be convened shortly.

Maharashtra

In accordance with the revised action plan and state provision for health care facilities, two cottage hospitals, eight primary health centres and 55 primary health unit's have already been established in Dhule District. Taking Into account the inaccessibility of some of the villages, provisions were made for eight additional public health unit's, 10 mobile unit's and a floating dispensary for villages within 10 km of the submergence zone. One hospital at Somawal resettlement village, is already functional.

Madhya Pradesh

Since 1992, Gandhi Medical College continued surveillance studies of the impact area of Madhya Pradesh and work commenced on additional facilities for the Nisarpur village hospital, Dhar District. Extension of the Nisarpur hospital is due for completion by the time, submergence of areas in Madhya Pradesh commences.

VII. Fisheries Conservation and Development

Following SSP dam attaining a height of 90m, the process of initial submergence has been triggered. With accomplishment of 100m height of the SSP dam, the major consequences of the impoundment shall manifest as follows: The impoundment of the Narmada by the SSP will convert a stretch of river between the dam site and the upper limit's of the reservoir at 105 Kms from a comparatively shallow, free-flowing river into a narrow lake with depth of about 80 meters at the dam site. A number of studies have been carried out to establish a baseline and help to predict future conditions for aquatic life behind the Sardar Sarovar dam .

None of the aquatic fauna of the Narmada is listed as rare or threatened in the "Red Data List" of the International Union for the Conservation of Nature and Natural Resources (IUCN). Nonetheless, CICFRI compiled a list of eight species, which is suggested, could be considered 'vulnerable' in the Narmada Basin though they are present elsewhere in India in abundance. These comprise three species of Mahaseer (*Tor tor*, *Tor putitora*, and *T.khudree*), important food and game fish upstream of the dam site, and one species each of *Rita rita*, *Rita pavementata* *Labeo fimbriatus* and *Notopterus chitala*. Experience of Indian impoundments has shown that all these species can adapt to the conditions in reservoirs and will thrive there. The CICFRI review also presented findings on the artificial hatching and rearing of key fish species. The report concluded that, if appropriate management practices are adopted, there would be no threat to important fauna.

Key measures to manage effects of the SSP on the upstream aquatic environment focus on the preservation of valuable fish species and proper management of fisheries in the reservoir. Protection of valuable fish fauna will, to some extent, be dependent on maintaining acceptable water quality upstream of the dam. In order to monitor water quality, the NVDA, CWC, CPCB and CICFRI have already commissioned a series of water quality monitoring stations along the Narmada River. Data is available.

Gujarat

The total amount for the rearing ponds is at present Rs. 64.36 lakh. The site selected is located in the village of Timbi (Nanded Taluk) of Bharuch district, in the Survey No. 303. In order to avoid any possibility of the formation of hydro-sulphuric sludge after the inundation of forests, all three state governments have prepared work plans for the clear-felling of the forest areas due to be submerged. In Gujarat, reservoir bowl is already cleared of all vegetative growth. Till the March, 2000 State Fisheries Department and other Fisheries Development Agencies have stocked 382.35 lacs fingerlings / yearlings in the main reservoir as well as dykes of the Sardar Sarovar.

Maharashtra

Following the desk review studies on conservation of fish fauna in SSP carried out by the Central Inland Capture Fisheries Research Institute (CICFRI), GOM assigned a short term study to the Vadodara Centre of CICFRI.

- Report of the study is yet awaited.
- The GOM may present the progress on status of felling for a review by the Sub-group.

Madhya Pradesh

Execution of felling in Madhya Pradesh will be carried-out *pari-passu* with the impoundment. Current status of Felling may lease be reported for a review of the Sub-Group

VIII. Command Area Development

The SSP will provide irrigation water for a cultivable command area of 1.9 million hectares in Gujarat and 75,000 hectares in Rajasthan. The introduction of fresh water to the drought-prone areas of Gujarat will create obvious benefits for the farming communities. In order to safeguard these benefits, control and monitoring was suggested by the Secretary, Ministry of Environment & Forests and Chairman of the Environment Sub-group in the following areas from time to time :

- drainage, water logging and soil salinity
- water quality
- forest loss
- potential impact on flora and fauna
- effects on public health
- socio-economic impacts.

Several studies have been conducted by expert institutions on various aspects of the command area development like conjunctive use of groundwater, drainage, off farm development, on farm development, farmers training, development of infrastructure, roads, seed storage, drainage aspects, cropping pattern, soil conditions, socio-economic, fisheries, flora, fauna etc. Action Plans have been drawn up and a Master Plan for integrated development of the command area is under formulation. Measures have been planned to mitigate possibility of alkalinity and salinity.

Govt. of Gujarat –

The Sardar Sarovar Project service area has been classified into 13 agro climatic regions based on broad topographical, hydro meteorological and soil surveys. The

drainage density is good in most of the regions except in regions 4, 7, and 11. Outfall conditions are sluggish in regions 4 and 7, parts of which are also affected by salinity. Sub areas or pockets likely to get waterlogged or saline due to irrigation in future have been identified for planning special measures to prevent development of such a situation. Key measures are summarised below:

- Mechanised, well controlled canal lining which would reduce seepage loss to only about 10% of that in unlined canals.
- Limited water delta.
- Command area development
- Conjunctive utilisation of surface and groundwater.
- Automated canal regulation.
- Rotational water supply on volumetric basis.
- Simultaneous provision of surface drains.
- Water application allowance based on agro-climatic zoning.
- Better water management and active participation of farmers.
- Encouragement to drip, sprinkler and other water application methods involving water savings.
- Carrying out water balance and salt balance studies and the necessary monitoring.

Rajasthan

In the absence of the representative of Govt. of Rajasthan during the last meeting, progress could not be reviewed.

- The latest position may please be presented by the Govt. of Rajasthan for a review by the Members.

IX. Down stream environment

the construction of dam would result into more regulated and perennial flow into the river with an overall beneficial impact. It is unlikely that any significant negative environmental impacts will occur over the next 30 years as a result of the project. Some possible adverse effects have been identified the main one being the effect of flood attenuation on Hilsa migration. These are being monitored.

CICFRI have also commissioned studies to monitor the whole of the estuary and their study has been extended to examine pollution and to undertake Modeling studies in the downstream environment.

Item No. XXXV - 3 (163) : REVIEW OF THE STATUS OF INDIRA SAGAR PROJECT MADHYA PRADESH

I. Catchment Area Treatment

By the end of July, 2000, against a target of 73,456 ha. an area of 46,380 ha. has been treated-up. The progress is stated to be about 63.14% of the final targets. Further progress, if any may please be presented.

II. Compensatory Plantations

By the end of July, 2000, Govt. of Madhya Pradesh have completed plantation works over an area of 70,031 ha. against a target of 80,945 ha., work thereby completing 86.5% of stipulated target. Further progress, if any may please be presented.

III. Survey of Flora Fauna & Carrying Capacity studies

In accordance with the recommendations of the study conducted by the Wildlife Institute of India, it was informed by the GOMP during the 33rd meeting of ESG that the issue regarding declaration of National Parks / Sanctuary was being examined by the Finance Department for further submission to Cabinet of GOMP. Further progress may please be presented for a review by the Sub-group.

IV. Archaeological & Anthropological Survey

Regarding needed protection measures for the Joga Fort, ASI, Nagpur, Branch prepared an estimate of Rs.1.50 crores. As per the information submitted during the 34th meeting, NVDA had requested ASI to take up the work

ASI is requested to suggest further course of action.

V. Seismicity and Rim Stability of Reservoir

During the last meeting, NVDA informed that regarding analysis and co-relation of data being collected / proposed to be collected by various Agencies in the Region of Narmada Sagar Project, the issue was under negotiation with ASI Nagpur. GOMP informed that for seismic monitoring, 10 sites were identified. An updated progress on each and every monitoring Stations may please be presented.

VI. Health Aspects

Regarding National Diseases Surveillance (NDS) Programme, it was informed during the last meeting that Gandhi Medical College, Bhopal, have suggested inclusion of two villages of the impact zone of the Indira Sagar Project, in the NDS programme of the National Institute of Communicable Diseases (NICD) in Madhya Pradesh. Further progress may please be intimated for review by the Sub-group. VIth six monthly report on Health Aspect (Epidemiological Surveillance) was submitted by the NVDA to MOEF and NCA vide letter dated 10.11.2000. . A copy of the Summary of the report is enclosed at **Annex – XXXV – (11) at Page – 119-121.**

This report has been forwarded to the Director General, Indian Council of Medical Research (ICMR) for their observations. The observations of the ICMR, if any, would be presented during the meeting for a review by the Sub-group

VII. Command area Development.

Environment Sub-group suggested revision of the Terms of Reference (TOR) for preparation of the command area development plan of the Indira Sagar Project. On the lines, the plan was under formulation for the areas in Gujarat for SSP. TOR of the various studies for the areas in Gujarat and Rajasthan were made available to the NVDA for the purpose. NVDA was requested to draft the TOR for which it was reported earlier that NVDA have short listed the Consultants. During the last meeting, NVDA informed that they are in touch with the Water Resources Department of Madhya Pradesh for drawing up of the TOR. Further progress may please be reported.

A note on the studies under progress on effect of agriculture run off from the fields on surface and ground water was requested from the NVDA during the last meeting. This is yet awaited.

Item No. XXXV-4(164) REVIEW OF ACTION TAKEN ON THE DECISION OF THE PREVIOUS MEETINGS

Status report for the period ending September, 2000 is at **Annex-XXXV-(3) page - 4-101.**

I. Environmental Management of SSP and ISP

Comprehensive documents of Environmental Management of Sardar Sarovar and Indira Sagar Projects were circulated to the Members vide NCA Office letter Nos. Env-4(8)/2000/4561-66 and Env-3(34)/2000/4567-85 dated 9.11.2000 for views of the Members. During the discussions on these issues, Members desired more time to study the twin documents for sending their view points.

No observations have been received so far. It is proposed to get the document on SSP published by a reputed publishing house for wider dissemination of the information on SSP.

II. Submission of Catchment Area Treatment Plans for freely draining critically degraded sub-watersheds (Item No.XXII-2(1122))

It was observed during the 34th meeting to include Joint Secretary / Commissioner of the Ministry of Agriculture as regular Invitees to the Sub-group. Accordingly, an invitation has been extended to **Dr. Rita Sharma, Jt. Comm, Ministry of Agriculture**, for participation during the 35th meeting of the Environment Sub-group.

As per the decision of GOI of June, 1992, the Project Authorities were required to submit the Action Plan for treatment of balance of the critically degraded sub-watersheds and the current status is summarised in the Status Report annexed and is placed at Annex.9. Further progress, if any may please be presented.

The State Govts. of Maharashtra and Madhya Pradesh may like to present the current studies of the works on (i) Implementation of the Phase-II plan and (ii) Establishment of Silt Monitoring Stations and presentation of the results thereof.

III. Cost Estimates for preparation of Action Plans and implementation of Environmental Safeguard Measures

In order to frame yard sticks on the cost estimates of the water resources Projects, the Chairman of the Sub-group during earlier meeting __ desired compilation of the estimates and expenditure incurred on survey, studies and implementation of the suggested safeguard measures for the SSP. Accordingly, the information compiled is being presented for information to the Sub-group at **Annex-XXXV-(12) at**

page No. 122. The latest updates on these issues based on the information received from the State Govts. is presented below for information of the Members.

Govts. of Gujarat, Madhya Pradesh and Maharashtra have requested to provide further updations, if any.

IV. Monitoring works in Maharashtra

Govt. of Maharashtra representative have expressed difficulties in receiving funds from the Project Authorities for implementation of the environment safeguard like Health, Fisheries, Flora, Fauna, etc. This issue was discussed and it was informed that a policy decision is to be taken by the appropriate authorities of the SSNNL after studying availability of the funds and financial consequences thereof. Further information is awaited from the Govts. of Maharashtra and Gujarat.

Regarding inter departmental coordination for the SSP related works in Maharashtra, Govt. of Maharashtra had suggested that the Officers nominated by the Govt. of Maharashtra on to the Field Visit Committee might suffice. However, no officers from Maharashtra has participated during the second field visit undertaken during July, 2000 and therefore, progress in Maharashtra could not be reviewed by the Committee for the areas in Maharashtra.

V. Publication of Environment

During its earlier meetings it was desired that good works being done by the Project Authorities are to be published. Progress on these aspects may please be presented by the State Govts.

During the 33rd meeting, the Sub-group desired that NCA should organise Seminar / Workshops on the Thrust Areas of the Environmental Ameliorative Measures. Steps have been taken to organise the Seminar during April / May, 2000, details are under formulation. This is for the information of the Members.

Item No. XXXV-5(165) : Any other item

Date and venue of the next meeting

ANNEXURES

Annex- XXXV – (1)**PARI PASSU : REGULATORY REGIME**

Central Govt. in June 1987, modified the powers, functions and duties of the Authority as under.

1. The role of the Authority will mainly comprise of overall coordination and direction of the implementation of all the projects, including the engineering works, the environmental protection measures and the rehabilitation programme and to ensure the faithful compliance of the terms and conditions stipulated by the Central Government at the time of clearance of the aforesaid projects.
- 2(a) The Authority may constitute one or more sub-committees and assign to them such of it's function and delegate such of its powers as it thinks fit".

CONDITIONS OF ENVIRONMENT CLEARANCE

While clearing the SSP and NSP from the environmental angle on 24.6.87, MOEF considered environmental safeguard parameters including R&R, catchment treatment, flora fauna, carrying capacity, etc. and noted that (i) Field surveys are yet to be completed. The first set of information has been made available and complete details have been assured to be furnished by 1989. (ii) The NCA has been expanded and its terms of reference have been amplified to ensure that environmental safeguard measures are planned and implemented in-depth and it's pace of implementation pari-passu with the progress of work on the project". MOEF granted clearance subject to the condition among others that:

- (i) The NCA will ensure that environmental safeguard measures are planned and implemented pari-passu with progress of works on projects.
- (ii) The catchment area treatment plan and the rehabilitation plan be so drawn as to be completed ahead of reservoir filling.

ENVIRONMENT SUB-GROUP

In the 26th meeting of the NCA held on 29.9.87, it was decided to set up a group of nodal officers of participating states for deciding the terms of reference and composition of the Environment Sub-group of the NCA. The group met on 30.10.87 and finalised the composition and terms of reference. It was decided that the sub-group would be headed by Secretary, MOEF and have as members one representative each from the four participating states, representative of ICAR, MOWR, Technical Experts in the field of forestry, wild-life, hydrology, flora, health, archaeology, anthropology, agriculture, and environment. The terms of reference to the sub-group were also finalised as under:

- i. to work out the environmental safeguard measures to be planned and implemented for the entire Narmada basin so that the environmental safeguard

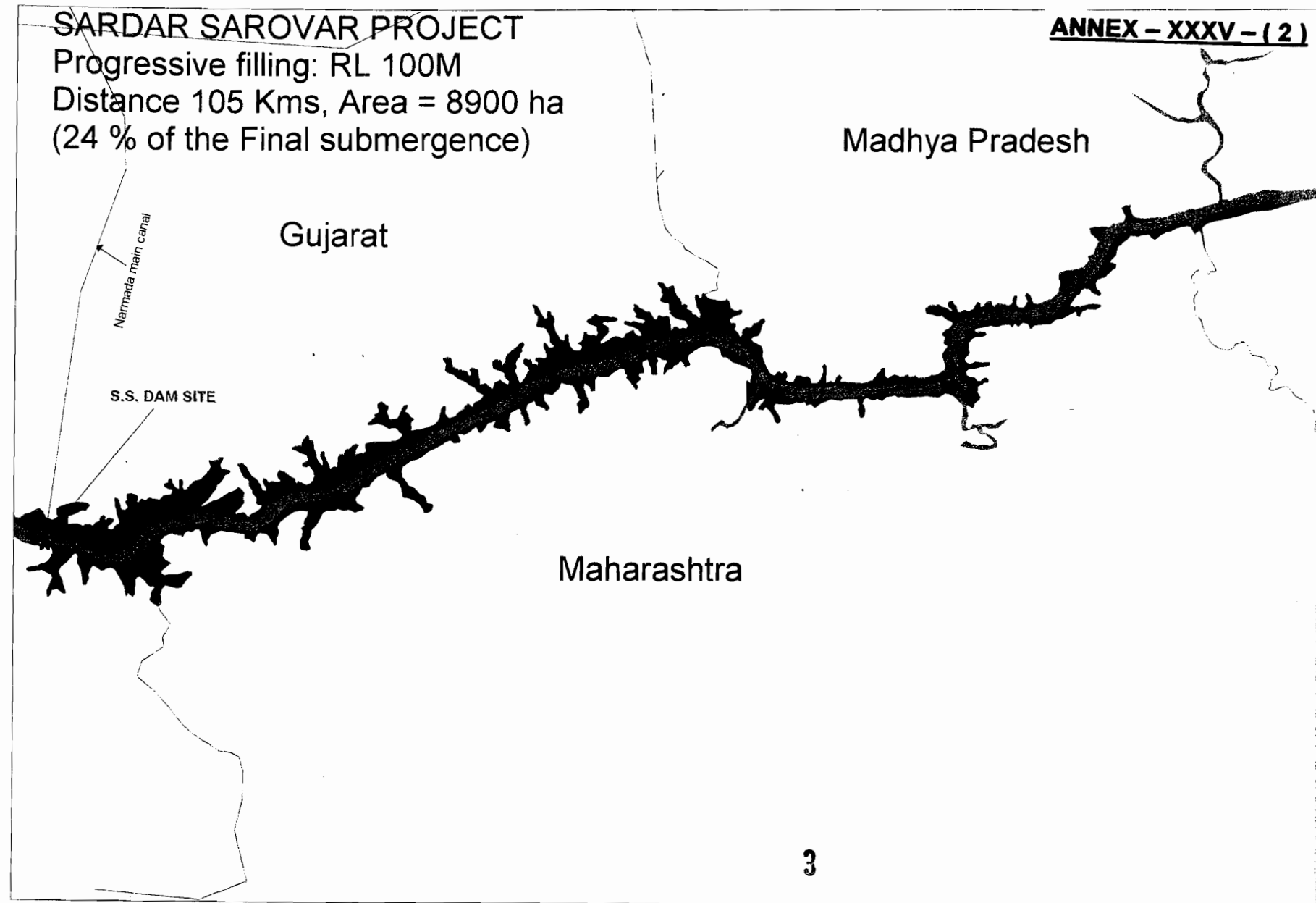
measures are executed and remain fully in consonance with the clearance accorded to the Narmada Sagar and Sardar Sarovar Projects.

- ii. to determine the terms of reference of required surveys necessary for the implementation of environmental safeguard measures inclusive of data-base required, the methods by which the data-base is to be prepared and also to identify the institutions/individuals to undertake the preparation of such documents.
- iii. to get prepared for clearance by Ministries and NCA the action plans with regard to all environmental safeguard measures and the assessment criteria thereof.
- iv. to devise a suitable monitoring and evaluation mechanism so that the action plans are effectively implemented in consonance with stipulations at the time of clearance of the projects.
- v. to assess the necessary organisation with management capability being set up for adequate implementation of environmental safeguard measures.
- vi. to undertake all measures necessary to assist the Narmada Control Authority in the planning and implementation of environmental safeguard measures.

CRITERION FOR REVIEWING PARI-PASSU COMPLIANCE OF ESM: DECISION OF THE ENVIRONMENT SUBGROUP

This issue was discussed in the 18th meeting of the Environment Sub-group held on 28.5.93, Chairman, while reviewing the preparedness of the environmental studies in relation to the construction works on project, reiterated that the pari-passu clause is to be so operated as to complete all the works on the areas commensurate with submergence which is an indicator of the progress of construction works. In order to get a clear view, Chairman desired that the progress of works on each component should be synchronised with submergence and shown in the form of a chart accompanied by an explanatory statement.

During the 22nd meeting, Chairman stated that all the works which adversely affect the environment steps for their mitigation have to proceed on pari-passu basis whereas certain other works can be done on a different scheduling for which a view has to be taken by the MOEF



ANNEX – XXXV – (3)

स्थिति विवरण
Status Report

केवल सरकारी प्रयोग के लिए
For Official Use Only



पर्यावरण प्रबन्धन
सरदार सरोवर एवं इंदिरा सागर परियोजनाएँ

**Environment Management
Sardar Sarovar & Indira Sagar Projects**

सितम्बर, 2000
September, 2000

**नर्मदा नियंत्रण प्राधिकरण
NARMADA CONTROL AUTHORITY**

इन्दौर
दिसम्बर, 2000

**Indore
December, 2000**

**Environment Management
Sardar Sarovar and Indira Sagar Project
September - 2000**

I N D E X

Page No.

Chapter 1

INTRODUCTION

• Master Plan For The Development Of Narmada River Basin: NWDTA	1
• Principal Levels and apportioning of the irrigation and power benefits by the NWDTA	2
• Key Directives By The NWDT On Environment & Rehabilitation	3
• Environmental Clearance by Govt. of India	3
• Forest Clearance	5
• Investment Clearance	5
• Monitoring by the NCA.	5
• Environment and Rehabilitation Wing Of The NCA	6
• Environment Sub-Groups Of NCA	6
• Functions Of The Environment Sub-Group.	6
• Important Sub-Groups and Sub-Committees On Environment	7
SARDAR SAROVAR PROJECT	
• Salient Features of the Project	8
• Key benefits from the proposed project	8
• Additional benefits	9
• The submergence	9
DEVELOPMENT AND CURRENT STATUS OF THE MANAGEMENT OF SSP ENVIRONMENT	10

Chapter 2

CATCHMENT AREA TREATMENT

• Studies	11
• Planning	12
• Phase-I: directly draining sub-watersheds	12
• Action plans	12
• Implementation	13
• Phase-II: indirectly draining sub-watersheds	17

Chapter 3

COMPENSATORY AFFORESTATION

• Studies	21
• Action plans	22
• Implementation	22
• Additional plantation activities	
• (a) Plantation along canal banks	25
• (b) Dam vicinity plantation	25
• (c) Ravine land afforestation	25

Chapter 4

COMMAND AREA DEVELOPMENT

• (A) Current scenario : Government of Gujarat	27
• Agriculture Practices and Socio Economic	27
• Drainage, Waterlogging and Salinity	28
• Ground Water Studies	28
• Drainage and studies	29
• Floral and Faunal Studies	29

• Fisheries	31
• Health	31
• Water Quality	31
• Flora and Fauna	33
• Sanctuaries	34
• Public Health	35
• Proposed Management Measures	37
• Waterlogging and Salinity	38
• Action Plan	40
• Implementation	41
• B) Current Scenario : Government of Rajasthan	41
➤ Narmada Main Canal	42
➤ Water Delivery Network	42
➤ The Distribution System of VSAs	43
➤ Drainage System	43
Chapter 5	
FLORA, FAUNA, WILDLIFE AND CARRYING CAPACITY	
• Studies / surveys	46
• Action plans	47
• Wildlife (Terrestrial)	47
• B) Fisheries (Aquatic):	48
• Summary of Status of Environmental Planning: Fisheries	
• Enhance Nature Conservation Outside the Immediate Catchment Area of the Narmada	49
• Implementation	50
• Ongoing Fisheries Activities in the Sardar Sarovar	50
Chapter 6	
SEISMICITY	
• Studies	51
• Implementation	51
• Status of implementation of Seismicity aspects	52
Chapter 7	
HEALTH ASPECTS	
• Studies and Action Plan	53
• Status of Implementation of Actions for Public Health	54
• Implementation	
• A) Govt. of Gujarat:	56
• B) Govt. of Maharashtra	57
• C) Govt. of Madhya Pradesh	57
Chapter 8	
ARCHAEOLOGICAL ANTHROPOLOGICAL	
ARCHAEOLOGICAL SURVEY	
• Studies	59
• Action Plans	61
• Summary of the Proposed Actions	
• Summary of current situation and progress	63
• Implementation	64

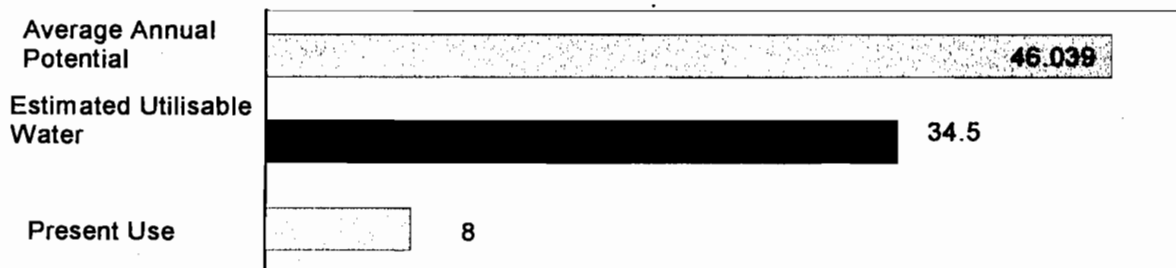
INDIRA SAGAR PROJECT	
Phased catchment area treatment	
• Studies	68
• Phased programme:	69
• Phase-I Programme	69
• Action Plan	70
• Implementation	71
• Freely Draining Area (Excluding Directly Draining Sub-watersheds)	72
• Action plan :	72
• Implementation :	72
• Requirement of Funds	73
Compensatory afforestation:	
• Action plan	75
• Implementation :	77
Command area development	
• Studies and findings	77
• Suggested strategies	79
• Action plan :	80
• Implementation	80
Flora, fauna and carrying capacity	
• Suggested strategies	82
• Action plan and implementation	83
SEISMICITY AND RIM STABILITY	
• Studies	85
• Suggested strategies	85
• Reservoir rim stability	86
Health aspect:	
• Studies and findings :	87
• Suggested strategies :	88
• Action plan :	89
• Implementation :	89
Archaeological & anthropological survey:	
Archaeological aspects	
• Surveys :	90
• Action plan :	90
• State protected monuments :	90
• Centrally protected monuments :	91
• Implementation :	91
• Plan of Archaeological Survey of India	91
Anthropological aspects:	
• Surveys/studies :	93
• Action plan :	93
• Implementation :	94

STATUS REPORT**Chapter 1****September, 2000**

Environment Management

Sardar Sarovar and Indira Sagar Project

Narmada is the fifth largest river of India. It is also the largest west flowing , least polluted river. Its length from Amarkantak to Arabian Sea is - 1312 Km. The mean Annual Rainfall in the basin is 1,180 mm (46.45 inches) and Average Annual Run-Off is 41,000 M.Cu.M (33.21 MAF). Its catchment area is about 98,000 Sq.Km, which is spread to the State of Madhya Pradesh, Maharashtra and Gujarat. The current utilization of the Narmada water is as follows (Units in MAF.):



Master Plan For The Development Of Narmada River Basin: NWDTA

In 1965, India appointed a committee to develop a master plan for the Narmada Basin. The committee's recommendations were not accepted by the riparian states. This impasse led to the constitution of the Narmada Water Disputes Tribunal in 1969 by Government of India under Inter State Water Dispute Act of 1956, for adjudication of water disputes of Narmada among riparian States. Its deliberations continued until 1979. The Tribunal considered the Sardar Sarovar Projects and the Narmada Sagar Projects together using the best hydrological, engineering, and other evidence available and passed the order which was notified in Gazette on December 16th, 1979.

NWDTA

In its 1979 award, the Narmada Water Disputes Tribunal made many of the most fundamental decisions about the Projects. These included the dam location, regulation of flows, reservoir levels etc. There are points in the Tribunal award that bear on the environmental aspects of Sardar Sarovar Project which are summarised below.

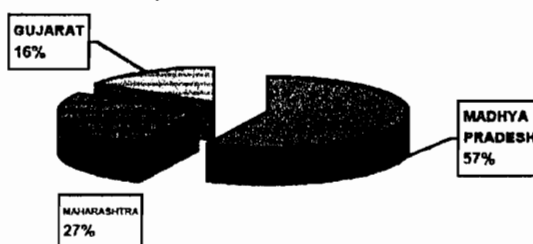
- + the utilizable quantum of Narmada waters at the Sardar Sarovar dam site is specified at 28 million acre feet (MAF) on the basis of 75 per cent dependability.
- + apportionment is to be 18.25 MAF for Madhya Pradesh, Gujarat 9.00 MAF, Rajasthan 0.50 MAF, and Maharashtra 0.25 or in that ratio.
- + the apportionment/sharing of water are subject to review after 45 years.
- + the canal and dam water levels are fixed.
- + the multi-purpose character of the project, including hydroelectric power, is affirmed.
- + Madhya Pradesh is to provide regulated releases of water from the Narmada Sagar Projects to the Sardar Sarovar Projects and.
- + terms of the award are subject to change if there is agreement between all the states concerned.

Principal Levels and apportioning of the irrigation and power benefits by the NWDTA

Sardar Sarovar Dam

Full Reservoir Level
+ 138.68 M [+455']
Maximum Water Level
+ 140.21 M [+460']

SHARE OF POWER BENEFITS



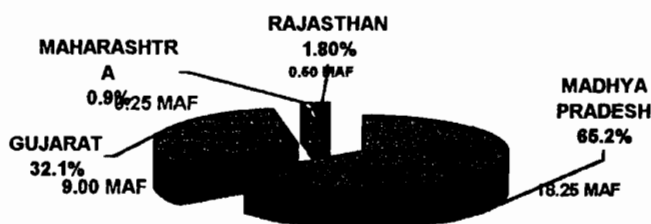
Narmada Main Canal

Full Supply Level
+ 91.44 M [+300']

AVAILABLE WATER 28 MAF (+45.57' AS LEVEL)
AT 75% DEPENDABILITY

Indira Sagar Dam [M.P.]

Full Reservoir Level
+ 262.13 M[860']



Estimates of Govt. of Madhya Pradesh anticipate that over the next half century there will be 29 major, 135 medium, and about 3,000 minor projects in the Narmada River valley. The Sardar Sarovar, one of the first to be built on the main river, is the terminal project on the river system and its benefits and impacts, are linked to developments of Indira Sagar Project upstream.

Key Directives By The NWDT On Environment & Rehabilitation

Fisheries development (NWDTA clause XI, sub-clause V (6) & (7) : The NWDT direction regarding this is in para- 5 & 7 of Sub-clause V of final order and decision of NWDT in Chapter XX of the Report of Volume II. The decision is reproduced below:

- V(6) "Notwithstanding vesting in Gujarat of the lands coming under submergence, Madhya Pradesh and Maharashtra shall continue to enjoy all rights of sovereignty intact over the submerged area in the respective States".
- V(7)"Madhya Pradesh and Maharashtra respectively shall be exclusively entitled to all rights of fishing, boating and water transportation over the part of lake over the submerged land within Madhya Pradesh and Maharashtra respectively provided, however, that such right is not exercised to the prejudice of any utilities of the legitimate performance of their duties by the project personnel".
- Monitoring of the protection shifting/relocation of the monuments of archaeological significance being affected by the submergence of Sardar Sarovar, Narmada Sagar, (NWDT clause XI-sub-clause III (4) & XIV-7,8(3)(iv).
- Studies related to Downstream scenario for estimating impacts of project activities (NWDT clause IX (Vii) related to indenting of water for downstream by Gujarat.
- Clause XI{sub clause I to VI, page 110-115}deals with the provision for rehabilitation of oustees (PAFs) from submergence area of Madhya Pradesh and Maharashtra who are likely to be resettled in Gujarat or in their home states.

Environmental Clearance by Govt. of India

It is recognised that the creation of reservoir will bring in environmental, social and economic impacts and that there will be changes in environmental regime in the upstream, downstream and in the command basically due to submergence and displacement of people and wildlife and irrigation in the command. Such changes are required to be assessed and evaluated for taking decision before proceeding with the project.

Ministry of Water Resources the then Ministry of Irrigation & Power had developed detailed guidelines framed during October, 1980 for project formulations which included a detailed check-list by the Ministry of Environment & Forests, the then department of Environment of the department of Science & Technology of the Govt. of India, for assessment of environmental impact of the projects and planning for Environmental Safeguard Measures.

In accordance with the requirement of the Department of Environment, project authorities submitted the detailed project report (DPR) along with the needed information on environmental issues during February to October, 1980. Environmental

Appraisal Committee of the Ministry of Environment & Forests approved the project in principle during its 12th meeting held in 1983. More information & data on certain parameters of Environmental impact & management were subsequently provided through additional documentations over a period of time in various stages of completeness by three states i.e. Maharashtra, Gujarat and Madhya Pradesh. The information provided was also updated from-time-to-time. The studies action and data were considered at levels and the projects namely Sardar Sarovar in Gujarat and Indira Sagar in Madhya Pradesh were formally cleared from environmental angle on 24th June, 1987 by the Ministry of Environment & Forests, Govt. of India. Permission for diversion of the forestland was also subsequently accorded for both the projects separately by the MOEF during September, 1987 and October, 1987. The Investment Clearance for the Sardar Sarovar and Indira Sagar Project was received from the Planning Commission during October, 1988 and November, 1988 respectively, thus paving the way for implementation of these projects.

Before a formal clearance by the Ministry of Environment & Forests, Narmada Control Authority was expanded and was entrusted with the increased responsibilities in the areas of environment and rehabilitation. The clearances issued subsequent to the expansion of the NCA by the Central Government departments, contained certain conditions to be complied with during the course of project implementation.

The Parameters

- + rehabilitation master plan;
- + phased catchment area treatment scheme;
- + compensatory afforestation plan;
- + command area development,
- + survey of flora and fauna; carrying capacity of surrounding area;
- + seismicity and
- + health aspects.

The Narmada Control Authority was given the responsibilities to ensure that the environmental safeguard measures would be planned and implemented in depth and the pace of its implementation would be pari passu with the progress of the work on the Projects. The four conditions of the clearance were:

- the Narmada Control Authority would ensure that the environmental measures are planned and implemented pari passu with the progress of the work on the project;
- the detailed surveys/studies would be done
- catchment area treatment and rehabilitation programs would be completed ahead of reservoir filling.
- The Department of Environment would be kept informed of progress.

Forest Clearance

In September 1987, under the Forest (Conservation) Act, 1980 the Central government gave approval for the diversion of over 13,386 hectares of forest land for the Sardar Sarovar Projects. This approval was subject to eleven conditions in all three states, of which the following are especially relevant.

- detailed compensatory afforestation plans would be submitted.
- a proposal for non-forest areas for rehabilitation of oustees would be submitted.
- compensatory afforestation would be in double the area of degraded forest lands in addition to the afforestation of equivalent non-forest land, and a scheme for this would be submitted.
- a catchment area treatment plan will be prepared by November 30, 1987, failing which a central government team would be appointed at a cost to the project.

Investment Clearance

The Planning Commission, Govt. of India approved investment for an estimate cost of Rs. 6,406 crores for SSP in Gujarat vide their letter dated 15.10.88. The Planning Commission of the Government of India granted the State of Gujarat approval for the Sardar Sarovar Projects subject to seven conditions that bear on the environment (as well as resettlement and rehabilitation).

- compliance with the 1987 environmental and forestry clearances;
- adequate funding to meet the construction schedule;
- submission of a detailed program for drainage and ground water balance studies beyond the Mahi River;
- adoption of measures to ensure project revenue from water rates to pay for annual operation and maintenance charges;
- setting up an expert group to study siltation in the main canal.
- drawing up a detailed schedule and plans for the micro-level irrigation network system; and an implementation schedule for completion of the canal network so that irrigation benefits do, in fact, start accruing from the financial investment.

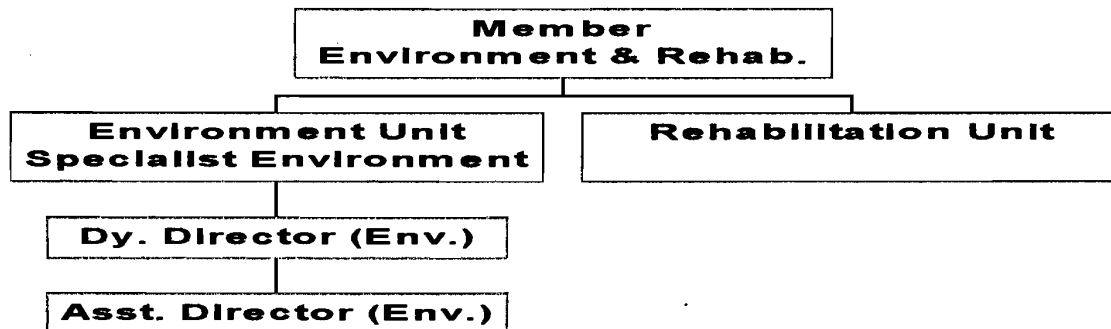
Monitoring by the NCA.

Following the recommendations of the Ministry of Environment & Forest, the scope of the Narmada Control Authority was enlarged on 4th June, 1987 through amendment brought out by MOWR under clause 9(i)4 9(2)a, through gazette notification. The functions of NCA were modified to include major functions of coordination & direction of the implementation of all the projects including the environmental protection measures to ensure the faithful compliance of the conditions attached by GOI while granting clearance to these projects.

Environment and Rehabilitation Wing Of The NCA

The Environment & Rehabilitation (E&R) wing of NCA is headed by Member (E&R), NCA, Indore. Member (E&R), The organizational structures of the Environment unit of the E&R wing is as given below :

Organisation Chart of E&R wing



Environment Sub-Group of NCA

NCA had constituted among others, a sub-group namely Environment sub-group under the Chairmanship of Secretary, Ministry of Env.& Forests, GOI. Member (E&R), NCA is Member Secretary to this sub-group.

Functions Of The Environment Sub-Group.

- i) To work out the environmental safeguard measures to be planned and implemented for the entire Narmada Basin so that environmental safeguard measures are executed and remain fully in consonance with the clearance accorded to the Narmada Sagar and Sardar Sarovar Projects.
- ii) To determine the terms of reference of required surveys and studies necessary for implementation of environmental safeguard measures inclusive of data base required, the methods by which the data base is to be prepared and also to identify the institutions/individuals to undertake the preparation of such documents.
- iii) To get prepared for clearance by the Ministries and NCA the action plans with regard to all environmental safeguard measures and the assessment criteria thereof.

- iv) To devise a suitable monitoring and evaluation mechanism so that the action plans are effectively implemented in consonance with stipulations at the time of clearance of the projects.
- v) To assess the necessary organisation with management capability being set up for adequate implementation of environmental safeguard measures.
- vi) To undertake all measures necessary to assist Narmada Control Authority in the planning and implementation of environmental safeguard measures.

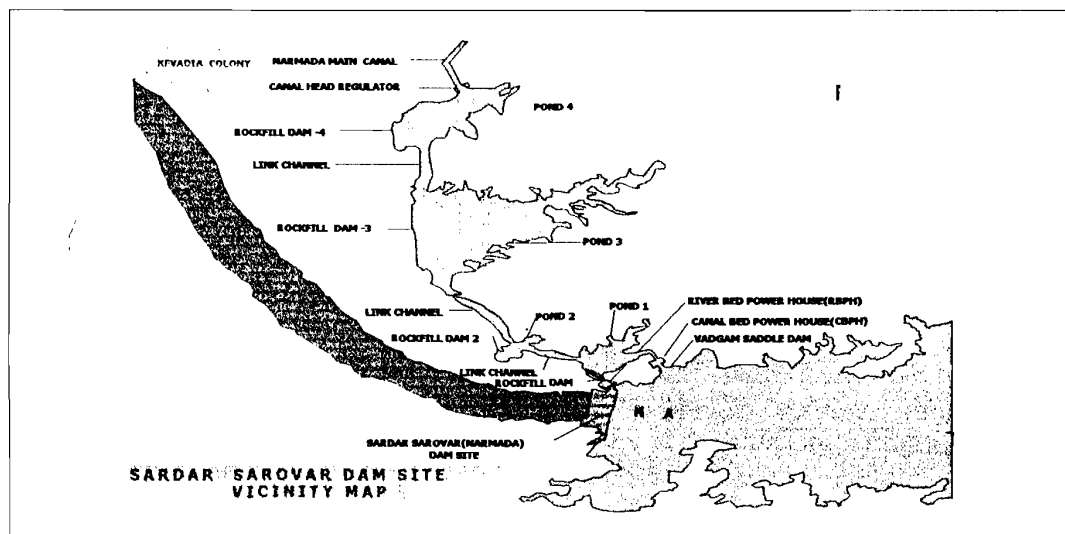
Important Sub-Groups and Sub-Committees On Environment

1. There is a Environment Committee headed by the Member (E&R), NCA. The Committee visits the impacted areas in all the three states by rotation for assessing compliance and submits its reports to the sub-group and necessary recommendations are forwarded to concerned State Governments for compliance.
2. High level expert group on fisheries development and conservation in Sardar Sarovar reservoir. This is chaired by the Joint Secretary, MOE&F. Member (E&R), NCA is the Member Secretary for this committee.
3. Committee on flora and fauna aspect of Sardar Sarovar and Narmada Sagar Project. This committee is chaired by Member (E&R), NCA.
4. Committee on archaeological and anthropological aspects. This committee is chaired by Member (E&R), NCA.
5. Committee on Health aspects. This committee is chaired by Member (E&R), NCA.
6. There are four high level expert multi disciplinary groups directing, coordinating and monitoring various studies commissioned by Govt. of Gujarat for the vast command area of SSP formed in pursuance of the directives of the Environment Sub-group for initiating such studies. Member (E&R) is included as regular member. Meeting of the expert group are convened by NPG from time to time to discuss the progress/interim reports of the studies commissioned by the Govt. of Gujarat.
7. Govt. of Maharashtra had formed Focus Group consisting of Secretaries of the various departments of the Govt. of Maharashtra to review issues related to SSP.
8. The Govt. of M.P. had constituted Wild Life Committee to review the environmental issues related with the SSP and ISP including studies, action plans and implementations.

SARDAR SAROVAR PROJECT

Salient Features of the Project

Locations	Near village Navagam, distt. Narmada
Height	163.00 m
Length	1,210.00 m
Gross storage	9.5 (7.70) b cum (MAF)
Live storage	5.8 (4.73) b cum (MAF)
Annual irrigation	18.65 lakh ha.
Installed capacity	1,450 mw (1200 mw + 250 mw)
Cost of Project Rs.6,406.00 crore (at 1986-87 price level)	Rs.13,180.62 crore (at 1991-92 price level)
Annual irrigation Per ha submergence of cultivable land	of About 165 ha



Key benefits from the proposed project.

Irrigation	Hydropower	Flood control
Gujarat 18.65 lakh ha Rajasthan 17.92 lakh ha Maharashtra 0.73 lakh ha	1450 MW	210 villages and Bharuch city 750,000 population

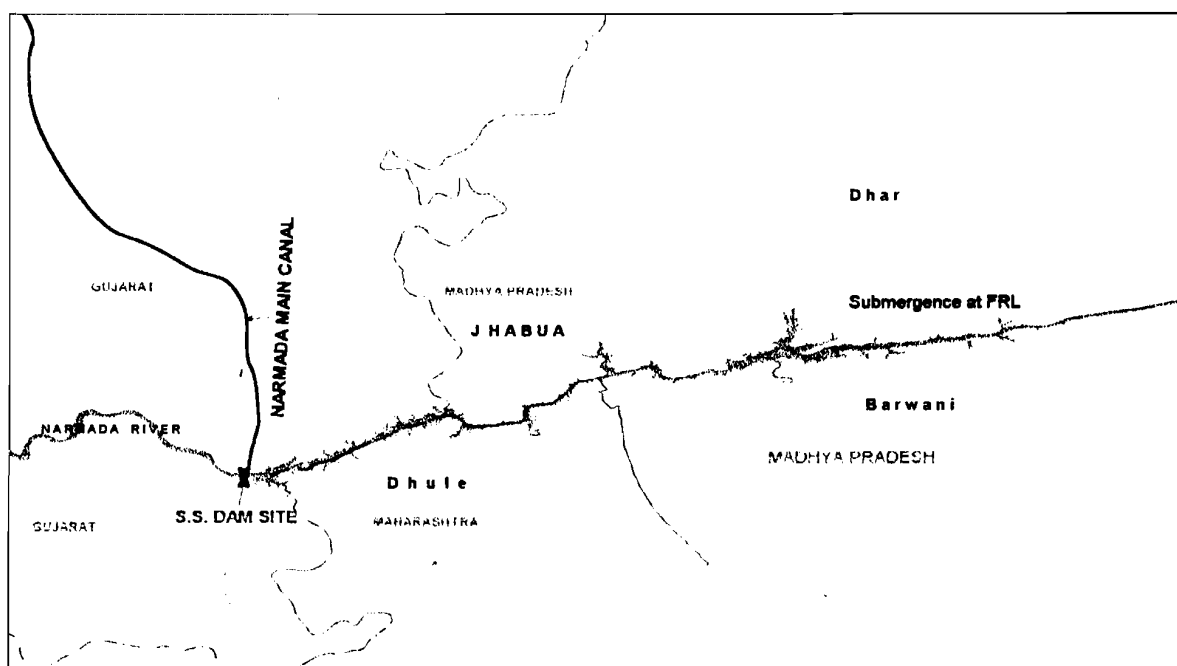
Additional benefits

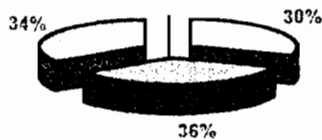
- + Drinking water supply to 135 urban centres and 8215 villages
- + Water supply for industries
- + Fisheries development
- + Wild life sanctuaries development

The submergence

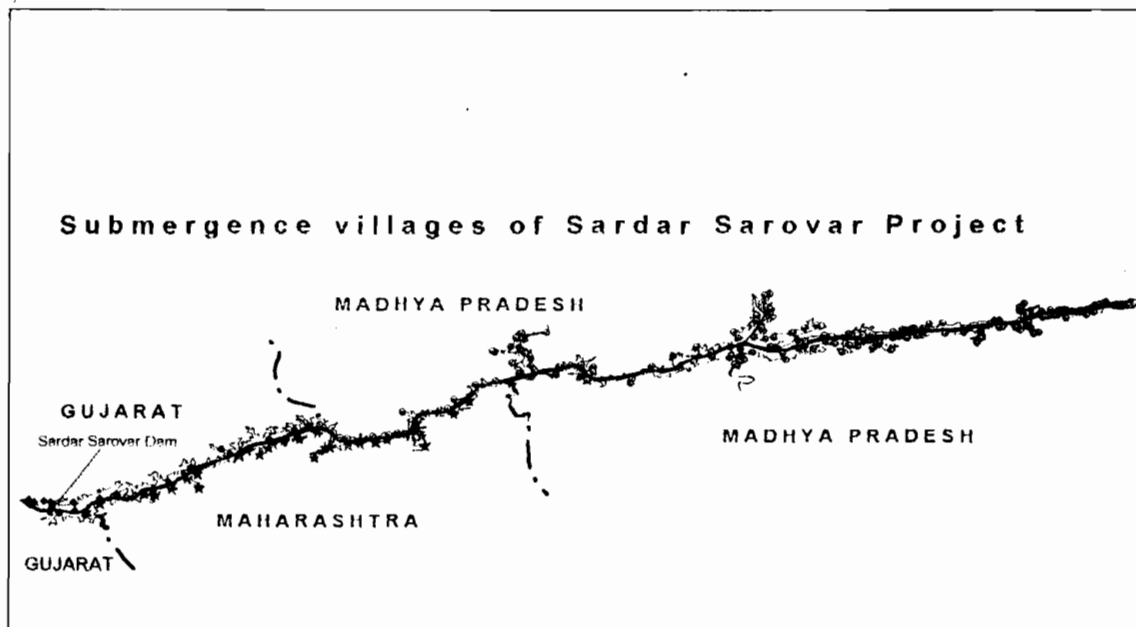
The submergence zone of the project lies within the State of Maharashtra , Madhya Pradesh & Gujarat as depicted in the table & map below.

State	Culturable land (ha)	Forest land (ha)	Land under other uses (ha)	Total land (ha)	Affected number of villages	Affected number of PAFs
Madhya Pradesh	7,883	2,731	10,208	20,822	193	33,014
Maharashtra	1,519	6,489	1,592	9,599	33	3,213
Gujarat	1,877	4,166	1,069	7,112	19	4,600
Total	11,279	13,386	12,869	37,533	245	40,827



LAND USE PATTERN OF LAND UNDER SUBMERGENCE

☐ Cultivable Land
 ☐ Forest Land
 ☐ Other Uses

**Sardar Sarovar Dam****Development and current status of the management of SSP environment**

The environmental clearance had suggested the following parameters for Environmental Management.

1. Resettlement & Rehabilitation.
2. Catchment Area Treatment
3. Compensatory Afforestation
4. Command Area Development.
5. Flora Fauna & Carrying Capacity of Surrounding area
6. Seismicity
7. Health

Chapter 2**CATCHMENT AREA TREATMENT**

The MOEF clearance granted in 1987 contained two conditions pertaining to CAT, as follows:

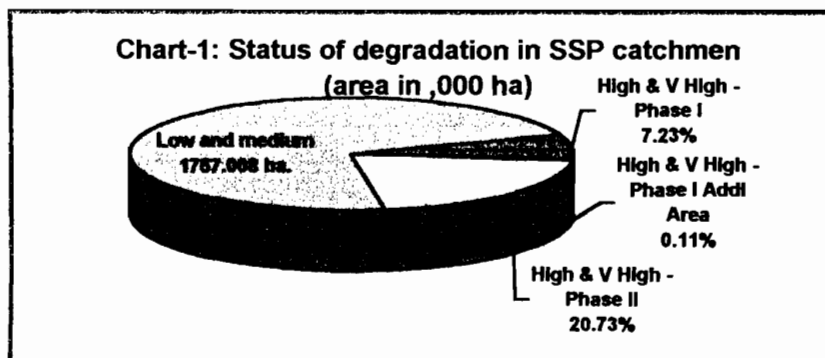
- more detailed surveys for prioritisation of the sub-catchments in the SSP area should be undertaken;
- A phased CAT programme should be prepared and implemented ahead of reservoir filling.

Studies

Surveys and studies have been undertaken to aid the development of a management plan for CAT in the SSP catchment. They include :-

- Report of Inter-Departmental Committee on Soil Conservation and Afforestation, (the Dewan Committee Report), 1985.
- Report on Prioritisation of Sub-watersheds in Sub-catchments of Narmada Catchment, 1991 by AIS&LUSO, New Delhi.

According to the above studies, the total catchment area of Sardar Sarovar Project below Narmada Sagar Dam is 24,42,440 ha. Out of this, 6,82,769 ha area spread to 500 sub-watersheds having silt yield index 1,200 and above was identified as critically degraded.



GOI issued a directive in July 1992 that, for the SSP, the project would bear the costs of the treatment of all critically degraded sub-watersheds draining directly into the reservoir. These watersheds were identified amongst those classified as either very high or

high-priority categories by the All India Soil & Land Use Survey Organisation (AISLUSO). The project would also be responsible for the treatment of those areas of the catchment, which are directly damaged by the project activities. In addition, plans are required to be prepared for the treatment of the balance of the critically degraded sub-watersheds but the cost of this will be met from other ongoing schemes and in a timeframe to be determined.

PLANNING:

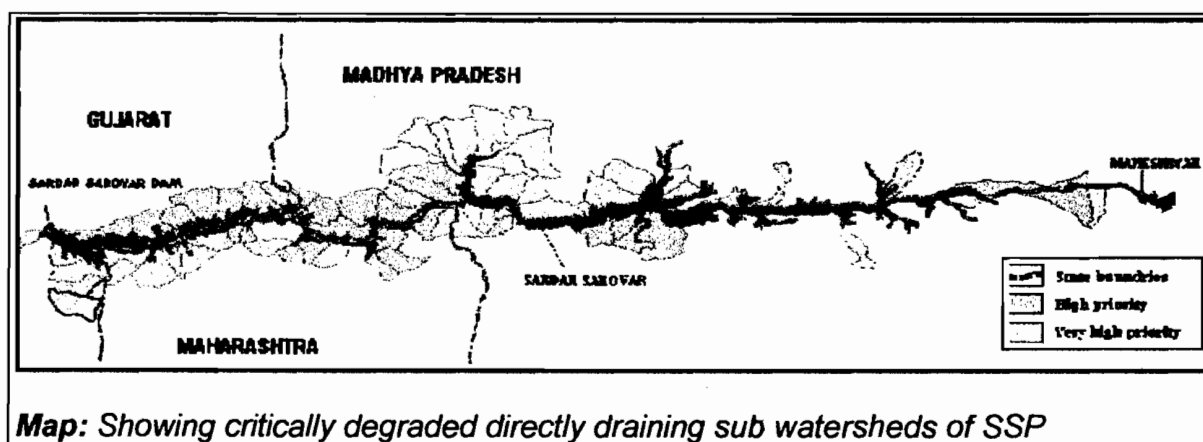
Project authorities were required to prepare the plans, as phase-I programme, for treating those critically degraded sub-watersheds which were identified as *directly draining* into the reservoir. The balance sub-watersheds were to be treated as Phase-II programme.

Particulars			Madhya Pradesh	Gujarat	Maharashtra	Total
Very High & High	Planned to Treat	Phase-I	125725	29157	24298	179180
		Phase-II	349892		77568	427460

Table 1: Area Statistics of Very High & High Priority Sub-watersheds in the Catchment of Sardar Sarovar Project

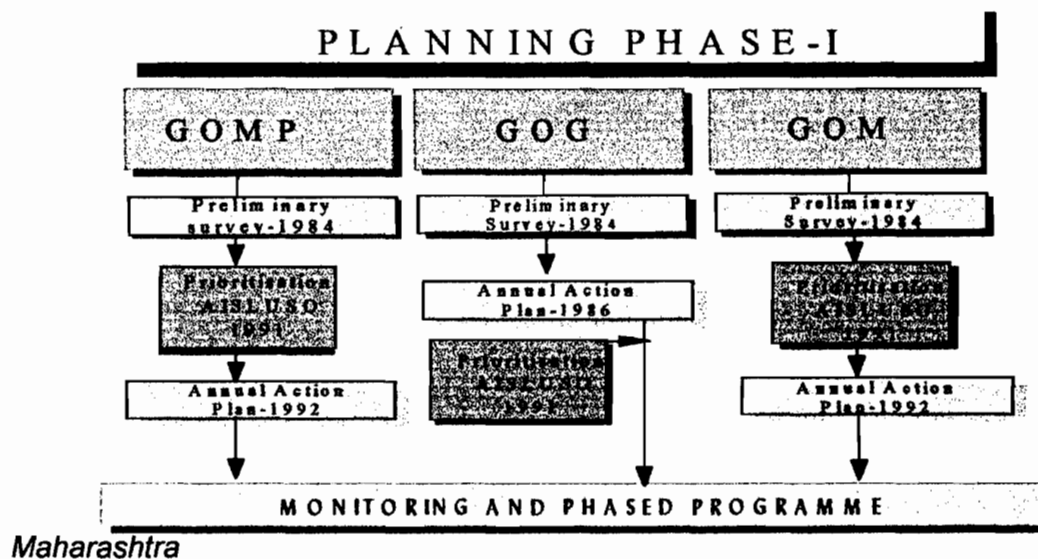
I. PHASE-I: DIRECTLY DRAINING SUB-WATERSHEDS

Project authorities have prepared the plans for treating total area of 1,79,180 ha as shown in the *table -1* above. This area is required to be treated pari-passu with the project works.

**ACTION PLANS:**

The project authorities have submitted the Action Plans in varying stages of completeness. These plans contained information related to survey work, management options, monitoring & phased programme of treatment besides provisions for annual budget. The various stages in planning for each item of the plan are given in the *Fig.-1* below.

Fig-1. Flow chart of CAT phase-I planning by Gujarat, Madhya Pradesh and



Elements of Action Plan

Key elements of the Action Plan which includes time-table, menu, budget etc. received from GOG, GOMP & GOM are depicted in Fig.-2

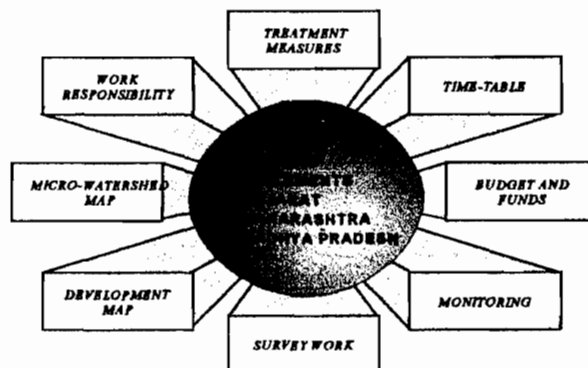


Figure 1 : Action Plan components.

IMPLEMENTATION:

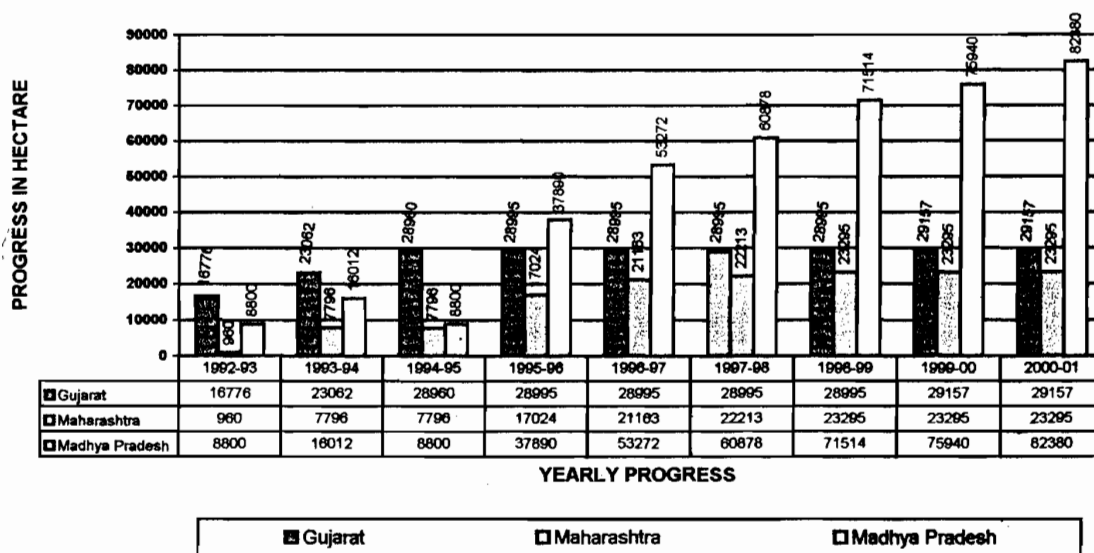
Project authorities have prepared the plans for treating 1,79,180 ha area in about 10 years time. Govt. of Gujarat started the treatment works w.e.f. monsoon of 1990 whereas Govt. of Maharashtra and Govt. of Madhya Pradesh could start the work in the year 1992. The progress of treatment work is detailed in the table – 2 and the bar chart-I drawn below.

Area under treatment 1,79,180 ha **Progress** 1,34,832 ha **Balance** 44,348 ha

Table -2: Year wise progress of CAT Works

YEAR	GOG			GOM			GOMP		
	F A	NFA	TOTAL	FA	NFA	TOTAL	F A	NFA	TOTAL
	27204	1953	29157	21122	3176	24298	51930	73795	125725
1990-91	4,528	898	5,426	0	0	0	0	0	00
1991-92	4,770	230	5,000	0	0	0	0	0	0
1992-93	6,014	336	6,350	960	0	960	0	8,800	8,800
1993-94	6,000	286	6,286	6,514	322	6,836	966	6,246	7,212
1994-95	5,730	168	5,898	6,542	2,686	9,228	4,263	594	4,857
1995-96	0	35	35	4,735	4	4,739	N/A	N/A	17,021
1996-97	0	0	0	450	0	450	N/A	N/A	14,482
1997-98	0	0	0	1082	0	1082	N/A	N/A	8,506
1998-99	0	0	0	0	0	0	N/A	N/A	10,636
99-2000	162	0	162	0	0	0	N/A	N/A	4426
00-2001	-	-	-	-	-	-	-	-	6440
Total	27,204	1,953	29,157	20,283	3,012	23,295	N/A	N/A	82,380

Cumulative progress of the CAT works in the States of Madhya Pradesh, Gujarat and Maharashtra.



Govt. of Gujarat

As the Catchment area of Sardar Sarovar was little in Gujarat, GOG accepted the recommendations of Diwan Committee and commenced the work of treating entire catchment area in the year 1990. By the end of 1994 forest area of 27,042 ha & non-forest area of 1953 ha were treated. Treatment work is almost completed. Graphic presentation of the progress is given in the chart-4.

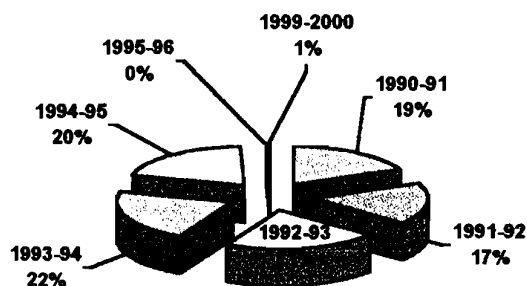
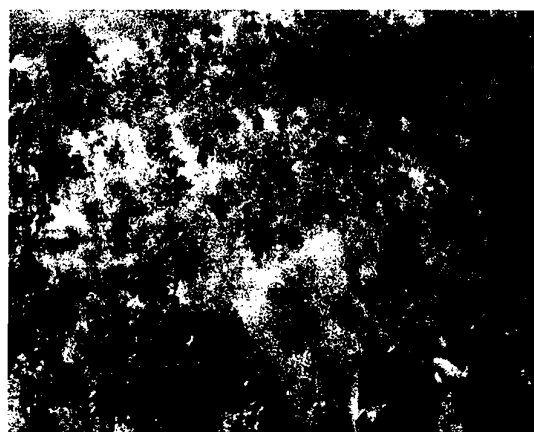


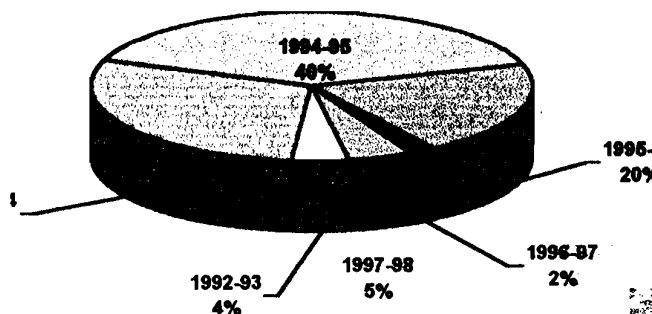
CHART-4 Progress of CAT Phase I in Gujarat (Area in Ha.)



Govt. of Maharashtra:

Treatment works in Maharashtra could commence in the year 1992. By the end of March, 1998 forest area of 20,283.47 ha and non-forest area 3,011.86 ha were treated. Thereby almost completing the Phase-I work in Maharashtra. Graphic profile of the progress is given in *chart-5*.

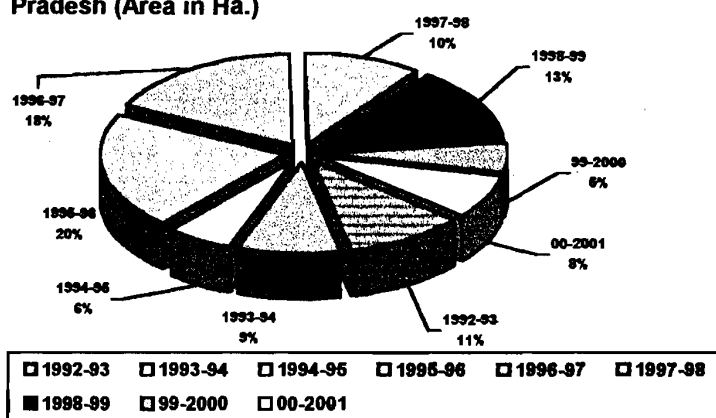
CHART 5 : Progress of CAT Phase I in Maharashtra (Area in Ha.)



Govt. of Madhya Pradesh

Treatment works in Madhya Pradesh could commence after submission of the revised work plan in 1992. By the end of September, 2000 a total of 82,380 ha area including both, forest & non-forest areas was treated-up. Progress is depicted in chart-6

CHART 6: Progress of CAT Phase I in Madhya Pradesh (Area in Ha.)



Runoff management structure in M.P.

Sardar Sarovar Project: Balance Targets :

Against the planned target of 179,180 ha of CAT works for the SSP as a whole, an area of 1,28,230ha was treated up by the end of September, 2000. It is proposed to treat the balance area as shown in chart-7 and detailed in the table-3

□ Progress upto September, 2000 □ Unachieved target 00-2001

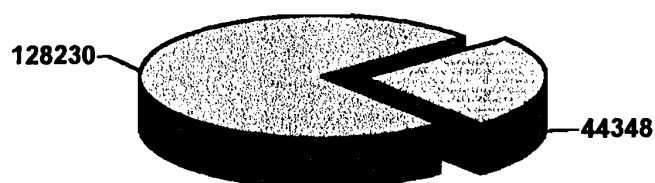
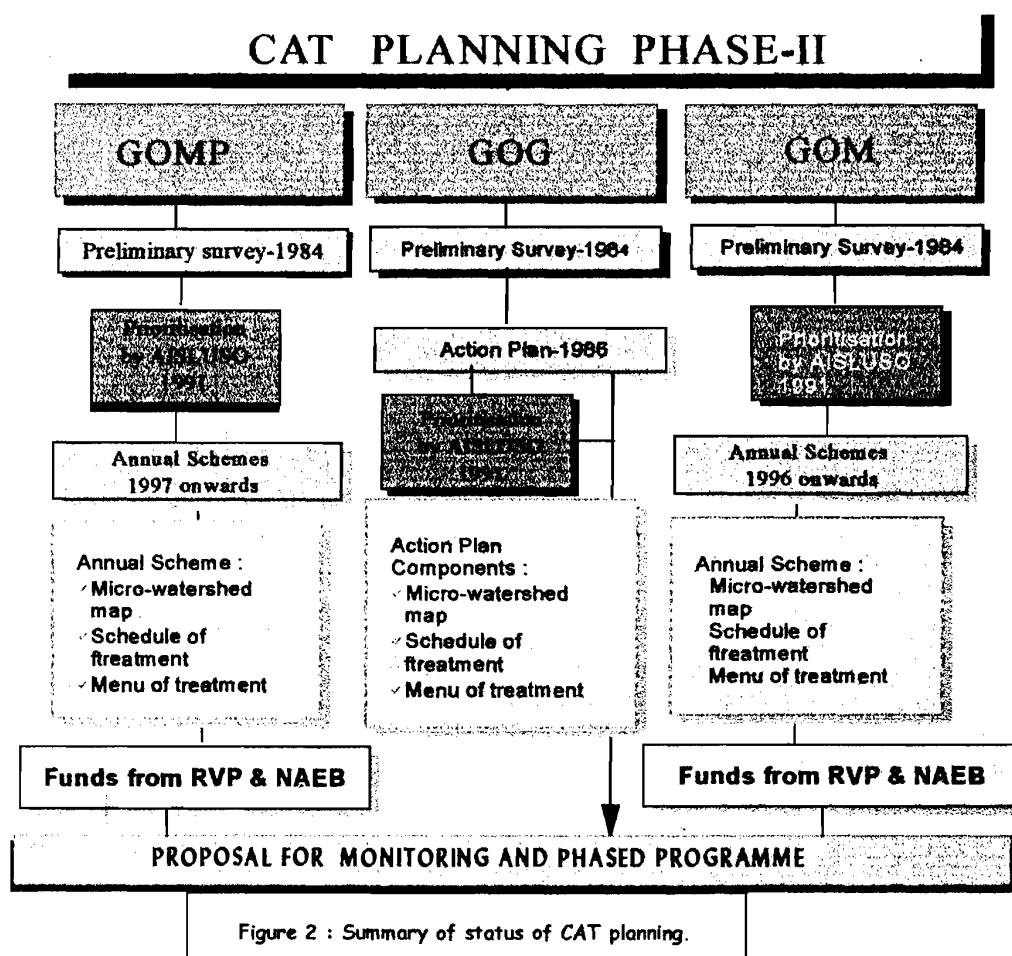


Table-3: CAT Works remaining

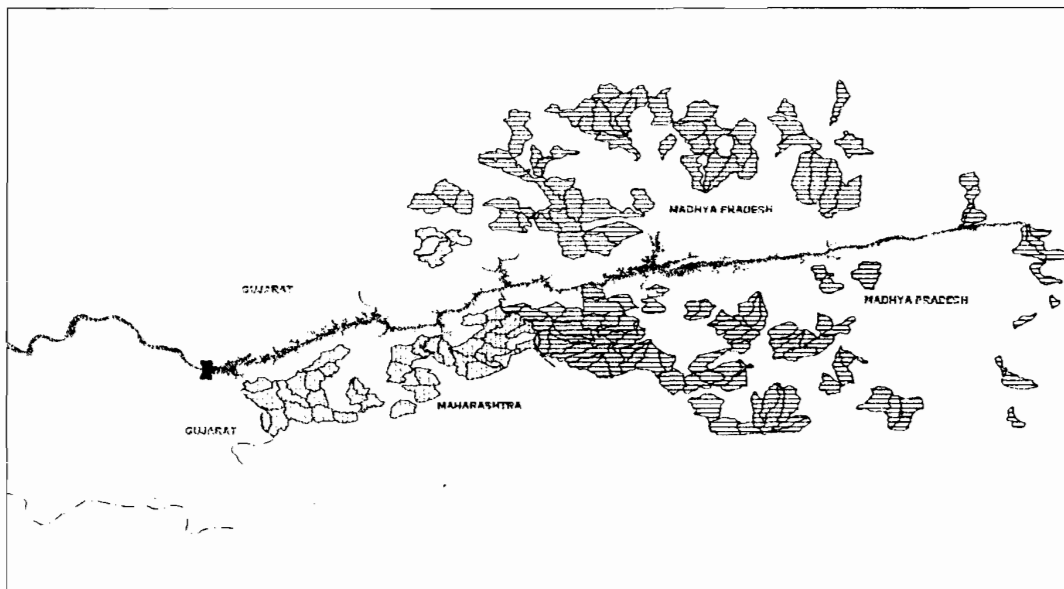
PARTICULARS	GUJARAT			MAHARASHTRA			MADHYA PRADESH		
	F.A.	N.F.A.	TOTAL	F.A.	N.F.A.	TOTAL	F.A.	N.F.A.	TOTAL
TARGET	27204	1953	29157	21122	3176	24298	51930	73795	125725
WORK DONE	27204	1953	29157	20283	3012	23295	N/A	N/A	82380
Balance	0	0	0	839	164	1003	N/A	N/A	44348

PHASE-II: INDIRECTLY DRAINING SUBWATERSHEDS:

Project authorities were required to prepare plans for treating balance of the critically degraded sub-watersheds. The planning process is summarised in the figure below :



State Govts. of Maharashtra and Madhya Pradesh have submitted the plans. The funds for treating these areas have been promised by the RVP Scheme of Planning Commission, National Afforestation and Eco-development Board etc. The plans are being revised in a phased manner in accordance with the guidelines of the funding agencies. The RVP and NAEB have approved some of these plans. Works have commenced. Planning Commission has agreed for inclusion of Narmada River catchment for treatment under its programme of River Valley Project Scheme. MOE&F also promise funds from National Afforestation & Eco-Development Board. Work commenced on 6 schemes in Maharashtra & a few others in Madhya Pradesh. Further 7 more schemes were approved during 1997-98.



SSP CAT Phase-II sub-watersheds

Madhya Pradesh:

Catchment area of Sardar Sarovar Project below Narmada Sagar in Madhya Pradesh is 5,44,505 ha. This area includes the freely draining area attributable to Jobat, Man, Maheshwar, and Omkareshwar Projects also as per the details given in the table-4. After subtracting such areas, the gross area of critically degraded sub-watersheds is 4,75,617 ha. Out of this, Govt. of Madhya Pradesh has prepared plans for treating 1,25,725 ha area, as Phase-I already described above, under directly draining category at the cost of the project. Therefore, the gross area for which plans are required to be submitted for Phase-II programme was 3,49,892 ha.

Table-4

Total Area of Freely Draining Critically Degraded Sub-watersheds	5,46,702 ha
Catchment below NSP	3,52,089 ha
Net Treatable area	3,18,118 ha

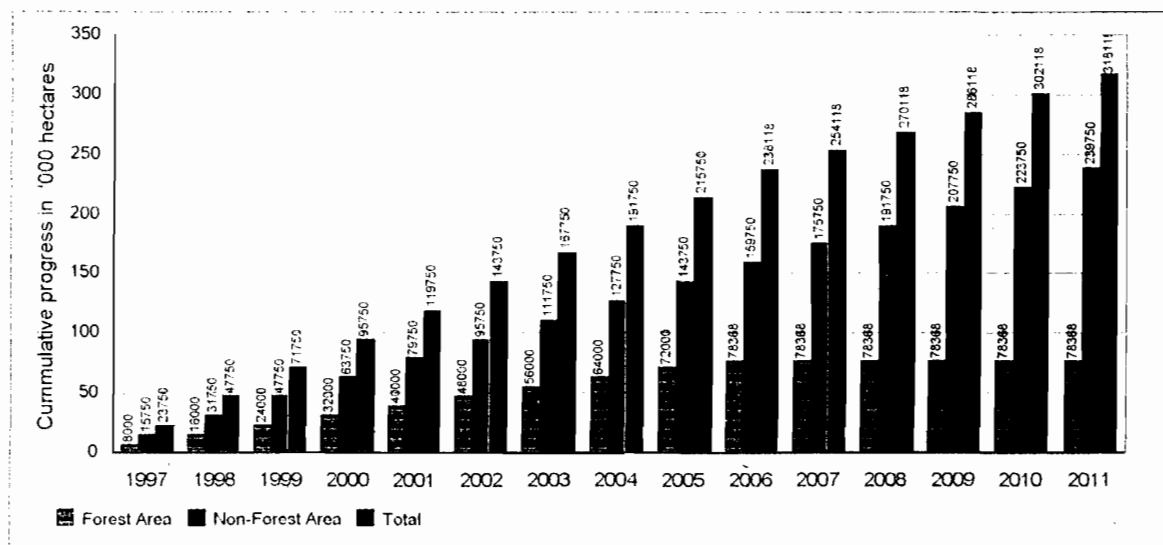
Project	Phase-I (Directly Draining)	Phase-II (Balance area)	Total Area
Jobat			28,211
Man			12,720
Maheshwar			13,209
Omkareshwar			14,748
SSP	1,25,725	3,49,892	4,75,617
		Total :	5,44,505

Schedule of Treatment

Project authorities have prepared the plans for treating the 3,49,892 ha of catchment in 139 sub-watersheds of Phase-II areas by the end of year 2011. The schedule of treatment planned is given in Bar Chart. However, annual micro-watershed plans are under implementation as presented below.

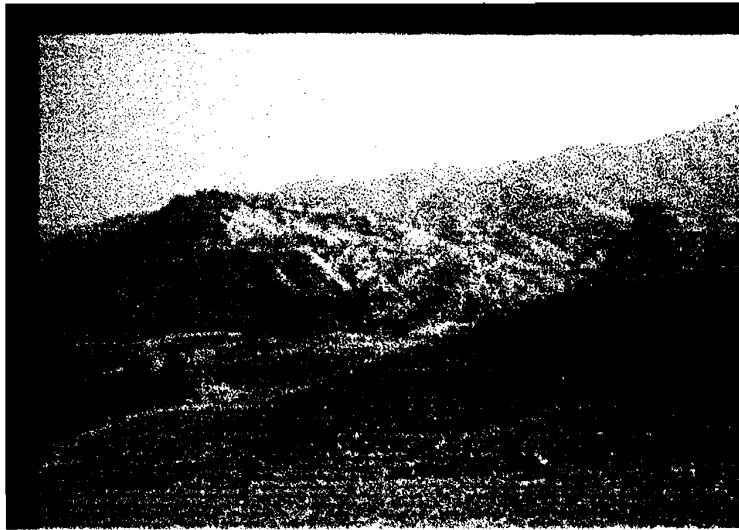
Progress of Implementation:

Under River Valley Project Schemes 43 schemes covering an area of 87884 ha had been approved by the GOI. Out of these, 30 schemes pertain to SSP. These 30 schemes envisages CAT over an area of 59566 ha of which 21036 ha area has been treated. Schedule of implementation is given in the Bar Chart-8.



Maharashtra

Govt. of Maharashtra have prepared a macro-watershed plan for 77,568 hectare in Phase-II of CAT works, out of total 80,881 hectare in 35 sub-watersheds. Apart from this separate micro-watersheds plans are prepared for forestland and non-forestland. Micro-watershed plans for forestland in all 35 watersheds have been submitted, which covers 42,867 hectare area. Progress on such schemes



is 7,050 hectare. In case of non-forestland, the schemes are not available with NCA but the progress of 7,854 hectare. is reported on 13 micro-watershed schemes covering an area of 15,656 hectare.

Chapter 3**COMPENSATORY AFFORESTATION**

Approval for the diversion of forestland for the SSP was granted by the MOEF in 1987, 1990 & in 1993 (including for R&R works) but several conditions were attached relating to the planning and implementation of CAF. Principals amongst these are the following stipulations.



Plantations near Dam site

- For every hectare of forestland submerged or diverted for construction of the project there should be Compensatory Afforestation on one hectare of non-forest land plus reforestation on two hectares of degraded forest.
- For the 4,200.00 hectares of forestland in Maharashtra, which is to be used for R&R, an equal area of non-forest land or double the area of degraded forest should be planted.
- The governments of the three states involved should prepare plans detailing their proposals for Compensatory Afforestation and submit these to the MOEF before work in the forest area is due to commence.
- The project should supply firewood to its construction workers, at its own cost, to prevent them from having to meet their fuel needs from the surrounding forests.

STUDIES

There have been a number of studies in three states aimed at assessing the extent and significance of the loss of forestland attributable to the SSP.

- Sardar Sarovar (Narmada) Project Development Plan, Volume-II prepared by the Narmada Planning Group (NPG) in 1983.
- Studies on Eco and Environment by M.S. University of Baroda (MSU) in 1983.
- Sardar Sarovar Project: Preparation of Environmental Work Plan by the Forest Department of Maharashtra in 1988.
- Eco-Environment and Wildlife Management Studies in Sardar Sarovar Submergence Area in Gujarat by MSU, in 1992.

- Impact Assessment of Madhya Pradesh Land to be submerged Under Sardar Sarovar Project and Adjoining Ecosystems by State Forest Research Institute, Jabalpur (1989-92).
- Report on Flora and Fauna In and Around Sardar Sarovar Project, Maharashtra by the University of Pune, August 1997.

ACTION PLANS

In compliance with the conditions set by the MOEF, each state has prepared an Action Plan for the CAF of areas within it's boundaries. The relevant documents are:

- Government of Gujarat Work Plan for Management of Environmental Effects, Section on Forests and Wildlife: The Compensatory Afforestation Plan for the Rann of Kachchh, 1986.
- Project for Afforestation in Sardar Sarovar Project Impact Areas due to Diversion of forestlands for Sardar Sarovar Project (GOG), 1991.
- Compensatory Afforestation Scheme in Lieu of Sardar Sarovar Project in Dhule District, Maharashtra State (1989).
- Government of Madhya Pradesh Forest Department Action Plan of Compensatory Afforestation for Sardar Sarovar Multipurpose River Valley Project (1989).

These plans were submitted in varying stages of completeness but each has now been revised and updated. Action Plans of three State Govt. contained following components:

Implementation

The Action Plans spell out a programme of tree planting in the three states on both non-forest and degraded forest areas as shown in bar *Chart-12* and *Table-6 & 7*.

Planning

An area of 13386 ha was diverted by MOEF vide it's order of 1987. It was stipulated in this order that plantations shall be carried out in equal non forest land in addition to the plantations on degraded forest land double in extent of the area diverted. Thus for every ha of the area diverted three ha of plantations were to be carried out by the project authorities. In addition to the area diverted by the MOEF in 1987 an area of 357 ha was diverted by GOG earlier. State Govts. have prepared the plans for plantations of 46,358 ha besides reforestation of 28,830 ha area including plantations over 4,200 ha of non-forest land in lieu of the land released for R&R works in Maharashtra. Statewise details of the total area taken for SSP and the planning in lieu thereof are given in the chart-11.

In Maharashtra State 4200 ha forest land was released for R&R works in two phases. In 1990 an area of 2700 ha was released in Taloda taluka. Further 1500 ha was

released during 1993 in the same taluka. State Govt. was required to carry out plantations on equal non-forestland. Detailed programme and progress of plantations is given in the table 6 below

Table-6. Compensatory Afforestation against 4200 ha forest land released for R&R works in Maharashtra vide MOEF order dated 1990 (2700ha) and 1993 (1500 ha).

Year	Land released	Progress 1993-94	Progress 1994-95	Progress 1995-96	Progress 1996-97	Progress 1997-98	Cumulative Progress	Target 1997-98
1990	2,700.00	2,192.37	311.00	184.50	0.00	0.00	2,687.87	12.13
1993	1,500.00	0.00	0.00	896.00	0.00	0.00	896.00	604.00
TOTAL	4,200.00	2,192.37	311.00	1,080.50	0.00	0.00	3,583.87	616.13

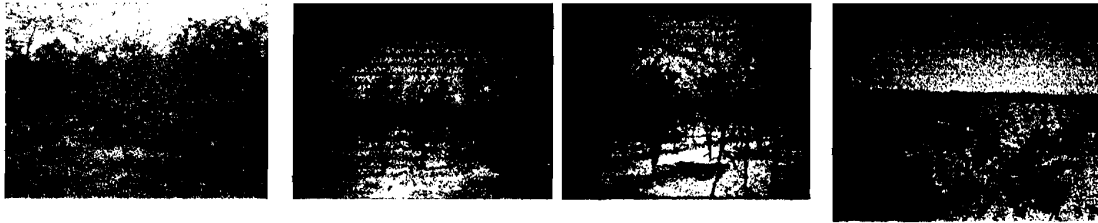
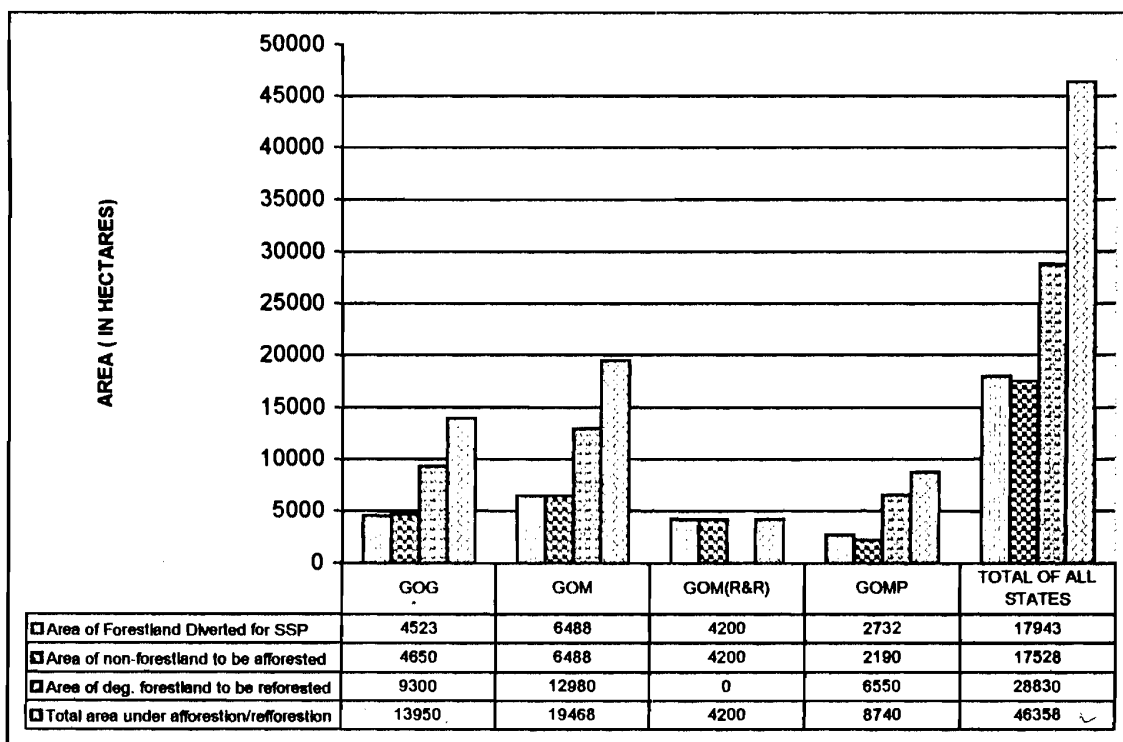
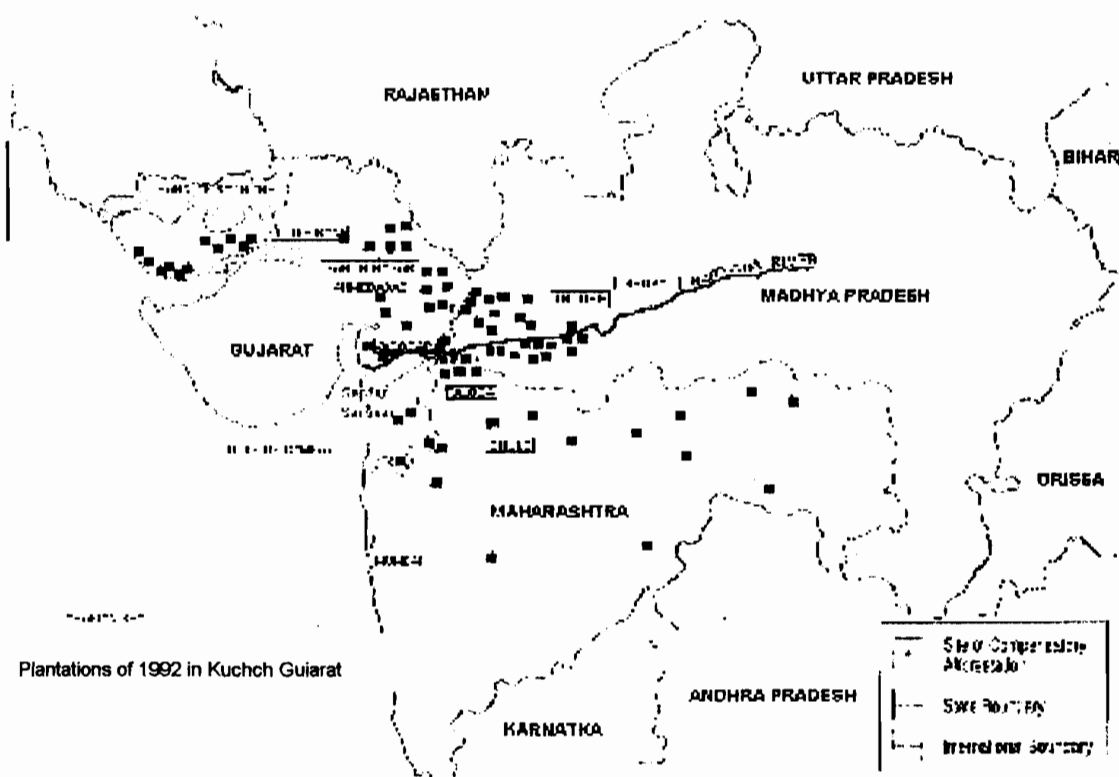


Chart-11: Showing forest areas taken for SSP. This includes 357 ha taken for SSP in Gujarat prior to formal clearance under FCA, 1980 besides the area diverted for R&R works in Maharashtra and targets for afforestation/reforestation





Map: 2 Showing locations of sites of plantations in the States of Gujarat, Maharashtra and Madhya Pradesh

Table-7: Showing detailed progress of CAF, against the target area of 42,158 ha. in lieu of 13,386 ha. diverted for submergence of SSP vide MOEF order dated December, 1987. (Area in ha)

Monsoon year	GUJARAT		MAHARASHTRA		MADHYA PRADESH	
	Degraded forest	Non-forest	Degraded forest	Non-forest	Degraded forest	Non-forest
90-91	-	2,150.00	-	-	132.00	716.00
91-92	2,834.00	350.00	8,383.00	-	1,200.00	373.00
92-93	2,450.00	847.00	4,552.00	2,276.00	2,400.00	-
93-94	2,500.00	460.00	20.00	1,156.00	2,215.00	-
94-95	1,516.00	843.00	-	2,894.00	1189 *	-
95-96	Completed	Completed	Completed	NIL	NIL	NIL
96-97	-	-	-	NIL	NIL	NIL
97-98	-	-	-	NIL	208 *	-
98-99	-	-	-	-	277 *	-
99-2000	-	-	-	-	26	-
Sub-total	9,300.00	4,650.00	12,955.00	6,326.00		
Total	13,950.00		19,281.00		8,736.00	

* Area classification, not reported.

In addition to the above following additional plantations have been taken up by the Govt. of Gujarat.

Additional Plantation Activities**(a) Plantation along Canal Banks**

The total potential of canal bank plantations is estimated to be 5,300 ha. A project report prepared for this purpose by Gujarat Forest Department is under scrutiny by SSNNL. The plantation programme was launched from the year 1990-91. Plantations on 1,870 ha have already been established till monsoon of 1999.

(b) Dam Vicinity Plantation (240ha)

The plantation in total area 551 ha. In the vicinity of dam have been completed by the forest department as well as project authorities. This is being maintained by project authorities.

(c) Ravine Land Afforestation (200 ha)

On the left bank of river Sabarmati an area of 200ha in two villages i.e. Ratanpur (120ha.) and Phirojpur (80 ha) was taken up for model plantation. Entire work has now been completed

An area of 311 ha. had been planted in the project area and the work is completed.

Canal Bank Plantations



Chapter 4**COMMAND AREA DEVELOPMENT**

The command area of the project is fixed based on the areas included by NWDT for purposes of considering requirement of Narmada water for irrigation in Gujarat. Accordingly, the GCA of the project is 3.43 million hectares of which culturable command is estimated to be 2.12 million hectares. Thus, the command encompasses a very large area of the state of Gujarat and about 75000 ha area in Rajasthan and is characterized by wide diversity in agro-climatic and socio-economic conditions.



- + The Narmada Main Canal also known as Navagam Main Canal off-takes from Sardar Sarovar Dam in Gujarat at a full supply level (FSL) of 91.44 m (300 ft.) and traverses through a distance of 458.30 km before entering Rajasthan near village Silu, Tehsil Sanchole, district Jalore.
- + In Rajasthan, the Canal runs for a distance of 74 km. The Topography of the area is suitable for a contour canal upto 54.00 km as such in this reach irrigation has been restricted to portion of command on river side only. From Km 54.00 onwards up-to the tail end (km 74.00) the canal has been aligned as a ridge canal to irrigate areas on either side.

To safeguard development of irrigation in the vast command, it is important to ensure that the transfer of water to the Command Area does not give rise to the environmental problems, which have been experienced by some water developments in the past. In view of the potentially far-reaching effects of water distribution in the SSP command area, mitigating measures have been determined requiring , control and monitoring in the following areas :

- drainage, waterlogging and soil salinity;
- water quality;
- forest loss;
- potential impact on flora and fauna;
- effects on public health;
- socio-economic impacts.

A large number of studies have been undertaken by the project authorities most of these studies are now complete. The result of the studies available by the end of 1993 were used to prepare and assessment report of the development of the Command Area simultaneously by the H.R. Wallingford and Narmada Planning Group during March /

April, 1993. An updated environmental management plan for the Command Area is under formulation.

(A) Current scenario : Government of Gujarat

Government of Gujarat have undertaken several studies related to the command area development. Most of these have been completed and the remaining are in progress. The various studies are listed below.

Agricultural Practices and Socio-Economic

- + Some Aspects of Role of Panchayats and Institutional Arrangements for Canal Irrigation in Two Talukas of Ahmedabad District. Institute of Cultural and Urban Anthropology, Ahmedabad, 1982
- + A Study of Settlement Pattern (6 Talukas in the Narmada Command Area of Mahesana, District of Gujarat).
- + Department of Geography, Gujarat University, Ahmedabad, 1982.
- + Regionalisation of Narmada Command, Operations Research Group, Vadodara, 1982.
- + Socio-Economic Bench Mark Survey of 62 Talukas (Sub-districts) of Narmada Command Area. Fourteen Different Agencies including Universities Research Institutions etc. 1983
- + Population Projection and Migration Study for Narmada Command Area. Operations Research Group, Vadodara, 1983.
- + Consumer Expenditure, Assets and Indebtedness of Rural Households of the Command Area of Sardar Sarovar (Narmada) Project Directorate of Economics & Statistics, Gandhinagar, 1983.
- + State of Adoption of Improved Technology in Narmada Command and Rest of Gujarat State (Based on Analysis of Crop cutting Experiments Data). Operations Research Group, Vadodara, 1985.
- + Land Use and Cropping Pattern Survey and Mapping of Narmada Command Area Zone 4A & 4B. Department of Geography, M.S. University, Vadodara, 1986.
- + Growth of Agro-Processing Industries in Phase-I of the SSP. Gujarat Industrial & Technical Consultancy Organisation Ltd., Gandhinagar, 1990.
- + Studies in Water Rates Policy, in 3 parts:
- + Pricing of a Public Utility Survey of Literature. Department of Economics, South Gujarat University, Surat.
- + Financial working of Irrigation Projects - A Case of Four Projects in Gujarat. Department of Economics, Sardar Patel University, Vallabh, Vidyanagar.
- + Some Policy Issue for Canal Water Rates in Gujarat. Department of Economics, Sardar Patel University, Vallabh, Vidyanagar, 1992.
- + Economic Dimension of the Sardar Sarovar Project. S.P. Institute of Social & Economic Research, Ahmedabad, 1995.

- + Wasteland Development Project for Command Area of Narmada Canal (Region 11 and 12).Gujarat State Rural Development Corporation Ltd., Gandhinagar, 1984.
- + Cropping Pattern and Waste Demand Study in Narmada Command Area. Operations Research Group, Vadodara, 1987.
- + Study on Preparation of a Detailed Integrated Command Area Development Plan for SSP.M/s. Wamana Consultants Pvt. Ltd., Hyderabad, 1994.

Drainage, Waterlogging and Salinity

Groundwater Studies

- » Mathematical Modeling of Ground Water System for single layer model-Narmada Mahi-Doab by Operations Research Group, Vadodara. Completed in 1982.

This study was taken up as a preliminary study, to deal with recharges due to rainfall and due to irrigation inputs of varying levels and rise of varying level of pumping. The study provided initial insights for planning for future ground water development on introduction of surface irrigation.

- » Mathematical Modeling of Ground Water System Narmada Mahi Doab. By Operations Research Group, Vadodara. Completed in 1985.

And

- » Additional work of Mathematical Modeling of Ground Water System Single Layer Model-Narmada Mahi-Doab. By Operations Research Group. Vadodara. Completed in 1985.

These detailed modeling studies dealt with recharges due to rainfall and due to irrigation inputs of varying levels and rise of Ground Water over time with varying levels of pumping. Based on these results, the ground water development in command area is visualised in planning of the SAP.

- » Survey and Investigation Work of Ground Water Resources in Narmada Mahi-Doab by Gujarat Water Resources Development Corporation Ltd. Gandhinagar. Completed in 1987.

This study was carried out for determination of hydro geological and hydrological parameters of the aquifers. The study has provided useful information regarding water levels and water quality for conjunctive use and to control the problem of water logging alter surface irrigation starts.

- » Mathematical Modeling of Ground Water System for SSP Command between Rivers Shedhi and Sabarmati by Consultancy Engineering Services, New Delhi. Completed in 1993.

And

- » Mathematical Modeling of Ground Water System for SSP Command between Rivers Sabarmati and Banas by Operations Research Group, Vadodara.
And
- » Mathematical Modeling of Ground Water System for SSP Command beyond Banas upto Rajasthan Border by Dalal Consultants, Ahmedabad. Completed in 1993.

These modeling studies dealt with recharge due to rainfall and due to irrigation inputs of varying levels and rise of ground water overtime with varying levels of pumping. The studies provided insights for planning for future ground water development on introduction of surface irrigation.

- » Hydro geological Impact Assessment Study by H.R. Wallingford. Completed in 1995.

This was a review of earlier drainage studies. It has provided information about the revised drainage co-efficient.

- » Survey and Investigation of Ground Water Resources beyond river Mahi upto border of Rajasthan in SSP Command Area.

This study was carried out for determination of hydro-geological and hydrological parameters of the aquifers. The study provides useful information regarding water levels and water quality for conjunctive use and to control the problem of waterlogging after surface irrigation starts.

Drainage Studies

- » Pre-feasibility Level Drainage Study of Narmada Mahi-Doab of SSP Command, by Core Consultants, Ltd., Ahmedabad. Completed in 1982.

This study has been carried out for assessing the drainage requirements of the command area upto Mahi. Drainage co-efficient for each region are worked out and accordingly surface and sub-surface drainage requirements are planned.

- » Pre-feasibility level Drainage Study for SSP Command beyond River Mahi. By Consultancy Engineering Services, New Delhi. Completed in 1993.

This study has been carried out for assessing the drainage requirements of the command area. Drainage co-efficient for each region are worked out and accordingly surface and sub-surface drainage requirements are planned.

Floral and Faunal Studies

- » The Sardar Sarovar Narmada Project Studies on Ecology and Environment by Department of Botany, M.S. University, Vadodara. Completed in 1983.

The objective of the study was to suggest ways and means of achieving optimum utilisation of the Narmada Waters without any appreciable damage to the river ecosystem and to collect the data on various parameters of ecosystem, to assess likely changes and to suggest remedial measures for negative impacts, if any. Based on the findings of the report, work plans for Forest and Wildlife, Public Health and Fish and Fisheries have been prepared for implementation.

- » Study on Flora and fauna of the Command Area of Sardar Sarovar (Narmada) Project lying between the Narmada and Sabarmati Rivers (EIA studies) by Sardar Patel University, Vallabh Vidhyanagar. Completed in November 1995.

The study was taken up to assess the Environmental Impact of the SSP on Flora and Fauna based on experience of Mahi irrigation Project. Based on recommendation of the study, the floral and faunal management plan is to be prepared.

- » Study on Flora and Fauna of the command area of Sardar Sarovar (Narmada) Project lying in Saurashtra and Kachchh Area (EIA) Studies by Saurashtra University, Rajkot. Completed in January 1996.

The study was taken up to assess the Environmental Impact of the SSP on Flora and Fauna based on experience of Mahi irrigation Project. Based on recommendations of this study, the floral and faunal management plan is to be prepared.

- » Study on Flora and Fauna of the Command Area of Sardar Sarovar (Narmada) Project lying between Sabarmati and Rajasthan Border (EIA studies) by Gujarat University, Ahmedabad. Completed in March 1998.

The study was taken up to assess the environmental impact of the SSP on flora and fauna based on experience of Mahi Irrigation Project. Based on recommendations of this study, the floral and faunal management plan is to be prepared.

- » EIA on Downstream of Sardar Sarovar Dam upto Gulf of Cambay by M/s. H. R. Wallingford. U.K. Completed in April 1995.

This was taken up to evaluate the environmental impacts on the downstream in the initial stage of 25 years of this project. The results of this study will be used for downstream area planning.

- » Ecological study on Wild Ass Sanctuary and surrounding Area Using Remote Sensing Technology for Environmental Impact Assessment by Gujarat Ecological Education and Research Foundation, Gandhinagar. Completed in 1997.

This study was taken up to determine various land use classes by remote sensing to monitor the trend of *prosopis*, salt and grass land in and around the sanctuary. The information of the study report will be utilised for detailed EIA study of the sanctuary.

- » Environmental impact Assessment of Nal Sarovar Bird Sanctuary by Gujarat Ecological Education and Research Foundation, Gandhinagar. Completed in 1998.

The study was taken up to assess the impacts of canal irrigation in and around the Sanctuary area. Based on the recommendations of this study, the Action Plan for Nal Sarovar Bird Sanctuary is to be prepared

- » Environmental Impact Assessment of Velavadar Black Buck National Park b Gujarat Ecological Education and Research Foundation, Gandhinagar Completed in 1997.

The study was taken up to assess the various impacts of surface irrigation) and around Sanctuary area. Based on the recommendations of the study, a draft action plan has bee prepared and as per tile suggestions of experts, the final Action Plan is being prepared.

Fisheries

- » Environmental Impact Assessment Studies on Inland Marine Fisheries relevant to the Command Area of Sardar Sarovar (Narmada) Project, by M.S. University, Vadodara. Completed in 1995.

This study was taken up to assess the impacts of SSP Canal water on fisheries. Based on recommendations of the study, fisheries development programme (an Action Plan) for Phase-I area has been prepared by the Commissioner of Fisheries.

Health

- » Environmental Impact Assessment (EIA) studies on Water Related Diseases in Sardar Sarovar Project (SSP) Command Area including the Area Down Stream of the SSP Dam by Commissionerate of Health, Medical Services Medical Education, Government Of Gujarat, Gandhinagar. Completed in October, 1995,

The study was taken up to assess the impacts of canal water on water related diseases. Based on recommendation of this study an action plan for health sector for the SSP Command is being prepared.

Water Quality

- ➔ GWSSB(1983) Study to detremine Municiple and Industrial demand; parallel study on Sabarmati basin by GPCB(1989).

- GPCB Compilation of water quality data for 10 selected rivers in Gujarat under GEMS (WHO Supported) and national MINARS Project; Limited ground water monitoring by GPCB.

The command area encompasses twelve districts, viz. Bharuch, Vadodara, Panchmahals, Kheda, Ahmedabad, Gandhinagar, Mahesana, Bhavnagar, Surendranagar, Rajkot, Banaskantha and Kutch. Total number of the talukas of these districts wholly or partially covered in the command is 62 and about 3344 villages of these talukas are expected to be served by the project for irrigation.

The Canal system would command a gross area of 3.43 M ha. and cultivable area of 2.124 M ha. It is envisaged to irrigate annually 1.792 M ha. with the availability of 9 MAF of surface water from the project. From management point of view, for laying down a set of prescriptions for crop pattern, water allocation and management, conjunctive use etc., the command has been divided into regions based on the following factors:

- Annual rainfall
- Land irrigability class including drainage characteristics
- Ground water quantity and quality in terms of ground water table and salinity of water in the upper aquifers
- Alignment and the command of major branches.

Considering these factors, the command has been divided into 13 regions. The main regions, their names, CGA and CCA are as follows:

Sl.No.	Name of the region	Region No.	CGA	CCA
1.	Sankheda-Savli	1	2531	1619
2.	Sinor-Vadodara	2	2731	1876
3.	Bharuch-Amod	3	1532	849
4.	Vagra-Jambusar	4	1113	368
5.	Mehmedabad-Daskroi	5	2957	1923
6.	Sanand-Kadi	6	1817	1257
7.	Dholka-Dhandhuka	7	4760	2643
8.	Limdi-Botad	8	2940	1826
9.	Halvad-Malia	9	2684	1680
10.	Viramgam-Dasada	10	3446	2421
11.	Sami-Harij	11	1917	1152
12.	Radhanpur-Vav	12	4628	3197
13.	Rapar-Mundra	13	1229	428
	All regions	14	34285	21239

The Soil Survey Manual (IARI 1970) recognises six irrigability classes.

- Class 1 : Lands that have few limitations for sustained use under irrigation.
 Class 2 : Lands that have moderate limitations for sustained use under irrigation.
 Class 3 : Lands that have severe limitations for sustained use under irrigation.

- Class 4 : Lands that are marginal for sustained use under irrigation because of very severe limitations.
- Class 5 : Lands that are temporarily classified as not suitable for sustained use under irrigation pending further investigations.
- Class 6 : Land not suitable for sustained use under irrigation.

Flora and Fauna

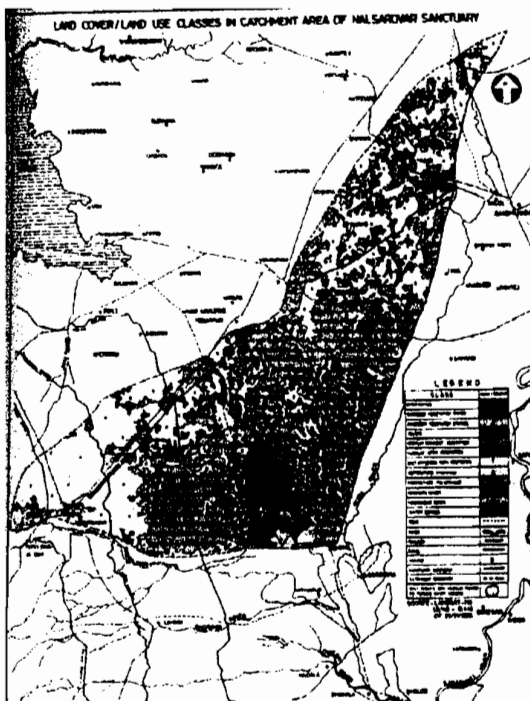
Based on the reports received from the three universities, which conducted the E.I.A. studies, the following are the identified impacts.

- + Irrigation will bring about sub-humid conditions in the various regions. This would be favourable for most crops trees of the area. Thus, semiarid regions of northern part of North Gujarat (region 12), Bhal area of Saurashtra (region 7) and Kutch (region 13) will also have partially sub-humid conditions in irrigated tracts.
- + SSP aims at diversified cropping patterns. Introduction of dry land horticultural crops on fallow and on areas not otherwise irrigable by gravity is also on the anvil.
- + Overall agricultural and tree-shrub biomass base will be substantially augmented. The range of biomass diversity adapted to sub-humid conditions is also likely to be larger. The following depicts the crop ranges of the area with stabilisation of irrigation and indicates that monocultures or limited ranges of cultures are not likely.
- + Studies show a rich potential for farm forestry, agro-silviculture, and forestry on saline and marginal lands. Including the canal side plantations on 18,000 ha, a conservative estimate indicates potential for plantations and tree culture of at least 3.27 lakh ha for the command area as a whole. Yields of grasslands in regions 4, 7, 8,9,10,11, and 12 will improve significantly with better propagation of perennial varieties like *Cynodon dactylon*, *Dichanthium annulatur* *Panicum*, *Paspalidium* etc.
- + Certain grass species and vegetation belonging exclusively to arid or desert climates may not thrive well as found from experience of Rajasthan Canal. However, since over 30 per cent of the geographical area will not have irrigation networks, the species may continue in these areas and this aspect is to be studied in depth.
- + Certain weeds may show accelerated growth of farmlands, drains, etc. and weed control strategies may have to be used. Weed problems in canals will not arise (when these are well maintained) because of lining down to 8 ha units.
- + If waterlogging develops in certain areas, new aqua vegetative systems with weeds are likely to develop.
- + There will be no impacts on major fauna since this is a present trend to agricultural regimes. Certain avifauna reptiles and rodents may proliferate. Avi fauna diversity will increase with a number of tanks and water bodies kept full as seen from the experience of Mahi command.
- + Steps for protection of the following flora and fauna species indicated presently as rare in the region to be taken are in the form of conversation measures in specific

areas identified or setting up herbaria etc. Universities will be involved for creation of gene bank pools to the extent required.

Sanctuaries

- For Nal Sarovar Bird Sanctuary (area 115 sq.kms. contribution from Sardar Sarovar Project waters will arise only when there are droughts and the lake does not fill up due to natural run-off from the catchment area. Studies done hitherto indicate that positive impacts can be expected with zoning out the lake area, protecting the habitat of migrant birds on the shore and a sound scientific plan which accommodates needs of the local communities for fishing and grazing. Utility of Nal Sarovar as a storage mechanism for supporting lift irrigation not likely to be favourable. Quality of agricultural run off to Nal Sarovar from the catchment area (which will be irrigated) is planned to be regularly monitored in the long run.



- As regards Wild Ass Sanctuary (area 4,953 sq kms), the overall impact is likely to be positive mainly because of availability of fresh water in waterholes for the wild Asses and better growth and sustenance of grasses. However, the sanctuary is under



some pressure because of salt industries and intrusion of cattle. Wild asses often damage crops on the periphery. The Kachchh Branch

crosses the neck dividing the Little Rann and the Great Rann and the most appropriate structure for the crossing is being worked out so as not to impede the movements of wild asses. Siphon type structure appears to be quite promising. Management plans will be worked out considering the salt industries, which have entered the Little Rann in a big way as also the pressure of cattle on the periphery. Better development of bio-mass on the islands, if brought about as a part of planned development, may reduce damages to the agriculture crops on the periphery by wild asses as observed at present. However, if the interior is not conserved, the impacts can be the just opposite.

→ As regards the Black Buck Sanctuary (area 34 sq kms), the Sardar Sarovar Project will create a very positive environment because of supply of fresh water which is highly deficient in the area. However identified negative impacts are listed below :

- + Wildlife habitat may be reduced in ecological zone due to the change in the land use and cropping pattern.
- + With increase in agricultural production, Blackbuck may start frequenting the fields, thus possibly increasing human/animal conflict.
- + Through there is very little likelihood of water-logging in ecological zone, some patches may face waterlogging creating small patches of saline marshes for short period.
- + Likely increase of pesticides and insecticides may affect migratory harriers and some other avi-fauna in ecological zone.
- + There is very little likelihood of a change in the microclimate in or around the park area.
- + Possibility of increase in water/moisture content in the soil may bring some change in plant communities especially Cyperaceae, Gramineae and some herbaceous species. There is likelihood of increase in area under *Prosopis juliflora* in parts of ecological zone.
- + There may be some increase in human activity, disturbing some wildlife in the ecological zone.
- + Increase in Blue bull population, due to the changed circumstances may cause problems of crop damage in surrounding areas of the National Park.

In general, for all the three sanctuaries, the networks are so planned as not to create problems of wild life movement and these are not extending anywhere inside the sanctuary limits.

Public Health

Major environmental apprehensions are with reference to the water-related diseases of malaria, filaria and schistosomiasis. As regards schistosomiasis, studies done by the National Institute of Communicable Diseases under WHO auspices indicate no snail-based foci for the disease in Narmada Valley. There are no prospects of occurrence of this disease for Narmada Project and monitoring will be ensured.

Malaria is found to occur naturally in epidemic cycles in Gujarat, partly influenced by climatic factors. Effectiveness of the chosen control strategy has also a significant influence on transmission rates. Malaria is important both for urban and rural areas. Two of the three mosquito species are considered as principal vectors responsible for transmission, viz. *Anopheles stephensi* in urban areas and *A. culicifacies* in rural areas.

Experience of surface irrigation in Mahi Project of Kheda District has shown enhanced transmission rates during the dry months of April to June which may be ascribed to irrigation but, in general, there is no clear relationship between average annual malaria incidence and irrigated areas in the 19 districts in Gujarat. Irrigation, thus is not the principal causative factor for malaria. It may have, however, impacts if stagnations of water bodies, seepages from canal, etc. are not controlled. Under SSP the infra-structure itself, at a large cost, takes care of avoiding or minimising seepages and stagnations.

The following control strategies are expected to address to malarial problems arising on account of Sardar Sarovar Project .

- (a) Special health units to monitor and treat migrants (workers and resettled people) intensively under malaria control programmes.)
- (b) Effective monitoring and surveillance under the operative malaria control programmes.
- (c) Emphasis on 'tidy' irrigation and drainage.
- (d) Creating awareness among Sardar Sarovar Project staff as well as among command population through health education and extension programmes. This also includes preparation of a manual on malaria control.
- (e) Use of identified carnivorous fish in tanks, ponds, etc. inside and near command area.

Filaria which is caused by the mosquito species of *Culex quinquefasciatus* (fatigan) will also be controlled. It is confined to coastal areas of Saurashtra and South Gujarat and not significant for the command area as such. However, monitoring of the disease will be required.

As regards other water related diseases like dysentery, typhoid, hepatitis, gastroenteritis etc. these are related in a very limited context to irrigation. Other major factors like sewage disposals, septic tank discharges, overall hygiene of the rural population and quality of domestic water supply under cities and towns which often gets infected due to old pipe networks predominate. With current emphasis on health programmes under of the State Government and those of Municipal Corporations and municipal bodies and with increasing financial outlays and operationalisation of health care as well as health education programmes (in the context of overall commitment of "Health for all by 2000 AD"), these diseases will be kept in control. Effective monitoring

and surveillance will be a part of the Health Plan for the command area of Sardar Sarovar Project.

Positive impacts due to reduction in scabies and skin diseases and availability of potable drinking water and bathing water through the SSP systems, as planned, would significantly prevail not only in the command area but also in the entire areas of Saurashtra, Kutch, and North Gujarat being served for domestic water by Sardar Sarovar Project. For scabies and skin diseases, the area benefited will not be only 20,000 sq. km. of Sardar Sarovar Project but about 80,000 sq. kms. of Saurashtra and Kutch.

Proposed Management Measures

The Sardar Sarovar Project service area has been classified into 13 agro climatic regions based on broad topographical, hydro meteorological and soil surveys. The drainage density is good in most of the regions except in regions 4, 7, and 11. Outfall conditions are sluggish in regions 4 and 7, parts of which are also affected by salinity. Sub areas or pockets likely to get waterlogged or saline due to irrigation in future have been identified for planning special measures to prevent development of such a situation.

The Phase-1 area of the project covering the command between the Narmada and the Mahi rivers has been taken up for detailed surveys, monitoring and planning. This comprises agro climatic regions 1 to 4. Detailed soil surveys and contour surveys have been carried out. Groundwater fluctuations in all the wells and special piezometers are being measured at regular intervals. Automatic water level recorders have also been installed at selected places. Hydro meteorological observation stations have been established. Studies for groundwater availability, annual recharge and mathematical modeling for surface and groundwater interaction have been carried out. Based on all these surveys and information as well as the data of rainfall intensities, the drainage plan for the Phase-1 area has been drawn up. The irrigation water allowances for the various regions in this area have been decided keeping in view the soil classification, groundwater availability, crops grown, and climatological factors. In poorly drained flat lands with relatively high water tables, limited water allowance and conjunctive use of surface and ground waters has been planned.

Similar exercises have been taken up for the command area beyond the Mahi river also. Regions 1 and 8 have very good surface topography and internal drainage. Surface drainage requirement, if any, will be in the form of minor drains for local patches. No sub-surface drainage works are required. A large part of region 9 is also similar. Regions 2, 5 and 13 also have good surface and internal drainage. Limited minor drains, remodeling of existing channels and ground water extraction for conjunctive use is considered adequate. Regions 3, 6, 10, 11, and 12 have relatively flat ground slope and moderate internal drainage. Minor drains, remodeling of existing channels, groundwater extraction, and a limited use of moderately saline ground water have been planned.

Regions 4,7 and 11 together with bordering areas of regions 9, 10 and 12 are relatively difficult for drainage. The Bhal tract of Gujarat falls within these regions. A well-planned intensive drainage network is being worked out for these regions. A very limited irrigation water allowance would be permitted. Ground water extraction, part mixing of saline water, improved water management and agricultural practices, leaching of surface salts by flooding with surplus spill waters of Narmada, salinity resistant agriculture and continuous careful monitoring of the groundwater table and salinity status through observation wells and piezometers etc. will constitute the multipronged strategy for tackling the problem areas.

The following are the proposed measures to prevent environmental degradation.

waterlogging and salinity:

1. Mechanised, well-controlled canal lining

This would reduce seepage loss to only about 10% of that in unlined canals. The canal system planning, design and operation are also inherently tuned to ensure that these problems do not arise. Thus, all the canals right down to the 8 ha blocks would be carefully lined to reduce the seepage losses. The main canals and branches will be concrete lined with mechanical pavers. The distribution system will be brick lined with a sandwiched rich mortar layer. Use of polyethylene membranes is also contemplated. The lining will reduce the seepage losses to about one tenth of the losses that would have occurred if the canals were unlined. The risk of waterlogging from seepage would be reduced to that extent.

2. Provision of surface drains.

The drainage excess rainfall, storm water from agricultural land for better crop productivity has been proposed at farm levels as well as at regional level. Whole of command has been divided into two regions in respect of preparation of operational design and layout of surface drainage network commencing from 40 ha chak. The construction of the drainage system shall go on concurrently with the canals.

3. Conjunctive utilisation of surface and ground water, limited water delta.

The amount of water supplied per unit of area in the SSP command will be amongst the lowest in the country. The average depth of surface water supplies for the entire year measured at the main canal head will be only about 53 cm over the command area as compared to 75 to 100 cm per crop season on most of the projects in the country. This will naturally call for very judicious and economical use of water. If the farmers want to grow water intensive crops, they will have to supplement the canal water with well waters or reduce the area of their crops under irrigation. The project authorities have contemplated, conjunctive use of surface and ground waters. In the existing

irrigated areas of other prefects where well irrigation is concurrently practiced, the problem of waterlogging has reduced.

4. *Better water management ,Automated canal regulation, Rotational water supply on volumetric basis ,and active participation of farmers*

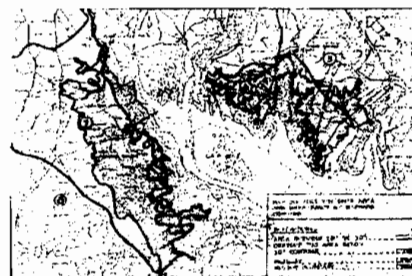
A draft legislation has been already prepared to regulate the distribution and use of canal and ground water in the state. On the Sardar Sarovar Project there will be volumetric supply of water through a computerized semi-automated operation system. Under this system, the discharge from the canals down to 8.5 cumecs (300 cusecs) capacity will be regulated through automatic computer control. These measures will not allow the canals to draw more water than planned. As the tariff for the water will be on the basis of the quantity supplied, the farmers will naturally try to use it most economically. This will be further ensured through better water management through farmers' associations and rotational water supply. The irrigation water depths actually required will be worked out through a system of soil moisture sensors and observations of hydro meteorological and climatological parameters as related to crop growth stages and the supplies will be regulated accordingly. Wherever possible drip and sprinkler methods of water application will also be encouraged.

5. *Carrying out water balance and salt balance studies and the necessary monitoring.*

During monsoon, when surplus waters are likely to be available in the canal, such waters will be used for flooding and leaching the saline soils. Continuous monitoring of salt and water balance has also been planned for such marginal soils.

6. *Bhal and Bara Tract*

Special problematic areas of Bhal and Bara are difficult for irrigation in view of high water table and salinity. A possible way of developing this area can be through suitable forest development programme. Salt loving plants, having a high evapo-transpiration rate can be preferred. These plants can help in controlling the water table. In the initial stage of development of irrigation in the command, there will be excess water available. This can be used over this area for initial leaching by way of surface diffusion. This can promote initial growth till the plants develop some resistance. Species like *Prosopis juliflora*, *Eucalyptus Artiplex* and other suitable plants can be tried. No irrigation system can be thought of for this area.



Flora fauna

National Park / sanctuaries :-

Velavadar National Park

Food availability, water and climate are some of the important factors regulating the population. Following are some of the resultant impacts on ecosystem :

- + More water can be made available for the wildlife in the National Park area.
- + Habitat improvement in some fringe areas of the park.
- + Increased availability of food in the ecological zone outside the park in agricultural fields. There may not be much change deeper in the park.
- + Decrease in biotic pressures, especially the cattle grazing on fringes of the park due to the availability of more forage outside the park.
- + Likely increase in the carrying capacity of Blackbuck, Nilgai, Wolf and other wild animals due to increase in the forage productivity and better water regime.
- + Increase in agricultural production and more area coming under agriculture, outside the park.
- + Likely change in cropping pattern, with two crops instead of one in some areas.
- + Fallow and cultivable wastelands can be made productive.
- + Possibility of taking more areas under tree cover, and agro-forestry. This may also increase the availability of fuel wood and fodder.
- + Adequate supply of drinking water in the area.
- + At some spots canal structure (distributaries) may obstruct the migration of Blackbuck outside the park area on northern side. This canal structure will act as a natural barrier to Blackbuck going in cultivated fields.

The negative impacts, likely to occur due to the network revolves mainly around four aspects

- (i) Water logging
- (ii) Change in the land use pattern and cropping pattern
- (iii) Wildlife-human conflict in the ecological zone
- (iv) Canal structure as an obstacle to the movement of wild life

For minimising the negative impacts, measures have been planned :

ACTION PLANS

Integration of all developmental activities related to irrigation, drainage, agriculture, co-operation, roads, marketing, forests, rural electrification etc. is considered as a basic requirement for the command area development programme targeted for SSP. The emphasis is on long term balanced and environment-friendly

growth. Action Plans have been drawn up on the issues like health, fisheries, flora fauna etc. for the Command Area.

IMPLEMENTATION

Construction of canal Phase -1 Ch 0.00 Km to 144.500 Km (Mahi crossing) along with the distributaries is almost complete. Surface drainage is being provided up to 40 ha chaks concurrently with the construction of canals. The command coming under Phase - 1 extends up to Narmada-Mahi doab and areas coming under this belongs to agro-climatic zone no 1 to 4. Development of the command area is a long drawn process. Gujarat has taken steps in accordance with the covenants of the investment clearance accorded to the project by the Planning Commission and *pari-passu* clause stipulated by the MOEF. By now, almost all the major studies have been completed and impacts are known. Action points have also been determined. State Govts. have taken steps for implementation of the identified action points in accordance with the requirement of the environmental control. The command area development activities and environmental safeguard measures will be taken when water starts flowing in the canals.



(B) Current Scenario : Government of Rajasthan

The Government of Rajasthan had submitted a report on Environmental and Ecological aspects and remedial measures for 'Narmada Canal Project'. Copy of the report was submitted to Ministry of Environment and Forests. Government of Rajasthan have assigned studies on EIA of Command area in Rajasthan portion to WAPCOS. Revised draft final report is available, which is in the process of approval by State Government. Current status of studies & works is summarised below :

Narmada Main Canal

Rajasthan has been allocated 0.5 MAF (616 MCM) of Narmada water under the final award of NWDT. To utilise its share of the Narmada water, Govt. of Rajasthan have planned a 74 km long Narmada Canal to irrigate 73,157 ha. of land in the drought prone districts of Jalore and Barmer. The canal system will cover Gross Command Area (GCA) of 1,42,020 ha. of which 1,35,476 ha. is culturable Command Area (CCA). Besides irrigation benefit to 89 villages (74 in Jalore & 15 in Barmer), the project also envisages to provide drinking water to a population of about 3.0 lakhs living in 124 villages around the irrigation canal.

The canal will be trapezoidal in section and will be lined by cement concrete. Maximum capacity of the canal at the head is 74.58 cumec while discharge requirement is 69.43 cumec. There are 9 major distributories with a total length of 282.30 km. The total length of minors and sub-minors is 485.0 and 636.0 km respectively. Additional project activities would include construction of head regulators, bridges, cross drainage works, escapes etc.

A map showing the command area and the layout plan of the canal system is given at plate-III. The detailed Project Report (revised) for appraisal was submitted to Central Water Commission for approval during February, 1990. The project was considered in the 51st meeting of Technical Advisory Committee on Irrigation, Flood Control and Multi-purpose Project held on 04.12.91 and investment clearance was accorded by Planning commission vide their letter No.2(307)/92-I & C AD, dated 23.01.1996 for Rs.467.53 crores at 1989-90 price level including Rs.280.14 crores share cost payable to Gujarat. The benefit cost ratio and internal rate of return of the project are 1.01 and 10.42% respectively.

The construction of Main Canal in the first 42.0 Km reach has been taken up and the earthwork is under progress. The entire Narmada Main Canal works in Rajasthan is scheduled for completion by 2005-2006.

Water Delivery Network

The water delivery system will cater to irrigation needs of the vast areas through irrigation units. Each unit of irrigation service area, called Village Service Area (VSA), has been planned to be served through a single outlet from the distributory. This outlet will remain fully open for a fixed period during irrigation water demand and will be closed during periods of no water demand and no water availability. Water will be delivered only on the basis of the demand to a group of organised cultivators on a volumetric basis at the head of VSA, and not to individual cultivators.

In the VSAs, network for water distribution is planned through minors and sub-minors feeding different chaks and sub-chaks. For the entire system below VSA outlets,

water will be supplied in proportion to the area served. Within the chak, the water will be rotated to individual fields over fixed times in proportion to the holdings.

The Distribution System Under VSAs

A Village Service Area (VSA) will generally constitute an area between 300-500 ha. of a village under command. For villages extending over areas larger than 500 ha. or if required on the basis of topography or other physical features, the VSA may cover a larger area. The VSA is planned to be divided into chaks of 30 to 60 ha.. In a chak there will be 4 to 6 sub chaks. A minor will lead the water from the VSA outlets to the heads of chaks. A sub minor will convey water into the chak up to heads of sub chaks. Field channels will carry water from heads of sub-chaks to individual fields. The chaks will be ungated and water will be rotated into sub-chaks through turnouts. In a sub chak, water will be rotated to individual farms.

The VSA outlets will either be 'on' or 'off'. A constant discharge will be released. The flow will be divided proportionately at each chak head, by fixed proportional devices. Within the chak, the flow will be rotated. The flow will continue over a fixed continuous period during a week. Generally, it will run over a period of one week. The schedule of rotation among farmers during the period of supply to the service area will be fixed for each season so that each farmer will know the day of the week and precise hours during which he is required to draw. Prior to the commencement of each crop season, the schedule may be altered so that night operations can be rotated among all farmers.

The water will flow in the VSA when demanded. Depending upon water availability, the number of waterings will be made available, at intervals, to the entire VSA. Each watering will start on a prefixed day of a week every time. During periods of peak demand, water can be supplied for consecutive weeks also. The periods between the irrigation will generally be in increments of seven days. Irrigation water will be delivered at an approximate rate of around 30 litres/sec to farmers. The actual stream size will be proportional to the area of the chak.

The farmers within a service area will, in association with the agricultural extension staff, collectively determine their common schedule for delivery of allocated water to the VSA in terms of size and number of irrigation waterings and dates of delivery. Any changes in the schedule during a cycle will be likewise determined. Short term altering of the delivery schedule to a VSA as a sequel to the rainfall, will be carried out under codes/procedures agreed upon between the agency and the VSA Committee.

Drainage System

Surface drainage would be an integral part of irrigation net work and is being provided for to cover 40 ha. chak unit in all the areas needing surface drainage. The vertical drainage as required will be through Tube Wells and Open Wells. The drainage

system would consist of surface network of open channels and ground water control wells. The natural drainage shall be suitably modified and additional drainage will be provided where ever necessary to take care of excess water during monsoon to ensure that the flood water gets drained out in a reasonable period and there is no spill over and choking of drainage. The sub-surface water drainage control will be through judical ground water exploitation and with adequate planning so that there is no water logging in the areas. The drainage system shall be constructed and maintained up to 40 ha. block synchronising in general with a chak distribution unit. The maintenance of drainage, within the chak will be left to the farmers. The construction of the drainage network will be completed simultaneously with the construction of major distribution network and completed on block to block basis so that it is ready for use by the farmers by which time the surface water becomes available for irrigation.

Chapter 5

FLORA, FAUNA, WILDLIFE & CARRYING CAPACITY

Several aspects of the SSP have potential to cause adverse effects on the terrestrial ecology of areas upstream of the dam, principal amongst these are:

- The submergence of forestland,
- And the resettlement of people in new areas



The SSP also has considerable potential to have beneficial effects on ecological resources, owing to:

- The creation of new and regenerated forest habitat;
- The establishment and improvement of wildlife sanctuaries;
- The greater availability of fresh water for irrigated forestry or for wildlife

The guidelines of the MOEF required that while seeking environmental clearance for the hydropower projects, surveys should be conducted so that the status of the flora and fauna present can be assessed, listed (rare and endangered) species can be detected, if present, and appropriate conservation measures devised.



On the basis of relevant details supplied by the various states, MOEF issued clearance for the SSP in 1987. A condition of this clearance, as far as it related specifically to the Flora & Fauna, was that the Narmada Control Authority would ensure in-depth studies on flora & fauna needed for implementation of Environmental Safeguard measures. The issues identified with respect to submergence area were identification of endangered species, rare & habitat sufficiency. Accordingly, the rehabilitation of flora fauna

action plans were expected to cover the Surveys of flora & fauna in the region going to be affected due to implementation of the SSP with reference to the following

- 1) Gene pool, if any, likely to be affected.
- 2) Details of wildlife habitat in the region
- 3) Measures proposed to rehabilitate endangered species of flora fauna, if any.
- 4) Assessment of the carrying capacity of the neighbouring areas wherein the wildlife would dispose if the scheme were implemented.
- 5) Plan for rehabilitation of endangered flora & fauna.

STUDIES / SURVEYS

Important survey work included the following:

- ❖ The Environmental Impact Study of 1983 prepared by MSU.
- ❖ Preliminary Report on First Botanical Exploration and Plant Collection from Narmada Valley by the Botanical Survey of India in 1986.
- ❖ Report on the Survey of the Narmada Sagar Area by Zoological Survey of India, 1988.
- ❖ Note on Sardar Sarovar Project - Preparation of Environmental Work Plan for Forest and Wildlife by the State Forest Department, GOM, 1988.
- ❖ Status of Flora and Fauna in and Around Sardar Sarovar Project, Maharashtra is studied by the University of Pune (1992-94). Final report is received in NCA.
- ❖ Eco-Environmental and Wildlife Management Studies in the Sardar Sarovar Area in Gujarat, 1992, by MSU.
- ❖ Impact Assessment of Madhya Pradesh Land to be Submerged Under Sardar Sarovar Project and Adjoining Ecosystems. The study was conducted by the State Forest Research Institute (SFRI) in Jabalpur and financed by the NVDA. This study was completed & report was submitted in 1994.
- ❖ Workshop on Approaches to Integrated Wildlife Management in Gujarat: A Report by the SSNNL, October 1990.
- ❖ People's Involvement in Wildlife Management, by VIKSAT in 1991.
- ❖ Wildlife Management Studies in the Submergence and Catchment Area of Narmada Project: With Special Reference to Shoolpaneshwar Wildlife Sanctuary, by the SSNNL, 1992.
- ❖ Narmada Basin Water Development Plan: Development of Fisheries, 1987, was prepared by the Narmada Planning Agency, GOMP.
- ❖ Rapid Reconnaissance Survey of Limnological Aspects Part I, II and III, 1987, were undertaken by the Bhopal, Vikram and Rani Durgavati Universities for GOMP.
- ❖ The Central Pollution Control Board, Central Water Commission, the State Pollution Control Boards and the National Institute of Oceanography have collected water quality data.
- ❖ Narmada River Basin Development Project: Fisheries Component, 1991 by the German Consultants to the World Bank, GOPA.
- ❖ Sociological Survey of the Fishing Families of the Narmada River by CICFRI, 1991.

- Aquatic Fauna (Fish) Studies in Indira Sagar Submergence Area, prepared by the Friends of Nature Society in 1991 on behalf on the NVDA reported on the fish fauna of the Narmada.
- Pre-and Post-Impoundment Limnological Studies of Narmada Basin, by three universities coordinated by Barkatullah University for the NVDA. (1989-92) Study report was available in 1994.
- Studies on Fish Conservation in Narmada Sagar, Sardar Sarovar and it's Downstream, is a desk review sponsored by the NCA and undertaken by CICFRI, 1993.
- Ecology and Fisheries of the Narmada Estuarine System with Special Reference to Proposed Impoundment (Sardar Sarovar Dam) is an ongoing study begun in 1988 by CICFRI.

ACTION PLANS

A) Wildlife (Terrestrial)

To ensure that the wildlife conservation measures are implemented effectively, Action Plans for the three states were prepared as follows:

- Felling plans for the forest area coming under submergence in Maharashtra and Madhya Pradesh will avoid the possibility of animals being trapped in the submergence area
- Plans for improvement works in the wildlife sanctuaries of Gujarat. Shoolpaneshwar sanctuary development Action Plan prepared by GOG in 1996 and submitted to Forest Department GOG for implementation.

Table-11: Summary of Status of Environmental Planning :

Wildlife

	Gujarat	Maharashtra	Madhya Pradesh
• Preliminary Surveys	Complete	Complete	Complete
• in-depth Studies	Complete, Final reports available.	Completed, Draft Final report available	Complete Final reports available.
• Development of Management Options	Complete for Shoolpaneshwar sanctuary.	Awaiting results of study report from SES, Pune.	Some work completed but awaiting deliberations of the expert group.
Action Plans :			
• Migratory corridors	Not needed	Not needed	Plan ready
• Sanctuary development	Shoolpaneshwar sanctuary Management Plan prepared	Not needed.	Not needed.
• Wildlife conservation measures in adjoining forest(s)	Massive afforestation in catchment of SSP.	Under formulations.	Awaits final outcome of the expert group.

• Implementation	Shoolpaneshwar Sanctuary Plan under implementation. CAT work (increasing carrying capacity) nearing completion.	CAF & CAT nearly completed. Plan under formulation.	Arrangements complete, awaiting final outcome of study. Substantial CAT works in the catchment completed.
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B) Fisheries (Aquatic):

Three State Govt.(s) submitted the fisheries development plans, which are as follows:

- The Narmada Basin Water Development Plan: The Development of Fisheries, 1984. This comprehensive plan for GOMP addressed the development of fisheries in the Omkareshwar, Maheshwar and SSP areas. Phasing and programming with respect to pre and post-impoundment, clearance of the forests, training of fishermen, cooperative societies and post-impoundment management was proposed.

- Environmental Work Plan Sector Fish and Fisheries, GOG, 1986. This work plan, prepared in compliance with the agreement with the World Bank included the establishment of fish hatcheries and fish farms, training of fishermen, establishing primary cooperatives, and establishing an Inter State Fisheries Board. In addition, it included proposals for conducting hydro-biological studies, studies on the morphology of the river, investigations into the physical and chemical characteristic of the water and soil, and studies on flora, fauna, fish yield, plankton, and productivity in the reservoir. This plan was again revised by GOG in August 1997 & resubmitted to NCA during November 1997.



- A Note on SSP: Preparation of Environmental Work Plan for Fisheries Development in Maharashtra, 1987.

This plan included proposals for the felling in the reservoir submergence zone, fish seed, hatcheries, stocking, fishing, manpower requirements, and training and management through the Inter-State Board. Some more studies have been proposed by GOM through CICFRI. Subsequently, the state governments have revised their plans with a view to address to issues as they



arose. The revised plan for GOM included proposals for the fishing population to be resettled on the periphery of the reservoir or in R&R sites in Maharashtra. In addition, the establishment of low-cost hatcheries and irrigation tanks, the development of pen cage culture fisheries, and intensive fish farming were proposed.

- GOG also revised their plan by end 1994.

The plan contained four volumes covering upstream, downstream & command areas. In view of the progressive impoundment which commenced in March 1994, NCA has constituted an expert group to lay down the guidelines for conservation & development of fisheries & its ecosystem. The plans submitted by state governments are under scrutiny of this expert group. The summary of status of planning is given in *table-10* and *table-11*.

Table-10. Summary of Status of Environmental Planning: Fisheries

	Govt. of Gujarat	Govt. Maharashtra	Govt. of M.P.
• Preliminary surveys work plan	Yes	Yes	Yes
• Updating of detailed surveys/studies of fish fauna	Yes	-	Yes
• Updated Action Plans	Yes	Yes	Submitted in 1997
Implementation :			
1. Plan for clear felling	Completed	Yes, to synchronise with submergence about 734.00 ha. felled.	Yes, to synchronise with submergence work commenced.
2. Development of fish farms	Under implementation	Proposal under revision	Proposal under revision
3. Establishment of IFDB for future R&D Management	Agreed	Agreed	Agreed.
4. Expert group to lay down guidelines for Conservation & Development	Yes, agreed by the State & constituted by the NCA. Five meetings held, guidelines are on the anvil.	As per col. No.2	As per col. No.2

Enhance nature conservation outside the immediate catchment area of the Narmada

The SSP will also provide an opportunity to enhance nature conservation outside the immediate catchment area of the Narmada. In particular three wildlife

sanctuaries located in the command area of the project will benefit from the increased freshwater availability resulting from

The project and there are plans by the GOG to further develop these. They comprise:

- Nal Sarovar, Bird Sanctuary;
- Wild Ass Sanctuary in the Rann of Kutch.
- Velavadar Black Buck National Park.

IMPLEMENTATION

CICFRI have also been commissioned to monitor the whole of the estuary and their study has been extended to examine pollution and to undertake Modeling studies in the downstream environment.

An expert group has been constituted by NCA to lay down the guidelines for fish conservation & development during progressive filling of the reservoir to advise the state executive agencies for follow-up action. Guidelines are on the anvil.

Creation of an Interstate Fisheries Development Board has been agreed to by party States, which is expected to be setup and fully functioning prior to reservoir filling. This Board would implement the guidelines for conservation of fisheries recommended by HLEG.

The Organisation is expected to be set up and fully functioning prior to reservoir filling.

On-going Fisheries Activities in the Sardar Sarovar

Some fisheries development activities are already going in the Sardar Sarovar from the year 1992 onwards. From 1993-94, these programmes received the financial support from the Sardar Sarovar projects. These activities are:

- Seed Stocking in the Sardar Sarovar
- Development of Rearing space for Fish Seed Production
- Mangrove Plantation Programme.

Till the March, 2000 State Forest Department and other Fisheries Development Agencies have stocked 382.35 lacs fingerlings / yearlings in the main reservoir as well as dykes of the Sardar Sarovar.

There is a provision to create rearing space for seed rearing in the Sardar Sarovar and the funds have been provided by the SSP.

The total amount for the rearing ponds is at present Rs.64.36 lakh. The site selected for the rearing ponds initially in the reservoir premises was found to be unsuitable on account of higher water permeability of the soil. Hence, another site has been located in the village of Timbi (Nanded Taluk) of Bharuch district, in the Survey No.303. The soil samples have been sent for analysis to decide the suitability.

In Gujarat, reservoir bowl is already cleared of all vegetative growth. Execution of felling in M.P. & Maharastra, as per felling plans prepared, await the commencement of impounding.

Chapter 6

SEISMICITY

INTRODUCTION

Studies of reservoir induced seismicity (RIS) and rim stability have been carried out by the Geological Survey of India (GSI), Central Water and Power Research Station (CWPRS), University of Roorkee and World Bank Consultants. The principal studies are described below:

- University of Roorkee. 1980. Geological and Seismological Investigations of the Environs of Narmada Valley around Navagam Dam site in Gujarat.
- GSI. 1981-82 and 1982-83. A Geotechnical Report on the Reservoir Competency Investigations in Parts of Sardar Sarovar Area, Bharuch & Vadodara Districts. Volumes II&I.
- Shenoi et al. 1982. Shenoi et al presented at the New Delhi Conference on the significance of Seismotectonic Aspects on Reservoir Development.
- Balasundaram, M.S. 1982 Sardar Sarovar Project: A Geotechnical Report compiled and edited for the Government of Gujarat.
- MSU. 1983. The Sardar Sarovar Narmada Project Studies on Ecology and Environment.
- NVDA published a Position Paper on Seismic Studies in January 1986.
- Krishna, Dr. J. 1989. Dams and Seismicity.
- GSI. 1990. Study of the Rim Stability of the SSP.
- GOI. 1993. Sardar Sarovar Project Seismicity and Sardar Sarovar Dam.

IMPLEMENTATION

The various recommendations for modification of the dam design which have all been implemented are summarised as:

- Adoption of horizontal design coefficient of 0.125g on the recommendation of the Dam Review Panel
- Installation of stress monitors in the main body of the dam
- Increase of the depth of the foundation to 18m below the lowest riverbed.

The Government of Gujarat has identified 9 locations for the installation of seismic monitoring stations, 4 each on either side and one at the downstream of the Sardar Sarovar reservoir, out of a total of 9 stations, 3 are in M.P., 1 in Maharashtra

Chapter 7

HEALTH ASPECTS

Health provision in India is defined by the National Health Policy (NHP) and national disease programmes such as the National Malaria Eradication Programme (NMEP). The NHP entitles access to medical facilities to all Indians, the number and distribution of which is determined by the local population density. The NMEP was developed, as a nation-wide strategy to combat the spread of malaria with regard to SSP all the three State Governments will integrate development of new facilities with proposals already made under the NHP and NMEP. Such integration will avoid duplication, maintain parity within the project area and provide better access to health care than would otherwise be achieved.

In addition to the general obligations of the State under national policy, a specific requirement for the SSP contained in the environment clearance order of GOI was that, that plans for the provision of health facilities to workers and residents of the affected areas should be prepared. Each State should take necessary measures to minimise the risk of malaria, filarial, schistosomiasis and other diseases associated with water that may result from implementation of the project. Preparation of an Action Plan for the surveillance and control of malaria was also stipulated.



HEALTH AND ENVIRONMENTAL IMPACT

The two main potential sources of health impact associated with the reservoir and Irrigation projects are as follows:

- The occurrence of pools of standing water, during construction and operation of the reservoir, may provide breeding areas for disease vectors:
- Immigrant construction workers may bring with them diseases or parasites, to which the local population may have low immunity.

The SSP is expected to confer significant public health benefit's since increased water availability will help to reduce the Incidence of 'water-washed' and 'waterborne' diseases which are associated with poor hygiene and restricted water borne water supply. Management of the potential health Impacts of the SSP will focus, therefore, on the exclusion and/or control of the disease vectors which spread 'water-based' and 'water-related' diseases.

A large number of studies have been carried out on the health profile of villages in the three affected states. The key studies are summarised below:

- Narmada Programme-Schistosomiasis -Back-to-Office Report, 1986, assessment carried out by Goodland, consultant to the World Bank, the National Institute of Communicable Diseases (NICD) and the World Health Organisation (WHO).
- Proceedings and Recommendations of the Meeting on Schistosomiasis Research and Surveillance held at NICD on 22nd November 1985.
- Disease Profile of Command Area by the State Commissariat of Health, Medical Services and Medical Education (SCHMS), 1986.
- Health Statistics< GOM, 1987. The State Department of Health, Report on the health profile of 33 project-affected villages in Dhule district, Maharashtra.
- Health Statistics 1982-84, GOMP. This study published by GOMP in 1985 & updated in 1994.
- The Sardar Sarovar Narmada Project Studies on Ecology and Environment by MSU in 1983, considered public health in Chapter-3.
- Numerous studies have been conducted on the incidence of malaria in India, amongst others, by the Malaria Research Center (MRC).
- Revised Plan by GOM, 1995.
- Revised Health Plan by GOG, 1996.
- Draft Health Management Plan by GOG, 1997.
- Epidemiological Surveillance Studies by GOM, 1996.
- Epidemiological Surveillance Studies by Gandhi Medical College, Bhopal for GOMP 5th Interim Report (1997).

Status of implementation of actions for Public Health

Studies on the disease profile in the SSP region and past experience with major water resources projects suggested that health Action Plans for the project should focus on the following:

- + Provision of health care for displaced people and immigrant workers;
- + Control of malaria and potential breeding sites for malarial vectors;
- + Monitoring for the incidence of other water-related and waterborne diseases with a view of preventing their establishment.

Gujarat

An Initial work Plan for Environmental Effects: Sector Public Health for the Command Area of Gujarat was drawn up in 1986 by the NPG in coordination with SCHMS. This plan covers villages within a 10 km radius of the reservoir including resettled populations and makes provision for the monitoring, surveillance and

control of malaria. The 1986 plan is under implementation with certain modifications and additions.

The principal objectives of the work plan are:

- To provide for systematic and continuous monitoring of the health profile of the project area;
- To provide suitable Infrastructure for health provision in the project area.

The plan also outlines actions for the surveillance and control of malaria. The main components of the plan area summarised below.

- + Establishment of hospital at Kevadia.
- + Strengthening of laboratory facilities including establishment of mobile unit.
- + Provision for laboratory technicians in existing public health centers (PHC's).
- + Expansion of malaria treatment depots.

Proposal to establish Urban Malaria Scheme for centres over 40,000 (anti-larval operations) not currently covered. Strengthening of state level health organisations to ensure monitoring of malaria, filaria, dengue and encephalitis, strengthening of district level health organisations for monitoring or implementation, residual insecticidal spraying operations are included in the plan.

Maharashtra

GOM submitted an Initial Work Plan for Public Health Sector In 1987, which was modified and resubmitted for consideration in 1991 and further and updated in 1992 & 1993. The work plan was based on the state health department survey of Dhule District. The principal objectives of the plan were as

- To monitor closely health conditions in Dhule district
- To provide facilities for carrying out this monitoring
- To adopt precautionary measures against the spread of diseases
- To be prepared to combat epidemics that might arise.

The work plan also contained provisions for the strengthening of state and district health facilities in existing villages and in resettlement areas. The provisions included the establishment of a monitoring and laboratory cell at the Rural Hospital and strengthening of the existing Primary Health Centre. It contained full descriptions of the likely costs and staffing requirements of these measures.

Madhya Pradesh

An initial Work Plan for the Public Sector was submitted to the NVDA the state health department in 1988. This plan included a summary of existing health profile in

the submergence villages and discussed the likely impacts of the SSP. The plan contains specific provisions for:

- Strengthening of health facilities already in place under the NHP and Minimum needs programme of the Seventh Five Year Plan;
- Establishment of a Health Monitoring Cell;
- Strengthening of health centers for construction workers;
- Establishment of district organizations for malaria control established of the NMEP.

An extension to the MP Health Plan was published by the NVDA in January 1990 and was revised and re-submitted in 1991. This report provides additional detail concerning the provision and training of health care staff, numbers of specialist staff required, funding and responsibilities for management.

In addition to the State Health Plan, a Memorandum of Understanding was signed between Gandhi Medical College, Bhopal and the NVDA to provide further arrangements for the monitoring of malaria and other diseases. This memorandum included provisions for the following:

- Study of mosquito vectors in the Narmada area;
- Comparison of SSP with other similar project situations and analysis of lessons learned;
- Collection and analysis of time-series-data on disease incidence;
- Recommendation of health promotion and disease preventative measures in the SSP area.

Implementation

A) Govt. of Gujarat:

There is a dispensary at SSP dam site run by M/s Jai Prakash Associates. It has regular Medical Officer and other staff to diagnose and treat the malaria patient.

A medical cell with 20 mobile unit's and 61 dispensaries are working in R&R sites. The cell consists of physician, pediatrician and Gynecologist. The cell is also provided with two ambulances. The main functions includes :



- ≤ Regular visiting of sites
- ≤ Providing specialized services at the door steps of PAFs
- ≤ Medical check-up

- ≤ Pot chlorination through distribution of chlorine tablets.
- ≤ Providing nutritional supplements to children's, pregnant's and lactic mothers.
- ≤ Other preventive and curative health measures

B) Govt. of Maharashtra:

In accordance with State provision for health care facilities, two cottage hospitals, eight primary health centres and 55 primary health unit's have already been established in Dhule District. Taking into account the inaccessibility of some of the villages, provisions were made for eight additional public health unit's, 10 mobile unit's and a floating dispensary for villages within 10 km of the submergence zone. One hospital at Somawal resettlement village, is already functional.



Photo : showing the Hospital at village Somawal in Maharashtra.

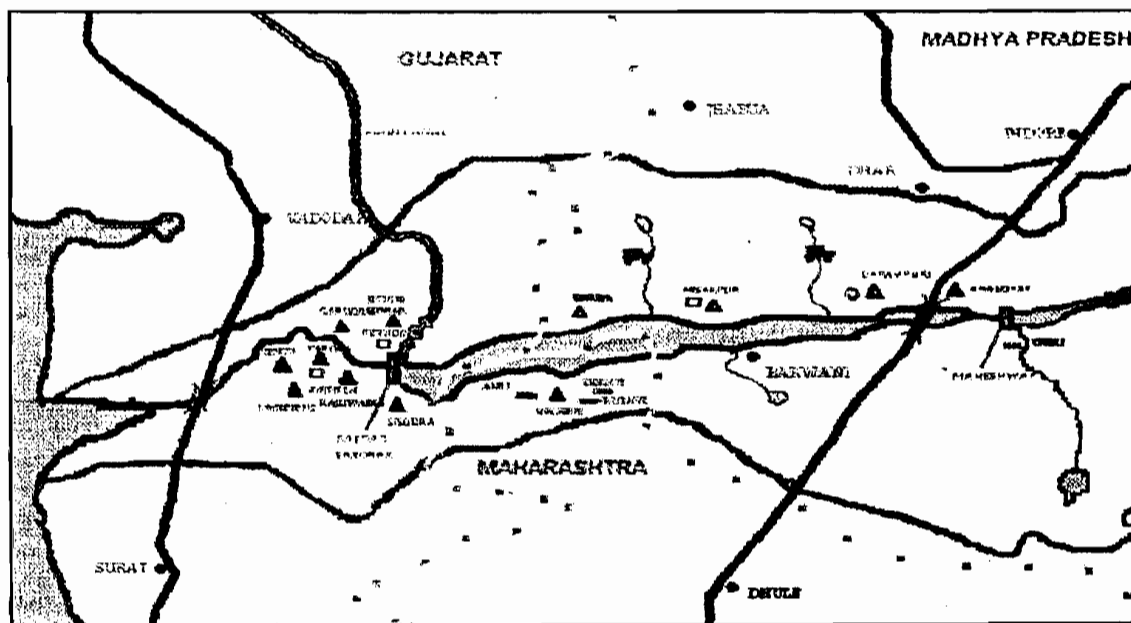
C) Govt. of Madhya Pradesh

During 1992, Gandhi Medical College continued surveillance studies of the impact area of Madhya Pradesh and work commenced on additional facilities for the Nisarpur village hospital, Dhar District. Extension of the Nisarpur hospital is due for completion commensurate with submergence of areas in Madhya Pradesh.

Action	Gujarat	Maharashtra	Madhya Pradesh
• Baseline studies	Complete, 1986 updated '95	Complete, 1987 being updated.	Complete, 1994 being updated.
• Preparation of state Action Plan	Submitted and modified in 1986; Urban Malaria Scheme proposed. Draft Health Management Plan submitted in 1997.	Original submitted in 1987 revised in 1991, 1992 & 1993.	Original submitted in 1986, revised in 1988 and final plan submitted in 1991. Cost details incorporated in 1996.
• Survey of existing facilities	Complete	Complete	Complete
• Establishment of new facilities	Hospital at Kevadia for workers; laboratory and mobile unit complete, drug dispensaries	Somawal village hospital; health centers and health unit's functioning.	Hospital, mobile unit and civil dispensaries for labour; detailed scheme for resettled population
• Vector control measures in place	NMEP; SSNNL work - shop on malaria control; laboratory established, studies on health completed	NMEP; adoption malaria control guidelines of irrigation Department	NMEP; state malaria control organizations strengthened
• Appointment of specialist staff	One senior health officer is posted at Kevadia	Yes one PHC, 3 dispensaries & one floating dispensaries established & 51 posts	Needs identified.

		filled up & laboratory facilities Provided.	
• Disease monitoring and responsibility	Entrusted to SCHMS EIA report submitted. Draft Health Management Plan submitted in 1997.	Entrusted to regular health Department Surveillance studies commenced. Phase-I survey report submitted by T.N. Medical College. Proposal for Phase-II study submitted.	Evaluation cell established monitoring by Gandhi Medical College, Bhopal. Five interim reports received

Map Showing status of implementation of health plan in SSP impact are



Chapter 8**ARCHAEOLOGICAL ANTHROPOLOGICAL****ARCHAEOLOGICAL SURVEY**

The Sardar Sarovar Project has necessitated afresh look at the archaeological and cultural heritage available in the Narmada valley. The Government of India recognises the value of such cultural sites and has enacted a series of laws to maintain and protect them from decay, misuse or development activities. Sites are classified into three categories as follows :

Type 1: monuments of national importance which are protected by central government:

Type 2: monuments of religious or cultural importance which are protected by the state governments;

Type 3: monuments which are neither centrally or State-protected but which are considered to be an Important part of cultural heritage.

In the case of SSP, where some sites may be submerged the NWDT award stipulated that, the entire cost of relocation and protection should be chargeable to GOG. Relocation work is to be supervised by the Department of Archaeology under the provisions of the 1958 Act.

STUDIES

The three State governments carried out a complete survey of cultural and religious sites within the submergence zone under the direction of the project proponents. The principal aim of these studies was to list all archaeological sites, identify and name any sites under state-protection and further identify sites of religious or cultural significance which, although not protected under national law, are of sufficient value to merit relocation. These studies are summarised below. Survey conducted for identification of various sites & monuments of significance has included the following:

- Gujarat: Archaeological Survey of Nineteen Villages Submerged by Sardar Sarovar Reservoir, 1989.
- Maharashtra: Survey by Department of Archaeology.
- Survey was carried out by the State Department of Archaeology for cultural sites in 24 villages of Akrani taluk and nine villages from Akkalkuwa taluk, Dhule district.
- Madhya Pradesh: Survey by State Department of Archaeology and Museum (1992), in sixteen volumes.

- Anthropological Survey of India: Narmada Salvage Plan.
- Anthropological Survey of India: People's of India.
- Adivasi Kala Parishad: Survey of Material Cultural in the Narmada Valley.
- Rashtriya Manav Sanghralaya: Narmada Salvage Plan.

Gujarat

- + Archaeological Survey of Nineteen Villages submerged by Sardar Sarovar Reservoir, 1989: - The Department of Archaeology was instructed to carry out a survey of archaeological sites in 19 villages of the proposed SSP submergence zone in Gujarat. By June, 1989, 12 villages had been surveyed. The initial report, submitted by the Director of Archaeology, contained a full list of villages surveyed and photographs of the Shoolpaneshwar and Hamfeshwar temples. Two further studies of sites in the remaining seven villages were carried out in March 1992 and a supplementary report issued.

Maharashtra

- + **State Department of Archaeology** : A survey was carried out by the Department of Archaeology of cultural sites in 24 villages of Akkrani Taluk and nine villages from Akkalkuva Taluk, Dhule District. A brief summary note was submitted by the Director of Archaeology in February 1992 which stated that no state-protected monuments were located in the area but recommended the preservation of monuments at the village of Manibeli, Dhule District.

Madhya Pradesh

- + **State Department of Archaeology and Museum** : The Archaeology Department of Madhya Pradesh compiled a detailed report of archaeological sites in 120 villages likely to be affected by SSP. A second study of 73 villages was completed in July, 1991. Each study contained photographs together with detailed descriptions of the current use and historical significance of the sites.

In addition to baseline studies on archaeological aspects, work has been carried out on the anthropological heritage of the Narmada Basin including examination of evidence of ancient dwellings and cultural artifacts. The principal studies in this area are described below.

- + Anthropological Survey of India. Narmada Salvage Plan : The Narmada Salvage Plan contains detailed background data on palaeo-anthropological, human ecological and other aspects of the Narmada valley. By May 1992, surface scanning of 17 sample villages coming under submergence had been carried out, 424 specimens including ancient tools etc had been collected.
- + Anthropological Survey of India. Peoples' of India : This project entailed a complete survey of 33 tribes of India including those of the Narmada Basin. The study

covered all aspects of tribal culture in India and was published in 61 volumes in 1992.

- + Parishad, A.K. Survey of Material Culture in the Narmada Valley : Work was completed and a report published by the National Museum of Humanity, Bhopal, on cultural objects from tribal artisans in Madhya Pradesh in 1990. Copies of the interim report were circulated to the Ministry of Environment and Forests and the Narmada Control Authority in April 1991.

ACTION PLANS

Summary of the proposed actions

State	Relocation of temple		Excavation		Sculptures	
	Target	Completed	Target	Progress	Target	Progress
• Gujarat	2	1	-		-	
• Maharashtra	NIL	N.A.	NIL	N.A.	NIL	N.A.
• Madhya Pradesh						
□ As per Action Plan 1993	7	*	5	2**	186	118***
□ As per Action Plan 1997	13	3	5	1	68	NIL

* Four structures are included in the Action Plan 1997 and remaining 3 nos. are handed over to ASI.

** Work was possible on 2 mounds and the remainings are handed over to ASI.

*** Remaining works are included in Action Plan 1997.

Gujarat

The Action Plan for two temples, i.e., Shoolpaneshwar and Hamfeshwar is ready.

Maharashtra

The Director of Archaeology, Maharashtra reported that no state-protected sites would come under submergence. However, plans would be needed to relocate the Shoolpaneshwar temple at Manibeli village. GOG has been entrusted with responsibility for relocation operations.

Madhya Pradesh

A large number of sites were identified for relocation although none of these sites are protected under the 1958 Act. It was proposed, therefore, that any decision on whether they should be relocated would be made on a case-by-case basis by an independent expert panel. This panel comprised representatives of the



Archaeological Survey of India, Central and State Governments and was established by GOMP. The panel's decisions were ratified by a joint Inspection committee of the Irrigation Department and Archaeological Department.

The expert panel proposed, a 4-phase Action Plan framework for relocation operations :

Phase-I Survey work, survey report, listing of monuments and sculptures, estimates for shifting.

Phase-II – Action Plan, documentation, detailed estimates.

Phase-III – Building construction, shifting of sculptures, shifting of monuments.

Phase-IV – Display arrangements, model preparation, video library, publication report, excavation reports, new findings (if any).

State Department of Archaeology and Museum had conducted a survey covering 193 villages coming under submergence of SSP and pointed out the monuments for protection and relocation works.

GOMP earlier prepared the Action Plan 1993. The details are as below:

Sl No	Particulars		
	Name of monument	Village	District
1.	Shiv Mandir	Roligaon	Jhabua
2.	Kanjaleshwar Mandir	Semalda	Dhar
3.	Jalaleshwar Mandir	Khujawa	Dhar
4.	Bhawani Mata Mandir	Khujawa	Dhar
5.	3 nos. big statues	Khujawa	Dhar
6.	Shiv Mandir	Barda	Dhar
7.	Rock-cut sculptures	Pipaldagarhi	Dhar

Excavation

Sl. No	Particulars	
	Name of archaeological mound	District
1.	Mound at village Khaparkheda	Dhar
2.	Mound at village Utavad	Khargone
3.	Mound at village Brahmangaon	Khargone
4.	Mound at village Krimohigaon	Khargone
5.	Mound at village Kheda	Dhar

GOMP prepared another Action Plan in 1997, in which, some more monuments and excavation sites were included. The details are as under :

Relocation / Protection

Sl. No	Particulars				
	Name of monument	Village	Tehsil	District	RL in m
1.	Shiv Mandir	Bada Barda	Manavar	Dhar	130.970
2.	Bhawani Mata Mandir	Khujawa	Dharampuri	Dhar	147.825
3.	Shomeshwar Mandir	Khujawa	Dharampuri	Dhar	129.530
4.	Shiv Mandir (S.No.1)	Khujawa	Dharampuri	Dhar	135.460
5.	Shiv Mandir (S.No.2)	Khujawa	Dharampuri	Dhar	135.475
6.	Shiv Mandir (S.No.3)	Khujawa	Dharampuri	Dhar	135.165
7.	Rock-cut caves	Khujawa	Dharampuri	Dhar	135.075
8.	Big statues	Khujawa	Dharampuri	Dhar	146.395
9.	Shiv Mandir (Mauni Baba Ashram)	Pipaldagarhi	Dharampuri	Dhar	153.775
10.	Rock-cut-sculptures	Pipaldagarhi	Dharampuri	Dhar	130.440
11.	Shiv Mandir	Bodhwada	Kukshi	Dhar	138.685
12.	Narmadesh-war Mandir	Dehar	Kukshi	Dhar	134.665
13.	Baneshwar Mandir (Shiv Mandir)	Navadatoli	Kasarawad	Khargone	137.765

Excavation

Sl. No	Particulars		
	Name of mound	District	RL in m
1.	Mound at village Maruchichli	Khargone	151.635
2.	Mound at village Ekalwara	Dhar	146.875
3.	Mound at village Katnera	Dhar	139.865
4.	Mound at village Khalghat (Khalkhurd)	Dhar	156.310
5.	Mound at village Kalyanpura	Dhar	148.035

Summary of Current Situation and Progress

	Gujarat	Madhya Pradesh	Maharashtra *
• Survey of villages in Submergence Zone	"Complete" for all item in all the States.		
• Identification of Cultural Sites.	"Complete" for all item in all the States.		
• Collection of Data and Documentation of Sites	Complete	In progress	Not required.
• Selection of appropriate sites	Complete	In process	Not required
• Action Plan	Complete	Finalised	Not required

- Survey in Maharashtra identified one temple, which was on the border with Gujarat. GOG has already relocated this temple 15 km. downstream of earlier location.

Implementation

A. Gujarat

Shoolpaneshwar temple which was on the border with State of Maharashtra is relocated 15 km. downstream of the SSP in village Gora. Relocation works already completed.



Relocation of remaining temple, i.e., Hampheshwar Temple is under progress. The stone monument of 'Garbhgrah' is completed upto 5.0 m height and about 18 columns of Rangmandap have also been erected. Stone monument work for two small temples namely: Ramji and Angaji adjoining to the main temple is done upto 51 ft. level.

B. Madhya Pradesh

Status of implementation for Action Plan of 1993 are as below:

SI No	Particulars			Status
	Name of monument	Village	District	
1.	Shiv Mandir	Roligaon	Jhabua	Handed over to ASI by State Department of Archaeology, MADHYA PRADESH Progress is awaited.
2.	Kanjaleshwar Mandir	Semalda	Dhar	- do -
3.	Jalaleshwar Mandir	Khujawa	Dhar	- do -
4.	Bhawani Mata Mandir	Khujawa	Dhar	The monument is taken in Action Plan 1997. Relocation is remaining.
5.	3 nos. big statues	Khujawa	Dhar	- do -
6.	Shiv Mandir	Barda	Dhar	The monument is taken in Action Plan 1997 and relocated completely.
7.	Rock-cut sculptures	Pipaldagarhi	Dhar	- do -

Excavation

SI. No	Particulars		Status
	Name of archaeological mound	District	
1.	Mound at village Khaparkheda	Dhar	Detailed excavation works was done by ASI.
2.	Mound at village Utavad	Khargone	- do -
3.	Mount at village Brahmangaon	Khargone	Archaeological survey was done. Later on mounds were vanished due to soil erosion

			by agricultural practices.
4.	Mound at village Krimohigaon	Khargone	- do -
5.	Mound at village Kheda	Dhar	Handed over to ASI. Progress is awaited.

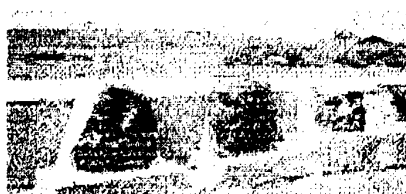
Status of implementation of Action Plan 1997 are as under

Relocation / Protection

Sl. No	Particulars					Status
	Name of monument	Village	Tehsil	District	RL in m	
1.	Shiv Mandir	Bada Barda	Manavar	Dhar	130.970	Relocated completely. <i>Completed</i>
2.	Bhawani Mata Mandir	Khujawa	Dharampuri	Dhar	147.825	Scrapping of lime plaster done for numbering purpose.
3.	Shomeshwar Mandir	Khujawa	Dharampuri	Dhar	129.530	Progress is nil.
4.	Shiv Mandir (S.No.1)	Khujawa	Dharampuri	Dhar	135.460	Work of relocation started but due to public resentment, it was stopped by the collector.
5.	Shiv Mandir (S.No.2)	Khujawa	Dharampuri	Dhar	135.475	
6.	Shiv Mandir (S.No.3)	Khujawa	Dharampuri	Dhar	135.165	
7.	Rock-cut caves	Khujawa	Dharampuri	Dhar	135.075	Progress is nil.
8.	Big statues	Khujawa	Dharampuri	Dhar	146.395	Progress is nil.
9.	Shiv Mandir (Mauni Baba Ashram)	Pipaldagarhi	Dharampuri	Dhar	153.775	Relocated completely in village Nimbola. ✓
10.	Rock-cut-sculptures	Pipaldagarhi	Dharampuri	Dhar	130.440	Relocated completely in village Nimbola. ✓
11.	Shiv Mandir	Bodhwada	Kukshi	Dhar	138.685	Progress is nil.
12.	Narmadeshwar Mandir	Dehar	Kukshi	Dhar	134.665	Progress is nil.
13.	Baneshwar Mandir (Shiv Mandir)	Navadatoli	Kasarawad	Khargone	137.765	Progress is nil. <i>Drawing & Photography in progress</i>

Excavation

Sl. No	Particulars			Status
	Name of mound	District	RL in m	
1.	Mound at village Maruchichli	Khargone	151.635	Progress is nil.
2.	Mound at village Ekalwara ✓	Dhar	146.875	Progress is nil. <i>will be taken up next year</i>
3.	Mound at village Katnera ✓	Dhar	139.865	Progress is nil. <i>taken up next month</i>
4.	Mound at village Khalghat (Khalkhurd)	Dhar	156.310	Excavated. Records are with the o/o the Archaeologist, Archaeology & Museum, Rajwada, Indore.
5.	Mound at village Kalyanpura ✓	Dhar	148.035	Progress is nil. <i>laying up</i>



Collection and display at Museum

Sculptures, 118 in nos. were collected from the regions coming under the submergence area of the Sardar Sarovar dam. These sculptures were obtained from Pipldagarhi, Khujawa, Dharamapuri and different other villages. These are displayed at Distt. Museum in Dhar Distt.

Since these sculptures were lying open for a very long time they bear traces of weathering effect on them like salt formation, red-oxide deposition, besides accumulating dust, dirt and fungus on them. They were cleaned by the chemists using necessary chemicals like Ammonia, Sodium hydroxide, Benzene P.V.A. etc. After cleaning the sculptures were coated with preservative for saving them from further deterioration.

Museum

- + Narmada Park and Museum at Lalbagh at Indore, besides Museum at Barwani and Kasarawad proposed. Land for museum at Barwani and Kasrawad requested.
- + Construction of a section on 'Narmada Dirgha' in the museum at Bhopal has been started.

Besides, Film documentation of all the monuments of SSP is in progress through an agency 'Madhyam', engaged by State Department for Documentation of the important monuments.

Anthropological Salvage Plan for Narmada Valley :- To date, surface scanning of the anthropological sites of 17 villages has been completed and 424 specimens taken.

In this plan the Udaipur Branch of the Archaeological Survey of India has collected information and specimens from 19 villages in Gujarat.

Summary of Current Situation and Progress

	Gujarat	Madhya Pradesh	Maharashtra
Survey of villages in submergence zone	Complete for all the items in all the States.		
Identification of cultural sites	Complete for all the items in all the States.		
Collection of data and documentation of sites	Complete	In progress	No required
Estimates of financial resources for relocation			
Selection of appropriate sites	Complete	In progress	No required
Action Plan	Complete	In progress	No required
Responsibility for removal identified			
Expansion of museum sites			
Quality control / inspections *			
* Quality control of relocation operations will be the responsibility of the Departments of Archaeology of the three States. Each of these departments have proven expertise in this area and are entrusted to conduct regular inspections of temple reconstruction to ensure that no damage ensues.			

INDIRA SAGAR PROJECT

The Action Plans and status of studies and implementation of Environmental Safeguard Measures upto quarter ending September, 2000 are summarised in this report.

The parameters. The suggested environmental safeguard parameters are indicated below

- ◆ *Phased Catchment Area Treatment*
- ◆ *Compensatory Afforestation*
- ◆ *Command Area Development*
- ◆ *Flora, Fauna, Wildlife and Carrying Capacity*
- ◆ *Seismicity*
- ◆ *Health Aspects*
- ◆ *Archaeological Survey, and Anthropological Studies*

As 'Resettlement and Rehabilitation' is dealt with separately, current status of other suggested parameters is presented hereunder.

1. PHASED CATCHMENT AREA TREATMENT

The MOEF clearance granted in 1987 contained two conditions pertaining to CAT, as follows:

- More detailed surveys for prioritisation of the sub-catchments in the ISP area should be undertaken;
- A phased CAT programme should be prepared and implemented ahead of reservoir filling. GOI issued a directive in July, 1992 that, the project would bear the costs of the treatment of all critically degraded sub-watersheds draining directly [Phase-I] into the reservoir. These watersheds were identified amongst those classified as either very high or high-priority categories by the All India Soil and Land Use Survey Organisation (AISLUSO). The project would also be responsible for the treatment of those areas of the catchment, which are directly damaged by the project activities.

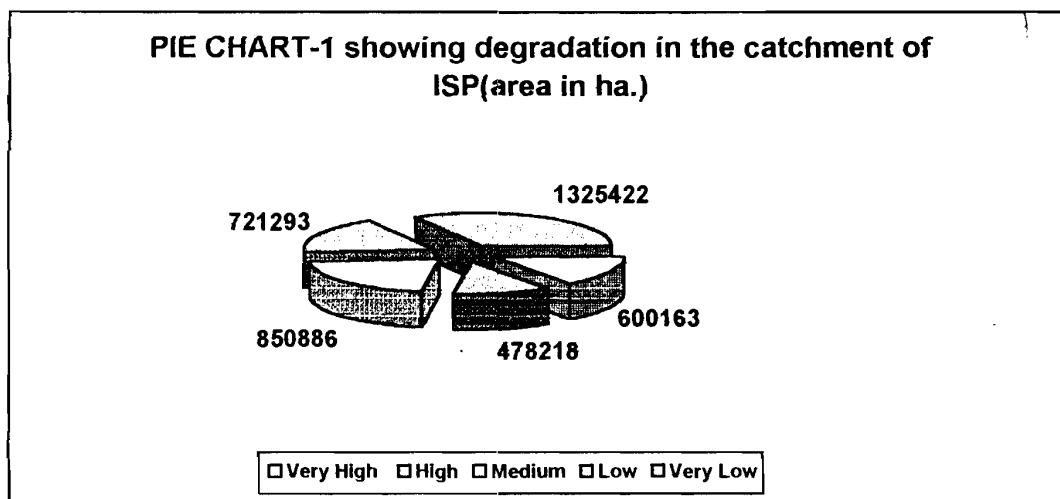
In addition, plans are required to be prepared for the treatment of the balance of the critically degraded sub-watersheds but the cost of this will be met from other ongoing schemes and in a timeframe to be determined.

Studies

Surveys and studies have been undertaken to aid the development of a management plan for CAT in the ISP catchment. They are: -

- Report of Inter-Departmental Committee on Soil Conservation and Afforestation, (the Dewan Committee Report), 1985.
- Report on Prioritisation of Sub-watersheds in sub-catchments of the Narmada Catchment, 1991 by AIS&LUSO, New Delhi. Revised subsequently in 1994

According to the above studies the freely draining area of Indira Sagar Project down stream of Bargi Dam is about 39,75,982 ha. Prioritisation survey of the watersheds was entrusted to the All India Soil & Land Use Survey Organisation, New Delhi. The Survey has been completed by AIS&LUSO, New Delhi and the survey reports have been received in the Narmada Valley Development Authority (NVDA) Government of Madhya Pradesh. Findings of the AIS&LUSO indicated that about 28% of the catchment was yielding SYI of 1200 and above. As such these were considered as critically degraded. Results of the prioritisation are summarised in pie chart -1.



AIS&LUSO in their final report have identified 508 no. of critically degraded sub-watersheds (having Silt Yield Index of 1200 and above), covering an area of about 10,78,381 ha.

Phased Programme:

On the basis of their proximity to the reservoir these watersheds have been planned for treatment in two phases namely Phase-I and Phase-II

As per the guidelines of MOWR, directly draining watersheds of very high and high priority categories only, are to be treated *pari-passu* with the construction of the dam and at the project cost.

PHASE-I Programme

On the basis of the reports submitted by the AIS&LUSO, sub-watersheds belonging to the very high and high priority categories and directly draining into the reservoir have been identified for treatment. There are 30 such sub-watersheds. They cover an area of about 73,456 ha. Map showing the location of the identified sub-watersheds is depicted in Map-1.

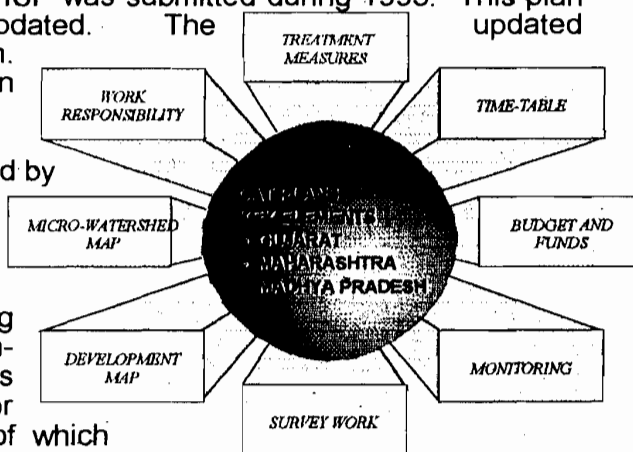


Map-1
Showing
submergence
area of
Indira Sagar
Project and
location of
critically
degraded
directly
draining
sub-
watersheds.

Action Plan :

Macro-watershed plan for the ISP was submitted during 1993. This plan was subsequently revised and updated. The plan of work is under implementation. Various components of the Action Plan are depicted in the Figure-1.

According to the plan submitted by the NVDA, 30 sub-watersheds covering an area of 73,456 ha have been identified as directly draining sub-watersheds. Out of the gross area of 73,456 ha, directly draining sub-watersheds, 57,697 ha is non-forest and the remaining 15,769 ha is forestland. The net area available for treatment, however, is 62,975 ha of which 51,927 ha area is non-forest and the balance 11,048 ha is forestland. Graphic presentation of the same is given below in Chart-1.



**CHART-1 : AREA STATISTICS OF CRITICALLY DEGRADED SUBWATERSHEDS
BELOW BARGI DAM & UPTO ISP**

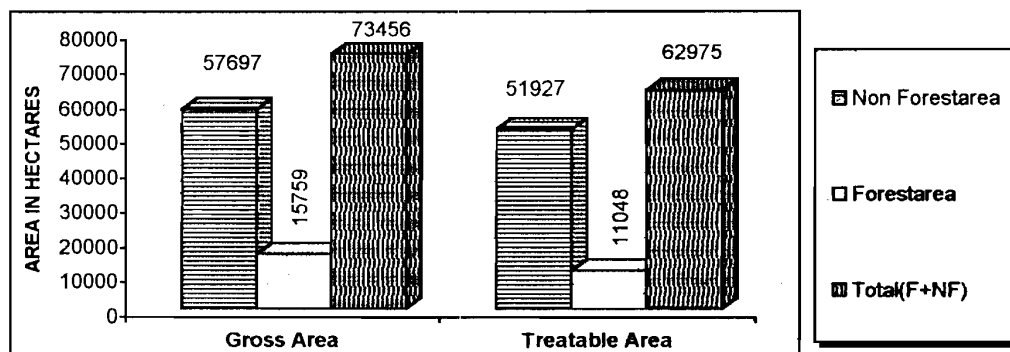
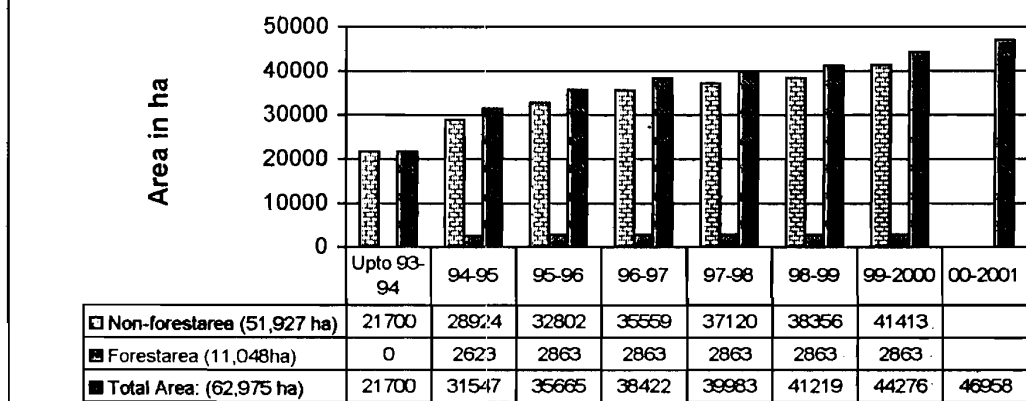


Chart-2 : Cumulative Progress of CAT works

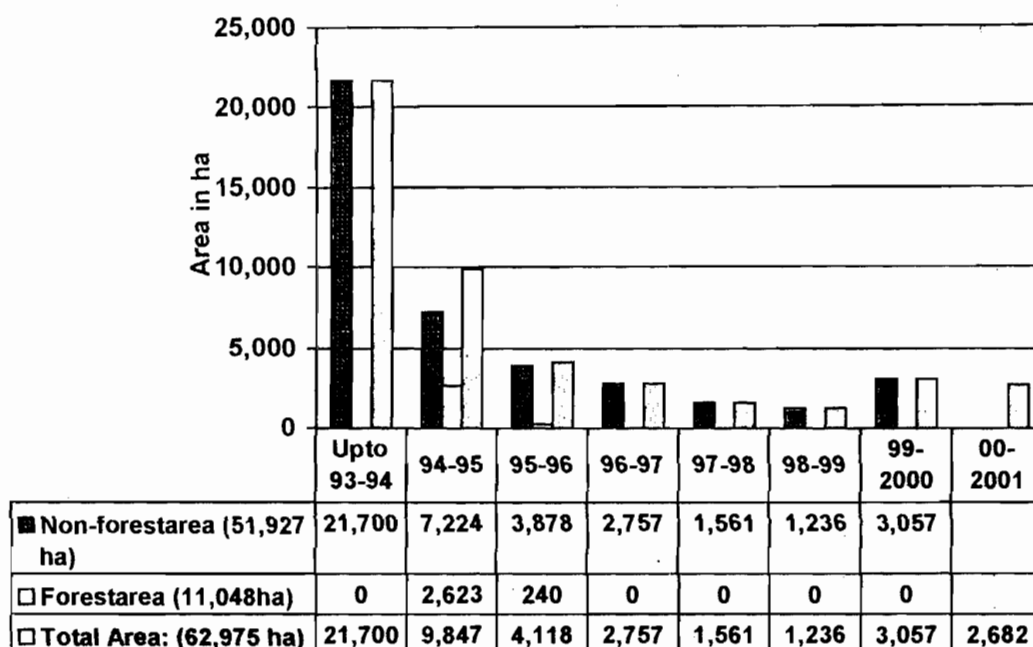


IMPLEMENTATION :

NVDA have planned to treat the Phase-I area in about 10 years' time commencing 1991, at the cost of the project and pari-passu with the construction work on the project.

By the end of September, 2000, during the year 2000-2001, the cumulative progress was 46,958 ha. In addition an area of 1636 ha was treated up under pilot project earlier. NVDA proposes to treat the balance areas during the next four years.

Chart-3 : Schedule of treatment of Phase-I



II. FREELY DRAINING AREA (Excluding Directly Draining Sub-watersheds)

According to the plan submitted by the NVDA, 478 sub-watersheds, covering a gross area of 10,12,640 ha have been identified as freely draining (other than directly draining) sub-watersheds. The net area available for treatment, however, is 9,15,150 ha of which 806,720 ha area is non-forest and the balance 108,430 ha is forestland. Above details are graphically presented in Chart-4.

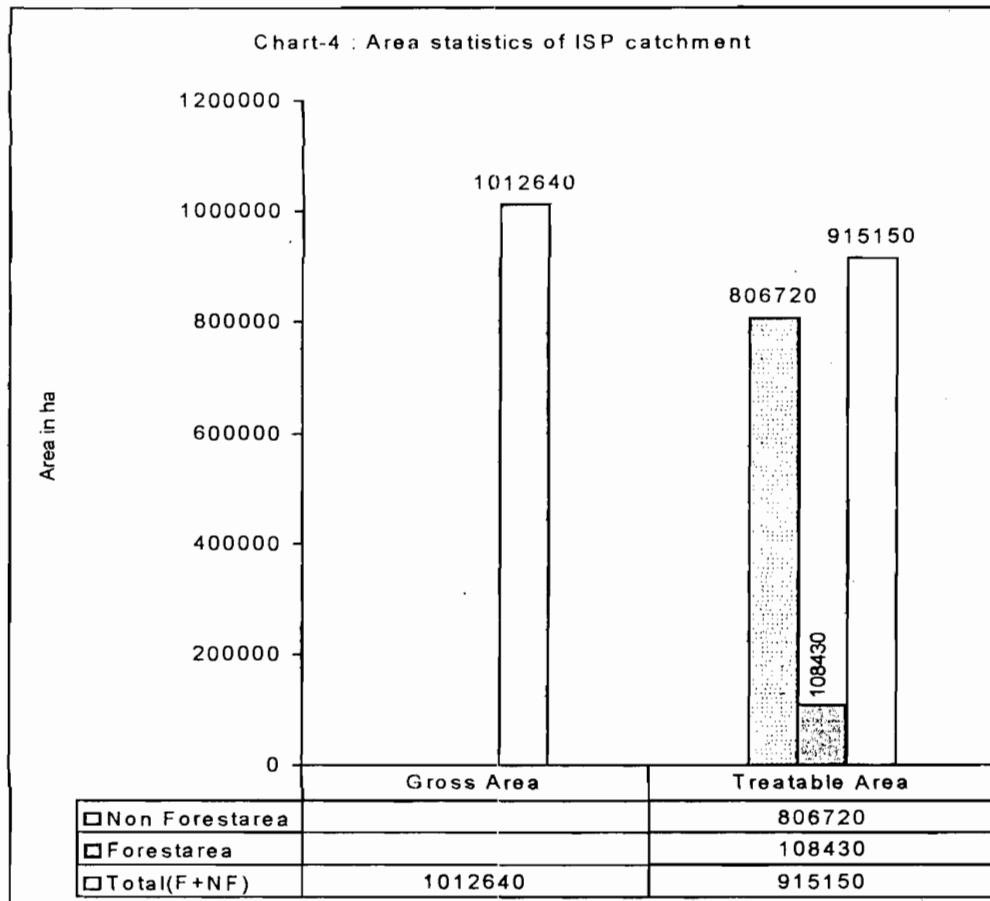
ACTION PLAN :

NVDA have submitted macro-watershed plans covering the above area during 1993. NVDA have planned to treat the Phase-II area in about 30 years' time commencing 1994-95, as per the schedule of implementation given in Table-5 below.

However, detailed micro-watershed schemes are required to be submitted to the funding agencies like NAEB, RVP etc. in accordance with the guidelines of these schemes. A few schemes have been submitted and got approved while the remaining schemes are under formulation.

IMPLEMENTATION :

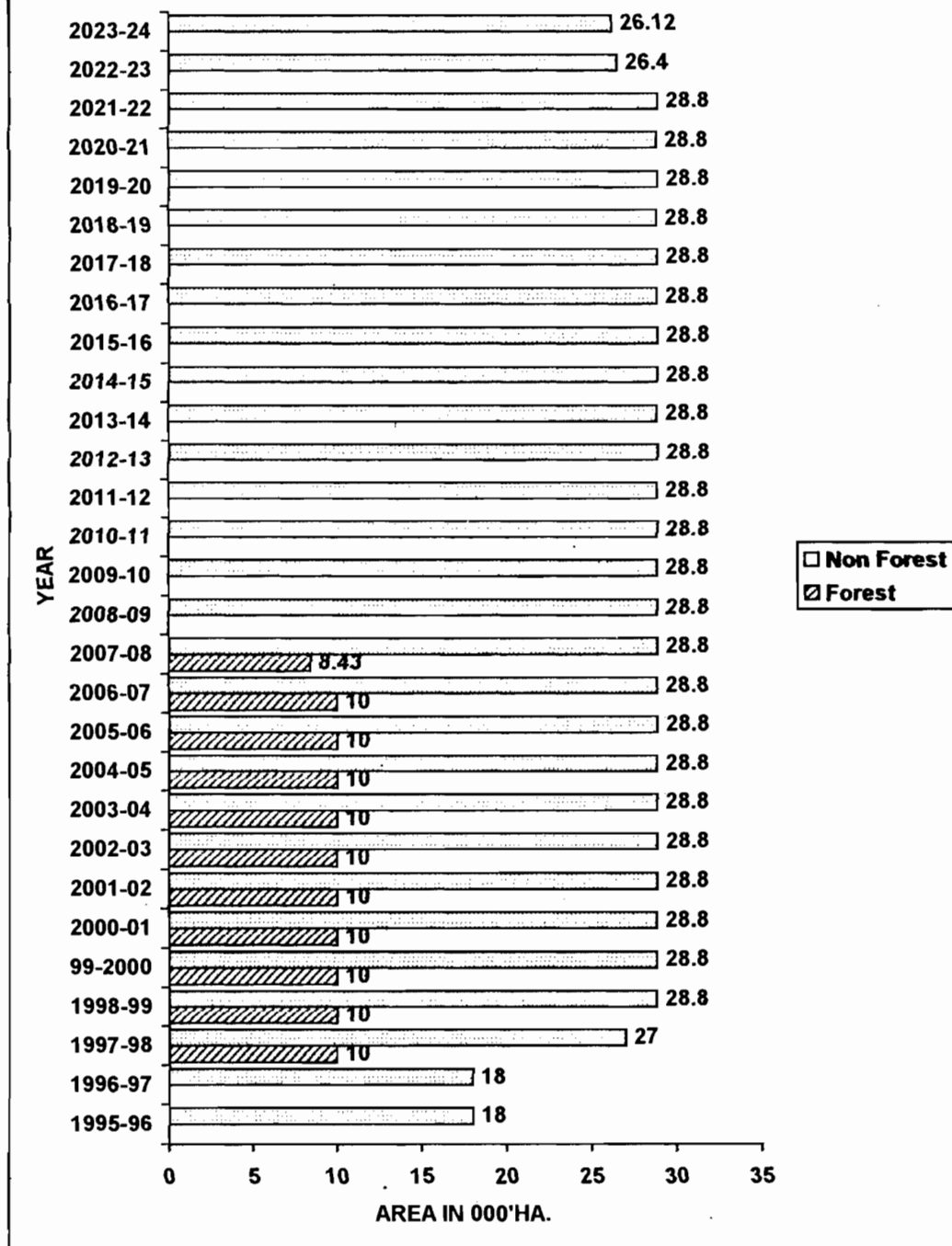
The Project Authorities have submitted CAT Phase-II plans for NAEB/RVP funding for seeking funds. Thirteen schemes covering the area of 28,318 ha. Were approved by the Govt. of India in RVP Schemes. By the end of September, 2000 the progress reported was 9,218 ha.



REQUIREMENT OF FUNDS :

The plan drawn up for treatment of Phase-II treatment works places requirement of total funds at Rs. 603 crores. It is proposed by GOMP to treat the non-forest area at an estimated cost of Rs.602.57 crores and forest area Rs.435.12 crores.

Chart-5 : Schedule of treatment of CAT works, Phase-II



2. COMPENSATORY AFFORESTATION:

A total of 40,332 ha forestland would come under submergence and an additional 779.90 ha. of forestland has been diverted for the residential colony, powerhouse complex, main dam, saddle dam and approach roads.

Subsequently, another 308.40 ha. of forestland was permitted to be diverted for powerhouse. Thus a total of 41,420 ha of forestland has been permitted to be utilised for the construction of ISP. Area proposed to be utilised for the ISP covers three districts as shown in Table-1 below.

TABLE-1 : Showing area taken by the ISP from three districts in M.P.

District	Area in hectares diverted for ISP
Khandwa	33,383
Dewas	4,528
Hoshangabad	3,678
Total	41,589

MOEF clearance granted in 1987 contained several conditions pertaining to compensatory afforestation. The key conditions among others was that

"Since the project involves violation of Forest (Conservation) Act, 1980, compensatory afforestation will be carried out over suitable degraded forest land double the diverted forest area in extent and in addition to the equivalent area in non-forest land. For this purpose, the area offered by the State Govt. vide their letter No.5/III/84-10-3, dated 14.10.1986 will be accepted and compensatory afforestation raised at the cost of the project in this area."

- State Forest Department re-conveyed the forestland for the purpose of ISP vide it's letter dated 28th November 1987 clarifying that-

"The plantations over the degraded forest, double in extent to the area which has been worked upon without the permission of the Forest Department, violating Forest Conservation Act thereby, shall be carried out, in addition to the usual plantations over non-forestland equal in extent to the area diverted."

ACTION PLAN :

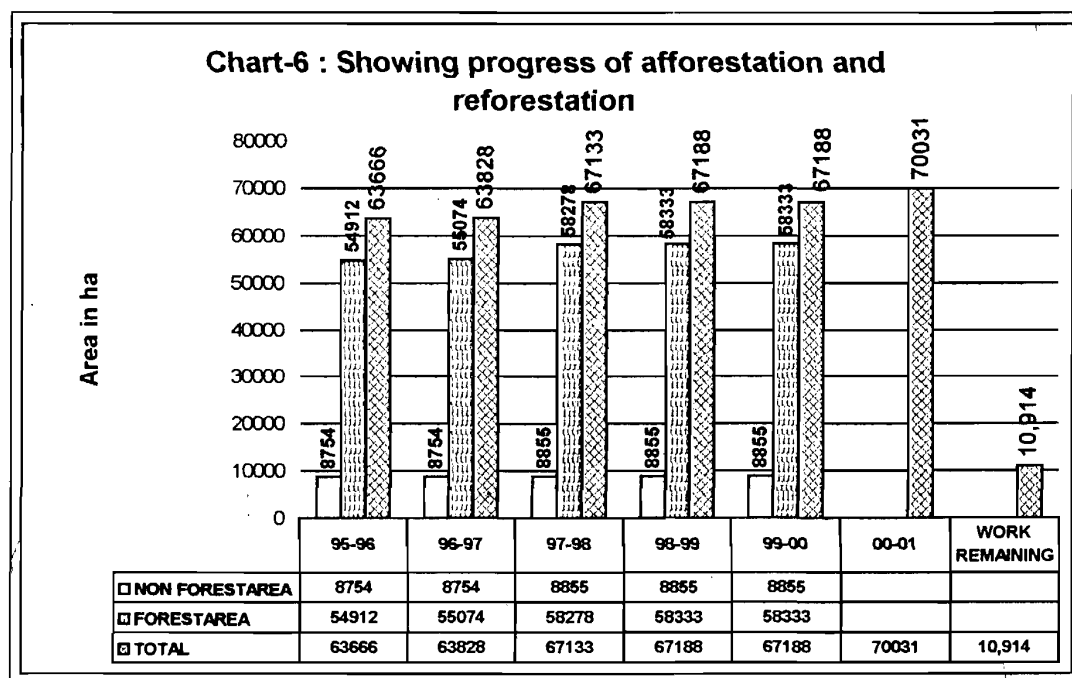
To compensate for this loss of forest the M.P. Forest Department had submitted an Action Plan for Compensatory Afforestation for the Indira Sagar Project in December, 1986. Area offered to this plan was accepted. The acceptance was acknowledged through the clearance order.

Accordingly, 10,143 ha of non-forest and 70,802 ha of degraded forestland has been identified for compensatory afforestation, in the districts of Khandwa, Hoshangabad, Dewas, Sehore, Dhar and Khargone as shown in Table-2.

TABLE-2 : Showing the district wise areas identified for compensatory plantation

District	Degraded Forest (In ha)	Area other than forest (In ha)
Khandwa	30,572	2,314
Hoshangabad	22,739	2,842
Dewas	17,491	802
Sehore	-	1,247
Dhar	-	1,001
Khargone	-	1,937
Total	70,802	10,143

The M.P. Forest Department has added additional areas to the prescribed afforestation hectare as a contingency to account for unforeseen circumstances. In selecting forestlands for the plantations, local requirements for grazing, firewood, and other nistar needs were kept in view. However, considering that with the dedication of vast areas to the proposed National Parks, some future adverse impacts on the local population's nistar needs may develop and that the wood from the submergence zone was expected to meet local fuel needs only for about 8 to 10 years, more emphasis was placed on fodder production in plantation areas in Khandwa and Dewas divisions. The plantations were to provide shelter and habitat to wildlife also.



IMPLEMENTATION :

NVDA started the plantation works in the degraded forests within the Narmada catchment on the areas identified in the plan. Subsequently, however, many of these areas were included in the CAT program, as these areas were identified as critically degraded areas within the catchment. Such areas were, however, excluded from the compensatory afforestation works. By the end of September, 2000 the progress reported was 70031 ha as shown in Chart-6 above.

3. COMMAND AREA DEVELOPMENT

The Command area proposed to be irrigated by the NSP spreads on the left bank of the Narmada River. It comprises territory falling in the Khandwa tehsil of Khandwa District and six tehsils of Khargone District. The Satpura Ranges flank the command on the south. The northern boundary is formed by the Narmada River itself. The land of the command comprises Forest: 10,055ha; Grasses and pastures: 10,498ha; Cultivated land: 142,406ha; Culturable fallow : 8,116 ha; Barren: 18,385 ha.

The command area has immense potential for development. The objectives of the command area development are :

- Optimum utilisation of created potential of irrigation.
- Introduction of multiple cropping patterns and increasing the levels of productivity and strengthening of agriculture research activities.
- Creation of adequate communication and storage facilities.
- Conservation management of integrated fisheries development.
- Intensification of dairy development.

The main components of the command area development program are

- On Farm Development,
- Conjunctive Use,
- Agro-Industries
- Regulated Market,
- Warehousing Facilities,
- Roads etc.

STUDIES AND FINDINGS

In 1975, at the request of the Narmada Water Dispute Tribunal (NWDT), the Gwalior Campus of J.N.K.V.V. University undertook a reconnaissance survey of the Narmada Sagar Command, using a 2-mile grid. Nearly 265 soil profiles were examined.

Reports on the quality of groundwater in the Indira Sagar Project area are limited, but the general assumption is that the quality is suitable for use in irrigation. Limited water quality testing was done in several blocks in the Indira Sagar Project area. These tests were apparently conducted in 1966 and 1967. In Barwaha block, five samples out of seven tested were of excellent quality.

During 1982-83, to appraise land irrigability, an area of about 2,80,000 ha falling within parts of Khandwa and Khargone districts was surveyed by the Department of Agriculture, M.P. Surveys were carried out on 1:50,000 – scale toposheets. Aerial photo-interpretation was carried out wherever possible. About 366 profiles and about 2787 auger bores were examined. The rate of profile examination was about 1 per 1000 ha. A total of 30 soil series were mapped. Areas falling under different classes of depth, erosion, slope, texture, and land irrigability subclasses were identified. This report indicated that typical vertisols are not extensive in the surveyed area.

A detailed reconnaissance soil survey of the Narmada Sagar Command Area was also carried out in January 1984 by the Directorate of Agriculture in co-ordination with the Govt. of India, National Bureau of Soil Survey and Land Use Planning Wing and the Agricultural University, Jabalpur in the command area of 2.10 lakh ha. The soils of the areas have been classified into 26 soil series taking into account the morphological features, topography, and physical and chemical characteristics. As per soil taxonomy (1970), altogether three orders, three suborders, three great groups, eight subgroups and ten families have been identified. Soils have been classified into various recognised classes in terms of their suitability for irrigation.

Table –3 : Showing land irrigability classification

Sl. No.	Land Irrigability Class	Slope Percent	Depth of Soil (in cms.)	Percentage of gross command area
1.	2	0-3%	More than 90	29.5
2.	3	1-5%	22.5 to 90	21.5
3.	4	3-10%	7.5 to 45	25.7
4.	6	5-15%	0 to 22.5%	23.3

In order to study whether full irrigation would lead to water logging and salinity problems, state govt. of Madhya Pradesh commissioned special studies on subsurface drainage and groundwater behavior to the Indian Institute of Science at Bangalore. For study purposes, the entire Narmada Sagar complex Area was divided into 34 hydro-geological zones. The studies considered the following :

- Rainfall data from stations around the composite command.
- Runoff as measured in nearby gauging stations.

- Evaporation rate data.
- Climatological data.
- Groundwater-level data from all types of wells.
- Pump test data.
- Hydro-geological information on wells and aquifers.
- Soil and soil moisture data.
- Agricultural land use data, including information on crops and the seasonal nature and extent of surface water and groundwater irrigation.
- Proposed crop-water requirements.

Jawahar Lal Nehru Krishi Vishwavidhyalaya, Jabalpur through their research centre are carrying out studies on impact of agro-chemicals run-off from fields on underground and surface water in command area with an objective of assessing the residues of toxic agricultural chemicals from fields in the ground water and surface water of command areas and ecological effects of the residues in irrigation water and their physiological effects on aquatic and terrestrial vegetation, crops, animal life and agro-ecosystem as a whole for devising measures to mitigate the same under the fallow and cropped yield conditions. Studies are commenced and are making progress.

SUGGESTED STRATEGIES

The Bangalore institute's study concluded that conjunctive use of surface water and groundwater on a significant scale would be required to avoid water logging and salinity problems in the Composite Command Area. Study data indicated that a water balance of 70% surface water and 30% groundwater would be suitable in most project areas to avoid waterlogged conditions.

Natural drainage conditions in the Narmada Sagar Complex Command Areas are quite favourable as Narmada Sagar area has a well-developed natural drainage system. The command complex lies on both flanks of the Narmada River, with a number of tributaries draining the area towards the Narmada River. The slope of the cultivable land generally ranges from 1 to 3% and it has good natural drainage. The groundwater aquifers are deeply incised, and major problems of surface drainage do not appear to exist. Surface drainage will, however, be required after irrigation is implemented through the provision of a proper network of field drains so that excess water will be removed from the cultivated fields.

Irrigation water from the Narmada River will be of good quality, and normal irrigation applications are considered sufficient to leach out the salts from saline/sodic soils. No additional leaching requirements will generally be necessary. Project planners do not expect any salinity problems if proper surface and subsurface drainage systems are installed.

ACTION PLAN

The Government of Madhya Pradesh have submitted command area development plan, delineating the soil classifications and land irrigability in the Narmada Sagar Command Area showing the first three phases of irrigation development by area, the land irrigability map of the Narmada Sagar Command Area showing lands of classes 2 through 6 by location in the first three phases of irrigation development during 1986.

The project on completion will provide annual irrigation to 1.69 lakh ha. Waterlogging occurs when the groundwater table rises too close to the ground surface and the soils are unable to drain properly. This concern has been carefully planned to avoid the problems. The conjunctive use of surface and groundwater resources to the extent of 30% is proposed.

The provision of drainage systems to prevent the accumulation of excessive water in the soils, and water management planning and monitoring to control the proportions of surface water and groundwater used in irrigation and the water levels in the groundwater aquifers are some of the measures being planned for prevention of any such eventuality.

In keeping with the study conclusions, planning for the Indira Sagar Project includes maintaining a water balance of 70% surface water and 30% groundwater use, lining of the canal distribution system from the Main Canal upto the eight ha. service area, and installing and maintaining surface and field drainage systems. Because of the deeply incised aquifers, plans for surface and field drains, and plans for conjunctive use of surface water and groundwater, the planned groundwater monitoring program would be sufficient to indicate the needed remedial measures. Essentially all of the groundwater development will be undertaken by the farmers, however the State Govt. plan to take appropriate action to encourage planned groundwater development on schedule and to ensure that the required 30% of the total irrigation demand was met from the groundwater. If groundwater development does not occur on schedule because of the lack of farmer initiative or because of problems with water quality or adverse aquifer conditions, State Govt. plan to step in and install appropriate drainage systems whenever wherever needed

IMPLEMENTATION

The Government of Madhya Pradesh has submitted command area development plan. The project on completion will provide annual irrigation to 1.69 lakh ha. The implementation of the plan would be taken up in three phases for completion in December-2007. The study on impact of Agro chemicals, runoff from fields on surface & ground water quality in the command area has been assigned to J.L. Agricultural University, Jabalpur. An MOU for this work was

finalised. An allocation of Rs.24.5 lakhs was made. Studies have commenced and are making progress. The works of on farm development will be started 2 years in advance of the start of irrigation from canal system in a phased manner in the entire command area.

4. FLORA, FAUNA AND CARRYING CAPACITY

The guidelines of the MOEF require that while seeking environmental clearance for the hydropower projects, surveys should be conducted so that the status of the flora and fauna present can be assessed, listed (rare and endangered) species can be detected, if present, and appropriate conservation measures devised. Important survey work undertaken for the purpose had included the following

- Preliminary Report on First Botanical Exploration and Plant Collection from Narmada Valley by the Botanical Survey of India in 1986.
- Report on the Survey of the Narmada Sagar Area by Zoological Survey of India, 1988.
- Narmada Basin Water Development Plan: Development of Fisheries, 1987, was prepared by the Narmada Planning Agency, GOMP.
- Rapid Reconnaissance Survey of Limnological Aspects Part I, II and III, 1987, were undertaken by the Bhopal, Vikram and Rani Durgavati, Universities for GOMP.
- Water quality data has been collected by the Central Pollution Control Board, Central Water Commission, the State Pollution Control Boards and the National Institute of Oceanography

On the basis of relevant details supplied by the various states, MOEF issued clearance in 1987. A condition of this clearance, as far as it related specifically to the Flora & Fauna, was that the Narmada Control Authority would ensure in-depth studies on flora and fauna needed for implementation of environmental safeguard measures.

Further in-depth studies with focus on the following prime concerns were taken up.

- Relocating and protecting wildlife through setting up and maintenance of the permanent protection areas.
- Detailed surveys of both flora and fauna to determine the number of individuals of the various species, their habitat types and other needs, their status in terms of being endangered, threatened or protected under Indian Legislation, and recommendations for minimising project impacts and maximising opportunities for protecting and enhancing plant and animal life.
- Studies to ascertain the capacity of the surrounding areas to accommodate additional wildlife

The objective of the suggested studies was to assess the environmental impacts as a result of the Narmada Sagar Complex, consisting of the three dams: the Narmada Sagar, Maheshwar and Omkareshwar, to ensure minimal adverse effects on wildlife as a result of the project development works. Studies were entrusted to Wildlife Institute of India and Friends of Nature Society. Institutes carried out exhaustive studies with a view to address the above concerns. Studies focused on the following

The reports submitted by the identified premier organisation during the period 1986 and 1997 included the following

- Sociological Survey of the Fishing Families of the Narmada River by CICFRI, 1991.
- Aquatic Fauna (Fish) Studies in Indira Sagar Submergence Area, prepared by the Friends of Nature Society in 1991 on behalf on the NVDA reported on the fish fauna of the Narmada.
- Pre-and Post-Impoundment Limnological Studies of Narmada Basin, by three universities coordinated by Barkatullah University for the NVDA. (1989-92) Study report was available in 1994.
- Studies on Fish Conservation in Narmada Sagar, Sardar Sarovar and its Downstream, is a desk review sponsored by the NCA and undertaken by CICFRI, 1993.
- Wetland and aquatic flora of Narmada Valley in Madhya Pradesh was also published in 1991 in Vol. 15 No.3 in J.Econ. Toxicology Bot.
- Studies on EIA of Flora & Fauna of NSP were entrusted to the Wildlife Institute of India, Dehradun in December, 1989 and were completed by March 1994.

Key concerns addressed on the terrestrial ecosystem were as follows:

- A wildlife inventory giving reliable estimates of the numbers of various species of wildlife in the project impact area.
- A catalogue of habitat types found in the project area.
- A status report on individual species indicating ones that are endangered, threatened, or protected under prevailing Indian wildlife Laws. The report on these special status species was also included the recommendations for actions to be taken to safeguard threatened species
- Recommendations for the creation of new protected areas for wildlife in the areas neighboring the submergence area.
- An assessment of the impact of the project gene pool reserves of wildlife in the project area.

SUGGESTED STRATEGIES

Establishments of protected areas in many parts of the country in the last three decades has largely been and outcome of the Govt. concern for mitigation

of the environmental degradation specially for preservation of species diversity and the genetic valuation within them. Besides, maintaining productive capacities of Eco-system and safeguarding habitat critically for the local range of species. Three new protected areas were proposed to mitigate the losses. This includes Narmada National Park, Suryamanya Sanctuary and Omkareshwar Sanctuary.

Name of the Sanctuary/Park	Area in ha.
Narmada National Park	47522
Suryamanya Sanctuary	16370
Omkareshwar Sanctuary	11996
Total Area	75888

It is suggested that the severity of the impact resulting from direct and indirect losses could be minimised through restoration of some of the aquatic vertebrates and delineation of a substantial area of the contiguity forest which has similar conservation values that are being lost in submergence and to elevate its status to a protected area – a combination of a national park and sanctuary. Key aquatic vertebrates species like otter is proposed to be restored and translocated. It was suggested to explore the possibility of capturing and translocation of impacted otters of Narmada Sagar into identified localities of the vacant niches in central Indian rivers. Besides, a species restoration plan for aquatic reptile (turtle) was also suggested within the submergence zone and also in other stretches of the river with rocky structure and sandy banks. The restoration program for mugger crocodile as being practices in other districts of M.P. was also suggested.

ACTION PLAN AND IMPLEMENTATION

Actions have been taken by NVDA to implement the recommendation of the WLI regarding declaration of National Park & protected areas. Matter is under consideration of the State Govt.

The studies of certain aspects of fisheries and reservoir sciences have been included in the Limnological studies being conducted by the three Universities of the State. Studies in the Upper Narmada, (Bargi Reservoir) by Rani Durgawati University, Jabalpur, studies in the Middle Narmada (Tawa, Barna and Kolar Reservoirs) by Barkatullah University, Bhopal, studies in the Lower Narmada by Vikram University, Ujjain. All the three Universities have

completed the studies in their respective areas as per MOU and final report is available. Accordingly Action Plan has also been drawn up

Since the topography in the reservoir area consists of rolling hills, NVDA expected the higher peaks to remain above the water surface level and constitute islands in the reservoir. These islands would contain remnant flora and fauna that would remain isolated and would be subjected to changes in microclimate by virtue of being surrounded by a large body of water. NVDA scientists have expressed an interest in the possible effects these special circumstances could induce.

In addition to these small islands, two large islands will be formed to the north and south of the Narmada River just upstream of the Indira Sagar Dam. Present plans are to reserve the northern island of 17 km², for people and to link it to the mainland and the highways leading to Indore and Bhopal. The southern island of about 23 km², however, is earmarked for conversion into a wildlife sanctuary. This prospective island would be considered large enough to preserve existing flora and fauna.

Plans have been drawn up for retrieval and conservation of terrestrial wild life. Actions have been taken by NVDA to implement the recommendation of the WLI regarding declaration of National Park & protected areas. Matter is under consideration of the State Govt.

The studies of certain aspects of fisheries have been included in the limnological studies being conducted by the three Universities of the State. Studies in the Upper Narmada, (Bargi Reservoir) by Rani Durgawati University, Jabalpur, and studies in the Middle Narmada (Tawa, Barna and Kolar Reservoirs) by Barkatullah University, Bhopal, and studies in the Lower Narmada by Vikram University, Ujjain. All the three Universities have completed the studies in their respective areas as per MOU and final report is available. Accordingly Action Plan has also been drawn up.

Aquatic fauna has also been covered under the studies completed by Friends of Nature Society, Bhopal. The draft report of FONS is also available. Action Plan submitted earlier is being updated.

5. SEISMICITY AND RIM STABILITY

The Narmada Sagar reservoir has a gross capacity of 12,200 million cubic meters, or about 9.9 million acre-feet, by far the largest-capacity reservoir planned in the Narmada River basin. Therefore the issues of seismicity, the potential for reservoir-induced seismicity (RIS) and the rim stability have been carefully studied and addressed.

SOURCES

Investigations have considered the Narmada Sagar complex dam sites at Indira Sagar, Omkareshwar and Maheshwar together for the studies. Geological Survey of India, the Central Water and Power Research Station of Pune, the University of Roorkee, GOG, GOMP and World Bank Consultants Pinkerton, Markwell and others have been closely associated with the studies and the mitigation planning. Several reports on seismological factors affecting design of the dam, including the following are available

Technical Memorandum 3.09, Evaluation of the Earthquake Parameters of the Indira Sagar Dam, by the Department of Earthquake Engineering, Roorkee University. Technical Memorandum 4.12, Seismological Considerations for Indira Sagar Dam. Part-1: Evaluation of Earthquake Parameters for Design of Dam. Part-2: Assessment of Potential for Reservoir-Induced Seismicity in Narmada Basin. Induced Seismicity and Other Geodynamic Processes Associated with Man-made lakes, Guha, S.K., Visiting Seismology Consultant, North Eastern Council, Shillong, India, Sessional Report presented at IVth International Congress, International Association of Engineering Geology, New Delhi, India, 10-15 December 1982. Hazards Due to Reservoir-Induced Seismicity in India, Guha, S.K. (See item-3 above.)

SUGGESTED STRATEGIES

Major conclusions related to the effects of RIS considerations on seismic design requirements and the needed plans for seismic monitoring. As for design, it was suggested that reservoir impoundment's by general agreement can trigger significant earthquakes only where tectonic deformations already exist in the geological structures. Thus it was concluded that filling the Narmada Sagar reservoir might cause an earthquake to occur sooner, but it would not affect the magnitude or intensity of ground motion associated with the earthquake. Consequently, RIS was assumed to have no influence on seismic design requirements for structures near to the reservoir.

Detailed studies got done from the University of Roorkee, by consultancy with Dr. Guha and expert opinion obtained from Dr. Ray W. Clough, were placed before the Dam Review Panel. The Indira Sagar Dam Review Panel considered all available reports and data and recommended that

To monitor seismicity during the pre and post-impoundment phases. Network of about live stations each be developed in the Narmada Sagar, Omkareshwar, and Maheshwar areas.

To record the ground motion intensity and response of the dams for any significant earthquake in the vicinity, installation of three strong motion seismographs at each dam site.

To record any significant ground motion that occurs during construction, one strong motion instrument near each dam site

Based on the recommendations of the Dam Review Panel, detailed designs for the dam have been prepared by the Central Water Commission.

At present, three experimental seismological stations have been established with the guidance of Central Water & Power Research Station, Pune, at Narmada Sagar, Omkareshwar and Maheshwar dam sites. The experimental station at Indira Sagar Dam site consists of a RV-320 Micro Earthquake Recorder, a Wood Anderson Seismograph and a Digital Recorder - 100 strong motion accellograph. The results are analysed by the Central Water & Power Research Station, Pune & IMD.

In order to study the seismic effects in the Narmada Sagar Complex Zone a network of 10 seismological observatories with sophisticated instruments are proposed to be established based on the recommendations of Erstwhile Dam Review Panel, Central Water and Power Research Station, (CWPRS) Pune and Indian Meteorological department (IMD). It is proposed to monitor pre and post impoundment seismicity also at these seismic stations to help in assessing the adequacy of seismic parameters adopted for designs. The location of these seismic observatories finalised on the recommendations of IMD are (1) Bagli (2) Barwani (3) Chhanera (4) Harda (5) Indore (6) Kannod (7) Khandwa (8) Maheshwar (9) Narmada Nagar (10) Omkareshwar. Order has been placed and supply has commenced

The dam is, in effect, over-designed in the interests of public safety. As for the Indira Sagar Dam, Seismic design coefficients, though higher than needed, also meaning higher costs have been preferred.

RESERVOIR ROM STABILITY

The reservoir competency survey has been done by GSI and report is submitted. In the report, GSI suggested further studies for some patches of narrow water divide. However environment sub-group decided not to have further studies as experts were of the opinion that there was no water loss between Mandla & Rajghat.

Establishment of 10 nos. of seismic observatories in the Narmada Sagar Complex area is taken up by NVDA. Order has been placed and supply has commenced. Besides, 12 nos. of Wood Anderson Seismometers and 6 nos. of photographic recorders are being procured from IMD supply has commenced.

Procurement of Micro Earthquake recorders is completed. In the mean time on the initiatives taken by NVDA, CWPRS has already installed the instrument to record, pre-impounding data and for undertaking seismic studies at NSP, Omkareshwar & Maheshwar projects through Analogue Micro Earthquake Recorder & Strong Motion Occillograph as an interim measure. IMD will interpret data.

6. HEALTH ASPECT:

The Indira Sagar Project would create a 913 km² reservoir, a main canal of 332 km. and 1,820 km of distributaries. Surveys have been conducted in the Indira Sagar impact areas to investigate existing levels of health and to gather information on specific diseases.

STUDIES AND FINDINGS:

Three specific diseases namely Malaria, Schistosomiasis, and Filaria were studied. Other diseases investigated were leishmaniasis and scabies and other water-washed diseases. The geographical reconnaissance study, to identify the potential breeding sites of malaria vector, is being explored.

Pre-impoundment and post-impoundment Limnological studies carried out by three Universities take care of water quality aspect. These studies have been completed and the final report is submitted.

Further regarding preventive aspects, Department of Preventive and Social Medicine, Gandhi Medical College, Bhopal are engaged for the epidemiological studies. Studies are making progress.

J.L. University which carried out initial studies for the planning commission on the aspects related with the use of insecticides and pesticides in the command through their research station at Khandwa have been entrusted with studies on impacts of application of insecticides etc.

According to the above studies, key findings included the following :

- Malaria is increasing in Khandwa and Khargone Districts surrounding the Indira Sagar Dam site.
- Cholera and gastroenteritis are endemic in Indore, Dhar and Jhabua Districts for more than seven months each year.
- Other common diseases are typhoid and dengue fever, although they are not often found in the project area.
- Filariasis is endemic to at least eight districts of MP, including Chindwara, adjacent to the Narmada Sagar Site. The vector mosquito (mainly *Culex fatigans*) responsible for this parasitic diseases proliferates in dirty water in

ponded areas and artificial containers and also to a lesser extent in stagnant irrigation tributaries and lakes.

- Little or no autochthonous leishmaniasis exists at present in MP. This disease is not water related since it is spread by sand flies that do not need water to breed. However, according to NICD, Delhi, leishmaniasis flared up following the construction of the Rajasthan canal.
- Guinea worm disease (dracontiasis) affects 3,000 villages in MP. This disease is caused by a nematode worm and the vector for its transmission is Cyclops, the fresh water fleas.

SUGGESTED STRATEGIES

Health problems related to these causes are expected to improve when the projects are implemented. The incidence of water-washed diseases should be reduced by the increased availability of water. The point has also been made that large water supply and irrigation projects often cause problems related to the expanded water environment. Plans have been prepared in both project areas to increase public health-related facilities, staffing, and services during project implementation. The incidence of water borne diseases in the Narmada Valley, as elsewhere in MP, is constantly being monitored by GOMP's Directorate of Health Services (DHS).

Means to control schistosomiasis include physical, chemical, and biological mitigation measures. Physical mitigation measures include draining area with standing water, clearing vegetation from water channels and banks, utilising flushing flows, and manipulating water levels. The primary chemical mitigation measure is the use of molluscicides. Biological mitigation measures would include the use of predator species that would eat the secondary host snails. Schistosomiasis is to be kept out of the project area through vigilant monitoring and the prompt use of eradication measures when needed.

Malaria is another disease that requires monitoring and control actions in the project areas. It was found that most of the existing diseases in the project area were related to prevailing socio-economic levels, mainly hygiene. Since the Anopheline mosquito vector has the potential to proliferate in the reservoir, the large draw down strip, and the canals and drains, preventive measures are to be in place to keep the mosquitoes in check. Some experimental resistance of adult mosquitoes to commonly used biocides has been noted under laboratory conditions. Thus research to maintain effective biocides will have to be continued on long term basis. Land levelling and land filling operations as well as appropriate vegetation clearing are being integrated. Control measures will include larvae-eating fish in water bodies, mosquito-inhibiting plants, and clearing of vegetation and other actions to destroy breeding sites.

ACTION PLAN :

NVDA has submitted the revised plan costing Rs.278.95 lacs for the preventive and curative aspects of health. The plan includes establishment a 30 bed hospital at Punasa. Other facilities includes the following :

- Mobile unit
- PHC 3 nos., equipped with 5 beds each, equipments, vehicles, staff etc.
- 2 civil dispensaries with labs
- 24 sub-health centres with equipments etc.

Action Plan includes continued investigations of the Central and Western Zone of Narmada at selected sites for the identified parameters. In addition, plan proposes biological characteristic study, microphytes, phytoplankton, zooplanktons, micro invertebrates, biomass etc. The proposal includes among others continued limnological studies, ecological studies. A note on health aspects of NSP prepared by NVDA was examined in the Ministry of E&F and comments were sent for modifying the report. NVDA has submitted the revised plan costing Rs.748.73 lacs for the preventive and curative aspects of health. Regarding preventive aspects, a MOU has been signed with the Department of Preventive and Social Medicine, Gandhi Medical College, Bhopal. Five half-yearly reports received. For studies on health aspect in project impact areas of SSP and NSP, work is proposed through a cell of monitoring and evaluation under the Directorate of Health Services, Bhopal. The approved plan is being implemented.

Pre-impoundment and post-impoundment Limnological studies carried out by three Universities will take care of water quality aspect. These studies have been completed and the final report is submitted. Action plan approved by NVDA is under scrutiny of NCA.

IMPLEMENTATION :

The above Action Plan is under implementation. For long term hydro-biological monitoring, one well equiped laboratory has been established at Barwani.

7. ARCHAEOLOGICAL & ANTHROPOLOGICAL SURVEY:**Archaeological Aspects**

Investigations of the basin revealed that valley was rich in archaeological belongings:

- ♦ Paleolithic sites are to be found in Nemavar, Kannod, Punjapura, Chirapahad, Sitabau, Dhardi, Moretakka, Maheshwar, Kasrawad, Sahastradhara, Khalghat, Dharampuri, Kalibaodi, Manawar, Budada, Barwani, and Kukshi.

- ♦ Mesolithic sites are to be found all over the valley.
- ♦ Cholelithic sites are to be found in Chikalda, Khedi, Badada, Mohipura, Hathnawar, Piplada, Khalghat, Maheshwar, Nawada, Todi, Kapila Sangam, Veda Sangam and Mardana.
- ♦ Rock-cut caves and sculptures are to be found at Piploda, Dharampuri, Bijagadha, Bagha and Mandogarh.

None of the archaeological sites mentioned above, that have special significance, would fall within the area of submergence of the projects.

SURVEYS :

A survey of the 254 villages for identification of the archaeological monuments falling within the submergence area was carried out by the State Department of Archaeology and Museum, Bhopal.

Archaeological Survey of India has also completed the survey for 167 villages for centrally protected monuments for identification of the monuments of significance. Implementation of the Action Plan is already initiated.

ACTION PLAN

State Protected Monuments :

The State Department has submitted an Action Plan for relocation of monuments of archaeological significance earlier in 1993. According to this, the details are as under :

• Excavation of archaeological mounds

Sl. No.	Particulars	Status
1.	Mound at village Khedinema.	Excavated

Later on GOMP has revised its plan as Action Plan 1997. The details are depicted in the table below:

• Relocation / Protection

Sl. No	Particulars				Status
	Name of mounment	Village / Tehsil	Distt.	RL in m	
1.	Shiv Mandir, Dharikotla	Harsud	Khandwa	229.500	80% of the relocation work is nearly completed.
2.	Shiv Mandir, Punghat	Harsud	Khandwa	240.315	Progress is nil.
3.	Shiv Mandir, Badkeshwar	Harsud	Khandwa	263.805	Scrapping, numbering, detailed drawing and photography

					completed.
4.	Shiv Mandir (Durga Mandir), Chandel	Khandwa	Khandwa	254.917	Progress is nil
5.	Chhatra Ghisor	Harsud	Khandwa	239.300	Progress is nil
6.	Shiv Mandir (2), Khudiamal	Harsud	Khandwa	266.215	Progress is nil
7.	Ridheshwar Mandir, Handia	Harda	Hoshanga bad	273.380	Progress is nil
8.	Abdul Hasan's Tomb	Harda	Hoshanga bad	269.680	Progress is nil
9.	Rock-cut statues	Deyat	Dewas	267.830	Progress is nil
10.	St. Singhaji's Samadhi	Singhajimafi	Khandwa	247.915	Progress is nil

• **Excavation**

Sl. No.	Particulars of archaeological mounds	Progress
1.	Mound at village Bijalpur Khurd, distt. Khandwa	Nil
2.	Mound at village Chhalpakala, distt. Khandwa	
3.	Mound at village Gajanpur, distt. Dewas	
4.	Mound at village Navalpura, distt. Khandwa	
5.	Mound at village Gannor, distt. Khandwa	

Centrally Protected Monuments :

Archaeological Survey of India have prepared a plan for protection of monuments coming under the submergence of Narmada Sagar Complex area. According to this plan, in the area of submergence of Indira Sagar Project, only lower bastion in north of the Joga Fort is likely to be affected by scour action of water.

IMPLEMENTATION :

Plan of Archaeological Survey of India

Environment Sub-group constituted a committee to look into the plans to protect the Joga Fort. The committee met twice and undertook field visits and observed as follows :

Field data collected was as follows:

R.L. of plinth of Joga Fort	+ 274.80 M
R.L. of Top of Joga Fort	+ 284.75 M
R.L. of Main Gate of Joga Fort	+271.035 M
R.L. of Top of well	+ 261.39 M
F.R.L. of ISP	+ 262.10 M
Observed Highest Flood Level	+ 264.27 M
(54,000 cumecs)	

HFL corresponding to 1 in 100	+ 265.52 M
year Flood (62,500 cumecs)	
HFL corresponding to 1 in 100	+ 266.029M
year Flood (83,366 cumecs)	
BWL corresponding to 1 in 100	+265.00 M
year Flood	
BWL corresponding to 1 in 100	+ 266.637M
year Flood	
Water Level (20.7.98)	+ 252.00 M
River Bank	+ 259.14 M
River Bed	+ 248.00 M

From the above data, it was inferred that the well situated in the midst of north bastion will be fully submerged at FRL + 262.10 M. However, this will remain submerged for 2-3 months during monsoon when reservoir might be at FRL.

As far as backwater effect is concerned, the temporary rise due to backwater will be about 0.60 M near well, above HFL. Archaeological Survey of India is reviewing its Action Plan for safeguarding the monument.



About 134 statues were collected from districts Hoshangabad, Dewas and Khandwa and are displayed in the museums there.

Photo(s) shown here are of statue displayed at Dewas museum. About 100 statues were treated chemically. Construction of Museum is over.



the



Anthropological aspects:

The Narmada Valley can be divided into three physiographic units (1) Western Vindhya (2) Narmada through West and South and (3) Western

Satpuras. Some Indologists place the Narmada-Chambal civilisation of Malwa as a contemporary of Indus civilisation. Navada Toli is a site contemporary to Harappa where evidence of early farming villages were discovered. Findings of a hominoid skull from Hathnora indicated the possibilities of the existence of human bio-cultural remains within the basin.

SURVEYS/STUDIES :

A series of studies have been conducted for salvaging the Narmada Basin from anthropological point of view which includes Paleo-Anthropological, human ecological, ethnography and pre-historic aspects. Besides studies on contemporary culture and collection of ethnographic specimens were collected and leading anthropologists were associated.

- *Rashtriya Manav Sanghralaya* has constituted a working group for the retrieval of bio-cultural material in Narmada Basin this includes studies on taphonomy and paleo ecology, excavation of upper paleo lithic sites, collection and documentation of material culture objects from tribal, artisan and folk culture.
- Survey of tribal art and handicraft entrusted to *M.P. Adivasi Kala Parishad* is completed and report is available. The report gathered details from the 24 submergence villages and identified 75 sculptors and eight groups of exhibitionists besides documentation of identified important sculptures. Cultural aspects of the tribes including marriages and their lifestyle were collected.
- The Bhil Track, a study of displaced tribal, sponsored by NVDA, of the 17 submergence villages of SSP compiled the information on their status, layout of their resettlements, construction of houses, social structure, division into clans, economic structure, in-depth, dependence on forests for living, inter-community relationship, leadership pattern, women's role, religion, superstitions and festivals.
- Besides Anthropological Survey of India has covered these studies under its own project called "People of India". The report is in 61 volumes out of which 7 volumes are under final editing.
- A Narmada salvage plan is also launched by Anthropological Survey of India.

ACTION PLAN :

Archaeological Survey of India is carrying out excavation at selected sites. Reports are available.

State Department has reviewed the Action Plan and has proposed 5 excavation sites as shown in table -4, in addition to the earlier proposal of collection of sculptures and excavation at Khedinama.

Table-4 Showing status of works at excavation sites

EXCAVATION SITES	STATUS
Bijalpur Khurd, Khandwa	Progress is nil
Chhalpa Kala, Khandwa	
Gajanpur, Dewas	
Nabalpura, Khandwa	
Gannaur, Khandwa	

Excavation works at Khedinama was completed earlier during 1993-94. Report is being published.

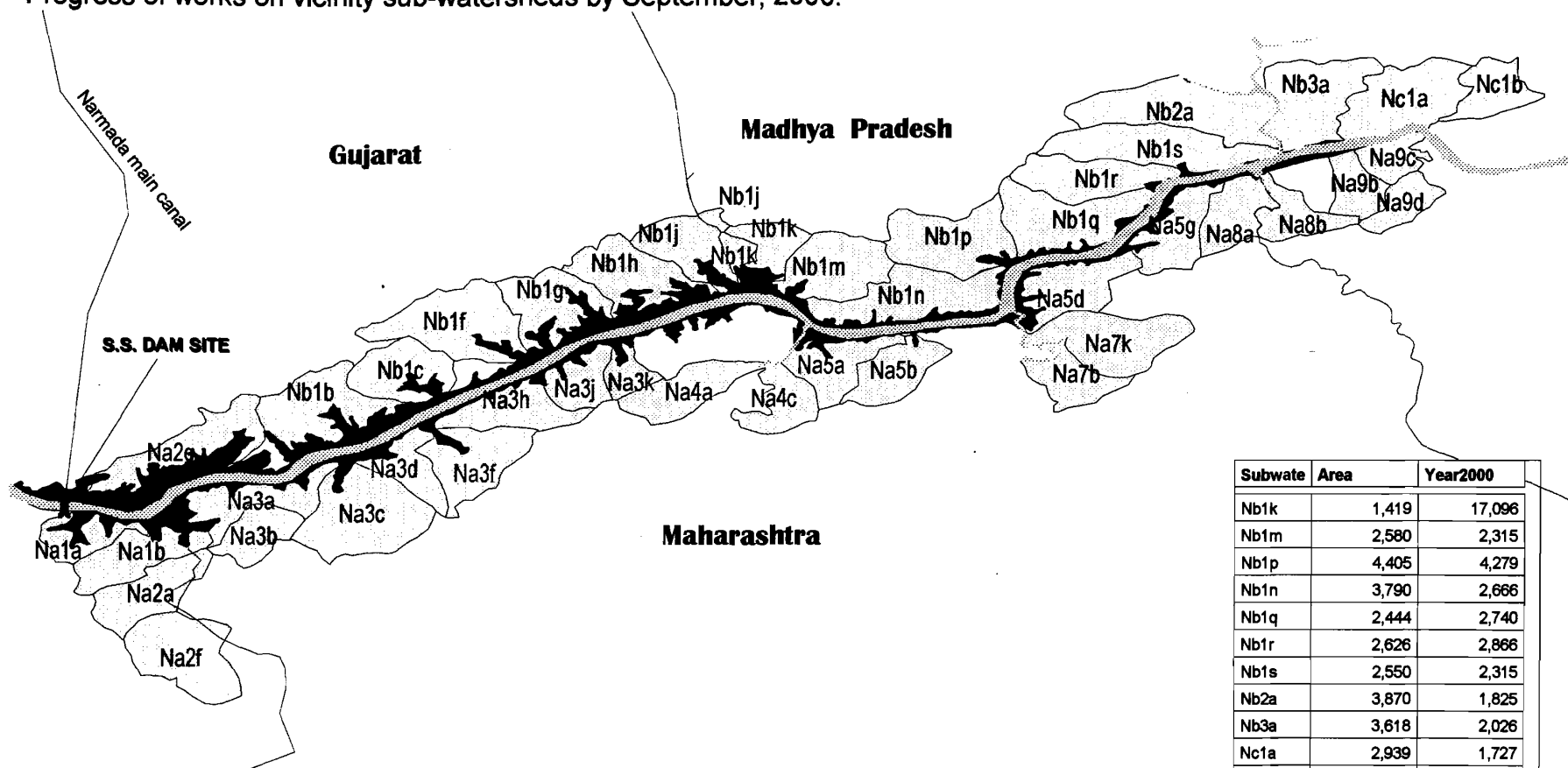
IMPLEMENTATION :

Excavation of the early historic mound in village Khedinama in Hoshangabad district is completed. Ancient tools and artifacts were found and report is available in NCA.

The entire area was scanned by the Anthropological Survey of India under Narmada Salvage Plan and some ancient tools have been found.

ANNEX – XXXV – (4)

SARDAR SAROVAR PROJECT : Catchment Area Treatment
 RL 100 m, Reservoir upto 105 kms., Impoundment = 8900 ha (24%)
 Progress of works on vicinity sub-watersheds by September, 2000.

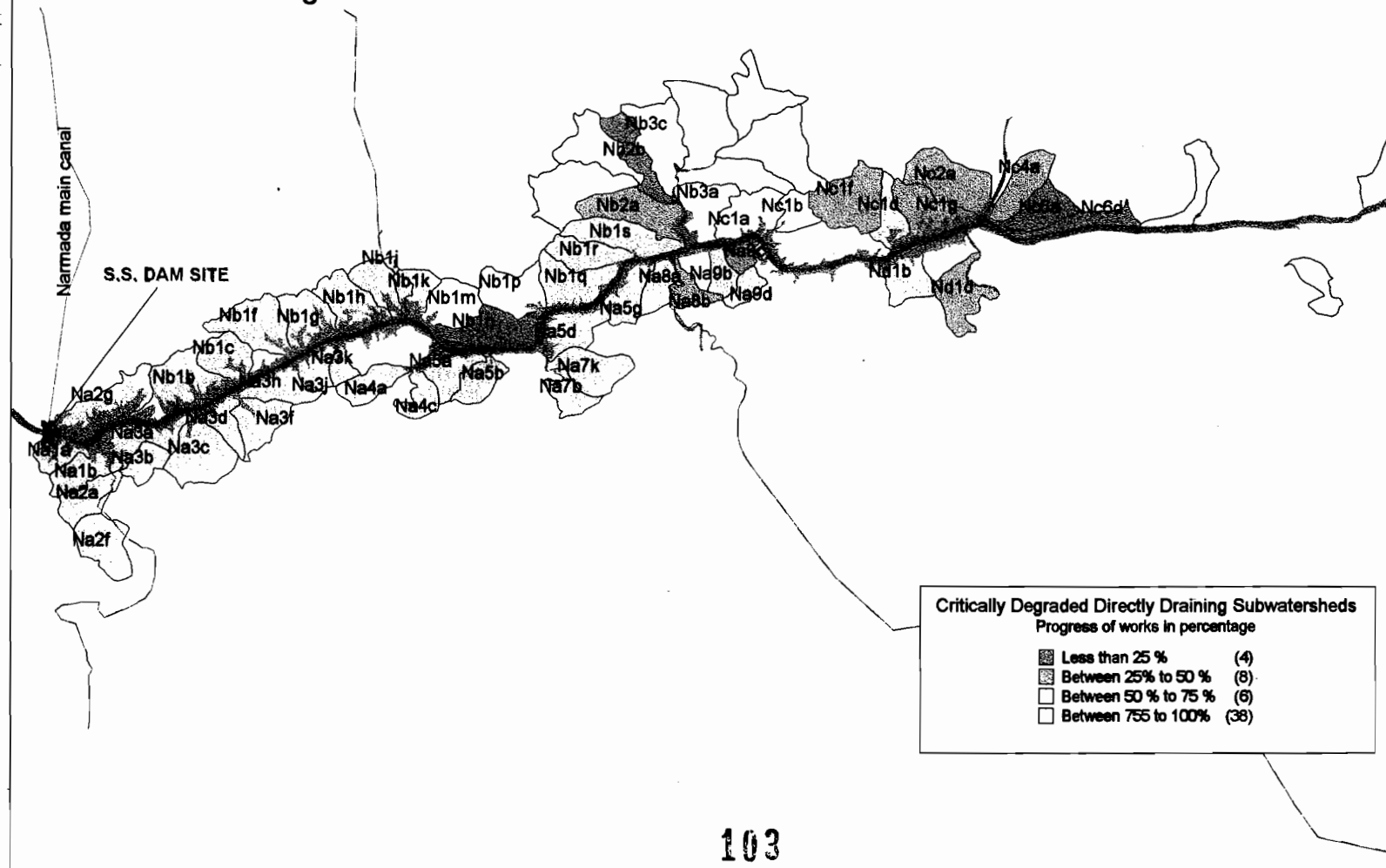
**Maharashtra**

MadhyaPradesh_CAT_Aug_2000 by VicinityLevel

□ 100 to 110 (45)

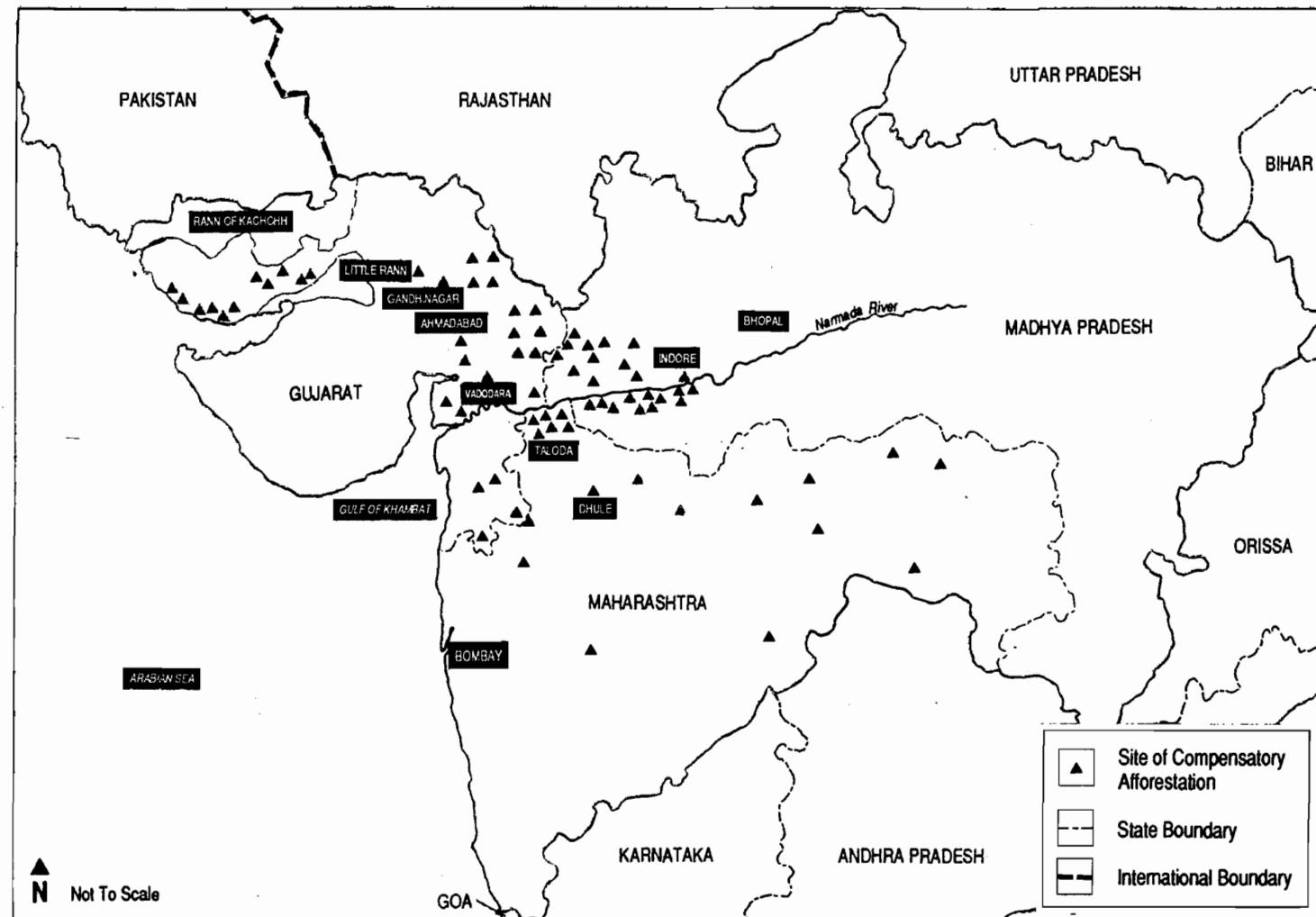
Subwater	Area	Year2000
Nb1k	1,419	17,096
Nb1m	2,580	2,315
Nb1p	4,405	4,279
Nb1n	3,790	2,666
Nb1q	2,444	2,740
Nb1r	2,626	2,866
Nb1s	2,550	2,315
Nb2a	3,870	1,825
Nb3a	3,618	2,026
Nc1a	2,939	1,727
Nc1b	1,916	1,004
Na8b	3,099	872
Na9b	1,497	1,490
Na9c	2,660	1,400
Na9d	827	825
Mahara	23,294	23,294
Gujarat	28,995	28,995
Total	92,529	82,954

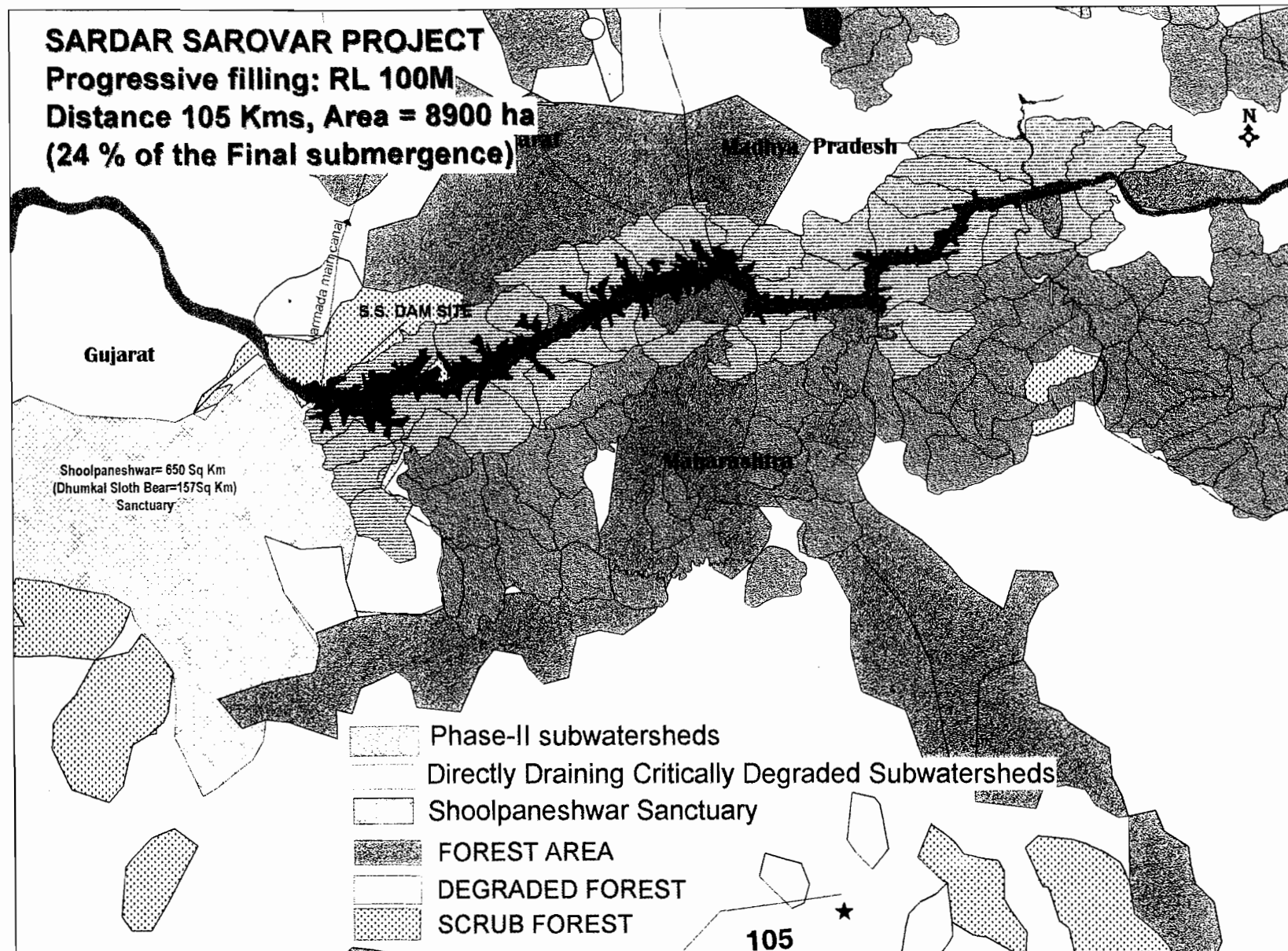
**CATCHMENT AREA TREATMENT:
SHOWING SUBWATERSHEDS IN THE VICINITY OF RESERVOIR CORRESPONDING TO RL 110m
Level Pool submergence**



Compensatory Afforestation in Gujarat, Maharashtra, Madhya Pradesh

ANNEX – XXXV – (5)



ANNEX - XXXV - (6)

सरदार सरोवर के फ्लोरा फौना अध्ययन प्रतिवेदन का क्रियान्वयन - सामाजिक वानिकी संबंधी वृक्षारोपण कार्य की लागत का सारांश ।

जिलेवार तहसीलवार गाँवों की संख्या एवं उनका रकबा

<u>जिला</u>	<u>तहसील</u>	<u>गाँव की संख्या</u>	<u>रकबा (हेक्टेयर में)</u>
घार	कुक्षी	40	2,76,28.90
	मनावर	31	15,395.69
	धरमपुरी	12	51,42.61
	योग	83	48,167.20
झाबुआ	अलीराजपुर	31	27,702.41
	योग-	31	27,702.41
खरगोन	बड़वानी	26	11,579.75
	गहेश्वर	07	2,722.96
	कसरावद	16	9,289.00
	ठीकरी	22	14,872.91
	योग-	71	38,464.62
	महायोग	185	114,334.23

मेड़ वृक्षारोपण

स्पेसिंग - 4' मी.

185 गाँव = 50 घर/गाँव = 9250 घर

9250 घर = 10 पीछे/घर = 92500 पीछे

92500 पीछे -

(अ) तार गेवियन के साथ - 92500 पीछे @ ₹55.83/पीछा = 51,64,275.00

(ब) बांस चटाई के साथ - 92500 पीछे @ ₹41.83/पीछा = 38,69,275.00

वृक्ष खेती एवं मेंडों पर वृक्षारोपण-

प्रस्तावित कार्यों के उद्देश्य:-

- (1) निजी भूमि पर वृक्षारोपण
- (2) कृषि विहिन निजी भूमि (बंजर भूमि) का उपयोग
- (3) निस्तार की पूर्ति
- (4) स्थानीय लोगों को रोजगार
- (5) जनता की भागीदारी
- (6) पर्यावरण संतुलन
- (7) जनता की भागीदारी से वनों की सुरक्षा
- (8) स्थानीय जनता को पर्यावरण संतुलन बावत समझाइस/प्रोत्साहित करना ।
- (9) वन क्षेत्र का विस्तारीकरण ।

(1) वृक्ष खेती हेतु प्राथमिकता निर्धारण/मापदण्ड

- (अ) ऐसे भूमि स्वामी जिनके पास स्वयं की 0.5 हे. से 5.000 हेक्टेयर तक की भूमि हो, एवं उनके पास स्वयं का सिंचाई का साधन हो ।
- (ब) वृक्षारोपण का अंतराल :- 3 मीटर × 2 मीटर
- (स) रोपित की जाने वाली प्रजातियाँ - (क्षेत्र की मृदा व जलवायु के अनुसार)

सागवान, आंवला, मुनगा, शीशम, महुआ, आम, जाम, कस्टार एवं घास, बाँस ।

- (द) योजना - 3 वर्ष हेतु ।

(2) मेंड वृक्षारोपण :-

- (अ) ऐसे भूमि स्वामी जिनके पास स्वयं की 0.5 हेक्टेयर से 2.5 हेक्टेयर तक की भूमि हो एवं उनके पास स्वयं का सिंचाई का साधन हो अथवा न हो ।
- (ब) वृक्षारोपण अंतराल :-
4 मीटर
- (स) रोपित की जाने वाली प्रजातियाँ :-

सागवान, बाँस, मुनगा, शीशम, आम, जाम, कटहल, नीम, पीपल इत्यादि ।

टीप:- इसी परिप्रेक्ष्य में कृषक चाहे तो अपने घरों के आसपास भी उपरोक्त प्रजातियों का चयन करके इच्छानुसार वृक्षारोपण का लाभ उठा सकता है ।

योजनावधि - 3 वर्ष

प्रथम वर्ष में भूमि तैयारी, द्वितीय वर्ष में रोपण तथा तृतीय वर्ष में रख-रखाव का कार्य किया जावेगा ।

उपरोक्त कार्यों में रोपित पौधों में पानी देना एवं सुरक्षा का कार्य भूमि स्वामी द्वारा किया जावेगा, शेष सभी कार्य विभाग द्वारा करवाये जावेंगे ।

कृषि खेती योजना - लागू अनुमान

1.000 हेक्टेयर हेतु.

क्रमांक	कार्य का विवरण	कार्य की मात्रा	दर (रु)	राशि (रु)
1	2	3	4	5

प्रथम वर्ष :- (तैयारी)

1	सर्वेक्षण/सीमांकन एवं खसरा नक्शा (मानचित्र) तैयार करना ।	1.000 है.	30.38/है.	30.38
2	क्षेत्र इकाई	1.000 है.	212.70/है.	212.70
3	घेराबंदी ले आउट	200 र.मी.	0.20/र.मी.	40.00
4	घेराबंदी -			
	(अ) एंगल एवं तार से	200 र.मी.	150/र.मी.	30000.00
	(ब) कंटीली झाड़ियों से	200 र.मी.	50/र.मी.	10000.00
5	गड़ड़ा चिन्हांकन कार्य	1600 गड़ड़े	151.90/हजार	243.00
6	गड़ड़ा खुदाई कार्य साइज (45 से.मी. x 45 से.मी. x 45 से.मी.)	1600 गड़ड़े	4.25/गड़ड़ा	6800.00
7	मिट्टी बदलवाई कार्य -			
	(अ) मिट्टी संग्रहण	48 सी.एम.टी.	48.12/सी.एम.टी.	2310.00
	(ब) खोदे गये गड़ड़ों के आधे भाग में उपतार मिट्टी भरना ।	1600 गड़ड़े	0.61/गड़ड़ा	960.00
8	रोपणी व्यय -			
	(अ) वर्षाकाल में रोपण हेतु	1600 पीघे	2/पीघा	3200.00
	(ब) परिवहन/रोपण के दौरान नष्ट होने वाले पीघे (10%)	160 पीघे	2/पीघा	320.00
	(स) आपात स्थिति हेतु 20%	320 पीघे	2/पीघा	640.00
9	अन्य व्यय		45 (एडमिनिस्ट्रेशन)	5000.00

व्यय प्रति पीघा - 31.00/- पीघा, योग
(तार फेंसिंग के साथ)

49756.00

व्यय प्रति पीघा - 19.00/- पीघा,
योग (कंटीली बाड़ के साथ)

29756.00

वृक्ष खेती

स्पेसिंग - 3x2 मी.

185 गाँव = 5.000 हे./गाँव = 925.000 हेक्टेयर

वृक्ष खेती के लिए प्रति कृषक 0.5 से 1 हे. क्षेत्र होना चाहिए।

925.000 हेक्टेयर -

(अ) तार फेंसिंग के साथ-925.000 हे. @ ₹70,801/हे. = 6,54,90,950.00

(ब) कंटीली बागड़ के साथ-925.000 हे. @ ₹50,801/हे. = 4,69,90,925.00

वृक्षारोपण हेतु प्रजातियों का चयन

- (अ) वृक्ष खेती- सागवान, बांस, आंवला, नीलगिरी, मुनगा, अंजन, आम, महुआ, अचार, कस्टार इत्यादि तथा स्थानीय मांग को ध्यान में रखते हुए प्रजातियों में फेर बदल किया जा सकता है।
- (ब) भेड़ वृक्षारोपण- बांस, आंवला, मुनगा, आम, अमरूद, जामुन, नीबू इत्यादि तथा स्थानीय मांग के अनुसार प्रजातियों में फेर बदल किया जा सकता है।
- (स) व्यय अनुमान- सहारिया समिति द्वारा प्रस्तावित दरें जो वर्ष 1998 में न.घा.वि. प्राधिकरण में अनुमोदित की गई हैं, पर आधारित है।

विशेष टिप - प्रजातियों का अनुपात निम्नानुसार होगा -

- (अ) 50 प्रतिशत फलदार प्रजातियाँ
- (ब) 30 प्रतिशत निस्तार पूर्ति हेतु प्रजातियाँ
- (स) 20 प्रतिशत लम्बी आयु में परिपक्व होने वाली प्रजातियाँ।

वृक्ष खेती हेतु प्रस्तावित राशि :

a.	तार फेंसिंग के साथ-	6,54,90,925 - 40% =	2,61,96,370.00
b.	बाँस चटई के साथ-	4,69,90,925 - 60% =	2,81,94,555.00
	योग:-		5,43,90,925.00
	हेक्टेयर हेतु आवश्यक राशि -		5,43,90,925.00

भेड़ वृक्षारोपण हेतु प्रस्तावित राशि :

a.	तार गेवियन के साथ -	51,64,270.00 - 40% =	20,69,710.00
b.	बाँस चटई के साथ -	38,69,275.00 - 60% =	23,21,565.00
	योग:-		43,87,275.00

92,500 पौधों के रोपण हेतु आवश्यक राशि - 43,87,275.00

अतः सामाजिक वानिकी कार्य पर कुल प्रस्तावित व्यय- ₹० 5,87,78,200.00

1.	2.	3	4	5.
द्वितीय वर्ष (रोपण)				
1	रोपण हेतु (4 माह)	1600 पीघे	1.00/पीघा	1600.00
	परिवहन रोपण के दौरान नष्ट होने वाले पीघे(10%)	160 पीघे	1/पीघा	160.00
	मृत पीघों का प्रत्यारोपण(रोपण पश्चात 10%)	160 पीघे	1.25/पीघा	200.00
	आगामी वर्ष के प्रत्यारोपण हेतु 20%	320 पीघे	3/पीघा	960.00
	आपात स्थिति हेतु (20%)	320 पीघे	3/पीघा	960.00
2	पीघा परिवहन कार्य-			
	(अ) निजी वाहन से	1600 पीघे	0.50/पीघा	800.00
	(ब) सिर बोझ से	1600 पीघे	0.30/पीघा	528.00
3	कीटनाशक पाउडर गड्ढों में डालना			
	(अ) क्रय	8 कि.ग्रा.	18/कि.ग्रा.	144.00
	(ब) लेबर व्यय	1600 पीघे	0.20/पीघा	320.00
4.	रोपण	1600 पीघे	0.91/पीघा	1456.00
5	थाला बनवाई	1600 पीघे	0.91/पीघा	1456.00
6	निंदाई 1600 पीघे	0.85/पीघा		1360.00
7.	खाद डलवाई			
	(अ) क्रय	16 कि.ग्रा.	6/कि.ग्रा.	96.00
	(ब) लेबर व्यय	1600 पीघे	0.20/पीघा	320.00
8	कीटनाशक स्प्रे			
	(अ) क्रय	1.5लीटर	300/लीटर	450.00
	(ब) लेबर व्यय	1600 पीघे	0.20/पीघा	320.00
9	अन्य व्यय		4550 रु मुश्त	3000.00
व्यय प्रति पीघा - 9/- पीघा, योग				14130.00

टीप- द्वितीय वर्ष में रोपित पीघों में कम से

कम 6 बार पानी दिया जावेगा । पानी देने एवं सुरक्षा

की जिम्मेदारी भूमि स्वामी की होगी ।

6

1	2	3	4	5
<u>तृतीय वर्ष (रख-रखाव)</u>				
1	<u>रोपणी व्यय</u>			
	(अ) मृत पौधों का प्रत्यारोपण	160 पौधे	1.25/पौधा	200.00
	(ब) परिवहन/रोपण के दौरान नष्ट होने वाले पौधे 10%	16 पौधे	1.25/पौधा	20.00
	(स) निर्दाई के दौरान बदले जाने वाले पौधे 10%	16 पौधे	1.50/पौधा	24.00
	(द) आपात स्थिति हेतु 20%	32 पौधे	3/पौधा	96.00
2	<u>पौधा परिवहन</u>			
	(अ) निजी वाहन से	160 पौधे	0.50/पौधा	80.00
	(ब) सिर बोझ से	160 पौधे	0.33/पौधा	53.00
3	<u>मृत पौधों के प्रत्यारोपण हेतु गड़्हा खुदाई कार्य</u>	<u>160 गड़्हे</u>	<u>2/गड़्हा</u>	<u>320.00</u>
4	<u>कीटनाशक डलवाई</u>			
	(अ) क्रय	1 कि. ग्रा.	18/कि. ग्रा.	18.00
	(ब) लेबर व्यय	160 पौधे	0.20/पौधा	32.00
5	<u>मृत पौधों का प्रत्यारोपण</u>	160 पौधे	0.91/पौधा	146.00
6	<u>थाला बनवाई</u>	1600 पौधे	0.91/पौधा	1456.00
7	<u>निर्दाई</u>	1600 पौधे	0.85/पौधा	1360.00
8	<u>खाद डलवाई</u>			
	(अ) क्रय	10 कि. ग्रा.	6/कि. ग्रा.	60.00
	(ब) लेबर व्यय	1600 पौधे	0.20/पौधा	320.00
9	<u>कीटनाशक छिड़काव</u>			
	(अ) क्रय	1.5 लीटर	300/लीटर	450.00
	(ब) लेबर व्यय	1600 पौधे	0.20/पौधा	320.00
10.	<u>अन्य व्यय</u>			<u>2000.00</u>
व्यय प्रति पौधा - रु. 4.34/- प्रति पौधा; योग -				6955.00
महायोग तार के साथ				70801.00
कंटीली बागड़				50801.00
व्यय प्रति पौधा - तार के साथ कंटीली बागड़				44.00

टीप - तृतीय वर्ष में रोपित पौधों को तीन बार पानी दिया जावेगा। पानी देने एवं सुरक्षा की जवाबदारी भूमि स्वामी की होगी।

111

मेड़ों पर वृक्षारोपण :- (1.000 हे. हेतु) - लागत अनुमान

1	2	3	4	5
<u>प्रथम वर्ष (तैयारी)</u>				
1	सर्वेक्षण/सीमांकन/खसरा मानचित्र तैयार करना	1.000 हे.	30.38/हे.	30.38
2	क्षेत्र सफाई	1.000 हे.	212.70/हे.	213.00
3	<u>घेराबंदी</u>			
	(अ) तार के गेवियन से	600 नग	200/नग	12000.00
	(ब) बांस की चटाई से	600 नग	60/नग	3600.00
4	गड़ड़ा चिन्हांकन कार्य	600 नग	151.90/हजार	91.00
5	गड़ड़ा खुदाई कार्य			
	साईज (45 से.मी.×45 से.मी.×45 से.मी.)	600 नग	425/नग	2550.00
6	<u>मिट्टी बदलवाई कार्य</u>			
	(अ) संग्रहण	27 सी.एम.टी.	4812/सी.एम.टी.	1299.00
	(ब) खोदे गये गड़ड़ों के आधे भाग में मिट्टी भरना	600 नग	0.61/गड़ड़ा	366.00
7	<u>रोपणी व्यय</u>			
	(अ) वर्षाकाल में रोपण हेतु	600 पौधे	2.00/पौधा	1200.00
	(ब) परिवहन/रोपण के दौरान नष्ट होने वाले पौधे (10%)	60 पौधे	2/पौधा	120.00
	(स) आपात स्थिति हेतु 20%	120 पौधे	2/पौधा	240.00
8	<u>अन्य व्यय</u>			4000.00
व्यय प्रति पौधा - ₹36.84/-; तार के गेवियन के साथ - योग				22109.00
व्यय प्रति पौधा - ₹22.84/-; बांस की चटाई(गेवियन के साथ)-योग				13709.00

द्वितीय वर्ष (रोपण)

1.	रोपण हेतु (4 माह)	600 पौधे	1.00/पौधा	600.00
	परिवहन रोपण के दौरान नष्ट होने वाले पौधे 10%	60 पौधे	1.00/पौधा	60.00
	मृत पौधों का प्रत्यारोपण 10%	60 पौधे	1.25/पौधा	75.00
	आगामी वर्ष के प्रत्यारोपण हेतु 20%	120 पौधे	3/पौधा	360.00
	आपात स्थिति हेतु 20%	120 पौधे	3/पौधा	360.00

8

	2	3	4	5
<u>पौधा परिवहन कार्य</u>				
(अ) निजी वाहन से	600 पौधे	0.50/पौधा	300.00	
(ब) सिर बोझ से	600 पौधे	0.33/पौधा	198.00	
<u>कीटनाशक पाउडर गड्ढों में डालना</u>				
(अ) क्रय	5 कि. ग्रा.	18/कि. ग्रा.	90.00	
(ब) लेबर व्यय	600 कि. ग्रा.	0.20/पौधा	120.00	
1 रोपण 600 पौधे	600 पौधे	0.91/पौधा	546.00	
5 थाला बनवाई	600 पौधे	0.91/पौधा	546.00	
5 खाद डलवाई				
(अ) क्रय	1 लीटर	300/लीटर	300.00	
(ब) लेबर व्यय	600 पौधे	0.20/पौधा	120.00	
8 निंदाई 600 पौधे	0.85/पौधा	0.20/पौधा	510.00	
9 अन्य व्यय			3000.00	
व्यय प्रति पौधा - 12/- पौधा योग-				7365.00

टीप - द्वितीय वर्ष में रोपित पौधों को पानी देना एवं सुरक्षा की जिम्मेदारी भूमि स्वामी की होगी।

तृतीय वर्ष (रख-रखाव)

1	<u>रोपणी व्यय -</u>			
(अ)	मृत पौधों का प्रत्यारोपण	60 पौधे	1.25/पौधा	75.00
(ब)	परिवहन/रोपण के दौरान नष्ट होने वाले पौधे 10%	6 पौधे	1.25/पौधा	7.00
(स)	निंदाई के दौरान बदले जाने वाले पौधे 10%	6 पौधे	1.50/पौधा	9.00
(द)	आपात स्थिति हेतु 20%	12 पौधे	3/पौधा	36.00

1	2	3	4	5
2	<u>पौधा परिवहन</u>			
	(अ) निजी वाहन से	60 पौधे	0.50/पौधा	30.00
	(ब) सिर बोझ से	60 पौधे	0.33/पौधे	20.00
3	मृत पौधों के प्रत्यारोपण हेतु गड़दा खुदाई कार्य	60 गड़दे	2/गड़दा	120.00
4	<u>कीटनाशक डलवाई</u>			
	(अ) क्रय	1/2 कि. ग्रा.	18/कि. ग्रा.	9.00
	(ब) लेबर व्यय	60 पौधे	0.20/पौधा	12.00
5	मृत पौधों का प्रत्यारोपण	60 पौधे	0.91/पौधा	54.00
6	थाला बनवाई	600 पौधे	0.91/पौधा	546.00
7	निंदाई	600 पौधे	0.85/पौधा	510.00
8	<u>खाद डलवाई</u>			
	(अ) क्रय	10 कि. ग्रा.	6/कि. ग्रा.	60.00
	(ब) लेबर व्यय	600 पौधे	0.20/पौधा	120.00
9	<u>कीटनाशक छिड़काव</u>			
	(अ) क्रय	1 लीटर	300/लीटर	300.00
	(ब) लेबर व्यय	600 पौधे	0.20/पौधा	120.00
10	अन्य व्यय			2000.00
व्यय प्रति पौधा - 6.7/- पौधा योग				4028.00
महायोग - तार गेवियन के साथ				38502.00
बांस चटाई के साथ				25102.00
व्यय प्रति पौधा - तार गेवियन के साथ				55.83
बांस कटाई के साथ				41.83

टीप - रोपित पौधों को पानी देने एवं सुरक्षा की जवाबदारी भूमि स्वामी की होगी।
विशेष टीप - यदि फलदार वृक्ष निजी रोपणी से कृप्य किये जाते हैं तो उसमें 20/- प्रति पौधा व्यय आयेगा।

10

टीप - एक ग्राम में औसत 50 घर मानकर चलने से प्रति घर 10 पीधे लगाने से ग्राम में 500 पीधे लगते हैं ।

इस प्रकार तीन वर्ष हेतु प्रति पीधा व्यय -

- (अ) तार गेवियन के साथ-रु 55.83/ पीधा
- (ब) बांस की चटाई के साथ-रु41.83/- पीधा

ANNEX - XXXV - (8)

Sardar Sarovar Project : Submergence at FRL

Cultural heritage : Monuments & Mounds

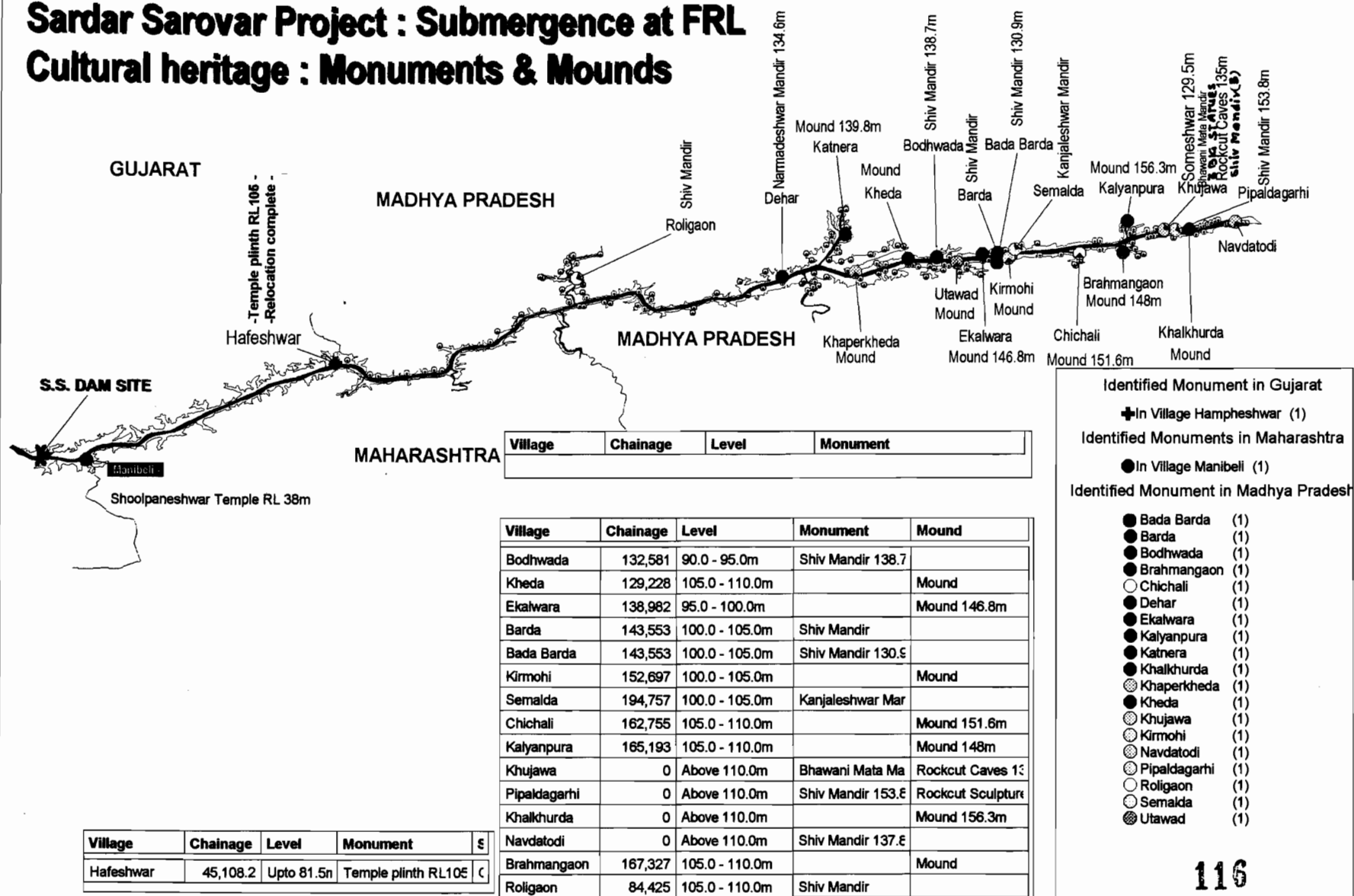
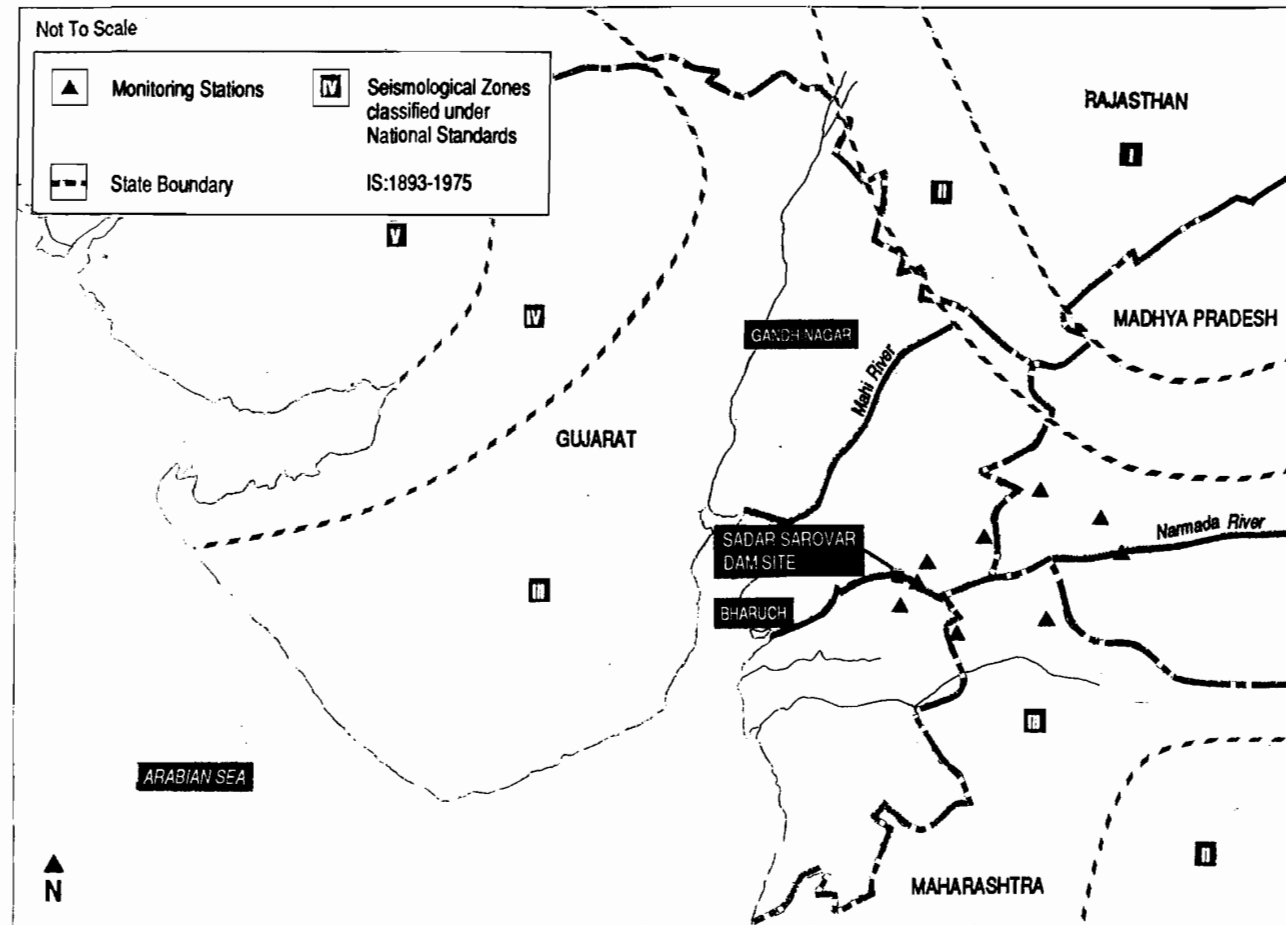
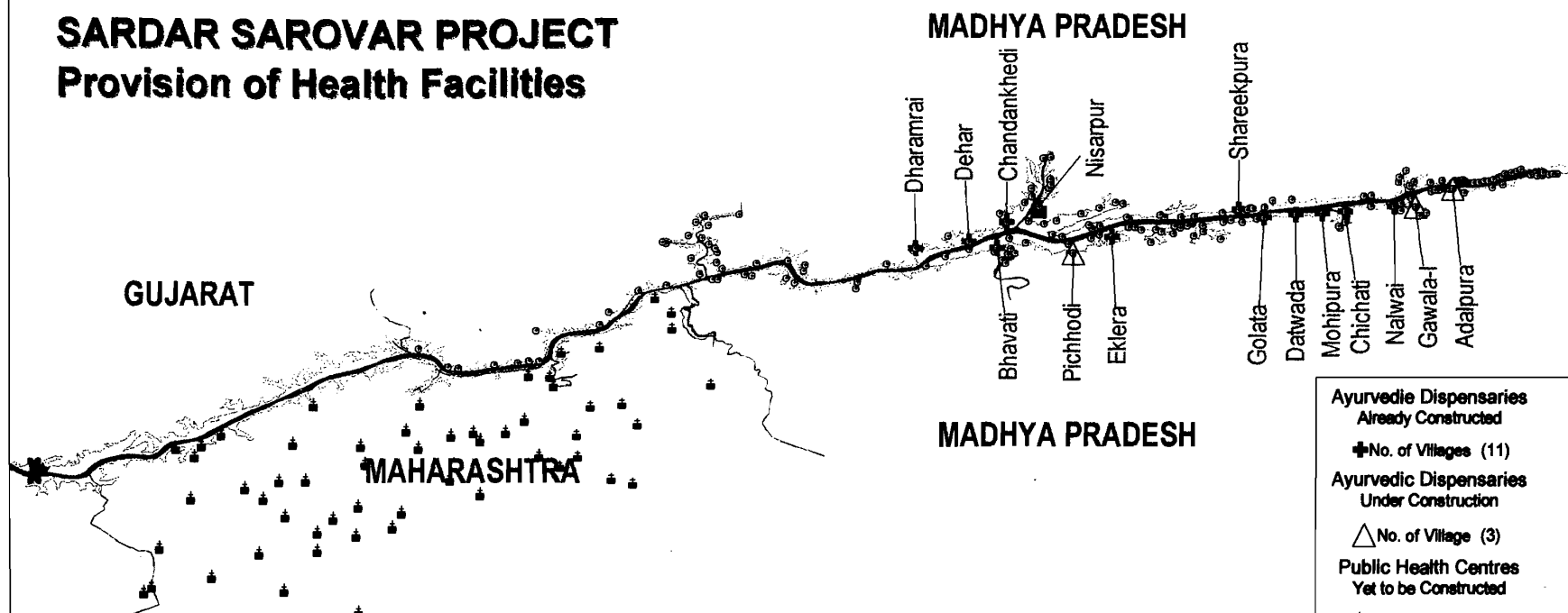


Figure 8.3a Location of Seismological Monitoring Stations

ANNEX - XXXV - (9)



ANNEX - XXXV - (11)**SARDAR SAROVAR PROJECT
Provision of Health Facilities**

Village	Level	Chainage	Dispensary	Tehsil
Adalpura	Above 110.0m	165	Yes	Kasaravad
Pichhodi	90.0 - 95.0m	121,914	Yes	Barwani
Gawala-I	105.0 - 110.0m	161,231	Yes	Thikri

Village	Chainage	Level	PHC	Tehsil	State
Nisarpur	118,886	90.0 - 95.0m	Yes	Kukshi	MP

Village	Chainage	Level	Hospital
Dehar	111,551	85.0 - 90.0m	Yes
Eklera	129,533	90.0 - 95.0m	Yes
Chandankhedi	115,456	85.0 - 90.0m	Yes
Shareekpura	150,259	100.0 - 105.0m	Yes
Golata	145,992	100.0 - 105.0m	Yes
Datwada	148,125	100.0 - 105.0m	Yes
Mohipura	149,649	100.0 - 105.0m	Yes
Chichati	162,755	105.0 - 110.0m	Yes
Bhavati	112,465	85.0 - 90.0m	Yes
Nalwai	156,964	105.0 - 110.0m	Yes
Dharamrai	106,236	81.5 - 85.0m	Yes

SUMMARY

Sixth and final phase of study is an abstract of last five phases of study. Conclusions are repeated in the current final phase of study except some minor changes in the final results

The cohort fixed in the earlier phases of the study for pre and post - impoundment areas was followed for epidemiological surveillance in the sixth and final phase of study. Hence the demographic and socioeconomic characteristics of study population were similar to the earlier phases and in conformity with national standard.

As per objectives the main emphasis on the final phase was on study of morbidity in these areas. In all five phases and also in current phase of study a high incidence of morbidity was recorded in post - impoundment area(14.47%) as compared to pre - impoundment area (11.16%). Like in last five phases age specific morbidity rate was higher at the extremes of age groups. Sex specific morbidity rate was higher for males (13.88%) than females (8.09%)

in pre - impoundment area and also higher for males (16.77%) than females (11.61%) in post - impoundment area.

Vector borne infections, Respiratory, Water borne gastrointestinal infections and skin infections are largely responsible for morbidity in the community in these areas.

Similarly prevalence of morbidity in post - impoundment area (9.46%) was higher as compared to pre - impoundment area (6.48%). All these observations show similar pattern of morbidity as observed in the earlier phases of study.

Prevalence of chronic diseases was also higher in post - impoundment area (7.15%) as compared to pre - impoundment area (4.90%) Bronchial asthma, Pulmonary tuberculosis, Cataract-Blindness and chronic Malaria were the main chronic diseases.

Surprisingly significant higher morbidity rate i.e. (42.68%) was recorded in well nourished children of post – impoundment area as compared to (27.11%) in pre – impoundment area.

Percentage of unimmunised children was more in pre – impoundment area (26.85%) as compared to post – impoundment area (23.34%). In both the areas Pvt. Medical Practitioners were main source of treatment for the community and allopathic system of treatment was more commonly adopted.

Since study belongs to rural population therefore majority of deliveries are home deliveries in both areas being conducted by trained birth attendant.

A very important finding in all phases of study was that slide positivity rate for malaria was always higher in post – impoundment area in the current phase also it is (4.40%) in post – impoundment area as compared to (3.04%) in pre – impoundment area.

ANNEX - XXXV - (12)**ENVIRONMENTAL COST OF SSP**

RELATED TO UNIT-I DAM:

A) Expenditure by project authorities

I) Cost of Survey & Studies (in Rs. lacs)

	GOG		GOM		GOMP		GOR/NCA		Total
	Estimate	Exp.	Estimate	Exp.	Estimate	Exp.	Estimate	Exp.	Total Estim.
CAF	4.52	4.52	5.29	5.29	2.44	2.44			12.25
CAT	8.77	8.77	7	7	3.28	2.8			19.05
F&F	101.84	80.47	38	16	20.33	20.33	15.27	15.3	175.44
Health	2.5	2.5	10	2.5	29.63	28.59			42.13
Arch./Anth.	1.3	0.6	N.A.		59	36.33			60.3
Seismicity	5.05	5.07	N.A.		23	13.59	1.98	1.98	30.03
CAD	11.25	11.25					N.A.		11.25
							Total (i)		350.45

ii) Cost of Implementation (in Rs. lacs) lacs)

	GOG		GOM		GOMP		GOR/NCA		Total
	Estimate	Exp.	Estimate	Exp.	Estimate	Exp.	Estimate	Exp.	Total Estim.
CAF	1938.82	1769.02	2116.00	1650.27	1800.00	1055.10			5854.82
CAT	3445.76	3810.07	2894.67	2218.27	8835.05	6804.87			15175.48
F&F inc. Eco-dev	663.31	126.26	117.00	2335.26	1650.00				2430.31
FISH		71.52	102.10						102.10
HEALTH	3800.00	583.47	546.60	9.26	848.48	21.66			5195.08
ARCHANT	329.00	174.04			6819.20	74.90			7148.20
SEIS.	219.57	335.20			NA	NA			219.57
CAD	NA	NA					NA		
							Total (ii)		36125.56
									Total (i & ii) 36476.01

N.A. Not available



केवल सरकारी प्रयोग के लिये
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पर्यावरण उपदल
ENVIRONMENT SUB-GROUP

पैंतीसवीं बैठक का कार्यवृत्त
Minutes of the 35th Meeting

19 जनवरी, 2001 को
केवडिया कालोनी, जिला - नर्मदा, गुजरात में हुई

Held at Kevadia Colony, Distt. Narmada,
Gujarat on 19th January, 2001

नर्मदा नियंत्रण प्राधिकरण

NARMADA CONTROL AUTHORITY

इन्दौर

फरवरी, 2001

Indore

February, 2001

**MINUTES OF THE 35th MEETING OF THE ENVIRONMENT SUB-GROUP OF NCA
HELD ON 19th JANUARY, 2001 AT KEVADIA COLONY, GUJARAT.**

I N D E X

ITEM NO	CONTENTS	PAGE NO.
	INTRODUCTION	1
XXXV-1(161)	CONFIRMATION OF MINUTES OF THE 34TH MEETING	2
XXXV-2(162)	SARDAR SAROVAR PROJECT: REVIEW OF THE STATUS OF ENVIRONMENTAL CONSIDERATIONS IN RELATION TO THE PROPOSED RASING OF THE DAM HEIGHT AT RL 100M	3
	A. Progressive filling of the reservoir:	3
	B. Review of the progress of works on the suggested parameters in relation to the proposed filling of the reservoir upto RL 100m by June 2002	4
	i. Phased Catchment Area Treatment	4
	ii. Compensatory Plantations	5
	iii. Survey of Flora, Fauna and Carrying Capacity Studies	5
	iv. Archaeological and Anthropological Survey	7
	v. Seismicity and Rim Stability of Reservoir	9
	vi. Health Aspects	9
	vii. Fisheries Conservation and Development	11
	viii. Command Area Development	12
	ix. Downstream environment	13
	Observations of the Sub-group	13
XXXV-3 (163)	REVIEW OF THE STATUS OF INDIRA SAGAR PROJECT MADHYA PRADESH	15
	i. Catchment Area Treatment	15
	ii. Compensatory Plantations	15
	iii. Survey of Flora Fauna & Carrying Capacity studies	15
	iv. Archaeological & Anthropological Survey	15
	v. Seismicity and Rim Stability of Reservoir	15
	vi. Health Aspects	16
	vii. Command area Development.	16
XXXV-4(164)	REVIEW OF ACTION TAKEN ON THE DECISION OF THE PREVIOUS MEETINGS	17
	I. Environmental Management of SSP and ISP	17
	II. Submission of Catchment Area Treatment Plans for freely draining critically degraded sub-watersheds (Item No.XXII-2(1122))	17
	III. Cost Estimates for preparation of Action Plans and implementation of Environmental Safeguard Measures	18
	IV. Monitoring works in Maharashtra	18
	V. Dissemination of Information	18

ANNEXURES

ANNEX	CONTENTS	PAGE NO.
XXXV - (1)	List of participants	1-2
XXXV - (2)	Letter from NVDA seeking corrections in the minutes	3-4
XXXV - (3)	Letter dated 24.11.2000 from Prof. R.K. Katti, Expert Member.	5-7
XXXV - (4)	Note on details of area transferred for CAF in Gujarat and their legal status.	8
XXXV - (5)	Note on targets and achievements related to development works in Shoolpaneshwar Sanctuary in Gujarat.	9-10
XXXV - (6)	Statement of works on Archaeological Aspects by NVDA for the areas in Madhya Pradesh.	11-22
XXXV - (7)	Summary of final report on study of Health Aspects by Deptt. Of PSM, Gandhi Medical College, Bhopal.	23-31
XXXV - (8)	Extract of studies on Runoff of Agrochemicals from the Agricultural fields submitted by NVDA.	32

**MINUTES OF THE 35th MEETING OF ENVIRONMENT SUB-GROUP
OF THE NCA HELD ON 19th JANUARY, 2001 AT
KEVADIA COLONY, GUJARAT**

INTRODUCTION

The 35th meeting of Environment Sub-group (ESG) of Narmada Control Authority was held at Kevadia Colony, Gujarat on 19th January, 2001. A list of participants is enclosed at **Annex-XXXV- Min-(1) at Page-1 and 2.**

Shri P.V. Jayakrishnan, Secretary, Ministry of Environment & Forests and the Chairman ESG, welcomed the participants. Discussion on the Agenda Items was taken up thereafter.

Item No.XXXV-1(161): CONFIRMATION OF MINUTES OF THE 34th MEETING

Minutes of the 34th meeting of Environment Sub-group circulated through letter No.Env-3(34)/2000/3167-3200 dated 29th December, 2000 were taken up for confirmation.

Govt. of Madhya Pradesh, vide their letter No.NVDA/E&F/Tech/2001/84 dated 18.1.2001 placed at **Annex.XXXV-Min-(2) at Page-3 to 4** requested following corrections.

Reference	As recorded in minutes	Modification requested
Last Sentence on page-10 Sub-item-4 under Item-XXXIV-3(159) Sardar Sarovar Project	It was further informed the plan was <u>under implemen-tation</u>	"It was further informed that the plan was <u>sent to the Forest Department of the GOMP.</u> "
First para on page-11 Sub-item-6 under Item No.XXIV-3(159), Sardar Sarovar & Indira Sagar Project, Govt. of Madhya Pradesh	Regarding Epidemio-logical Surveillance Studies entrusted to Gandhi Medical College, Bhopal, the Member (E&F), NVDA informed that <u>sixth and final Report has been received and is being complied.</u>	"Regarding Epidemiological Surveillance studies entrusted to Gandhi Medical College, Bhopal, the Member (E&F), NVDA, informed that the <u>sixth and last report has been received.</u> However, a final report incorporating all findings and recommendation is awaited.

As the requested corrections were factual, these were accepted and the Minutes were confirmed. .

Item No. XXXV-2(162): SARDAR SAROVAR PROJECT: REVIEW OF THE STATUS OF ENVIRONMENTAL CONSIDERATIONS IN RELATION TO THE PROPOSED RAISING OF THE DAM HEIGHT AT RL 100M

Member (E&Rs), NCA, initiated the discussions and informed the Members about the visit of the Chairman of the Sub-Group to the dam site, Aqueduct near Bodoli, canal Bank plantations raised along Narmada Canal from CH-45 kms to 48 kms, Surya rehabilitation site located in Samkheda Taluka of District Vadodara and Shoolpaneshwar Sanctuary to get a first hand assessment of the status of compliance of environmental safeguard measures. He also informed the Sub Group about the proposed visit of the Chairman next day to the plantation works in Kutch area on 20th January, 2001.

A. Progressive filling of the reservoir

The Member (E&R), with the permission of the chair, placed before the Sub-group a copy of the letter addressed to the Secretary, MoEF by Shri. Shekher Singh,. He presented the contents of this letter to the Members for a review.

Prof. R.K. Katti, referred to his letter addressed to the Chairman (copy placed at **Annex.XXXV-Min(3) at Page-5 to 7**) and stated that catchment area treatment is an engineering activity for reducing siltation which is accounted for as dead storages during the planning process itself. However, regarding the definition of the pari-passu clause, he pointed out that the issue was already settled by the Sub-group way back in the 18th meeting of the ESG held in May, 1993 and that there was no need to reopen the issue again. Prof. Ramaseshan reiterated the views expressed by Prof. Katti and also referred to the earlier discussions of the Sub-group wherein it was brought out that the Phase-II areas should be treated in a rational time frame.

Responding to the issues raised by Shri Shekhar Singh in his letter about pari-passu implementation of various environmental conditions, particularly catchment area treatment, the Chairman referred to the judgment of 18th October, 2000 of the Apex Court in Civil Writ Petition No.319/1994 of NBA V/s Union of India & Others and

observed that the matter was discussed and settled, particularly under the caption "Catchment Area Treatment". He further stressed that the directions given are quite clear and the Sub-group has to function in accordance with the operative part of the judgement.

B. Review of the progress of works on the suggested parameters in relation to the proposed filling of the reservoir upto RL 100m by June 2002

I. Phased Catchment Area Treatment

Member (E&R), NCA presented the progress reported in the Agenda and informed that all works for Phase -I in Maharashtra and Gujarat have been completed . As against a target of 1,79,180 ha., an area of about 1,34,832 ha. i.e., 75.27% has been treated, So far. The total area of sub-watersheds in the vicinity of the proposed impoundment is 92,529 ha. against which an area of 82,279 ha. has been treated which comes to about 88.4%. He further stated that the balance work remained only in Madhya Pradesh and by the end of November, 2000, the progress of works on sub-watersheds located in the vicinity of the proposed impoundment, was 29,990 ha. against a target of 40,240 ha. Overall an area of 82,380 ha has been treated against a target of 1,25,725 ha in Madhya Pradesh..

Prof. Ramaseshan pointed out that there was a need for Madhya Pradesh to accelerate the works in all areas and specially in the areas of the vicinity sub-watersheds. Director (IA), MoEF, suggested that all works in the identified sub-watersheds of Phase-I should be completed by March, 2002 in Madhya Pradesh also. Representative of GOMP assured that all the balance works for CAT would be completed by June, 2002.

II. Compensatory Plantations

Member (E&R), NCA stated that compensatory plantation over an area of 41,967.00 ha has been raised by State Forest Departments of Gujarat, Maharashtra & Madhya Pradesh and the planned targets achieved. In addition to the reforestation in the catchment, Project Authorities have also raised plantations over an area of 1,870 ha. along the Canal banks, 550 ha. in the vicinity of dam, 200 ha. on the left bank of the river Sabarmati in Gujarat. In Maharashtra, the forest land released for R&R works, was 4200 ha. and progress achieved was 3,584 ha.

Representative of GOG informed that they have taken steps to bring the planted areas under forests and have issued notices U/s 4 of the Indian Forests Act, 1927. Status Note made available during the meeting is at **Annex.XXXV-Min(4) at Page-8.**

III. Survey of Flora, Fauna and Carrying Capacity Studies

Specialist (Environment), NCA, pointed out that the issues identified with respect to submergence area were, identification of endangered/rare species, and habitat sufficiency. Accordingly, Action Plan for the rehabilitation of flora, fauna were expected to be based on the Surveys of flora & fauna in the region that would be affected due to implementation of the SSP with reference to (1) Threat to the Gene pool, (2) Details of wildlife habitat in the region (3) Measures proposed to rehabilitate endangered species of flora/ fauna. (4) Assessment of the carrying capacity of the neighbouring areas wherein the wildlife would disperse due to impoundment and (5) Plan for rehabilitation of endangered flora & fauna. Further, , felling plans were expected to provide felling of the trees in a manner so as not to trap the animal in up-hill areas of any hillock.

It was explained by the Specialist (Env.), NCA, that in Maharashtra and Gujarat the forest getting submerged formed only a small part of the large contiguous tracts of forests and none of the identified animal species was either endemic (rare /

endangered / threatened) or migratory in nature, except local migration for food and shelter. Therefore, migratory corridors during progressive filling of the reservoir were not considered necessary and that there was no threat to the Gene Pool. Carrying Capacity of the adjoining forest eco systems were studied and measures have been devised for improving the same. To accomplish this plantations under CAT programmes along the periphery of the proposed impoundment have been undertaken by the State Govts., which are expected to be 100% complete before filling of the reservoir at EL 100m. by June, 2002.

Gujarat

Regarding felling of trees from the submergence area, it was reported that in Gujarat entire reservoir bowl was cleared of vegetation and even coppice crop was also removed.

Progress on implementation of the ameliorative measures in Shoolpaneshwar Sanctuary made available by the Govt. of Gujarat is placed at **Annex.XXXV-Min(5) at Page-9 to 10.** A tabular statement showing the targets and achievements on the works in Shoolpaneshwar Sanctuary was presented by the Govt. of Gujarat. However, the Joint Secretary, MoEF, desired that a column for recommendations of the Study Group along with the action taken on each of the recommendations also needs to be incorporated.

Maharashtra

In Maharashtra, out of 6,488 ha. of forest land getting submerged at FRL about 2,500 ha. area required felling. Out of this, about 750 ha. of forest has already been felled and marking for felling has been carried out in balance areas. For ensuring clear felling of trees upto EL 100 m, Govt., of Maharashtra was requested to provide a phased Action Plan. Officials of Government of Maharashtra could not furnish these details during the meeting. The Sub Group felt that, as in the case of Gujarat,

Government of Maharashtra should also prepare, in a tabular form, the findings of the study report on flora, fauna, action needed and present status, etc.

Chairman, accordingly, desired that the Govt. of Maharashtra should compile these details and submit them for review by the Sub-group and suggested that MoEF / NCA should follow it up.

Madhya Pradesh

The Specialist (Environment.), NCA, presented the available information and informed that the details of wildlife habitat in the region have been surveyed and studied by State Forest Research Institute (SFRI), Jabalpur. Action Plans drawn by NVDA, on the basis of the recommendations of these studies envisaged completion of CAT works as a measure to improve carrying capacity of their adjoining eco system besides, social forestry activities in the impact zone. Project Authorities in Madhya Pradesh have also prepared plans for felling the forests in a manner to avoid trapping of the wild animals. The plan submitted by the Govt. of Madhya Pradesh contained two components viz., CAT works and carrying capacity and schemes for social forestry plantations for the people in the impact zone. Further information was requested from the NVDA.

It was informed by the Subject Matter Specialist (SMS), NVDA, that the CAT works were already under advanced stage of implementation and that for Social Forestry components, works have been entrusted to the regular Social Forestry Department. Depending upon availability of the land, plantations would be undertaken by the Social Forestry Wing of the Forest Department and the needed funds would be provided by the NVDA.

IV. Archaeological and Anthropological Survey

Specialist (Environment), NCA, informed that the three State Govts. have completed surveys of cultural and religious sites within the submergence zone with a view to list all archaeological sites requiring protection/relocation under state list. etc. The list also includes sites of religious or cultural significance which, although not

protected under national law, are of significance and needed to be relocated. The monuments identified for re-location / protection were shown on a GIS generated map. It was pointed out that the work for housing the sculptures in Museums at Village Kasravad and District Headquarters at Indore, Dewas and Bhopal collected from in and around the river bed was in progress. The State Govt., Officials were requested to provide further information for a review by the Sub-group.

Gujarat

CCF, SSNNL, informed that no State / Centrally protected monument would be affected due to impoundment. However, Government of Gujarat has prepared plans for relocation of two temples namely; Shoolpaneshwar and Hampleshwar. He further informed that relocation of Shoolpaneshwar Temple was completed earlier and all works on relocations of Hampleshwar Temple have also been completed recently.

Madhya Pradesh

Commissioner (Archeology), Govt. of Madhya Pradesh informed that temples viz at village Varda and Pipaldagarhi besides Rock-cut sculptures at village Pipaldagarhi have already been relocated and preparations have commenced for relocation of the temple at Nawada Toli situated in RL of 137.765 m. Details of the progress on relocation, protection, excavation given during the meeting are placed at **Annex.XXXV-Min(6) at Page-11 to 22.**

Prof. Ramaseshan, suggested that monuments impacted by the back water level of the proposed impoundments also need to be identified and protected in time.

It was pointed out by Joint Secretary (MOEF) that though apparently the identified monuments are at higher elevation if the villages in which these are located get fully/partially submerged at EL 100m; it may become difficult thereafter to re-locate them. Therefore, he suggested that such monuments should also be identified. For this purpose, the backwater contours drawn at various elevations and available with NVDA could be used.

Report on findings of the excavation works was also requested by the Members of the Sub-group.

The Commissioner (Archeology), Govt. of Madhya Pradesh agreed to submit the detailed information within a week's time.

V. Seismicity and Rim Stability of Reservoir

The Member (E&R), NCA, pointed out that Studies have been carried out and the recommendations for modifications of the dam design have been implemented. Rim stability studies have also been completed and well equipped nine Monitoring Stations along the periphery of the reservoir were functioning. However, with regard to getting analysis of data collected by these observatories done by expert institutions, action appears to have been taken. The Chairman desired that this may be expedited.

VI. Health Aspects

The Specialist (Env.), NCA, presented the available information and pointed out that the Project Authorities were expected to prepare plans on Public Health Aspects focusing on prevention and control of malaria, besides, surveillance of diseases during pre and post impoundment period and the routine care taken by the concerned Departments of the State and Central Govts., under their own programmes like National Anti Malaria Programme, Diseases Surveillance Programme, Research on Malaria, etc.

Action Plan on preventive and curative aspects

Gujarat

The Representative of the State Govt., informed that by the end of year 2000, the intensified malaria control programme was underway in several villages impacted by the project in Gujarat and the construction of a 25-bed hospital at Kevadia was complete. The Specialist (Env.), NCA, pointed out that during the last review of the Health Aspects undertaken by the Member (E&R), NCA, it was presented that incidence of Malaria had declined in the command area and this was attributed to the better managerial practices

adopted by the Govt., of Gujarat. However, keeping in view the draughts during the last couple of years, it was desired to tread cautiously.

Govt. of Madhya Pradesh Officials desired a copy of the work plan prepared by SSNNL for their reference. This was agreed to by the Govt., of Gujarat.

Maharashtra

In accordance with the revised action plan and state provision for health care facilities, two cottage hospitals, eight primary health centres and 55 primary health units have already been established in Dhule District. Taking into account the inaccessibility of some of the villages, provisions were made for eight additional public health units, 10 mobile units and a floating dispensary for villages within 10 km of the submergence zone. One hospital at Somawal resettlement village was already functional.

Madhya Pradesh

According to the action plan work commenced on additional facilities for the Nisarpur village hospital, Dhar District. It was informed that extension of the Nisarpur hospital is due for completion by the time submergence of areas in Madhya Pradesh commences.

Diseases Surveillance Studies

Since 1992, Gandhi Medical College continued surveillance studies of the impact area of Madhya Pradesh. It was informed that investigators have submitted 6 Interim reports. Dr. S.C. Tiwari of the Gandhi Medical College pointed out that certain cases of filaria have been reported from some pockets of the impact areas of Maheshwar project upstream of Sardar Sarovar Project. Joint Secretary, MOEF suggested effective monitoring to keep the disease in check.

Specialist Environment, NCA informed that the 6th report was sent to the ICMR, New Delhi for their views. A copy of the Executive Summary of the 6th Report is placed at **Annex.XXXV-Min(7) at Page-23 to 31**. The views of ICMR upon receipt would be communicated to the NVDA for further necessary action. Regarding inclusion of impacted districts in the districts under diseases surveillance programme of the NICD,

Joint Director, NICD, New Delhi informed that a request from NVDA was awaited. He however suggested that as the information from Madhya Pradesh is for inclusion of certain villages where as NICD monitors for the districts as a whole. Therefore, a health cell may be created in NVDA for coordinating the activities. Representative of the GOMP informed that NICD has been approached and the issue would be sorted out.

The Managing Director, SSNNL informed that based on the recommendations of the EIA studies action plan has been updated by the Govt. of Gujarat. This action plan shall be discussed with the experts during next month.

Information from the Govt. of Maharashtra on the progress of Phase-II studies was awaited.

VII. Fisheries Conservation and Development

The Member (E&R), NCA pointed out that none of the fishes of the Narmada is listed as rare or threatened in the "Red Data List" of the International Union for the Conservation of Nature and Natural Resources (IUCN). Nonetheless, CICFRI compiled a list of eight species, which it suggested could be considered 'vulnerable' in the Narmada Basin though they are present elsewhere in India in abundance.

These comprise three species of Mahaseer (*Tor tor*, *Tor putitora*, and *T.khudree*), important food and game fish upstream of the dam site, and one species each of *Rita rita*, *Rita pavementata* *Labeo fimbriatus* and *Notopterus chitala*. It was reported by CICFRI that if appropriate management practices are adopted, there would be no threat to important fauna. Protection of valuable fish fauna will, to some extent, be dependent on maintaining acceptable water quality upstream of the dam. In order to monitor water quality, the NVDA, CWC, CPCB and CICFRI have already commissioned a series of water quality monitoring stations along the Narmada River.

Gujarat

CCF, SSNNL, informed that to improve the quality of seed to be stocked and to lessen the pressure on land deployment, the possibility of Cage / Pen rearing of Fish

Seed is being examined, in consultation with the Central Institute of Fisheries Aqua – culture, Bangalore, who have offered a consultancy package to the State Fisheries Department. It was further informed that SSNNL has already appointed a Fisheries Consultant to gear up the fisheries-sector activities under SSP.

Maharashtra

The Specialist (Env.), NCA pointed out that following the desk review studies on conservation of fish fauna in SSP carried out by the Central Inland Capture Fisheries Research Institute (CICFRI), Govt., of Maharashtra assigned a short term study to the Vadodara Centre of CICFRI, but the Report is not yet furnished by the CICFRI.

The Chairman desired that a separate letter should be addressed to the Govt. of Maharashtra for submission of this report and that Secretary of the Ministry of Agriculture might also be approached for this purpose.

Madhya Pradesh

Current status of execution of felling in Madhya Pradesh is awaited

VIII. Command Area Development

The Member (E&R), NCA, pointed out that the introduction of irrigation in the drought-prone areas of Gujarat would benefit the farming communities. In order to ensure envisaged benefits, Chairman, ESG stressed the need for controlled use of surface and ground water and continuous monitoring in the areas of drainage, water logging & soil salinity, water quality, impact on flora and fauna, effects on public health, socio-economic impacts etc. He requested for details on these aspects from the Officials of the State Govt., of Gujarat.

Govt. of Gujarat

Prof. Ramaseshan suggested that adequate measures should be undertaken to ensure conjunctive use of the water. He further suggested establishment of institutions for monitoring problematic areas and permit system for proper development of ground water. He was of the view that development of ground water should not be left to the private parties and suggested mathematical modeling for monitoring water table.

The Managing Director, SSNNL, informed that the Sardar Sarovar Project service area has been classified into 13 agro climatic regions based on broad topographical, hydro meteorological and soil surveys and that special measures have been planned for tackling the problematic areas of Bhal and Bara tracts. He informed that the proposed canal lining would reduce seepage loss to only about 10% of that of the unlined canals.

Rajasthan

In the absence of the representative of Govt. of Rajasthan during the last few meetings, progress could not be reviewed. The Executive Member, NCA, stated that there was substantial progress on construction of Canal Network in Rajasthan portion and a review of the implementation of environment safeguard measures is desirable for implementation of the Project in time. He was of the view that to facilitate the same, the Govt. of Rajasthan be pursued for appropriate presentation during the meetings of the Sub-group. The Chairman desired that Govt. of Rajasthan should be addressed separately for ensuring review of the progress.

IX. Down stream environment

The Member (E&R), NCA pointed out that It is unlikely that any significant negative environmental impacts will occur over the next 30 years as a result of the Project. Some possible adverse effects have been identified, the main one being the effect of flood attenuation on Hilsa migration. These were being monitored.

Concluding the discussions, Chairman observed that for enabling a decision on raising of the dam height upto 100 m by June, 2002, the State Governments should submit the following information which could be considered in the next meeting of the Environment Sub Group.

GUJARAT

- Tabular information on recommendations, action plans and present status of various studies and surveys carried out for Shoolpaneshwar Sanctuary.
- Command Area development details, particularly with reference to the proposed monitoring and controlled release of water for avoiding water logging, salinity etc.
- Final Health Plan incorporating the preventive and curative measures proposed for malaria control and other diseases.

MADHYA PRADESH

- Proposal for completion of remaining Catchment Area Treatment covering an area of 40,240 ha for phase-I by June, 2002.
- Proposal for felling of trees in the submergence zone prior to impoundment of the reservoir.
- Write-up on recommendations, action plan and present status of various studies and surveys relating to flora and fauna affected due to impoundment
- Plan for relocation of archaeological sites/monuments getting affected at EL 100 m including the ones in villages getting affected due to backwater effect.
- Report on health aspects and the additional districts required to be covered by NICD.

MAHARASHTRA

- Phased felling plan for forests coming under submergence at EL 100 m
- Information on recommendations of the study group on flora and fauna and the proposed action plan for their dispersal/migration
- Health plan

RAJASTHAN

- Command Area Development Plan

**Item No. XXXV-3 (163) : REVIEW OF THE STATUS OF INDIRA SAGAR PROJECT
MADHYA PRADESH**

I. Catchment Area Treatment

It was informed that by the end of November, 2000, against a target of 73,456 ha. an area of 42,325 ha. (excluding 5,309 ha of Datuni pilot project) has been treated-up.

II. Compensatory Plantations

It was informed that by the end of November, 2000, Govt. of Madhya Pradesh have completed plantation works over an area of 70,031 ha. against a target of 80,945 ha.

III. Survey of Flora Fauna & Carrying Capacity Studies

In accordance with the recommendations of the study conducted by the Wildlife Institute of India regarding declaration of National Parks / Sanctuary, It was informed by the SMS, NVDA, that the issue was taken up by a Committee formed for placing the issue before the Cabinet but now it has been decided to take up the issue directly to the Cabinet. The Chairman desired that this issue be expedited at the earliest.

IV. Archaeological & Anthropological Survey

Regarding needed protection measures for the Joga Fort, ASI, Nagpur, Branch had prepared an estimate of Rs.1.50 crores. As per the information submitted during the 34th meeting, NVDA had requested ASI to take up the work. ASI officers were not present and therefore progress could not be ascertained. The Chairman desired that the issue be taken up with the Director General, Archaeological Survey of India, New Delhi.

V. Seismicity and Rim Stability of Reservoir

It was informed that analysis and co-relation of data being collected / proposed to be collected by various Agencies in the Region of Narmada Sagar Project, is awaited from the field formations.

VI. Health Aspects

The issue was discussed already under SSP.

VII. Command area Development

It was informed that the Terms of Reference (TOR) for preparation of the command area development plan of the Indira Sagar Project was under examination of the NVDA.

A note on the studies under progress on effect of agriculture run off from the fields on surface and ground water was submitted during the meeting and is placed at **Annex.XXXV-Min(8) at Page-32.**

Item No. XXXV-4(164) REVIEW OF ACTION TAKEN ON THE DECISION OF THE PREVIOUS MEETINGS

I. Environmental Management of SSP and ISP

During the discussion on comprehensive documents of Environmental Management of Sardar Sarovar and Indira Sagar Projects circulated to the members by NCA, members desired more time to study the twin documents for sending their view points.

II. Submission of Catchment Area Treatment Plans for freely draining critically degraded sub-watersheds (Item No.XXII-2(1122))

Madhya Pradesh

It was informed that regarding the works on Implementation of the Phase-II plan there was no change in the status. However there were some structural changes in the pattern of funding by the Govt. of India to the State of Madhya Pradesh. The changed pattern also covers the centrally sponsored schemes of River Valley Projects, however, efforts are being made for smooth implementation of the schemes related to Narmada River Catchment. Regarding establishment of Silt Monitoring Stations, it was informed that the Bhopal Office of the CWC was approached and their response was awaited.

Maharashtra

It was submitted by CF, Dhule, Govt. of Maharashtra during the meeting that out of the total of 80,881 ha. of the area of the watersheds, 40,619 ha. is forest area and 36,949 ha. is the area under Agriculture Department. Progress was reported in 13 sub-watersheds for which under River Valley Project schemes were approved by the Ministry of Agriculture, out of 31,219 ha. available from 13 sub-watersheds, about 22,706 ha. was available for treatment of which, 13,843 ha. area has been treated by the end of December, 2000.

It was further informed that for the ninth five year plan period, cost norms have been revised to Rs.10,000/- requiring the revision of the balance schemes. It was pointed out that there was no problem of release of funds from the Ministry of Agriculture, Govt. of India, to the Govt. of Maharashtra. The Member (E&R), NCA, stated that the Joint Secretary (Soil Conservation), Ministry of Agriculture (MOA), was invited for this meeting, however, she could not make it. The Executive Member, NCA, was of the view that to facilitate a timely review of the progress of works it was necessary that the concerned Officers of the MOA participate during the meeting and that they should also be contacted separately. The Chairman desired that Secretary, Department of Agricultural Co-operation should also be addressed for the purpose.

III. Cost Estimates for preparation of Action Plans and implementation of Environmental Safeguard Measures

The latest update on these issues based on the information received from the State Govts. was presented with the agenda papers however up-dating was awaited.

IV. Monitoring works in Maharashtra

Govt. of Maharashtra representative have expressed difficulties in receiving funds from the Project Authorities for implementation of the environment safeguard like Health, Fisheries, Flora, Fauna, etc. This issue was discussed and it was informed that a policy decision is to be taken by the appropriate authorities of SSNNL after studying availability of funds and financial consequences thereof. Information was awaited.

In the absence of appropriate participation, progress in Maharashtra could not be reviewed by the Committee on various issues for the areas in Maharashtra. The Chairman desired that Govt. of Maharashtra should be addressed on this issue.

V. Dissemination of Information

During its earlier meetings it was desired that good works being done by the Project Authorities should be published.

- Govt. of Madhya Pradesh desired some more time.
- Govt. of Gujarat informed that SSNNL has taken up the preparation of two documents namely –

- Environmental Activities and the Impacts in the SSP, Gujarat &
 - Faunal Diversity in the SSP Catchment area of Gujarat.
- It was informed by Specialist Environment, NCA that steps are being taken for organising Seminar / Workshops on the Thrust Areas of the Environmental Ameliorative Measures.

The Executive Member, NCA, pointed out that NCA has approved the schedule of construction recently and that all works on Environment and R&R are also required to be completed accordingly. He drew the attention of the Members towards the urgent need for providing drinking water and irrigation supplies to the drought prone areas of Gujarat and stated that substantial work on construction of Canal was already completed. He requested the State Govts. to speed up the works for completion of the Project at the earliest.

The Chairman summed up the discussions by observing that there was a need to create awareness on various environmental works undertaken for the project by means of publications/publicity. He further expressed that as per the directions of the Hon'ble Supreme Court, the Review Committee of the NCA is expected to meet quarterly to review the progress of work on the project. Accordingly, the Sub-group may also have to meet periodically. He suggested that the next meeting of the Sub-group can be held some time during April, 2001.

The Chairman thanked Shri K.C. Kapoor, Managing Director, SSNNL, his team, and the Govt. of Gujarat for extending co-operation during the Field Visit and the meeting.

The meeting ended with vote of thanks to the Chair.

ANNEXURES

ANNEX-XXXV-MIN-I

**LIST OF PARTICIPANTS OF THE 35TH MEETING OF
ENVIRONMENT SUB-GROUP OF NCA HELD ON
19TH JANUARY, 2001 AT KEVADIA COLONY, GUJARAT**

GOVERNMENT OF INDIA

S / Shri/Smt.

Ministry of Environment & Forests, New Delhi

1. P. V. Jayakrishnan, IAS, Secretary, MoEF
2. V. Rajgopalan, IAS, Joint Secretary (Impact Assessment), MoEF
3. Dr. Nalini Bhat, Director (IA), MoEF

Narmada Control Authority, Indore

1. Suresh Chandra, Executive Member
2. N.D. Tiwari, IFS, Member (E&R)
3. Dr. Pawan Kumar, Specialist (Environment)
4. Rakesh Gaurana, Asstt. Director (Environment)

Sardar Sarovar Construction Advisory Committee, Vadodara

1. K.K. Saha, Assistant Secretary, SSCAC

National Institute of Communicable Diseases, New Delhi

1. Dr. R.C. Sharma, Joint Director, NICD

GOVERNMENT OF GUJARAT

1. K.C. Kapoor, IAS, Managing Director, SSNNL
2. D.P.S. Verma, IFS, PCCF
3. Dr. S.A. Chavan, IFS, CCF, SSNNL
4. N.B. Desai, Director (Civil), SSNNL
5. A.S. Parmar, DFO, Environment Cell, SSNNL
6. Dr. S.G. Ruparelia, Asstt. Director, National Institute of Occupational Health

GOVERNMENT OF MADHYA PRADESH

1. Man Dahima, IAS, Commissioner Archaeology, Archives & Museum
2. R.K. Behre, Subject Matter Specialist (H&S), NVDA
3. R.K. Gupta, IFS, DFO (Monitoring), NVDA
4. Dr. S.C. Tiwari, Prof. & Head of Deptt. PSM, Gandhi Medical College

GOVERNMENT OF MAHARASHTRA

1. S.A. Thorat, IFS, Conservator of Forests, Dhule
2. A.J.Kansle, Dy. Conservator of Forest, Dhule

EXPERT MEMBERS

1. Dr. R.K. Katti, Prof. Emeritus, IIT, Mumbai and Director & Consultant, UNEECS, Mumbai
2. Dr. S. Ramaseshan, Retd. Prof. IIT Kanpur, Perundurai.

ANNEX – XXXV – MIN. (2)

Narmada Valley Development Authority
Narmada Bhawan, Tulsi Nagar, Bhopal

No. NVDA/E&F/Tech/2001/ 84

18/02
Bhopal. 2001

To,

The Member
(Environment & Rehabilitation),
&
Member Secretary,
Environment Sub-Group of NCA,
Narmada Control Authority,
B 6-79, Scheme No. 74-C,
Vijay Nagar, Indore-452010 (M.P.)

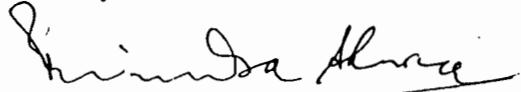
Sub: Request for correction/clarification in the draft minutes of 34th meeting of Environment Sub-Group of Narmada Control Authority.

Kindly make following corrections in the minutes –

Reference	Circulated as	Required as
Page 10 Sub-para 4) under item No. XXXIV-3 (159) Sardar Sarovar Project, Last sentence.	It was further informed the plan was under implementation.	It was further informed that the plan was sent to the Forest Department of the GoMP.
Page 11 Sub-para 6 under item No. xxiv-3(159) Sardar Sarovar Project & Indira Sagar Project. Govt. of M.P.	Regarding Epidemiological Surveillance studies entrusted to Gandhi Medical College, Bhopal, the Member (E&F), NVDA informed that <u>sixth & final report has been received and is being compiled.</u>	Regarding Epidemiological surveillance studies entrusted to Gandhi Medical College, Bhopal, the Member (E&F), NVDA informed that the <u>sixth & last report has been received.</u> However a final report incorporating all findings & recommendation is awaited.

8

2. With reference to information given by Dr. R.C. Sharma, Director, NICD (item No. xxxiv-3(159)) under sub-para 6) on page 11., a list of the 11 districts included in the three States may be made available.



Vice Chairman
NVDA, Bhopal

18.1.2001

UNEECS**Universal Earth Engineering Consultancy Services Pvt. Ltd.**

Alankar Mkt, Plot No. 16, Sector - 24,
Turbhe, Navi Mumbai - 400 705.
Tel : 7672420, 7630671, 7634329, 44
Fax : 91-22-7633911

Laboratory : 11/E, Sita Estate,
Mahul Road, Chembur (E),
Mumbai-400 074.
Tel : 5560982

Ref. No. : RKK:BL: 88/2000

24.11.2000

To,
The Chairman
Environment Sub-Group
Narmada Control Authority &
Secretary, Govt. of India
Ministry of Environment and Forests
Paryavaran Bhavan, CGO Complex
Lodhi Road, New Delhi - 110003.

Sub : Arising out of agenda of 34th meeting of Environment Sub-Group, N.C.A., 14th Nov. 2000. 3 pm - Comments On Siltation of Reservoir Catchment Area Treatment, Stage Impounding of Reservoir and Pari - Pasu. by Dr. R.K. Katti, Expert Non-official Member of Environment Sub-Group. NCA

Dear Sir,

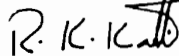
Now and then a point regarding stage impounding of Sardar Sarovar Project Reservoir and Pari-pasu is raised.

I am giving below my comments on siltation of reservoir catchment area treatment and Pari-pasu in my capacity as an expert in civil engineering with environmental and human habitats background. This may be of interest to members.

With kind personal regards.

Thanking you,

Yours sincerely,



(Dr. R. K. Katti)
Expert Member
Non-official Member of Environment Sub-Group, NCA
Prof. Emeritus, IITB
Director and Consultant, UNEECS
Advisor, Simplex Co.

Encl. : a/a

C.C. to Dr. Pawan Kumar

5

Comments On Siltation of Reservoir, Catchment Area Treatment, Stage Impounding of Reservoir and Pari - Pasu.

By Dr. R.K. Katti

Expert Non-official Member of Environment Sub-Group, NCA

Earth is continuously subjected to cycles of diastrophism, erosion and sedimentation. Water is one of the agents causing erosion. Degree of erosion depends upon geological, topographical, pedological, morphological and other factors.

Irrespective of whether there is a reservoir or not for the sake of safe guarding fertility of land which depends upon soil cover, erosion control measures are adopted in a river basin.

Indian subcontinent suffers from spatial disparity with respect to rainfall precipitation. There is a need to conserve both surface water and ground water from all over the country and using modern methods and technologies to distribute water equitably to all corners of sovereign republic of India and protect people from the horrors of draught and flood.

Surface water from the rivers need to be stored in reservoirs on the earth surface. Magnitude of water that can be stored from a river basin depends upon topography, geology, terrain conditions, pedology etc of the catchment and also of the reservoir location. There is nothing such as small reservoirs, medium reservoirs or large reservoirs. The location which gives optimum storage and facilitates wider distribution of water with less losses and maximum cost benefit ratio would be ruling point. There is not hard and fast rule to deal with earth crust. Utilize it in the best and imaginative way in its existing form to store the water.

Human settlements are dynamic in nature and shift from location to location depending upon availability of natural resource and other facilities as exist or the natural resources and facilities as made available artificially by adopting modern transportation techniques, which have resulted into large transport oriented human habitants such as megalopolis, metropolis, cities and towns etc. There is a tendency to form more and more numbers of transport oriented human habitats resulting from rural exodus. Thus, all the sovereign countries in the world store natural resources and make them available to all human beings in different part of their country, whether they are near river banks or in far way metroplis or in a drought prone area.

Thus, storing water and distributing it by adopting efficient management system to all parts of the country using modern technology is an accepted phenomenon all over the world. To conserve water, shifting of part of human habitats to other locations with added improvement in standard of living, adopting even the principles of transport oriented human habitat is an accepted phenomenon all over the world.

Catchment area treatment is an engineering requirement to increase the life of reservoir in addition to preserving the fertility of land. Degree of erosion and siltation depend upon multivariant factors. By treating the catchment area a major factor is taken care of in reducing siltation and erosion. There are methods available where in with the help of heavy agitators to reduce siltation of reservoirs. As water becomes precious such methods may become cost effective.

Thus, while designing dead storage capacity to be provided method of stage construction and stage impounding are normally taken care of. It is both engineering impracticability and also economic impracticability to wait for starting of construction of dam untill entire catchment area is treated and command area is treated.

Thus, pari-pasu clause as understood in engineering perspective and as implemented by NCA can be considered as in order.

By completing the dam as early as possible, more funds can be made available to adopt more sophisticated methods to control erosion and reduce rate of silting of the reservoir.

It will increase the life of the dam.

R. K. Kato

ANNEX – XXXV – MIN. (4)**ANNEXURE : VI****Details of Area transferred for Compensatory Afforestation for SSP
and its present legal status**

Sr. No.	Division	Taluka	Village	Area transferred Ha.	Present legal status legal status	Remarks
1	East	Rapar	Manaba	550.00	Section-4 area	
2	East	Bhachau	Shikarpur	1000.00	Section-4 area	
3	East	Bhachau	Vandhiya	600.00	Section-4 area	
4	East	Bhachau	Bhachau	800.00	Section-4 area	
5	East	Bhachau	Bhachau	500.00	Section-4 area	
6	East	Bhachau	Lakadiya	109.69	Transferred area	
7	East	Anjar	Chandarani	150.00	Section-4 area	
8	East	Anjar	Dhamadaka	270.00	Section-4 area	
Sub-total East Sn.				3979.69		
8	West	Mandvi	Godhara	301.00	Reserved Forest	
9	West	Mandvi	Bada	200.00	Reserved Forest	
10	West	Mandvi	Dhokada	121.01	Reserved Forest	
11	West	Mandvi	Ratadiya-mota	130.71	Reserved Forest	
12	West	Mandvi	Undoth-moti	190.00	Transferred area	
13	West	Mandvi	Sambharai	119.00	Transferred area	
14	West	Mandvi	Changdai	224.00	Transferred area	
15	West	Mandvi	Vandh	105.00	Transferred area	
16	West	Mandvi	Bayath	84.00	Transferred area	
17	West	Mandvi	Kotadi-Mahadevp	300.00	Transferred area	
18	West	Abadasa	Jakhau	352.58	Section-4 area	
19	West	Abadasa	Vanku	208.33	Transferred area	
20	West	Abadasa	Vinzan	235.29	Section-4 area	
		Abadasa	Vinzan	221.65	Transferred area	
21	West	Abadasa	Naliya	147.20	Transferred area	
22	West	Abadasa	Konathiya	137.31	Transferred area	
23	West	Abadasa	Moti-dhufi	97.89	Transferred area	
24	West	Abadasa	Khanay	57.06	Transferred area	
25	West	Abadasa	Gadhavara	310.34	Transferred area	
Sub-total West Dn.				3542.37		
Grand Total				7522.06		

ANNEX - XXXV - MIN. (5)**ACTIVITIES BEING CARRIED OUT IN SHOOLPANESHWAR SANCTUARY
VIS-A-VIS ACTIVITIES SUGGESTED IN THE ACTION PLAN**

Sr. No.	GROUP PRIORITY (Actions or objectives to be carried out)	Physical Progress		Remarks
		Target	Achieve- ment	
1	2	3	4	5
1	Afforestation			
	(A) Plantation of fuel wood, timber, MFP and Bamboo	500 Ha.	194 Ha.	
	(B) Plantation for making animal corridor and local migration. (gap plantations, to make compact corridors)	250 Ha.	--	Corridors have been identified, works to be started from next year
	(C) Providing and Planting fruit tree species bamboos and other mfp species to tribals around their cultivated fields(Under RDFL components CFP programme (Rate as per CFP model)	100 Ha.	--	Horticulture Plants (Mango, Chicku, Nariyali distributed to tribal.)
2	Soil and Moisture Conservation Works			
	(A) Check dam		--	
	(i) Pacca/ Kachcha	25 No.	16 No.	
	(ii) Desilting of check dams.	25 No.	--	
	(B) Gully Plugging	500 No.	--	
	(C) Van Talavadi	25 No.	21 Nos.	
3	ECO DEVELOPMENT PROGRAMME IN & AROUND VILLAGES.			
	(A) Water facilities for villages and cattle.			
	(i) Well (New)	25 No.	--	
	(ii) Deepening of well	25 No.	--	
	(iii) Hand pumps	25 No.	2 No	
	(iv) Repairs of Hand Pump	25 No.	--	
	(v) Bore wells	5 No.	4 Nos.	
	(vi) Aveda	25 No.	3 Nos.	
	(B) SMC Work in agricultural fields.	500 No.	--	
	(C) School Building	5 No.	2 Nos.	
	(D) Mobile Stores (Existing) facilities of WFP programme to be utilized.	-	--	
	(E) Mobile Medical unit	1 No.	--	Presently Dediapada Unit is helping.
	(F) Providing better breed of live stock	100 No.	--	
	(G) Veterinary camps & vaccination of Non Sanctuary cattle.	-	--	Every year, from December to June, Three camps are held
	(H) Gobar Gas Plant	100 No.	--	
	(I) Development of Non- conventional energy sources (Solar implements wind power generation etc.)	-	--	
	(J) Employment oriented Training Institute.	1 No.	--	

	2	3	4	5
(K) Nature Education Camps (Two days per camp)		150 No.	84 Nos.	
(L) Poultry Development		-	--	
(M) Crematoria		-	--	
PROTECTION				
(A) Demarcation of Sanctuary Boundary		-	2671 Rmt	
(B) Erection of dry rubble wall to stop encroachment		-	95.80 Km.	
(C) Setting of Wireless net work (Already existing, reinforcement required)		-	1 Set	
(D) Purchase of fire fighting equipment (One Truck)		-	35 Nos.	
(E) Fire line Works		-	3710 m.	
(F) Watch Tower		30 Nos.	28 Nos.	
Wildlife Management & Research				
(A) Habitat Improvement (Removal of weeds and increase of fodder spp.)		-	15 Ha.	
(B) Establishment of meteorological station		2 No.	--	It is proposed for next Year.
(C) Research station at sagai.		1 No.	--	
(D) Periodical wildlife census		-	1 No.	Wildlife Census- 1999
(i) Construction of cage/ enclosures (Animals & Birds)		-	3 Nos.	
(ii) Regular supply of food.		-	--	Saltics is being provided to Wildlife.
(iii) Veterinary Service		-	--	This facility is already available at Dadiapada.
(iv) Transport		-	--	
(v) Bird ringing		-	--	BNHS has been contacted and they are going to fix programme next year.
(vi) Permanent waterholes for wildlife		-	28 Nos.	
6 TOURISM DEVELOPMENT				
(A) Orientation Center		-	2 Parts	One is already established at Kevadia.
(B) Bird observation huts at Namgir Duthar, Sagai - 3 Nos.		1 No.	--	Design for Bird observatory huts has been approved and work will be started from next year.
(C) Audio visual aids (T.V, V.C.R, Tape-recorder etc.)		-	1 Set	
(D) Publicity & Display material		-	15 Nos.	

ANNEX - XXXV - MIN. (6)**Relocation / Protection of Monument in Sardar Sarovar**

Status Report as on Oct. 2000

S.No.	Name of Monuments	Village	Tehsil	Distt.	R.L. in Mtrs.	Status
1	Shiv Temple	Bada Barda	Manawar	Dhar	130.970	Relocation completed
2	Bhawani mata mandir	Khujawa	Dharampuri	Dhar	147.825	Scrapping of lime plaster done for numbering & detailed drawing
3	Someshwar Temple	Khujawa	Dharampuri	Dhar	129.53	While relocating the temple no. 1,2,&3 at khujawa obstacle was created by local people, and hence no progress was made for relocation of the temple
4	Shiv Temple No. 1	Khujawa	Dharampuri	Dhar	135.460	Relocation was started in 1998 but due to public presentment the work was stopped by collector Dhar. Permission for carrying out the relocation work is awaited. Identification of Architectural slabs detailed drawing, numbering and Photography completed.
5	Shiv Temple No.2	Khujawa	Dharampuri	Dhar	135.46	Detailed drawing, numbering, photography, Identification of architectural slabs were completed. However due to obstacle created by local people, the relocation of the temple was stopped.
6	Shiv Temple No. 3	Khujawa	Dharampuri	Dhar	135.165	Detailed drawing, numbering, photography, Identification of architectural slabs were completed. However due to obstacle created by local people, the relocation of the temple was stopped.
7	Rock cut caves	Khujawa	Dharampuri	Dhar	135.075	Due to obstacle created by local people the progress for shifting the rock cut caves could not be made.
8	Big statues	Khujawa	Dharampuri	Dhar	146.395	As per decision taken in meeting dated 10.4.2000 by Collector for shifting of these statues the estimate for relocation have been prepared. Relocation work likely to be started in December 2000. However Pre-

S.No.	Name of Monuments	Village	Tehsil	Dist.	Area in Mtrs.	Status
						translocation the fibre models of these statues are been prepared. work is in progress.
9	Shiv Temple Mounibaba Ashram	Pipaldagarhi	Dharampuri	Dhar	153.775	Relocation work completed at village Nimboia
10	Rock cut sculptures	Pipaldagarhi	Dharampuri	Dhar	130.440	Relocation work completed at village Nimboia.
11	Shiv Temple	Bodhwada	Kukshi	Dhar	138.685	Pre-relocation work i.e. identification of architectural peices of temple, numbering, photography and detailed drawing is completed. Land allotment for new site is still awaited.
12	Narmdeshwar Temple	Dehar	Kukshi	Dhar	134.665	Pre-relocation work i.e. identification of architectural pieces of temple, numbering, photography and detailed drawing is completed. Land allotment for new site is still awaited.
13	Baneshwar Temple	Nabda Toli	Kasrawad	Khargone	137.765	Pre relocation work i.e. identification of architectural pieces, detailed drawing, numbering and photography work is in progress. No objection from the managing trust is awaited. As soon as no objection will be given the work of relocation will be started by the department. Relocation work is likely to be started in december, 2000.

Excavation of Archaeological mounds in Sardar Sarovar Project.

S.No.	Name of Mound	Distt.	R.L. in Metres	Status Report as on October 2000
1	Mound at village Maruchichil	Khargone	151.635	Proposed for excavation in session 2001-2002.
2	Mound at village Ekalware	Dhar	146.875	Proposal for permission for excavation in session 2000-2001 is sent to archaeological survey of India, New Delhi. As soon as permission is granted the excavation work will be conducted by the department.
3	Mound at village Katnera	Dhar	139.865	Proposal for permission for excavation in session 2000-2001 is sent to archaeological survey of India, New Delhi. As soon as permission is granted the excavation work will be conducted by the department.
4	Mound at village Khalghat (Khalkhurd)	Dhar	156.310	Excavation work is completed. Excavation Report is being prepared. Work is in progress.
5	Mound at village Kalyanpura	Dhar	148.035	Proposal for permission for excavation in session 2000-2001 is sent to archaeological survey of India, New Delhi. As soon as permission is granted the excavation work will be conducted by the department.

Relocation / Translocation work of Monuments in Indira Sagar Project

S.No.	Name of Monuments	Village	Tehsil	Distt.	R.L. in Mtrs.	Status
1	Shiv Temple	Dharikotla	Harsud	Khandwa	229.500	80% of relocation work is nearly completed as per instruction of Narmada Valley Development Authority and Collector Khandwa the work was stopped. Final decision for completion of the work is yet to be taken by NVDA and collector Khandwa. As soon as the permission is granted the remaining work of relocation will be completed.
2	Shiv Temple	PunGhat	Harsud	Khandwa	240.315	Land allotment for relocation of the temple is awaited.
3	Shiv Temple	Badkeshwar	Harsud	Khandwa	263.805	Pre relocation work i.e. scraping of lime plaster identification of architectural slabs numbering, detailed drawing and photography completed. Land allotment is awaited.
4	Shiv Temple (Durga mandir)	Chandel	Khandwa	Khandwa	254.917	Land allotment is awaited.
5	Chhatra	Ghisor	Harsud	Khandwa	239.300	Land allotment is awaited.
6	Shiv Temple (2)	Khudiamal	Harsud	Khandwa	266.215	Land allotment is awaited.
7	Riddheshwar Temple	Handia	Harda	Harda (Previously in Hoshangabad Distt.)	273.380	The temple will be protected by raising coffer wall at river side. Corresponding for budget is being made. Estimate for coffer wall have already been prepared.
8	Abdul Hasan	Handia	Harda	Harda	269.680	Site for relocation / model is to be decided.

S.No.	Name of Monuments	Village	Tehsil	Distt.	R.L. in Mtrs.	Status
	Tomb			(Previously in Hoshangabad Distt.)		
9	Rock cut statues	Daiyat	Dewas (Khategaon)	Dewas	267.830	Estimate for cutting and shifting of sculptures is being prepared.
10	Sant Singha ji Samadhi	Singhaji Mafi	Harsud	Khandwa	247.915	Decision for protection/ relocation of samadhi is to be taken by State Govt.

Excavation of Archaeological mounds in Indira Sagar Project.

S.No.	Name of Mound	Distt.	Status Report as on October 2000
1	Mound at village Beetalpur Khurd	Khandwa	Excavation will be conducted in near future
2	Mound at village Chhatrapati	Khandwa	Excavation will be conducted in near future
3	Mound at village Gajanpur	Dewas	Excavation will be conducted in near future
4	Mound at village Navalpura	Khandwa	Excavation will be conducted in near future
5	Mound at village Gannor	Khandwa	Excavation will be conducted in near future

विषय:- नर्मदा नियंत्रण प्राधिकरण के पर्यावरण उपदल की 35वीं बैठक हेतु चर्चा के बिन्दु एवं निष्पादित कार्यों की अद्यतन स्थिति ।

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नर्मदा परियोजनांतर्गत नर्मदा नदी एवं उसकी सहायक नदियों पर प्रस्तावित बृहद परियोजनाओं के अंतर्गत प्रभावित क्षेत्र के सर्वेक्षण में चिन्हांकित पुरातत्त्वदा के संकलन, स्मारकों के पुनर्स्थापन, पुरातत्त्वीय उत्खनन तथा संग्रहालयों की स्थापना हेतु विभाग द्वारा तैयार की गयी कार्य योजनाओं 1993 तथा संशोधित कार्य योजना 1997 के नर्मदा घाटी विकास प्राधिकरण एवं शासन के अनुमोदन उपरान्त नर्मदा घाटी विकास प्राधिकरण द्वारा उपलब्ध कराये गये बजट से परियोजना कार्यों का निष्पादन किया जा रहा है ।

इस प्रकार माह अक्टूबर 2000 तक निष्पादित कार्यों की जानकारी निम्नानुसार है:-

अ- सरदार सरोवर परियोजना

सरदार सरोवर परियोजनांतर्गत डूब में आने वाले कुल 193 ग्रामों में बिखरी पुरातत्त्वदा के चिन्हांकन हेतु पुरातत्त्वीय सर्वेक्षण का कार्य वर्ष 1992-93 में पूर्ण कर लिया गया । सर्वेक्षण में चिन्हांकित पुरातत्त्वदा के संकलन संवर्द्धन पुरातत्त्वदा के पुनर्स्थापन, डाक्यूमेंटेशन तथा उत्खनन आदि कार्यों के निष्पादन हेतु कार्य योजना 93 एवं संशोधित कार्य योजना 1997 तैयार की जाकर कार्यों का निष्पादन किया जा रहा है कार्य योजना 97 के अनुसार सरदार सरोवर परियोजनांतर्गत कुल रु. 3.93 करोड़ का व्यय अनुमानित है । जिसकी स्वीकृति नर्मदा घाटी विकास प्राधिकरण व शासन द्वारा प्राप्त की जाकर कार्य निष्पादित किये जा रहे हैं माह अक्टूबर 2000 तक परियोजना कार्यों का स्टेटस रिपोर्ट निम्नानुसार है:-

1. स्मारकों का पुनर्स्थापन

कार्य योजना 97 के अनुसार पुनर्स्थापन के लिए प्रस्तावित कुल 13 स्मारकों में से तीन स्मारकों यथा 1. शिवमंदिर बड़ा बड़दा 2. शैलेश्वरी प्रतिमाएं पिपल्दागढ़ी 3. शिवमंदिर पिपल्दागढ़ी के पुनर्स्थापन का कार्य पूर्णतः वैज्ञानिक पुरातत्त्वीय अधिनियमों के अनुसार तकनीकी कर्मचारियों द्वारा पूर्ण कर लिया गया है । जबकि खजावा स्थित तीन स्मारकों यथा शिवमंदिर क्र. 1, 2 व 3 नर्मदेश्वर मंदिर डेहर एवं देवप्रतिमिंग शिवमंदिर बोधवाड़ा के पुनर्स्थापन पूर्व के कार्य यथा शिल्पखण्डों का चिन्हांकन मानचित्रीकरण रेखांकन एवं उनकी नम्बरिंग तथा साफ सफाई कार्य पूर्ण कर लिये गये तथा शारंगेश्वर मंदिर कतराचद के शिल्पखण्डों के चिन्हांकन,

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मानचित्रीकरण रेखांकन आदि कार्य प्रगति पर है । इसी प्रकार शिवमंदिर क्र. 1, 2 व 3 खजावा के पुनर्स्थापन हेतु कलेक्टर धार से अनुमति प्राप्त नहीं होने के कारण पुनर्स्थापन कार्य लम्बित है। जिला कलेक्टर धार द्वारा स्थानीय जनप्रतिनिधियों की आयोजित बैठक दिनांक 10.4.2000 में प्रथमतः तीन विशाल प्रतिमाएं {प्रतिमाएं राज्य संरक्षित} को पुनर्स्थापन हेतु निर्णय लिया जाकर तृपित किया गया है तदनुसार प्रतिमाओं के पुनर्स्थापन हेतु स्वीकृति जारी की जाना है । इस प्रकार माह नवम्बर 2000 तक पुनर्स्थापन कार्य पर कुल रु. 12.86 लाख का व्यय किया जा चुका है ।

2. संग्रहालय का निर्माण एवं विकास

सरदार सरोवर परियोजनांतर्गत डूब क्षेत्र से संकलित पुरातत्त्वदा एवं उत्खनन से प्राप्त पुरातत्त्वदा के प्रदर्शन हेतु तहसील मुख्यालय कतरावद एवं वडवानी {वर्तमान में जिला मुख्यालय बड़वानी} में संग्रहालय हेतु भूमि का हस्तांतरण प्राप्त हो चुका है । कतरावद में प्रस्तावित संग्रहालय भवन का निर्माण नर्मदा घाटी विकास प्राधिकरण की लोक निर्माण विभाग सेल द्वारा कराया जा रहा है तथा अद्यतन भवन का निर्माण कार्य लगभग 90% पूर्ण है नर्मदा घाटी विकास प्राधिकरण के स्थानीय अधिकारियों द्वारा संग्रहालय भवन को आगामी माह तक पूर्ण करने की संभावना है भवन का निर्माण पूर्ण होते ही पुरातत्त्व विभाग के अधीनस्थ में लिया जाकर पुरातत्त्वदा का प्रदर्शन किया जावेगा । इस हेतु विभाग द्वारा रु. 14.00 लाख का प्राक्कलन तैयार कर उनका परीक्षण किया जा रहा है । साथ ही राज्य संग्रहालय भोपाल में नर्मदा गैलरी का निर्माण कार्य लोक निर्माण विभाग के माध्यम से कराया जा रहा है अद्यतन गैलरी का निर्माण कार्य लगभग पूर्ण है मात्र भवन की फिनिशिंग, विपुल फिटिंग एवं दीवार की सफाई कार्य शेष है जिसे पूर्ण होते ही अधिकार में लिया जाकर पुरातत्त्वदा का प्रदर्शन किया जावेगा ।

उत्खनन कार्य

सरदार सरोवर परियोजना के डूब क्षेत्र में स्थित पुरातत्त्ववीय उत्खनन के लिए प्रस्तावित स्थानों में से ब्राह्मण गांव तथा खापरखेड़ा स्थित टीलों का उत्खनन कार्य वर्ष 1995 में कराया गया तथा

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सत्र 1998-99 में खजुर्दो खण्डाट स्थित टीलों का उत्खनन कार्य पूर्ण किया जाकर वहां विकसित ताम्रायम एवं प्रारम्भिक ऐतिहासिक संस्कृति से संबंधित सामग्री प्रकाश में लाये गये । खण्डाट उत्खनन कार्य का विस्तृत प्रतिवेदन तैयार किया जा रहा है जिसे शीघ्र पूर्ण किये जाने की संभावना है इस प्रकार उत्खनन कार्य एवं प्रतिवेदन पर कुल रु. 1,27,824/- का व्यय किया गया है ।

चालू वित्तीय सत्र 2000-2001 में सरदार सरोवर परियोजनांतर्गत प्रभावित स्थलों कटनेरा, कल्याणपुरा एवं स्कलवारा स्थित पुरातत्त्वोपस्थलों के उत्खनन की अनुमति हेतु भारतीय पुरातत्त्व सर्वेक्षण नई दिल्ली को प्रस्ताव भेजा गया है । भारतीय पुरातत्त्व सर्वेक्षण विभाग से उत्खनन की अनुमति प्राप्त होते ही उत्खनन का कार्य प्रारम्भ किया जायेगा ।

पुरातत्त्वदा/प्रतिमा संकलन

सरदार सरोवर परियोजना के अंतर्गत संकलन के लिए चिन्हंकित 186 प्रतिमाओं में से 118 प्रतिमाओं का संकलन कार्य पूर्ण कर लिया गया है। शेष प्रतिमाएं पूजा के अधीन रहने एवं जन विरोध के कारण संकलित नहीं हो सकी है ।

रसायनीकरण

सरदार सरोवर परियोजनांतर्गत पुनर्स्थापित स्मारकों यथा गैभोत्कीर्ण प्रतिमाएं पिपल्दागढ़ी, शिवमंदिर पिपल्दागढ़ी तथा शिवमंदिर वड़ा बड़दा के पुनर्स्थापन उपरांत उनकी सुरक्षा के लिए आवश्यक रसायनीकरण कार्य कराया गया तथा डूब क्षेत्र से संग्रहीत प्रतिमाओं के रसायनीकरण का कार्य कराया गया ।

डाक्यूमेंटेशन

सरदार सरोवर परियोजनांतर्गत डूब में आने वाले पुरातत्त्वदा का ~~अविवक्षित~~ भविष्य के लिए रिकार्ड हेतु डाक्यूमेंटेशन का कार्य म.प्र. माध्यम से कराया गया है जिस पर कुल रु. 20,12,500/- का व्यय हुआ है ।

प्रकाशन

नर्मदा परियोजनांतर्गत विभाग द्वारा निष्पादित किये गये कार्यों पर एक लघु पुस्तिका *Heritage flourishing in Narmada Valley* प्रकाशित की गयी है ।

१८

प्रतिकृति निर्माण

सरदार सरोवर परियोजना के अंतर्गत महत्वपूर्ण स्मारकों एवं पुरासम्पदा की प्रतिकृतियों का निर्माण कार्य योजना 97 में प्रस्तावित है तदनुसार पिपल्दागढ़ी स्थित शैलोत्कीर्ण प्रतिमाएं के प्रतिकृति का निर्माण कार्य कराया गया है तथा छ्वावा स्थित तीन विशाल प्रतिमाओं के फाइवर प्रतिकृति का निर्माण कार्य प्रगति पर है ।

इंदिरा सागर परियोजनाअ- स्मारकों का पुनर्स्थापन

इंदिरा सागर परियोजनांतर्गत विभाग द्वारा तैयार किये गये कार्य योजना के अनुसार कुल 10 स्मारकों शिवमंदिर धारी कोटला शिवमंदिर बडकेश्वर, शिवमंदिर पुनघाट, शिवमंदिर छुटियामाल, संतसिंगाजी की समाधि छत्रो घिसोर, शिवमंदिर चंदेल जिला छडवा तथा शैलोत्कीर्ण प्रतिमाएं दैय्यत, रिटेश्वर मंदिर हण्डिया तथा अब्दुल हसन का मकबरा हण्डिया का पुनर्स्थापन एवं संरक्षण कार्य प्रस्तावित है ।

इस प्रकार पुनर्स्थापन के लिए प्रस्तावित स्मारकों में से प्रथमतः शिवमंदिर धारी कोटला के पुनर्स्थापन का कार्य वर्ष 1998-99 में प्रारम्भ किया गया परन्तु कार्य निष्पादन के दौरान गणमान्य नागरिकों स्थानीय विधायक महोदय द्वारा गतिरोध उत्पन्न करने के कारण नर्मदा घाटी विकास प्राधिकरण द्वारा कार्य रोक दिये जाने के निर्देश से कार्य बंद है ।

इस प्रकार शेष रहे पुनर्स्थापन कार्य को पूर्ण करने तथा छडवा जिले के शेष स्मारकों के पुनर्स्थापन हेतु भूमि आवंटन के संबंध में उनके निर्णय हेतु जिला कलेक्टर छडवा द्वारा दिनांक 14.4.2000 को बैठक आयोजित की गयी है परन्तु अद्यतन भी विभाग को भूमिका आवंटन प्राप्त न होने के कारण पुनर्स्थापन कार्य प्रारम्भ नहीं किया जा सका है ।

प्रतिमा संकलन

इंदिरा सागर परियोजनांतर्गत पूर्वानुसार जिला होशंगाबाद, देवास तथा छडवा जिलों से कुल 153 प्रतिमाओं का संकलन किया जा चुका है । संकलित प्रतिमाएं जिला संग्रहालय देवास, होशंगाबाद तथा छडवा में संग्रहीत है शेष प्रतिमाएं पूजा के अधीन रहने तथा ग्रामवास्तियों के तीव्र विरोध के कारण संग्रहीत नहीं की जा सकी ।

१९

उत्खनन

इंदिरा सागर परियोजनांतर्गत उत्खनन कार्य के लिए चिन्हांकित पुरातत्वीय स्थलों में से खेडीनेमा जिला होशंगाबाद के उत्खनन का कार्य वर्ष 1994 में पूर्ण कर उत्खनन प्रतिवेदन तैयार किया जा चुका है। गोप्र पुरास्थलों विजलपुर खुर्द, छालपा कला, नवलखेडा एवं गन्नोर जिला खण्डवा तथा गाजनपुर जिला देवास के उत्खनन का कार्य भारतीय पुरातत्व विभाग सर्वेक्षण विभाग से अनुमति प्राप्त कर किया जावेगा।

संग्रहालय निर्माण

विभाग द्वारा तैयार किये गये कार्य योजना के अनुसार इंदिरा सागर परियोजनांतर्गत जिला मुख्यालय खण्डवा में संग्रहालय स्थापित किये जाने का प्रस्ताव रहा है। अतः संग्रहालय स्थापित करने हेतु नर्गदा घाटी विकास प्राधिकरण द्वारा अपने ही स्तर से रु. 8.74 लाख का बजट जिला कलेक्टर खण्डवा को दिया जाकर संग्रहालय भवन का निर्माण कार्य कराया गया है। परन्तु संग्रहालय भवन में अतिरिक्त गैलरी के निर्माण एवं विकास पर रु. 15 लाख का प्रावधान कार्य योजना 97 में रखा गया है तथा संकलित प्रतिमाओं के प्रदर्शन हेतु पेडिस्टल निर्माण कार्य पर रु. 84,000/- का व्यय किया जा चुका है परन्तु संग्रहालय भवन को संचालनालय के आधिपत्य में न दिये जाने के कारण संग्रहालय का विकास कार्य प्रभावित हो रहा है।

रसायनीकरण

इंदिरा सागर परियोजनांतर्गत डूब क्षेत्र से संग्रहीत प्रतिमाओं एवं उत्खनन से प्राप्त पुरावशेषों की सुरक्षा के लिए कुल रु. 19,874=00 का व्यय हुआ है। इस प्रकार व्यय हुई राशि से जिला संग्रहालय खण्डवा व देवास में संग्रहीत प्रतिमाओं का रसायनीकरण कार्य किया गया है। उक्त रसायनीकरण कार्य के अतिरिक्त पुनर्स्थापित हो रहे स्मारकों के पूर्व एवं पश्चात के रसायनीकरण कार्य किये जाना है।

डाक्यूमेंटेशन

इंदिरा सागर परियोजनांतर्गत डूब क्षेत्र में आने वाले पुरावशेषों के जीवन्त रिकार्ड रखने हेतु उनका विस्तृत डाक्यूमेंटेशन कराया जाना है। जिसमें पुरातत्त्वदा एवं स्मारकों की वीडियोग्राफी, डाक्यूमेंटेशन तथा फ्लिड फोटोग्राफी एवं विस्तृत रेखांकन कार्य सम्मिलित है परन्तु बजट उपलब्ध न होने के कारण कार्य प्रभावित रहा। तथापि पुनर्स्थापित हो रहे स्मारकों का विस्तृत रेखांकन एवं छायांकन कार्य कराया गया है।

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२६

डॉ. रोमिला थापर द्वारा उठाये गये मुद्दों पर कार्रवाई एवं परीक्षा

इंदिरा सागर परियोजनांतर्गत श्री एस.बी.ओटा द्वारा प्रस्तुत प्रतिवेदन के आधार पर उत्पन्न विसंगति के समाधान के लिए श्री ओटा द्वारा दी गयी सूची तथा नर्मदा नियंत्रण प्राधिकरण द्वारा उपलब्ध कराये गये भौगोलिक स्थिति की सूची में दशायें गये स्थलों का पुनर्सर्वेक्षण विभाग द्वारा कराया गया है अतः 78 ग्रामों का पुनर्सर्वेक्षण किया जाकर उनमें स्थित पुरासम्पदा/पुरातत्वीय महत्ता की पुष्टि की गयी है ।

महेश्वर परियोजना

महेश्वर परियोजनांतर्गत डूब में जाने वाले 61 ग्रामों के सर्वेक्षण उपरांत चिह्नांकित पुरासम्पदा के संरक्षण एवं संवर्धन डाक्यूमेंटेशन आदि कार्यों के लिए शासन के निर्णयानुसार बजट श्री महेश्वर हाइड्रिल पावर कार्पोरेशन से प्राप्त होना है । विगत दो सत्रों से बजट उपलब्ध कराने हेतु श्री महेश्वर हाइड्रिल पावर कार्पोरेशन को निरंतर पत्र लिखा जाकर सम्पर्क किया जा रहा है परन्तु अबतक कोई भी राशि विभाग को उपलब्ध न हो सकी है जिसके कारण कार्यों की वांछित प्रगति नहीं हो सकी है तथापि कार्यों को समय सीमा में पूर्ण किये जाने के उद्देश्य से नितान्त आवश्यक कार्य यथा पीतनगर जिला खरगोन स्थित पुरातत्वीय टीलों के उत्खनन का कार्य सत्र 1998-99 व 1999-2000 में दिभागीय बजट से कराया जाकर ताम्राशम संस्कृति के अवशेष प्रकाश में लाये गये ।

**SUMMARY
OF
FINAL REPORT**

ON

**"STUDY OF HEALTH ASPECTS IN PROJECT
AREA OF NARMADA SAGAR AND SARDAR
SAROVAR THROUGH EPIDEMIOLOGICAL
SURVEILLANCE"**

**BY
DEPARTMENT OF PREVENTIVE AND
SOCIAL MEDICINE.
GANDHI MEDICAL COLLEGE, BHOPAL**

22

INTRODUCTION

Narmada projects involves construction of 29 major dams. 135 medium size and approximately 3000 small irrigation schemes in Madhya Pradesh. Construction of dams is mainly utilized in irrigation of land and hydroelectric power generation. Thus irrigation systems have become an important economic component of agricultural development in many developing countries.

Major benefits of successful irrigation schemes include increased food production and income, thus increasing the potential for better nutrition and health. There many also better access to safe drinking water and sanitation. But the negative aspect is that irrigation systems are often associated with an increased incidence of disease (Tiffen 1989, Yoder 1983).

Large surface of water reservoirs will increase humidity, which will give favourable conditions for insect breeding, increasing vector density, and thus enhancing transmission potential of Arthropod borne diseases. Due to social mobility and uprooting, ecological adjustment, specially in transitional phase, diseases of psychosocial stress may increase significantly.

Mosquitoes are vector of Malaria, Filaria and a number of arboviral

23

infections, therefore incidence of these vector born infections is likely to increase in these areas. Sautasis Sorumani and Chaualong Harinasuta in a study entitled "Disease Hazards of Irrigation Schemes in Thailand" found increased incidence of parasite and vector borne diseases. It was also demonstrated that prevalence and infections increased with the length of time of which irrigation had been installed.

Especially in the tropics, irrigation schemes carrying a high risk of vector born and water related diseases. More than 30 diseases have been linked to irrigation (Hunter 82 Music, 87 Tiffen, 89). Vector born disease transmission is aggravated by man made environmental changes that favour proliferation of vector. Main vector borne diseases in these areas are Malaria and Filaria. Effects of water resources development on health are reviewed by Hunter et al (1982) in many countries, viz- Brazil, Egypt, Kenya, Malayasia, Mali, Nigeria etc. It has come to the conclusion that water resource development projects always lead to a higher incidence of vector born diseases.

24

OBJECTIVES

1. To Study morbidity and mortality pattern in Narmada project area.
2. Compare it with health situations in a similar area for which project was completed earlier.
3. To elucidate any change in health situations in due course of time.
4. To suggest Health - promotion and Disease prevention measures for the project area.
5. To compare morbidity status of post impoundment area with morbidity status of area prior to dam construction.

25

METHOD

The survey work in all six phases was carried out with the help of medical interns. The first six monthly survey conducted during 1st July to 31st December, 1992, and last survey was carried out for the period of March 99 to Aug 99 in four months.

A total of 19 villages in pre-impoundment area including the villages adjoining to the area from Sardar Sarovar and 21 villages in post impoundment area were covered during survey of 2000 families i.e. 1000 each in pre and post impoundment area.

As per decision taken in the meeting held on 26th Aug. 99 at ICMR, New Delhi an efforts were also made to compare the morbidity profile of post impoundment area with the morbidity profile prior to dam construction in post impoundment area. The findings of all six phases of the study are summarized below.

DEMOGRAPHIC PROFILE

The age and sex composition of the population surveyed in all phases (six phases) is same except some minor changes in the percentage of population in last three phases i.e. 4th, 5th and sixth phases in different age groups. These minor changes hardly make any difference in out come of final findings of report. Again the age composition observed in

26

these areas is in conformity with national standard this also implies a consistency in the demographic data collected in the survey.

In both the areas majority of families consisted of five to six members in all six phases of study. Socio-Economic features of study is described in detailed final report.

MORBIDITY PROFILE

INCIDENCE OF MORBIDITY WITHIN A FORTNIGHT OF SURVEY

Overall it was observed that incidence of morbidity was significantly higher in post impoundment area (14.33%) as compared pre impoundment area (11.16%).

These finding were consistent with the finding of all six phases. In both the areas higher incidence of morbidity was observed at the extremes of ages i.e. in 0-4 years children and above 60 years, similar to the findings of 3rd, 4th, 5th and sixth phase, Vector Born infections Malaria, Dengu Fever etc. Respiratory, Gastrointestinal infections and skin infections were the main groups of diseases responsible for morbidity in the community in both the areas. A higher incidence of morbidity as compared to the findings of the earlier phase could be because of environmental effects of impoundment of water for long periods.

Prevalence of morbidity in last six months was also studied, Morbidity rate in post impoundment area (9.46%) was obviously higher than in pre-impoundment area (6.48%). The age specific morbidity rate in children

27

0-14 years age group of post impoundment area was almost double (32.70%) than pre-impoundment area (14.59%). This finding is also consistent with the finding of 3rd, 4th, 5th and sixth phase of study. The age specific morbidity rate in all remaining age groups in post-impoundment area was higher than pre-impoundment area except in the age group 61-70 years, 71 and above of pre-impoundment area where age specific morbidity rate was higher (40.88%) than post-impoundment area (33.76%). However in these extreme age groups the rise in age specific morbidity rate in pre-impoundment area over post impoundment area can not be termed as a significant findings.

AGE AND SEX SPECIFIC MORBIDITY

Age and sex specific morbidity rates were also calculated for different groups of illnesses in pre and post impoundment areas. It was observed that there is variation in the morbidity rates of different age groups between males and females with a higher rate for males and females in post-impoundment area as compared to pre-impoundment area.

After examining the morbidity rates according to diseases and sex, slight difference was noticed in sex specific morbidity rates in both the areas. This difference was visible for Vector born and Water borne Gastrointestinal diseases in pre-impoundment area and for Vector borne and Respiratory infection in post-impoundment area. Incidence of Gastrointestinal diseases was slightly higher in males than females in post-impoundment area.

28

RECOMMENDATIONS

At the end of sixth and final phase of the study recommendation already made in the earlier phases still hold viz..

1. The existing health agencies needs to be strengthen specially for activities like malaria surveillance, Filaria survey and periodical check up and counseling of vulnerable group, i.e. mother and children.
2. One female health worker for 2000 population for registering women and children for comprehensive health care.
3. It can be suggested that for Filaria surveillance a lab technician may be available for a population of 10,000 to work in malaria clinic so that eradicable treatment is started immediately.
4. For proper management of resources of personal and material it can be suggested that a health management should be part of NVDA to manage the field work in the rehabilitated areas.
5. Epidemiological surveillance is a continuous process where information from the community reaches to epidemiologist and in turn a feed back is sent to the community for reducing the incidence of diseases. Thus it can be suggested that one epidemiological cell

27

should be created to monitor health condition in the rehabilitated areas.

6. Periodical meeting between epidemiologist health manager and Medical Officer working in the fields will improve the health situations that will help to raise the physical quality of life of the rehabilitated population.

7. The above mentioned six recommendations equally hold for similar Sarovar Project too.

ACTION PLAN TO BE SUGGESTED

With the co-ordination of Director Medical Education, Director Medical Services and authorities of Narmada Valley Development Authorities and health agencies working in the project area, a plan of action can be drawn.

To reduce the extent of health problems to be faced in the area.

13.11.2011
Dr. S. C. Purohit
Dr. G. P. Nakhare

ANNEX – XXXV – MIN. (8)**EFFECT OF RUNOFF OF AGRO CHEMICALS :
Extract from the findings of Study Group****VII. Command area Development.**

Regarding revision of the Terms of Reference (ToR) for preparation of the command area development plan of Indira Sagar Project, the matter is under the examination of NVDA.

Report for the part of study completed to have effect of runoff of agro chemicals from farmers' field, into surface & ground water, is received and the same is being submitted separately. However, the conclusions are as under :

- The data obtained from the pollution study emphasize that the residues of the herbicides like 2,4-D appears in the runoff water significantly and therefore, if a sensitive crop like cotton is grown in the near by areas, may get adversely affected. Therefore, 2,4-D must be used as weedicide with appropriate precautions.
- Further, some herbicides like pendimethalin affect the microbial activity and thus it should be avoided during nodulation in legume crops, should be avoided in legumes.
- There is a significant increase in the use of chemical fertilizers as well as pesticides during decade, particularly in the cotton growing areas of the state. The data on soil characteristics emphasize that these soils are clayey in nature having higher CEC values, thus better retention of any chemical constituent. Therefore, it will need critical and regular monitoring of the residues in the soil as well as water samples for ecofriendly and sustainable production of crops.
- The data reported in the literature indicated that apart from soil and water, other items of daily use too contain significant residues of pesticides. Therefore, the analytical work of other products like vegetables, milk, fruits, flora and fauna etc. need to be monitored.



केवल सरकारी प्रयोग के लिये
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**पर्यावरण उपदल
ENVIRONMENT SUB-GROUP**

**छत्तीसवीं बैठक की कार्यसूची
Agenda for the 36th Meeting**

स्थान : पर्यावरण भवन, सी.जी.ओ.
काम्पलेक्स, नई दिल्ली ।

दिनांक : 2 मई, 2001, 2.30 बजे

Venue : Paryavaran Bhawan
C.G.O. Complex, New Delhi

Date : 2nd May, 2001, 2.30 P.M.

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**नर्मदा नियंत्रण प्राधिकरण
NARMADA CONTROL AUTHORITY**

**इन्दौर
अप्रैल, 2001**

**Indore
April, 2001**

**NARMADA CONTROL AUTHORITY
ENVIRONMENT SUB-GROUP : AGENDA FOR THE 36TH MEETING**

I N D E X

Item No.	Contents	Page No.
XXXVI-1(165)	CONFIRMATION OF MINUTES OF THE 35 TH MEETING	1
XXXVI-2(166):	SARDAR SAROVAR PROJECT: REVIEW OF THE STATUS OF ENVIRONMENTAL CONSIDERATIONS IN RELATION TO THE PROPOSED RAISING OF THE DAM HEIGHT AT RL 100M	2
	A. Progressive Filling of the Reservoir : Dam Construction vis a vis submergence schedule	2
	B. Review of the progress of works on the suggested parameters in relation to the proposed filling of the reservoir upto RL 100m by June 2002	3
	i. Phased Catchment Area Treatment	4
	ii. Compensatory Plantations	5
	iii. Survey of Flora, Fauna and Carrying Capacity Studies	5
	iv. Archaeological and Anthropological Survey	7
	v. Seismicity and Rim Stability of Reservoir	8
	vi. Health Aspects	8
	vii. Fisheries Conservation and Development	9
	viii. Command Area Development	10
	ix. Downstream Environment	10
XXXVI-3 (167) :	REVIEW OF THE STATUS OF INDIRA SAGAR PROJECT MADHYA PRADESH	
	i. Catchment Area Treatment	13
	ii. Compensatory Plantations	13
	iii. Survey of Flora, Fauna and Carrying Capacity Studies	13
	iv. Archaeological and Anthropological Survey	13
	v. Seismicity and Rim Stability of Reservoir	14
	vi. Health Aspects	14
	vii. Command Area Development	14
XXXVI-4(168)	REVIEW OF ACTION TAKEN ON THE DECISION OF THE PREVIOUS MEETINGS	
	i. Environmental Management of SSP and ISP	15
	ii. Submission of CAT plans for freely draining critically degraded sub-watershed.	15
	iii. Cost Estimates for preparation of Action Plans and implementation of Environmental Safeguard Measures	16
	iv. Monitoring works in Maharashtra	16
	v. Publication of Environment	17
XXXVI-5(169) :	Any other item Date & Venue of next meeting.	15

ANNEXURES

XXXVI- (1)	A diagrammatic view of the proposed dam at RL 100 m to be achieved by June 2002.	1
XXXVI- (2)	A copy of the Status Report on Environment Management of Sardar Sarovar Project for the quarter ending December, 2000.	2
XXXVI- (3)	Thematic map of the areas under treatment as Phase-I programme of CAT works.	70
XXXVI- (4)	A tabular statement showing the target and achievement on the work in Shoolpaneshwar sanctuary received from GOG.	71
XXXVI- (5)	A tabular statement on the recommendations of the study group of Pune University covering flora fauna and carrying capacity aspects.	74
XXXVI- (6)	A plan for felling of trees from submergence areas in Maharashtra and its presentation on GIS generated map.	76
XXXVI- (7)	Summary of the plan on Flora & Fauna received from NVDA .	79
XXXVI- (8)	Summary of the plan for felling of trees received from the NVDA and its presentation on GIS generated map.	93
XXXVI- (9)	A copy of the Minutes of the 3 rd meeting on Archaeology & Anthropology taken by Member (E&R), NCA on 8 th March, 2001.	106
XXXVI- (10)	A GIS generated Map showing locations of protection / relocation / excavation works under progress.	114
XXXVI- (11)	A tabular statement containing details of the health facilities created in the State of Gujarat, Maharashtra and Madhya Pradesh.	116
XXXVI- (12)	A GIS generated map showing location of health facilities in the three states.	121
XXXVI- (13)	A copy of the action plan on health aspects received from Govt. of Gujarat.	123
XXXVI- (14)	A copy of the Status Report on Environment Management of Indira Sagar Project for the quarter ending December, 2000.	148
XXXVI- (15)	A copy of the letter addressed to the Secretary, Department of Culture, Govt. of India with regard to protection works on Joga Fort.	176
XXXVI- (16)	A copy of the letter addressed to the Secretary, Department of Culture, Govt. of India with regard to Catchment Area Treatment under RVP Scheme.	180
XXXVI- (17)	Draft statement of cost estimates and expenditure related to survey, studies and implementation of the Environment Work Plan for updating.	182

ENVIRONMENT SUB-GROUP AGENDA FOR THE 36TH MEETING

Item No. XXXVI-1(165) : CONFIRMATION OF MINUTES OF THE 35TH MEETING

Minutes of 35th Meeting of Environment Sub-Group of Narmada Control Authority were circulated to all Members and Invitees vide NCA Office letter No.Env-3(35)/2001/1082-1112 dated 03.03.2001.

No comments were received and, therefore, the Minutes are put up for confirmation.

Item No. XXXVI-2(166): SARDAR SAROVAR PROJECT: REVIEW OF THE STATUS OF ENVIRONMENTAL CONSIDERATIONS IN RELATION TO THE PROPOSED RAISING OF THE DAM HEIGHT AT RL 100M

The Hon'ble Supreme Court, in its judgement given in civil Writ Petition No.319 of 1994 filed by Narmada Bachao Andolan (NBA) against the Sardar Sarovar Project (SSP), allowed the project to go ahead, as per the stipulations of NWDT Award.

In view of the above, it has to be ensured that the Project is completed expeditiously, as per the provisions of the Award, along with implementation of the Relief and Rehabilitation works, ameliorative and compensatory measures for environmental protection. The Environment Sub-group of NCA, has to consider and give, at each stage of the construction of the dam, environmental clearance for further construction beyond 90m.

The construction programme of the SSP approved by the NCA in its 61st meeting held on 17.11.2000 envisaged construction of dam in four stages i.e., 100m (June, 2002) 110m (June, 2003) & 121m (June, 2004) and FRL 138.68m (June, 2005). According to this decision of the NCA, the next stage of construction will be 100m. Therefore, it is desirable to review the progress of works on implementation of the suggested environment safeguard measures in the context of the pari-passu compliance with reference to dam construction of EL 100m. Accordingly, current status of the survey studies and implementation of the suggested safeguard measures in relation to dam height of 100m. is presented below for a review by the Sub-group.

The linkage between progressive filling of the reservoir and implementation of the suggested safeguards has been viewed in the context of the pari-passu clause contained in the clearance order of 1987 and subsequent discussions of the Sub-group and submission of the Union of India during hearing in the Apex Court. Accordingly, submergence was to be the indicator of the progress of works on the project and that advance steps were to be taken for all that, which were to be affected adversely.

The submergence to be caused during progressive filling of the reservoir vis-a-vis schedule of the construction programme is presented below.

A. Progressive Filling of the Reservoir

Dam Construction vis a vis submergence schedule

As per the construction schedule approved by the NCA, the project authorities have plans to raise the dam height from the present height of RL 90m. to the proposed

height of RL 100 m by the end of June, 2002. The resulting reservoir would extend upstream upto 105 Kms from the dam site. This would increase the area under pool submergence from the present 7200 ha to 8900 ha. This constitutes 24% of the submergence. A diagrammatic view of the proposed dam at RL 100 m to be achieved by June 2002, is at **Annex – XXXVI-(1) at Page-1.**

B. Review of the progress of works on the suggested parameters in relation to the proposed filling of the reservoir upto RL 100m by June 2002

A copy of the Status Report on Environment Management of Sardar Sarovar Project for the quarter ending December, 2000 is placed at **Annex –XXXVI – (2) Page 2-69** for a ready reference.

Status of the works on suggested parameters vis a vis submergence at RL 100m., was reviewed. During the last meeting, the State Governments were requested to submit the following information.

GUJARAT

Flora & Fauna and Carrying Capacity

Tabular information on recommendations, action plans and present status of various studies and surveys carried out for Shoolpaneshwar Sanctuary.

Command Area Development

Command Area Development details, particularly with reference to the proposed monitoring and controlled release of water for avoiding water logging, salinity, etc.

Health

Final Health Plan incorporating the preventive and curative measures proposed for malaria control and other diseases.

— parasite — Sardar Sarovar — Surveillance
NCA — activity &
— Control process

MADHYA PRADESH

Catchment Area Treatment

Proposal for completion of remaining Catchment Area Treatment covering an area of 40,240 ha. for Phase-I by June, 2002.

Flora & Fauna

Proposal for felling of trees in the submergence zone prior to impoundment of the reservoir. Write-up on recommendations, action plan and present status of various studies and surveys relating to flora and fauna affected due to impoundment.

— Preventive —
— Biological quality of 3 water & vector.

165

Archaeology

Plan for relocation of archaeological sites / monuments getting affected at EL 100m. including the ones in villages getting affected due to backwater effect.

Health

Report on health aspects and the additional districts required to be covered by NICD.

Khargone & Khambhade

MAHARASHTRA

Flora & Fauna

- ♦ Phased felling plan for forests coming under submergence at EL 100m. ✓
- ♦ Information on recommendations of the study group on flora and fauna and the proposed action plan for their dispersal / migration.

Health

- ♦ The Health Plan

For reviewing the action taken by the States on the issues identified during the last meeting, status of works on implementation of the environmental safe guard measures in relation to the proposed raising of the dam height to EL 100m. is presented below .

I. Phased Catchment Area Treatment

For the Project as a whole, against a target of 1,79,180 ha. of CAT an area of 1,35,222 ha. i.e., 75.46% has been treated. Thematic maps generated through GIS containing sub-watershed wise details, vis a vis the proposed schedule of progressive filling, are presented at **Annex – XXXVI – (3) at Page 70.** State-wise breakup of the targets and achievements is presented below.

Gujarat

The target area of 29,157 ha. treated completely.

Maharashtra

As the actual area available for treatment was found 23,295 ha, the same had been treated against the planned target of 24,298 ha. Therefore, the treatment work may be considered completed.

108145 end of 2002 March
17580 Ha →

Madhya Pradesh

90565 ha.

By the end of March, 2001, an area of 82,770 ha has been treated against the target area of 1,25,725 ha. Necessary action plan to complete the remaining works may please be put up by the NVDA.

II. Compensatory Plantations

Against the usual requirement of raising equal area of plantation over non-forest land in lieu of the submergence of certain area of the forest land, the Project Authorities were required to raise plantation over an area of 3 ha. (equal area of non forest land plus double of the degraded forests) in lieu of each hectare of forest land submerged. Accordingly for the project as a whole the concerned states through their Forest Department, have prepared Action Plans to raise plantations over an area of 42,158 ha., against 13,386 ha of the forest land diverted for the purpose of submergence.

Gujarat

By the end of September, 1994, Govt. of Gujarat had completed plantation works in the entire planned area of 13,950 ha. (including both non forest and degraded forest areas) i.e., 100% of the works were completed.

Maharashtra

For the land released for R&R works, progress achieved was 4,198 ha. against a target of 4,200 ha. However for the area getting submerged, the actual progress is 19,378 ha.

By the end of the March, 2001 an area of 42,064 ha is afforested against the target of 42,158 ha. The progress against the land used for R&R works is 4,198 ha. against 4,200 ha

Madhya Pradesh

By the end of March, 2001, the progress is 8,736 ha. against the target of 8,737 ha thus almost 100%.

III. Survey of Flora, Fauna and Carrying Capacity Studies

The regions which are affected due to the project were surveyed with reference to the following.

- 1) Gene pool, if any, likely to be affected.
- 2) Details of wildlife habitat in the region
- 3) Measures proposed to rehabilitate endangered species of flora fauna, if any.
- 4) Assessment of the carrying capacity of the neighbouring areas wherein the wildlife would dispose if the scheme were implemented.
- 5) Plan for rehabilitation of endangered flora & fauna.

The carrying capacity of the impact areas in Gujarat, Maharashtra and Madhya Pradesh have been studied and ameliorative measures are being undertaken in the areas neighbouring submergence under the schemes of CAT. While 6,476 ha. of the forest land (in Gujarat 4,376 ha, in Maharashtra 2,300 ha, in Madhya Pradesh 1,900 ha) is to be submerged at an EL of 100m. entire works of the plantation have been completed.

- ◆ Studies conducted indicated that there was no endemic endangered / rare / threatened species in the submergence areas of the Sardar Sarovar Project and therefore there was no possibility of a loss of gene pool.
- ◆ Details of wildlife habitat in the region was studied. There was one sanctuary known as Dhumkhal sloth bear sanctuary in the vicinity of the reservoir in the state of Gujarat. Details of this sanctuary were studied and its area was enlarged about four times to rehabilitate any wild animal species found in the region.
- ◆ Carrying capacity of the adjoining ecosystem was studied and ameliorative measures in form of massive plantations within the catchment and soil moisture conservation works have been completed in the entire area in Gujarat and Maharashtra and substantial works have been completed in the State of Madhya Pradesh.

The status of works in each state is summarised below

Gujarat

- ◆ A tabular statement showing the recommendations, target and achievement on the work in Shoolpaneshwar sanctuary received from GOG is attached in **Annex XXXVI-(4) page No. 71-73.**
- ◆ Regarding felling of trees from submergence areas, the entire reservoir bowl was cleared of vegetation and even coppice crops was also removed.

Maharashtra

Local Migration above catchment

- ◆ A tabular statement on the recommendations of the study group of Pune University covering flora fauna and carrying capacity aspects along with the suggested actions is placed at **Annex XXXVI-(5) page No. 74-75.** - 7 Recommendations taken care by M.D. but we need a final report
- ◆ The forest area under submergence at FRL 138.68 m. in Maharashtra State is 6489 ha. However the area to be cleared is up to a level 4 m below FRL. The encroachment in forest area is very large and is nearly 1036.19 ha. Most of the trees have already been felled by the encroachers in Akrani Taluka. In Akrani Taluka 2101.95 ha area is under land in river and nalla portion. Thus for felling only 2753.93 ha area falls under the RL 4 m below FRL. As per the information available about 748.02 ha. was already felled.
- ◆ A plan for felling in Maharashtra in relation to proposed increase in dam height to EL 100M is enclosed and placed at **Annex XXXVI-(6) page No. 76-78.** GOM is requested to complete the felling of trees by May / June, 2002. Lgo. So. He.

Madhya Pradesh

- ◆ All the studies related to flora fauna and carrying capacity aspected have been completed.
- ◆ Action plan drawn-up by NVDA on the recommendations of the SFRI, Jabalpur was received in NCA and MOEF. It envisages CAT works as a measure to improve carrying capacity of their adjoining eco-system besides social forestry activities in the impact zone. Summary of the plan under implementation is placed at **Annex XXXVI-(7) page No. 79-92.**
- ◆ Felling plan was prepared by the SFRI initially in 1991 which was subsequently revised in 1996 and was discussed during the 18th meeting of the Environment Sub-group. This plan is under implementation and it was informed that entire area commensurate with submergence at EL 100 m. was felled. Summary of the plan received from the NVDA and its presentation on map is placed at **Annex XXXVI-(8) page No. 93-105.**

IV. Archaeological and Anthropological Survey

The three party states completed surveys of cultural and religious sites within the submergence zone with a view to list all archaeological sites requiring protection / relocation / excavation. State-wise position is as under :

Gujarat

- ◆ There was one temple namely Hampheshwar temple relocated completely in village Hampheshwar in Gujarat. All works related to relocation this temple have already been completed.

Madhya Pradesh

The current status of works in relation to the submergence to be caused by raising the dam height to EL 100m. is placed below.

- ◆ In follow-up of the discussions in the last meeting of the Environment Sub-group, a Review Meeting on Archaeological aspects was taken by the Member (E&R), NCA, on 8.3.2001. A copy of the Minutes of the meeting is enclosed at **Annex XXXVI-(9) page No.106-113**. A GIS generated Map is also enclosed at **Annex-XXXVI-(10) page No. 114-115**. Accordingly no monument shall be impacted by the submergence to the cost by the pondage by raising the dam to EL 100 m. with regards to the impacts of backwater there would not be any change in the status of the monuments as compared to with dam not in place.

Maharashtra

- ◆ There was one temple namely Shoolpaneshwar temple on the border of Gujarat and Maharashtra in village Manibeli. Gujarat have accepted the responsibilities in this regard. All works regarding relocation of temple were completed earlier.

V. Seismicity and Rim Stability of Reservoir

Rim stabilities studies have been completed and well equipped 9 monitoring stations along the periphery of the reservoir are functioning. Data collected by these observatories are to be analysed by expert institutions.

Institutional arrangement — Not

VI. Health Aspects

Project authorities have prepared plans on public health aspects focusing on prevention and control of Malaria, surveillance of disease during pre and post impoundment and routine care taken by concerned department of State and Central Governments Under their own programme like National Anti Malaria Programme, Disease Surveillance programme, research on malaria etc. A tabular statement containing costs of the facilities created in the State of Gujarat, Maharashtra and Madhya Pradesh is placed at **Annex XXXVI-(11) page No.116-120**. A GIS generated map showing location of health facilities in the three states is placed at **Annex XXXVI-(12)- page 121-122**. The Statewise issues are as under :

Gujarat

- ◆ A copy of the action plan on health aspects received from Govt. of Gujarat is placed at **Annex XXXVI-(13) page 122-143**.

Maharashtra

In accordance with the revised action plan submitted by Maharashtra provision for health care facilities, two cottage hospitals, eight primary health centres and 55 primary health unit's have already been established in Dhule District. Taking into account the inaccessibility of some of the villages, provisions were made for eight additional public health unit's, 10 mobile unit's and a floating dispensary for villages within 10 km of the submergence zone. One hospital at Somawal resettlement village, was already functional.

Madhya Pradesh

According to the action plan work commenced on additional facilities for the Nisarpur village hospital, Dhar district. It was informed that extension of the Nisarpur Hospital is due for completion by the time submergence of areas in Madhya Pradesh commences.

- ♦ Long term studies on disease surveillance by Gandhi Medical College, Bhopal, continued for the impact areas of the M.P. The 6th Interim report of Gandhi Medical College, Bhopal was sent to ICMR, New Delhi for their views.
- ♦ To include the districts in the disease surveillance programme of NICD a request from NVDA was to be made to the NICD. Progress may please be informed.

VII. Fisheries Conservation and Development

The 100 m dam height will create a narrow reservoir with 85 m depth of water at dam site for this studies have been carried out to establish a baseline and help to predict future conditions for aquatic life.

According to IUCN, red data list fishes of Narmada are not included as rare or threatened species. CICFRI compiled a list of 8 species which may be considered vulnerable in Narmada basin. However they are present else where in India in abundance. State-wise progress is as below :

Gujarat

To improve the quality of seed to be stocked and to lesson the pressure on land deployment, the possibility of cage / pen rearing of fish seed is being examined, in consultation with the Central Institute of Fisheries Aqua culture, Bangalore, who have offered a consultancy package to the State Fisheries Department.. It was further

informed that SSNNL has already appointed a Fisheries consultant to gear up the fisheries sector activities under SSP.

Maharashtra

Following the desk review studies on conservation of fish fauna in SSP carried out by the Central Inland Capture Fisheries Research Institute (CICFRI), GOM assigned a short term study to the Vadodara Centre of CICFRI. Report of the study is yet awaited.

VIII. Command Area Development

The SSP water for irrigation purposes would start flowing in the canal once the dam height was raised to 110 m. The SSP will provide irrigation water for a cultivable command area of 18 lacs hectares in Gujarat and 75,000 hectares in Rajasthan. The introduction of fresh water to the drought-prone areas of Gujarat will create obvious benefits for the farming communities. In order to safeguard these benefits, control and monitoring was suggested by the Secretary, Ministry of Environment & Forests and Chairman of the Environment Sub-group in the following areas from time to time :

- drainage, water logging and soil salinity
- water quality
- forest loss
- potential impact on flora and fauna
- effects on public health
- socio-economic impacts.

Rajasthan

There is substantial progress in the construction of canal network to review the implementation of ESM and updated progress may please be put up for review by the members. .

IX. Down stream environment

the construction of dam would result into more regulated and perennial flow into the river with an overall beneficial impact. It is unlikely that any significant negative environmental impacts will occur over the next 30 years as a result of the project. Some possible adverse effects have been identified the main one being the effect of flood attenuation on Hilsa migration. These are being monitored.

CICFRI have also commissioned studies to monitor the whole of the estuary and their study has been extended to examine pollution and to undertake Modeling studies in the downstream environment.

A tabular statement summarizing the current status of works in relation to the submergence to be caused by raising the dam height to EL 100m is placed below for review of the Members.

Dam Construction at EL 100 m. would submerged an area upto 105 km. from the dam site resulting in impoundment of 24% of the area.

Sl. No	Pre-requisite as per minutes of 35 th meeting of the Environment Sub-group.	Status of works	Remarks
1.	Catchment Area Treatment Proposal for completion of remaining Catchment Area Treatment covering an area of 40,240 ha. for Phase-I by June, 2002. [Action NVDA]	Catchment Area Treatment for the SSP as a whole 75.46% completed. Details for completion of works in two years time for the areas in Madhya Pradesh awaited.	Subject to submission of details by NVDA progress on the project satisfactory.
2.	Flora & Fauna and Carrying Capacity Tabular information on recommendations, action plans and present status of various studies and surveys carried out for Shoolpaneshwar Sanctuary. [Action Gujarat] Proposal for felling of trees in the submergence zone prior to impoundment of the reservoir. Write-up on recommendations, action plan and present status of various studies and surveys relating to flora and fauna affected due to impoundment. [Action NVDA] Phased felling plan for forests coming under submergence at EL 100m. [Action Maharashtra] Information on recommendations of the study group on flora and fauna and the proposed action plan for their dispersal / migration. [Action Maharashtra]	Submitted by SSNNL and annexed with the Agenda papers. Information available and annexed with the Agenda papers. Information available and annexed with the Agenda papers. Information available and annexed with the Agenda papers.	Complied. Complied. Complied. Complied.
3.	Command Area Development Command Area Development details, particularly with reference to the	Information available and writeup will be circulated during the meeting.	Complied. There is time on hand. No impact till

	<p>proposed monitoring and controlled release of water for avoiding water logging, salinity, etc.</p> <p>[Action Gujarat] Command area Development Plan for the areas in Rajasthan</p> <p>[Action Rajasthan]</p>	Information awaited.	<p>dam is raised to an EL of 110m.</p> <p>There is time on hand. No impact till dam is raised to full height.</p>
4.	<p>Health</p> <p>Final Health Plan incorporating the preventive and curative measures proposed for malaria control and other diseases.</p> <p>[Action Gujarat] Report on health aspects and the additional districts required to be covered by NICD.</p> <p>[Action NVDA] The Health Plan</p> <p>[Action Maharashtra]</p>	<p>Information available and annexed with the Agenda papers.</p> <p>Information awaited from NVDA. However this relates to Indira Sagar Project.</p> <p>Information available.</p>	<p>Complied.</p> <p>Awaited but not relevant.</p> <p>Complied.</p>
5.	<p>Archaeology</p> <p>Plan for relocation of archaeological sites / monuments getting affected at EL 100m. including the ones in villages getting affected due to backwater effect.</p> <p>[Action NVDA]</p>	Information available and annexed with the Agenda papers.	Complied.

In view of the above permission to raise the dam height to EL 100 m. may be considered by the Sub-group

Item No. XXXVI - 3 (167) : REVIEW OF THE STATUS OF INDIRA SAGAR PROJECT MADHYA PRADESH

A copy of the Status Report on Environment Management of Indira Sagar Project for the quarter ending December, 2000 is placed at **Annex-XXXVI - (14) Page 148-175** for a ready reference.

I. Catchment Area Treatment

By the end of March, 2001, against a target of 73,456 ha. an area of 46,958 ha. has been treated-up. The progress is stated to be about 63.92% of the final targets. Further progress, if any may please be presented.

51,810 Ha.

II. Compensatory Plantations

By the end of July, 2000, Govt. of Madhya Pradesh have completed plantation works over an area of 70,031 ha. against a target of 80,945 ha., work thereby completing 86.5% of stipulated target. Further progress, if any may please be presented.

Canal

III. Survey of Flora Fauna & Carrying Capacity studies

In accordance with the recommendations of the study conducted by the Wildlife Institute of India regarding declaration of National Parks / Sanctuary it was informed by the Subject Matter Specialist, NVDA that the issue was taken up by a committee formed for placing the issue before the Cabinet. But now it has been decided to take up the issue directly to the cabinet. The Chairman desired that this issue be expedited at the earliest. Progress may please be represented by the NVDA.

IV. Archaeological & Anthropological Survey

The action plan for protection of Joga Fort was prepared by the ASI at an estimated cost of Rs.1.67 crores. Due to administrative difficulties the work could not be taken up by them. During the last review taken by the Member (E&R) on 8th March 2001, NVDA stated that the cost of the work of execution would be borne by the NHPC Limited and that the work may also be taken up by them provided ASI is not willing and permits NVDA / NHDC to carry out the work. Correspondence in this regard is placed at **Annex XXXVI-(15) Page 176-179**. The progress in this regard may please be informed by the ASI.

Dr. Harshvardhan, Dy. Director, ASI informed that the detailed investigation were carried out by the ASI during 1992-93, and a draft report was submitted. The interim / draft / final report may please be presented for information of the members.

V. Seismicity and Rim Stability of Reservoir

In the last meeting it was informed that the analysis and co-relation of data being collected / proposed to be collected by various agencies in the region of Indira Sagar Project is awaited from the field. The same may presented.

VI. Health Aspects

Detailed progress may please be presented by NVDA .

VII. Command area Development.

In the last meeting it was informed that the terms of references (TOR) for preparation of command area development plan of the Indira Sagar Project was under examination of the NVDA.

Further progress may please be informed.

Item No. XXXVI-4(168) REVIEW OF ACTION TAKEN ON THE DECISION OF THE PREVIOUS MEETINGS

I. Environmental Management of SSP and ISP

Comprehensive documents of Environmental Management of Sardar Sarovar and Indira Sagar Projects were circulated to the Members vide NCA Office letter Nos. Env-4(8)/2000/4561-66 and Env-3(34)/2000/4567-85 dated 9.11.2000 for views of the Members. During the 35th meeting of Environment Sub-group, Members desired more time to study the twin documents for sending their view points.

Observations received from the Govt. of Gujarat have been incorporated. It is proposed to get the document on SSP published by a reputed publishing house for wider dissemination of the information on SSP.

II. Submission of Catchment Area Treatment Plans for freely draining critically degraded sub-watersheds (Item No.XXII-2(112))

As per the decision of GOI of June, 1992, the Project Authorities were required to submit the Action Plan for treatment of balance of the critically degraded sub-watersheds and the current status is summarised in the Status Report annexed herewith at annex – 14 of this agenda.

The State Govts. of Maharashtra and Madhya Pradesh may like to present the current studies of the works on (i) Implementation of the Phase-II plan and (ii) Establishment of Silt Monitoring Stations and presentation of the results thereof.

It was observed during the 35th meeting that due to decentralization of the funding components of the watershed management schemes and placement of funds at the disposal of the respective State Govts. It was felt that needed steps should be taken for continued supports to the soil moisture conservation works as envisaged. In this connection it was suggested that Secretary, Agricultural be approached for soliciting his cooperation in expeditious completion of the phase-II works related to SSP and ISP. In pursuance thereof Member (E&R) and Specialist (Environment) held discussions with the concerns officials of the Ministry of Agriculture. A copy of the letter addressed in this regard is placed at **Annex XXXVI-(16) Page No. 180-181**. In accordance with the decision of the Sub-group an invitation was extended to Dr. Shamsher Singh, Additional Commissioner, Soil Conservation & also to the Joint Secretary / Commissioner of the Ministry of Agriculture for attending future meetings of the Sub-group.

III. Cost Estimates for preparation of Action Plans and implementation of Environmental Safeguard Measures

In order to frame yard sticks on the cost estimates of the water resources Projects, the Chairman of the Sub-group during earlier meeting desired compilation of the estimates and expenditure incurred on survey, studies and implementation of the suggested safeguard measures for the SSP. Accordingly, the information compiled is being presented for information to the Sub-group at **Annex-XXXVI-(17) page No. 182**. The latest updates on these issues based on the information received from the State Govts. is presented below for information of the Members.

Updating at the current price level of the estimate and expenditure on environmental components of the Sardar Sarovar and Indira Sagar Project is requested from the Govts. of Gujarat, Madhya Pradesh and Maharashtra.

IV. Monitoring works in Maharashtra

Govt. of Maharashtra representative have expressed difficulties in receiving funds from the Project Authorities for implementation of the environment safeguard like Health, Fisheries, Flora, Fauna, etc. This issue was discussed and it was informed that a policy decision is to be taken by the appropriate authorities of the SSNNL after studying availability of the funds and financial consequences thereof. Further information is awaited from the Govts. of Maharashtra and Gujarat.

Regarding inter departmental coordination for the SSP related works in Maharashtra, Govt. of Maharashtra had suggested that the Officers nominated by the Govt. of Maharashtra on to the Field Visit Committee might suffice. However, no officers from Maharashtra has participated during the second field visit undertaken during July, 2000 and therefore, progress in Maharashtra could not be reviewed by the Committee for the areas in Maharashtra. Similarly during the last meeting of the Environment Sub-group also there was a lack of participation at appropriate level due to which progress on various issues for the areas in Maharashtra could not be ascertained.

Members may like to discuss and review.

V. Publication of Environment

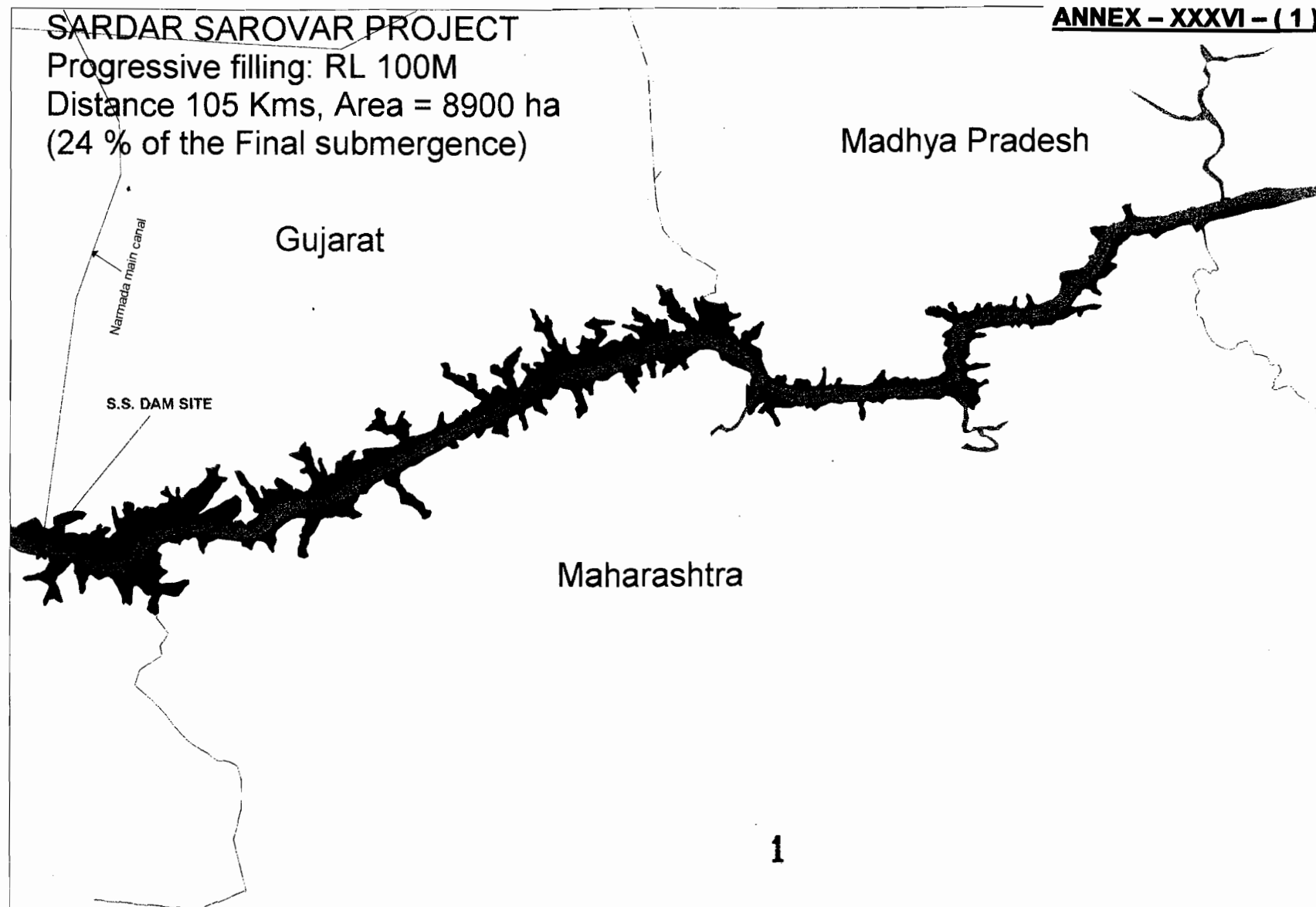
During its earlier meetings it was desired that good works being done by the Project Authorities are to be published . Progress on these aspects may please be presented by the State Govts.

During the 33rd meeting, the Sub-group desired that NCA should organise Seminar / Workshops on the Thrust Areas of the Environmental Ameliorative Measures. Details for organizing the seminar at the earliest are under formulation. This is for the information of the Members.

Item No. XXXVI-5(169) : Any other item

Date and venue of the next meeting

ANNEXURES



ANNEX – XXXVI – (2)

Environment Management Sardar Sarovar and Indira Sagar Project December - 2000	
I N D E X	
Chapter 1	Page No.
INTRODUCTION	
• Master Plan For The Development Of Narmada River Basin: NWDTA	1
• Principal Levels and apportioning of the irrigation and power benefits by the NWDTA	2
• Key Directives By The NWDT On Environment & Rehabilitation	3
• Environmental Clearance by Govt. of India	3
• Forest Clearance	5
• Investment Clearance	5
• Monitoring by the NCA.	5
• Environment and Rehabilitation Wing Of The NCA	6
• Environment Sub-Groups Of NCA	6
• Functions Of The Environment Sub-Group.	6
• Important Sub-Groups and Sub-Committees On Environment	7
SARDAR SAROVAR PROJECT	
• Salient Features of the Project	8
• Key benefits from the proposed project	8
• Additional benefits	9
• The submergence	9
DEVELOPMENT AND CURRENT STATUS OF THE MANAGEMENT OF SSP ENVIRONMENT	10
Chapter 2	
CATCHMENT AREA TREATMENT	
• Studies	11
• Planning	12
• Phase-I: directly draining sub-watersheds	12
• Action plans	12
• Implementation	13
• Phase-II: indirectly draining sub-watersheds	17
Chapter 3	
COMPENSATORY AFFORESTATION	
• Studies	20
• Action plans	21
• Implementation	21
• Additional plantation activities	
• (a) Plantation along canal banks	23
• (b) Dam vicinity plantation	23
• (c) Ravine land afforestation	24
Chapter 4	
COMMAND AREA DEVELOPMENT	
• (A) Current scenario : Government of Gujarat	25
• Agriculture Practices and Socio Economic	26
• Drainage, Waterlogging and Salinity	27
• Ground Water Studies	27
• Drainage and studies	28
• Floral and Faunal Studies	28

• Fisheries	30
• Health	30
• Water Quality	30
• Flora and Fauna	32
• Sanctuaries	33
• Public Health	34
• Proposed Management Measures	36
• Waterlogging and Salinity	37
• Action Plan	39
• Implementation	40
• B) Current Scenario : Government of Rajasthan	41
➤ Narmada Main Canal	42
➤ Water Delivery Network	42
➤ The Distribution System of VSAs	43
➤ Drainage System	43
Chapter 5	
FLORA, FAUNA, WILDLIFE AND CARRYING CAPACITY	
• Studies / surveys	44
• Action plans	46
• Wildlife (Terrestrial)	46
• B) Fisheries (Aquatic):	47
• Summary of Status of Environmental Planning: Fisheries	
• Enhance Nature Conservation Outside the Immediate Catchment Area of the Narmada	48
• Implementation	49
• Ongoing Fisheries Activities in the Sardar Sarovar	49
Chapter 6	
SEISMICITY	
• Studies	50
• Implementation	50
• Status of implementation of Seismicity aspects	51
Chapter 7	
HEALTH ASPECTS	
• Studies and Action Plan	52
• Status of Implementation of Actions for Public Health	53
• Implementation	
• A) Govt. of Gujarat:	55
• B) Govt. of Maharashtra	56
• C) Govt. of Madhya Pradesh	56
Chapter 8	
ARCHAEOLOGICAL ANTHROPOLOGICAL	
ARCHAEOLOGICAL SURVEY	
• Studies	58
• Action Plans	60
• Summary of the Proposed Actions	
• Summary of current situation and progress	62
• Implementation	63

STATUS REPORT**Chapter 1****December, 2000**

Environment Management

Sardar Sarovar and Indira Sagar Project

Narmada is the fifth largest river of India. It is also the largest west flowing , least polluted river. Its length from Amarkantak to Arabian Sea is - 1312 Km. The mean Annual Rainfall in the basin is 1,180 mm (46.45 inches) and Average Annual Run-Off is 41,000 M.Cu.M (33.21 MAF). Its catchment area is about 98,000 Sq.Km, which is spread to the State of Madhya Pradesh, Maharashtra and Gujarat. The current utilization of the Narmada water is as follows (Units in MAF.):

Average Annual Potential	46.039
Estimated Utilisable Water	34.5
Present Use	8

Master Plan For The Development Of Narmada River Basin: NWDTA

In 1965, India appointed a committee to develop a master plan for the Narmada Basin. The committee's recommendations were not accepted by the riparian states. This impasse led to the constitution of the Narmada Water Disputes Tribunal in 1969 by Government of India under Inter State Water Dispute Act of 1956, for adjudication of water disputes of Narmada among riparian States. Its deliberations continued until 1979. The Tribunal considered the Sardar Sarovar Projects and the Narmada Sagar Projects together using the best hydrological, engineering, and other evidence available and passed the order which was notified in Gazette on December 16th, 1979.

NWDTA

In its 1979 award, the Narmada Water Disputes Tribunal made many of the most fundamental decisions about the Projects. These included the dam location, regulation of flows, reservoir levels etc. There are points in the Tribunal award that bear on the environmental aspects of Sardar Sarovar Project which are summarised below.

- + the utilizable quantum of Narmada waters at the Sardar Sarovar dam site is specified at 28 million acre feet (MAF) on the basis of 75 per cent dependability.
- + apportionment is to be 18.25 MAF for Madhya Pradesh, Gujarat 9.00 MAF, Rajasthan 0.50 MAF, and Maharashtra 0.25 or in that ratio.
- + the apportionment/sharing of water are subject to review after 45 years.
- + the canal and dam water levels are fixed.
- + the multi-purpose character of the project, including hydroelectric power, is affirmed.
- + Madhya Pradesh is to provide regulated releases of water from the Narmada Sagar Projects to the Sardar Sarovar Projects and.
- + terms of the award are subject to change if there is agreement between all the states concerned.

Principal Levels and apportioning of the irrigation and power benefits by the NWDTA

Sardar Sarovar Dam

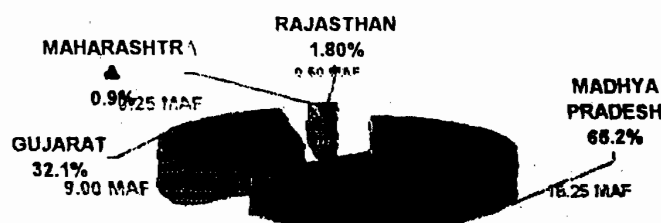
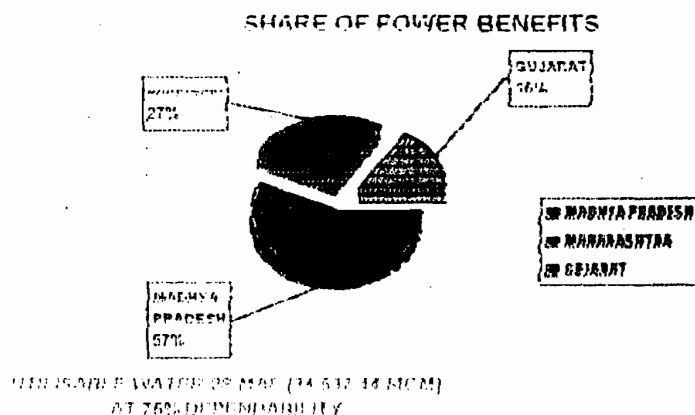
Full Reservoir Level
+ 138.68 M [+455']
Maximum Water Level
+ 140.21 M [+460']

Narmada Main Canal

Full Supply Level
+ 91.44 M [+300']

Indira Sagar Dam [M.P.]

Full Reservoir Level
+ 262.13 M[860']



Estimates of Govt. of Madhya Pradesh anticipate that over the next half century there will be 29 major, 135 medium, and about 3,000 minor projects in the Narmada River valley. The Sardar Sarovar, one of the first to be built on the main river, is the terminal project on the river system and its benefits and impacts, are linked to developments of Indira Sagar Project upstream.

Key Directives By The NWDT On Environment & Rehabilitation

Fisheries development (NWDTA clause XI, sub-clause V (6) & (7) : The NWDT direction regarding this is in para- 5 & 7 of Sub-clause V of final order and decision of NWDT in Chapter XX of the Report of Volume II. The decision is reproduced below:

- V(6) "Notwithstanding vesting in Gujarat of the lands coming under submergence, Madhya Pradesh and Maharashtra shall continue to enjoy all rights of sovereignty intact over the submerged area in the respective States".
- V(7) "Madhya Pradesh and Maharashtra respectively shall be exclusively entitled to all rights of fishing, boating and water transportation over the part of lake over the submerged land within Madhya Pradesh and Maharashtra respectively provided, however, that such right is not exercised to the prejudice of any utilities of the legitimate performance of their duties by the project personnel".
- Monitoring of the protection shifting/relocation of the monuments of archaeological significance being affected by the submergence of Sardar Sarovar, Narmada Sagar, (NWDT clause XI-sub-clause III (4) & XIV-7,8(3)(iv).
- Studies related to Downstream scenario for estimating impacts of project activities (NWDT clause IX (VII) related to indenting of water for downstream by Gujarat.
- Clause XI{sub clause I to VI, page 110-115}deals with the provision for rehabilitation of oustees (PAFs) from submergence area of Madhya Pradesh and Maharashtra who are likely to be resettled in Gujarat or in their home states.

Environmental Clearance by Govt. of India

It is recognised that the creation of reservoir will bring in environmental, social and economic impacts and that there will be changes in environmental regime in the upstream, downstream and in the command basically due to submergence and displacement of people and wildlife and irrigation in the command. Such changes are required to be assessed and evaluated for taking decision before proceeding with the project.

Ministry of Water Resources the then Ministry of Irrigation & Power had developed detailed guidelines framed during October, 1980 for project formulations which included a detailed check-list by the Ministry of Environment & Forests, the then department of Environment of the department of Science & Technology of the Govt. of India, for assessment of environmental impact of the projects and planning for Environmental Safeguard Measures.

In accordance with the requirement of the Department of Environment, project authorities submitted the detailed project report (DPR) along with the needed information on environmental issues during February to October, 1980. Environmental

Appraisal Committee of the Ministry of Environment & Forests approved the project in principle during its 12th meeting held in 1983. More information & data on certain parameters of Environmental impact & management were subsequently provided through additional documentations over a period of time in various stages of completeness by three states i.e. Maharashtra, Gujarat and Madhya Pradesh. The information provided was also updated from-time-to-time. The studies action and data were considered at levels and the projects namely Sardar Sarovar in Gujarat and Indira Sagar in Madhya Pradesh were formally cleared from environmental angle on 24th June, 1987 by the Ministry of Environment & Forests, Govt. of India. Permission for diversion of the forestland was also subsequently accorded for both the projects separately by the MOEF during December, 1987 and October, 1987. The Investment Clearance for the Sardar Sarovar and Indira Sagar Project was received from the Planning Commission during October, 1988 and November, 1988 respectively, thus paving the way for implementation of these projects.

Before a formal clearance by the Ministry of Environment & Forests, Narmada Control Authority was expanded and was entrusted with the increased responsibilities in the areas of environment and rehabilitation. The clearances issued subsequent to the expansion of the NCA by the Central Government departments, contained certain conditions to be complied with during the course of project implementation.

The Parameters

- + rehabilitation master plan;
- + phased catchment area treatment scheme;
- + compensatory afforestation plan;
- + command area development,
- + survey of flora and fauna; carrying capacity of surrounding area;
- + seismicity and
- + health aspects.

The Narmada Control Authority was given the responsibilities to ensure that the environmental safeguard measures would be planned and implemented in depth and the pace of its implementation would be pari passu with the progress of the work on the Projects. The four conditions of the clearance were:

- the Narmada Control Authority would ensure that the environmental measures are planned and implemented pari passu with the progress of the work on the project;
- the detailed surveys/studies would be done
- catchment area treatment and rehabilitation programs would be completed ahead of reservoir filling.
- The Department of Environment would be kept informed of progress.

Forest Clearance

In September 1987, under the Forest (Conservation) Act, 1980 the Central government gave approval for the diversion of over 13,386 hectares of forest land for the Sardar Sarovar Projects. This approval was subject to eleven conditions in all three states, of which the following are especially relevant.

- detailed compensatory afforestation plans would be submitted.
- a proposal for non-forest areas for rehabilitation of oustees would be submitted.
- compensatory afforestation would be in double the area of degraded forest lands in addition to the afforestation of equivalent non-forest land, and a scheme for this would be submitted.
- a catchment area treatment plan will be prepared by November 30, 1987, failing which a central government team would be appointed at a cost to the project.

Investment Clearance

The Planning Commission, Govt. of India approved investment for an estimate cost of Rs. 6,406 crores for SSP in Gujarat vide their letter dated 15.10.88. The Planning Commission of the Government of India granted the State of Gujarat approval for the Sardar Sarovar Projects subject to seven conditions that bear on the environment (as well as resettlement and rehabilitation).

- compliance with the 1987 environmental and forestry clearances;
- adequate funding to meet the construction schedule;
- submission of a detailed program for drainage and ground water balance studies beyond the Mahi River;
- adoption of measures to ensure project revenue from water rates to pay for annual operation and maintenance charges;
- setting up an expert group to study siltation in the main canal.
- drawing up a detailed schedule and plans for the micro-level irrigation network system; and an implementation schedule for completion of the canal network so that irrigation benefits do, in fact, start accruing from the financial investment.

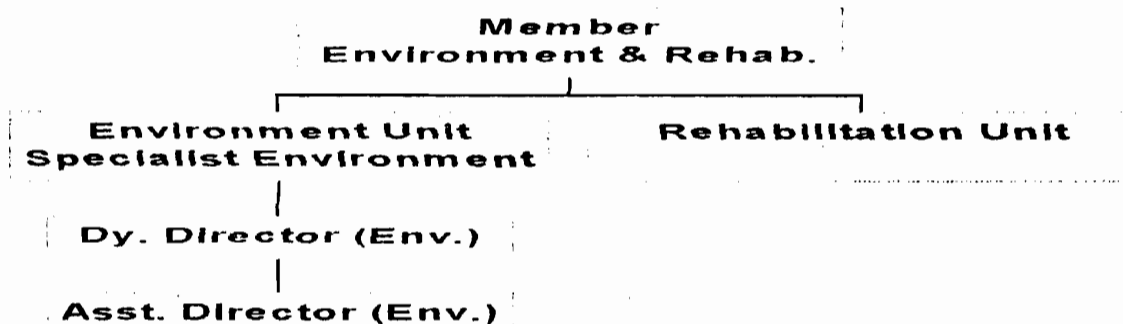
Monitoring by the NCA.

Following the recommendations of the Ministry of Environment & Forest, the scope of the Narmada Control Authority was enlarged on 4th June, 1987 through amendment brought out by MOWR under clause 9(i)4 9(2)a, through gazette notification. The functions of NCA were modified to include major functions of coordination & direction of the implementation of all the projects including the environmental protection measures to ensure the faithful compliance of the conditions attached by GOI while granting clearance to these projects.

Environment and Rehabilitation Wing Of The NCA

The Environment & Rehabilitation (E&R) wing of NCA is headed by Member (E&R), NCA, Indore. Member (E&R), The organizational structures of the Environment unit of the E&R wing is as given below :

Organisation Chart of E&R wing



Environment Sub-Group of NCA

NCA had constituted among others, a sub-group namely Environment sub-group under the Chairmanship of Secretary, Ministry of Env.& Forests, GOI. Member (E&R), NCA is Member Secretary to this sub-group. The 34th Meeting of the Subgroup was held on 14th November, 2000.

Functions Of The Environment Sub-Group.

- i) To work out the environmental safeguard measures to be planned and implemented for the entire Narmada Basin so that environmental safeguard measures are executed and remain fully in consonance with the clearance accorded to the Narmada Sagar and Sardar Sarovar Projects.
- ii) To determine the terms of reference of required surveys and studies necessary for implementation of environmental safeguard measures inclusive of data base required, the methods by which the data base is to be prepared and also to identify the institutions/individuals to undertake the preparation of such documents.
- iii) To get prepared for clearance by the Ministries and NCA the action plans with regard to all environmental safeguard measures and the assessment criteria thereof.

- iv) To devise a suitable monitoring and evaluation mechanism so that the action plans are effectively implemented in consonance with stipulations at the time of clearance of the projects.
- v) To assess the necessary organisation with management capability being set up for adequate implementation of environmental safeguard measures.
- vi) To undertake all measures necessary to assist Narmada Control Authority in the planning and implementation of environmental safeguard measures.

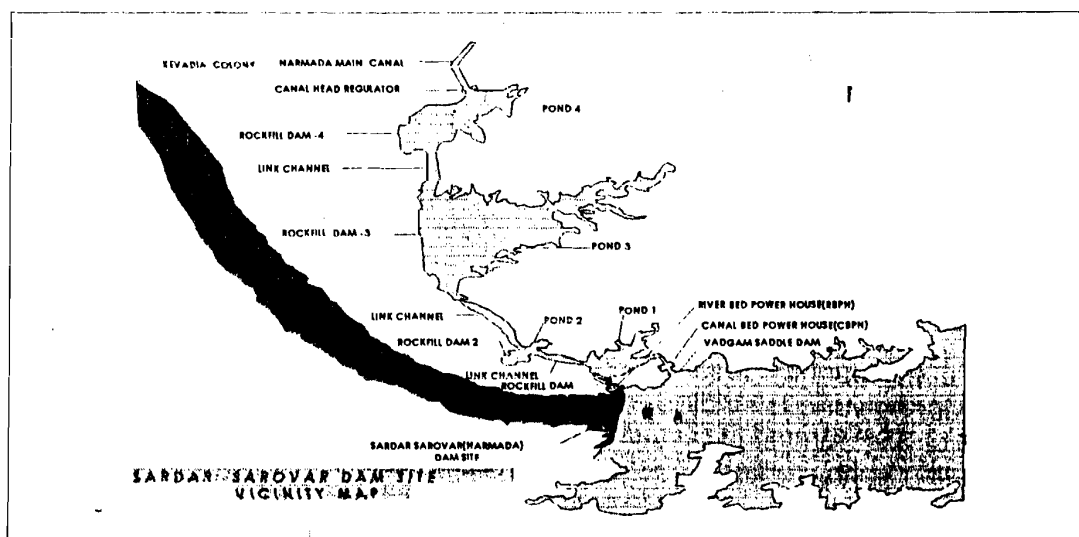
Important Sub-Groups and Sub-Committees On Environment

1. There is a Environment Committee headed by the Member (E&R), NCA. The Committee visits the impacted areas in all the three states by rotation for assessing compliance and submits its reports to the sub-group and necessary recommendations are forwarded to concerned State Governments for compliance.
2. High level expert group on fisheries development and conservation in Sardar Sarovar reservoir. This is chaired by the Joint Secretary, MOE&F. Member (E&R), NCA is the Member Secretary for this committee.
3. Committee on flora and fauna aspect of Sardar Sarovar and Narmada Sagar Project. This committee is chaired by Member (E&R), NCA.
4. Committee on archaeological and anthropological aspects. This committee is chaired by Member (E&R), NCA.
5. Committee on Health aspects. This committee is chaired by Member (E&R), NCA.
6. There are four high level expert multi disciplinary groups directing, coordinating and monitoring various studies commissioned by Govt. of Gujarat for the vast command area of SSP formed in pursuance of the directives of the Environment Sub-group for initiating such studies. Member (E&R) is included as regular member. Meeting of the expert group are convened by NPG from time to time to discuss the progress/interim reports of the studies commissioned by the Govt. of Gujarat.
7. Govt. of Maharashtra had formed Focus Group consisting of Secretaries of the various departments of the Govt. of Maharashtra to review issues related to SSP.
8. The Govt. of M.P. had constituted Wild Life Committee to review the environmental issues related with the SSP and ISP including studies, action plans and implementations.

SARDAR SAROVAR PROJECT

Salient Features of the Project

Locations	Near village Navagam, distt. Narmada
Height	163.00 m
Length	1,210.00 m
Gross storage	9.5 (7.70) b cum (MAF)
Live storage	5.8 (4.73) b cum (MAF)
Annual irrigation	18.65 lakh ha.
Installed capacity	1,450 mw (1200 mw + 250 mw)
Cost of Project Rs.6,406.00 crore (at 1986-87 price level)	Rs.13,180.62 crore (at 1991-92 price level)
Annual irrigation Per ha submergence of cultivable land	of About 165 ha



Key benefits from the proposed project.

Irrigation	Hydropower	Flood control
Gujarat 18.65 lakh ha Rajasthan - 75,000 ha Maharashtra 37,500 ha.	1450 MW	210 villages and Bharuch city 750,000 population

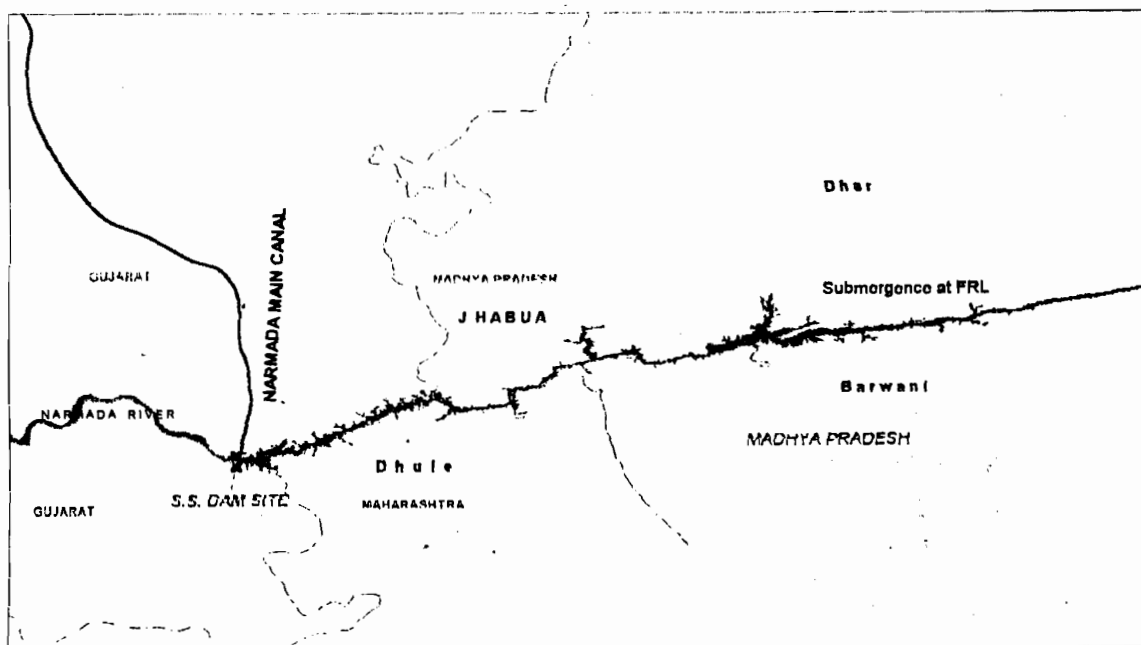
Additional benefits

- + Drinking water supply to 135 urban centres and 8215 villages
- + Water supply for industries
- + Fisheries development
- + Wild life sanctuaries development

The submergence

The submergence zone of the project lies within the State of Maharashtra , Madhya Pradesh & Gujarat as depicted in the table & map below.

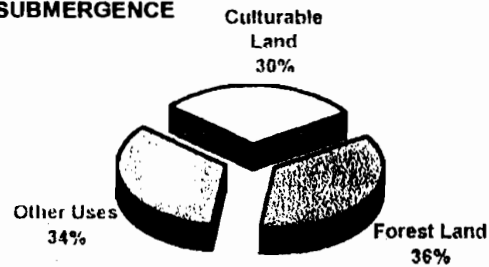
State	Culturable land (ha)	Forest land (ha)	Land under other uses (ha)	Total land (ha)	Affected number of villages	Affected number of PAFs
Madhya Pradesh	7,883	2,731	10,208	20,822	193	33,014
Maharashtra	1,519	6,489	1,592	9,599	33	3,213
Gujarat	1,877	4,166	1,069	7,112	19	4,600
Total	11,279	13,386	12,869	37,533	245	40,827



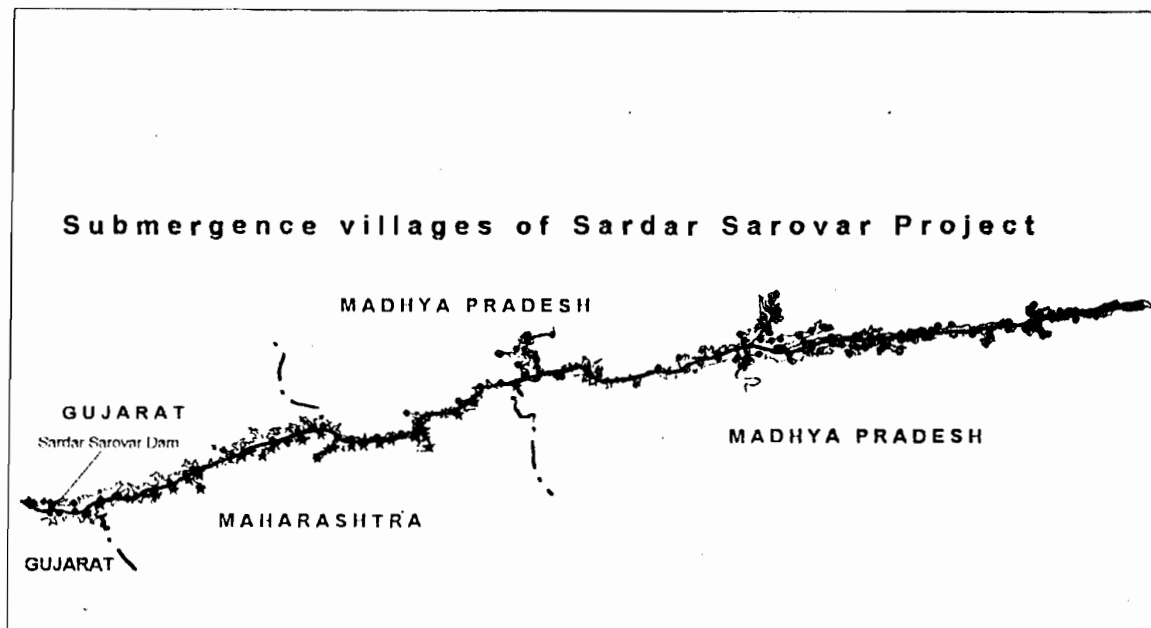


Sardar Sarovar Dam

LAND USE PATTERN OF LAND UNDER SUBMERGENCE



□ Culturable Land □ Forest Land □ Other Uses



Development and current status of the management of SSP environment

The environmental clearance had suggested the following parameters for Environmental Management.

- ◆ Resettlement & Rehabilitation.
- ◆ Compensatory Afforestation
- ◆ Flora Fauna & Carrying Capacity of Surrounding area
- ◆ Health
- ◆ Catchment Area Treatment
- ◆ Command Area Development.
- ◆ Seismicity

Chapter 2

CATCHMENT AREA TREATMENT

The MOEF clearance granted in 1987 contained two conditions pertaining to CAT, follows:

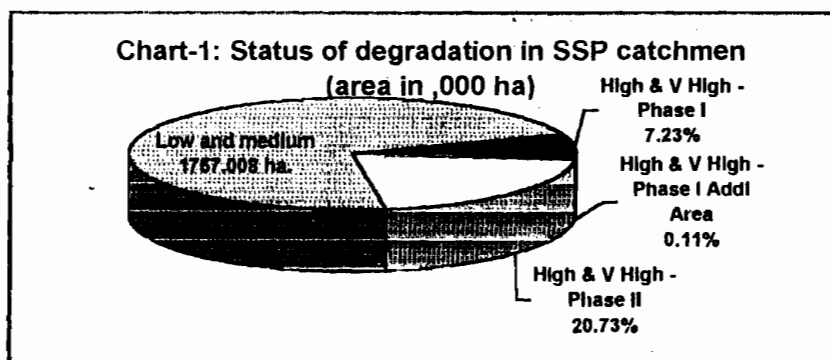
- more detailed surveys for prioritisation of the sub-catchments in the SSP area should be undertaken;
- A phased CAT programme should be prepared and implemented ahead of reservoir filling.

Studies

Surveys and studies have been undertaken to aid the development of management plan for CAT in the SSP catchment. They include : -

- Report of Inter-Departmental Committee on Soil Conservation and Afforestation (the Dewan Committee Report), 1985.
- Report on Prioritisation of Sub-watersheds in Sub-catchments of Narmada Catchment, 1991 by AIS&LUSO, New Delhi.

According to the above studies, the total catchment area of Sardar Sarovar Project below Narmada Sagar Dam is 24,42,440 ha. Out of this, 6,82,769 ha are spread to 500 sub-watersheds having silt yield index 1,200 and above was identified critically degraded.



GOI issued directive in July 1991 that, for the SSP, the project would bear the costs of the treatment of all critically degraded sub-watersheds draining directly into the reservoir. The watersheds were identified among those classified either very high

high-priority categories by the All India Soil & Land Use Survey Organisation (AISLUSO). The project would also be responsible for the treatment of those areas of the catchment which are directly damaged by the project activities. In addition, plans are required to be prepared for the treatment of the balance of the critically degraded sub-watersheds. The cost of this will be met from other ongoing schemes and in a timeframe to be determined.

PLANNING:

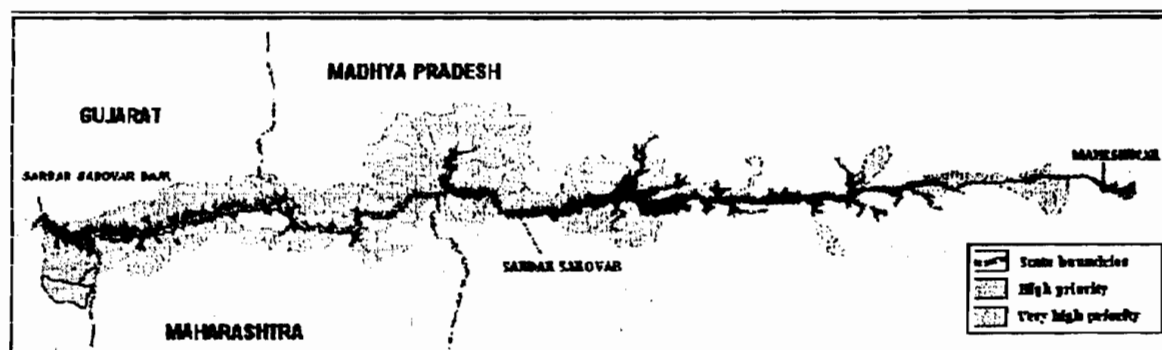
Project authorities were required to prepare the plans, as phase-I programme, for treating those critically degraded sub-watersheds which were identified as *directly draining* into the reservoir. The balance sub-watersheds were to be treated as Phase-II programme.

Particulars			Madhya Pradesh	Gujarat	Maharashtra	Total
Very High & High	Planned to Treat	Phase-I	125725	29157	24298	179180
		Phase-II	349892		77568	427460

Table 1: Area Statistics of Very High & High Priority Sub-watersheds in the Catchment of Sardar Sarovar Project

PHASE-I: DIRECTLY DRAINING SUB-WATERSHEDS

Project authorities have prepared the plans for treating total area of 1,79,180 ha as shown in the *table -1* above. This area is required to be treated *pari-passu* with the project works

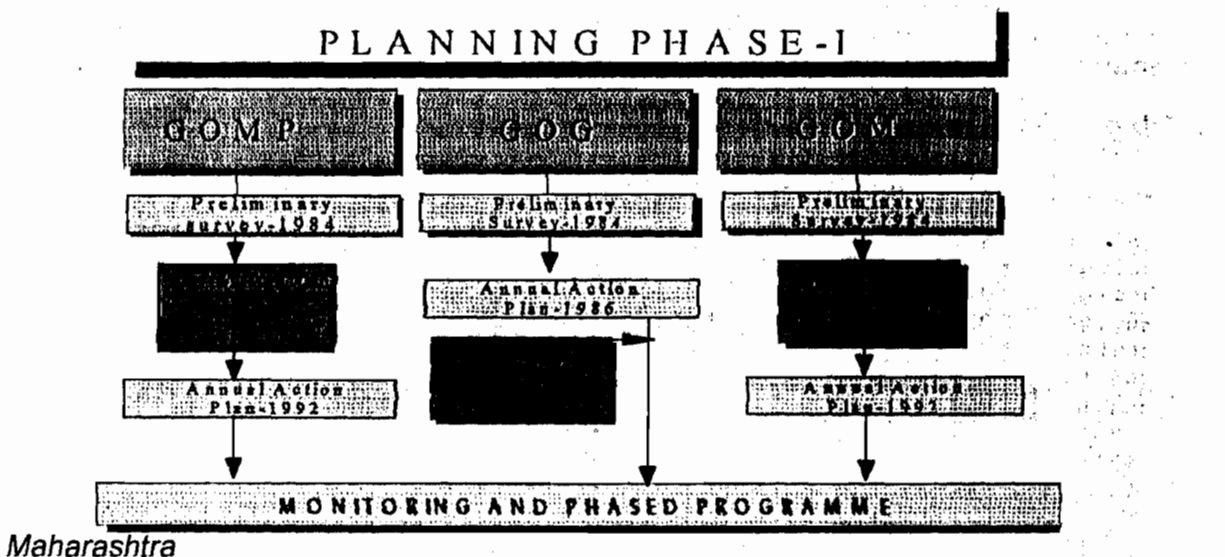


Map: Showing critically degraded directly draining sub watersheds of SSP

ACTION PLANS:

The project authorities have submitted the Action Plans in varying stages of completeness. These plans contained information related to survey work, management options, monitoring & phased programme of treatment besides provisions for annual budget. The various stages in planning for each item of the plan are given in the *Fig.-1* below.

Fig. 1. Flow chart of CAT phase-I planning by Gujarat, Madhya Pradesh and



Elements of Action Plan

Key elements of the Action Plan which includes time-table, menu, budget etc. received from GOG, GOMP & GOM are depicted in Fig.-2

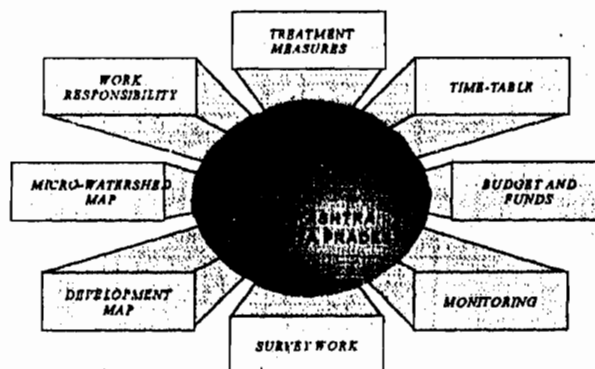


Figure 1 : Action Plan components.

IMPLEMENTATION:

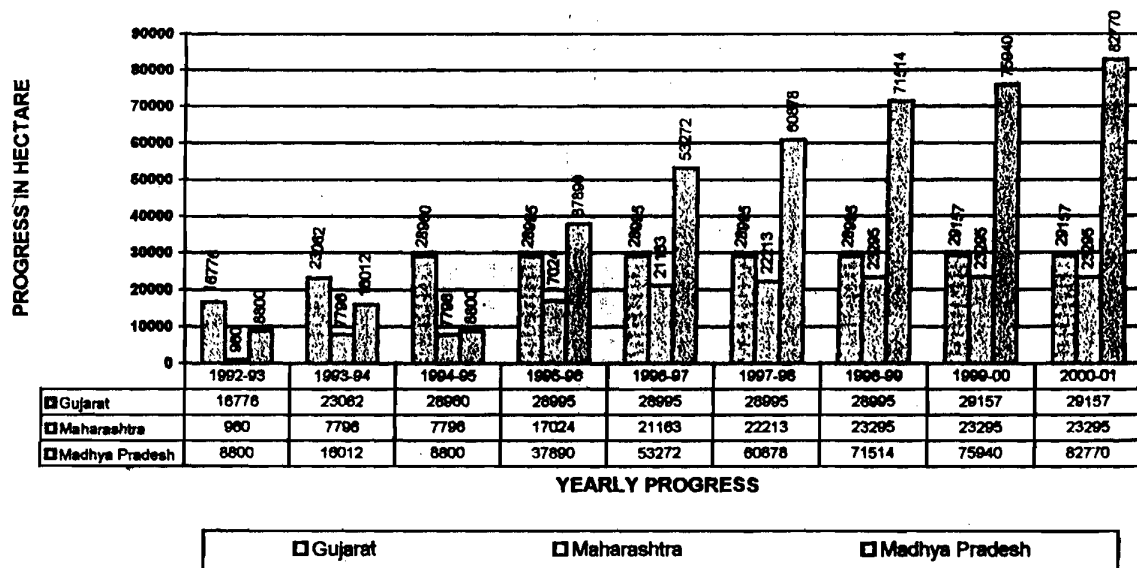
Project authorities have prepared the plans for treating 1,79,180 ha area in about 10 years time. Govt. of Gujarat started the treatment works w.e.f. monsoon of 1990 whereas Govt. of Maharashtra and Govt. of Madhya Pradesh could start the work in the year 1992. The progress of treatment work is detailed in the table - 2 and the bar chart-I drawn below:

Area under treatment 1,79,180 ha Progress 1,35,222 ha. Balance 43,958 ha

Table -2: Year wise progress of CAT Works

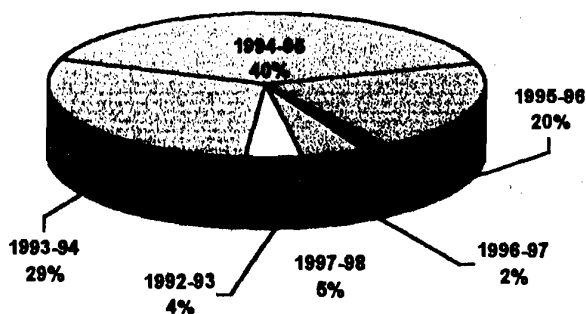
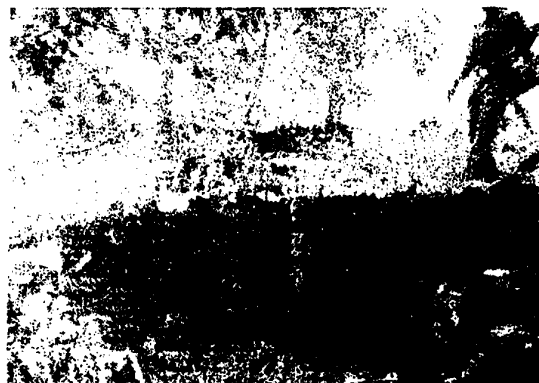
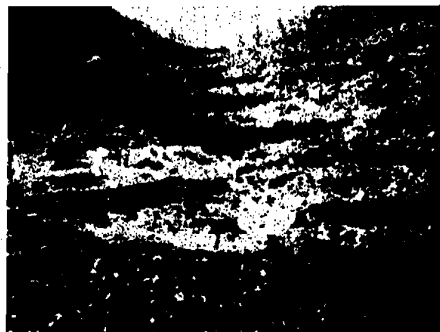
YEAR	GOG			GOM			GOMP		
TARGETS	F A 27204	NFA 1953	TOTAL 29157	FA 21122	NFA 3176	TOTAL 24298	F A 51930	NFA 73795	TOTAL 1,25,725
1990-91	4,528	898	5,426	0	0	0	0	0	00
1991-92	4,770	230	5,000	0	0	0	0	0	0
1992-93	6,014	336	6,350	960	0	960	0	8,800	8,800
1993-94	6,000	286	6,286	6,514	322	6,836	966	6,246	7,212
1994-95	5,730	168	5,898	6,542	2,686	9,228	4,263	594	4,857
1995-96	0	35	35	4,735	4	4,739	N/A	N/A	17,021
1996-97	0	0	0	450	0	450	N/A	N/A	14,482
1997-98	0	0	0	1082	0	1082	N/A	N/A	8,506
1998-99	0	0	0	0	0	0	N/A	N/A	10,636
99-2000	162	0	162	0	0	0	N/A	N/A	4426
00-2001	-	-	-	-	-	-	-	-	6830
Total	27,204	1,953	29,157	20,283	3,012	23,295	N/A	N/A	82,770

Cumulative progress of the CAT works in the States of Madhya Pradesh, Gujarat and Maharashtra.



Govt. of Gujarat

As the Catchment area of Sardar Sarovar was little in Gujarat, GOG accepted the recommendations of Diwan Committee and commenced the work of treating entire catchment area in the year 1990. By the end of 1994 forest area of 27,204 ha & non-forest area of 1953 ha were treated. Treatment work is almost completed. Graphic presentation of the progress is given in the chart-4.



By the end of December, 2000 a total of 82,770 ha area including both, forest & non-forest areas was treated-up. Progress is depicted in *chart-6*

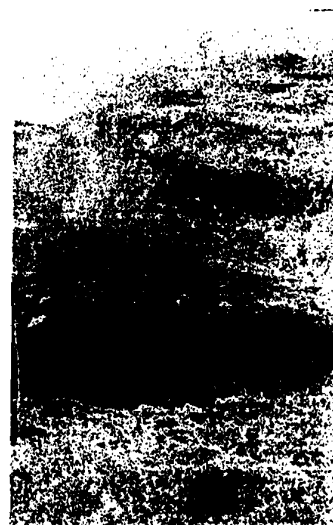
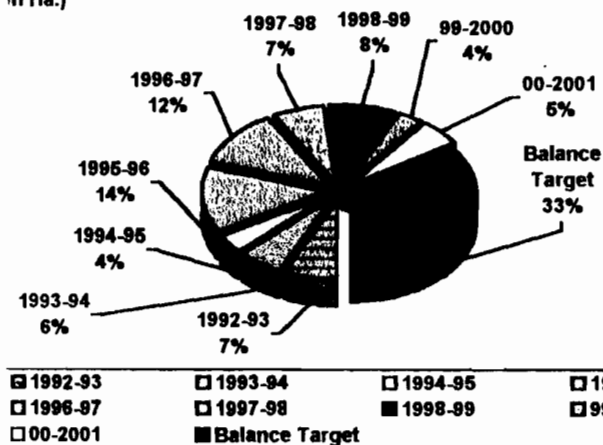


CHART 6: Progress of CAT Phase I in Madhya Pradesh (Area in Ha.)



Sardar Sarovar Project: Balance Targets :

Against the planned target of 179,180 ha of CAT works for the SSP as a whole, an area of 1,35,222 ha was treated up by the end of December, 2000. It is proposed to treat the balance area as shown in chart-7 and detailed in the table-3

Progress upto
December,
2000
76%



Unachieved
target 00-2001
24%

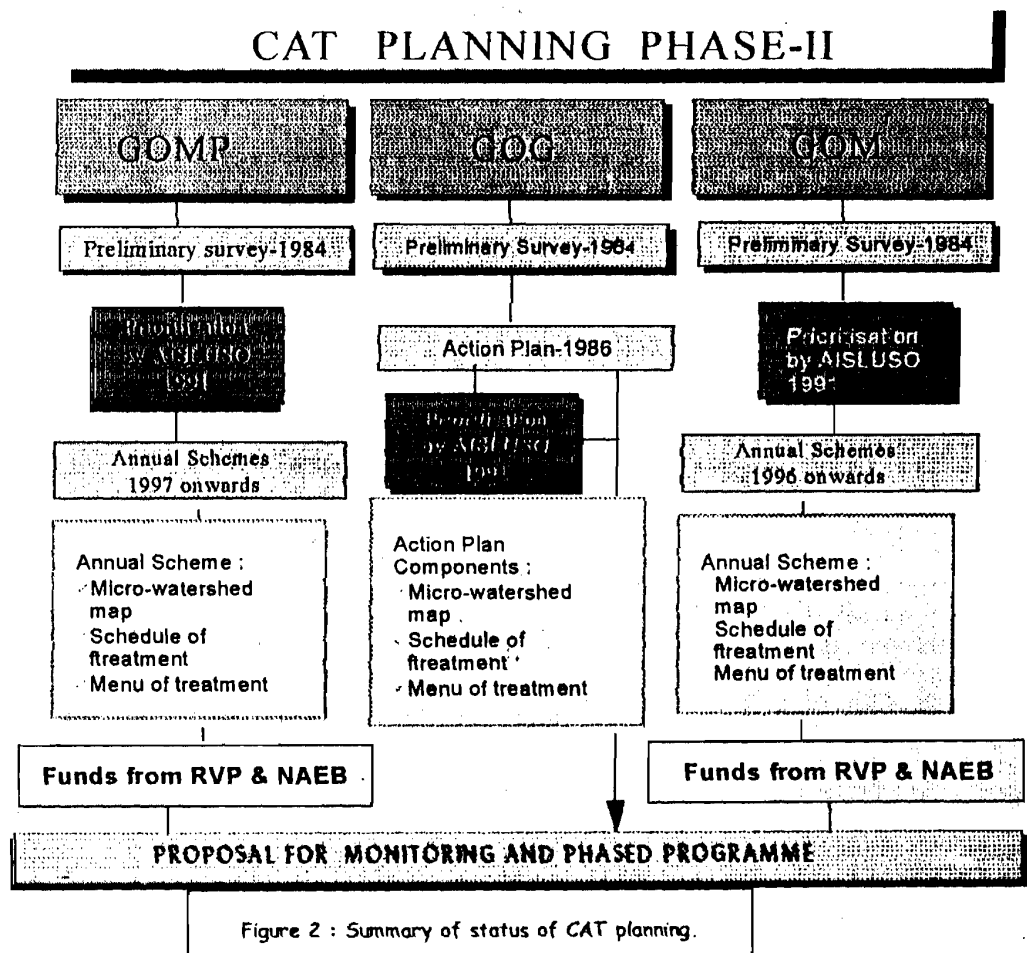
Table-3: CAT Works remaining

PARTICULARS	GUJARAT			MAHARASHTRA			MADHYA PRADESH		
	F.A.	N.F.A.	TOTAL	F.A.	N.F.A.	TOTAL	F.A.	N.F.A.	TOTAL
TARGET	27204	1953	29157	21122	3176	24298	51930	73795	125725
WORK DONE	27204	1953	29157	20283	3012	23295	N/A	N/A	82770
Balance	0	0	0	839*	164*	1003*	N/A	N/A	42955

Areas not available for treatment.

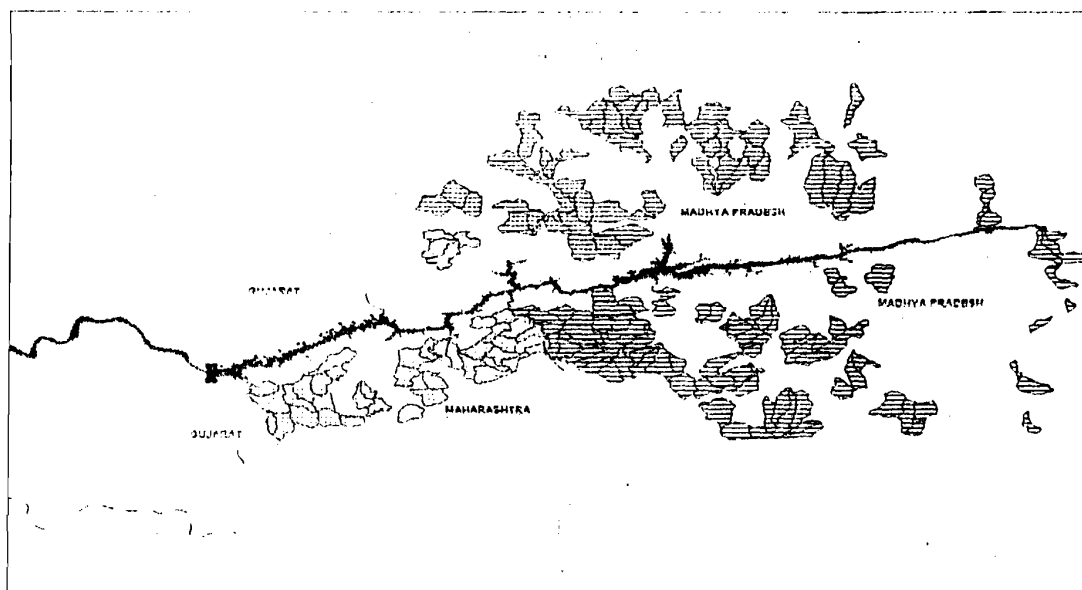
PHASE-II: INDIRECTLY DRAINING SUBWATERSHEDS:

Project authorities were required to prepare plans for treating balance of the critically degraded sub-watersheds. The planning process is summarised in the figure below :



State Govts. of Maharashtra and Madhya Pradesh have submitted the plans. The funds for treating these areas have been promised by the RVP Scheme of Planning Commission, National Afforestation and Eco-development Board etc. The plans are being revised in a phased manner in accordance with the guidelines of the funding agencies. The RVP and NAEB have approved some of these plans. Works have commenced. Planning Commission has agreed for inclusion of Narmada River catchment for treatment under its programme of River Valley Project Scheme. MOE&F also promise funds from National Afforestation & Eco-Development Board. Work

commenced on 6 schemes in Maharashtra & a few others in Madhya Pradesh. Further 7 more schemes were approved during 1997-98.



SSP CAT Phase-II sub-watersheds

Madhya Pradesh:

Catchment area of Sardar Sarovar Project below Narmada Sagar in Madhya Pradesh is 5,44,505 ha. This area includes the freely draining area attributable to Jobat, Man, Maheshwar, and Omkareshwar Projects also as per the details given in the table-4. After subtracting such areas, the gross area of critically degraded sub-watersheds is 4,75,617 ha. Out of this, Govt. of Madhya Pradesh has prepared plans for treating 1,25,725 ha area, as Phase-I already described above, under directly draining category at the cost of the project. Therefore, the gross area for which plans are required to be submitted for Phase-II programme was 3,49,892 ha.

Table-4

Total Area of Freely Draining Critically Degraded Sub-watersheds	5,46,702 ha
Catchment below NSP	3,52,089 ha
Net Treatable area	3,18,118 ha

Project	Phase-I (Directly Draining)	Phase-II (Balance area)	Total Area
Jobat			28,211
Man			12,720
Maheshwar			13,209
Omkareshwar			14,748

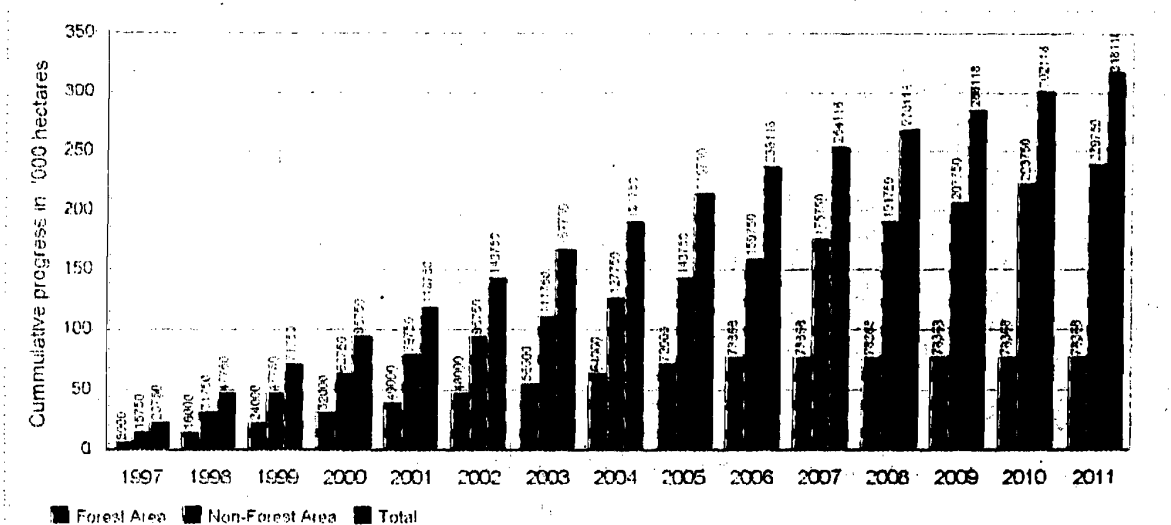
SSP	1,25,725	3,49,892	4,75,617
		Total :	5,44,505

Schedule of Treatment

Project authorities have prepared the plans for treating the 3,49,892 ha of catchment in 139 sub-watersheds of Phase-II areas by the end of year 2011. The schedule of treatment planned is given in Bar Chart. However, annual micro-watershed plans are under implementation as presented below.

Progress of Implementation:

Under River Valley Project Schemes 43 schemes covering an area of 87884 ha had been approved by the GOI. Out of these, 30 schemes pertain to SSP. These 30 schemes envisages CAT over an area of 59566 ha of which 21036 ha area has been treated. Schedule of implementation is given in the Bar Chart-8.

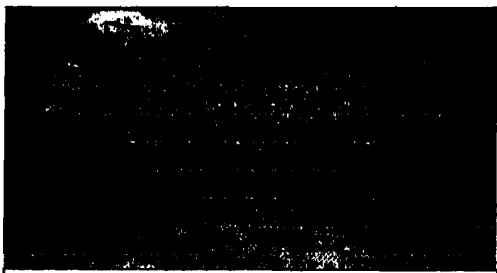


Maharashtra

Govt. of Maharashtra have prepared a macro-watershed plan for 77,568 hectare in Phase-II of CAT works, out of total 80,881 hectare in 35 sub-watersheds. Apart from this separate micro-watersheds plans are prepared for forestland and non-forestland. Micro-watershed plans for forestland in all 35 watersheds have been submitted, which covers 42,867 hectare area. Progress on such schemes is 7,050 hectare. In case of non-forestland, the schemes are not available with NCA but the progress of 7,854 hectare. is reported on 13 micro-watershed schemes covering an area of 15,656 hectare.



Chapter 3

COMPENSATORY AFFORESTATION

Plantations in Madhya Pradesh

Approval for the diversion of forestland for the SSP was granted by the MOEF in 1987, 1990 & in 1993 (including for R&R works) but several conditions were attached relating to the planning and implementation of CAF. Principals amongst these are the following stipulations.

- For every hectare of forestland submerged or diverted for construction of the project there should be Compensatory afforestation on one hectare of non-forest land plus reforestation on two hectares of degraded forest.
- For the 4,200.00 hectares of forestland in Maharashtra, which is to be used for R&R, an equal area of non-forest land or double the area of degraded forest should be planted.
- The governments of the three states involved should prepare plans detailing their proposals for Compensatory Afforestation and submit these to the MOEF before work in the forest area is due to commence.
- The project should supply firewood to it's construction workers, at it's own cost, to prevent them from having to meet their fuel needs from the surrounding forests.

STUDIES

There have been a number of studies in three states aimed at assessing the extent and significance of the loss of forestland attributable to the SSP.

- Sardar Sarovar (Narmada) Project Development Plan, Volume-II prepared by the Narmada Planning Group (NPG) in 1983.
- Studies on Eco and Environment by M.S. University of Baroda (MSU) in 1983.
- Sardar Sarovar Project: Preparation of Environmental Work Plan by the Forest Department of Maharashtra in 1988.
- Eco-Environment and Wildlife Management Studies in Sardar Sarovar Submergence Area in Gujarat by MSU, in 1992.
- Impact Assessment of Madhya Pradesh Land to be submerged Under Sardar Sarovar Project and Adjoining Ecosystems by State Forest Research Institute, Jabalpur (1989-92).
- Report on Flora and Fauna In and Around Sardar Sarovar Project, Maharashtra by the University of Pune, August 1997.

ACTION PLANS

In compliance with the conditions set by the MOEF, each state has prepared an Action Plan for the CAF of areas within it's boundaries. The relevant documents are:

- Government of Gujarat Work Plan for Management of Environmental Effects, Section on Forests and Wildlife: The Compensatory Afforestation Plan for the Rann of Kachchh, 1986.
- Project for Afforestation in Sardar Sarovar Project Impact Areas due to Diversion of forestlands for Sardar Sarovar Project (GOG), 1991.
- Compensatory Afforestation Scheme in Lieu of Sardar Sarovar Project in Dhule District, Maharashtra State (1989).
- Government of Madhya Pradesh Forest Department Action Plan of Compensatory Afforestation for Sardar Sarovar Multipurpose River Valley Project (1989).

These plans were submitted in varying stages of completeness but each has now been revised and updated. Action Plans of three State Govt. contained following components:

Implementation

The Action Plans spell out a programme of tree planting in the three states on both non-forest and degraded forest areas as shown in bar Chart-12 and Table-6 & 7.

Planning

An area of 13386 ha was diverted by MOEF vide it's order of 1987. It was stipulated in this order that plantations shall be carried out in equal non forest land in addition to the plantations on degraded forest land double in extent of the area diverted. Thus for every ha of the area diverted three ha of plantations were to be carried out by the project authorities. In addition to the area diverted by the MOEF in 1987 an area of 357 ha was diverted by GOG earlier. State Govts. have prepared the plans for plantations of 46,358 ha besides reforestation of 28,830 ha area including plantations over 4,200 ha of non-forest land in lieu of the land released for R&R works in Maharashtra. Statewise details of the total area taken for SSP and the planning in lieu thereof are given in the chart-11.

In Maharashtra State 4200 ha forest land was released for R&R works in two phases. In 1990 an area of 2700 ha was released in Taloda taluka. Further 1500 ha was released during 1993 in the same taluka. State Govt. was required to carry out plantations on equal non-forestland. Detailed programme and progress of plantations is given in the table 6 below

Table-6. Compensatory Afforestation against 4200 ha forest land released for R&R works in Maharashtra vide MOEF order dated 1990 (2700ha) and 1993 (1500 ha.)

Year	Land released	Progress 1993-94	Progress 1994-95	Progress 1995-96	Progress 2000-01	Cumulative Progress	Balance targets
1990	2,700.00	2,192.37	311.00	184.50	9.63	2697.5	2.5
1993	1,500.00	0.00	0.00	896.00	604	1500.00	00
TOTAL	4,200.00	2,192.37	311.00	1,080.50	613.63	4197.5	2.5

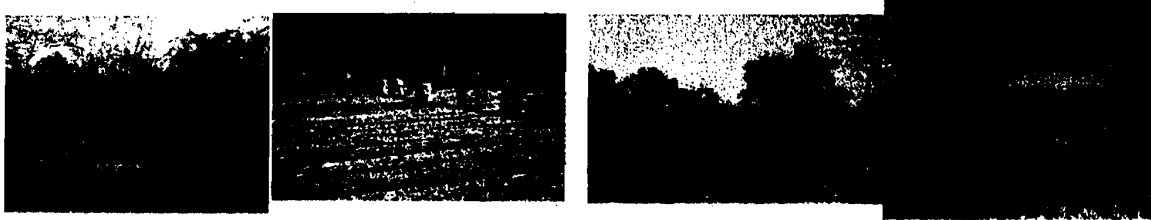
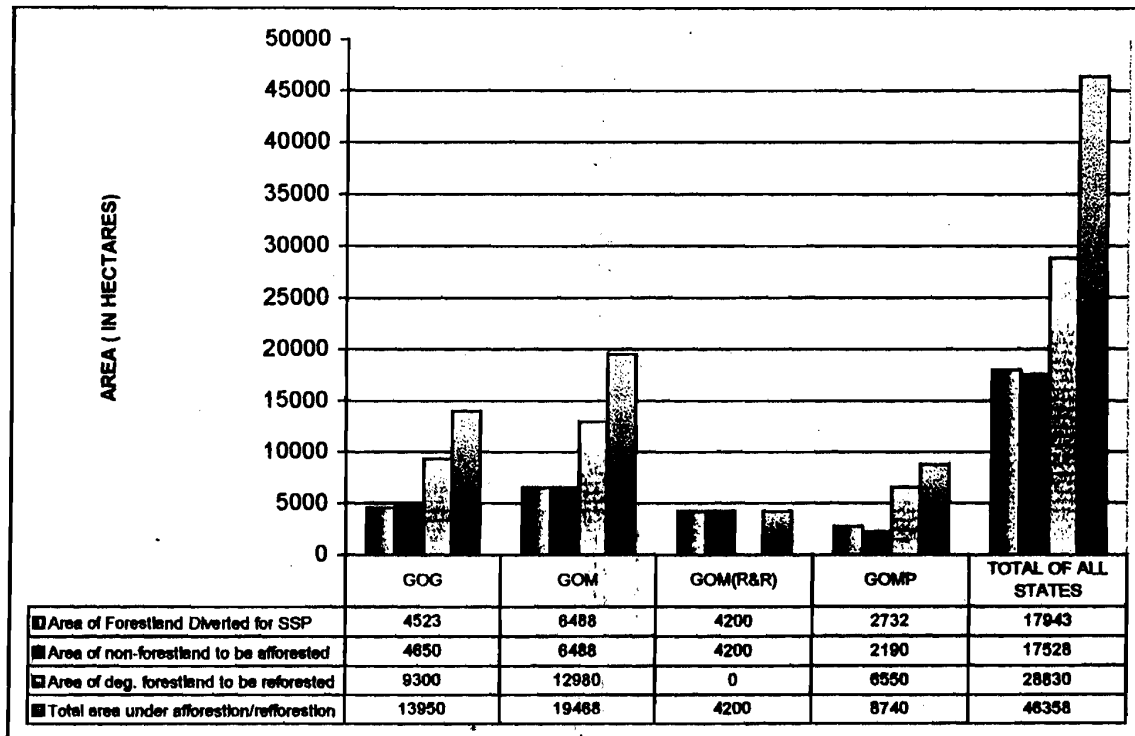
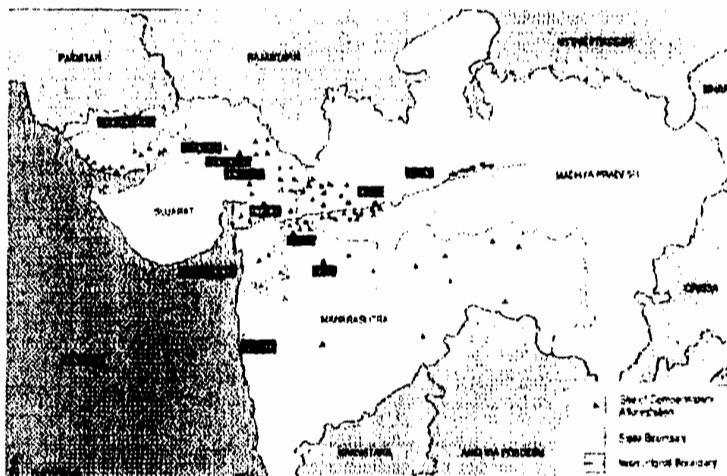


Chart-11: Showing forest areas taken for SSP. This includes 357 ha taken for SSP in Gujarat prior to formal clearance under FCA, 1980 besides the area diverted for R&R works in Maharashtra and targets for afforestation/reforestation





Map: 2 Showing locations of sites of plantations in the States of Gujarat, Maharashtra and Madhya Pradesh

Table-7: Showing detailed progress of CAF, against the target area of 42,158 ha. in lieu of 13,386 ha. diverted for submergence of SSP vide MOEF order dated December, 1987. (Area in ha)

Monsoon year	GUJARAT		MAHARASHTRA		MADHYA PRADESH	
	Degraded fores	Non-forest	Degraded fores	Non-forest	Degraded fores	Non-forest
90-91	-	2,150.00	-	-	132.00	716.00
91-92	2,834.00	350.00	8,383.00	-	1,200.00	373.00
92-93	2,450.00	847.00	4,552.00	2,276.00	2,400.00	-
93-94	2,500.00	460.00	20.00	1,156.00	2,215.00	-
94-95	1,516.00	843.00	-	2,894.00	1189 *	-
95-96	Completed	Completed	Completed	NIL	NIL	NIL
96-97	-	-	-	NIL	NIL	NIL
97-98	-	-	-	NIL	208 *	-
98-99	-	-	-	-	277 *	-
99-2000	-	-	-	-	26	-
Sub-total	9,300.00	4,650.00	12,977.00*	6,401.00	-	-
Total	13,950.00		19,378.00		8,736.00	

* Area classification, not reported.

In addition to the above following additional plantations have been takenup by the Govt. of Gujarat.

Additional Plantation Activities

(a) Plantation along Canal Banks

The total potential of canal bank plantations is estimated to be 5,300 ha. A project report prepared for this purpose by Gujarat Forest Department is under scrutiny by SSNNL. The plantation programme was launched from the year 1990-91. Plantations on 1,870 ha have already been established till monsoon of 1999.

(b) Dam Vicinity Plantation (240ha)

The plantation in total area 551 ha. In the vicinity of dam have been completed by the forest department as well as project authorities. This is being maintained by project authorities.

(c) Ravine Land Afforestation (200 ha)

On the left bank of river Sabarmati an area of 200ha in two villages i.e. Ratanpur (120ha.) and Phirojpur (80 ha) was taken up for model plantation. Entire work has now been completed

An area of 311 ha. had been planted in the project area and the work is completed.

Canal Bank Plantations



Chapter 4

COMMAND AREA DEVELOPMENT

The command area of the project is fixed based on the areas included by NWDT for purposes of considering requirement of Narmada water for irrigation in Gujarat. Accordingly, the GCA of the project is 3.43 million hectares of which culturable command is estimated to be 2.12 million hectares. Thus, the command encompasses a very large area of the state of Gujarat and about 75000 ha area in Rajasthan and is characterized by wide diversity in agro-climatic and socio-economic conditions.



- + The Narmada Main Canal also known as Navagam Main Canal off-takes from Sardar Sarovar Dam in Gujarat at a full supply level (FSL) of 91.44 m (300 ft.) and traverses through a distance of 458.30 km before entering Rajasthan near village Silu, Tehsil Sanchore, district Jalore.
- + In Rajasthan, the Canal runs for a distance of 74 km. The Topography of the area is suitable for a contour canal upto 54.00 km as such in this reach irrigation has been restricted to portion of command on river side only. From Km 54.00 onwards up-to the tail end (km 74.00) the canal has been aligned as a ridge canal to irrigate areas on either side.

To safeguard development of irrigation in the vast command, it is important to ensure that the transfer of water to the Command Area does not give rise to the environmental problems, which have been experienced by some water developments in the past. In view of the potentially far-reaching effects of water distribution in the SSP command area, mitigating measures have been determine requiring , control and monitoring in the following areas :

- drainage, waterlogging and soil salinity;
- water quality;
- forest loss;
- potential impact on flora and fauna;
- effects on public health;
- socio-economic impacts.

A large number of studies have been undertaken by the project authorities most of these studies are now complete. The result of the studies available by the end of 1993 were used to prepare and assessment report of the development of the Command Area simultaneously by the H.R. Wallingford and Narmada Planning Group during March /

April, 1993. An updated environmental management plan for the Command Area is under formulation.

(A) Current scenario - Government of Gujarat

Government of Gujarat have undertaken several studies related to the command area development. Most of these have been completed and the remaining are in progress. The various studies are listed below:

Agricultural Practices and Socio-Economic

- + Some Aspects of Role of Panchayats and Institutional Arrangements for Canal Irrigation in Two Talukas of Ahmedabad District Institute of Cultural and Urban Anthropology, Ahmedabad, 1982
- + A Study of Settlement Pattern (6 Talukas in the Narmada Command Area of Mahesana, District of Gujarat).
- + Department of Geography, Gujarat University, Ahmedabad, 1982.
- + Regionalisation of Narmada Command, Operations Research Group, Vadodara, 1982.
- + Socio-Economic Bench Mark Survey of 62 Talukas (Sub-districts) of Narmada Command Area. Fourteen Different Agencies including Universities Research Institutions etc. 1983
- + Population Projection and Migration Study for Narmada Command Area. Operations Research Group, Vadodara, 1983.
- + Consumer Expenditure, Assets and Indebtedness of Rural Households of the Command Area of Sardar Sarovar (Narmada) Project Directorate of Economics & Statistics, Gandhinagar, 1983.
- + State of Adoption of Improved Technology in Narmada Command and Rest of Gujarat State (Based on Analysis of Crop cutting Experiments Data). Operations Research Group, Vadodara, 1985.
- + Land Use and Cropping Pattern Survey and Mapping of Narmada Command Area Zone 4A & 4B. Department of Geography, M.S. University, Vadodara, 1986.
- + Growth of Agro-Processing Industries in Phase-I of the SSP. Gujarat Industrial & Technical Consultancy Organisation Ltd., Gandhinagar, 1990.
- + Studies in Water Rates Policy, in 3 parts:
- + Pricing of a Public Utility Survey of Literature. Department of Economics, South Gujarat University, Surat.
- + Financial working of Irrigation Projects - A Case of Four Projects in Gujarat. Department of Economics, Sardar Patel University, Vallabh, Vidyanagar.
- + Some Policy Issue for Canal Water Rates in Gujarat. Department of Economics, Sardar Patel University, Vallabh, Vidyanagar, 1992.
- + Economic Dimension of the Sardar Sarovar Project. S.P. Institute of Social & Economic Research, Ahmedabad, 1995.

- + Wasteland Development Project for Command Area of Narmada Canal (Region 11 and 12). Gujarat State Rural Development Corporation Ltd., Gandhinagar, 1984.
- + Cropping Pattern and Waste Demand Study in Narmada Command Area. Operations Research Group, Vadodara, 1987.
- + Study on Preparation of a Detailed Integrated Command Area Development Plan for SSP. M/s. Wamana Consultants Pvt. Ltd., Hyderabad, 1994.

Drainage, Waterlogging and Salinity

Groundwater Studies

- » Mathematical Modeling of Ground Water System for single layer model-Narmada Mahi-Doab by Operations Research Group, Vadodara. Completed in 1982.

This study was taken up as a preliminary study, to deal with recharges due to rainfall and due to irrigation inputs of varying levels and rise of varying level of pumping. The study provided initial insights for planning for future ground water development on introduction of surface irrigation.

- » Mathematical Modeling of Ground Water System Narmada Mahi Doab. By Operations Research Group, Vadodara. Completed in 1985.

And

- » Additional work of Mathematical Modeling of Ground Water System Single Layer Model-Narmada Mahi-Doab. By Operations Research Group. Vadodara. Completed in 1985.

These detailed modeling studies dealt with recharges due to rainfall and due to irrigation inputs of varying levels and rise of Ground Water over time with varying levels of pumping. Based on these results, the ground water development in command area is visualised in planning of the SAP.

- » Survey and Investigation Work of Ground Water Resources in Narmada Mahi-Doab by Gujarat Water Resources Development Corporation Ltd. Gandhinagar. Completed in 1987.

This study was carried out for determination of hydro geological and hydrological parameters of the aquifers. The study has provided useful information regarding water levels and water quality for conjunctive use and to control the problem of water logging after surface irrigation starts.

- » Mathematical Modeling of Ground Water System for SSP Command between Rivers Shedhi and Sabarmati by Consultancy Engineering Services, New Delhi. Completed in 1993.

And

- » Mathematical Modeling of Ground Water System for SSP Command between Rivers Sabarmati and Banas by Operations Research Group, Vadodara.
And
- » Mathematical Modeling of Ground Water System for SSP Command beyond Banas upto Rajasthan Border by Dalal Consultants, Ahmedabad. Completed in 1993.

These modeling studies dealt with recharge due to rainfall and due to irrigation inputs of varying levels and rise of ground water overtime with varying levels of pumping. The studies provided insights for planning for future ground water development on introduction of surface irrigation.

- » Hydro geological Impact Assessment Study by H.R. Wallingford. Completed in 1995.

This was a review of earlier drainage studies. It has provided information about the revised drainage co-efficient.

- » Survey and Investigation of Ground Water Resources beyond river Mahi upto border of Rajasthan in SSP Command Area.

This study was carried out for determination of hydro-geological and hydrological parameters of the aquifers. The study provides useful information regarding water levels and water quality for conjunctive use and to control the problem of waterlogging after surface irrigation starts.

Drainage Studies

- » Pre-feasibility Level Drainage Study of Narmada Mahi-Doab of SSP Command, by Core Consultants, Ltd., Ahmedabad. Completed in 1982.

This study has been carried out for assessing the drainage requirements of the command area upto Mahi. Drainage co-efficient for each region are worked out and accordingly surface and sub-surface drainage requirements are planned.

- » Pre-feasibility level Drainage Study for SSP Command beyond River Mahi. By Consultancy Engineering Services, New Delhi. Completed in 1993.

This study has been carried out for assessing the drainage requirements of the command area. Drainage co-efficient for each region are worked out and accordingly surface and sub-surface drainage requirements are planned.

Floral and Faunal Studies

- » The Sardar Sarovar Narmada Project Studies on Ecology and Environment by Department of Botany, M.S. University, Vadodara. Completed in 1983.

The objective of the study was to suggest ways and means of achieving optimum utilisation of the Narmada Waters without any appreciable damage to the river ecosystem and to collect the data on various parameters of ecosystem, to assess likely changes and to suggest remedial measures for negative impacts, if any. Based on the findings of the report, work plans for Forest and Wildlife, Public Health and Fish and Fisheries have been prepared for implementation.

- » Study on Flora and fauna of the Command Area of Sardar Sarovar (Narmada) Project lying between the Narmada and Sabarmati Rivers (EIA studies) by Sardar Patel University, Vallabh Vidhyanagar. Completed in November 1995.

The study was taken up to assess the Environmental Impact of the SSP on Flora and Fauna based on experience of Mahi irrigation Project. Based on recommendation of the study, the floral and faunal management plan is to be prepared.

- » Study on Flora and Fauna of the command area of Sardar Sarovar (Narmada) Project lying in Saurashtra and Kachchh Area (EIA) Studies by Saurashtra University, Rajkot. Completed in January 1996.

The study was taken up to assess the Environmental Impact of the SSP on Flora and Fauna based on experience of Mahi irrigation Project. Based on recommendations of this study, the floral and faunal management plan is to be prepared.

- » Study on Flora and Fauna of the Command Area of Sardar Sarovar (Narmada) Project lying between Sabarmati and Rajasthan Border (EIA studies) by Gujarat University, Ahmedabad. Completed in March 1998.

The study was taken up to assess the environmental impact of the SSP on flora and fauna based on experience of Mahi Irrigation Project. Based on recommendations of this study, the floral and faunal management plan is to be prepared.

- » EIA on Downstream of Sardar Sarovar Dam upto Gulf of Cambay by M/s. H. R. Wallingford, U.K. Completed in April 1995.

This was taken up to evaluate the environmental impacts on the downstream in the initial stage of 25 years of this project. The results of this study will be used for downstream area planning.

- » Ecological study on Wild Ass Sanctuary and surrounding Area Using Remote Sensing Technology for Environmental Impact Assessment by Gujarat Ecological Education and Research Foundation, Gandhinagar. Completed in 1997.

This study was taken up to determine various land use classes by remote sensing to monitor the trend of *prosopis*, salt and grass land in and around the sanctuary. The information of the study report will be utilised for detailed EIA study of the sanctuary.

- » Environmental impact Assessment of Nal Sarovar Bird Sanctuary by Gujarat Ecological Education and Research Foundation, Gandhinagar. Completed in 1998.

The study was taken up to assess the impacts of canal irrigation in and around the Sanctuary area. Based on the recommendations of this study, the Action Plan for Nal Sarovar Bird Sanctuary is to be prepared

- » Environmental Impact Assessment of Velavadar Black Buck National Park b Gujarat Ecological Education and Research Foundation, Gandhinagar Completed in 1997.

The study was taken up to assess the various impacts of surface irrigation) and around Sanctuary area. Based on the recommendations of the study, a draft action plan has bee prepared and as per tile suggestions of experts, the final Action Plan is being prepared.

Fisheries

- » Environmental Impact Assessment Studies on Inland Marine Fisheries relevant to the Command Area of Sardar Sarovar (Narmada) Project, by M.S. University, Vadodara. Completed in 1995.

This study was taken up to assess the impacts of SSP Canal water on fisheries. Based on recommendations of the study, fisheries development programme (an Action Plan) for Phase-I area has been prepared by the Commissioner of Fisheries.

Health

- » Environmental Impact Assessment (EIA) studies on Water Related Diseases in Sardar Sarovar Project (SSP) Command Area including the Area Down Stream of the SSP Dam by Commissionerate of Health, Medical Services Medical Education, Government Of Gujarat, Gandhinagar. Completed in October, 1995,

The study was taken up to assess the impacts of canal water on water related diseases. Based on recommendation of this study an action plan for health sector for the SSP Command is being prepared.

Water Quality

- GWSSB(1983) Study to detremine Municiple and Industrial demand; parallel study on Sabarmati basin by GPCB(1989).

- GPCB Compilation of water quality data for 10 selected rivers in Gujarat under GEMS (WHO Supported) and national MINARS Project; Limited ground water monitoring by GPCB.

The command area encompasses twelve districts, viz. Bharuch, Vadodara, Panchmahals, Kheda, Ahmedabad, Gandhinagar, Mahesana, Bhavnagar, Surendranagar, Rajkot, Banaskantha and Kutch. Total number of the talukas of these districts wholly or partially covered in the command is 62 and about 3344 villages of these talukas are expected to be served by the project for irrigation.

The Canal system would command a gross area of 3.43 M ha. and cultivable area of 2.124 M ha. It is envisaged to irrigate annually 1.792 M ha. with the availability of 9 MAF of surface water from the project. From management point of view, for laying down a set of prescriptions for crop pattern, water allocation and management, conjunctive use etc., the command has been divided into regions based on the following factors:

- Annual rainfall
- Land irrigability class including drainage characteristics
- Ground water quantity and quality in terms of ground water table and salinity of water in the upper aquifers
- Alignment and the command of major branches.

Considering these factors, the command has been divided into 13 regions. The main regions, their names, GCA and CCA are as follows:

Sl.No.	Name of the region	Region No.	GCA	CCA
1.	Sankheda-Savli	1	2531	1619
2.	Sinor-Vadodara	2	2731	1876
3.	Bharuch-Amod	3	1532	849
4.	Vagra-Jambusar	4	1113	368
5.	Mehmedabad-Daskroi	5	2957	1923
6.	Sanand-Kadi	6	1817	1257
7.	Dholka-Dhandhuka	7	4760	2643
8.	Limdi-Botad	8	2940	1826
9.	Halvad-Malia	9	2684	1680
10.	Viramgam-Dasada	10	3446	2421
11.	Sami-Harij	11	1917	1152
12.	Radhanpur-Vav	12	4628	3197
13.	Rapar-Mundra	13	1229	428
	All regions	14	34285	21239

The Soil Survey Manual (IARI 1970) recognises six irrigability classes.

- Class 1 : Lands that have few limitations for sustained use under irrigation.
 Class 2 : Lands that have moderate limitations for sustained use under irrigation.
 Class 3 : Lands that have severe limitations for sustained use under irrigation.

- Class 4 : Lands that are marginal for sustained use under irrigation because of very severe limitations.
- Class 5 : Lands that are temporarily classified as not suitable for sustained use under irrigation pending further investigations.
- Class 6 : Land not suitable for sustained use under irrigation.

Flora and Fauna

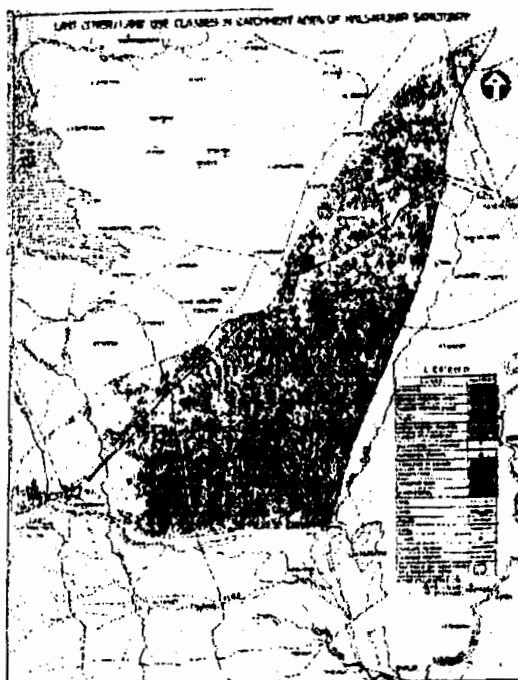
Based on the reports received from the three universities, which conducted the E.I.A. studies, the following are the identified impacts.

- + Irrigation will bring about sub-humid conditions in the various regions. This would be favourable for most crops trees of the area. Thus, semiarid regions of northern part of North Gujarat (region 12), Bhal area of Saurashtra (region 7) and Kutch (region 13) will also have partially sub-humid conditions in irrigated tracts.
- + SSP aims at diversified cropping patterns. Introduction of dry land horticultural crops on fallow and on areas not otherwise irrigable by gravity is also on the anvil.
- + Overall agricultural and tree-shrub biomass base will be substantially augmented. The range of biomass diversity adapted to sub-humid conditions is also likely to be larger. The following depicts the crop ranges of the area with stabilisation of irrigation and indicates that monocultures or limited ranges of cultures are not likely.
- + Studies show a rich potential for farm forestry, agro-silviculture, and forestry on saline and marginal lands. Including the canal side plantations on 18,000 ha, a conservative estimate indicates potential for plantations and tree culture of at least 3.27 lakh ha for the command area as a whole. Yields of grasslands in regions 4, 7, 8,9,10,11, and 12 will improve significantly with better propagation of perennial varieties like *Cynodon dactylon*, *Dichanthium annulatum*, *Panicum*, *Paspalum* etc.
- + Certain grass species and vegetation belonging exclusively to arid or desert climates may not thrive well as found from experience of Rajasthan Canal. However, since over 30 per cent of the geographical area will not have irrigation networks, the species may continue in these areas and this aspect is to be studied in depth.
- + Certain weeds may show accelerated growth of farmlands, drains, etc. and weed control strategies may have to be used. Weed problems in canals will not arise (when these are well maintained) because of lining down to 8 ha units.
- + If waterlogging develops in certain areas, new aqua vegetative systems with weeds are likely to develop.
- + There will be no impacts on major fauna since this is a present trend to agricultural regimes. Certain avifauna reptiles and rodents may proliferate. Avifauna diversity will increase with a number of tanks and water bodies kept full as seen from the experience of Mahi command.
- + Steps for protection of the following flora and fauna species indicated presently as rare in the region to be taken are in the form of conservation measures in specific

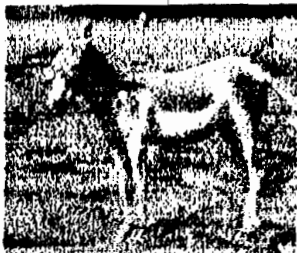
areas identified or setting up herbaria etc. Universities will be involved for creation of gene bank pools to the extent required.

Sanctuaries

- For Nal Sarovar Bird Sanctuary (area 115 sq.kms. contribution from Sardar Sarovar Project waters will arise only when there are droughts and the lake does not fill up due to natural run-off from the catchment area. Studies done hitherto indicate that positive impacts can be expected with zoning out the lake area, protecting the habitat of migrant birds on the shore and a sound scientific plan which accommodates needs of the local communities for fishing and grazing. Utility of Nal Sarovar as a storage mechanism for supporting lift irrigation not likely to be favourable. Quality of agricultural run off to Nal Sarovar from the catchment area (which will be irrigated) is planned to be regularly monitored in the long run.



- As regards Wild Ass Sanctuary (area 4,953 sq kms), the overall impact is likely to be positive mainly because of availability of fresh water in waterholes for the wild-Asses and better growth and sustenance of grasses. However, the sanctuary is under some pressure because of salt industries and



intrusion of cattle. Wild asses often damage crops on the periphery. The Kachchh Branch crosses the neck dividing the Little Rann and the Great Rann and the most appropriate structure for the crossing is being worked out so as not to impede the movements of wild asses. Siphon type structure appears to be quite promising. Management plans will be worked out considering the salt industries, which have entered the Little Rann in a big way as also the pressure of cattle on the periphery. Better development of bio-mass on the islands, if brought about as a part of planned development, may reduce damages to the agriculture crops on the periphery by wild asses as observed at present. However, if the interior is not conserved, the impacts can be the just opposite.

→ As regards the Black Buck Sanctuary (area 34 sq kms), the Sardar Sarovar Project will create a very positive environment because of supply of fresh water which is highly deficient in the area. However identified negative impacts are listed below :

- + Wildlife habitat may be reduced in ecological zone due to the change in the land use and cropping pattern.
- + With increase in agricultural production, Blackbuck may start frequenting the fields, thus possibly increasing human/animal conflict.
- + Through there is very little likelihood of water-logging in ecological zone, some patches may face waterlogging creating small patches of saline marshes for short period.
- + Likely increase of pesticides and insecticides may affect migratory harriers and some other avi-fauna in ecological zone.
- + There is very little likelihood of a change in the microclimate in or around the park area.
- + Possibility of increase in water/moisture content in the soil may bring some change in plant communities especially Cyperaceae, Gramineae and some herbaceous species. There is likelihood of increase in area under *Prosopis juliflora* in parts of ecological zone.
- + There may be some increase in human activity, disturbing some wildlife in the ecological zone.
- + Increase in Blue bull population, due to the changed circumstances may cause problems of crop damage in surrounding areas of the National Park.

In general, for all the three sanctuaries, the networks are so planned as not to create problems of wild life movement and these are not extending anywhere inside the sanctuary limits.

Public Health

Major environmental apprehensions are with reference to the water-related diseases of malaria, filaria and schistosomiasis. As regards schistosomiasis, studies done by the National Institute of Communicable Diseases under WHO auspices indicate

no snail-based foci for the disease in Narmada Valley. There are no prospects of occurrence of this disease for Narmada Project and monitoring will be ensured.

Malaria is found to occur naturally in epidemic cycles in Gujarat, partly Influenced by climatic factors. Effectiveness of the chosen control strategy has also a significant influence on transmission rates. Malaria is important both for urban and rural areas. Two of the three mosquito species are considered as principal vectors responsible for transmission, viz. *Anopheles stephensi* in urban areas and *A. culicifacies* in rural areas.

Experience of surface irrigation in Mahi Project of Kheda District has shown enhanced transmission rates during the dry months of April to June which may be ascribed to irrigation but, in general, there is no clear relationship between average annual malaria incidence and irrigated areas in the 19 districts in Gujarat. Irrigation, thus is not the principal causative factor for malaria. It may have, however, impacts if stagnations of water bodies, seepages from canal, etc. are not controlled. Under SSP the infra-structure itself, at a large cost, takes care of avoiding or minimising seepages and stagnations.

The following control strategies are expected to address to malarial problems arising on account of Sardar Sarovar Project .

- (a) Special health units to monitor and treat migrants (workers and resettled people) intensively under malaria control programmes.)
- (b) Effective monitoring and surveillance under the operative malaria control programmes.
- (c) Emphasis on 'tidy' irrigation and drainage.
- (d) Creating awareness among Sardar Sarovar Project staff as well as among command population through health education and extension programmes. This also includes preparation of a manual on malaria control.
- (e) Use of identified carnivorous fish in tanks, ponds, etc. inside and near command area.

Filaria which is caused by the mosquito species of *Culex quinquefasciatus* (fatigan) will also be controlled. It is confined to coastal areas of Saurashtra and South Gujarat and not significant for the command area as such. However, monitoring of the disease will be required.

As regards other water related diseases like dysentery, typhoid, hepatitis, gastroenteritis etc. these are related in a very limited context to irrigation. Other major factors like sewage disposals, septic tank discharges, overall hygiene of the rural population and quality of domestic water supply under cities and towns which often gets infected due to old pipe networks predominate. With current emphasis on health programmes under of the State Government and those of Municipal Corporations and municipal bodies and with increasing financial outlays and operationalisation of health care as well as health education programmes (in the context of overall commitment of

"Health for all by 2000 AD"), these diseases will be kept in control. Effective monitoring and surveillance will be a part of the Health Plan for the command area of Sardar Sarovar Project.

Positive impacts due to reduction in scabies and skin diseases and availability of potable drinking water and bathing water through the SSP systems, as planned, would significantly prevail not only in the command area but also in the entire areas of Saurashtra, Kutch, and North Gujarat being served for domestic water by Sardar Sarovar Project. For scabies and skin diseases, the area benefited will not be only 20,000 sq. km. of Sardar Sarovar Project but about 80,000 sq. kms. of Saurashtra and Kutch.

Proposed Management Measures

The Sardar Sarovar Project service area has been classified into 13 agro climatic regions based on broad topographical, hydro meteorological and soil surveys. The drainage density is good in most of the regions except in regions 4, 7, and 11. Outfall conditions are sluggish in regions 4 and 7, parts of which are also affected by salinity. Sub areas or pockets likely to get waterlogged or saline due to irrigation in future have been identified for planning special measures to prevent development of such a situation.

The Phase-1 area of the project covering the command between the Narmada and the Mahi rivers has been taken up for detailed surveys, monitoring and planning. This comprises agro climatic regions 1 to 4. Detailed soil surveys and contour surveys have been carried out. Groundwater fluctuations in all the wells and special piezometers are being measured at regular intervals. Automatic water level recorders have also been installed at selected places. Hydro meteorological observation stations have been established. Studies for groundwater availability, annual recharge and mathematical modeling for surface and groundwater interaction have been carried out. Based on all these surveys and information as well as the data of rainfall intensities, the drainage plan for the Phase-1 area has been drawn up. The irrigation water allowances for the various regions in this area have been decided keeping in view the soil classification, groundwater availability, crops grown, and climatological factors. In poorly drained flat lands with relatively high water tables, limited water allowance and conjunctive use of surface and ground waters has been planned.

Similar exercises have been taken up for the command area beyond the Mahi river also. Regions 1 and 8 have very good surface topography and internal drainage. Surface drainage requirement, if any, will be in the form of minor drains for local patches. No sub-surface drainage works are required. A large part of region 9 is also similar. Regions 2, 5 and 13 also have good surface and internal drainage. Limited minor drains, remodeling of existing channels and ground water extraction for conjunctive use is considered adequate. Regions 3, 6, 10, 11, and 12 have relatively flat ground slope and moderate internal drainage. Minor drains, remodeling of existing channels, groundwater extraction, and a limited use of moderately saline ground water have been planned.

Regions 4,7 and 11 together with bordering areas of regions 9, 10 and 12 are relatively difficult for drainage. The Bhal tract of Gujarat falls within these regions. A well-planned intensive drainage network is being worked out for these regions. A very limited irrigation water allowance would be permitted. Ground water extraction, part mixing of saline water, improved water management and agricultural practices, leaching of surface salts by flooding with surplus spill waters of Narmada, salinity resistant agriculture and continuous careful monitoring of the groundwater table and salinity status through observation wells and piezometers etc. will constitute the multipronged strategy for tackling the problem areas.

The following are the proposed measures to prevent environmental degradation.

waterlogging and salinity:

1. Mechanised, well-controlled canal lining

This would reduce seepage loss to only about 10% of that in unlined canals. The canal system planning, design and operation are also inherently tuned to ensure that these problems do not arise. Thus, all the canals right down to the 8 ha blocks would be carefully lined to reduce the seepage losses. The main canals and branches will be concrete lined with mechanical pavers. The distribution system will be brick lined with a sandwiched rich mortar layer. Use of polyethylene membranes is also contemplated. The lining will reduce the seepage losses to about one tenth of the losses that would have occurred if the canals were unlined. The risk of waterlogging from seepage would be reduced to that extent.

2. Provision of surface drains.

The drainage excess rainfall, storm water from agricultural land for better crop productivity has been proposed at farm levels as well as at regional level. Whole of command has been divided into two regions in respect of preparation of operational design and layout of surface drainage network commencing from 40 ha chak. The construction of the drainage system shall go on concurrently with the canals.

3. Conjunctive utilisation of surface and ground water, limited water delta.

The amount of water supplied per unit of area in the SSP command will be amongst the lowest in the country. The average depth of surface water supplies for the entire year measured at the main canal head will be only about 53 cm over the command area as compared to 75 to 100 cm per crop season on most of the projects in the country. This will naturally call for very judicious and economical use of water. If the farmers want to grow water intensive crops, they will have to supplement the canal water with well waters or reduce the area of their crops under irrigation. The project authorities have contemplated, conjunctive use of surface and ground waters. In the existing

irrigated areas of other prefects where well irrigation is concurrently practiced, the problem of waterlogging has reduced.

4. *Better water management, Automated canal regulation, Rotational water supply on volumetric basis, and active participation of farmers*

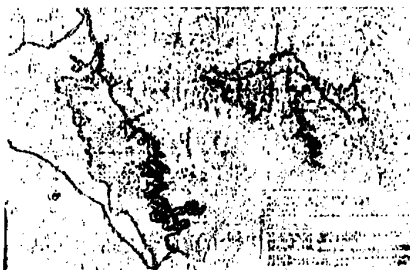
A draft legislation has been already prepared to regulate the distribution and use of canal and ground water in the state. On the Sardar Sarovar Project there will be volumetric supply of water through a computerized semi-automated operation system. Under this system, the discharge from the canals down to 8.5 cumecs (300 cusecs) capacity will be regulated through automatic computer control. These measures will not allow the canals to draw more water than planned. As the tariff for the water will be on the basis of the quantity supplied, the farmers will naturally try to use it most economically. This will be further ensured through better water management through farmers' associations and rotational water supply. The irrigation water depths actually required will be worked out through a system of soil moisture sensors and observations of hydro meteorological and climatological parameters as related to crop growth stages and the supplies will be regulated accordingly. Wherever possible drip and sprinkler methods of water application will also be encouraged.

5. *Carrying out water balance and salt balance studies and the necessary monitoring.*

During monsoon, when surplus waters are likely to be available in the canal, such waters will be used for flooding and leaching the saline soils. Continuous monitoring of salt and water balance has also been planned for such marginal soils.

6. *Bhal and Bara Tract*

Special problematic areas of Bhal and Bara are difficult for irrigation in view of high water table and salinity. A possible way of developing this area can be through suitable forest development programme. Salt loving plants, having a high evapo-transpiration rate can be preferred. These plants can help in controlling the water table. In the initial stage of development of irrigation in the command, there will be excess water available. This can be used over this area for initial leaching by way of surface diffusion. This can promote initial growth till the plants develop some resistance. Species like *Prosopis juliflora*, *Eucalyptus Artiplex* and other suitable plants can be tried. No irrigation system can be thought of for this area.



Flora fauna

National Park / sanctuaries :-

Velavadar National Park

Food availability, water and climate are some of the important factors regulating the population. Following are some of the resultant impacts on ecosystem :

- + More water can be made available for the wildlife in the National Park area.
- + Habitat improvement in some fringe areas of the park.
- + Increased availability of food in the ecological zone outside the park in agricultural fields. There may not be much change deeper in the park.
- + Decrease in biotic pressures, especially the cattle grazing on fringes of the park due to the availability of more forage outside the park.
- + Likely increase in the carrying capacity of Blackbuck, Nilgai, Wolf and other wild animals due to increase in the forage productivity and better water regime.
- + Increase in agricultural production and more area coming under agriculture, outside the park.
- + Likely change in cropping pattern, with two crops instead of one in some areas.
- + Fallow and cultivable wastelands can be made productive.
- + Possibility of taking more areas under tree cover, and agro-forestry. This may also increase the availability of fuel wood and fodder.
- + Adequate supply of drinking water in the area.
- + At some spots canal structure (distributaries) may obstruct the migration of Blackbuck outside the park area on northern side. This canal structure will act as a natural barrier to Blackbuck going in cultivated fields.

The negative impacts, likely to occur due to the network revolves mainly around four aspects

- (i) Water logging
- (ii) Change in the land use pattern and cropping pattern
- (iii) Wildlife-human conflict in the ecological zone
- (iv) Canal structure as an obstacle to the movement of wild life

For minimising the negative impacts, measures have been planned :

ACTION PLANS

Integration of all developmental activities related to irrigation, drainage, agriculture, co-operation, roads, marketing, forests, rural electrification etc. is considered as a basic requirement for the command area development programme targeted for SSP. The emphasis is on long term balanced and environment-friendly

growth. Action Plans have been drawn up on the issues like health, fisheries, flora fauna etc. for the Command Area.

IMPLEMENTATION

Construction of canal Phase -1 Ch 0.00 Km to 144.500 Km (Mahi crossing) along with the distributaries is almost complete. Surface drainage is being provided up to 40 ha chaks concurrently with the construction of canals. The command coming under Phase -1 extends up to Narmada-Mahi doab and areas coming under this belongs to agro-climatic zone no 1 to 4. Development of the command area is a long drawn process. Gujarat has taken steps in accordance with the covenants of the investment clearance accorded to the project by the Planning Commission and *pari-passu* clause stipulated by the MOEF. By now, almost all the major studies have been completed and impacts are known. Action points have also been determined. State Govts. have taken steps for implementation of the identified action points in accordance with the requirement of the environmental control. The command area development activities and environmental safeguard measures will be taken when water starts flowing in the canals.



(B) Current Scenario : Government of Rajasthan

The Government of Rajasthan had submitted a report on Environmental and Ecological aspects and remedial measures for 'Narmada Canal Project'. Copy of the report was submitted to Ministry of Environment and Forests. Government of Rajasthan have assigned studies on EIA of Command area in Rajasthan portion to WAPCOS. Revised draft final report is available, which is in the process of approval by State Government. Current status of studies & works is summarised below :

Narmada Main Canal

Rajasthan has been allocated 0.5 MAF (616 MCM) of Narmada water under the final award of NWDT. To utilise its share of the Narmada water, Govt. of Rajasthan have planned a 74 km long Narmada Canal to irrigate 73,157 ha. of land in the drought prone districts of Jalore and Barmer. The canal system will cover Gross Command Area (GCA) of 1,42,020 ha. of which 1,35,476 ha. is culturable Command Area (CCA). Besides irrigation benefit to 89 villages (74 in Jalore & 15 in Barmer), the project also envisages to provide drinking water to a population of about 3.0 lakhs living in 124 villages around the irrigation canal.

The canal will be trapezoidal in section and will be lined by cement concrete. Maximum capacity of the canal at the head is 74.58 cumec while discharge requirement is 69.43 cumec. There are 9 major distributories with a total length of 282.30 km. The total length of minors and sub-minors is 485.0 and 636.0 km respectively. Additional project activities would include construction of head regulators, bridges, cross drainage works, escapes etc.

A map showing the command area and the layout plan of the canal system is given at plate-III. The detailed Project Report (revised) for appraisal was submitted to Central Water Commission for approval during February, 1990. The project was considered in the 51st meeting of Technical Advisory Committee on Irrigation, Flood Control and Multi-purpose Project held on 04.12.91 and investment clearance was accorded by Planning commission vide their letter No.2(307)/92-I & C AD, dated 23.01.1996 for Rs.467.53 crores at 1989-90 price level including Rs.280.14 crores share cost payable to Gujarat. The benefit cost ratio and internal rate of return of the project are 1.01 and 10.42% respectively.

The construction of Main Canal in the first 42.0 Km reach has been taken up and the earthwork is under progress. The entire Narmada Main Canal works in Rajasthan is scheduled for completion by 2005-2006.

Water Delivery Network

The water delivery system will cater to irrigation needs of the vast areas through irrigation units. Each unit of irrigation service area, called Village Service Area (VSA), has been planned to be served through a single outlet from the distributory. This outlet will remain fully open for a fixed period during irrigation water demand and will be closed during periods of no water demand and no water availability. Water will be delivered only on the basis of the demand to a group of organised cultivators on a volumetric basis at the head of VSA, and not to individual cultivators.

In the VSAs, network for water distribution is planned through minors and sub-minors feeding different chaks and sub-chaks. For the entire system below VSA outlets,

water will be supplied in proportion to the area served. Within the chak, the water will be rotated to individual fields over fixed times in proportion to the holdings.

The Distribution System Under VSAs

A Village Service Area (VSA) will generally constitute an area between 300-500 ha. of a village under command. For villages extending over areas larger than 500 ha. or if required on the basis of topography or other physical features, the VSA may cover a larger area. The VSA is planned to be divided into chaks of 30 to 60 ha.. In a chak there will be 4 to 6 sub chaks. A minor will lead the water from the VSA outlets to the heads of chaks. A sub minor will convey water into the chak up to heads of sub chaks. Field channels will carry water from heads of sub-chaks to individual fields. The chaks will be ungated and water will be rotated into sub-chaks through turnouts. In a sub chak, water will be rotated to individual farms.

The VSA outlets will either be 'on' or 'off'. A constant discharge will be released. The flow will be divided proportionately at each chak head, by fixed proportional devices. Within the chak, the flow will be rotated. The flow will continue over a fixed continuous period during a week. Generally, it will run over a period of one week. The schedule of rotation among farmers during the period of supply to the service area will be fixed for each season so that each farmer will know the day of the week and precise hours during which he is required to draw. Prior to the commencement of each crop season, the schedule may be altered so that night operations can be rotated among all farmers.

The water will flow in the VSA when demanded. Depending upon water availability, the number of waterings will be made available, at intervals, to the entire VSA. Each watering will start on a prefixed day of a week every time. During periods of peak demand, water can be supplied for consecutive weeks also. The periods between the irrigation will generally be in increments of seven days. Irrigation water will be delivered at an approximate rate of around 30 litres/sec to farmers. The actual stream size will be proportional to the area of the chak.

The farmers within a service area will, in association with the agricultural extension staff, collectively determine their common schedule for delivery of allocated water to the VSA in terms of size and number of irrigation waterings and dates of delivery. Any changes in the schedule during a cycle will be likewise determined. Short term altering of the delivery schedule to a VSA as a sequel to the rainfall, will be carried out under codes/procedures agreed upon between the agency and the VSA Committee.

Drainage System

Surface drainage would be an integral part of irrigation net work and is being provided for to cover 40 ha. chak unit in all the areas needing surface drainage. The vertical drainage as required will be through Tube Wells and Open Wells. The drainage

system would consist of surface network of open channels and ground water control wells. The natural drainage shall be suitably modified and additional drainage will be provided where ever necessary to take care of excess water during monsoon to ensure that the flood water gets drained out in a reasonable period and there is no spill over and choking of drainage. The sub-surface water drainage control will be through judicious ground water exploitation and with adequate planning so that there is no water logging in the areas. The drainage system shall be constructed and maintained up to 40 ha. block synchronising in general with a chak distribution unit. The maintenance of drainage within the chak will be left to the farmers. The construction of the drainage network will be completed simultaneously with the construction of major distribution network and completed on block to block basis so that it is ready for use by the farmers by which time the surface water becomes available for irrigation.

Chapter 5

FLORA, FAUNA, WILDLIFE & CARRYING CAPACITY

Several aspects of the SSP have potential to cause adverse effects on the terrestrial ecology of areas upstream of the dam, principal amongst these are:

- (a) The submergence of forestland,
- (b) And the resettlement of people in new areas

The SSP also has considerable potential to have beneficial effects on ecological resources, owing to:

- (a) The creation of new and regenerated forest habitat:
- (b) The establishment and improvement of wildlife sanctuaries:
- (c) The greater availability of fresh water for irrigated forestry or for wildlife



The guidelines of the MOEF required that while seeking environmental clearance for the hydropower projects, surveys should be conducted so that the status of the flora and fauna present can be assessed, listed (rare and endangered) species can be detected, if present, and appropriate conservation measures devised.

On the basis of relevant details supplied by the various states, MOEF issued clearance for the SSP in 1987. A condition of this clearance, as far as it related specifically to the Flora & Fauna, was that the Narmada Control Authority would ensure in-depth studies on flora & fauna needed for implementation of Environmental Safeguard measures. The issues identified with respect to submergence area were identification of endangered species, rare & habitat sufficiency. Accordingly, the rehabilitation of flora fauna action plans were expected to cover the Surveys of flora & fauna in the region going to be affected due to implementation of the SSP with reference to the following

- 1) Gene pool, if any, likely to be affected.
- 2) Details of wildlife habitat in the region.
- 3) Measures proposed to rehabilitate endangered species of flora fauna, if any.
- 4) Assessment of the carrying capacity of the neighbouring areas wherein the wildlife would dispose if the scheme were implemented.
- 5) Plan for rehabilitation of endangered flora & fauna.

STUDIES / SURVEYS

Important survey work included the following:

- The Environmental Impact Study of 1983 prepared by MSU.
- Preliminary Report on First Botanical Exploration and Plant Collection from Narmada Valley by the Botanical Survey of India in 1986.
- Report on the Survey of the Narmada Sagar Area by Zoological Survey of India, 1988.
- Note on Sardar Sarovar Project - Preparation of Environmental Work Plan for Forest and Wildlife by the State Forest Department, GOM, 1988.
- Status of Flora and Fauna in and Around Sardar Sarovar Project, Maharashtra is studied by the University of Pune (1992-94). Final report is received in NCA.
- Eco-Environmental and Wildlife Management Studies in the Sardar Sarovar Area in Gujarat, 1992, by MSU.
- Impact Assessment of Madhya Pradesh Land to be Submerged Under Sardar Sarovar Project and Adjoining Ecosystems. The study was conducted by the State Forest Research Institute (SFRI) in Jabalpur and financed by the NVDA. This study was completed & report was submitted in 1994.
- Workshop on Approaches to Integrated Wildlife Management in Gujarat: A Report by the SSNNL, October 1990.
- People's Involvement in Wildlife Management, by VIKSAT in 1991.
- Wildlife Management Studies in the Submergence and Catchment Area of Narmada Project: With Special Reference to Shoolpaneshwar Wildlife Sanctuary, by the SSNNL, 1992.
- Narmada Basin Water Development Plan: Development of Fisheries, 1987, was prepared by the Narmada Planning Agency, GOMP.
- Rapid Reconnaissance Survey of Limnological Aspects Part I, II and III, 1987, were undertaken by the Bhopal, Vikram and Rani Durgavati Universities for GOMP.
- The Central Pollution Control Board, Central Water Commission, the State Pollution Control Boards and the National Institute of Oceanography have collected water quality data.
- Narmada River Basin Development Project: Fisheries Component, 1991 by the German Consultants to the World Bank, GOPA.
- Sociological Survey of the Fishing Families of the Narmada River by CICFRI, 1991.

- Aquatic Fauna (Fish) Studies in Indira Sagar Submergence Area, prepared by the Friends of Nature Society in 1991 on behalf of the NVDA reported on the fish fauna of the Narmada.
- Pre-and Post-Impoundment Limnological Studies of Narmada Basin, by three universities coordinated by Barkatullah University for the NVDA. (1989-92) Study report was available in 1994.
- Studies on Fish Conservation in Narmada Sagar, Sardar Sarovar and its Downstream, is a desk review sponsored by the NCA and undertaken by CICFRI, 1993.
- Ecology and Fisheries of the Narmada Estuarine System with Special Reference to Proposed Impoundment (Sardar Sarovar Dam) is an ongoing study begun in 1988 by CICFRI.

ACTION PLANS

A) Wildlife (Terrestrial)

To ensure that the wildlife conservation measures are implemented effectively, Action Plans for the three states were prepared as follows:

- Felling plans for the forest area coming under submergence in Maharashtra and Madhya Pradesh will avoid the possibility of animals being trapped in the submergence area
- Plans for improvement works in the wildlife sanctuaries of Gujarat. Shoolpaneshwar sanctuary development Action Plan prepared by GOG in 1996 and submitted to Forest Department GOG for implementation.
- Action Plan on Flora & Fauna by Govt. of Madhya Pradesh, 2000. The plan prepared by the NVDA was submitted to MOEF & NCA during November, 2000.

Table-11: Summary of Status of Environmental Planning :

Wildlife

	Gujarat	Maharashtra	Madhya Pradesh
• Preliminary Surveys	Complete	Complete	Complete
• in-depth Studies	Complete, Final reports available.	Completed, Draft Final report available	Complete Final reports available.
• Development of Management Options	Complete for Shoolpaneshwar sanctuary.	Awaiting results of study report from SES, Pune.	Some work completed but awaiting deliberations of the expert group.
Action Plans :			
• Migratory corridors	Not needed	Not needed	Plan ready
• Sanctuary development	Shoolpaneshwar sanctuary Management Plan prepared	Not needed.	Not needed.
• Wildlife conservation	Massive afforestation in	Under formulations.	Catchment treatment

measures in adjoining forest(s)	catchment of SSP.		works and social forestry plantations.
• Implementation	Shoolpaneshwar Sanctuary Plan under implementation. CAT work (increasing carrying capacity) nearing completion.	CAF & CAT nearly completed. Plan under formulation.	Substantial CAT works in the catchment completed. Social forestry plantation to be implemented by the State Forest department under its programme. Funds are proposed to be provided by the project.

B) Fisheries (Aquatic):

Three State Govt.(s) submitted the fisheries development plans, which are as follows:

- The Narmada Basin Water Development Plan: The Development of Fisheries, 1984. This comprehensive plan for GOMP addressed the development of fisheries in the Omkareshwar, Maheshwar and SSP areas. Phasing and programming with respect to pre and post-impoundment, clearance of the forests, training of fishermen, cooperative societies and post-impoundment management was proposed.

- Environmental Work Plan Sector Fish and Fisheries, GOG, 1986. This work plan, prepared in compliance with the agreement with the World Bank included the establishment of fish hatcheries and fish farms, training of fishermen, establishing primary cooperatives, and establishing an Inter State Fisheries Board. In addition, it included proposals for conducting hydro-biological studies, studies on the morphology of the river, investigations into the physical and chemical characteristic of the water and soil, and studies on flora, fauna, fish yield, plankton, and productivity in the reservoir. This plan was again revised by GOG in August 1997 & resubmitted to NCA during November 1997.



- A Note on SSP: Preparation of Environmental Work Plan for Fisheries Development in Maharashtra, 1987.

This plan included proposals for the felling in the reservoir submergence zone, fish seed, hatcheries, stocking, fishing, manpower requirements, and training and management through the Inter-State Board. Some more studies have been proposed by GOM through CICFRI. Subsequently, the state governments have revised their plans with a view to address to issues as they arose. The revised plan for GOM included proposals for the fishing population to be resettled on the periphery of the reservoir or in R&R sites in

Maharashtra. In addition, the establishment of low-cost hatcheries and irrigation tanks, the development of pen cage culture fisheries, and intensive fish farming were proposed.

- GOG also revised their plan by end 1994.

The plan contained four volumes covering upstream, downstream & command areas. In view of the progressive impoundment which commenced in March 1994, NCA has constituted an expert group to lay down the guidelines for conservation & development of fisheries & its ecosystem. The plans submitted by state governments are under scrutiny of this expert group. The summary of status of planning is given in *table-10* and *table-11*.

Table-10. Summary of Status of Environmental Planning: Fisheries

	Govt. of Gujarat	Govt. Maharashtra of	Govt. of M.P.
• Preliminary surveys work plan	Yes	Yes	Yes
• Updating of detailed surveys/studies of fish fauna	Yes	-	Yes
• Updated Action Plans	Yes	Yes	Submitted in 1997
Implementation :			
1. Plan for clear felling	Completed	Yes, to synchronise with submergence about 734.00 ha. felled.	Yes, to synchronise with submergence work commenced.
2. Development of fish farms	Under implemen- tation	Proposal under revision	Proposal under revision
3. Establishment of IFDB for future R&D Management	Agreed	Agreed	Agreed.
4. Expert group to lay down guidelines for Conservation & Development	Yes, agreed by the State & constituted by the NCA. Five meetings held, guidelines are on the anvil.	As per col. No.2	As per col. No.2

Enhance nature conservation outside the immediate catchment area of the Narmada

The SSP will also provide an opportunity to enhance nature conservation outside the immediate catchment area of the Narmada. In particular three wildlife sanctuaries located in the command area of the project will benefit from the increased freshwater availability resulting from

The project and there are plans by the GOG to further develop these. They comprise:

- Nal Sarovar, Bird Sanctuary;
- Wild Ass Sanctuary in the Rann of Kuchch.
- Velavadar Black Buck National Park.

IMPLEMENTATION

CICFRI have also been commissioned to monitor the whole of the estuary and their study has been extended to examine pollution and to undertake Modeling studies in the downstream environment.

An expert group has been constituted by NCA to lay down the guidelines for fish conservation & development during progressive filling of the reservoir to advise the state executive agencies for follow-up action. Guidelines are on the anvil.

Creation of an Interstate Fisheries Development Board has been agreed to by party States, which is expected to be setup and fully functioning prior to reservoir filling. This Board would implement the guidelines for conservation of fisheries recommended by HLEG.

The Organisation is expected to be set up and fully functioning prior to reservoir filling.

On-going Fisheries Activities in the Sardar Sarovar

Some fisheries development activities are already going in the Sardar Sarovar from the year 1992 onwards. From 1993-94, these programmes received the financial support from the Sardar Sarovar projects. These activities are:

- Seed Stocking in the Sardar Sarovar
- Development of Rearing space for Fish Seed Production
- Mangrove Plantation Programme.

Till the March, 2000 State Forest Department and other Fisheries Development Agencies have stocked 382.35 lacs fingerlings / yearlings in the main reservoir as well as dykes of the Sardar Sarovar.

There is a provision to create rearing space for seed rearing in the Sardar Sarovar and the funds have been provided by the SSP.

The total amount for the rearing ponds is at present Rs.64.36 lakh. The site selected for the rearing ponds initially in the reservoir premises was found to be unsuitable on account of higher water permeability of the soil. Hence, another site has been located in the village of Timbi (Nanded Taluk) of Bharuch district, in the Survey No.303. The soil samples have been sent for analysis to decide the suitability.

In Gujarat, reservoir bowl is already cleared of all vegetative growth. Execution of felling in M.P. & Maharastra, as per felling plans prepared, await the commencement of impounding.

Chapter 6

SEISMICITY**STUDIES**

Studies of reservoir induced seismicity (RIS) and rim stability have been carried out by the Geological Survey of India (GSI), Central Water and Power Research Station (CWPRS), University of Roorkee and World Bank Consultants. The principal studies are described below:

- University of Roorkee. 1980. Geological and Seismological Investigations of the Environs of Narmada Valley around Navagam Dam site in Gujarat.
- GSI. 1981-82 and 1982-83. A Geotechnical Report on the Reservoir Competency Investigations in Parts of Sardar Sarovar Area, Bharuch & Vadodara Districts. Volumes II&I.
- Shenoj et al. 1982. Shenoj et al presented at the New Delhi Conference on the significance of Seismotectonic Aspects on Reservoir Development.
- Balasundaram, M.S. 1982 Sardar Sarovar Project: A Geotechnical Report compiled and edited for the Government of Gujarat.
- MSU. 1983. The Sardar Sarovar Narmada Project Studies on Ecology and Environment.
- NVDA published a Position Paper on Seismic Studies in January 1986.
- Krishna, Dr. J. 1989. Dams and Seismicity.
- GSI.1990. Study of the Rim Stability of the SSP.
- GOI.1993. Sardar Sarovar Project Seismicity and Sardar Sarovar Dam.

IMPLEMENTATION

The various recommendations for modification of the dam design which have all been implemented are summarised as:

- Adoption of horizontal design coefficient of 0.125g on the recommendation of the Dam Review Panel
- Installation of stress monitors in the main body of the dam
- Increase of the depth of the foundation to 18m below the lowest riverbed.

The Government of Gujarat has identified 9 locations for the installation of seismic monitoring stations, 4 each on either side and one at the downstream of the Sardar Sarovar reservoir, out of a total of 9 stations, 3 are in M.P., 1 in Maharashtra

& 5 are in Gujarat. Construction and instrumentation installation work is completed at all the 9 seismic monitoring stations.

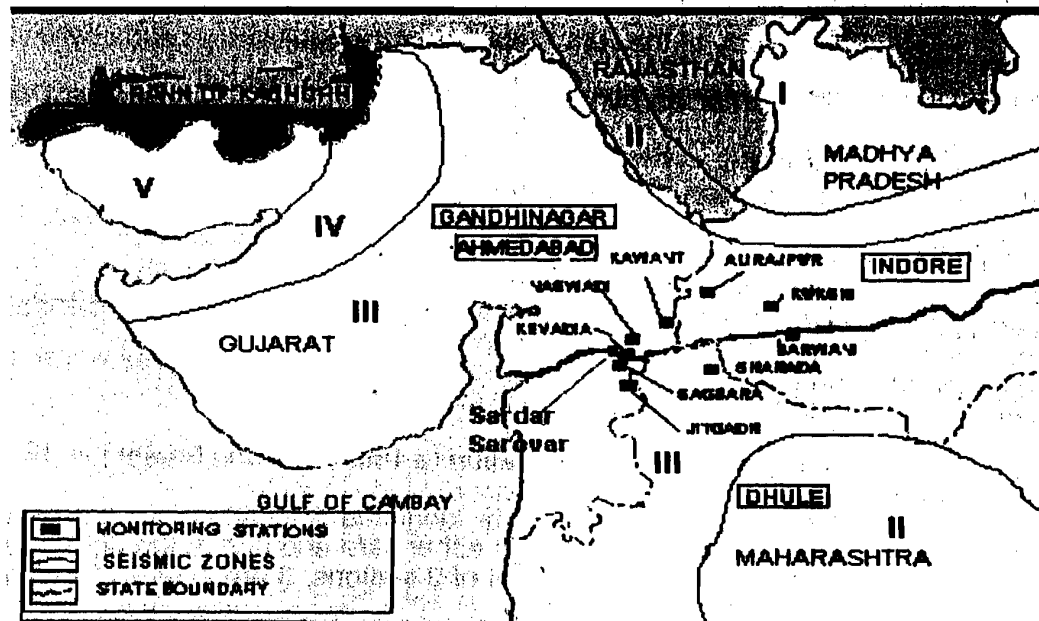
The seismological observatory at Kevadia Colony is in operation since 1973. The data of Kevadia Colony seismograph station for the period from 1973 to 1984 was analysed by CWPRS, Pune and GEAR, Vadodara. Also, Micro-earthquake surveys around Navagam Dam were carried out in the year 1980 by Dept. of Earthquake Engineering, University of Roorkee. The Micro-earthquake activity was found to be of low level and was generally scattered in the Narmada basin.

The seismological network with latest instruments was established in the year 1989. After the installation of new seismic instruments at new sites, local micro-earthquakes as well as global earthquakes are being recorded. The events which are recorded at network are analysed and located using the computer program 'FASTHYPO' incorporated with seismic Data processing and Analysis Computer (DAC - 300). The progress of implementation is illustrated in Table below.

Table-12 : Status of implementation of seismicity aspects

ACTION	STATUS
• Dam design modifications	Completed
• Monitoring stations	Construction and instrument installation work is completed at all 9 seismic monitoring stations.
• GSI (Nagpur Division) Rim Stability studies	Completed
• Tracer Studies by CWPRS	Reports submitted.

Map-2: Showing locations of seismological station on periphery of the Sardar Sarovar reservoir



Chapter 7

HEALTH ASPECTS

Health provision in India is defined by the National Health Policy (NHP) and national disease programmes such as the National Malaria Eradication Programme (NMEP). The NHP entitles access to medical facilities to all Indians, the number and distribution of which is determined by the local population density. The NMEP was developed, as a nation-wide strategy to combat the spread of malaria with regard to SSP all the three State Governments will integrate development of new facilities with proposals already made under the NHP and NMEP. Such integration will avoid duplication, maintain parity within the project area and provide better access to health care than would otherwise be achieved.



In addition to the general obligations of the State under national policy, a specific requirement for the SSP contained in the environment clearance order of GOI was that, that plans for the provision of health facilities to workers and residents of the affected areas should be prepared. Each State should take necessary measures to minimise the risk of malaria, filarial, schistosomiasis and other diseases associated with water that may result from implementation of the project Preparation of an Action Plan for the surveillance and control of malaria was also stipulated.

STUDIES & ACTION PLANS

The two main potential sources of health impact associated with the reservoir and Irrigation projects are as follows:

- The occurrence of pools of standing water, during construction and operation of the reservoir, may provide breeding areas for disease vectors:
- Immigrant construction workers may bring with them diseases or parasites, to which the local population may have low immunity.

The SSP is expected to confer significant public health benefit's since increased water availability will help to reduce the Incidence of 'water-washed' and 'waterborne' diseases which are associated with poor hygiene and restricted water borne water supply. Management of the potential health Impacts of the SSP will focus, therefore, on the exclusion and/or control of the disease vectors which spread 'water-based' and 'water-related' diseases.

A large number of studies have been carried out on the health profile of villages in the three affected states. The key studies are summarised below:

- Narmada Programme-Schistosomiasis -Back-to-Office Report, 1986, assessment carried out by Goodland, consultant to the World Bank, the National Institute of Communicable Diseases (NICD) and the World Health Organisation (WHO).
- Proceedings and Recommendations of the Meeting on Schistosomiasis Research and Surveillance held at NICD on 22nd November 1985.
- Disease Profile of Command Area by the State Commissariat of Health, Medical Services and Medical Education (SCHMS), 1986.
- Health Statistics< GOM, 1987. The State Department of Health, Report on the health profile of 33 project-affected villages in Dhule district, Maharashtra.
- Health Statistics 1982-84, GOMP. This study published by GOMP in 1985 & updated in 1994.
- The Sardar Sarovar Narmada Project Studies on Ecology and Environment by MSU in 1983, considered public health in Chapter-3.
- Numerous studies have been conducted on the incidence of malaria in India, amongst others, by the Malaria Research Center (MRC).
- Revised Plan by GOM, 1995.
- Revised Health Plan by GOG, 1996.
- Draft Health Management Plan by GOG, 1997.
- Epidemiological Surveillance Studies by GOM, 1996.
- Epidemiological Surveillance Studies by Gandhi Medical College, Bhopal for GOMP 5th Interim Report (1997).

Status of Implementation of Actions for Public Health

Studies on the disease profile in the SSP region and past experience with major water resources projects suggested that health Action Plans for the project should focus on the following:

- + Provision of health care for displaced people and immigrant workers;
- + Control of malaria and potential breeding sites for malarial vectors;
- + Monitoring for the incidence of other water-related and waterborne diseases with a view of preventing their establishment.

Gujarat

An Initial work Plan for Environmental Effects: Sector Public Health for the Command Area of Gujarat was drawn up in 1986 by the NPG in coordination with SCHMS. This plan covers villages within a 10 km radius of the reservoir including resettled populations and makes provision for the monitoring, surveillance and

control of malaria. The 1986 plan is under implementation with certain modifications and additions.

The principal objectives of the work plan are:

- To provide for systematic and continuous monitoring of the health profile of the project area;
- To provide suitable Infrastructure for health provision in the project area.

The plan also outlines actions for the surveillance and control of malaria. The main components of the plan area summarised below.

- + Establishment of hospital at Kevadia.
- + Strengthening of laboratory facilities including establishment of mobile unit.
- + Provision for laboratory technicians in existing public health centers (PHC's).
- + Expansion of malaria treatment depots.

Proposal to establish Urban Malaria Scheme for centres over 40,000 (anti-larval operations) not currently covered. Strengthening of state level health organisations to ensure monitoring of malaria, filaria, dengue and encephalitis, strengthening of district level health organisations for monitoring or implementation, residual insecticidal spraying operations are included in the plan.

Maharashtra

GOM submitted an Initial Work Plan for Public Health Sector In 1987, which was modified and resubmitted for consideration in 1991 and further and updated in 1992 & 1993. The work plan was based on the state health department survey of Dhule District. The principal objectives of the plan were as

- To monitor closely health conditions in Dhule district
- To provide facilities for carrying out this monitoring
- To adopt precautionary measures against the spread of diseases
- To be prepared to combat epidemics that might arise.

The work plan also contained provisions for the strengthening of state and district health facilities in existing villages and in resettlement areas. The provisions included the establishment of a monitoring and laboratory cell at the Rural Hospital and strengthening of the existing Primary Health Centre. It contained full descriptions of the likely costs and staffing requirements of these measures.

Madhya Pradesh

An initial Work Plan for the Public Sector was submitted to the NVDA the state health department in 1988. This plan included a summary of existing health profile in

the submergence villages and discussed the likely impacts of the SSP. The plan contains specific provisions for:

- Strengthening of health facilities already in place under the NHP and Minimum needs programme of the Seventh Five Year Plan;
- Establishment of a Health Monitoring Cell;
- Strengthening of health centers for construction workers;
- Establishment of district organizations for malaria control established of the NMEP.

An extension to the MP Health Plan was published by the NVDA in January 1990 and was revised and re-submitted in 1991. This report provides additional detail concerning the provision and training of health care staff, numbers of specialist staff required, funding and responsibilities for management.

In addition to the State Health Plan, a Memorandum of Understanding was signed between Gandhi Medical College, Bhopal and the NVDA to provide further arrangements for the monitoring of malaria and other diseases. This memorandum included provisions for the following:

- Study of mosquito vectors in the Narmada area;
- Comparison of SSP with other similar project situations and analysis of lessons learned;
- Collection and analysis of time-series-data on disease incidence;
- Recommendation of health promotion and disease preventative measures in the SSP area.

Implementation

A) Govt. of Gujarat:

There is a dispensary at SSP dam site run by M/s Jai Prakash Associates. It has regular Medical Officer and other staff to diagnose and treat the malaria patient.



A medical cell with 20 mobile unit's and 61 dispensaries are working in R&R sites. The cell consists of physician, pediatrician and Gynecologist. The cell is also provided with two ambulances. The main functions includes :

- Regular visiting of sites
- Providing specialized services at the door steps of PAFs
- Medical check-up

- Pot chlorination through distribution of chlorine tablets.
- Providing nutritional supplements to children's, pregnant and lactic mothers.
- Other preventive and curative health measures

B) Govt. of Maharashtra:

In accordance with State provision for health care facilities, two cottage hospitals, eight primary health centres and 55 primary health unit's have already been established in Dhule District. Taking into account the inaccessibility of some of the villages, provisions were made for eight additional public health unit's, 10 mobile unit's and a floating dispensary for villages within 10 km of the submergence zone. One hospital at Somawal resettlement village, is already functional.



Photo : showing the Hospital at village Somawal in Maharashtra.

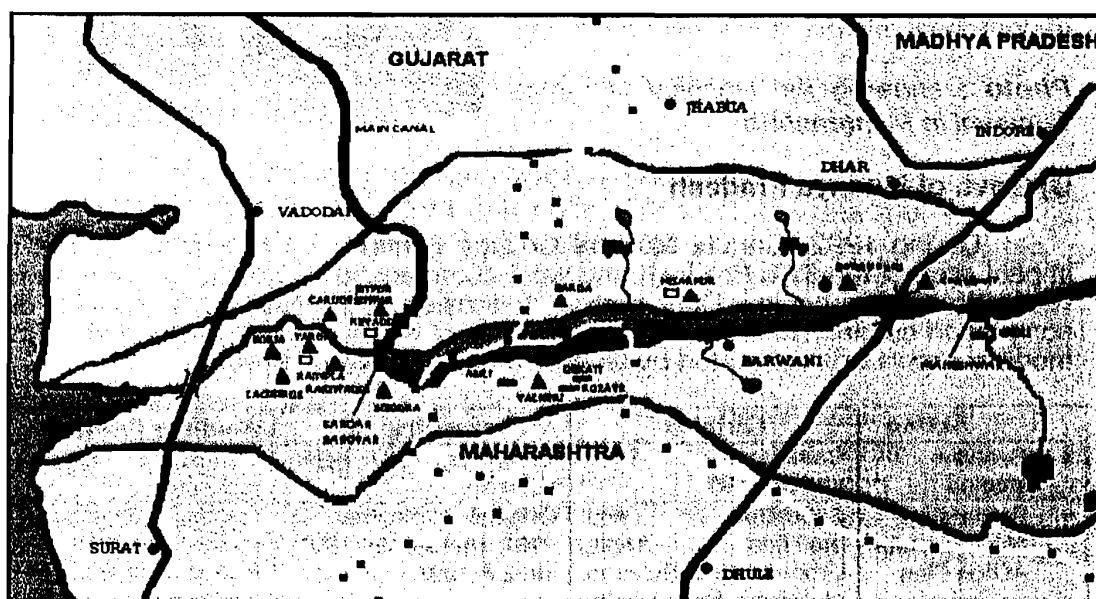
C) Govt. of Madhya Pradesh

During 1992, Gandhi Medical College continued surveillance studies of the impact area of Madhya Pradesh and work commenced on additional facilities for the Nisarpur village hospital, Dhar District. Extension of the Nisarpur hospital is due for completion commensurate with submergence of areas in Madhya Pradesh. Final six monthly report was submitted by Gandhi Medical College, Bhopal.

Action	Gujarat	Maharashtra	Madhya Pradesh
• Baseline studies	Complete, 1986 updated '95	Complete, 1987 being updated.	Complete, 1994 being updated.
• Preparation of state Action Plan	Submitted and modified in 1988; Urban Malaria Scheme proposed. Draft Health Management Plan submitted in 1997.	Original submitted in 1987 revised in 1991, 1992 & 1993.	Original submitted in 1986, revised in 1988 and final plan submitted in 1991. Cost details incorporated in 1996.
• Survey of existing facilities	Complete	Complete	Complete
• Establishment of new facilities	Hospital at Kevadia for workers; laboratory and mobile unit complete, drug dispensaries	Somawal village hospital; health centers and health unit's functioning.	Hospital, mobile unit and civil dispensaries for labour; detailed scheme for resettled population
• Vector control measures in place	NMEP; SSNNL work - shop on malaria control; laboratory established, studies on health completed	NMEP; adoption malaria control guidelines of irrigation Department	NMEP; state malaria control organizations strengthened
• Appointment of specialist	One senior health officer is posted at	Yes one PHC, 3 dispensaries & one	Needs identified.

staff	Kevadla	floating dispensaries established & 51 posts filled up & laboratory facilities Provided.	
• Disease monitoring and responsibility	Entrusted to SCHMS EIA report submitted. Draft Health Management Plan submitted in 1997.	Entrusted to regular health Department Surveillance studies commenced. Phase-I survey report submitted by T.N. Medical College. Proposal for Phase-II study submitted.	Evaluation cell established monitoring by Gandhi Medical College, Bhopal. Five Interim. reports received

Map-3: Showing status of implementation of health plan in SSP impact are



Chapter 8

ARCHAEOLOGICAL ANTHROPOLOGICAL

ARCHAEOLOGICAL SURVEY

The Sardar Sarovar Project has necessitated afresh look at the archaeological and cultural heritage available in the Narmada valley. The Government of India recognises the value of such cultural sites and has enacted a series of laws to maintain and protect them from decay, misuse or development activities. Sites are classified into three categories as follows :

Type 1: monuments of national importance which are protected by central government:

Type 2: monuments of religious or cultural importance which are protected by the state governments;

Type 3: monuments which are neither centrally or State-protected but which are considered to be an Important part of cultural heritage.

In the case of SSP, where some sites may be submerged the NWDT award stipulated that, the entire cost of relocation and protection should be chargeable to GOG. Relocation work is to be supervised by the Department of Archaeology under the provisions of the 1958 Act.

STUDIES

The three State governments carried out a complete survey of cultural and religious sites within the submergence zone under the direction of the project proponents. The principal aim of these studies was to list all archaeological sites, identify and name any sites under state-protection and further identify sites of religious or cultural significance which, although not protected under national law, are of sufficient value to merit relocation. These studies are summarised below. Survey conducted for identification of various sites & monuments of significance has included the following:

- Gujarat: Archaeological Survey of Nineteen Villages Submerged by Sardar Sarovar Reservoir, 1989.
- Maharashtra: Survey by Department of Archaeology.
- Survey was carried out by the State Department of Archaeology for cultural sites in 24 villages of Akrani taluk and nine villages from Akkalkuwa taluk, Dhule district.
- Madhya Pradesh: Survey by State Department of Archaeology and Museum (1992), in sixteen volumes.

- Anthropological Survey of India: Narmada Salvage Plan.
- Anthropological Survey of India: People's of India.
- Adivasi Kala Parishad: Survey of Material Cultural in the Narmada Valley.
- Rashtriya Manav Sanghralaya: Narmada Salvage Plan.

Gujarat

- + Archaeological Survey of Nineteen Villages submerged by Sardar Sarovar Reservoir, 1989: - The Department of Archaeology was instructed to carry out a survey of archaeological sites in 19 villages of the proposed SSP submergence zone in Gujarat. By June, 1989, 12 villages had been surveyed. The initial report, submitted by the Director of Archaeology, contained a full list of villages surveyed and photographs of the Shoolpaneshwar and Hamfeshwar temples. Two further studies of sites in the remaining seven villages were carried out in March 1992 and a supplementary report issued.

Maharashtra

- + **State Department of Archaeology** : A survey was carried out by the Department of Archaeology of cultural sites in 24 villages of Akkrani Taluk and nine villages from Akkalkuva Taluk, Dhule District. A brief summary note was submitted by the Director of Archaeology in February 1992 which stated that no state-protected monuments were located in the area but recommended the preservation of monuments at the village of Manibeli, Dhule District.

Madhya Pradesh

- + **State Department of Archaeology and Museum** : The Archaeology Department of Madhya Pradesh compiled a detailed report of archaeological sites in 120 villages likely to be affected by SSP. A second study of 73 villages was completed in July, 1991. Each study contained photographs together with detailed descriptions of the current use and historical significance of the sites.

In addition to baseline studies on archaeological aspects, work has been carried out on the anthropological heritage of the Narmada Basin including examination of evidence of ancient dwellings and cultural artifacts. The principal studies in this area are described below.

- + Anthropological Survey of India. Narmada Salvage Plan : The Narmada Salvage Plan contains detailed background data on palaeo-anthropological, human ecological and other aspects of the Narmada valley. By May 1992, surface scanning of 17 sample villages coming under submergence had been carried out, 424 specimens including ancient tools etc had been collected.
- + Anthropological Survey of India. Peoples' of India : This project entailed a complete survey of 33 tribes of India including those of the Narmada Basin. The study

covered all aspects of tribal culture in India and was published in 61 volumes in 1992.

- + Parishad, A.K. Survey of Material Culture in the Narmada Valley : Work was completed and a report published by the National Museum of Humanity, Bhopal, on cultural objects from tribal artisans in Madhya Pradesh in 1990. Copies of the interim report were circulated to the Ministry of Environment and Forests and the Narmada Control Authority in April 1991.

ACTION PLANS

Summary of the proposed actions

State	Relocation of temple		Excavation		Sculptures	
	Target	Completed	Target	Progress	Target	Progress
• Gujarat	2	2	-		-	
• Maharashtra	NIL	N.A.	NIL	N.A.	NIL	N.A.
• Madhya Pradesh						
□ As per Action Plan 1993	7	*	5	2**	186	118***
□ As per Action Plan 1997	13	3	5	1	68	NIL

* Four structures are included in the Action Plan 1997 and remaining 3 nos. are handed over to ASI.

** Work was possible on 2 mounds and the remaining are handed over to ASI.

*** Remaining works are included in Action Plan 1997.

Gujarat

The Action Plan for two temples, i.e., Shoolpaneshwar and Hamfeshwar is ready.

Maharashtra

The Director of Archaeology, Maharashtra reported that no state-protected sites would come under submergence. However, plans would be needed to relocate the Shoolpaneshwar temple at Manibeli village. GOG has been entrusted with responsibility for relocation operations.

Madhya Pradesh

A large number of sites were identified for relocation although none of these sites are protected under the 1958 Act. It was proposed, therefore, that any decision on whether they should be relocated would be made on a case-by-case basis by an independent expert panel. This panel comprised representatives of the Archaeological Survey of India, Central and State Governments and was



established by GOMP. The panel's decisions were ratified by a joint Inspection committee of the Irrigation Department and Archaeological Department.

The expert panel proposed, a 4-phase Action Plan framework for relocation operations :

Phase-I - Survey work, survey report, listing of monuments and sculptures, estimates for shifting.

Phase-II - Action Plan, documentation, detailed estimates.

Phase-III - Building construction, shifting of sculptures, shifting of monuments.

Phase-IV - Display arrangements, model preparation, video library, publication report, excavation reports, new findings (if any).

State Department of Archaeology and Museum had conducted a survey covering 193 villages coming under submergence of SSP and pointed out the monuments for protection and relocation works.

GOMP earlier prepared the Action Plan 1993. The details are as below:

Sl No	Particulars		
	Name of monument	Village	District
1.	Shiv Mandir	Roligaon	Jhabua
2.	Kanjaleshwar Mandir	Semalda	Dhar
3.	Jalaleshwar Mandir	Khujawa	Dhar
4.	Bhawani Mata Mandir	Khujawa	Dhar
5.	3 nos. big statues	Khujawa	Dhar
6.	Shiv Mandir	Barda	Dhar
7.	Rock-cut sculptures	Pipaldagarhi	Dhar

Excavation

Sl. No	Particulars	
	Name of archaeological mound	District
1.	Mound at village Khaparkheda	Dhar
2.	Mound at village Utavad	Khargone
3.	Mount at village Brahmangaon	Khargone
4.	Mound at village Krimohigaon	Khargone
5.	Mound at village Kheda	Dhar

GOMP prepared another Action Plan in 1997, in which, some more monuments and excavation sites were included. The details are as under :

Relocation / Protection

Sl. No	Particulars				
	Name of monument	Village	Tehsil	District	RL in m
1.	Shiv Mandir	Bada Barda	Manavar	Dhar	130.970
2.	Bhawani Mata Mandir	Khujawa	Dharampuri	Dhar	147.825
3.	Shomeshwar Mandir	Khujawa	Dharampuri	Dhar	129.530
4.	Shiv Mandir (S.No.1)	Khujawa	Dharampuri	Dhar	135.460
5.	Shiv Mandir (S.No.2)	Khujawa	Dharampuri	Dhar	135.475
6.	Shiv Mandir (S.No.3)	Khujawa	Dharampuri	Dhar	135.165
7.	Rock-cut caves	Khujawa	Dharampuri	Dhar	135.075
8.	Big statues	Khujawa	Dharampuri	Dhar	146.395
9.	Shiv Mandir (Mauni Baba Ashram)	Pipaldagarhi	Dharampuri	Dhar	153.775
10.	Rock-cut-sculptures	Pipaldagarhi	Dharampuri	Dhar	130.440
11.	Shiv Mandir	Bodhwada	Kukshi	Dhar	138.685
12.	Narmadesh-war Mandir	Dehar	Kukshi	Dhar	134.665
13.	Baneshwar Mandir (Shiv Mandir)	Navadatoli	Kasarawad	Khargone	137.765

Excavation

Sl. No	Particulars		
	Name of mound	District	RL in m
1.	Mound at village Maruchichli	Khargone	151.635
2.	Mound at village Ekatwara	Dhar	146.875
3.	Mound at village Katnera	Dhar	139.865
4.	Mound at village Khalghat (Khalkhurd)	Dhar	156.310
5.	Mound at village Kalyanpura	Dhar	148.035

Summary of Current Situation and Progress

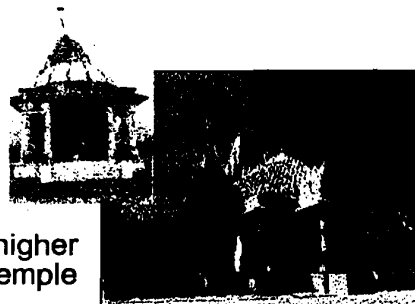
	Gujarat	Madhya Pradesh	Maharashtra *
Survey of villages in Submergence Zone	"Complete" for all item in all the States.		
Identification of Cultural Sites.	"Complete" for all item in all the States.		
Collection of Data and Documentation of Sites	Complete	In progress	Not required.
Selection of appropriate sites	Complete	In process	Not required
Action Plan	Complete	Finalised	Not required

- Survey in Maharashtra identified one temple, which was on the border with Gujarat. GOG has already relocated this temple 15 km. downstream of earlier location.

Implementation

A. Gujarat:

Shoolpaneshwar temple which was on the border with State of Maharashtra is relocated 15 km. downstream of the SSP in village Gora. Relocation works already completed.



Hampsheshwar Temple has been relocated at higher elevations within the same village. Construction of Temple was completed recently.

B. Madhya Pradesh:

Status of implementation for Action Plan of 1993 are as below:

Sl No	Particulars			Status
	Name of monument	Village	District	
1.	Shiv Mandir	Roligaon	Jhabua	Handed over to ASI by State Department of Archaeology, MADHYA PRADESH Progress is awaited.
2.	Kanjaleshwar Mandir	Semalda	Dhar	- do -
3.	Jalaleshwar Mandir	Khujawa	Dhar	- do -
4.	Bhawani Mata Mandir	Khujawa	Dhar	The monument is taken in Action Plan 1997. Relocation is remaining.
5.	3 nos. big statues	Khujawa	Dhar	- do -
6.	Shiv Mandir	Barda	Dhar	The monument is taken in Action Plan 1997 and relocated completely.
7.	Rock-cut sculptures	Pipaldagarhi	Dhar	- do -

Excavation

Sl. No	Particulars		Status
	Name of archaeological mound	District	
1.	Mound at village Khaparkheda	Dhar	Detailed excavation works was done by ASI.
2.	Mound at village Utavad	Khargone	- do -
3.	Mound at village Brahmangaon	Khargone	Archaeological survey was done. Later on mounds were vanished due to soil erosion by agricultural practices.
4.	Mound at village Krimohigaon	Khargone	- do -
5.	Mound at village Kheda	Dhar	Handed over to ASI. Progress is awaited.

Status of implementation of Action Plan 1997 are as under

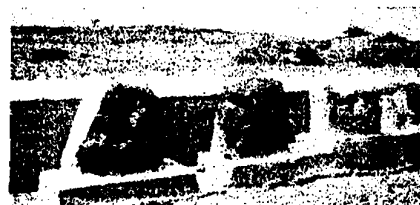
Relocation / Protection

Sl. No.	Particulars					Status
	Name of monument	Village	Tehsil	District	RL in m	
	Shiv Mandir	Bada Barda	Manavar	Dhar	130.970	Relocated completely.
	Bhawani Mata Mandir	Khujawa	Dharamपुरी	Dhar	147.825	Scrapping of lime plaster done for numbering and detailed drawing.
	Shomeshwar Mandir	Khujawa	Dharamपुरी	Dhar	129.530	Progress is nil, due to agitation.
	Shiv Mandir (S.No.1)	Khujawa	Dharamपुरी	Dhar	135.460	Drawing numbering and photography completed. Work of relocation started but due to public resentment, it was stopped by the collector.
	Shiv Mandir (S.No.2)	Khujawa	Dharamपुरी	Dhar	135.475	Drawing numbering and photography completed. Work of relocation started but due to public resentment, it was stopped
	Shiv Mandir (S.No.3)	Khujawa	Dharamपुरी	Dhar	135.165	Drawing numbering and photography completed. Work of relocation started but due to public resentment, it was stopped
	Rock-cut caves	Khujawa	Dharamपुरी	Dhar	135.075	Progress is nil due to agitation.
	Big statues	Khujawa	Dharamपुरी	Dhar	146.395	Estimates ready, work is in progress.
	Shiv Mandir (Mauni Baba Ashram)	Pipaldagarhi	Dharamपुरी	Dhar	153.775	Relocated completely in village Nimbola.
	Rock-cut-sculptures	Pipaldagarhi	Dharamपुरी	Dhar	130.440	Relocated completely in village Nimbola.
	Shiv Mandir	Bodhwada	Kukshi	Dhar	138.685	Pre-relocation work is completed, land allotment awaited
	Narmadeshwar Mandir	Dehar	Kukshi	Dhar	134.665	Pre-relocation work is completed, land allotment awaited

						awaited
13.	Baneshwar Mandir (Shiv Mandir)	Navadatoli	Kasarawad	Khargone	137.765	Pre-relocation work is completed. Photography is in progress. NOC from managing trust awaited.

Excavation

Sl. No	Particulars			Status
	Name of mound	District	RL in m	
1.	Mound at village Maruchichli Historic period	Khargone	151.635	Proposed for excavation during 2001-02.
2.	Mound at village Ekalwara Pre-historic	Dhar	146.875	The excavation to commence.
3.	Mound at village Katnera Historic period	Dhar	139.865	Permission for excavation awaited from ASI
4.	Mound at village Khalghat (Khalkhurd) Pre-historic	Dhar	156.310	Excavated. Records are with the o/o the Archaeologist, Archaeology & Museum, Rajwada, Indore. Report under preparation.
5.	Mound at village Kalyanpura Copper & pre-historic	Dhar	148.035	Permission for excavation awaited from ASI



Collection and display at Museum

Sculptures, 118 in nos. were collected from the regions coming under the submergence area of the Sardar Sarovar dam. These sculptures were obtained from Pipldagarhi, Khujawa, Dharamapuri and different other villages. These are displayed at Distt. Museum in Dhar Distt.

Since these sculptures were lying open for a very long time they bear traces of weathering effect on them like salt formation, red-oxide deposition, besides accumulating dust, dirt and fungus on them. They were cleaned by the chemists using necessary chemicals like Ammonia, Sodium hydroxide, Benzene P.V.A. etc. After cleaning the sculptures were coated with preservative for saving them from further deterioration.

Museum

- + Narmada Park and Museum at Lalbagh at Indore, besides Museum at Barwani and Kasarawad proposed. Land for museum at Barwani and Kasrawad requested.

Construction of a section on 'Narmada Dirgha' in the museum at Bhopal has been started.

Besides, Film documentation of all the monuments of SSP is in progress through an agency 'Madhyam', engaged by State Department for Documentation of the important monuments.

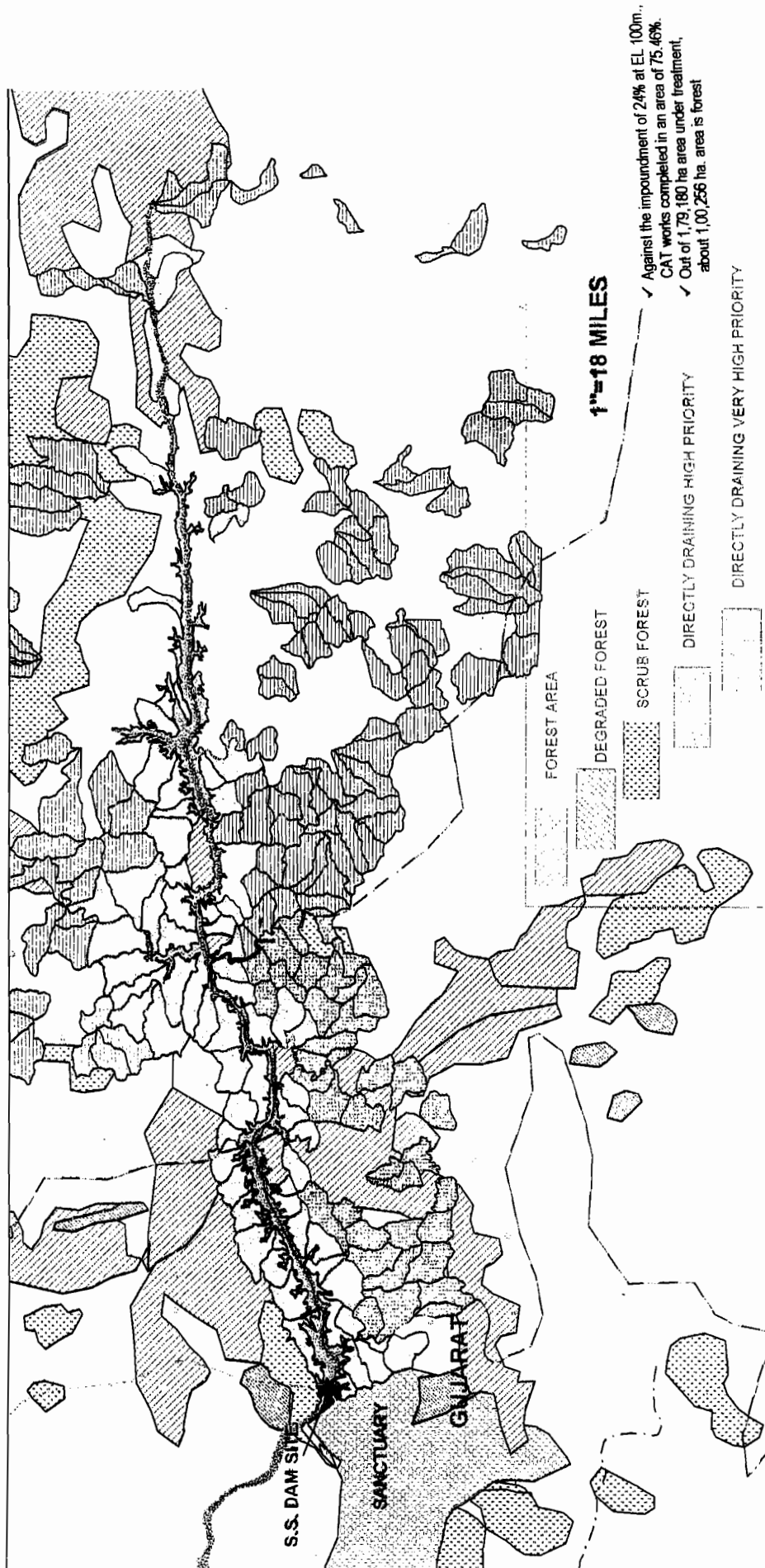
Anthropological Salvage Plan for Narmada Valley :- To date, surface scanning of the anthropological sites of 17 villages has been completed and 424 specimens taken. In this plan the Udaipur Branch of the Archaeological Survey of India has collected information and specimens from 19 villages in Gujarat.

Summary of Current Situation and Progress

	Gujarat	Madhya Pradesh	Maharashtra
Survey of villages in submergence zone	Complete for all the items in all the States.		
Identification of cultural sites	Complete for all the items in all the States.		
Action Plan	Complete		Not needed
Collection of data and documentation of sites	Complete	In progress	No required
Estimates of financial resources for relocation			
Selection of appropriate sites	Complete	In progress	
Responsibility for removal identified	Complete	Yes	
Expansion of museum sites		In progress	
Quality control / inspections *		In progress	

* Quality control of relocation operations will be the responsibility of the Departments of Archaeology of the three States. Each of these departments have proven expertise in this area and are entrusted to conduct regular inspections of temple reconstruction to ensure that no damage ensues.

ANNEX - XXXVI - (3)



SARDAR SAROVAR SUBMERGENCE AREA; SOIL MOISTURE CONSERVATION WORKS IN THE VICINITY OF THE SUBMERGENCE STATUS OF VEGETATIONAL COVER IN THE SURROUNDING AREAS; FLORA, FAUNA AND CARRYING CAPACITY ASPECTS

ANNEX - XXXVI - (4)

ACTIVITIES BEING CARRIED OUT IN SHOOLPANESHWAR SANCTUARY V/S-A-V/S
ACTIVITIES SUGGESTED IN THE ACTION PLAN

Sr. No.	GROUP PRIORITY (Actions or objectives to be carried out)	Recommended in Action Plan	Year-wise Achievements								Remarks
			1993- 94	1994- 95	1995- 96	1996- 97	1997- 98	1998- 99	1999- 2000	Total	
1	2	3	4	5	6	7	8	9	10	11	12
✓	Afforestation										
	(A) Plantation of fuel wood, timber, MFP and bamboo	500 Ha.		15 ha			62 ha	97 ha	20 ha	194 Ha.	
	(B) Plantation for making animal corridor and local migration. (gap plantations, to make compact corridors)	250 Ha.								--	Corridors have been identified, works to be started from next year
	(C) Providing and Planting fruit tree species bamboos and other mfp species to tribals around their cultivated fields(Under RDPL components CFP programme (Rate as per CFP model)	100 Ha.								--	Horticulture Plants (Mango, Chicku, Nariyali distributed to tribal.)
	Soil and Moisture Conservation Works										
	(A) Check dam									--	
	(i) Pacca/ Kachcha	25 No.	2	1	5	1	4	1	2	16 No.	
	(ii) Desilting of check dams.	25 No.								--	
	(B) Gully Plugging	500 No.								--	
	(C) Van Talavadi	25 No.	6		1	5	2	4	3	21 Nos.	
✓	ECO- DEVELOPMENT PROGRAMME IN & AROUND VILLAGES.										
	(A) Water facilities for villages and cattle.										
	(i) Well (New)	25 No.								--	
	(ii) Deepening of well	25 No.								--	
	(iii) Hand pumps	25 No.					1	1	1	3 No	
	(iv) Repairs of Hand Pump	25 No.								--	
	(v) Bore wells	5 No.				1	1	1	1	4 Nos.	
	(vi) Aveda	25 No.				1	1		1	3 Nos.	
	(B) SMC Work in agricultural fields.	500 No.								--	

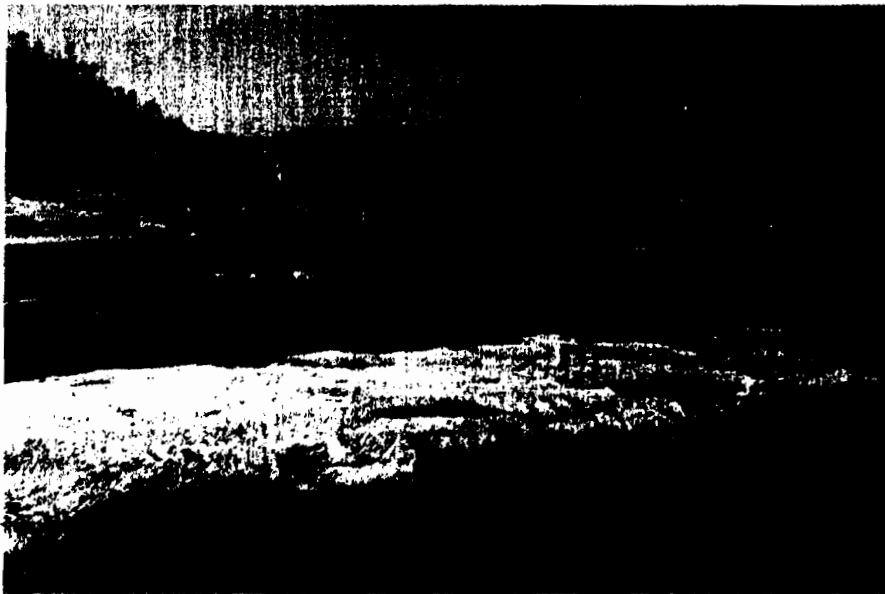
(C) School Building	5 No.					1	1		2 Nos.	
2	3	4	5	6	7	8	9	10	11	12
(D) Mobile Stores (Existing) facilities of WFP programme to be utilized.	-								--	
(E) Mobile Medical unit	1 No.								--	Presently Dediapada Unit is helping.
(F) Providing better breed of live stock	100 No.								--	
(G) Veterinary camps & vaccination of Non Sanctuary cattle.	-								--	Every year, from December to June, Three camps are held.
(H) Gobar Gas Plant	100 No.								--	
(I) Development of Non- conventional energy sources (Solar implements wind power generation etc.)	-								--	
(J) Employment oriented Training Institute.	1 No.								--	
(K) Nature Education Camps (two days per camp)	150 No.	5		4		18	37	20	84 Nos.	
(L) Poultry Development	-								--	
(M) Crematoria	-								--	
PROTECTION										
(A) Demarcation of Sanctuary Boundary	-						1263 mt	1408 mt	2671 Rmt	
(B) Erection of dry rubble wall to stop encroachment	-					8.05	10.21	17.54	35.80 km.	
(C) Setting of Wireless net work (Already existing, reinforcement required)	-				1				1 Set	
(D) Purchase of fire fighting equipment (One Truck)	-						35		35 Nos.	
(E) Fire line Works	-	1675	338	1130	215	62	100		3520 km.	
(F) Watch Tower	30 Nos.	3			2		18	5	28 Nos.	
Wildlife Management & Research										
(A) Habitat Improvement (Removal of weeds and increase of fodder spp.)	-							15	15 Ha.	

2	3	4	5	6	7	8	9	10	11	12
✓ (B) Establishment of meteorological station	2 No.								--	It is proposed for next Year.
(C) Research station at sagai.	1 No.								--	
(D)										
(D) Periodical wildlife census	-							1	1 No.	Wildlife Ccnsus- 1999
(i) Construction of cage/ enclosures (Animals & Birds)	-	2						1	3 Nos.	
(ii) Regular supply of food.	-								--	Saltics is being provided to Wildlife.
(iii) Veterinary Service	-								--	This facility is already available at Dadiapada.
(iv) Transport	-								--	
(v) Bird ringing	-								--	BNHS has been contacted and they are going to fix programme next year.
(vi) Permanent waterholes for wildlife	-		4	10	10	1	1	2	28 Nos.	
✓ TOURISM DEVELOPMENT										
(A) Orientation Center	-	1		1					2 Parts	One is already established at Kevadia.
(B) Bird observation huts at Namgir Duthar, Sagai - 3 Nos.	1 No.								--	Design for Bird observatory huts has been approved and work will be started from next year.
(C) Audio visual aids (T.V, V.C.R, Tape-recorder etc)	-					1			1 Set	
(D) Publicity & Display material	-					15			15 Nos.	

ANNEX – XXXVI – (5)

**STATUS OF FLORA AND FAUNA IN AND AROUND
SARDAR SAROVAR PROJECT
MAHARASHTRA**

Final Report Submitted
to
Department of Environment, Government of Maharashtra



SCHOOL OF ENVIRONMENTAL SCIENCES,
UNIVERSITY OF PUNE,

✓ Recommendations

To minimise the loss of biomass and life, including wildlife, anticipated due to submergence on account of filling the reservoir, following measures are recommended:

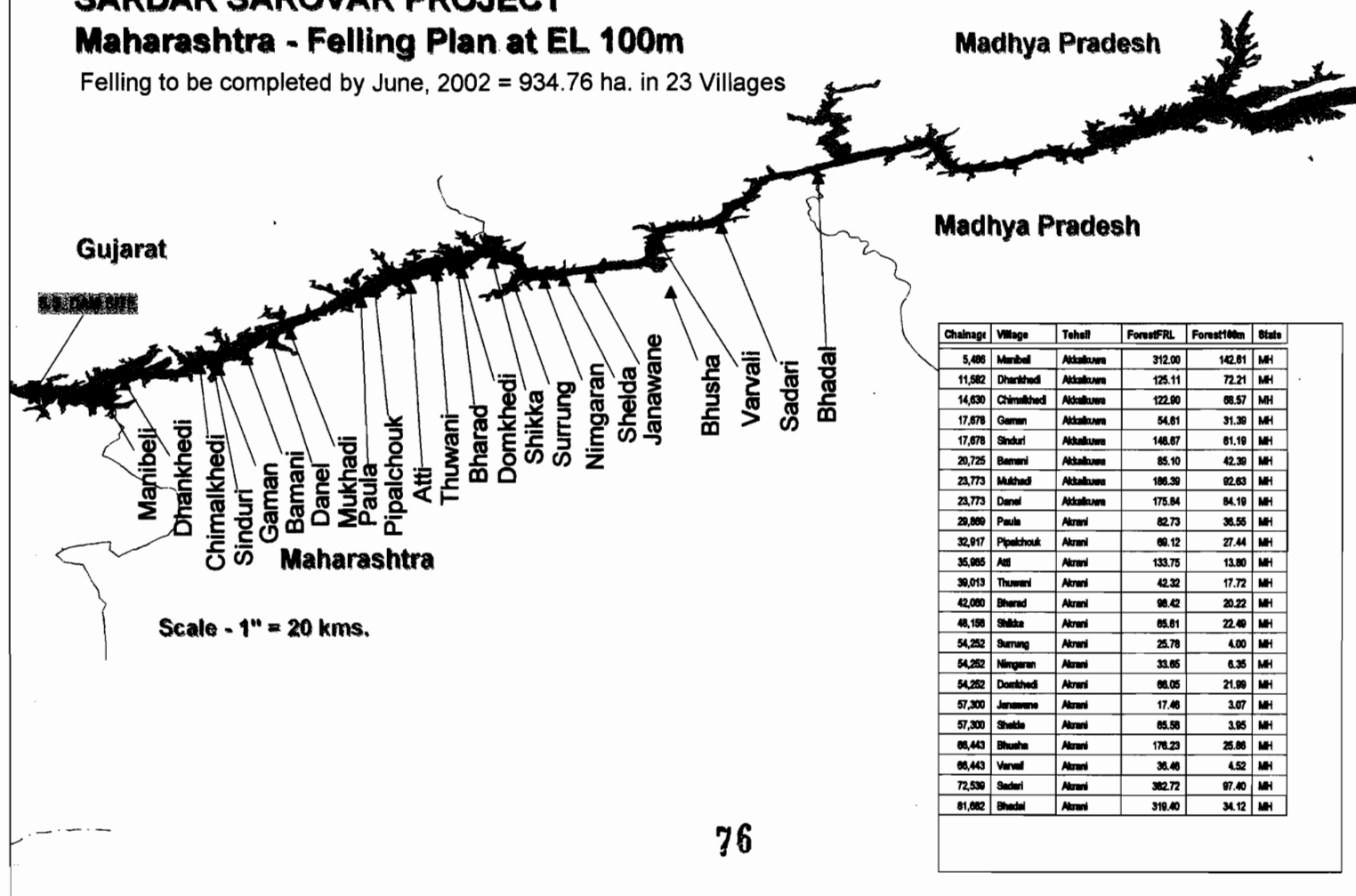
- W.V.✓ 1. Management of corridors for shifting of wildlife, several corridors, passing through moderate to good ($0 > 3$) vegetation cover are suggested.
2. Seed bank status of soils of low-lying (e.g. valley bottoms) areas having found to be good hence; it is suggested that surface soils from such areas be used to develop vegetation (natural) in degraded areas.
3. It is further suggested that these soils should be deposited, rather than spread thin at the end points of transformation, to facilitate diverse vegetation growth, comparable to natural vegetation.
4. Tree species with high diversity in the region (e.g. *Buchanania lanzan*) should be conserved on large scale, in the form of multi-region seed banks. Some of these seeds from each variety, should be planted in iso-climate regions, with care, if such regions fall in degraded areas.
5. It will be futile exercise to concentrate on one or other methods for conservation of soil since there are various types of terrains. Therefore, it is necessary to go in for a combination of more than one method as locally feasible. Small storages of run-off water, should be aimed at.
6. Based on the abundance of vegetation growth in different terrains such as vegetation along the crevices and slopes, suggestion is made to use these species with spreading habit which are already identified from this area could be effectively used for soil conservation and to develop microhabitats on difficult terrain. Such efforts will form a pioneer stages of secondary succession on distributed habitats, help to consolidate the substratum and pave the way for further regeneration on steep slopes and areas with poor soil cover (please see the Summary).
- CAT. ✓ 7. Efforts should be made to encourage conservation of soil on slopes and crests and restore adequate soil cover on undulating grounds, through deposition of soil, restoration of degraded lands, formation and retention of plant cover and eventually improvement of water potential. Reciprocally supplementary phenomena of improvement of high diversity vegetation cover and soil potential should be exploited and encouraged through meticulous planning and its execution. This for ultimate aim of improvement of carrying capacity of the region. ✓

Routine Conservation
measures taken by
Mah. F.D.

ANNEX - XXXVI - (6)

SARDAR SAROVAR PROJECT **Maharashtra - Felling Plan at EL 100m**

Felling to be completed by June, 2002 = 934.76 ha. in 23 Villages



Chainage	Village	Tehsil	Forest FRL	Forest 100m	State
5,486	Manibeli	Abkaluwa	312.00	142.81	MH
11,582	Dhankhedi	Abkaluwa	125.11	72.21	MH
14,630	Chimalkhedi	Abkaluwa	122.90	68.57	MH
17,678	Gaman	Abkaluwa	54.81	31.30	MH
17,678	Sinduri	Abkaluwa	148.67	61.19	MH
20,725	Bamani	Abkaluwa	85.10	42.30	MH
23,773	Mukhadi	Abkaluwa	186.30	92.63	MH
23,773	Danel	Abkaluwa	175.84	84.19	MH
29,889	Paula	Akrani	82.73	36.55	MH
32,917	Pipalchouk	Akrani	66.12	27.44	MH
35,065	Atti	Akrani	133.75	13.80	MH
36,013	Thuwani	Akrani	42.32	17.72	MH
42,080	Bharad	Akrani	98.42	20.22	MH
48,158	Shikka	Akrani	65.81	22.40	MH
54,252	Surrung	Akrani	25.78	4.00	MH
54,252	Nimgaran	Akrani	33.65	6.35	MH
54,252	Domkhedi	Akrani	66.05	21.96	MH
57,300	Janawane	Akrani	17.46	3.07	MH
57,300	Shelda	Akrani	65.58	3.95	MH
66,443	Bhusha	Akrani	176.23	26.86	MH
66,443	Varvali	Akrani	36.46	4.52	MH
72,539	Sadari	Akrani	382.72	97.40	MH
81,682	Bhadal	Akrani	319.40	34.12	MH

Annex-9

Annex-9

SARDAR SAROVAR PROJECT

Statement showing the forest area to be cleared in affected village of Sardar Sarovar Project

Sr. No.	Name of village.	Total area affected @		Total area affected @		Area to be cleared.											
		RL 138.68m.		RL 134.68m.		R.L.at 90m.		R.L.at 100m.		R.L.at 110m.		R.L.at 121m.		R.L.at 134.68m.			
		H	A	H	A	H	A	H	A	H	A	H	A	H	A		
<hr/>																	
<u>(A) AKKALKUWA TALUKA</u>																	
1	Manibeli...	312.00		279.60		80.48		62.13		64.76		40.83		31.40			
2	Dhankhedi...	125.97	11	117.69		50.76		21.45		21.87		14.47		9.13			
3	Chimalkhadi...	122.90		112.83		45.20		23.37		25.62		10.45		8.19			
4	Sinduri...	148.87		130.73		35.22		25.97		29.03		22.47		18.03			
5	Gaman...	54.81		48.19		27.44		3.95		4.33		7.92		4.95			
6	Bamari...	85.10		76.02		27.19		15.20		15.50		10.20		7.93			
7	Danel...	175.84		149.63		54.16		30.13		38.26		15.20		11.83			
8	Mukhadi...	186.39		175.68		56.76		35.87		37.99		25.17		19.89			
9	Mandwa...	11.02		7.68		-		-		-		3.00		4.60			
10	Jangathi...	17.96		12.96		3.17		2.07		2.36		3.54		1.82			
11	Arathi...	4.80		-		-		-		-		-		-			
12	Kukadipadar...	-		-		-		-		-		-		-			
<hr/>																	
TOTAL (A) :-		1244.08		1111.33		380.38		220.14		239.72		153.25		117.82			

(B) <u>AKRANI TALUKA</u>								
10	Faula.. 35.55	82.73	78.78	23.19	13.36	14.12	14.56	13.45
14	Pimpalchouk.. 27.44	69.12	60.19	20.20	7.24	7.64	13.57	11.54
15	Shelgada 0	1.89	1.63	-	13.80	60.93	0.47	0.60
18	Atti.. 3.20	133.75	121.30	-	13.80	66.93	26.39	14.18
17	Keli.. =	17.50	3.47	-	-	0.90	1.30	1.27
18	Thuwani.. 1.71	42.32	39.35	11.80	5.92	6.46	9.59	5.58
16	Bharad 10.01	98.42	63.37	10.95	9.27	7.55	21.40	14.20
17	Shikka 20.48	65.61	50.89	10.62	11.87	12.45	9.60	6.35
18	Domkhedi 2.00	66.05	62.35	12.17	9.82	11.03	14.40	14.93
29	Chinchkhedi 0	19.61	14.43	-	-	-	6.30	8.15
20 23	Roshmal 0	8.40	7.18	-	-	-	3.25	3.93
21 24	Surung 4.50	25.78	25.12	1.25	2.75	3.898	9.12	8.02
22 25	Nimgavan 5.35	33.65	27.57	-	6.35	9.59	6.75	4.88
23 26	Shelda 3.05	65.56	58.58	-	3.95	29.33	13.20	12.10
24 27	Junawane 1.07	17.46	14.88	-	3.07	4.48	4.02	3.31
25 28	Bhusha 15.28	176.23	149.05	8.17	17.69	18.83	55.30	49.06
26 29	Savriya 0	35.22	34.21	-	-	-	23.17	11.04
27 30	Bilgaon 0	24.68	23.97	-	-	-	15.62	8.35
28 31	Varvali 0.11	38.48	23.60	1.25	3.27	3.46	9.45	6.17
29 32	Sadri 37.40	382.72	345.17	7.35	90.05	81.10	98.15	68.52
30 33	Udadya 0	116.71	106.14	-	-	63.40	22.40	20.34
31 34	Bhadel 0	319.40	283.42	-	34.12	141.11	56.07	52.12
32 35	Khardi 0	27.96	26.56	-	-	16.86	6.59	3.11
33 36	Mal 0	44.80	43.52	-	-	16.04	19.25	8.13
TOTAL (B):-		1912.95	1664.65	106.95	232.53	515.73	460.05	349.39
GRAND TOTAL (A+B)		3157.03	2775.98	487.33	452.67	755.45	613.30	467.21

ANNEX - XXXVI - (7)

ACTION PLAN

FOR

IMPACT ASSESMENT OF

M.P. LANDS TO BE SUBMERGED

AND

ADJOINING ECOSYSTEM

[FLORA, FAUNA AND OTHER BIOTIC COMPONENTS]

FOR

SARDAR SAROVAR



NARMADA VALLEY DEVELOPMENT AUTHORITY
BHOPAL - MADHYA PRADESH (INDIA)

TABLE OF CONTENTS

Items	Page No.
-----	-----
List of Abbreviation :-	

Chapter-I : Introduction	1
Chapter-II : Catchment Development	6
Chapter-III : Wildlife Management	10
Chapter-IV : Social Forestry	13
Chapter-V : Implementation Schedule & Financial Outlay.	18
Annexures :-	

I : Action Plan for Catchment Treatment.	20
II : List of animals, birds & snakes.	105
III : List of species for planting.	108
IV : List of Villages identified for social forestry in impact areas.	111

- 18 -

CHAPTER-V

IMPLEMENTATION SCHEDULE AND FINANCIAL OUTLAY

The mains works to the implemented under this Action Plan are :-

1. Catchment Development.
2. Social Forestry.

Under component no. above, the action plan prepared for the directly draining subwatersheds in M.P. is appended as annexure I. This plan was prepared in May, 1993. Which is currently under implementation the costling works out as follows.

For Forest Areas :-

Implementation schedule is from 1992-93 to 2000-2001.

Establishment Cost	--	Rs 4.20 Crores
Cost of Works	--	Rs 28.80 Crores

Total :		Rs 33.00 Crores.

For Non Forest Areas :-

Establishment Cost	Rs 11.07 Crores
Cost of works	Rs 44.27 Crores

Total :	Rs 55.34 Crores

Grand Total : Rs 88.34 Crores.

- 19 -

For Components (2) ~~is~~ ^{is not} social Forestry since it is different to ~~fix~~ ^{if agreed,} up the targets, so the funds are ~~may~~ proposed to be allotted to Forest Department as per the annual demands received in NVDA. The works shall be executed by Forest Deptt. Subject to availability of areas in the field.

सरदार सरोवर के फ्लोरा फौना अध्ययन प्रतिवेदन का क्रियान्वयन - सामाजिक वानिकी संबंधी वृक्षारोपण कार्य की लागत का सारांश ।

जिलेवार तहसीलवार गाँवों की संख्या एवं उनका रकबा

<u>जिला</u>	<u>तहसील</u>	<u>गांव की संख्या</u>	<u>रकबा (हेक्टेयर में)</u>
धार	कुक्षी	40	2,7,6 28.90
	मनावर	31	15,3 95.69
	धरमपुरी	12	51 42.61
	योग	83	48,1 67.20
झाबुआ	अलीराजपुर	31	27, 702.41
	योग-	31	27, 702.41
खरगोन	बड़वानी	26	11, 579.75
	महेश्वर	07	2,722.96
	कसरावद	16	9,289.00
	ठीकरी	22	14,872.91
	योग-	71	38,464.62
	महायोग	185	114,334.23

मेड़ वृक्षारोपण

स्पेसिंग - 4 मी.

185 गाँव = 50 घर/गाँव = 9250 घर

9250 घर = 10 पीछे/घर = 92500 पीछे

92500 पीछे -

(अ) तार गेवियन के साथ - 92500 पीछे @ ₹55.83/पीछा = 51,64,275.00

(ब) बांस चटाई के साथ - 92500 पीछे @ ₹41.83/पीछा = 38,69,275.00

वृक्ष खेती एवं मेंडों पर वृक्षारोपण-प्रस्तावित कार्यों के उद्देश्य:-

- (1) निजी भूमि पर वृक्षारोपण
- (2) कृषि विहिन निजी भूमि (बंजर भूमि) का उपयोग
- (3) निस्तार की पूर्ति
- (4) स्थानीय लोगों को रोजगार
- (5) जनता की भागीदारी
- (6) पर्यावरण संतुलन
- (7) जनता की भागीदारी से वनों की सुरक्षा
- (8) स्थानीय जनता को पर्यावरण संतुलन बावत् समझाइस/प्रोत्साहित करना ।
- (9) वन क्षेत्र का विस्तारीकरण ।

(1) वृक्ष खेती हेतु प्राथमिकता निर्धारण/मापदण्ड

- (अ) ऐसे भूमि स्वामी जिनके पास स्वयं की 0.5 हे. से 5.000 हेक्टेयर तक की भूमि हो, एवं उनके पास स्वयं का सिंचाई का साधन हो ।

- (ब) वृक्षारोपण का अंतराल :- 3 मीटर × 2 मीटर

- (स) रोपित की जाने वाली प्रजातियाँ - (क्षेत्र की मृदा व जलवायु के अनुसार)

सागवान, आंवला, मुनगा, शीशम, महुआ, आम, जाम, कस्टार एवं घास, बाँस ।

- (द) योजना - 3 वर्ष हेतु ।

(2) मेंड वृक्षारोपण :-

- (अ) ऐसे भूमि स्वामी जिनके पास स्वयं की 0.5 हेक्टेयर से 2.5 हेक्टेयर तक की भूमि हो एवं उनके पास स्वयं का सिंचाई का साधन हो अथवा न हो ।

- (ब) वृक्षारोपण अंतराल :-

4 मीटर

- (स) रोपित की जाने वाली प्रजातियाँ :-

सागवान, बाँस, मुनगा, शीशम, आम, जाम, कटहल, नीम, पीपल इत्यादि ।

टीप:- इसी पारिप्रेक्ष्य में कृषक चाहे तो अपने घरों के आसपास भी उपरोक्त प्रजातियों का चयन करके इच्छानुसार वृक्षारोपण का लाभ उठा सकता है ।

योजनावधि - 3 वर्ष

प्रथम वर्ष में भूमि तैयारी, द्वितीय वर्ष में रोपण तथा तृतीय वर्ष में रख-रखाव का कार्य किया जावेगा ।

उपरोक्त कार्यों में रोपित पौधों में पानी देना एवं सुरक्षा का कार्य भूमि स्वामी द्वारा किया जावेगा,

शेष सभी कार्य विभाग द्वारा करवाये जावेंगे ।

कृषि खेती योजना - नक़्सा अनुमान

1.000 हेक्टेयर हेतु.

क्रमांक	कार्य का विवरण	कार्य की मात्रा	दर (रु)	राशि (रु)
1	2	3	4	5

प्रथम वर्ष :- (तैयारी)

1.	सर्वेक्षण/सीमांकन एवं खसरा नक्शा (मानचित्र) तैयार करना ।	1.000 हे.	30.38/हे.	30.38
2.	क्षेत्र इकाई	1.000 हे.	212.70/हे.	212.70
3.	घेराबंदी ले आउट	200 र.मी.	0.20/र.मी.	40.00
4.	घेराबंदी -			
	(अ) एंगल एवं तार से	200 र.मी.	150/र.मी.	30000.00
	(ब) कंटीली झाड़ियों से	200 र.मी.	50/र.मी.	10000.00
5.	गड़ड़ा चिन्हांकन कार्य	1600 गड़ड़े	151.90/हजार	243.00
6.	गड़ड़ा खुदाई कार्य साइज (45 से.मी. x 45 से.मी. x 45 से.मी.)	1600 गड़ड़े	4.25/गड़ड़ा	6800.00
7.	मिट्टी बदलवाई कार्य -			
	(अ) मिट्टी संग्रहण	48 सी.एम.टी.	48.12/सी.एम.टी.	2310.00
	(ब) खोदे गये गड़ड़ों के आधे भाग में उपताऊ मिट्टी भरना ।	1600 गड़ड़े	0.61/गड़ड़ा	960.00
8.	रोपणी व्यय -			
	(अ) वर्षाकाल में रोपण हेतु	1600 पीघे	2/पीघा	3200.00
	(ब) परिवहन/रोपण के दौरान नष्ट होने वाले पीघे (10%)	160 पीघे	2/पीघा	320.00
	(स) आपात स्थिति हेतु 20%	320 पीघे	2/पीघा	640.00
9.	अन्य व्यय			5000.00

व्यय प्रति पीघा - 31.00/- पीघा, योग
(तार फेंसिंग के साथ)

49756.00

व्यय प्रति पीघा - 19.00/- पीघा,
योग (कंटीली बाड़ के साथ)

85

29756.00

वृक्ष खेती

स्पेसिंग - 3x2 मी.

185 गाँव = 5.000 हे./गाँव = 925.000 हेक्टेयर

वृक्ष खेती के लिए प्रति कृषक 0.5 से 1 हे. क्षेत्र होना चाहिए।

925.000 हेक्टेयर -

(अ) तार फेंसिंग के साथ-925.000 हे. @ ₹70,801/हे. = 6,54,90,950.00

(ब) कंटीली बागड़ के साथ-925.000 हे. @ ₹50,801/हे. = 4,69,90,925.00

वृक्षारोपण हेतु प्रजातियों का चयन(अ) वृक्ष खेती-

सागवान, बांस, आंवला, नीलगिरी, मुनगा, अंजन, आम, महुआ, अचार, कस्टार इत्यादि तथा स्थानीय मांग को ध्यान में रखते हुए प्रजातियों में फेर बदल किया जा सकता है।

(ब) भेड़ वृक्षारोपण-

बांस, आंवला, मुनगा, आम, अमरुद, जामुन, नीबू इत्यादि तथा स्थानीय मांग के अनुसार प्रजातियों में फेर बदल किया जा सकता है।

(स) व्यय अनुमान-

सहारिया समिति द्वारा प्रस्तावित दरें जो वर्ष 1998 में न.घा.वि. प्राधिकरण में अनुमोदित की गई हैं, पर आधारित है।

विशेष टीप - प्रजातियों का अनुपात निम्नानुसार होगा -

(अ) 50 प्रतिशत फलदार प्रजातियाँ

(ब) 30 प्रतिशत निस्तार पूर्ति हेतु प्रजातियाँ

(स) 20 प्रतिशत सम्बन्धी आयु में परिपक्व होने वाली प्रजातियाँ।

वृक्ष खेती हेतु प्रस्तावित राशि :

a. तार फेंसिंग के साथ- 6,54,90,925 - 40% = 2,61,96,370.00

b. बाँस चटई के साथ- 4,69,90,925 - 60% = 2,81,94,555.00

योग:-

5,43,90,925.00

हेक्टेयर हेतु आवश्यक राशि -

5,43,90,925.00

भेड़ वृक्षारोपण हेतु प्रस्तावित राशि :

a. तार गेवियन के साथ - 51,64,270.00 - 40% = 20,69,710.00

b. बाँस चटई के साथ - 38,69,275.00 - 60% = 23,21,565.00

योग:-

43,87,275.00

92,500 फैले के रोपण हेतु आवश्यक राशि - 43,87,275.00

अतः सामाजिक वानिकी कार्य पर कुल प्रस्तावित व्यय- ₹. 5,87,78,200.00

1.	2.	3	4	5.
द्वितीय वर्ष (रोपण)				
1	रोपण हेतु (4 माह)	1600 पीघे	1.00/पीघा	1600.00
	परिवहन रोपण के दौरान नष्ट होने वाले पीघे(10%)	160 पीघे	1/पीघा	160.00
	मृत पीघों का प्रत्यारोपण(रोपण पश्चात 10%)	160 पीघे	1.25/पीघा	200.00
	आगामी वर्ष के प्रत्यारोपण हेतु 20%	320 पीघे	3/पीघा	960.00
	आपात स्थिति हेतु (20%)	320 पीघे	3/पीघा	960.00
2	पीघा परिवहन कार्य-			
	(अ) निजी वाहन से	1600 पीघे	0.50/पीघा	800.00
	(ब) सिर बोझ से	1600 पीघे	0.30/पीघा	528.00
3	कीटनाशक पाउडर गड्ढों में डालना			
	(अ) क्रय	8 कि. ग्रा.	18/कि. ग्रा.	144.00
	(ब) लेबर व्यय	1600 पीघे	0.20/पीघा	320.00
4.	रोपण	1600 पीघे	0.91/पीघा	1456.00
5	थाला बनवाई	1600 पीघे	0.91/पीघा	1456.00
6	निंदाई 1600 पीघे	0.85/पीघा		1360.00
7.	स्वादि स्लवाई			
	(अ) क्रय	16 कि. ग्रा.	6/कि. ग्रा.	96.00
	(ब) लेबर व्यय	1600 पीघे	0.20/पीघा	320.00
8	कीटनाशक स्प्रे			
	(अ) क्रय	1.5लीटर	300/लीटर	450.00
	(ब) लेबर व्यय	1600 पीघे	0.20/पीघा	320.00
9	अन्य व्यय		4500 रु. मुश्त	3000.00
व्यय प्रति पीघा - 9/- पीघा, योग				14130.00

टीप- द्वितीय वर्ष में रोपित पीघों में कम से

कम 6 बार पानी दिया जावेगा । पानी देने एवं सुरक्षा

की जिम्मेदारी भूमि स्वामी की होगी ।

1	2	3	4	5
तृतीय वर्ष (रख-रखाव)				
1	<u>रोपणी व्यय</u>			
	(अ) मृत पीधों का प्रत्यारोपण	160 पीधे	1.25/पीघा	200.00
	(ब) परिवहन/रोपण के दौरान नष्ट होने वाले पीधे 10%	16 पीधे	1.25/पीघा	20.00
	(स) निंदाई के दौरान बदले जाने वाले पीधे 10%	16 पीधे	1.50/पीघा	24.00
	(द) आपात स्थिति हेतु 20%	32 पीधे	3/पीघा	96.00
2	<u>पीघा परिवहन</u>			
	(अ) निजी वाहन से	160 पीधे	0.50/पीघा	80.00
	(ब) सिर बोझ से	160 पीधे	0.33/पीघा	53.00
3	<u>मृत पीधों के प्रत्यारोपण हेतु गड़ड़ा खुदाई कार्य</u>	160 गड़ड़े	2/गड़ड़ा	320.00
4	<u>कीटनाशक डलवाई</u>			
	(अ) क्रय	1 कि.ग्रा.	18/कि.ग्रा.	18.00
	(ब) लेबर व्यय	160 पीधे	0.20/पीघा	32.00
5	<u>मृत पीधों का प्रत्यारोपण</u>	160 पीधे	0.91/पीघा	146.00
6	<u>थाला बनवाई</u>	1600 पीधे	0.91/पीघा	1456.00
7	<u>निंदाई</u>	1600 पीधे	0.85/पीघा	1360.00
8	<u>खाद डलवाई</u>			
	(अ) क्रय	10 कि.ग्रा.	6/कि.ग्रा.	60.00
	(ब) लेबर व्यय	1600 पीधे	0.20/पीघा	320.00
9	<u>कीटनाशक छिड़काव</u>			
	(अ) क्रय	1.5 लीटर	300/लीटर	450.00
	(ब) लेबर व्यय	1600 पीधे	0.20/पीघा	320.00
10.	<u>अन्य व्यय</u>			2000.00
व्यय प्रति पीघा - ₹4.34/- प्रति पीघा; योग -				6955.00
महायोग तार के साथ				70801.00
कंटीली बागड़				50801.00
व्यय प्रति पीघा - तार के साथ कंटीली बागड़				44.00

टीप - तृतीय वर्ष में रोपित पीधों को तीन बार पानी दिया जावेगा। पानी देने एवं सुरक्षा की जवाबदारी भूमि स्वामी की होगी।

मेड़ों पर वृक्षारोपण :- (1.000 हे. हेतु) - लागत अनुमान

1	2	3	4	5
प्रथम वर्ष (तैयारी)				
1	सर्वेक्षण/सीमांकन/खसरा मानचित्र तैयार करना	1.000 हे.	30.38/हे.	30.38
2	क्षेत्र सफाई	1.000 हे.	212.70/हे.	213.00
3	<u>घेराबंदी</u>			
	(अ) तार के गेवियन से	600 नग	200/नग	12000.00
	(ब) बांस की चटाई से	600 नग	60/नग	3600.00
4	गड़ड़ा चिन्हांकन कार्य	600 नग	151.90/हजार	91.00
5	गड़ड़ा खुदाई कार्य			
	साईज (45 से.मी.×45 से.मी.×45 से.मी.)	600 नग	425/नग	2550.00
6	<u>मिट्टी बदलवाई कार्य</u>			
	(अ) संग्रहण	27 सी.एम.टी.	4812/सी.एम.टी.	1299.00
	(ब) खोदे गये गड़ड़ों के आधे भाग में मिट्टी भरना	600 नग	0.61/गड़ड़ा	366.00
7	<u>रोपणी व्यय</u>			
	(अ) वर्षाकाल में रोपण हेतु	600 पौधे	2.00/पौधा	1200.00
	(ब) परिवहन/रोपण के दौरान नष्ट होने वाले पौधे (10%)	60 पौधे	2/पौधा	120.00
	(स) आपात स्थिति हेतु 20%	120 पौधे	2/पौधा	240.00
8	<u>अन्य व्यय</u>			4000.00
	व्यय प्रति पौधा - ₹36.84/-; तार के गेवियन के साथ - योग			22109.00
	व्यय प्रति पौधा ₹22.84/-; बांस की चटाई (गेवियन के साथ) - योग			13709.00

द्वितीय वर्ष (रोपण)

1.	रोपण हेतु (4 माह)	600 पौधे	1.00/पौधा	600.00
	परिवहन रोपण के दौरान नष्ट होने वाले पौधे 10%	60 पौधे	1.00/पौधा	60.00
	मृत पौधों का प्रत्यारोपण 10%	60 पौधे	1.25/पौधा	75.00
	आगामी वर्ष के प्रत्यारोपण हेतु 20%	120 पौधे	3/पौधा	360.00
	आपात स्थिति हेतु 20%	120 पौधे	3/पौधा	360.00

1	2	3	4	5
2	<u>पौधा परिवहन कार्य</u>			
	(अ) निजी वाहन से	600 पौधे	0.50/पौधा	300.00
	(ब) सिर बोझ से	600 पौधे	0.33/पौधा	198.00
3	<u>कीटनाशक पाउडर गड़दों में डालना</u>			
	(अ) क्रय	5 कि. ग्रा.	18/कि. ग्रा.	90.00
	(ब) लेबर व्यय	600 कि. ग्रा.	0.20/पौधा	120.00
4	रोपण 600 पौधे	600 पौधे	0.91/पौधा	546.00
5	थाला बनवाई	600 पौधे	0.91/पौधा	546.00
6	<u>खाद डलवाई</u>			
	(अ) क्रय	1 लीटर	300/लीटर	300.00
	(ब) लेबर व्यय	600 पौधे	0.20/पौधा	120.00
8	निंदाई 600 पौधे	0.85/पौधा	0.20/पौधा	510.00
9	अन्य व्यय			3000.00

व्यय प्रति पौधा - 12/- पौधा योग- 7365.00

टीप - द्वितीय वर्ष में रोपित पौधों को पानी देना एवं सुरक्षा की जिम्मेदारी भूमि स्वामी की होगी ।

तृतीय वर्ष (रख-रखाव)

1	<u>रोपणी व्यय -</u>			
	(अ) मृत पौधों का प्रत्यारोपण	60 पौधे	1.25/पौधा	75.00
	(ब) परिवहन/रोपण के दौरान नष्ट होने वाले पौधे 10%	6 पौधे	1.25/पौधा	7.00
	(स) निंदाई के दौरान बदले जाने वाले पौधे 10%	6 पौधे	1.50/पौधा	9.00
	(द) आपात स्थिति हेतु 20%	12 पौधे	3/पौधा	36.00

1	2	3	4	5
2	<u>पौधा परिवहन</u>			
	(अ) निजी वाहन से	60 पौधे	0.50/पौधा	30.00
	(ब) सिर बोझ से	60 पौधे	0.33/पौधे	20.00
3	मृत पौधों के प्रत्यारोपण हेतु गड़दा खुदाई कार्य	60 गड़दे	2/गड़दा	120.00
4	<u>कीटनाशक डलवाई</u>			
	(अ) क्रय	1/2 कि.ग्रा.	18/कि.ग्रा.	9.00
	(ब) लेबर व्यय	60 पौधे	0.20/पौधा	12.00
5	मृत पौधों का प्रत्यारोपण	60 पौधे	0.91/पौधा	54.00
6	थाला बनवाई	600 पौधे	0.91/पौधा	546.00
7	निंदाई	600 पौधे	0.85/पौधा	510.00
8	<u>खाद डलवाई</u>			
	(अ) क्रय	10 कि.ग्रा.	6/कि.ग्रा.	60.00
	(ब) लेबर व्यय	600 पौधे	0.20/पौधा	120.00
9	<u>कीटनाशक छिड़काव</u>			
	(अ) क्रय	1 लीटर	300/लीटर	300.00
	(ब) लेबर व्यय	600 पौधे	0.20/पौधा	120.00
10	अन्य व्यय			2000.00
व्यय प्रति पौधा - 6.7/- पौधा योग				4028.00
महायोग - तार गेवियन के साथ				38502.00
बांस चटाई के साथ				25102.00
व्यय प्रति पौधा - तार गेवियन के साथ				55.8
बांस कटाई के साथ				41.8

टीप - रोपित पौधों को पानी देने एवं सुरक्षा की जवाबदारी भूमि स्वामी की होगी ।
विशेष टीप - यदि फलदार वृक्ष निजी रोपणी से क्रय किये जाते हैं तो उसमें 20/- प्रति पौधा व्यय आयेगा ।

10

टीप - एक ग्राम में औसत 50 घर मानकर चलने से प्रति घर 10 पीछे लगाने से ग्राम में 500 पीछे लगते हैं ।

इस प्रकार तीन वर्ष हेतु प्रति पीछा व्यय -

- (अ) तार गेवियन के साथ-रु 55.83/ पीछा
- (ब) बांस की चटाई के साथ-रु41.83/- पीछा

STATE FOREST RESEARCH INSTITUTE, JABALPUR, (M.P.)

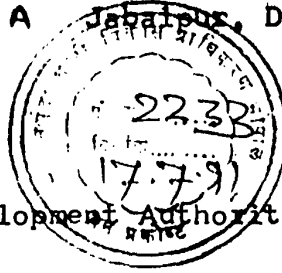
ANNEX - XXXVI - (8)

No. SFRI/NVDA/FMA/SS/ 2228 A

Jabalpur, Dt. 8.7.91.

To,

Member,
(Env't. & Forests),
Narmada Valley Development Authority,
Narmada Bhawan,
BHOPAL (M.P.)



Sub:- Scheme for clear felling the forest areas to be submerged in Sardar Sarovar Project.

Ref:- Your letter No. NVDA/FMA/Forests/496, dt.22-4-91 and this office No. 730, Dated 4-3-91.

Sir,

With reference to your letter under reference this office has obtained the Photo stat copies of the current 1: 50,000 (2 cms = 1 km) Scale Range management maps of working plans and schemes of Jhabua, Dhar and Badwani Forest divisions for preparation of above scheme as desired.

(2) Kindly find herewith the area statement No. 'A' showing the existing compt. Nos. Felling series and proposed new coupes Nos for clear felling the forest areas to be submerged in Sardar Sarovar during 1991-92 and 1992-93. Maps on scale 4: 50,000 (2 cms = 1 km) scale showing the existing forest working system's comptt. Nos. Felling series bound aries, FRL. Countour line of 455, (138.78 mtrs) and the proposed new ^{Coupe} boundaries and Nos. which are to be clear felled during 1991-92 and 1992-93 are enclosed herewith for favour of your perusal. There are no working plan nor scheme for Pati R.F. area of Badwani Forest Division, hence the proposed coupe Nos I and II of SSP. have been formed according to the forest

93

-2-

guard's beat areas.

(3) Forest Vegetation and Wild Life -

Narmada river is passing through compact forest area of 4,700 to 5,000 sq km (approx.) spread over in M.P., Maharastra and Gujarat States for which kindly peruse map No. 2. Total forest area under submergence of Sardar Sarovar 3 states is only 138 sq km and in case of M.P. its only 27 sq km Average width of submergence area is less than $\frac{1}{4}$ to 2 km wide in forest area.

Forest areas to the north of Narmada River are very poor i.e. under stocked having blanks falling in the Dhar forest Division. On Southern side, forest areas of Badwani Division are also understocked. The forests of Jhabua are of poor site quality i.e. IV b Teak/Mixed and some pathes of Anjan (H. binata) with low density. In the forests of Dhar and Badwani illicit felling, cultivation, grazing and fires are rampant and as a result of these biotic pressures the forests have been converted into degraded wastelands. In the year 1963-64 the forests of Dhar division were recorded to have IV b Teak Mixed quality forests and now its density has gone down. The areas are now understocked with blanks.

There are compact blocks of forests adjoining 27 km of submergence area and therefore these appears to be little difficulty in the movement of wild-life. Had these been isolated patches probably specific measures should have been required to move the wildlife. Absence of wildlife in the likely submergence area suggests that the animals might have already moved deeper in side the forests.

- 3 -

The enclosed plan of action for clearing of submergence area is being submitted for your approval and necessary action. As already informed ^{maps} ~~maps~~ on 1: 15,000 scale are not available and therefore these maps have been prepared on 1: 50,000 scales.

Thanking you,

Encl: Proposals in duplicate.

Yours faithfully,


(Dr. Ram Prasad)


877

Statement - A

Scheme for clear felling the forest areas to be submerged in Sardar Sarovar Project M.P.

Name of Division/ District	Range	Name of new proposed Felling series/Coupe No.	Forest areas for clear felling in ha. (Areas Below the FRL-455' (138.78 mtrs Contour)	Year of felling	CompttNo.	Area	Remarks
2	3	4	5	6	7	8	9
Jhabua	Mathwar	Sardar Sarovar		1991-92	1	205.200	Alkadia Imp. W.C.
Jhabua		Coupe No. I			2	81.600	-"-
					16	7.600	-"-
					22	6.800	-"-
					17	91.800	Vakner - "-
					18	119.000	Shakaraja Selection-cu Imp. W.C.
					19	52.400	-"-
					20	0.400	-"-
Total -					-	564.800	
-Do-	-Do-	Sardar Sarovar		1992-93	37	0.800	-"-
		Coupe No. II			38	120.000	-"-

- 2 -

55	55.600	Shakraja Selection-cum-Imp.W.C.	
56	35.000	"	"
58	4.800	"	"
60	2.000	Bhitada	"
75	8.000	"	"
76	1.200	"	"
77	5.600	"	"
87 & 88	32.800	"	"
120	20.800	Sendwa	"
95	50.400	Sendwa Bhanchedi	"
96	11.600	"	"
99	6.400	"	"
100	7.600	"	"
101	6.800	"	"
102	13.600	"	"
358 and 359	24.000	Anjan lopping cycle	Areas of Dhar W.P. by E.G. Venkatram, W.D.O. 1964-65
360 and 361	23.200	"	"
@ Areas of Working Scheme of Jhabua by H.S. Parihar 1963-64			

 Total- 430.200

 G.T. @ 995.000

- 3 -

45	Kukshi	<u>Sardar Sarovar</u> Coupe No. I	1991-92	622 ✓ (P-39)	71.225	@1) Complete Kukshi-Range forest area is under catchment Protection W.C., W.C. 1987-90. 2) Old Comptt No. are shown in brackets i.e. Venkat ramans up of 1964-65. 3) The entire area of catchment Protection W.C. is understated and balnk with density less than 0.4
				618 (P-35)	45.325	
				619 ✓ (P-36)	16.185	
				620 ✓ (P-32)	38.850	
				626 ✓ (P-41)	3.666	
				627 ✓ (P-40)	38.850	
				628 ✓ (P-42)	61.506	
				629 (P-43)	3.666	
				Total - 279.273		

45 -Do-	-Do-	<u>Sardar Sarovar</u> Coupe No. II	1992-93	593 (P-13)	57.460
				594 (P-14)	30.361
				595 (P-15)	9.712
				598 (P-18)	29.137

- 4 -

602 51,800
(P-22)

603 51-800
(P-23)

617 32,375
(P-34)

Total -262,645

G.T. 541,918

58 Badwani
West Nimar
(Khargone)

Badwani

Sardar Sarovar

Coupe No. I

1991-92 Forest Guard's
beat

1) Bhadal 200,000

2) Katabandni 175,000

3) Tuwarkheda 259,640

Total - 634,640

@ Areas not covered by any working
plan or working scheme as yet.
Entire area of division is under
stocked and blank as well as heavily
encroached. Y

62 -Do-

-Do-

Sardar Sarovar
Coupe No. II

1992-93) Kuli 310,150

2) Bhamta 250,000

Total @ 560,150

G.T. @ 1194,798

Total submergence
area -2731,708

- 5 -

Abstract

1. Jhabua

Sardar Sarovar

Coupe No. I	1991-92	564,800
- " - II	1992-93	430,200

995,000

2. Dhar

Sardar Sarovar

Coupe No. I	1991-92	279,273
Coupe No. II	1992-93	262,645

541,918

3. Badwani

Sardar Sarovar

Coupe No. I	1991-92	634,648
- " - II	1992-93	560,150

1194,798

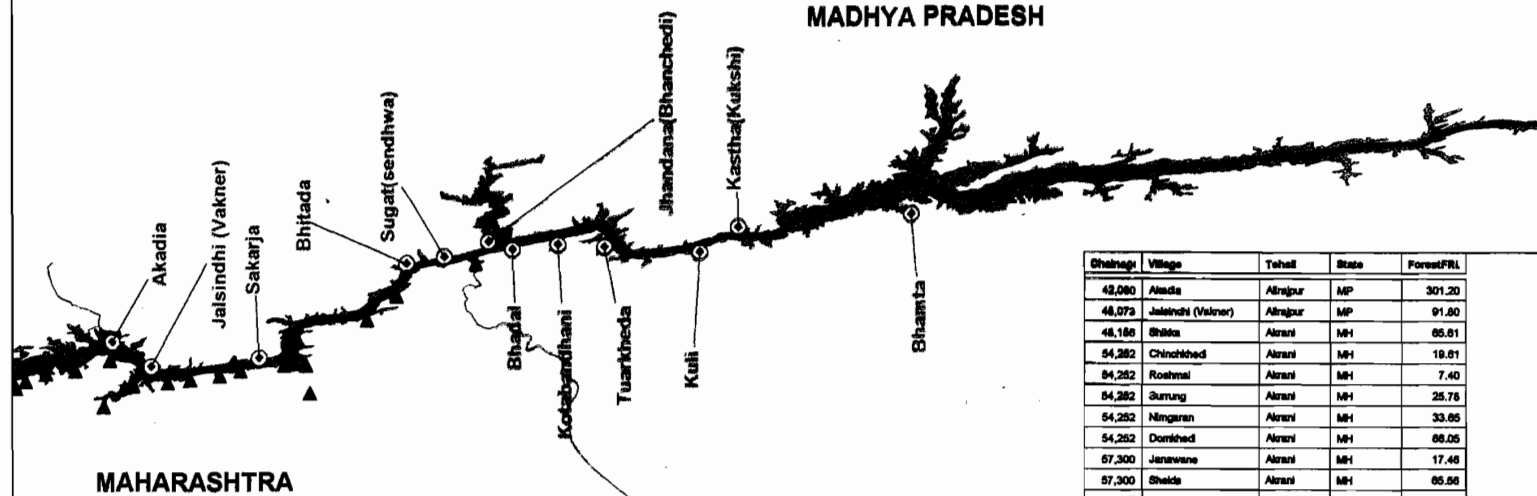
G.F. 2731,716

SARDAR SAROVAR PROJECT

Felling plan for areas in MP at FRL

Felling to be completed at FRL = 821 ha

Balance area is either blank or cultivated



Shetnagri	Village	Tehsil	State	Forest FRL
42,080	Alada	Alirajpur	MP	301.20
48,073	Jalsindhi (Vakner)	Alirajpur	MP	91.80
48,186	Bhikha	Alirajpur	MH	65.81
54,282	Chinchhed	Alirajpur	MH	19.81
54,282	Roshni	Alirajpur	MH	7.40
54,282	Sumung	Alirajpur	MH	25.78
54,282	Nimgan	Alirajpur	MH	33.85
54,282	Dorichhed	Alirajpur	MH	66.05
57,300	Janewane	Alirajpur	MH	17.48
57,300	Bhikha	Alirajpur	MH	65.56
60,347	Mal	Alirajpur	MH	44.70
60,409	Sakarja	Alirajpur	MP	368.00
63,395	Khard	Alirajpur	MH	27.96
66,443	Bilgeon	Alirajpur	MH	24.88
66,443	Vavali	Alirajpur	MH	36.48
66,443	Bhusha	Alirajpur	MH	178.23
66,443	Sevarya	Alirajpur	MH	35.22
71,886	Bhitada	Alirajpur	MP	49.80
72,539	Bedar	Alirajpur	MH	382.72
72,587	Udadya	Alirajpur	MH	116.71
74,482	Sugati (sendhwa)	Alirajpur	MP	20.80
78,102	Jhandana (Bhanchedi)	Alirajpur	MP	143.80
81,682	Bhadai	Alirajpur	MH	319.40
81,682	Barvani	Alirajpur	MP	200.00
83,511	Kotabandhani	Barvani	MP	175.00
86,558	Tuarkheda	Barvani	MP	258.85
86,816	Kuli	Barvani	MP	310.15
86,821	Kastha (Kukshi)	Kukshi	MP	541.82
117,847	Bhanta	Barvani	MP	250.00

District/ Division	Tahsil/ Range	Comptt. No.	Teak Quality			Mixed Quality			Under stocked	Blank	Encroa- chment	1/2 River bed	Forest village area	Revenue	Total	Remark
			IVa	IVb	Total	IVa	IVb	Total								
Dhar	Kukshi	593	-	-	-	-	-	-	-	55	2	-	-	-	57	P present treatment working circle
		594	-	-	-	-	-	-	-	30	-	-	-	-	30	P Catchment protection working circle
		595	-	-	-	-	-	-	-	10	-	-	-	-	10	P "
		598	-	-	-	-	-	-	-	29	-	-	-	-	29	P "
		602	-	-	-	-	-	-	-	52	-	-	-	-	52	P "
		603	-	-	-	-	-	-	-	47	-	-	-	-	47	P "
		617	-	-	-	-	-	-	-	29	-	-	-	-	29	P "
		618	-	-	-	-	-	-	-	45	-	-	-	-	45	P "
		619	-	-	-	-	-	-	-	16	-	-	-	-	16	P "
		620	-	-	-	-	-	-	-	39	-	-	-	-	20	P "
		622	-	-	-	-	-	-	-	71	-	-	-	-	71	P "
		626	-	-	-	-	-	-	-	4	-	-	-	-	4	P "
		627	-	-	-	-	-	-	-	39	-	-	-	-	39	P "
		628	-	-	-	-	-	-	-	62	-	-	-	-	62	P "
		629	-	-	-	-	-	-	-	4	-	-	-	-	4	P "
Total		15	-	-	-	-	-	-	552	10	-	-	-	542		

Note - P - Partially submerged

Division	Range	No.	IVa	IVb	Total	IVa	IVb	Total	plus ex- tremely under stacked	11	12	13	14	15	16	17
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Jhabua	Alirajpur															
Jhabua	Mathwad	1	-	145	145	-	-	-	-	-	60	-	60	205	Imp WC	Akadiya
		2	-	40	40	-	12	12	-	-	30	-	30	82	-do-	-do-
		15	-	8	8	-	-	-	-	-	-	-	-	8	P -do-	-do-
		17	-	52	52	-	32	32	-	-	8	-	8	92	P -do-	Vakner
		18	-	29	29	-	60	60	-	-	30	-	30	119	P SCI	Sakraja
		19	-	-	-	-	46	46	-	-	6	-	6	52	P -do-	-do-
		20	-	1	1	-	-	-	-	-	-	-	-	1	P IMP	Vakner
		22	-	4	4	-	-	-	-	-	3	-	3	7	P -do-	Akadiya
		37	-	1	1	-	-	-	-	-	-	-	-	1	P SCI	Sakraja
		38	-	10	10	-	100	100	-	-	10	-	10	120	P -do-	-do-
		55	-	40	40	-	6	6	-	-	7	-	7	55	P -do-	-do-
		56	-	20	20	-	-	-	-	-	15	-	15	35	P -do-	-do-
		58	-	1	1	-	4	4	-	-	-	-	-	5	P -do-	-do-
		60	-	2	2	-	-	-	-	-	-	-	-	2	P -do-	-do-
		75	-	4	4	-	4	4	-	-	-	-	-	8	P -do-	-do-
		76	-	1	1	-	-	-	-	-	-	-	-	1	P -do-	-do-
		77	-	1	1	-	5	5	-	-	-	-	-	6	P -do-	-do-
		87	-	-	-	-	32	32	-	-	-	-	-	32	P -do-	-do-

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		95	-	-	-	-	48	48	-	-	2	-	2	50	P -do-	-do-
		96	-	-	-	-	9	9	-	-	3	-	3	12	P -do-	-do-
		99	-	-	-	-	6	6	-	-	-	-	-	6	P -do-	-do-
		100	-	-	-	-	8	8	-	-	-	-	-	8	P -do-	-do-
		101	-	-	-	-	7	7	-	-	-	-	-	7	P -do-	-do-
		102	-	-	-	-	13	13	-	-	-	-	-	13	P -do-	-do-
		120	-	-	-	-	21	21	-	-	-	-	-	21	P -do-	-do-
		358	-	-	-	-	24	24	-	-	-	-	-	24	P -do-	-do-
		359	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		360	-	-	-	-	23	23	-	-	-	-	-	23	P -do-	-do-
		361	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		29	-	359	359	-	462	462	-	-	174	-	-	995	-	-

Note - P - Partially submerged

104

District/ Division	Tahsil/ Range	Name of forest block	Comptt. No. or name of village	Teak Quality			Mixed Quality			Under stocked blank wasteland etc.	Cultivation	Total (8+11+12) (13)	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13	14
West Ninar Badwani	Badwani	Pati reserved forest block	Kuli FV - (encroa- ched- forest area)	-	-	-	-	-	-	280	9	9	There is no teak forest in submergence area - sub- mergence area is containing mixed forest below 0.4 density and most of the forest areas are blank with scrub and heavily encroached by villagers
-do-		Ghonsa F.V.		-	-	-	-	-	-		21	21	
		Total		-	-	-	-	-	-	280	30	320	
-do-	Badwani/	-do-	Tumar- khera F.V.	-	-	-	-	-	-		16		
			Dhajra F.V.	-	-	-	-	-	-		15		
			Kari FV	-	-	-	-	-	-	762	20		
			Kotha bandhni F.V.	-	-	-	-	-	-		52		
			Bhadal F.V.	-	-	-	-	-	-		20		
		Total		-	-	-	-	-	-	762	123	885	
		Grand Total		-	-	-	-	-	-	1042	153	1195	

Note - R.F. and P.F. areas of Badwani Forest Division have not been covered by any working plan or working scheme hence the compartmentwise areas have not been given in the statement. In place of of compartments forest village wise areas are given.



केवल सरकारी प्रयोग के लिये
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**सरदार सरोवर परियोजना के पुरातत्वीय एवं मानवशास्त्रीय
संबन्धित प्रगति का पुनरीक्षण**

**Review Of the Progress on Archaeological and
Anthropological Aspects in Relation to Sardar Sarovar
and Indira Sagar Projects**

**तीसरी बैठक का कार्यवृत्त
Minutes of the 3rd Meeting**

**8 मार्च, 2001 को न.नि.प्रा. सम्पर्क शाखा, भिकाजी कामा भवन,
नई दिल्ली में सम्पन्न हुई**

**Held at NCA Liaison Office, Bhikaji Cama Place,
New Delhi on 8th March, 2001**

**नर्मदा नियंत्रण प्राधिकरण
NARMADA CONTROL AUTHORITY**

**इन्दौर
अप्रैल, 2001**

**Indore
April, 2001**

**SUMMARY RECORDS OF
REVIEW MEETING ON ARCHAEOLOGICAL AND ANTHROPOLOGICAL
ASPECTS OF SARDAR SAROVAR AND INDIRA SAGAR PROJECTS
HELD ON 8TH MARCH, 2001 AT NEW DELHI**

I N D E X

Item No.	CONTENTS	Page No.
1.	The plan for relocation of Archeological sites / Monuments getting affected at EL 100m including the ones in villages getting affected due to backwater effect and identification of the Monuments located at higher elevations in respect of whom it would be difficult to provide for the relocation due to inundation of the approaches, once the height of the Dam is raised to EL 100m.	1
	Progress of works on Sardar Sarovar and Indira Sagar Projects by the State Department of Archeology and Museum, Govt. of Madhya Pradesh.	2
	Relocation of 15 Monuments and 6 mounds for excavation by the Archeological Survey of India entrusted by the State Department of Archeology & Museum as per the revised action plan of 1999 referred to as action plan of 1997.	4
2.	Plan for protection of the north bastion of the Joga Fort from the scouring of the water of the Indira Sagar Project by Archaeological Survey of India.	5
3.	Re-confirmation of the data and map made available by the ASI on the presence / absence of the Archeological finds of significance in the submergence zone of the Indira Sagar Project.	6
4.	Work on Narmada Basin by Anthropological Survey of India	6
ANNEXURES		
ANNEX-1	List of participants.	1
ANNEX-2	Data sheet containing details of the RL of monuments and mounds impacted by the SSP waters at levels, provided by the NVDA during the meeting.	2
ANNEX-3	GIS generated map on Archaeological and Anthropological aspects – Relocation / protection / excavation work plan for SSP.	3
ANNEX-4	Status Report on relocation work of monuments impacted by SSP, submitted by the Commissioner, Archaeology, Govt. of M.P.	4
ANNEX-5	ASI letter D.O.No. 9-6/93-EE dated 30.6.1999, regarding administrative difficulties in taking of the work of the Joga Fort.	17

**SUMMARY RECORDS OF
REVIEW MEETING ON ARCHAEOLOGICAL AND ANTHROPOLOGICAL
ASPECTS OF SARDAR SAROVAR AND INDIRA SAGAR PROJECTS
HELD ON 8TH MARCH, 2001 AT NEW DELHI**

The third meeting to review the progress on Archeological and Anthropological aspects in relation to Sardar Sarovar and Indira Sagar Projects was held on 8.3.2001 under the Chairmanship of the Member (E&R), NCA, at 11:00 AM in the Committee Room of NCA, New Delhi. The list of the participants is enclosed at **Annex.1**.

The Chairman welcomed the participants and after brief introduction urged them to discuss the issues identified in the note enclosed with the Agenda of the meeting. The discussions on the issue was taken up thereafter.

The summary record of the last review on the subject was forwarded to all concerned vide Office letter No.Env-4(11)/200/166-76 dated 6.7.2000. There were no comments on the same and, therefore, the Minutes were confirmed as circulated.

- 1. The plan for relocation of Archeological sites / Monuments getting affected at EL 100m including the ones in villages getting affected due to backwater effect and identification of the Monuments located at higher elevations in respect of whom it would be difficult to provide for the relocation due to inundation of the approaches, once the height of the Dam is raised to EL 100m.**

Initiating the discussions, Member (E&R), NCA, informed that following the directions of the Apex Court, in the Civil Writ Petition No.319 of 1994, NCA has prepared a time frame for construction works on the Sardar Sarovar Project and other works have to be synchronized with this schedule. He stated that the issue related with Archeology were discussed by the Environment Sub-group during its 35th meeting held on 19.1.2001 at Kevadia Colony, under the Chairmanship of Secretary, MOEF. During the discussions on Archeological and Anthropological aspects, a plan for relocation of Archeological aspects / Monuments, getting affected at EL 100m., including ones in villages getting affected due to backwater affect was requested from GOMP. The Commissioner, State Department of

Archeology and Museum, GOMP, had agreed that the needed details would be submitted within a week's time.

The Commissioner, State Department of Archeology and Museum, GOMP, requested the Project Officer, Dr. Singh and Shri R.K. Behre, Additional Director, to provide the information already available on this aspect. Shri Behre, submitted the information based on the data sheet received by him from the SSNNL and the State Department of Archeological and Museum. The information given is placed at **Annex.2**.

Shri Man Dahima, Commissioner, Archeology, however, stated that in order to ascertain status of the approach to the monuments which were to be impacted due to the affect of submergence and its back water would take some more time as the data was being collected from the field formation. It was agreed by the Member (Rehabilitation), NVDA, that the needed information would be made available within a month's time.

The GIS generated map bringing out the location of Monuments vis-a-vis submergence at EL 100m., and its back water is enclosed at **Annex.3**.

Progress of works on Sardar Sarovar and Indira Sagar Projects by the State Department of Archeology and Museum, Govt. of Madhya Pradesh.

Dr. Singh, Project Officer, NVDA, presented the progress of protection / relocation works related to ISP and Omkareshwar Projects, a copy of the information presented by him is placed at **Annex.5**. A summary of the status of works on Monument / Mounds in relation to pondage as well as backwater effects of one in hundred flood is presented below. Accordingly, it was observed that no Monument or Mound is impacted by the proposed pondage at EL 100m. and that the impacts due to backwater would remain same to the impacts normally observed even without dam in place .

Sl. No	Particulars				Status
	Name of monument	Village	RL in m	Impact at pondage at EL 100	
1.	Shiv Mandir	Bada Barda	130.970	No	Relocated completely.
2.	Bhawani Mata Mandir	Khujawa	147.825	No	Scrapping of lime plaster done for numbering and detailed drawing.
3.	Shomeshwar Mandir	Khujawa	129.530	No	Progress is nil, due to agitation.
4.	Shiv Mandir (S.No.1)	Khujawa	135.460	No	Drawing numbering and photography completed. Work of relocation started but due to public resentment, it was stopped by the collector.
5.	Shiv Mandir (S.No.2)	Khujawa	135.475	No	Drawing numbering and photography completed. Work of relocation started but due to public resentment, it was stopped
6.	Shiv Mandir (S.No.3)	Khujawa	135.165	No	Drawing numbering and photography completed. Work of relocation started but due to public resentment, it was stopped
7.	Rock-cut caves	Khujawa	135.075	No	Progress is nil due to agitation.
8.	Big statues	Khujawa	146.395	No	Work is in progress. Financial approval for Rs.2.80 lacs already granted.
9.	Shiv Mandir (Mauni Baba Ashram)	Pipaldagari	153.775	No	Relocated completely in village Nimbola.
10.	Rock-cut-sculptures	Pipaldagari	130.440	No	Relocated completely in village Nimbola.
11.	Shiv Mandir	Bodhwada	138.685	No	Pre-relocation work is completed, land allotment awaited

✓ 12.	Narmadeshwar Mandir	Dehar	134.665	No	Pre-relocation work is completed, land allotment awaited
✓ 13.	Baneshwar Mandir (Shiv Mandir)	Navadatoli	137.765	No	Pre-relocation work is completed. Photography is in progress. NOC from managing trust awaited.

Excavation

Sl. No	Particulars			Status
	Name of mound	RL in m	Impact at pondage At EL 100	
1.	Mound at village Maruchichli Historic period	151.635	No	Proposed for excavation during 2001-02.
2.	Mound at village Ekalwara Pre-historic	146.875	No	The work commenced.
3.	Mound at village Katnera Historic period	139.865	No	Permission for excavation obtained.
4.	Mound at village Khalghat (Khalkhurd) Pre-historic	156.310	No	Completed.
5.	Mound at village Kalyanpura Copper & pre-historic	148.035	No	Permission for excavation obtained.

Relocation of 15 Monuments and 6 mounds for excavation by the Archeological Survey of India entrusted by the State Department of Archeology & Museum as per the revised action plan of 1999 referred to as action plan of 1997.

Initiating the discussions on the re-location of Monuments by the ASI, Specialist (Environment), NCA, informed that a great deal of correspondence was exchanged between NVDA and ASI and that the status of works on ten Monuments and excavation of six Mounds was to be provided by the ASI. The Chairman requested Member (E&F), NVDA, to pursue the matter with the ASI, Bhopal. It was also suggested by him that the status of these Monuments in relation to submergence at EL 100m., and its backwater may also be provided. Member (E&F), NVDA, informed that in case ASI is not willing to pursue re-location / excavation works, this work may also be taken up by the State Department of Archeology & Museum, GOMP.

2. Plan for protection of the north bastion of the Joga Fort from the scouring of the water of the Indira Sagar Project by Archaeological Survey of India.

Initiating the discussion on the issue related with protection of the Joga Fort, Specialist (Environment), NCA, brought out that the action plan for protection of Joga Fort from waters of the ISP was prepared by the ASI at an estimated cost of Rs.1.50 crores. However, they have indicated their inability to take up the work due to administrative difficulties. The communication received from the ASI in this regard is placed at **Annex.4**. The Member (E&F), NVDA, expressed the opinion that since Joga Fort is a centrally protected Monument the job must be handled by the ASI and that funds for the above Project would be provided by the NHPC Ltd. However, in case, if ASI felt that there was no problem with the act and that NVDA could also handle the job, it would be agreeable to the NVDA subject to the condition that - (1) All legal formalities would be completed by the ASI and (2) Constant supervision has to be ensured by the ASI.

Member (E&F), NVDA, informed that Unit-I and III of the Indira Sagar Project were being commissioned through joint venture with NHPC Ltd. and that in view of this, the works related to the Project would actually be done by the NHPC Ltd. and, therefore, he desired that in future discussions, representative of the NHPC Ltd. may also be invited. He further stated that NHPC Ltd. would also pay the cost of the Project including Monuments and would charge it to the Project. The role of the NVDA would mainly comprise of a coordinator.

Replying to the question by the Chairman, Member (E&F), NVDA, informed that the time schedule laid down by the NHDC for ISP and Omkareshwar Project was 5 and 7 years respectively. However, on behalf of the GOMP, the NHDC Ltd. were trying to expedite the construction works at the earliest and that the time schedule laid down might be advanced.

3. Re-visiting the submergence zone of the Indira Sagar Project by the State Department of Archaeology & Museum, GOMP for verification of the data made available by the ASI on the presence / absence of the Archeological finds of significance .

Following the suggestions, based on the findings of the ASI publication, on need for a verification and timely protection of the representative significant cultural sites in the Narmada Valley of Dr Romilla Thapper, the state department of archaeology and museum ,GOMP was requested by the NVDA to revisit the villages likely to be impacted by the ISP for verification of the cultural site of significance. It was informed that 78 villages of the ISP were re-visited and report has been prepared and the work was under progress.

4. Work on Narmada Basin by Anthropological Survey of India.

Dr. Harshwardhan, Dy. Director, ASI, informed that the detailed investigations were carried out by the Anthropological Survey of India during 1992-93 and a draft report was submitted. This report was under finalization and would be made available soon. The Chairman requested him to make available a copy of the Interim / Draft / Final Report to the NCA for circulation to all concerned.

Regarding publication on Anthropological aspects, he informed that the reports related to Narmada Projects are under press and further information would be made available as soon as these are finally published. In response to a question from the Chairman, Project Officer informed that Navadatoli was actually a Dock Yard and that Dr. Sankhalya of the Deecan College, Pune, had excavated this Site during early 90s and that the report was available.

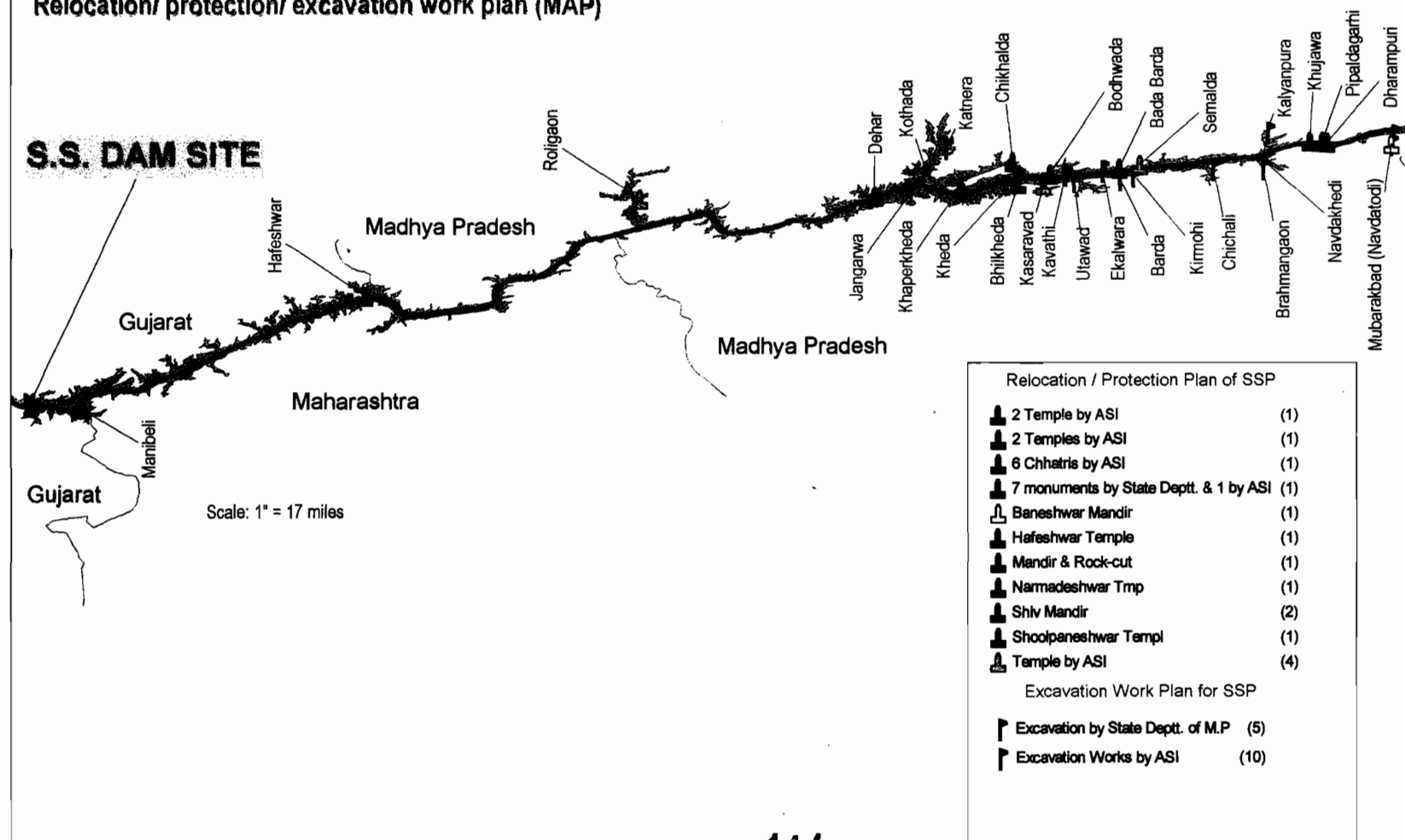
The Chairman summed up the discussions and stated that the information as requested above may be made available at the earliest and, if possible, before the proposed visit to the Narmada Project of the Secretary, MOEF, some time during April, 2001.

The meeting ended with vote of thanks to the Chair.

SARDAR SAROVAR PROJECT

Archaeological and Anthropological aspects

Relocation/ protection/ excavation work plan (MAP)



Chainage	Village	Monument	RLofMonument	WOfdam	Dam90	Dam95	Dam100	MinHL
84,425	Rollgaon	Temple by ASI	130.8400	112.99	117.97	120.30	122.92	131
111,551	Dehar	Narmadeshwar Tmp	134.8850	127.81	128.36	128.95	129.91	134
117,037	Kothada	Temple by ASI	137.8100	130.43	130.78	131.17	131.87	130
125,878	Bhilkheda	6 Chhatris by ASI	133.7900	133.78	133.78	134.15	134.54	134
131,887	Kasaravad	Temple by ASI	138.9800	135.22	135.22	135.51	135.81	139
132,581	Bodhwada	Shiv Mandir	138.8850	135.31	135.31	135.59	135.88	136
128,181	Chikhaldia	2 Temple by ASI	134.8800	134.30	134.30	134.64	134.99	135
143,553	Bada Barda	Shiv Mandir	130.9700	141.07	141.07	141.07	141.07	137
194,757	Semalda	Temple by ASI	136.1000	138.93	138.93	138.93	138.93	156
171,594	Khujawa	7 monuments(130)+1/	135.0000	148.29	148.29	148.29	148.29	0
180,432	Pipaldagarhi	Mandir & Rock-cut	130.4400	148.67	148.67	148.67	148.67	0
173,427	Dharampuri	2 Temples by ASI	135.0000	148.97	148.97	148.97	148.97	0
199,939	Mubarakbad (Navdatod)	Baneshwar Mandir	137.7850	154.86	154.86	154.86	154.86	0
45,108	Hafeshwar	Hafeshwar Temple	105.0000	82.14	113.25	116.86	120.39	79
5,486	Manibeli	Shoolpaneshwar Tem	39.0000	53.54	112.78	116.49	120.07	50

Chainage	Village	Mound	RLofMound	WOfdam	Dam90	Dam95	Dam100	MinFL
114,903	Jangarwa	Mound by ASI	131.82	129.45	129.86	130.32	131.11	122
122,523	Khaperkheda	Mound by ASI	136.00	133.14	133.14	133.61	134.07	139
120,999	Katnera	Mound	139.87	132.83	132.83	133.15	133.86	128
139,286	Utawad	Mound by ASI	1.00	137.50	137.50	137.50	137.80	135
138,982	Kavathi	Mound by ASI	132.67	137.42	137.42	137.42	137.80	128
129,228	Kheda	Mound by ASI	136.62	134.64	134.64	134.96	135.29	137
138,982	Ekalwara	Mound	148.88	137.42	137.42	137.42	137.80	131
143,553	Barda	Mound by ASI	136.60	138.93	138.93	138.93	138.93	134
152,697	Kirmohi	Mound by ASI	1.00	141.16	141.16	141.16	141.16	137
162,755	Chichali	mound	151.63	143.64	143.64	143.64	143.64	135
165,193	Kalyanpura	Mound	148.03	144.45	144.45	144.45	144.45	137
160,012	Navdakhedi	Mound by ASI	136.62	142.92	142.92	142.92	142.92	137
183,480	Khalkhurda	Mound	156.31	149.37	149.37	149.37	149.37	0
199,939	Mubarakbad (Navdatod)	Mound by ASI	149.34	154.86	154.86	154.86	154.86	0
167,327	Brahmangaon	Mound by ASI	1.00	145.38	145.38	145.38	145.38	138

ANNEX – XXXVI – (11)

S S P : HEALTH PLAN

SUMMARY : COST ESTIMATE DETAILS

116

S S P : HEALTH PLAN
SUMMARY : DETAILED COST ESTIMATES

S.No	ITEM	ESTIMATED COST (LAC Rs.)		
		GOMP	GOM	GOG
		1 YEAR	10 YEARS	17 YEARS
A	PREVENTIVE AND CURATIVE ASPECTS OF MALARIA AND OTHER COMMUNICABLE DISEASES			
N(1)	FACILITIES CREATED/PROPOSED AT PROJECT SITE			
1	Hospital including building ,staff quarters,medicines			
	a. Salaries			39.610
	b. Medicines & food			0.000
	c. Electricity, water, stationery			0.000
	d. POL/maintenance			5.100
	e. X-Ray films			0.000
	f. Ambulance			2.000
	g. X-ray M/c			0.000
	h. Equipment			0.250
	i. Beds			0.090
	j. Laboratory articles			0.250
	k. Infrastructure			0.000
	l. Cost of hospital buildings			0.000
	m. Cost of Staff quarters, etc.			0.000
	Total			47.300
2	Primary Health Center			
	a. Salaries			
	b. Beds			
	c. Laboratory			
	d. Ambulance			
	e. Buildings			
	Total			
3	Dispensary run by Jaiprakash Associates			
	a. Salaries			
	b. Medicines			
	c. Equipment & furniture			
	d. Construction of quarters			
	e. Ambulance			
	f. Beds			
	g. Laboratory			
	h. Buildings			
	i. Others			
	Total			
4	General hospital (Rajpipla)			
5	Preventive Health Organisation, Kevadia			3.91

S S P : HEALTH PLAN
SUMMARY : DETAILED COST ESTIMATES

S.No	ITEM	ESTIMATED COST (LAC Rs.)		
		GOMP	GOM	GOG
		1 YEAR	10 YEARS	17 YEARS
A(2)	FACILITIES CREATED/PROPOSED AT PERIPHERAL VILLAGES			
1	Hospital including building ,staff quarters,medicines etc.			
	a. Salaries	15.447		
	b. Medicines & food	0.576		
	c. Electricity, water, stationery	0.100		
	d. POL/maintenance	0.150		
	e. X-Ray films	0.060		
	f. Ambulance	0.300		
	g. X-ray M/c	2.000		
	h. Equipment	3.000		
	i. beds	0.000		
	k. Laboratory articles	0.000		
	l. Infrastructure	0.000		
	m. Cost of hospital buildings	25.000		
	n. Cost of Staff quarters, etc.	93.000		
	Total	140.000		
2	Community health centres			
	a. Salaries	0.63		
	b. Construction of buildings	20.00		
	Total	20.63		
3	Primary health centre			
	a. Salaries			
	b. 5 beds per PHC	6.00		
	c. Laboratory	0.40		
	d. Ambulance	8.00		
	e. Buildings	80.00		
	Total	94.40		
4	Establishment of civil dispensaries			
	a. Salaries	1.26		
	b. Medicines	0.24		
	c. Equipment & furniture	0.20		
	d. Construction of quarters	18.30		
	e. Ambulance	2.00		
	f. 5 beds per dispensary	1.50		
	g. Laboratory	0.10		
	Total	23.60		

S S P : HEALTH PLAN
SUMMARY : DETAILED COST ESTIMATES

S.No	ITEM	ESTIMATED COST (LAC Rs.)		
		GOMP	GOM	GOG
		1 YEAR	10 YEARS	17 YEARS
5	Sub Health Centers			
	a. Equipment & furniture	10.00		
	b. Construction of quarters	75.00		
	Total	85.00		
6	Mobile units, I/c mobile PH Lab			
	a. Salaries	2.13		
	b. Medicines	1.00		
	c. POL	0.24		
	d. Contingencies	0.67		
	e. Van, fully equipped	4.00		
	f. X-ray unit	2.00		
	g. Lab equipments	0.20		
	h. Establishment of floating dispensary	0.00		
	i. Establishment of temporary rescue camps	0.00		
	Total	10.24		
A(3)	FACILITIES CREATED/PROPOSED AT RESETTLEMENT SITES			
1	Hospital including building ,staff quarters, medicines etc.			
	a. Salaries		0.000	
	b. Medicines & food		0.000	
	c. Electricity, water, stationery		0.000	
	d. POL/maintenance		0.000	
	e. X-Ray films		0.000	
	f. Ambulance		0.000	
	g. X-ray I/c		0.000	
	h. Equipment		0.000	
	i. beds		0.000	
	j. Laboratory articles		0.000	
	k. Infrastructure		0.000	
	l. Cost of hospital buildings		0.000	
	m. Cost of Staff quarters, etc.		0.000	
	Total		0.000	
2	Community health centres			
	a. Salaries			
	b. Construction of buildings			
	Total			
3	Primary health centre			
	a. Salaries		144.60	
	b. 5 beds per PHC		0.00	
	c. Laboratory		0.00	
	d. Ambulance		38.50	
	e. Buildings		0.00	
	f. Anti malarial activities			76.81
	Total		183.10	76.81

S S P : HEALTH PLAN
SUMMARY : DETAILED COST ESTIMATES

S.No	ITEM	ESTIMATED COST (LAC Rs.)		
		GOMP	GOM	GOG
		1 YEAR	10 YEARS	17 YEARS
4	Establishment of civil dispensaries			
	a. Salaries			
	b. Medicines			
	c. Equipment & furniture			
	d. Construction of quarters			
	e. Ambulance			
	f. 5 beds per dispensary			
	g. Laboratory			
	Total		149.40	
5	Sub Health Centers			
	a. Equipment & furniture			
	b. Construction of quarters			
	Total			
6	Mobile units,i/c mobile PH Lab			
	a. Salaries		0.00	
	b. Medicines		0.00	
	c. POL		0.00	
	d. Contingencies		0.00	
	e. Van, fully equipped		0.00	
	f. X-ray unit		0.00	
	g. Lab equipments		0.00	
	h. Establishment of floating dispensary		126.50	
	i. Establishment of temporary rescue camps		28.80	
	Total		155.30	
B	LONG TERM STRATEGIES			
1	Monitoring and Evaluation	4.94	20.00	
2	Evaluation and Forecasting	5.00		
3	Epidemiological Surveillance Studies	29.63	10.00	2.50
4	Water quality monitoring			
5	Health Awareness,Seminar,Training etc.			
	Grand Total (Rs. in lac)	413.44	517.80	128.61

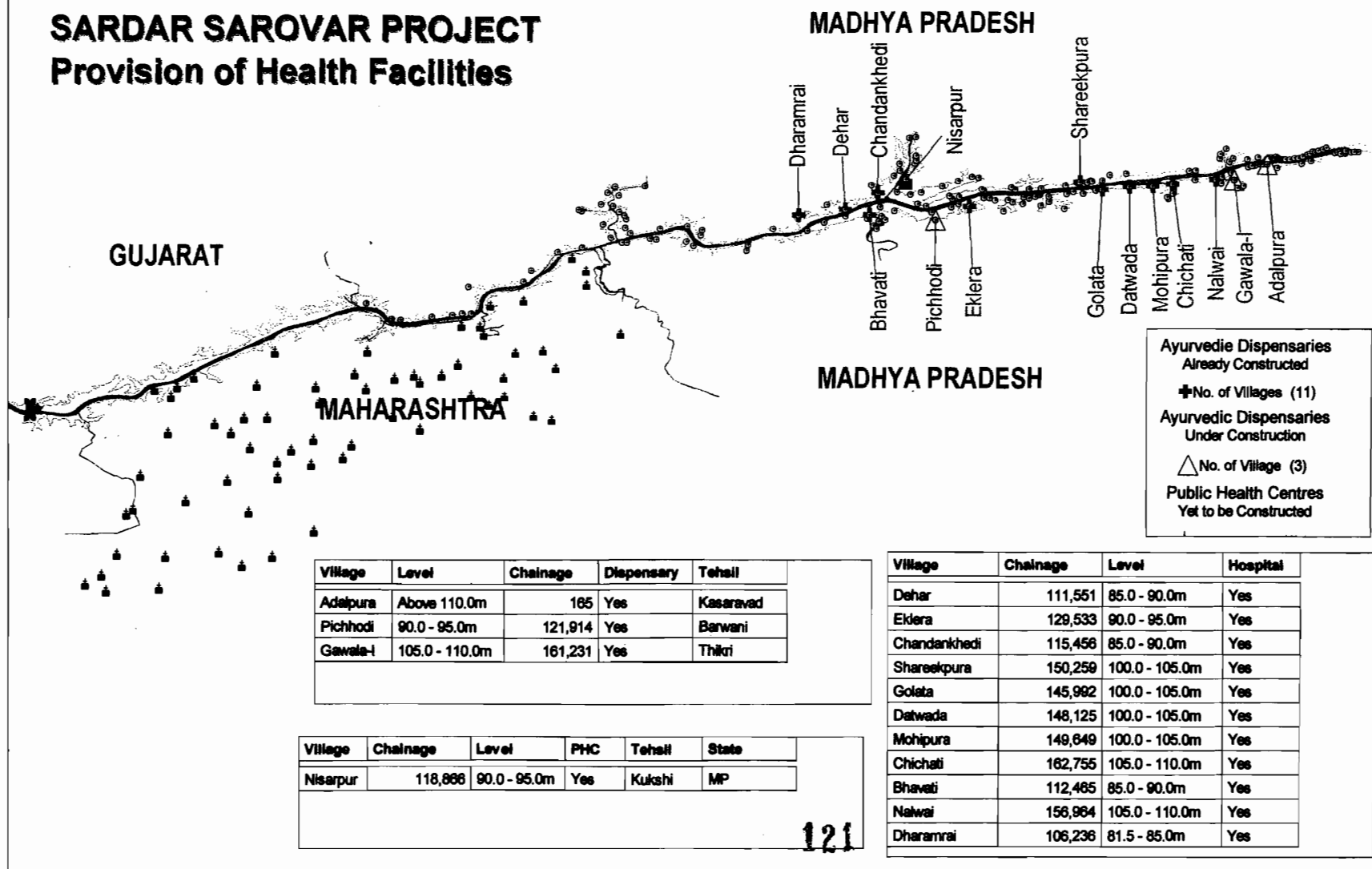
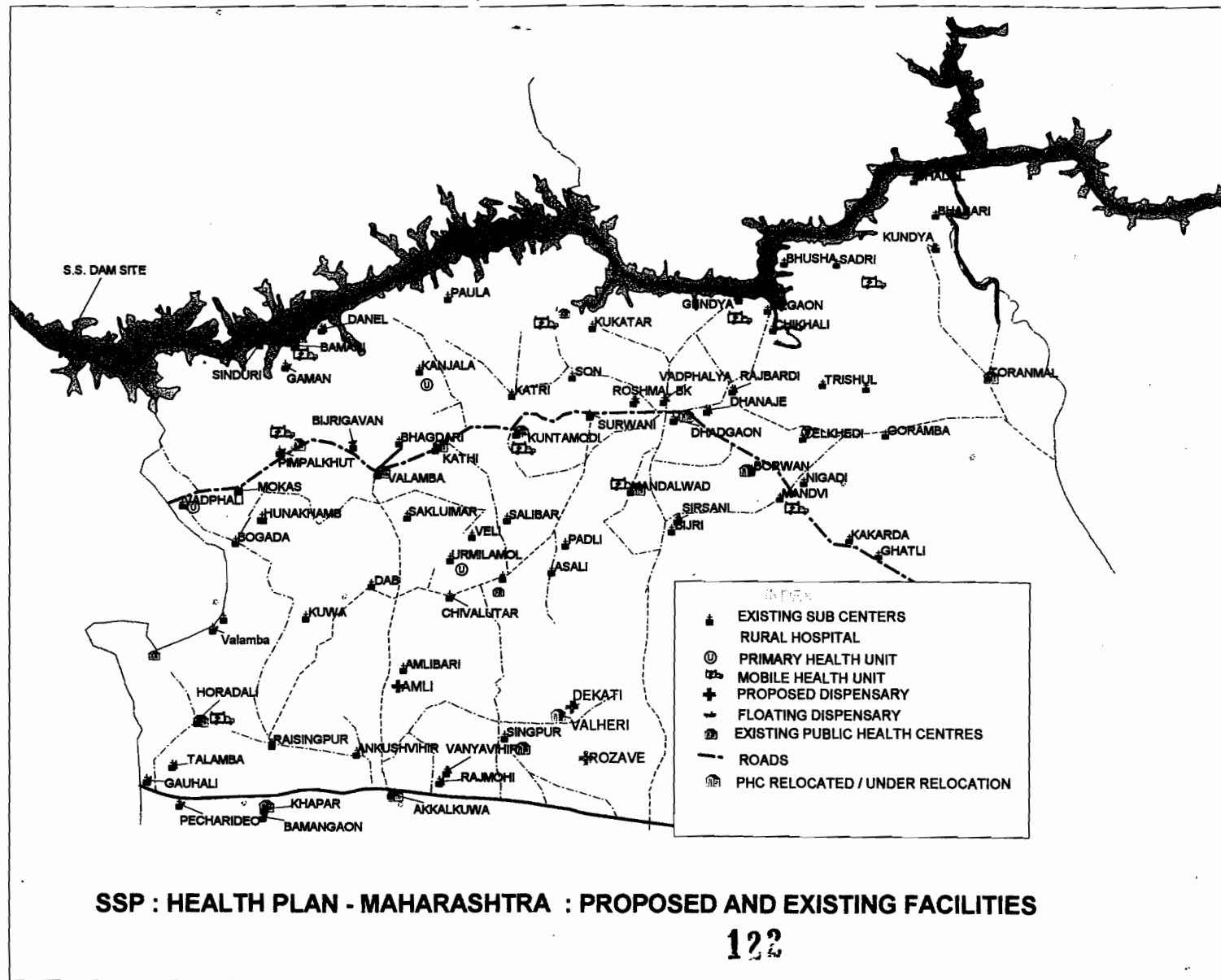
ANNEX - XXXVI - (12)**SARDAR SAROVAR PROJECT
Provision of Health Facilities**

PLATE - XV



ANNEX – XXXVI – (13)

SARDAR SAROVAR PROJECT

HEALTH ACTION PLAN GUJRAT

2000 – 2001

Prepared By

Commissionerate Of Health & Medical Services

[Health Section]

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123

SARDAR SAROVAR PROJECT
HEALTH MANAGEMENT PLAN
YEAR 2000 --2001

INTRODUCTION:

Experiences of water resource development projects all over the world have revealed problem of water related diseases particularly vector borne diseases like malaria due to several favourable factors for the transmission of such diseases.

In the Sardar Sarovar Project area also during the construction phase incidence of malaria has increased considerably. Several studies conducted previously have also identified malaria as a major problem in the project area. Based on the findings of the studies and the malaria situation in the project area various measures are suggested for effective control of malaria.

For undertaking preventive and control measures the project ~~are~~ is divided in to three major parts viz. project area, resettlement sites and command area. As irrigation has not commenced in the command area at present there is no need to make any specific measures eventhough monitoring of the canal already constructed needs to be done to identified water stagnation and breeding of mosquitoes. Ones irrigation starts then command area also should get proper attention and there should be a long term action plan for control of water related / vector borne diseases. At present the focus should be on project area and rehabilitation sites. The actions proposed as well as activities being undertaken (already initiated) in 2000 - 01 for project area as well as rehabilitation sites are as under:

(I) Project area:

Looking to the severity of malaria in project area and as per the recommendations of public health experts, commissionerate of health proposed to establish a preventive health organisation at kevadiya colony. This proposal has been sanctioned by Sardar Sarovar Narmada Nigam Limited (SSNNL). The preventive health organisation comprises 36 posts of different categories and action to fill these posts has been initiated.

The preventive health organisation is sanctioned with a specific purpose and will be beneficial not only to the project area but also can function as a nodal agency for undertaking preventive and control measures to minimize the risk of vector borne diseases particularly malaria to gear up this organisation activities, during this year all efforts will be made to start this organisation. Budgetary provision of Rs. 50.33 lakh is made in this year budget for this organisation.

(1.1) Functions of Preventive Health Organisation

The main function of this organisation is the control of all water related diseases in the project area and to prevent the occurrence of epidemic. However the detailed functions are as under.

1. Surveillance for case detection and treatment of malaria and other communicable diseases.
2. Anti-larval measures (Identifying, eliminating/treating potential mosquito breeding places)
3. Insecticidal spray (For control of adult mosquitoes/vectors in high risk and problematic villages)
4. Entomological studies (To monitor vector prevalence, it's density and other entomological parameters)

5. To undertake environmental sanitation methods for control of water related diseases.
6. Engineering methods of vector control through inter sectoral coordination.
7. Information Education and Communication to promote awareness in the community and to avail their participation.

This Preventive Health Organisation will look after 50000 populations in and around the project area. The staff sanctioned under this organisation is not sufficient to cover the 50000 population as per norms but with close coordination with the existing network of Primary Health Care delivery system it will be able to take care of the entire project and surrounding areas. Job functions of different categories of staff is enclosed in annexure -I

Now a Medical cell has started functioning at Vadodara under SSPA. To avoid duplication of efforts the Preventive Health Organisation can be attached to this cell for better co-ordination and effective implementation. Henceforth funds can also be placed at the disposal of this cell.

(1.2) District Malaria Organisation

Till the preventive health organisation start functioning the district malaria organisation will under take all anti malaria measures as per the guidelines of Government of India through the primary health care delivery system. The activities proposed & in progress are as under:

- 1 **Surveillance to detect and treat malaria cases.** Active surveillance is carried out by MPHIs every fortnight and passive surveillance is undertaken by primary health centers. 21 MPHIs are working in the 4 PHCs functioning in the project areas. Under the World Bank assisted project 27 Malaria Link Volunteers have been appointed in 79 villages around the project for surveillance work. Rapid diagnostic kits are provided to PHCs and hospitals in the project areas, which can diagnose *P. falciparum* quickly.

- 2 **Insecticidal spray.** In the project area and rehabilitation sites in and around the project area insecticidal spray is regularly carried out. In addition to this those villages which qualifies for spray is also covered under spray during this year. The population being covered under spray in the project area from 1/6/2000 is 40419.
- 3 **Biological Control.** This control measure is being carried out as a part of National Anti Malaria Programme for control of mosquito breeding through the introduction of larvivorous fishes.
- 4 **Entomological studies.** Regular entomological studies are also carried out to find out the prevalence of vector mosquitoes.
- 5 **Curative referral services by Project Hospital.**
At the project site a hospital having 48 Medical and Paramedical staff is functioning which provides referral services and curative services. This hospital has 50 beds. More over some staff is available for undertaking preventive measures like anti larval activity.

The efforts made by the state as well as the district authorities contributed in reducing the disease load in the community residing in the project area. This is quite clear from the malaria situation of the 4 PHCs located in the project area and also the overall malaria situation of the 4 PHCs as shown in the following tables

(1.3) Malaria situation in PHCs located in SSP area

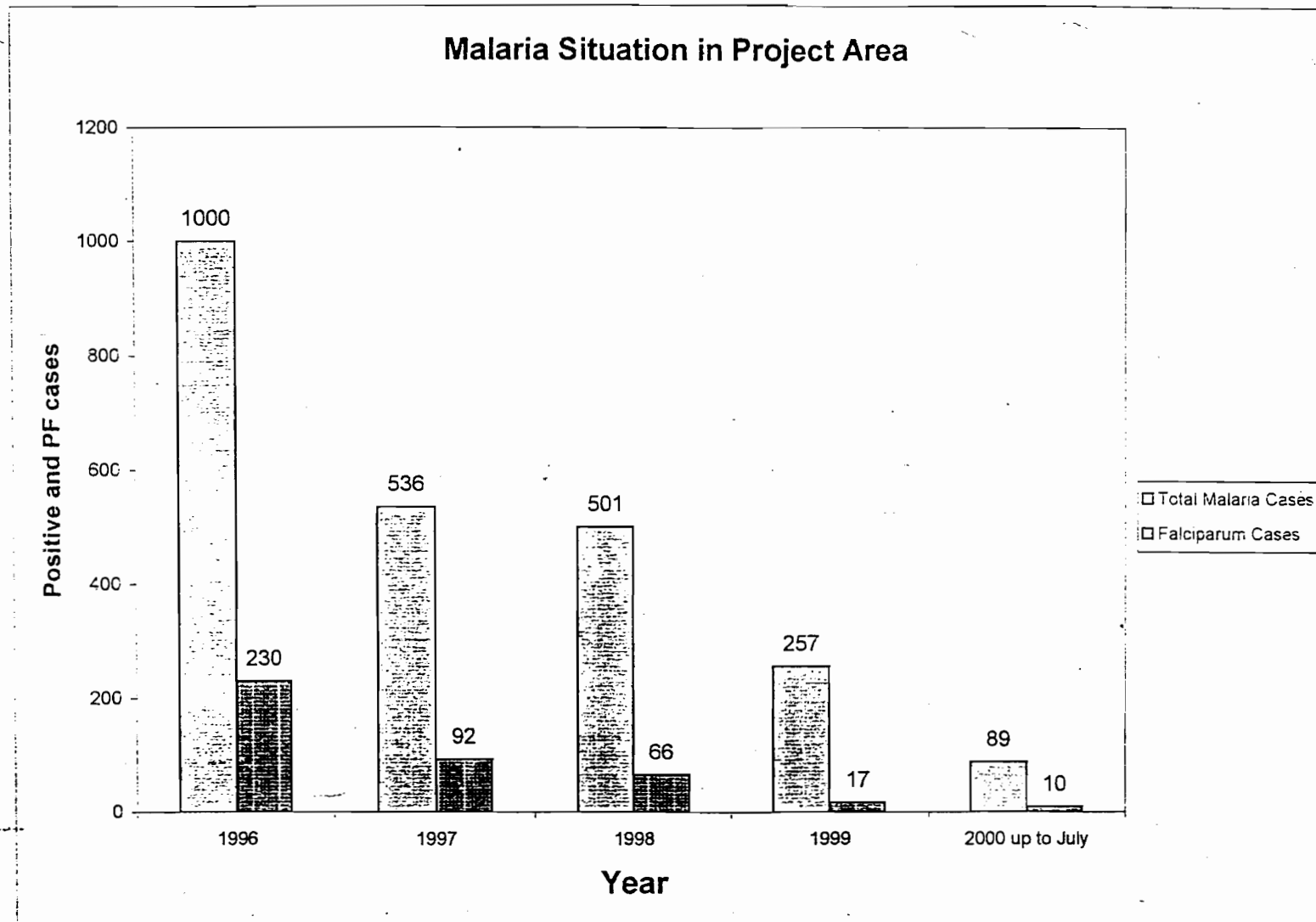
Year	Lachhras			Jetpur			Garudeswar			Borin		
	BSE	+ve	PF	BSE	+ve	PF	BSE	+ve	PF	BSE	+ve	PF
1996	6004	158	23	12230	460	106	7485	247	66	4677	135	35
1997	5553	102	16	11163	295	59	5023	99	9	4849	40	8
1998	4394	72	12	9966	296	37	5586	86	12	4906	47	5
1999	3614	43	2	7892	142	10	4613	37	3	3559	35	2
2000	1521	29	1	1832	06	0	4195	53	9	2528	1	0

(1.4) The overall malaria situation in the project area (total of 4 PHCs mentioned above) is given in the following table.

Year	Blood Smear Examination	Total malaria cases	Falcifarum cases
1996	30396	1000	230
1997	26598	536	92
1998	24852	501	66
1999	19678	257	17
2000 up to July	10076	89	10

**(1.5) ACTIVITIES PROPOSED/ BEING UNDER TAKEN IN PROJECT AREA
(IN AND AROUND DAM SITE)**

- Surveillance through MPHWs (21), PHCs (4) and Hospitals (2)
- Early Detection and Prompt Treatment of malaria cases through active and passive surveillance
- Ensuring availability of anti malarial drugs through 27 Malaria Link Volunteers
- Use of rapid diagnostic kits for quick diagnosis of Falcifarum cases
- Referral services by project hospital
- Insecticidal spray in 40419 population for control of malaria (already commenced)
- Biological control through introduction of larvivorous fishes
- Entomological studies
- Setting up of preventive Health Organisation at Kevadia colony (Budget provision made)



(2) Resettlement sites

At present 8403 projects affected families are resettled in 182 rehabilitation site spread over 49 PHCs and 24 talukas of Bharuch, Panchmahal, Vadodara and Kheda districts. The number of project-affected persons will increase simultaneously with the progress of dam construction and it's height. Districtwise R&R sites are as per annexure-2.

(2.1) Medical Cell.

Over and above, the existing primary health care delivery system and referral services through the network of PHCs and CHCs, a separate medical cell headed by Dy. Director has started functioning since 1/5/99 to provide the required health care (curative and preventive) to the project affected families.

Health & Medical Activities at Resettlement sites under SSPA

The Health and Medical setup of medical cell, S.S.P.A has been strengthen in a massive way after creation of GRA & as per their instructions. A Medical Cell, headed by Deputy Director (Medical) and having a nucleus of medical experts consisting of a physician, a Pediatrician, a Gynecologist, an MBBS doctor, a Block Extension Educator, a Statistical Assistant and a Pharmacist has been set up in SSPA to monitor and advise the medical functionaries working for medical services of PAPs and to co-ordinate with various such organizations.

Under the Medical Infrastructure, 20 Medical Officers (MBBS) heading the 21 mobile medical units, 75 M.P.H.W (Female) and 20 M.P.H.W (Male) are working in R&R sites. Each medical officer has been made mobile by giving an ambulance to visit the R&R sites on biweekly basis. The medical officers and paramedical staff are providing the health services by making house-to-house visit of PAFs. In the sites having dispensaries the female health workers are present for the whole day. Details are as per annexure-3

(1) Medical Services And Treatment Provided

All services and treatment provided to the PAPs through medical cell are free of cost. Under this activity number of cases attended and provided medical treatment under the aegis of medical cell between 1st April '99 to 31st Mar.'00 is given in Annexure -7. Moreover, special efforts have been made to see that health and hygiene of the PAPs is of good quality. The details of this are as follows: -

(2) Diagnostic Camp and Health Camps

Multispecialisation Diagnostic and treatment camps are organized by the medical cell every fortnight in the community health center of the talukas. Advanced investigation and diagnostic facilities like laboratory tests, X-ray, ECG and ultrasound are made available at these diagnostic camps. The patients requiring any further services are brought to medical college or any other speciality hospital and all kinds of necessary check up of PAPs done free of cost. A mobile medical hospital equipped with all such diagnostic and treatment equipments is under preparation and will soon be added in the infrastructure.

(3) Health Survey and Medical Check up activity

A comprehensive health survey and medical check up activity was completed in three phases since April '99 covering 29423 PAPs. This activity is ongoing and during current year a special records system of family health folder and maintenance of health profile of each PAPs of all R&R sites is under progress up till now 8557 PAPs are screened. Resurvey activity is also planned to be carried out on every six months interval.

(4) Nutritional Supplements and Services

Nutritional Supplements and services are provided to the children up to 6 yrs. Of age, expectant and lactating mothers through integrated child development scheme by way of anganwadi centers and sub centers. Every month about 6196 beneficiaries are taking this benefit. Moreover, for malnourished children and vulnerable target group, special food supplement in the form of Hyderabad Mix has been provided to 2418 beneficiaries. In addition, about 5672 school going children are covered every month under mid day meal programme.

By providing such supplementary nutrition there is a remarkable improvement observed in nutritional status of PAPs specially in a pediatric group. Initially, during Aug '99 in 6.1% of the target group mal nutrition was prevailing which has decreased to 2.2% during May'00.

(5) TB Control and Prevention Activity

Under this programme, all chest symptomatic persons were screened by special examination like sputum microscopy, X-ray, chest and blood test etc. and cases found positive for TB have been given domiciliary treatment under direct observation of doctor or paramedics. In this field during last one year there was remarkable achievement of identifying 181 positive cases, out of which 48% cases have completed the treatment and cured.

Moreover, out of the TB positive case enrolled for social welfare scheme of financial assistant of Rs.250/- per month, 40% cases have already started getting this benefit.

(6) Information, Education And Communication Activity (I.E.C)

Under this activity, over and above distribution of health education material and writing of wall slogans, in 68 R&R sites having larger population, orientation training camp (OTC) or Health shibirs are successfully organized. Film shows, exhibition and group meeting were also arranged in different sites. Details are as per Annexure -4.

(7) Survey for Physically Handicapped and Mentally Retarded persons

This was undertaken for providing social welfare benefits. Under this activity 144 cases of physically handicapped and 33 cases of mentally retarded persons were screened and necessary certificates are issued.

(8) Epidemic Prevention Activity

Advance micro planning and execution of the plan for preventing any epidemic expected during summer and monsoon season has been under taken to prevent any outbreak. Under this activity special training programme were also conducted for prevention of commonly occurring water born epidemics and water quality monitoring. These trainings were imparted to medical officers, C.D.P.O, paramedicals and deputy engineers.

(9) National Health Programmes

National Health and Family welfare programme like maternal child health immunization, anemia prevention, school health check up, family welfare programme are being successfully conducted in different R&R sites with help of local primary and community health centers. To strengthen this high degree of co-ordination is maintained with the functionaries of Govt. and panchayat health setup.

(2.2) Covering the future resettlements: -

The experience of the medical setup has been very satisfactory. The PAPs also are responding to the facility being provided. Persons from the host villages are also at times availing the services. The Doctor - population ratio at present is 1250 population per doctor, which is quite negligible against such ratio of normal Govt. setup. The same network with a suitable addition in the manpower and infrastructure will be extended to all the PAPs who resettle in Gujarat hereafter.

Working system and achievements of medical cell and the detailed weekly tour programme of mobile units are given in annexure - 5 & 6

(2.3) The expenditure incurred by Medical cell, SSPA, Vadodara during the year 1999 - 2000 is given in the following table

Type of expenditure	Item	Expenditure incurred in Rs
Recurring	Pay and allowances	88,86,502
	TA on tour	4,27,764
	POL	7,32,271
	Contingency and stationary	2,13,265
Non recurring	Drugs and equipment	8,48,626
	Nutritional supplements	45,180
	Honorarium	13,525
TOTAL		1,11,67,158

A brief summary of the Health and Medical services provided to the resettled families of Sardar Sarovar Project area is given in annexure - 7

(2.4.) Proposed health activities at resettlement sites:

(1) Health survey through family health folder system

- To know the health status of project affected resettled population a comprehensive health and medical activity is planned with the help of medical officers is going on since July '00. The data collected by this health survey is planned to be recorded in special record system of family health folder which will enable to maintain the detail health profile of each Project Affected Person
- Moreover, as this information of family health folder will be computerized so as to have a easy and quick access for any health related information pertaining to the population. This will help us to plan out future activities under health sector. A copy of the family folder is annexed as annexure - 8.

(2) Mobile Hospital Plan:

- To provide specialized medical services by way of providing investigation facilities nearer to the R&R sites, a mobile medical hospital equipped with all such diagnostic and treatment equipments is under preparation and will soon start functioning during the current year. Details about mobile hospital is as per annexure -9.

(3) Impact assessment activity:

- Under different national health programmes, which are being conducted in all R&R sites, this year it is planned to assess the impact of the services for following programmes.
 - (A) TB control programme
 - (B) Anemia Control Programme
 - (C) Nutritional deficiency status
 - (D) Immunization programme
 - (E) Family Welfare Programme

5) Malaria control in resettlement sites:

In addition to the health services being provided by the medical cell as mentioned above special measures are also being carried out for control of malaria.

Case Detection and Treatment.

Detection and treatment of fever/ malaria cases are carried out by the mobile medical units and medical dispensaries functioning under the medical cell. Blood smears are collected which are sent to the nearest laboratory for examination. If found positive for malaria radical treatment is provided by the staff of the concerned primary health center.

2 Routine surveillance activities.

In addition to the services being provided by the medical cell routine surveillance activities are carried out by the existing primary health care delivery system, which covers the resettlement sites also. Malaria situation of each rehabilitation site is monitored every month at the district level. At present as per the information communicated by the concerned district malaria officers' incidence of malaria has declined in almost all rehabilitation sites and is totally under control.

3 Insecticidal Spray.

All the human dwellings at the 185 rehabilitation sites are covered under insecticidal spray with effective insecticide. The approximate population covered is 41,000. Spray activities are in progress as per schedule, which will complete by 15th October 2000.

4 **Information Education and Communication.**

For intensified awareness campaign in the rehabilitation sites a provision of Rs. 2.00 lakh has been made in the current year budget, which will be spent to promote awareness in the community.

5 **Insecticide Treated Mosquito Nets.**

In the coming year it is proposed to provide insecticide treated mosquito nets to each resettled family. This will be a more appropriate strategy for control of malaria on a long-term basis. For this purpose a provision of Rs.71.60 lakh has been made in the current year budget. For undertaking this activity and its monitoring the proposed Preventive Health Organisation is very essential. Otherwise the medical cell should carry out the distribution of mosquito nets. The District Malaria Organisation does not have the expertise and staff to implement and monitor this particular activity. Help of Malaria Research Center Nadiad can be sought for this purpose.

(2.6) Current malaria situation

Malaria situation in the districts Viz. Vadodara, Bharuch, Panchmahal and Kheda is under control as per the reports received from District Malaria Officers. However during August 2000 some villages of Panchmahal district malaria incidence has shown a sharp increase which is attributed to labourers returned from Surat city. In this group of labourers the percentages of indigenous cases are very less. Malaria situation in the above four districts are given in the following table:

(2.7) Malaria situation in districts where project affected families are resettled

District	Year	BSE	Positive	PF
Vadodara	1998	435909	6122	1290
	1999	384748	5158	860
	2000	216607	1326	97
Panchmahal	1998	580954	15556	1398
	1999	521627	7975	275
	2000	246236	1488	45
Bharuch	1998	278660	8906	1922
	1999	212519	4245	422
	2000	99994	1000	36
Kheda	1998	649338	7900	1101
	1999	516437	4652	563
	2000	261383	1214	44

RESETTLEMENT SITES

- Biweekly visits of 182 R & R sites by 20 mobile medical units for providing health care services
- Health care facilities by 75 medical dispensaries functioning at various R & R sites
- Referral services by expert team consisting of 3 medical specialists.
- Insecticidal spray covering all 8175 project affected families
- Information, Education and Communications activities (Budgetary provision of Rs. 2.00 lakh made)
- Distribution of Insecticide treated mosquito nets covering all members of resettled families (proposed for 2001. Budgetary provision already made)

3) Command area:

The command area of Sardar Sarovar Project comprises 3393 villages spread over 12 districts. The state govt. is undertaking the following activities for control of malaria in the command area

- 1 Monitoring of malaria situation in the command area every month..
- 2 Routine surveillance activities for Early Diagnosis and Prompt Treatment of malaria cases.
- 3 Insecticidal spray of villages in the command area, which are eligible for spray as per Govt. of India criteria.
- 4 Entomological studies to find out prevalence and density of vector mosquito.

Annexure - 5

WORKING SYSTEM & ACHIEVEMENTS OF MEDICAL CELL S.S.P.A. VADODARA

To improve upon the Health & Medical services provided by SSPA. To the PAFs. and to strengthen the monitoring system, A Medical cell within SSPA. Is created from 1.5.99. This cell is headed by Dy. Director health & medical services, supported by specialists

I. HEALTH STRUCTURE

A. The health structure under this medical cell comprises of following manpower.

Sr. No.	Category of personnel	No. Available	Place of Posting
1	Deputy Director	1	Medical Cell
2	Medical Specialists-3		
a.	Physician	1	Medical Cell
b.	Paediatrician	1	Medical Cell
c.	Gynecologist	1	Medical Cell
3	Medical Officer	21	Mobile Medical Unit
4	M.P.W. [male]	20	Mobile Medical Unit
5	M.P.W. [female]	75	Medical Dispensary
6	Ministerial Staff	11	Medical Cell
7	Vehicle With Driver	23	Mobile+S.S.P.A.

B. Medical dispensaries manned by F.H.W. & visited biweekly by M.O. mobile unit are situated at 75 R&R sites occupied by PAFs of M.P. & Mah. 7 more new dispensaries for PAFs. of M.P. sites and 26 for Gujarat sites are going to be operated in coming future.

C. 20 Mobile medical units manned by one medical officer [M.B.B.S.] Assisted by one M.P.W. Male along with one ambulance and driver are visiting biweekly all 182 R&R sites situated in 4 districts of Gujarat namely Vadodara, Bharuch, Panchmahal & Kheda.

D. A team of three specialists namely Physician, Paediatrician & Gynecologist are attached to medical cell for attending the patients referred by mobile units & F.H.W.

E. Over and above health structure under S.S.P.A., following govt. institutions like 43 P.H.C. & 17 C.H.C. are also extending their services to the PAFs of R&R sites which are falling nearer to concerned institution.

F. Trust Hospitals and hospital run by NGO are also there to provide services in emergencies and during special disease camps organized by Medical cell.

HEALTH FACILITIES. -

Health facilities under medical cell are available through two main setup

1. Mobile medical units

2. Medical Dispensaries

1. Under mobile medical units following facilities are available

- a. Ambulance with driver
- b. Essential Drugs and Dressing material.
- c. Essential Medical equipment.
- d. Medical officer (M.B.B.S.)
- e. Male health worker

2. Under Medical Dispensary following facilities are available

- a. Dispensary Building.
- b. F.H.W. Quarter (under progress)
- c. Medical equipment's.
- d. Essential Furniture
- e. Drugs & Dressing material
- f. Female Health Worker
- g. Trained Dai

3. Other facilities-

1. Aganwadi center/Sub center
2. Mid Day Meal program for School children
3. Diagnostic & treatment camp through NGO.
4. Anti Malarial Insecticide spray Activity
5. Health survey activity with provision of health Identity Card
6. Potable, Chlorinated Drinking water
7. Services of all National Health programs
8. Emergency referral Services
9. Necessary Expenses for specialized Tertiary Treatment

FUNCTIONS & JOB RESPONSIBILITIES OF STAFF UNDER MEDICAL CELL

A. Female Health Worker- (At Dispensary)

1. Examination & Treatment of Patients with minor ailments
2. Home visits for serious case, vulnerable group or elderly person.
3. Assessment of any epidemic situation, follow-up of old cases.
4. To take care of antenatal mothers, newborn & Infants
5. To attend & conduct safe delivery
6. To visit school for check up & mid day meal program.
7. To visit Aganwadi center for Growth Monitoring & Supp. Nutrition.
8. To visit Vasahat for water & environmental Sanitation.
9. To provide Health education & Motivation for all national Health Programs.
10. To attend & if requires, Referral of emergency case (In absence of MO)

B. Male Health Worker- (with Mobile unit)

1. To make rapid survey of Vasahat to know about Health status of PAFs and about any Epidemic Situation prevailing at the site.
2. To bring the patients to the Dispensary for treatment.
3. As per the instructions of M.O. Follow-up & feedback of old sick patients in the Vasahat.
4. To contact D.D.C.&F.T.D. centers as well as village leader of the Vasahat.
5. To check drinking water status and environmental sanitation.
6. Motivational activities for all National health programs.
7. Health education & Publicity activity in the site.
8. To conduct periodical Health surveys.
9. To keep linkage with P.H.C. worker of that area.
10. To assist MO mobile unit in providing Health services.
11. To visit school & A.W.C. for health activities.

JOB RESPONSIBILITY OF MEDICAL OFFICER OF MOBILE MEDICAL UNIT

1. Regular biweekly visits of R&R sites on fix day and fix time. As per planned program.
2. To attend all ill cases of the sites requiring treatment.
3. To pay house to house visit in the Vasahat for knowing overall health situation, for attending disable or sick persons, follow-up of chronic patients and to create awareness about available medical facilities.
4. To attend emergency and to arrange for referral services to the patients.
5. To plan and to bring sick cases requiring referral at CHC/Hospital on day of scheduled visit of specialist team or on fixed day at district hospital.
6. To confirm about Births & Deaths occurring in the Vasahat and specially death cases are to be thoroughly investigated.
7. To arrange to bring maximum cases worth referral to diagnostic and treatment camps organized by medical cell.
8. To check drinking water source for knowing potability of water and cleanliness surrounding the source.
9. To ensure general sanitation and cleanliness in the site.
10. To attend I.C.D.S. Aganwadi centers for medical checkup & growth monitoring of Aganwadi beneficiaries periodically.
11. To ensure regular food supply and IFA tab. distribution in AWC
12. To attend school for examination & treatment of any ailment prevailing in school going children and for health education.
13. To plan & implement I.E.C. activities with the co-operation of local PHC for healthy habits & health education
14. To keep close liaison with the Vasahat Sathi/ leader or Panchayat member.
15. To supervise the fieldwork of male & female health workers of the site including all National health programs

16. Periodical inspection of dispensary for record keeping, stock position & regularity of the visit.
17. To pay weekly visit to the host PHC & CHC, to exchange information & to seek co-operation from PHC MO and the staff.
18. To assist & work with the P.H.C. during any special health campaign organized by govt. of India or Govt. of Gujarat.
19. To exert overall administrative control over the staff of mobile unit as well as medical dispensary at the site.
20. To provide daily feedback about health status of Vasahat.
21. To stay at the headquarter of mobile unit.

D. EXPERT MEDICAL TEAM

To improve upon Medical services provided to the PAFs., Post of three specialists namely Paediatrician, Physician & Gynecologist is sanctioned in medical cell. The job responsibility of these experts is as under.

1. To provide specialized services to the patients referred by the Medical officers of mobile units
2. To visit the sites for providing referral services as per program approved by Dy. Director Medical cell.
3. Follow-up & Monitoring of cases which are referred by the specialist to higher Hospital for special investigations & Interventions
4. To monitor the health status of Vulnerable groups like pregnant women, Newborn infants, Aged & chronic patients.
5. To guide and direct M.O. to take follow-up action about patients
6. Emergency visit of the site where any out break or epidemic of any disease is reported.
7. To supervise & monitor services provided by Mobile medical unit and Medical dispensaries.
8. Periodical inspections of dispensaries & Mobile units.
9. To assist deputy director in planning & execution of Medical & Health services
10. To arrange Diagnostic & Treatment camps at different sites periodically.
Annexure-
11. To supervise & to provide expert services during celebration of any special Health & Medical campaign arranged by GOI or GOG.
12. To attend duties on special, well-equipped mobile van or at Base Hospital.
13. To assess the health status of R&R sites in reference to Safe water supply, General sanitation & cleanliness.
14. To assess the Morbidity & Mortality pattern of PAFs and to suggest measures to prevent it.
15. To assess & guide for the health status of infants & preschool children in respect of Growth monitoring, Anaemia, Vaccin preventable disease & Mal nutrition by paediatrician.

16. To assess, guide & initiate measures for anti natal care, Safe delivery, post natal care & Contraception along with Anaemia and mal nutrition by Gynecologist.
17. To assess, guide & initiate measure in respect to important common public health problems specially TB, Malaria, and Leprosy Water born & water related disease by Physician.

E. DEPUTY DIRECTOR

1. To act as a Supervisory mechanism regularly overseeing the medical amenities provided for the PAF's.
2. To supervise & monitor the functions, duties & responsibilities of medical and paramedical personnel working in medical cell.
3. To provide guidance to medical & paramedical staff in regards to health and hygiene aspect of PAF's.
4. To co ordinate with Regional deputy Director (health), Chief District Health Officer, civil Surgeon and Superintendent/ Dean of Medical collage.
5. To fix the time schedule & to establish linkage with the staff at the dispensaries for the visit of the mobile medical unit to various sites.
6. To organize special diagnostic camps.
7. To keep a liaison with the district level officers for executing National Programs.

ACTIVITIES AND ACHIEVEMENTS.

Following activities are undertaken by the mobile medical units and medical dispensaries.

A. Curative Services-

1. Diagnosis & treatment of ill persons available at sites
2. Referral services to cases for investigation & for super specialty services and serious patients.
3. Special diagnostic & treatment camps at different sites.

B. Preventive services-

1. IFA Tablets & Vitamin A distribution to children and IFA tab. to mothers
2. Supplementary Nutrition for 0- to 6 yr. Children and pregnant/lactating mothers
3. Mid day meal program for school going children
4. Antenatal & postnatal care and distribution of DD kits
5. Immunization services to children and mothers
6. Chlorination of water source and chlorine tab. Distribution.
7. D-Worming of school children.
8. Antimalarial spray activity
9. IEC activity
10. Family welfare Program.

C. National Health Programs

1. TB. Control programs.
2. Malaria Eradication program.
3. Leprosy elimination program
4. Blindness control program.
5. I.C.D.S. program.
6. School health program.
7. Family welfare program.

Achievements under Health & Medical services by the Medical cell since May 99 are shown in Annexure- 7

HEALTH SURVEY

To know the health status of all PAFs. and to conduct medical check up activity an extensive health survey campaign was under taken during April 99 by commissioner health and s.s.p.a.

The summary of health survey is as under-

1. Area covered----4 districts(vadodara,Bharuch,P.mahal & Kheda.)
2. No. of R&R sites covered-- 172
3. Target population for campaign--A population--31509
B Families----6309
4. Period of survey--24th.to 30th. April 99
5. Total no . of teams---31
6. Total manpower engaged--A. Medical officers 31+10(from s.s.p.a.)
B. M.P.W. male 31
C. M.P.W.female 31
D. Lab. Technicians 31
7. Each team was supported with-- 1 vehicle
2 Medicine
8. Population surveyed and Medical check up done--17186
9. During survey health identity card was issued to each person and health checkup information card was prepared. Annexure-11

WATER SUPPLY & SANITATION

(A) For providing drinking water at all the sites 512 Open wells/Dug wells and 80 Pipe water supply systems are there in the sites.

For ensuring safe drinking water supply at the sites the water samples from these sources are being checked and if required necessary corrective measures are being taken through Engineering section of the s.s.p.a.

(B) A campaign for testing the water samples for Bacteriological & Chemical examination of all R&R sites is being under progress since 14.6.99. More over regular pot Chlorination by distribution of chlorine tablets during house to house visit of paramedical staff is ensured.

SUPERVISION & MONITORING.

Following activities are being undertaken as part of supervision & monitoring

1. Field visits-

Regular field visit of dispensaries & mobile units are carried out by the specialist and deputy director of medical cell.

2. Meetings

Regular weekly and monthly meetings are organized at the head quarter level for obtaining feed back and monitor health activities specially epidemic situation and ill or serious patients. Annexur-12

3. Inspections-

Regular inspection in detail as per the pre printed format is being carried out for the dispensaries as well as mobile units by the officers from head quarter.

4. Daily contacts-

All the 20 mobile unit medical officers are contacting telephonically with the head quarter for providing feed back about day-to-day work.

For effective co-ordination between panchayat health staff and medical staff of S.S.P.A., regular weekly visits of medical officer mobile unit to the P.H.C. is ensured. More over regular quarterly joint meeting are organized at the District level.

RECORDS & REPORTS.

Following records & reports are being maintained at Dispensary & mobile unit level.

At Dispensary- 1. Out patient register 2. Referral register 3. Drug register
5. Daily workbook 5. Master register 6. Visit book 7. Survey register

At Mobile unit- 1. Out patient register 2. Referral book 3. Dead stock reg.
4. Drug register 5. Log book. Annexure-14

Reporting system- Daily, weekly & monthly reports are collected & compiled by mobile unit medical officer and are submitted to the medical cell regularly. There are 10 types of formats, which are providing detail information about all medical & health activities carried out by medical cell.

- 1 Weekly health & medical report from mobile units
- 2 Monthly statement of work progress in health & medical services.
- 3 Monthly report about patients examined, treated & referred.
- 4 Report about laboratory work.
- 5 Monthly report about maternal & child health services.
- 6 Birth and death report.
- 7 Report about general sanitation and epidemic situation.
- 8 Report about health education and family well fare program.
- 9 Report about I.C.D.S. program.
- 10 Stock position report.

ANNEX 10000

INDIRA SAGAR PROJECT	
Phased catchment area treatment	
• Studies	67
• Phased programme:	68
• Phase-I Programme	68
• Action Plan	69
• Implementation	70
• Freely Draining Area (Excluding Directly Draining Sub-watersheds)	71
• Action plan :	71
• Implementation :	71
• Requirement of Funds	72
Compensatory afforestation:	
• Action plan	74
• Implementation :	76
Command area development	
• Studies and findings	76
• Suggested strategies	78
• Action plan :	79
• Implementation	79
Flora, fauna and carrying capacity	
• Suggested strategies	81
• Action plan and implementation	83
SEISMICITY AND RIM STABILITY	
• Studies	85
• Suggested strategies	85
• Reservoir rim stability	85
Health aspect:	
• Studies and findings :	86
• Suggested strategies :	87
• Action plan :	88
• Implementation :	88
Archaeological & anthropological survey:	
Archaeological aspects	
• Surveys :	89
• Action plan :	89
• State protected monuments :	89
• Centrally protected monuments :	90
• Implementation :	90
• Plan of Archaeological Survey of India	90
Anthropological aspects:	
• Surveys/studies :	92
• Action plan :	92
• Implementation :	93

INDIRA SAGAR PROJECT

The Action Plans and status of studies and implementation of Environmental Safeguard Measures upto quarter ending December, 2000 are summarised in this report.

The parameters: The suggested environmental safeguard parameters are indicated below

- ◆ *Phased Catchment Area Treatment*
- ◆ *Compensatory Afforestation*
- ◆ *Command Area Development*
- ◆ *Flora, Fauna, Wildlife and Carrying Capacity*
- ◆ *Seismicity*
- ◆ *Health Aspects*
- ◆ *Archaeological Survey, and Anthropological Studies*

As 'Resettlement and Rehabilitation' is dealt with separately, current status of other suggested parameters is presented hereunder.

1. PHASED CATCHMENT AREA TREATMENT

The MOEF clearance granted in 1987 contained two conditions pertaining to CAT, as follows:

- More detailed surveys for prioritisation of the sub-catchments in the ISP area should be undertaken;
- A phased CAT programme should be prepared and implemented ahead of reservoir filling. GOI issued a directive in July, 1992 that, the project would bear the costs of the treatment of all critically degraded sub-watersheds draining directly [Phase-I] into the reservoir. These watersheds were identified amongst those classified as either very high or high-priority categories by the All India Soil and Land Use Survey Organisation (AISLUSO). The project would also be responsible for the treatment of those areas of the catchment, which are directly damaged by the project activities.

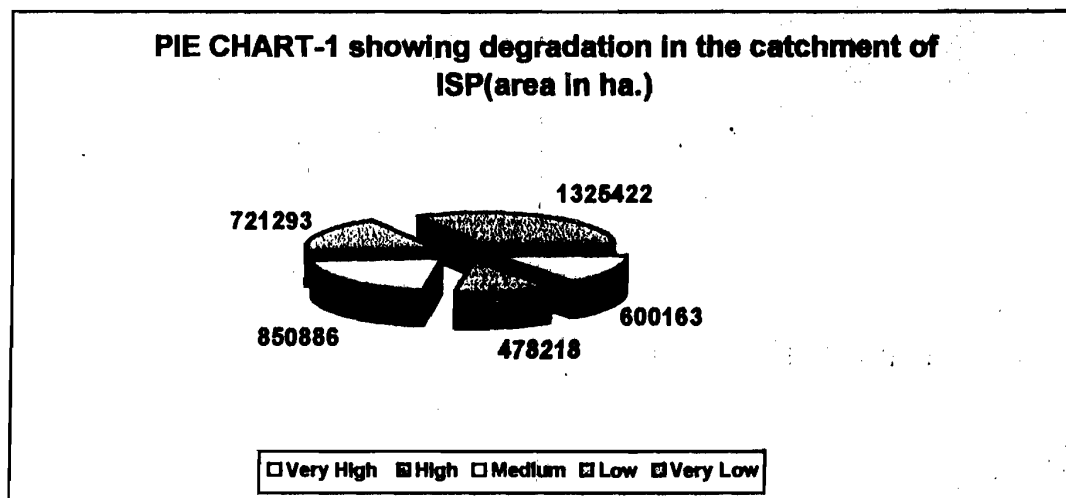
In addition, plans are required to be prepared for the treatment of the balance of the critically degraded sub-watersheds but the cost of this will be met from other ongoing schemes and in a timeframe to be determined.

Studies

Surveys and studies have been undertaken to aid the development of a management plan for CAT in the ISP catchment. They are: -

- Report of Inter-Departmental Committee on Soil Conservation and Afforestation, (the Dewan Committee Report), 1985.
- Report on Prioritisation of Sub-watersheds in sub-catchments of the Narmada Catchment, 1991 by AIS&LUSO, New Delhi. Revised subsequently in 1994

According to the above studies the freely draining area of Indira Sagar Project down stream of Bargi Dam is about 39,75,982 ha. Prioritisation survey of the watersheds was entrusted to the All India Soil & Land Use Survey Organisation, New Delhi. The Survey has been completed by AIS&LUSO, New Delhi and the survey reports have been received in the Narmada Valley Development Authority (NVDA) Government of Madhya Pradesh. Findings of the AIS&LUSO indicated that about 28% of the catchment was yielding SYI of 1200 and above. As such these were considered as critically degraded. Results of the prioritisation are summarised in pie chart -1.



AIS&LUSO in their final report have identified 508 no. of critically degraded sub-watersheds (having Silt Yield Index of 1200 and above), covering an area of about 10,78,381 ha.

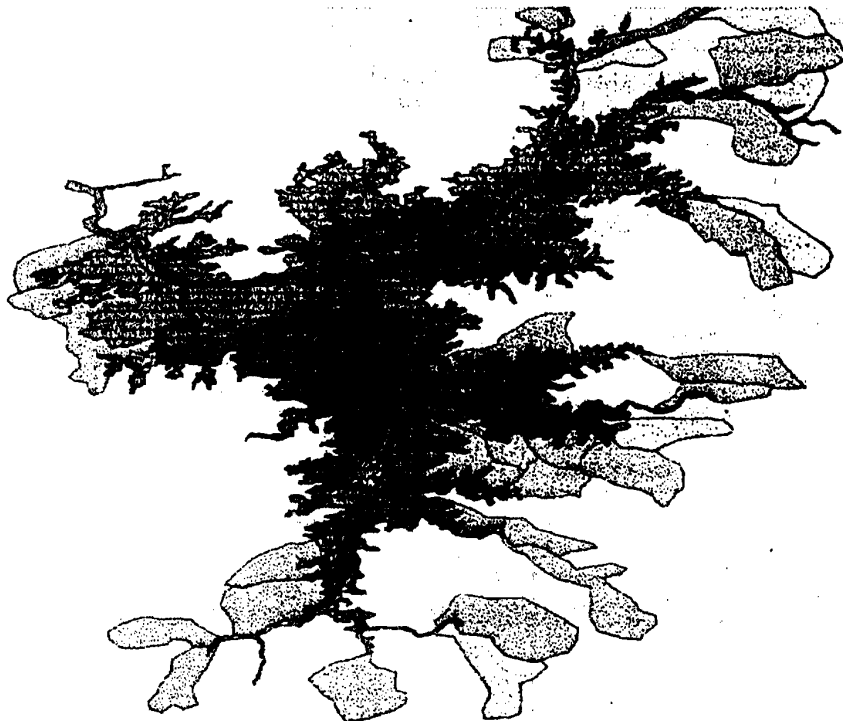
Phased Programme:

On the basis of their proximity to the reservoir these watersheds have been planned for treatment in two phases namely Phase-I and Phase-II

As per the guidelines of MOWR, directly draining watersheds of very high and high priority categories only, are to be treated *pari-passu* with the construction of the dam and at the project cost.

PHASE-I Programme

On the basis of the reports submitted by the AIS&LUSO, sub-watersheds belonging to the very high and high priority categories and directly draining into the reservoir have been identified for treatment. There are 30 such sub-watersheds. They cover an area of about 73,456 ha. Map showing the location of the identified sub-watersheds is depicted in Map-1.

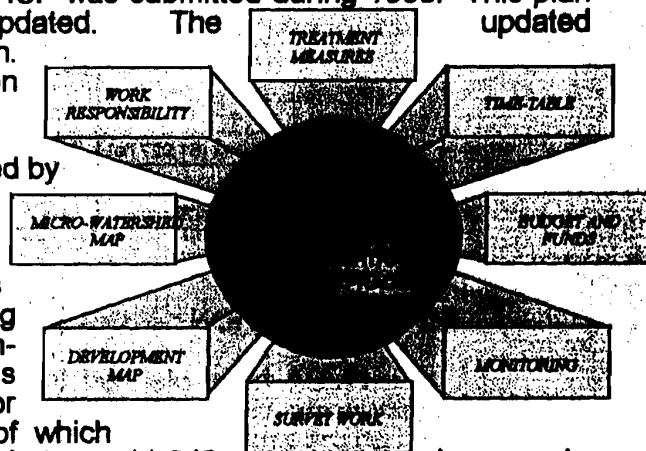


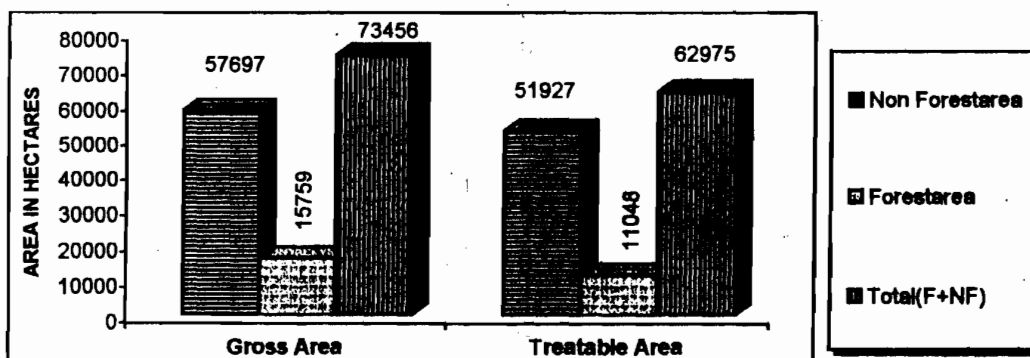
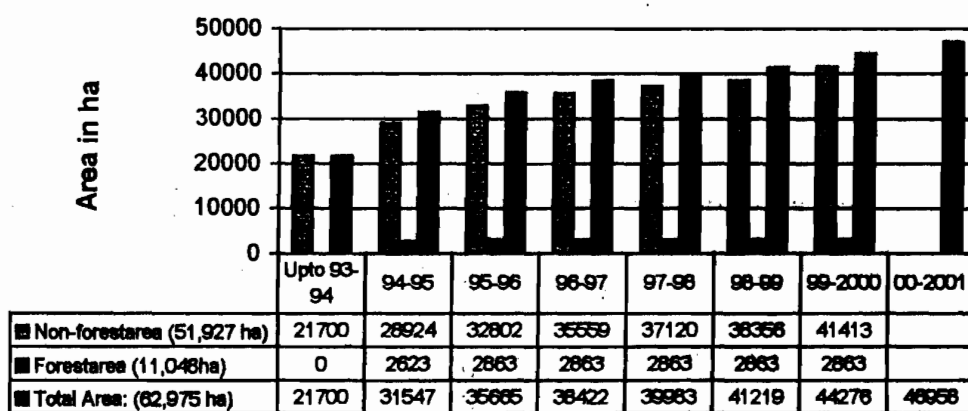
Map-1
Showing
submergence
area of
Indira Sagar
Project and
location of
critically
degraded
directly
draining
sub-
watersheds.

Action Plan :

Macro-watershed plan for the ISP was submitted during 1993. This plan was subsequently revised and updated. The plan of work is under implementation. Various components of the Action Plan are depicted in the Figure-1.

According to the plan submitted by the NVDA, 30 sub-watersheds covering an area of 73,456 ha have been identified as directly draining sub-watersheds. Out of the gross area of 73,456 ha, directly draining sub-watersheds, 57,697 ha is non-forest and the remaining 15,769 ha is forestland. The net area available for treatment, however, is 62,975 ha of which 51,927 ha area is non-forest and the balance 11,048 ha is forestland. Graphical presentation of the same is given below in Chart-1.

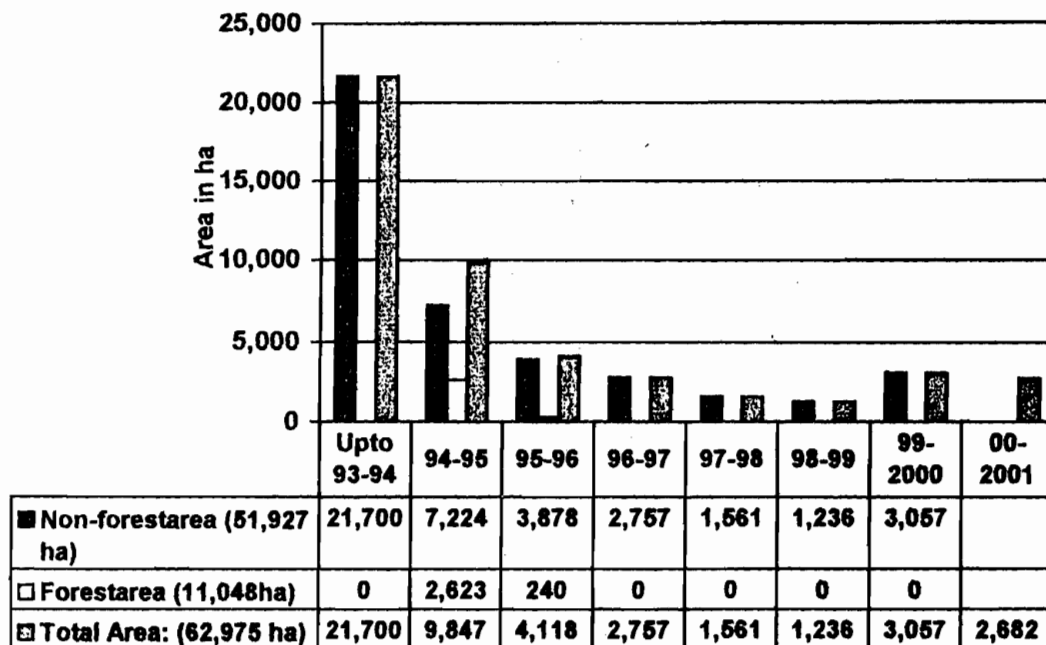


**CHART-1 : AREA STATISTICS OF CRITICALLY DEGRADED SUBWATERSHEDS
BELOW BARGI DAM & UPTO ISP****Chart-2 : Cumulative Progress of CAT works****IMPLEMENTATION :**

NVDA have planned to treat the Phase-I area in about 10 years' time commencing 1991, at the cost of the project and pari-passu with the construction work on the project.

By the end of December, 2000, during the year 2000-2001, the cumulative progress was 46,958 ha. In addition an area of 1636 ha was treated up under pilot project earlier. NVDA proposes to treat the balance areas during the next four years.

Chart-3 : Schedule of treatment of Phase-I



II. FREELY DRAINING AREA (Excluding Directly Draining Sub-watersheds)

According to the plan submitted by the NVDA, 478 sub-watersheds, covering a gross area of 10,12,640 ha have been identified as freely draining (other than directly draining) sub-watersheds. The net area available for treatment, however, is 9,15,150 ha of which 806,720 ha area is non-forest and the balance 108,430 ha is forestland. Above details are graphically presented in Chart-4.

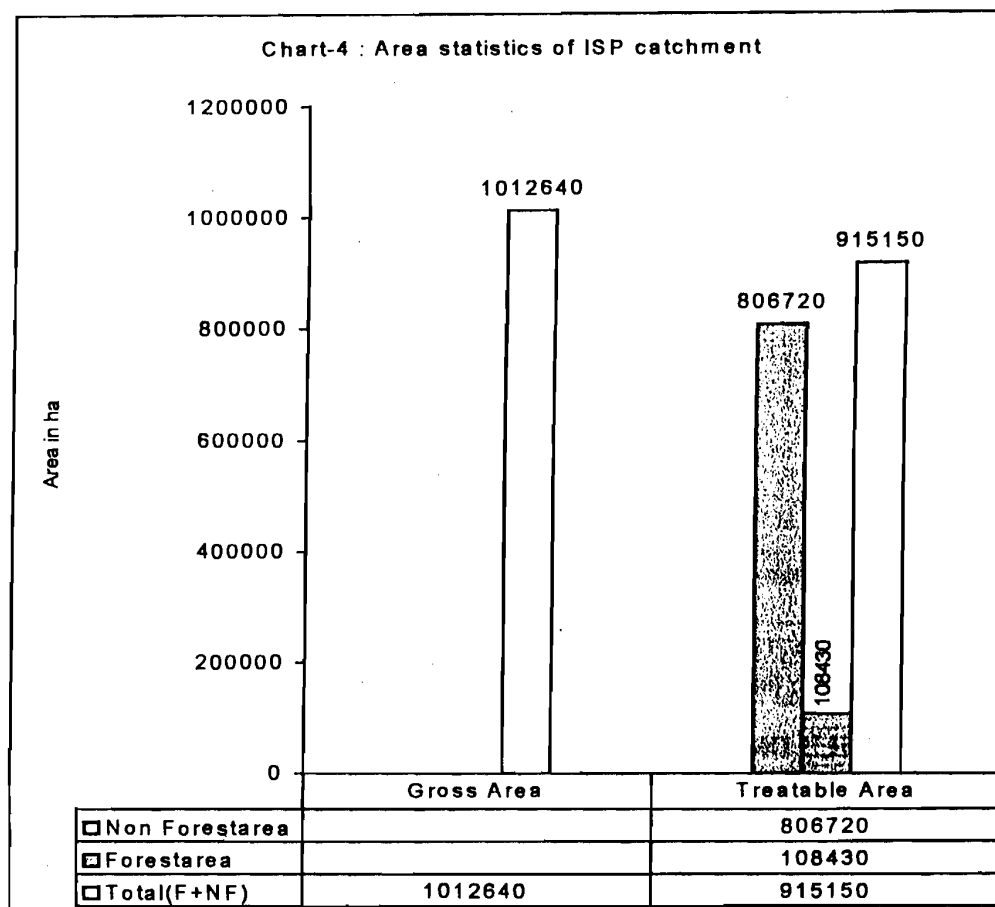
ACTION PLAN :

NVDA have submitted macro-watershed plans covering the above area during 1993. NVDA have planned to treat the Phase-II area in about 30 years' time commencing 1994-95, as per the schedule of implementation given in Table-5 below.

However, detailed micro-watershed schemes are required to be submitted to the funding agencies like NAEB, RVP etc. in accordance with the guidelines of these schemes. A few schemes have been submitted and got approved while the remaining schemes are under formulation.

IMPLEMENTATION :

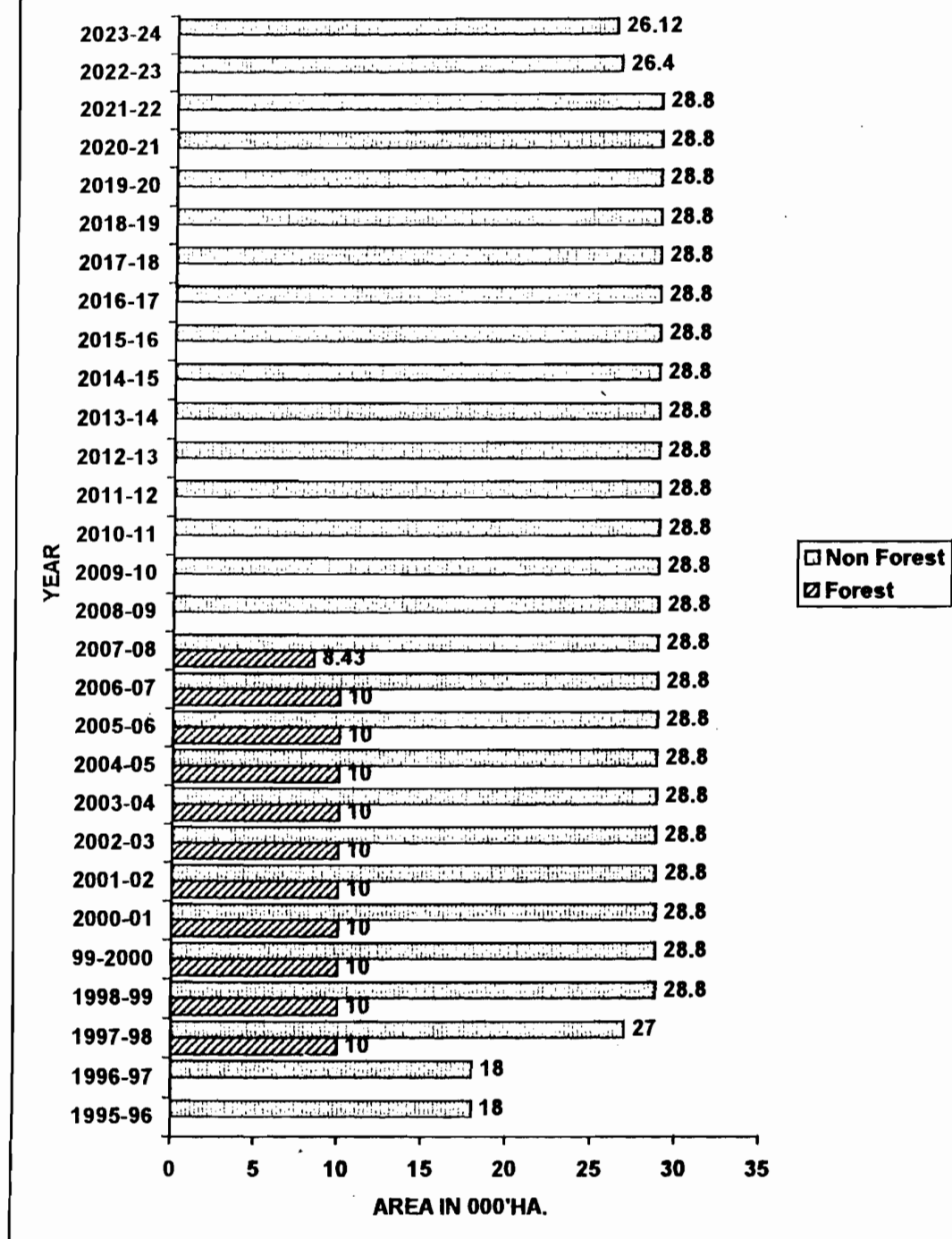
The Project Authorities have submitted CAT Phase-II plans for NAEB/RVP funding for seeking funds. Thirteen schemes covering the area of 28,318 ha. Were approved by the Govt. of India in RVP Schemes. By the end of December, 2000 the progress reported was 9,218 ha.



REQUIREMENT OF FUNDS :

The plan drawn up for treatment of Phase-II treatment works places requirement of total funds at Rs. 603 crores. It is proposed by GOMP to treat the non-forest area at an estimated cost of Rs.602.57 crores and forest area Rs.435.12 crores.

Chart-5 : Schedule of treatment of CAT works, Phase-II



2. COMPENSATORY AFFORESTATION:

A total of 40,332 ha forestland would come under submergence and an additional 779.90 ha. of forestland has been diverted for the residential colony, powerhouse complex, main dam, saddle dam and approach roads.

Subsequently, another 308.40 ha. of forestland was permitted to be diverted for powerhouse. Thus a total of 41,420 ha of forestland has been permitted to be utilised for the construction of ISP. Area proposed to be utilised for the ISP covers three districts as shown in Table-1 below.

TABLE-1 : Showing area taken by the ISP from three districts in M.P.

District	Area in hectares diverted for ISP
Khandwa	33,383
Dewas	4,528
Hoshangabad	3,678
Total	41,589

MOEF clearance granted in 1987, contained several conditions pertaining to compensatory afforestation. The key conditions among others was that

"Since the project involves violation of Forest (Conservation) Act, 1980, compensatory afforestation will be carried out over suitable degraded forest land double the diverted forest area in extent and in addition to the equivalent area in non-forest land. For this purpose, the area offered by the State Govt. vide their letter No.5/III/84-10-3, dated 14.10.1986 will be accepted and compensatory afforestation raised at the cost of the project in this area."

- State Forest Department re-conveyed the forestland for the purpose of ISP vide it's letter dated 28th November 1987 clarifying that-

"The plantations over the degraded forest, double in extent to the area which has been worked upon without the permission of the Forest Department, violating Forest Conservation Act thereby, shall be carried out, in addition to the usual plantations over non-forestland equal in extent to the area diverted."

ACTION PLAN :

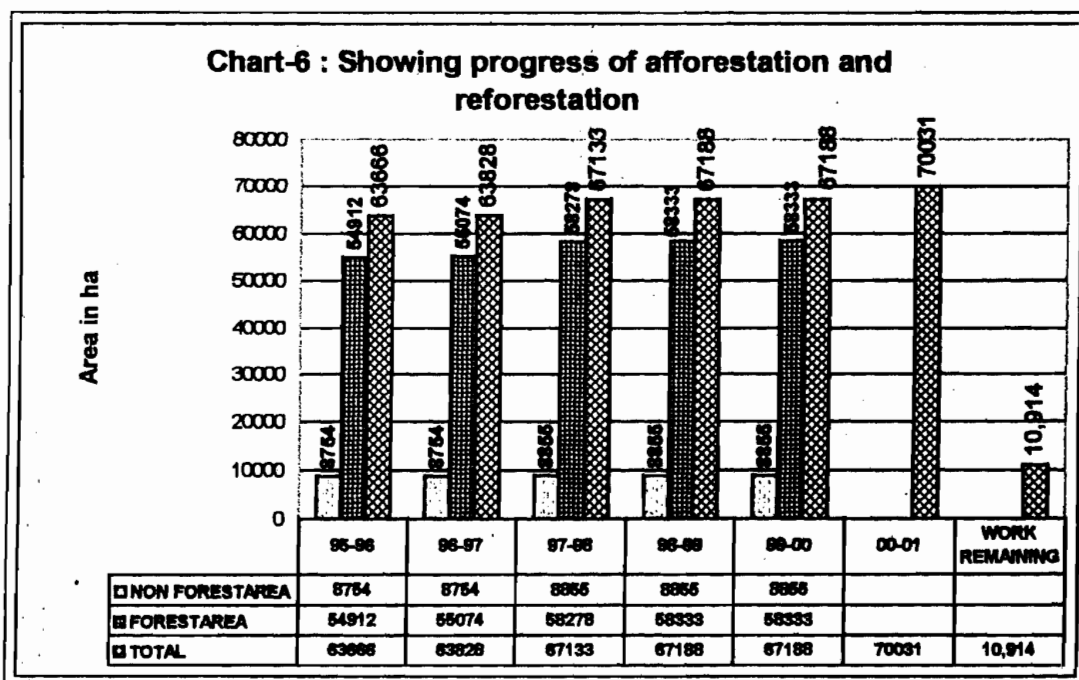
To compensate for this loss of forest the M.P. Forest Department had submitted an Action Plan for Compensatory Afforestation for the Indira Sagar Project in December, 1986. Area offered to this plan was accepted. The acceptance was acknowledged through the clearance order.

Accordingly, 10,143 ha of non-forest and 70,802 ha of degraded forestland has been identified for compensatory afforestation, in the districts of Khandwa, Hoshangabad, Dewas, Sehore, Dhar and Khargone as shown in Table-2.

TABLE-2 : Showing the district wise areas identified for compensatory plantation

District	Degraded Forest (In ha)	Area other than forest (In ha)
Khandwa	30,572	2,314
Hoshangabad	22,739	2,842
Dewas	17,491	802
Sehore	-	1,247
Dhar	-	1,001
Khargone	-	1,937
Total	70,802	10,143

The M.P. Forest Department has added additional areas to the prescribed afforestation hectare as a contingency to account for unforeseen circumstances. In selecting forestlands for the plantations, local requirements for grazing, firewood, and other nistar needs were kept in view. However, considering that with the dedication of vast areas to the proposed National Parks, some future adverse impacts on the local population's nistar needs may develop and that the wood from the submergence zone was expected to meet local fuel needs only for about 8 to 10 years, more emphasis was placed on fodder production in plantation areas in Khandwa and Dewas divisions. The plantations were to provide shelter and habitat to wildlife also.



IMPLEMENTATION :

NVDA started the plantation works in the degraded forests within the Narmada catchment on the areas identified in the plan. Subsequently, however, many of these areas were included in the CAT program, as these areas were identified as critically degraded areas within the catchment. Such areas were, however, excluded from the compensatory afforestation works. By the end of December, 2000 the progress reported was 70031 ha as shown in Chart-6 above.

3. COMMAND AREA DEVELOPMENT

The Command area proposed to be irrigated by the NSP spreads on the left bank of the Narmada River. It comprises territory falling in the Khandwa tehsil of Khandwa District and six tehsils of Khargone District. The Satpura Ranges flank the command on the south. The northern boundary is formed by the Narmada River itself. The land of the command comprises Forest:10,055ha; Grasses and pastures:10,498ha; Cultivated land: 142,406ha; Culturable fallow : 8,116 ha; Barren:18,385 ha.

The command area has immense potential for development. The objectives of the command area development are :

- Optimum utilisation of created potential of irrigation.
- Introduction of multiple cropping patterns and increasing the levels of productivity and strengthening of agriculture research activities.
- Creation of adequate communication and storage facilities.
- Conservation management of integrated fisheries development.
- Intensification of dairy development.

The main components of the command area development program are

- On Farm Development,
- Conjunctive Use,
- Agro-Industries
- Regulated Market,
- Warehousing Facilities,
- Roads etc.

STUDIES AND FINDINGS

In 1975, at the request of the Narmada Water Dispute Tribunal (NWDT), the Gwalior Campus of J.N.K.V.V. University undertook a reconnaissance survey of the Narmada Sagar Command, using a 2-mile grid. Nearly 265 soil profiles were examined.

Reports on the quality of groundwater in the Indira Sagar Project area are limited, but the general assumption is that the quality is suitable for use in irrigation. Limited water quality testing was done in several blocks in the Indira Sagar Project area. These tests were apparently conducted in 1966 and 1967. In Barwaha block, five samples out of seven tested were of excellent quality.

During 1982-83, to appraise land irrigability, an area of about 2,80,000 ha falling within parts of Khandwa and Khargone districts was surveyed by the Department of Agriculture, M.P. Surveys were carried out on 1:50,000 – scale topo-sheets. Aerial photo-interpretation was carried out wherever possible. About 366 profiles and about 2787 auger bores were examined. The rate of profile examination was about 1 per 1000 ha. A total of 30 soil series were mapped. Areas falling under different classes of depth, erosion, slope, texture, and land irrigability subclasses were identified. This report indicated that typical vertisols are not extensive in the surveyed area.

A detailed reconnaissance soil survey of the Narmada Sagar Command Area was also carried out in January 1984 by the Directorate of Agriculture in co-ordination with the Govt. of India, National Bureau of Soil Survey and Land Use Planning Wing and the Agricultural University, Jabalpur in the command area of 2.10 lakh ha. The soils of the areas have been classified into 26 soil series taking into account the morphological features, topography, and physical and chemical characteristics. As per soil taxonomy (1970), altogether three orders, three suborders, three great groups, eight subgroups and ten families have been identified. Soils have been classified into various recognised classes in terms of their suitability for irrigation.

Table –3 : Showing land irrigability classification

Sl. No.	Land Irrigability Class	Slope Percent	Depth of Soil (in cms.)	Percentage of gross command area
1.	2	0-3%	More than 90	29.5
2.	3	1-5%	22.5 to 90	21.5
3.	4	3-10%	7.5 to 45	25.7
4.	6	5-15%	0 to 22.5%	23.3

In order to study whether full irrigation would lead to water logging and salinity problems, state govt. of Madhya Pradesh commissioned special studies on subsurface drainage and groundwater behavior to the Indian Institute of Science at Bangalore. For study purposes, the entire Narmada Sagar complex Area was divided into 34 hydro-geological zones. The studies considered the following :

- Rainfall data from stations around the composite command.
- Runoff as measured in nearby gauging stations.

- Evaporation rate data.
- Climatological data.
- Groundwater-level data from all types of wells.
- Pump test data.
- Hydro-geological information on wells and aquifers.
- Soil and soil moisture data.
- Agricultural land use data, including information on crops and the seasonal nature and extent of surface water and groundwater irrigation.
- Proposed crop-water requirements.

Jawahar Lal Nehru Krishi Vishwavidhyalaya, Jabalpur through their research centre are carrying out studies on impact of agro-chemicals run-off from fields on underground and surface water in command area with an objective of assessing the residues of toxic agricultural chemicals from fields in the ground water and surface water of command areas and ecological effects of the residues in irrigation water and their physiological effects on aquatic and terrestrial vegetation, crops, animal life and agro-ecosystem as a whole for devising measures to mitigate the same under the fallow and cropped yield conditions. Studies are commenced and are making progress.

SUGGESTED STRATEGIES

The Bangalore institute's study concluded that conjunctive use of surface water and groundwater on a significant scale would be required to avoid water logging and salinity problems in the Composite Command Area. Study data indicated that a water balance of 70% surface water and 30% groundwater would be suitable in most project areas to avoid waterlogged conditions.

Natural drainage conditions in the Narmada Sagar Complex Command Areas are quite favourable as Narmada Sagar area has a well-developed natural drainage system. The command complex lies on both flanks of the Narmada River, with a number of tributaries draining the area towards the Narmada River. The slope of the cultivable land generally ranges from 1 to 3% and it has good natural drainage. The groundwater aquifers are deeply incised, and major problems of surface drainage do not appear to exist. Surface drainage will, however, be required after irrigation is implemented through the provision of a proper network of field drains so that excess water will be removed from the cultivated fields.

Irrigation water from the Narmada River will be of good quality, and normal irrigation applications are considered sufficient to leach out the salts from saline/sodic soils. No additional leaching requirements will generally be necessary. Project planners do not expect any salinity problems if proper surface and subsurface drainage systems are installed.

finalised. An allocation of Rs.24.5 lakhs was made. Studies have commenced and are making progress. The works of on farm development will be started 2 years in advance of the start of irrigation from canal system in a phased manner in the entire command area.

4. FLORA, FAUNA AND CARRYING CAPACITY

The guidelines of the MOEF require that while seeking environmental clearance for the hydropower projects, surveys should be conducted so that the status of the flora and fauna present can be assessed, listed (rare and endangered) species can be detected, if present, and appropriate conservation measures devised. Important survey work undertaken for the purpose had included the following

- Preliminary Report on First Botanical Exploration and Plant Collection from Narmada Valley by the Botanical Survey of India in 1986.
- Report on the Survey of the Narmada Sagar Area by Zoological Survey of India, 1988.
- Narmada Basin Water Development Plan: Development of Fisheries, 1987, was prepared by the Narmada Planning Agency, GOMP.
- Rapid Reconnaissance Survey of Limnological Aspects Part I, II and III, 1987, were undertaken by the Bhopal, Vikram and Rani Durgavati, Universities for GOMP.
- Water quality data has been collected by the Central Pollution Control Board, Central Water Commission, the State Pollution Control Boards and the National Institute of Oceanography

On the basis of relevant details supplied by the various states, MOEF issued clearance in 1987. A condition of this clearance, as far as it related specifically to the Flora & Fauna, was that the Narmada Control Authority would ensure in-depth studies on flora and fauna needed for implementation of environmental safeguard measures.

Further in-depth studies with focus on the following prime concerns were taken up.

- Relocating and protecting wildlife through setting up and maintenance of the permanent protection areas.
- Detailed surveys of both flora and fauna to determine the number of individuals of the various species, their habitat types and other needs, their status in terms of being endangered, threatened or protected under Indian Legislation, and recommendations for minimising project impacts and maximising opportunities for protecting and enhancing plant and animal life.
- Studies to ascertain the capacity of the surrounding areas to accommodate additional wildlife

ACTION PLAN :

The Government of Madhya Pradesh have submitted command area development plan, delineating the soil classifications and land irrigability in the Narmada Sagar Command Area showing the first three phases of irrigation development by area, the land irrigability map of the Narmada Sagar Command Area showing lands of classes 2 through 6 by location in the first three phases of irrigation development during 1986.

The project on completion will provide annual irrigation to 1.69 lakh ha. Waterlogging occurs when the groundwater table rises too close to the ground surface and the soils are unable to drain properly. This concern has been carefully planned to avoid the problems. The conjunctive use of surface and groundwater resources to the extent of 30% is proposed.

The provision of drainage systems to prevent the accumulation of excessive water in the soils, and water management planning and monitoring to control the proportions of surface water and groundwater used in irrigation and the water levels in the groundwater aquifers are some of the measures being planned for prevention of any such eventuality.

In keeping with the study conclusions, planning for the Indira Sagar Project includes maintaining a water balance of 70% surface water and 30% groundwater use, lining of the canal distribution system from the Main Canal upto the eight ha. service area, and installing and maintaining surface and field drainage systems. Because of the deeply incised aquifers, plans for surface and field drains, and plans for conjunctive use of surface water and groundwater, the planned groundwater monitoring program would be sufficient to indicate the needed remedial measures. Essentially all of the groundwater development will be undertaken by the farmers, however the State Govt. plan to take appropriate action to encourage planned groundwater development on schedule and to ensure that the required 30% of the total irrigation demand was met from the groundwater. If groundwater development does not occur on schedule because of the lack of farmer initiative or because of problems with water quality or adverse aquifer conditions, State Govt. plan to step in and install appropriate drainage systems whenever wherever needed

IMPLEMENTATION

The Government of Madhya Pradesh has submitted command area development plan. The project on completion will provide annual irrigation to 1.69 lakh ha. The implementation of the plan would be taken up in three phases for completion in December-2007. The study on impact of Agro chemicals, runoff from fields on surface & ground water quality in the command area has been assigned to J.L. Agricultural University, Jabalpur. An MOU for this work was

finalised. An allocation of Rs.24.5 lakhs was made. Studies have commenced and are making progress. The works of on farm development will be started 2 years in advance of the start of irrigation from canal system in a phased manner in the entire command area.

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- Detailed surveys of both flora and fauna to determine the number of individuals of the various species, their habitat types and other needs, their status in terms of being endangered, threatened or protected under Indian Legislation, and recommendations for minimising project impacts and maximising opportunities for protecting and enhancing plant and animal life.
- Studies to ascertain the capacity of the surrounding areas to accommodate additional wildlife

The objective of the suggested studies was to assess the environmental impacts as a result of the Narmada Sagar Complex, consisting of the three dams: the Narmada Sagar, Maheshwar and Omkareshwar, to ensure minimal adverse effects on wildlife as a result of the project development works. Studies were entrusted to Wildlife Institute of India and Friends of Nature Society. Institutes carried out exhaustive studies with a view to address the above concerns. Studies focused on the following

The reports submitted by the identified premier organisation during the period 1986 and 1997 included the following

- Sociological Survey of the Fishing Families of the Narmada River by CICFRI, 1991.
- Aquatic Fauna (Fish) Studies in Indira Sagar Submergence Area, prepared by the Friends of Nature Society in 1991 on behalf on the NVDA reported on the fish fauna of the Narmada.
- Pre-and Post-impoundment Limnological Studies of Narmada Basin, by three universities coordinated by Barkatullah University for the NVDA. (1989-92) Study report was available in 1994.
- Studies on Fish Conservation in Narmada Sagar, Sardar Sarovar and its Downstream, is a desk review sponsored by the NCA and undertaken by CICFRI, 1993.
- Wetland and aquatic flora of Narmada Valley in Madhya Pradesh was also published in 1991 in Vol. 15 No.3 in J.Econ. Toxicology Bot.
- Studies on EIA of Flora & Fauna of NSP were entrusted to the Wildlife Institute of India, Dehradun in December, 1989 and were completed by March 1994.

Key concerns addressed on the terrestrial ecosystem were as follows:

- A wildlife inventory giving reliable estimates of the numbers of various species of wildlife in the project impact area.
- A catalogue of habitat types found in the project area.
- A status report on individual species indicating ones that are endangered, threatened, or protected under prevailing Indian wildlife Laws. The report on these special status species was also included the recommendations for actions to be taken to safeguard threatened species
- Recommendations for the creation of new protected areas for wildlife in the areas neighboring the submergence area.
- An assessment of the impact of the project gene pool reserves of wildlife in the project area.

SUGGESTED STRATEGIES

Establishments of protected areas in many parts of the country in the last three decades has largely been and outcome of the Govt. concern for mitigation

of the environmental degradation specially for preservation of species diversity and the genetic valuation within them. Besides, maintaining productive capacities of Eco-system and safeguarding habitat critically for the local range of species. Three new protected areas were proposed to mitigate the losses. This includes Narmada National Park, Suryamanya Sanctuary and Omkareshwar Sanctuary.

Name of the Sanctuary/Park	Area in ha.
Narmada National Park	47522
Suryamanya Sanctuary	16370
Omkareshwar Sanctuary	11996
Total Area	75888

It is suggested that the severity of the impact resulting from direct and indirect losses could be minimised through restoration of some of the aquatic vertebrates and delineation of a substantial area of the contiguity forest which has similar conservation values that are being lost in submergence and to elevate its status to a protected area – a combination of a national park and sanctuary. Key aquatic vertebrates species like otter is proposed to be restored and translocated. It was suggested to explore the possibility of capturing and translocation of impacted otters of Narmada Sagar into identified localities of the vacant niches in central Indian rivers. Besides, a species restoration plan for aquatic reptile (turtle) was also suggested within the submergence zone and also in other stretches of the river with rocky structure and sandy banks. The restoration program for mugger crocodile as being practices in other districts of M.P. was also suggested.

ACTION PLAN AND IMPLEMENTATION

Actions have been taken by NVDA to implement the recommendation of the WLI regarding declaration of National Park & protected areas. Matter is under consideration of the State Govt.

The studies of certain aspects of fisheries and reservoir sciences have been included in the Limnological studies being conducted by the three Universities of the State. Studies in the Upper Narmada, (Bargi Reservoir) by Rani Durgawati University, Jabalpur, studies in the Middle Narmada (Tawa, Barna and Kolar Reservoirs) by Barkatullah University, Bhopal, studies in the Lower Narmada by Vikram University, Ujjain. All the three Universities have

completed the studies in their respective areas as per MOU and final report is available. Accordingly Action Plan has also been drawn up

Since the topography in the reservoir area consists of rolling hills, NVDA expected the higher peaks to remain above the water surface level and constitute islands in the reservoir. These islands would contain remnant flora and fauna that would remain isolated and would be subjected to changes in microclimate by virtue of being surrounded by a large body of water. NVDA scientists have expressed an interest in the possible effects these special circumstances could induce.

In addition to these small islands, two large islands will be formed to the north and south of the Narmada River just upstream of the Indira Sagar Dam. Present plans are to reserve the northern island of 17 km², for people and to link it to the mainland and the highways leading to Indore and Bhopal. The southern island of about 23 km², however, is earmarked for conversion into a wildlife sanctuary. This prospective island would be considered large enough to preserve existing flora and fauna.

Plans have been drawn up for retrieval and conservation of terrestrial wild life. Actions have been taken by NVDA to implement the recommendation of the WLI regarding declaration of National Park & protected areas. Matter is under consideration of the State Govt.

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Aquatic fauna has also been covered under the studies completed by Friends of Nature Society, Bhopal. The draft report of FONS is also available. Action Plan submitted earlier is being updated.

5. SEISMICITY AND RIM STABILITY

The Narmada Sagar reservoir has a gross capacity of 12,200 million cubic meters, or about 9.9 million acre-feet, by far the largest-capacity reservoir planned in the Narmada River basin. Therefore the issues of seismicity, the potential for reservoir-induced seismicity (RIS) and the rim stability have been carefully studied and addressed.

STUDIES

Investigations have considered the Narmada Sagar complex dam sites at Indira Sagar, Omkareshwar and Maheshwar together for the studies. Geological Survey of India, the Central Water and Power Research Station of Pune, the University of Roorkee, GOG, GOMP and World Bank Consultants Pinkerton, Markwell and others have been closely associated with the studies and the mitigation planning. Several reports on seismological factors affecting design of the dam, including the following are available

Technical Memorandum 3.09, Evaluation of the Earthquake Parameters of the Indira Sagar Dam, by the Department of Earthquake Engineering, Roorkee University. Technical Memorandum 4.12, Seismological Considerations for Indira Sagar Dam. Part-1: Evaluation of Earthquake Parameters for Design of Dam. Part-2: Assessment of Potential for Reservoir-Induced Seismicity in Narmada Basin. Induced Seismicity and Other Geodynamic Processes Associated with Man-made lakes, Guha, S.K., Visiting Seismology Consultant, North Eastern Council, Shillong, India, Sessional Report presented at IVth International Congress, International Association of Engineering Geology, New Delhi, India, 10-15 December 1982. Hazards Due to Reservoir-Induced Seismicity in India, Guha, S.K. (See item-3 above.)

SUGGESTED STRATEGIES

Major conclusions related to the effects of RIS considerations on seismic design requirements and the needed plans for seismic monitoring. As for design, it was suggested that reservoir impoundment's by general agreement can trigger significant earthquakes only where tectonic deformations already exist in the geological structures. Thus it was concluded that filling the Narmada Sagar reservoir might cause an earthquake to occur sooner, but it would not affect the magnitude or intensity of ground motion associated with the earthquake. Consequently, RIS was assumed to have no influence on seismic design requirements for structures near to the reservoir.

Detailed studies got done from the University of Roorkee, by consultancy with Dr. Guha and expert opinion obtained from Dr. Ray W. Clough, were placed before the Dam Review Panel. The Indira Sagar Dam Review Panel considered all available reports and data and recommended that

To monitor seismicity during the pre and post-impoundment phases. Network of about five stations each be developed in the Narmada Sagar, Omkareshwar, and Maheshwar areas.

To record the ground motion intensity and response of the dams for any significant earthquake in the vicinity, installation of three strong motion seismographs at each dam site.

To record any significant ground motion that occurs during construction, one strong motion instrument near each dam site

Based on the recommendations of the Dam Review Panel, detailed designs for the dam have been prepared by the Central Water Commission.

At present, three experimental seismological stations have been established with the guidance of Central Water & Power Research Station, Pune, at Narmada Sagar, Omkareshwar and Maheshwar dam sites. The experimental station at Indira Sagar Dam site consists of a RV-320 Micro Earthquake Recorder, a Wood Anderson Seismograph and a Digital Recorder - 100 strong motion accellograph. The results are analysed by the Central Water & Power Research Station, Pune & IMD.

In order to study the seismic effects in the Narmada Sagar Complex Zone a network of 10 seismological observatories with sophisticated instruments are proposed to be established based on the recommendations of Erstwhile Dam Review Panel, Central Water and Power Research Station, (CWPRS) Pune and Indian Meteorological department (IMD). It is proposed to monitor pre and post impoundment seismicity also at these seismic stations to help in assessing the adequacy of seismic parameters adopted for designs. The location of these seismic observatories finalised on the recommendations of IMD are (1) Bagli (2) Barwani (3) Chhanera (4) Harda (5) Indore (6) Kannod (7) Khandwa (8) Maheshwar (9) Narmada Nagar (10) Omkareshwar. Order has been placed and supply has commenced

The dam is, in effect, over-designed in the interests of public safety. As for the Indira Sagar Dam, Seismic design coefficients, though higher than needed, also meaning higher costs have been preferred.

RESERVOIR RIM STABILITY

The reservoir competency survey has been done by GSI and report is submitted. In the report, GSI suggested further studies for some patches of narrow water divide. However environment sub-group decided not to have further studies as experts were of the opinion that there was no water loss between Mandla & Rajghat.

Establishment of 10 nos. of seismic observatories in the Narmada Sagar Complex area is taken up by NVDA. Order has been placed and supply has commenced. Besides, 12 nos. of Wood Anderson Seismometers and 6 nos. of photographic recorders are being procured from IMD supply has commenced.

Procurement of Micro Earthquake recorders is completed. In the mean time on the initiatives taken by NVDA, CWPRS has already installed the instrument to record, pre-impounding data and for undertaking seismic studies at NSP, Omkareshwar & Maheshwar projects through Analogue Micro Earthquake Recorder & Strong Motion Occillograph as an interim measure. IMD will interpret data.

6. HEALTH ASPECT:

The Indira Sagar Project would create a 913 km² reservoir, a main canal of 332 km. and 1,820 km of distributaries. Surveys have been conducted in the Indira Sagar impact areas to investigate existing levels of health and to gather information on specific diseases.

STUDIES AND FINDINGS :

Three specific diseases namely Malaria, Schistosomiasis, and Filariasis were studied. Other diseases investigated were leishmaniasis and scabies and other water-washed diseases. The geographical reconnaissance study, to identify the potential breeding sites of malaria vector, is being explored.

Pre-impoundment and post-impoundment Limnological studies carried out by three Universities take care of water quality aspect. These studies have been completed and the final report is submitted.

Further regarding preventive aspects, Department of Preventive and Social Medicine, Gandhi Medical College, Bhopal are engaged for the epidemiological studies. Studies are making progress.

J.L. University which carried out initial studies for the planning commission on the aspects related with the use of insecticides and pesticides in the command through their research station at Khandwa have been entrusted with studies on impacts of application of insecticides etc.

According to the above studies, key findings included the following :

- Malaria is increasing in Khandwa and Khargone Districts surrounding the Indira Sagar Dam site.
- Cholera and gastroenteritis are endemic in Indore, Dhar and Jabua Districts for more than seven months each year.
- Other common diseases are typhoid and dengue fever, although they are not often found in the project area.
- Filariasis is endemic to at least eight districts of MP, including Chhindwara, adjacent to the Narmada Sagar Site. The vector mosquito (mainly *Culex fatigans*) responsible for this parasitic disease proliferates in dirty water in

ponded areas and artificial containers and also to a lesser extent in stagnant irrigation tributaries and lakes.

- Little or no autochthonous leishmaniasis exists at present in MP. This disease is not water related since it is spread by sand flies that do not need water to breed. However, according to NICD, Delhi, leishmaniasis flared up following the construction of the Rajasthan canal.
- Guinea worm disease (dracontiasis) affects 3,000 villages in MP. This disease is caused by a nematode worm and the vector for its transmission is Cyclops, the fresh water fleas.

SUGGESTED STRATEGIES :

Health problems related to these causes are expected to improve when the projects are implemented. The incidence of water-washed diseases should be reduced by the increased availability of water. The point has also been made that large water supply and irrigation projects often cause problems related to the expanded water environment. Plans have been prepared in both project areas to increase public health-related facilities, staffing, and services during project implementation. The incidence of water borne diseases in the Narmada Valley, as elsewhere in MP, is constantly being monitored by GOMP's Directorate of Health Services (DHS).

Means to control schistosomiasis include physical, chemical, and biological mitigation measures. Physical mitigation measures include draining area with standing water, clearing vegetation from water channels and banks, utilising flushing flows, and manipulating water levels. The primary chemical mitigation measure is the use of molluscicides. Biological mitigation measures would include the use of predator species that would eat the secondary host snails. Schistosomiasis is to be kept out of the project area through vigilant monitoring and the prompt use of eradication measures when needed

Malaria is another disease that requires monitoring and control actions in the project areas. It was found that most of the existing diseases in the project area were related to prevailing socio-economic levels, mainly hygiene. Since the Anopheline mosquito vector has the potential to proliferate in the reservoir, the large draw down strip, and the canals and drains, preventive measures are to be in place to keep the mosquitoes in check. Some experimental resistance of adult mosquitoes to commonly used biocides has been noted under laboratory conditions. Thus research to maintain effective biocides will have to be continued on long term basis. Land levelling and land filling operations as well as appropriate vegetation clearing are being integrated. Control measures will include larvae-eating fish in water bodies, mosquito-inhibiting plants, and clearing of vegetation and other actions to destroy breeding sites.

ACTION PLAN :

NVDA has submitted the revised plan costing Rs.278.95 lacs for the preventive and curative aspects of health. The plan includes establishment a 30 bed hospital at Punasa. Other facilities includes the following :

- Mobile unit
- PHC 3 nos., equipped with 5 beds each, equipments, vehicles, staff etc.
- 2 civil dispensaries with labs
- 24 sub-health centres with equipments etc.

Action Plan includes continued investigations of the Central and Western Zone of Narmada at selected sites for the identified parameters. In addition, plan proposes biological characteristic study, microphytes, phytoplankton, zooplanktons, micro invertebrates, biomass etc. The proposal includes among others continued limnological studies, ecological studies. A note on health aspects of NSP prepared by NVDA was examined in the Ministry of E&F and comments were sent for modifying the report. NVDA has submitted the revised plan costing Rs.748.73 lacs for the preventive and curative aspects of health. Regarding preventive aspects, a MOU has been signed with the Department of Preventive and Social Medicine, Gandhi Medical College, Bhopal. Six half-yearly reports received. For studies on health aspect in project impact areas of SSP and NSP, work is proposed through a cell of monitoring and evaluation under the Directorate of Health Services, Bhopal. The approved plan is being implemented.

Pre-impoundment and post-impoundment Limnological studies carried out by three Universities will take care of water quality aspect. These studies have been completed and the final report is submitted. Action plan approved by NVDA is under scrutiny of NCA.

IMPLEMENTATION :

The above Action Plan is under implementation. For long term hydro-biological monitoring, one well equipped laboratory has been established at Barwani.

7. ARCHAEOLOGICAL & ANTHROPOLOGICAL SURVEY:**Archaeological Aspects**

Investigations of the basin revealed that valley was rich in archaeological belongings:

- ♦ Paleolithic sites are to be found in Nemavar, Kannod, Punjapura, Chirapahad, Sitabau, Dhardi, Moretakka, Maheshwar, Kasrawad, Sahastradhara, Khalghat, Dharampuri, Kalibaodi, Manawar, Budada, Barwani, and Kukshi.
- ♦ Mesolithic sites are to be found all over the valley.

- ◆ Cholelithic sites are to be found in Chikalda, Khedi, Badada, Mohipura, Hathnawar, Piplada, Khalghat, Maheshwar, Nawada, Todi, Kapila Sangam, Veda Sangam and Mardana.
- ◆ Rock-cut caves and sculptures are to be found at Piploda, Dharampuri, Bijagadha, Bagha and Mandogarh.

None of the archaeological sites mentioned above, that have special significance, would fall within the area of submergence of the projects.

SURVEYS :

A survey of the 254 villages for identification of the archaeological monuments falling within the submergence area was carried out by the State Department of Archaeology and Museum, Bhopal.

Archaeological Survey of India has also completed the survey for 167 villages for centrally protected monuments for identification of the monuments of significance. Implementation of the Action Plan is already initiated.

ACTION PLAN :

State Protected Monuments :

The State Department has submitted an Action Plan for relocation of monuments of archaeological significance earlier in 1993. According to this, the details are as under :

• Excavation of archaeological mounds

Sl. No.	Particulars	Status
1.	Mound at village Khedinema.	Excavated

Later on GOMP has revised its plan as Action Plan 1997. The details are depicted in the table below:

• Relocation / Protection

Sl. No	Particulars				Status
	Name of mounment	Village / Tehsil	Distt.	RL in m	
1.	Shiv Mandir, Dharikotla	Harsud	Khandwa	229.500	80% of the relocation work is nearly completed. Work was stopped by the Collector, Khandwa.
2.	Shiv Mandir, Punghat	Harsud	Khandwa	240.315	Land allotment awaited.
3.	Shiv Mandir, Badkeshwar	Harsud	Khandwa	263.805	Pre-relocation work completed. Land allotment awaited.

4.	Shiv Mandir (Durga Mandir), Chandel	Khandwa	Khandwa	254.917	Land allotment awaited
5.	Chhatra Ghisor	Harsud	Khandwa	239.300	Land allotment awaited
6.	Shiv Mandir (2), Khudiamal	Harsud	Khandwa	266.215	Land allotment awaited
7.	Ridheshwar Mandir, Handia	Harda	Hoshanga bad	273.380	Estimate ready.
8.	Abdul Hasan's Tomb	Harda	Hoshanga bad	269.680	Site identification in progress.
9.	Rock-cut statues	Deyat	Dewas	267.830	Estimates are under preparation.
10.	St. Singhaji's Samadhi	Singhaji mafi	Khandwa	247.915	Progress is nil

• **Excavation**

Sl. No.	Particulars of archaeological mounds	Progress
1.	Mound at village Bijalpur Khurd, distt. Khandwa	Nil
2.	Mound at village Chhalpakala, distt. Khandwa	
3.	Mount at village Gajanpur, distt. Dewas	
4.	Mound at village Navalpura, distt. Khandwa	
5.	Mound at village Gannor, distt. Khandwa	

Centrally Protected Monuments :

Archaeological Survey of India have prepared a plan for protection of monuments coming under the submergence of Narmada Sagar Complex area. According to this plan, in the area of submergence of Indira Sagar Project, only lower bastion in north of the Joga Fort is likely to be affected by scour action of water.

IMPLEMENTATION :

Plan of Archaeological Survey of India

Environment Sub-group constituted a committee to look into the plans to protect the Joga Fort. The committee met twice and undertook field visits and observed as follows :

R.L. of plinth of Joga Fort	+ 274.80 M
R.L. of Top of Joga Fort	+ 284.75 M
R.L. of Main Gate of Joga Fort	+271.035 M
R.L. of Top of well	+ 261.39 M
F.R.L. of ISP	+ 262.10 M
Observed Highest Flood Level (54,000 cumecs)	+ 264.27 M
HFL corresponding to 1 in 100	+ 265.52 M

year Flood (62,500 cumecs)	
HFL corresponding to 1 in 100	+ 266.029M
year Flood (83,366 cumecs)	
BWL corresponding to 1 in 100	+265.00 M
year Flood	
BWL corresponding to 1 in 100	+ 266.637M
year Flood	
Water Level (20.7.98)	+ 252.00 M
River Bank	+ 259.14 M
River Bed	+ 248.00 M

From the above data, it was inferred that the well situated in the midst of north bastion will be fully submerged at FRL + 262.10 M. However, this will remain submerged for 2-3 months during monsoon when reservoir might be at FRL.

As far as backwater effect is concerned, the temporary rise due to backwater will be about 0.60 M near well, above HFL. Archaeological Survey of India has prepared an estimate of Rs.1.50 crores for construction of a wall to protect the in-take well.

MAP-2 Location of Joga Fort (Ruins) In Village Joga Kalan



About 134 statues were collected from districts Hoshangabad, Dewas and Khandwa and are displayed in the museums there.

Photo(s) shown here are of the statute displayed at Dewas museum. About 100 statues were treated chemically. Construction of Museum is over.



Anthropological aspects:

The Narmada Valley can be divided into three physiographic units (1) Western Vindhya (2) Narmada through West and South and (3) Western Satpuras. Some Indologists place the Narmada-Chambal civilisation of Malwa as a contemporary of Indus civilisation. Navada Toli is a site contemporary to

Harappa where evidence of early farming villages were discovered. Findings of a hominoid skull from Hathnora indicated the possibilities of the existence of human bio-cultural remains within the basin.

SURVEYS/STUDIES :

A series of studies have been conducted for salvaging the Narmada Basin from anthropological point of view which includes Paleo-Anthropological, human ecological, ethnography and pre-historic aspects. Besides studies on contemporary culture and collection of ethnographic specimens were collected and leading anthropologists were associated.

- *Rashtriya Manav Sanghralaya* has constituted a working group for the retrieval of bio-cultural material in Narmada Basin this includes studies on taphonomy and paleo ecology, excavation of upper paleo lithic sites, collection and documentation of material culture objects from tribal, artisan and folk culture.
- Survey of tribal art and handicraft entrusted to *M.P. Adivasi Kala Parishad* is completed and report is available. The report gathered details from the 24 submergence villages and identified 75 sculptors and eight groups of exhibitionists besides documentation of identified important sculptures. Cultural aspects of the tribes including marriages and their lifestyle were collected.
- The Bhil Track, a study of displaced tribal, sponsored by NVDA, of the 17 submergence villages of SSP compiled the information on their status, layout of their resettlements, construction of houses, social structure, division into clans, economic structure, in-depth, dependence on forests for living, inter-community relationship, leadership pattern, women's role, religion, superstitions and festivals.
- Besides Anthropological Survey of India has covered these studies under its own project called "People of India". The report is in 61 volumes out of which 7 volumes are under final editing.
- A Narmada salvage plan is also launched by Anthropological Survey of India.

ACTION PLAN :

Archaeological Survey of India is carrying out excavation at selected sites. Reports are available.

State Department has reviewed the Action Plan and has proposed 5 excavation sites as shown in table -4, in addition to the earlier proposal of collection of sculptures and excavation at Khedinama.

Table-4 Showing status of works at excavation sites

EXCAVATION SITES	STATUS
Bijalpur Khurd, Khandwa	Progress is nil
Chhalpa Kala, Khandwa	
Gajanpur, Dewas	
Nabalpura, Khandwa	
Gannaur, Khandwa	

Excavation works at Khedinama was completed earlier during 1993-94. Report is being published.

IMPLEMENTATION :

Excavation of the early historic mound in village Khedinama in Hoshangabad district is completed. Ancient tools and artifacts were found and report is available in NCA.

The entire area was scanned by the Anthropological Survey of India under Narmada Salvage Plan and some ancient tools have been found.

EX - XXXVI - (15)



नर्मदा नियंत्रण प्राधिकरण NARMADA CONTROL AUTHORITY

No. Env- 4(11)/2001/1209 - 15

Dated: April, 11, 2001

To

Shri Vaidyanath Ayyar,
Secretary, Department of Culture,
Shastri Bhawan,
New Delhi.

Sub: Archaeological heritage impacted by Indira Sagar Project, M.P.

Sir,

This is to bring it to your kind notice that Protection / Relocation / Excavation works of the Archaeological heritage impacted by the Indira Sagar Project (ISP) have been planned by the Archaeological Survey of India, office at Bhopal, Madhya Pradesh. Accordingly North Bastion of one centrally protected monument viz Joga Fort in village Joga Kalan shall be impacted by the scour action of the ISP waters. ASI, Bhopal have prepared a detailed plan and estimates for protecting the intake well situated in the North Bastion of this fort through erection of a wall around it. The estimates are valued at Rs.1.67 crores. Project authorities have pledged release of financial grants to the ASI for executing its plan of protecting the monument under reference. However ASI, Bhopal have expressed its inability to carry out the works due to administrative difficulties. A copy of the letter received from the ASI is enclosed for ready reference.

During the recent review carried out by the Member (E&R), NCA for ascertaining the progress on 8th March, 2001, it was gathered that expenditure sanctioned to carry out the work of Rs.1.67 crores is beyond the delegated powers of the Director General of Archaeological Survey of India (copy enclosed for your ready reference). Since the issue is hanging in balance for long we request your good offices for expediting the examination and sanction of the estimates to enable the concerned authorities of the ASI to take up execution of the works at the earliest.

As the project authorities have prepared a plan for an expeditious completion of the Indira Sagar Project. This may please be given priority.

Thanking you,

Yours faithfully,

(DR. PAWAN KUMAR)
SPECIALIST (ENVIRONMENT)

BG-79, Scheme No. 74-C, Vijay Nagar, Indore - 452 010 (M.P.)

बी.जी. - 79, स्कीम नं. 74-सी, विजय नगर, इन्दौर 452 010 (म.प्र.)

Phone No.: Mem (E&R)- 554333, SPL (Env)- 571587, IAO-558603, APRO-557691

Gram : NARCONTRO

Fax : 91-731-55433

ISSUED
11/4/01

176

// 2 //

Copy forwarded to:

1. Mrs. Komal Anand, Director General, Archaeological Survey of India, 11, Janpath, New Delhi.
2. Shri Ravindra Sharma, IAS, Vice Chairman, Narmada Valley Development Authority, Narmada Bhawan, Tulsi Nagar, Bhopal.
3. Shri Suresh Chandra, IFS Member (E&F), Narmada Valley Development Authority, Narmada Bhawan, Tulsi Nagar, Bhopal.
4. Managing Director, National Hydropower Development Corporation Ltd. Paryavas Bhavan, near Vallabh Bhavan, Bhopal, Madhya Pradesh
5. Shri J.P. Vyas, IAS, Member (R), Narmada Valley Development Authority, Narmada Bhawan, Tulsi Nagar, Bhopal.
6. Dr. P.K. Mishra, Superintending Archaeologist, Archaeological Survey of India, Central Region, G.T.B. Complex, T.T. Nagar, Bhopal - 462003, for further needful at his level.



(DR. PAWAN KUMAR)
SPECIALIST (ENVIRONMENT)

251

177



भारत सरकार
GOVERNMENT OF INDIA



फैक्स : (0755) 558250

फोन : 558250, 558270, 763294

अधीक्षण पुरातत्त्वविद्

भारतीय पुरातत्त्व सर्वेक्षण

जी.टी.बी.कॉम्प्लेक्स

टी.टी. नगर, भोपाल - 462003

Superintending Archaeologist
Archaeological Survey of India
G.T.B. Complex, T.T. Nagar,
Bhopal - 462003

फाईल क्रमांक - 4624
दिनांक - 21/7/2000

To,

Dr. Pawan Kumar,
Narmada Control Authority,
Indore.

Sub: (a) Minutes of the meeting in relation to Sardar Sarovar Project.
(b) Protection work of Joga Fort.

Sir,

With reference to your letter No.4(ii)/200/1166-76, dt.06/07/2000, on the above related subjects I would like to state that on the page 4 para 1 it is pointed that Choubes Avtar temple is already relocated. Thus correction needs to be made that the temple is still to be translocated as the land for same has not yet been transferred to ASI, by the district administration pending a Court case.

The second issue with regard to the protection of the Joga Fort by construction of a safe guard wall had been referred to Director General, Archaeological Survey of India, as committed in the meeting for his final view. The Directorate has recommended vide reference No.9-6/93-EE, dt.2nd July, 1999 that the said work should be taken up by the NVDA as per the requirement of the Archaeological Survey of India in accordance to the estimate and design submitted (letter enclosed).

You are requested to clarify the same with the Director General, Archaeological Survey of India, directly under intimation to this office.

Yours faithfully,

Encl: As above

(Dr. P.K. Mishra)

Superintending Archaeologist

For na please
26/7/2000
D/E 26/7/2000

Endt.No.

Bhopal, dt.

1. Director General, ASI, for information and necessary action.
2. Director Planning, ASI, for confirmation and to communicate to NVDA and NCA authorities of the same.
3. Chairman, NVDA for information and necessary action.

172

Archaeologist



नर्मदा नियंत्रण प्राधिकरण NARMADA CONTROL AUTHORITY

ANNEX - XXXVI - (16)

No.Env-39(36)/2001/1202-8

April 11, 2001.

To

Shri J.N.L. Shrivastava
Secretary (Agriculture)
Ministry of Agriculture
Department of Agriculture & Cooperation
Krishi Bhawan
NEW DELHI

BY FAX & SPEED POST

Sub: Catchment Area Treatment under River Valley Project Schemes -
reg.

Sir,

This is to bring to your kind notice that Narmada Control Authority is a body established by the Ministry of Water Resources as per the provisions of the Inter-state Water Dispute Act for ensuring the faithful compliances to the directions of the Narmada Water Dispute Tribunal Award and also the conditions of clearances granted to the River Valley Projects viz., Sardar Sarovar and Indira Sagar by the Govt. of India. According to one of the conditions of the clearance granted by the Ministry of Environment & Forests, Project Authorities were required to prepare schemes for treatment of priority catchment within the catchment of the above Projects. the prioritized catchment was to be taken up for treatment in two phases. While, in accordance with the decision of the Govt. of India, the areas treated under Phase-I are being charged to the Project, Phase-II areas were to be treated under various schemes of the Central / State Governments.

The Planning Commission had agreed for inclusion of Narmada Catchment under Centrally sponsored schemes of your Ministry and a great deal of work was carried out under these schemes by the States of Maharashtra and Madhya Pradesh. The progress on these works is being monitored by a Sub-group constituted by the NCA which is chaired by the Secretary, Ministry of Environment & Forests, Govt., of India, periodically. During the last review taken by him on 17.1.2001, a concern was raised on the possible delay in execution of the treatment programme and it was decided to approach your goodself for possible remedial measures.

Contd... P-2

180

BG-79, Scheme No. 74-C, Vijay Nagar, Indore - 452 010 (M.P.)
बी.जी. - 79, स्कीम नं. 74-सी, विजय नगर, इन्दौर 452 010 (म.प्र.)
Phone No.: Mem (E&R)- 554333, SPL(Env)- 571587, IAO-558603, APRO-557691

Gram : NARCONTROL
Fax : 91-731-554333

// 2 //

In view of this, I intend to draw your kind attention towards the recent decision of de-centralisation of the watershed treatment schemes, which hitherto, were under the control of your Ministry. This may result in possible change in the priorities of the State Govts., of Maharashtra and Madhya Pradesh, the Narmada Catchment might not figure under their scheme in the priority list due to constraint of resources with the State Govts. Thus, the programme on the Narmada Catchment may receive a set-back.

You may appreciate the need of continuing with the treatment programme in Narmada Basin and for this I request you to use your good offices for providing continued support to the treatment programme related to Inter-state Sardar Sarovar Project, so that the pace of work currently under progress and planned for the near future is not affected adversely.

Yours faithfully,



(DR. PAWAN KUMAR)
SPECIALIST (ENVIRONMENT)

Copy forwarded for information and necessary action to:

1. Shri Suresh Chandra, Member (E&F), NVDA, Narmada Bhawan, Tulsinagar, Bhopal.
2. Secretary (Environment), Govt. of Maharashtra, Mantralaya, Mumbai.
3. Dr. Shamsheer Singh, Addl. Commissioner, Soil Conservation, Ministry of Agriculture, Shastri Bhawan, New Delhi.
4. Shri S.A. Thorat, Conservator of Forests, Dhule Circle, Dhule.
5. Shri R.K. Behre, Joint Director (Agri.), NVDA, Narmada Bhawan, Tulsinagar, Bhopal.

6 - Smt. Nolini Bhat, Director, MOEF, New Delhi

ISSUED
Sr 11/4/07
5.30 PM



A.C. GROVER
3014821



*Pl. inter-circularly
accordingly*

अ. स. पत्र सं० १
D. O. No. 9-6/93-EE
निदेशक (संरक्षण)
DIRECTOR (CONSERVATION)
भारतीय पुरातत्व सर्वेक्षण
ARCHAEOLOGICAL SURVEY OF INDIA
जनपथ/Janpath.
नई दिल्ली-110011, तारीख 19
New Delhi-110011, the 30.6.19 99

Dear Dr. Mishra,

I would like to invite your attention to the D.O. letter no. 6/120/98-M-6272 dated 31.8.98 addressed to the DG regarding the construction of a safeguarding wall around the Joga Fort for its protection from submergence.

The construction of a RCC retaining wall at a cost of Rs. 1.67 crores is an original work which does not come within the delegated powers of the DG for sanction. As such, it would be appropriate that the design and construction of this wall is taken up by the NVDA. The aesthetic appearance of the wall shall however be as per the requirement of the ASI.

You may inform the NVDA accordingly.

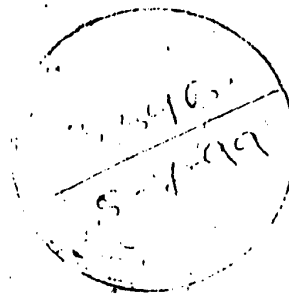
This issues with the approval of the DG.

With regards.

Yours sincerely,

(A.C. GROVER)

Dr. P.K. Mishra,
Superintending Archaeologist,
Archaeological Survey of India,
Bhopal circle, Bhopal.



ENVIRONMENTAL COST OF SSP

ANNEX - XXXVI - (17)

RELATED TO UNIT-I DAM:

A) Expenditure by project authorities

i) Cost of Survey & Studies (in Rs. lacs)

G.O.G.		G.O.M.		G.O.M.P.		G.O.R. N.C.A.		Total
Estimate	Exp.	Estimate	Exp.	Estimate	Exp.	Estimate	Exp.	Total Estim.
4.52	4.52	5.29	5.29	2.44	2.44			12.25
8.77	8.77	7	7	3.28	2.8			19.05
101.84	80.47	38	16	20.33	20.33	15.27	15.3	175.44
2.5	2.5	10	2.5	29.63	28.59			42.13
1.3	0.6	N.A.		59	36.33			60.3
5.05	5.07	N.A.		23	13.59	1.98	1.98	30.03
11.25	11.25					N.A.		11.25
						Total (i)		350.45

ii) Cost of Implementation (in Rs. lacs) lacs)

G.O.G.		G.O.M.		G.O.M.P.		G.O.R. N.C.A.		Total
Estimate	Exp.	Estimate	Exp.	Estimate	Exp.	Estimate	Exp.	Total Estim.
1938.82	1769.02	2116.00	1650.27	1800.00	1055.10			5854.82
3445.76	3810.07	2894.67	2218.27	8835.05	6804.87			15175.48
663.31	126.26	117.00	2335.26	1650.00				2430.31
	71.52	102.10						102.10
3800.00	583.47	546.60	9.26	848.48	21.66			5195.08
329.00	174.04			6819.20	74.90			7148.20
219.57	335.20			NA	NA			219.57
NA	NA					NA		
						Total (ii)		36125.56
						Total (i & ii)		36476.01

N.A. Not available



नर्मदा नियंत्रण प्राधिकरण NARMADA CONTROL AUTHORITY

सं: पर्या-३(३६)२००१/ 2319-2351

दिनांक: २८ मई, २००१

स्पीड पोस्ट द्वारा

11/6/2001

सेवा में,

न.नि.प्रा. के पर्यावरण उपदल के सभी सदस्य/आमंत्रितगण,
संलग्न सूची के अनुसार ।

विषय: नर्मदा नियंत्रण प्राधिकरण के पर्यावरण उपदल की छत्तीसवीं बैठक का कार्यवृत्त ।

महोदय,

इस पत्र के साथ नर्मदा नियंत्रण प्राधिकरण के पर्यावरण उपदल की पर्यावरण भवन, नई दिल्ली में दिनांक २ मई, २००१ को हुई छत्तीसवीं बैठक के कार्यवृत्त की एक प्रति संलग्न कर भेजी जा रही है यदि इस पर आपकी कोई टिप्पणी/राय है तो यथाशीघ्र अधोहस्ताक्षरी को भेजने का कष्ट करें ।

कृपया इसकी प्राप्ति स्वीकार करें ।

संलग्नक : उपरोक्तानुसार ।

भवदीय,

नरेन्द्र देव तिवारी
(नरेन्द्र देव तिवारी)

सदस्य (पर्यावरण एवं पुनर्वास) एवम्
सदस्य सचिव, पर्यावरण उपदल

प्रतिलिपि सूचनार्थ प्रेषित :

- 1- सचिव, जल संसाधन मंत्रालय एवं अध्यक्ष, न.नि.प्रा., भारत सरकार, श्रम शक्ति भवन, रफी मार्ग, नई दिल्ली - 110 001.
- 2- उपाध्यक्ष, सरदार सरोवर नर्मदा निगम लि0, नया सचिवालय परिसर, गाँधीनगर - ३८२ ०१०
- 3- उप-निदेशक (सम्पर्क), नर्मदा नियंत्रण प्राधिकरण,, 1001, 10वीं मंजिल, भिकाजी कामा भवन, आर.के.पुरम, नई दिल्ली - 110 066.

521
(नरेन्द्र देव तिवारी)

सदस्य पर्यावरण एवं पुनर्वास एवम्
सदस्य सचिव, पर्यावरण उपदल

No.Env-3(36)/2001/

May 31, 2001

To

All the Members & Invitees
of the Environment Sub-group
(As per list attached)

Sub: Minutes of the 36th Minutes of the Environment Sub-group.

Sir,

I am enclosing the Minutes of the 36th meeting of the Environment Sub-group held at Paryavaran Bhawan, New Delhi on 2.5.2001.

In case of any suggestions / clarification, the same may kindly be sent to this Office at the earliest. Please acknowledge the receipt

Yours faithfully,

Sd/-

(N.D. TIWARI)
MEMBER (E&R) & MEMBER SECRETARY
ENVIRONMENT SUB-GROUP

Encl: As above.

Copy forwarded along with enclosure:

1. Secretary (WR) & Chairman (NCA), Govt., of India, Shram Shakti Bhawan, Rafi Marg, New Delhi 110001.
2. Vice Chairman, Sardar Sarovar Narmada Nigam Ltd, New Sachivalaya Complex, Gandhinagar 382010
3. Dy. Director (Liaison), Narmada Control Authority, 1001, 10th Floor, Bhikaji Cama Place, Bhikaji Cama Bhawan, R.K. Puram, New Delhi 110066.

Sd/-

(N.D. TIWARI)
MEMBER (E&R) & MEMBER SECRETARY
ENVIRONMENT SUB-GROUP

PTC for English Version

पर्यावरण उपदल के सदस्यगण

- १- श्री पी०वी० जय कृष्णन, सचिव, भारत सरकार, पर्यावरण एवं वन मंत्रालय, सी०जी०ओ० काम्पलेक्स, लोदी रोड, नई दिल्ली-११० ००३
-अध्यक्ष
- २- श्री सुरेश चन्द्र, कार्यकारी सदस्य, न.नि.ग्रा., बी.जी.११३, योजना कमांक-७४-सी, विजय नगर, इन्दौर - ४५२ ०१० म.प्र.
- ३- श्री रवीन्द्र शर्मा, उपाध्यक्ष, नर्मदा घाटी विकास प्राधिकरण, नर्मदा भवन, तुलसी नगर, भोपाल-४६२००३.
- ४- श्री ए०सी० त्यागी, आयुक्त, पी.पी, भारत सरकार, जल संसाधन मंत्रालय, श्रम शक्ति भवन, रफी मार्ग, नई दिल्ली - ११० ००१.
- ५- सचिव पर्यावरण, महाराष्ट्र सरकार, पर्यावरण विभाग, मंत्रालय, मुम्बई-३२
- ६- श्री के०सी० कपूर, प्रबन्ध निदेशक, सरदार सरोवर नर्मदा निगम लि०, नया सचिवालय परिसर, गांधीनगर - ३८२ ०१०
- ७- सचिव, पर्यावरण, राजस्थान सरकार, पर्यावरण विभाग, सचिवालय, जयपुर - ३०२००५
- ८- महानिदेशक, नृवंशविज्ञान सर्वेक्षण विभाग, पश्चिम ब्लाक-२, प्रथम मंजिल, स्कंध-६, रामकृष्ण पुरम, नई दिल्ली - ११००६६
- ९- महानिदेशक, भारतीय ज्ञान अनुसंधान परिषद, अंसारी नगर, पोस्ट बाक्स नं०-४५०८, नई दिल्ली - ११० ०२९
- १०- उपमहानिदेशक, मृदा कृषि विज्ञान एवं इंजीनियरी, भारतीय कृषि अनुसंधान परिषद, कृषि भवन, डा० राजेन्द्र प्रसाद मार्ग, नई दिल्ली - ११०००१
- ११- श्री एस०के० मुखर्जी, निदेशक, भारतीय वन्य जीव संस्थान, पोस्ट बाक्स नं० १८, देहरादून - २४८ ००१
- १२- डा० आर०के० कट्टी, सलाहकार, ४०१/बी०, पूनम चेम्बर्स, शिव सागर स्टेट, डा० एनी बेसेन्ट रोड, मुम्बई - ४०० ०१८
- १३- डा० एस० रामाशेषन, सलाहकार, प्रोफेसर, सिविल इंजिनियरिंग विभाग, कोन्गू इंजिनियरिंग कालेज, पेरुन्दुरई, इरोड - ६३८०५२
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- १५- उप-महानिरीक्षक, वन, भारत सरकार, पर्यावरण एवं वन मंत्रालय, पर्यावरण भवन, सी.जी.ओ.काम्पलेक्स, लोदी रोड, नई दिल्ली-११० ००३
- १६- महानिदेशक, भारतीय पुरातत्व सर्वेक्षण, ११, जगपथ, नई दिल्ली - ११०००१
- १७- श्री नरेन्द्र देव तिवारी, सदस्य, पर्यावरण एवं पुनर्वसि, न०नि०प्रा०, इन्दौर - सदस्य सचिव

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1. Shri P.V. Jaya Krishnan, Secretary, Govt. of India, Ministry of Environment & Forests, Paryavaran Bhawan, C.G.O. Complex, Lodhi Road, New Delhi-110 003.
- Chairman
2. Shri Suresh Chandra, Executive Member, NCA, BG-113, Scheme No.74-C, Vijay Nagar, Indore, 452 010.
3. Shri Ravindra Sharma, Vice-Chairman, Narmada Valley Development Authority, Narmada Bhawan, Tulsi Nagar, Bhopal - 462 003.
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17. Shri N.D.Tiwari, Member (E&R), NCA, BG-79, Scheme No.74-C, Vijay Nagar, Indore - 452 010
-Member-Secretary

आमंत्रितगण

- 1- श्रीमती रीता शर्मा, संयुक्त सचिव, भारत सरकार, कृषि मंत्रालय, कृषि भवन, डा० राजेन्द्र प्रसाद मार्ग, नई दिल्ली - ११०००१
- 2- श्री ए०के० महाना, सचिव, सरदार सरोवर निर्माण सलाहकार समिति, ए-ब्लाक, चौथी मंजिल, नर्मदा भवन, इन्दिरा एवेन्यू, बड़ोदरा - 390 001
- 3- श्री वी० राजगोपालन, संयुक्त सचिव, भारत सरकार, पर्यावरण एवं वन मंत्रालय, सी.जी.ओ. काम्पलेक्स, लोदी रोड, नई दिल्ली-११० ००३
- ४- मुख्य वन संरक्षक -मध्य- भारत सरकार, पर्यावरण एवं वन मंत्रालय, क्षेत्रीय कार्यालय, ई-३/२४०, अरेरा कालोनी, भोपाल ।
- ५- सदस्य, पर्या० एवं वन, नर्मदा घाटी विकास प्राधिकरण, नर्मदा भवन, तुलसी नगर, भोपाल - ४६२ ००३
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- ७- श्री एन०के०माधुर, अति० सचिव पर्यावरण, राजस्थान सरकार, पर्यावरण विभाग, कमरा नं० ३२१-ए, एस०एस०ओ० भवन, सचिवालय, जयपुर -३०२ ००५
- ८- श्री एस०ए० चव्हाण, मुख्य वन संरक्षक सरदार सरोवर नर्मदा निगम लि०, नया सचिवालय परिसर, गाँधीनगर - 382 010
- ९- मुख्य अभियन्ता -इएपी- एवं संयुक्त सचिव, सिंचाई, महाराष्ट्र सरकार, सिंचाई विभाग, मंत्रालय मुम्बई - ४०० ०३२
- १०- श्री मान दाहिमा, आयुक्त, पुरातत्व एवं संग्रहालय विभाग, मध्य प्रदेश शासन, बाणगंगा, भोपाल ।
- ११- श्री आर०डी० दीक्षित, संयुक्त निदेशक, पर्यावरण एवं वन मंत्रालय, भारतीय वनस्पति सर्वेक्षण, केन्द्रीय वृत्त, १० चेथम लेन, इलाहाबाद - २११००२
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- 3- श्री वी० राजगोपालन, संयुक्त सचिव, भारत सरकार, पर्यावरण एवं वन मंत्रालय, सी.जी.ओ. काम्पलेक्स, लोदी रोड, नई दिल्ली-११० ००३
- ४- मुख्य वन संरक्षक -मध्य- भारत सरकार, पर्यावरण एवं वन मंत्रालय, क्षेत्रीय कार्यालय, ई-३/२४०, अरेरा कालोनी, भोपाल ।
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- १२- श्री बी०जी० वर्गाज, अनुसंधान प्रोफेसर, सेन्टर फार पालिसी रिसर्च, धर्मा मार्ग, चाणक्यपुरी, नई दिल्ली - ११००२१
- १३- डा० आर०सी० शर्मा, उप-निदेशक, राष्ट्रीय संक्रामक रोग संस्थान, २२, श्याम नाथ मार्ग, नई दिल्ली - ११० ००७

INVITEES

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2. Shri A.K. Mahana, Secretary, Sardar Sarovar Construction Advisory Committee, A-Block, 4th Floor, Narmada Bhawan, Indira Avenue, Vadodara-390001.
3. Shri V. Rajagopalan, Joint Secretary, Ministry of Environment & Forests, Paryavaran Bhawan, CGO Complex, Lodhi Road, New Delhi - 110 003.
4. Chief Conservator of Forests (C), Ministry of Environment & Forest, Regional Office, E-3/240, Arera Colony, Bhopal.
5. Member (E&F), Narmada Valley Development Authority, Narmada Bhawan, Tulsi Nagar, Bhopal - 462 003.
6. Principal Secretary (Forests), Revenue & Forest Department, Govt. of Maharashtra, Mantralaya, Mumbai- 400 032.
7. Shri N.K.Mathur, Addl. Secretary (Env.), Govt. of Rajasthan, Environment Department, Room No.321-A, SSO Bhawan, Sachivalaya, Jaipur - 302 005.
8. Dr. S.A. Chavan, Chief Conservator of Forests, Sardar Sarovar Narmada Nigam Ltd., Gandhinagar - 382010.
9. The Chief Engineer (EAP) & Joint Secretary (Irrigation), Govt. of Maharashtra, Irrigation Department, Mantralaya, Mumbai- 400 032.
10. Shri Man Dahima, Commissioner, State Department of Archaeology & Museum, Govt. of M.P., Banganga, Bhopal.
11. Shri R.D. Dixit, Joint Director, Botanical Survey of India, Central Office, 10 Chatham Line, Allahabad - 211 002 (U.P.)
12. Shri B.G. Varghese, Research Professor, Centre for Policy Research, Dharma Marg, Chanakyapuri, New Delhi - 110 021.
13. Dr. R.C. Sharma, Dy. Director, National Institute of Communicable Diseases, 22, Shyam Nath Marg, New Delhi-110 007.



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पर्यावरण उपदल
ENVIRONMENT SUB-GROUP

छत्तीसवीं बैठक की कार्यसूची
Minutes of the 36th meeting

२ मई, २००१ को
पर्यावरण भवन, नई दिल्ली में हुई
Held at Paryavaran Bhawan, New Delhi on 2nd May, 2001

नर्मदा नियंत्रण प्राधिकरण
NARMADA CONTROL AUTHORITY

इन्दौर
मई, २००१

Indore
May, 2001

**MINUTES OF THE 36TH MEETING OF THE ENVIRONMENT SUB-GROUP OF NCA
HELD ON 2ND MAY, 2001 AT PARYAVARAN BHAWAN, NEW DELHI**

I N D E X

Item No.	Contents	Page No.
	Introduction	1
XXXVI-1(165)	CONFIRMATION OF MINUTES OF THE 35 TH MEETING	2
XXXVI-2(166):	SARDAR SAROVAR PROJECT: REVIEW OF THE STATUS OF ENVIRONMENTAL CONSIDERATIONS IN RELATION TO THE PROPOSED RAISING OF THE DAM HEIGHT AT RL 100M	3
	A. Review of the progress of works on the suggested parameters in relation to the proposed filling of the reservoir up to RL 100m. by June, 2002	4
	Gujarat	4
	Madhya Pradesh	6
	Maharashtra	9
XXXVI-3 (167) :	REVIEW OF THE STATUS OF INDIRA SAGAR PROJECT MADHYA PRADESH	
	i. Catchment Area Treatment	14
	ii. Compensatory Plantations	14
	iii. Survey of Flora, Fauna and Carrying Capacity Studies	14
	iv. Archaeological and Anthropological Survey	14
	v. Seismicity and Rim Stability of Reservoir	14
	vi. Health Aspects	15
	vii. Command Area Development	15
XXXVI-4(168)	REVIEW OF ACTION TAKEN ON THE DECISION OF THE PREVIOUS MEETINGS	
	i. Environmental Management of SSP and ISP	16
	ii. Submission of CAT plans for freely draining critically degraded sub-watershed.	16
	iii. Cost Estimates for preparation of Action Plans and implementation of Environmental Safeguard Measures	17
	iv. Monitoring works in Maharashtra	17
	v. Publication of Environment	17
XXXVI-5(169) :	Any other item Information submitted by the Commissioner (PP), MOWR, for information of the Sub-group	18

ANNEXURES

XXXVI-Min(1)	List of participants.	1
XXXVI-Min(2)	The operative part of the judgment.	3
XXXVI-Min(3)	A copy of the letter addressed by Dr. Shekhar Singh, IIPA, dated 1.5.2001.	5
XXXVI-Min(4)	A plan for treating the balance area during the next two years submitted by the Govt. of Madhya Pradesh.	7
XXXVI-Min(5)	Progress Report on creation of various health facilities submitted by Govt. of Madhya Pradesh.	8
XXXVI-Min(6)	Information on progress of Phase-II CAT works submitted by the Govts. of Madhya Pradesh.	9
XXXVI-Min(7)	A copy of the letter addressed by the Secretary, MOA, GOI, to the Chief Secretary, GOMP, to provide funds for Narmada Project.	10
XXXVI-Min(8)	A copy of the statement on Environmental Cost of the SSP.	12
XXXVI-Min(9)	A copy of the letter addressed by Commissioner (PP) to the Secretary, MOEF & the Chairman of the Env. Sub-group during the meeting.	13-14

**MINUTES OF THE 36th MEETING OF ENVIRONMENT SUB-GROUP OF THE NCA
HELD ON 2nd May, 2001 AT PARYAVARAN BHAWAN,
CGO COMPLEX, NEW DELHI**

The 36th meeting of Environment Sub-group (ESG) of Narmada Control Authority was held at Paryavaran Bhawan, CGO Complex, New Delhi, under the Chairmanship of Shri P.V. Jayakrishnan, Secretary, Ministry of Environment & Forests, Govt. of India. A list of participants is enclosed at **Annex-XXXVI-Min-(1) at Page-1 and 2.**

The Chairman, ESG, welcomed the Members and Invitees and discussion on the Agenda Items was taken up after a brief introduction of the participants.

Item No. XXXVI-1(165) : CONFIRMATION OF MINUTES OF THE 35TH MEETING

As there were no comments, the minutes of the 35th Meeting of Environment Sub-Group of Narmada Control Authority circulated to all Members and Invitees vide NCA Office letter No.Env-3(35) /2001 /1082-1112 dated 03.03.2001, were confirmed as circulated.

Item No. XXXVI-2(166): SARDAR SAROVAR PROJECT: REVIEW OF THE STATUS OF ENVIRONMENTAL CONSIDERATIONS IN RELATION TO THE PROPOSED RAISING OF THE DAM HEIGHT AT RL 100M

Member (E&R), NCA, pointed out that the Hon'ble Supreme Court, in its judgment given in civil Writ Petition No.319 of 1994 filed by Narmada Bachao Andolan (NBA) against the Sardar Sarovar Project (SSP), allowed the project to go ahead, as per the stipulations of NWDT Award. It was to be ensured that the Project was completed expeditiously, as per the provisions of the Award, along with implementation of the Relief and Rehabilitation works, ameliorative and compensatory measures for environmental protection. He further stated that according to the directions contained in the judgment delivered by the Hon'ble Supreme Court, the Environment Sub-group of NCA, has to consider and give, at each stage of the construction of the dam, environmental clearance for further construction beyond 90m.

Member (E&R) informed the Members that important event after the land mark judgment of 18th October, 2000 has been that a Review Petition filed by the NBA for seeking clarifications on some aspects of the judgment was considered and dismissed by the Apex Court. The operative part of the judgment is placed at **Annex-XXXVI-Min-(2) at Page- 3 and 4** for information of the Members.

He also informed that Dr. Shekhar Singh, IIPA, has addressed a letter to the Chairman of the Sub-group in which a concern has been raised against raising of the dam height and monitoring of the implementation aspects copy of the letter is placed at **Annex-XXXVI-Min-(3) at Page-5 & 6**. Members discussed the matter referred to by Dr. Shekhar Singh, and observed that the points raised by him are old one, which have been attended already, by the Sub-group.

It was further brought out by Member (E&R), NCA, that the construction programme of the SSP approved by the NCA in its 61st meeting held on 17.11.2000 envisaged construction of dam in four stages i.e., 100m (June, 2002) 110m (June, 2003) & 121m (June, 2004) and FRL 138.68m (June, 2005). Accordingly, the next stage of construction will be 100m. The ESG during its last meeting held on 19.1.2001, at Kevadia Colony, Gujarat, had reviewed the progress of implementation of the suggested safe guards in relation to the proposed raising of the dam height. During this review, it was considered desirable to seek more information on some aspects related to health, flora & fauna, felling from the submergence area, archaeology, etc., as was

reflected on page-13 and 14 of the Minutes of the 35th meeting of ESG. He informed that in pursuance thereof, a series of steps have been taken by the NCA and the State Govts., as reflected in the following items of the Agenda papers. In the context of the pari-passu compliance with reference to dam construction of EL 100m, he requested the Sub-group for thorough discussions, for approving the proposed raising of the dam height beyond EL 90m. and up to EL 100m.

It was pointed out that the linkage between progressive filling of the reservoir and implementation of the suggested safeguards has been viewed in the context of the pari-passu clause contained in the clearance order of 1987 and subsequent discussions of the Sub-group and submission of the Union of India during hearing in the Apex Court. Accordingly, submergence was to be the indicator of the progress of works on the project and that advance steps were to be taken for all that, which were to be affected adversely.

Member (E&R), NCA, further pointed out that by raising the dam height up to EL 100m. reservoir to be formed, would extend upstream up to 105 Kms from the dam site. This would increase the area under pool submergence from the present 7200 ha to 8900. ha. This constitutes 24% of the submergence. He requested the State Govts., of Madhya Pradesh, Maharashtra and Gujarat, to present the current status of implementation of the suggested safe guards under the items presented in the Agenda Notes, in the light of the deliberations of the last meeting of the Sub-group.

A. Review of the progress of works on the suggested parameters in relation to the proposed filling of the reservoir up to RL 100m. by June, 2002

Member (E&R), NCA, drew the attention of the Members of the ESG to the Status Report on Environment Management of Sardar Sarovar Project for the quarter ending December, 2000 placed at Annex -XXXVI (2) Page-2-69 of the Agenda Notes for ready reference and requested the State Govts., to up-date the progress wherever necessary for consideration of the Sub-group.

GUJARAT

The Managing Director, SSNNL, informed that all that which was required to be expedited by the Govt. of Gujarat has already been done and is already summarised in the Agenda papers placed before the Sub-group by NCA.

Flora & Fauna and Carrying Capacity

During the discussions on activities being carried out in Shoolpaneshwar Sanctuary, the Director, MOEF, referred to the Item-A under "Afforestation" and "B – Eco Development Programme" of the Table at Page-71 of the Agenda where against the recommendation of plantation over 500 ha. and 250 ha. for animal corridor achievements have been very meagre to point out that there was a difference in the targets planned and achieved so far. Therefore, she sought more details on individual items of work covered in the tabular statement on Flora & Fauna furnished by the Govt. of Gujarat.

CCF, SSNNL, informed that as there were no endemic endangered species in the submergence area and that the trees from the submergence area were removed much earlier, there is hardly any wildlife needing relocation. In addition, entire catchment in Gujarat has been covered up under Soil Moisture Conservation and Plantation works to improve its carrying capacity. The Sanctuary which was originally known as Dhumkal Sloth Bear Sanctuary was enlarged four times of its original size so that it touches the shore line of the proposed reservoir. As the Sanctuary area was very large, various development activities have been undertaken under the umbrella of Sanctuary Management Plan, which was under execution by the regular Forest Department and only additionalities necessitated on account of the Project are being funded and monitored by the Project Authorities. He explained that what is reported in the Agenda, is the work executed by the Project Authorities. The rest of the targets are being achieved by regular Forest Department of Govt., of Gujarat. It was, however, agreed that further details would be obtained by the SSNNL from Forest Department and a consolidated progress would be placed before the Sub-group for information and monitoring by the Sub-group.

Command Area Development

Prof. B.G. Verghees, stated that the population to be served with water for irrigation and drinking, etc., in this Project if compared with similar data of other Projects would be quite useful. The Managing Director, SSNNL, informed that there was hardly any water available for drinking and similar uses in Gujarat after January, 2001 and that the water lifted from the Sardar Sarovar after flowing through the main canal would be reaching up to Junagarh District in the next few days. The Executive Member, NCA pointed out considering the quantum of water available in the river Narmada, its utilisation has been very meager. He further pointed out that even with the completion of the Narmada projects its utilisation would be as low as 4 %.

The Director, MOEF, requested details related to the proposed monitoring and controlled release of water for avoiding water logging, salinity, etc. in the Command Area Development. The Managing Director, SSNNL, informed that the problem of water logging is expected only in three out of thirteen Agro Climatic Zones of the Command area and the Expert Group appointed decided that the drains to be provided would be based on Gravity Flow besides envisaging conjunctive use. After some discussions, it was agreed by SSNNL to provide a time schedule for implementation of the safe guards commensurate with provision of water in the Canal System.

The Chairman suggested that it would be useful to bring out factual information on the areas / towns / villages being served and benefited by the waters of the Narmada during the period of adversity resulting from the failure of the monsoon this year.

Health

Final Health Plan incorporating the preventive and curative measures proposed for malaria control and other diseases was annexed with the Agenda papers. Dy. Director General, Indian Council of Medical Research, brought out that good piece of work has been carried out to contain diseases in the command area in Gujarat and that cases of Malaria have gone down considerably. She, however, emphasized that similar models are required to be adapted for the areas in Maharashtra and Madhya Pradesh also to have a uniform patterns with local variations. Prof. Katti, pointed out that the drought conditions prevailing in Gujarat may be a risk for proliferation of the diseases emanating from stagnant water / shallow pools formed along the river course.

To a query from the Chairman, whether consecutive drought in Gujarat is a reason for decrease in the Malaria cases, it was explained by the Joint Director, NICD. that better medical facilities and preventive measures taken by health personnel has resulted in the reduction of Malaria cases and drought has no direct bearing on the decline of Malaria in Gujarat.

MADHYA PRADESH

Catchment Area Treatment

During the last meeting, proposal for completion of remaining Catchment Area Treatment covering an area of 40,240 ha. for Phase-I by June, 2002 was requested from Govt., of Madhya Pradesh. The Vice Chairman, NVDA, informed that by the end of March, 2001, against a final target of 1,25,725 ha. an area of 90,565 ha., was treated up and that the entire area commensurate with proposed impoundment at EL 100m. has been treated up. He further informed that it is proposed to treat 17,580 ha. area during 2001-2002 and 2002-2003 respectively for completion of CAT works. A plan for treating the balance area during the next two years submitted by the Govt. of Madhya Pradesh is placed at **Annex -XXXVI -Min.(4) Page-7.**

Flora, Fauna and Carrying Capacity

During the last meeting, proposal for felling of trees in the submergence zone prior to impoundment of the reservoir, write-up on recommendations, action plan and present status of various studies and surveys relating to flora and fauna affected due to impoundment were requested.

The Vice Chairman, NVDA, pointed out that felling plan prepared by the SFRI in 1991, is already appended in the Agenda of this meeting. Accordingly, Felling of Govt. Forest has been in progress in the previous years. As not much work is involved in felling of the trees up to EL 100m. the schedule of completion envisaged, can be adhered to. However, current status of felling was being ascertained from the forest department.

The Vice Chairman, NVDA, further informed that Survey of Flora, Fauna and Carrying Capacity, was conducted by the State Forest Research Institute, Jabalpur. There were three major recommendations, viz.,

1. Establishment of sanctuaries at Bokarata and Mathwad,
2. Implementation of soil and water conservation measures in the vicinity of reservoir, and
3. Carrying out social forestry works in the Project impact area.

An action plan based on the studies was posed to the State Wild Life Committee. After due consideration, the Committee did not approve the creation of sanctuaries as the areas were not rich in wild life. Besides, it was also considered that soil and water conservation measures being executed under catchment area treatment programme were adequate.

As regards implementation of social forestry works in the impact area of SSP in Madhya Pradesh, the Committee expressed the opinion that this work should be got executed by the social forestry wing under the State Forest Department. A proposal on this aspects framed, formed a part of the Action Plan was already annexed with the Agenda of this meeting. The Director, MOEF, requested NVDA to provide information in the tabular format on the recommendations of the Study Group, the action proposed and the status of implementation.

Archaeology

Plan for relocation of archaeological sites / monuments getting affected at EL 100m. including the ones in villages getting affected due to backwater effect was requested during the 35th meeting of the ESG.

The Vice Chairman, NVDA, informed that :

- No identified monument is getting impacted by raising the dam height to EL 100m or by its back water.
- However micro-planning, considering the priority of monuments for their relocation in relation to rise in submergence due to raising of dam to various levels / stages was not included in the action plan of 1997. The field Officers have been instructed to look into this aspect.

- Regarding back water level corresponding to one in hundred year flood at EL 100m. of dam, data available in NVDA was provided to the Specialist (Environment), NCA, and the Commissioner, Archaeology, GOMP, in the meeting dated 8.3.2001 and is reflected in the Annex of agenda of this meeting.

Specialist (Environment), NCA referred to the table annexed to the agenda at page 115 and clarified that the table under reference indicated that the impact of the backwaters of designed floods (1 in 100 year flood), in the villages where monuments are located, without dam or with a dam height of 95m. / 100m. in most of the cases would remain unchanged. He further clarified that these monuments even if dam is not in place would be temporarily impacted by the flood of 1 in 100 year intensity and that there would not be any change in the status of these monuments in relation to designed flood with or without raising the dam height to EL 100 m.

As no Officer from Archaeological Survey of India (ASI) was present during the meeting, the progress of works on the monuments / mounds being handled by the ASI, Bhopal, could not be ascertained. NVDA was requested to present the progress with regards to these monuments / mounds also.

Health

During the last meeting, report on health aspects and the additional districts required to be covered by NICD were requested. The Vice Chairman, NVDA informed that the Joint Director, NICD, New Delhi had informed in the 35th meeting that NICD monitors for the Districts as a whole and not the villages and therefore the Principal Investigator of Surveillance Studies had approached NICD for inclusion of Districts Khandwa and Khargone in their programme. Joint Director, NICD suggested that surveillance studies on vector born, water born, gastro intestinal diseases etc. be continued on a long term basis and biological quality of the water should also be monitored.

The Vice Chairman, NVDA, stated that sixth interim report on Surveillance Studies conducted by Gandhi Medical College, Bhopal, was submitted to NCA during the last meeting of the Sub-group. The Reports were equally applicable to the submergence area in Madhya Pradesh spread due to SSP and includes the above aspects. Final Report was awaited from Gandhi Medical College (GMC) , Bhopal.

Deputy Director General, Indian Council of Medical Research presented her observations on the 6th interim report of GMC and suggested a joint action plan for the Sardar Sarovar Project as a whole. She further suggested that monitoring is very essential for tracking new emerging trends and the plan therefore may include the following :

- surveillance should be continuous process
- establishment of early warning system
- breeding of vectors need to be controlled
- vulnerable areas should be delineated

Member (E&R), NCA drew the attention of the Members to the page 128 of the annexure of the agenda of this meeting where activities proposed / being under taken in project area as contained in the plan of the Govt. of Gujarat are delineated. The Managing Director, SSNNL, informed that the Action Plan has been developed by the qualified experts in the field. Besides, a Consultant has been appointed recently by the SSNNL for developing in-house expertise and for pursuing the plan for the Dam sites as well as for the entire command in Gujarat.

The Chairman desired that monitoring is necessary for the disease normally associated with the development of Water Resources Projects and suggested increasing the frequency of the deliberations by the Group of Experts on Health and further suggested that field visits may also be organized for assessment of ground conditions in the impact zones.

MAHARASHTRA

The Secretary (Forests), Govt., of Maharashtra, informed the Sub-group that Catchment Area Treatment works have been completed and for Compensatory Afforestation targets except for 89 ha. area all plantations have also been completed. Under these programmes, local tree species as suggested by the Experts, have been planted up. On Archaeology, there are no identified monuments in Maharashtra

Flora & Fauna

The Secretary (Forests); Govt., of Maharashtra, pointed out that during the last meeting, a phased felling plan for forests coming under submergence at EL 100m. and Information on recommendations of the study group on flora and fauna and the proposed action plan for their dispersal / migration was requested. He informed that the recommendations of the University of Pune on Flora and Fauna aspects have been adapted in the programmes of Catchment Area Treatment and Compensatory Afforestation. The Director, MOEF, requested the recommendations on Flora and

Fauna aspects of the University of Pune be presented in a tabular form and that this table should also include the suggested actions, targets and implementation schedule. Regarding felling of trees, the Sub-group was informed that about 290 ha. is required to be felled for which orders are likely to be issued by the Govt., of Maharashtra soon.

Health

During the last meeting, current status of implementation the Health Plan was requested. It was pointed out that the Phase-I Surveillance studies were completed much earlier and the provisions contained in the Health Plan submitted by the Govt. of Maharashtra were delineated in the Annex-XI of the Agenda papers of this meeting. The latest up-dates on the activities carried out by the Govt., of Maharashtra as per the provisions contained in the Health Plan were requested. The Member (E&R), NCA, requested the review the implementation of Health provisions within the impact zone of the Sardar Sarovar Project.

Regarding the status of works on implementation of the environmental safe guard measures in relation to the proposed raising of the dam height to EL 100m. following was brought out before the Sub-group.

Phased Catchment Area Treatment (Directly draining)	For the Project as a whole, against a target of 1,79,180 ha. of CAT an area of 1,43,017 ha. was treated up.	79.81% has been treated.
Govt. of Gujarat	The target area of 29,157 ha. treated completely.	Complete
Govt. of Maharashtra	As the actual area available for treatment was found 23,295 ha, the same had been treated against the planned target of 24,298 ha	Complete
Govt. of Madhya Pradesh	By the end of March, 2001, an area of 90,565 ha. has been treated against the target area of 1,25,725 ha.	72 % complete Remaining work to be completed by March, 2003

Compensatory Plantations	By the end of the March, 2001 an area of 42,064 ha is afforested against the target of 42,158 ha. The progress against the land used for R&R works is 4,198 ha. against 4,200 ha	While 6,476 ha. of the forest land (in Gujarat 4,376 ha, in Maharashtra 2,300 ha, & in Madhya Pradesh 1,900 ha) is to be submerged at an EL of 100m. entire works of the plantation have been completed.
Govt. of Gujarat	By the end of September, 1994, Govt. of Gujarat had completed plantation works in the entire planned area of 13,950 ha	Complete
Govt. of Maharashtra	For the land released for R&R works, progress achieved was 4,198 ha. against a target of 4,200 ha. However for the area getting submerged, the actual progress is 19,378 ha. (90 ha. area not available)	Complete
Govt. of Madhya Pradesh	By the end of March, 2001, the progress is 8,736 ha. against the target of 8,737 ha thus almost 100%.	Complete
Survey of Flora, Fauna and Carrying Capacity Studies		
Gene pool, if any, likely to be affected.	Studies conducted indicated that there was no endemic endangered / rare / threatened species in the submergence areas of the Sardar Sarovar Project and therefore there was no possibility of a loss of gene pool.	Complete

Details of wildlife habitat in the region.	Details of wildlife habitat in the region was studied along with the Dhumkhal sloth bear sanctuary in the vicinity of the reservoir in the state of Gujarat. Details of this sanctuary were studied	Complete
Measures proposed to rehabilitate endangered species of flora fauna, if any.	The area of the above sanctuary was enlarged about four times to rehabilitate any wild animal species found in the region.	Complete The area would be markedly benefited due to increased moisture and improved micro climatic condition.
Plan for rehabilitation of endangered flora & fauna	Action Plan for development of Shoolpaneshwar Sanctuary is under implementation.	Under implementation
Assessment of the carrying capacity of the neighboring areas wherein the wildlife would dispose if the scheme were implemented.	Carrying capacity of the adjoining ecosystem was studied and ameliorative measures in form of massive plantations within the catchment and soil moisture conservation works have been completed in the entire area in Gujarat and Maharashtra and substantial works have been completed in the State of Madhya Pradesh	Complete

Concluding the discussion on the readiness of environmental plans for raising the dam up to EL 100m., the State Govts., were requested to provide detailed information on the following:

Flora Fauna and Carrying Capacity

- ◆ A tabular statement showing the recommendations, target and achievement on the work in Shoolpaneshwar sanctuary – **Action Govt. of Gujarat**
- ◆ A tabular statement on the recommendations of the study group of Pune University covering flora fauna and carrying capacity aspects along with the suggested actions and implementation. **Action Govt. of Maharashtra**

- ♦ A tabular statement on the recommendations of the State Forests Research Institute covering flora fauna and carrying capacity aspects along with the suggested actions and implementation. **Action Govt. of Madhya Pradesh**

- ♦ Current status of felling in Maharashtra and Madhya Pradesh in relation to proposed increase in dam height to EL 100m. **Action Govt. of Maharashtra and Madhya Pradesh.**

1994-1996 - 20792 trees - 561 Ha. Thelma
 11.42 Ha → 8.70 Multind.

- ♦ Rim stabilities studies have been completed and well equipped 9 monitoring stations along the periphery of the reservoir are functioning. Data collected by these observatories are to be analysed by expert institutions. **Action Govt. of Gujarat, Maharashtra and Madhya Pradesh**
- ♦ Disease surveillance by Gandhi Medical College, Bhopal, Final report – **Action Govt. of Madhya Pradesh**
- ♦ To include the districts of Khandwa and Khargone of Madhya Pradesh in the disease surveillance programme of NICD. **Action NICD and Govt. of Madhya Pradesh**
- ♦ The SSP water for irrigation purposes would start flowing in the canal once the dam height was raised to 110 m. Reports on drainage, water logging and soil salinity **Action Govt. of Gujarat**

There is substantial progress in the construction of canal network in Rajasthan. To review the implementation of ESM an updated progress. **Action Govt. of Rajasthan.**

The Chairman observed that it would be appreciated if Member (E&R), NCA, keep him informed on the latest status of R&R after the meeting(s) of R&R Sub-group. He also expressed that permission to raise the dam height to EL 100 m. would be considered by the Sub-group during its next meeting.

**Item No. XXXVI-3 (167) : REVIEW OF THE STATUS OF INDIRA SAGAR PROJECT
MADHYA PRADESH**

The Vice Chairman, NVDA informed that there was substantial progress on implementation of environment safeguard measures for the Indira Sagar Project . He provided latest updates on the suggested parameters as follows :

1. Catchment Area Treatment

Against a target of 62,975 ha. an area of 51,810 ha. has been treated up. The progress is stated to be about 82.27% of the final targets.

2. Compensatory Plantations

By the end of July, 2000, Govt., of Madhya Pradesh have completed afforestation works over an area of 70,031 ha., against a target of 80,945 ha. work thereby completing 86.5% of stipulated target.

3. Survey of Flora Fauna & Carrying Capacity studies

The issue of notification for national park and Sanctuaries was under consideration of Govt. of Madhya Pradesh and was being pursued

4. Archaeological & Anthropological Survey

As no representative of the Archaeological Survey of India was present, the progress could not be reviewed.

5. Seismicity and Rim Stability of Reservoir

Regarding analysis of the observed data Vice Chairman, NVDA informed that some of the staff of NVDA was trained by IMD for initial analysis of observed data and determining the magnitude of earthquake.

He further informed that the initial analysis of the observed data for the period from 5.5.1997 to 31.12.2000 was available with NVDA. He agreed that the final analysis of observed data from the observatories shall have to be done in consultation with IMD, New Delhi.

6. Health Aspects

Progress Report on creation of various Health facilities submitted by Govt. of Madhya Pradesh is presented at **Annex-XXXVI.Min.(5) page-8**. The Vice Chairman, NVDA, informed that the present Action Plan envisages establishment of monitoring and evaluation cell at the Directorate of Health Services, Bhopal and Monitoring and Forecasting Cell at PSM Department of Gandhi Medical College, Bhopal.

7. Command area Development

The Vice Chairman, NVDA, informed that a Committee has been constituted under the Chairmanship of Member (Engineering), NVDA, for suggesting ToRs to formulate detailed action plan for development of command area of Indira Sagar Project. ToRs received from Govt., of Gujarat and Rajasthan are posed to this Committee which is looking into the adaptability of various measures / details under the conditions of terrain and agro climate prevailing in Madhya Pradesh.

Item No. XXXVI-4(168) REVIEW OF ACTION TAKEN ON THE DECISION OF THE PREVIOUS MEETINGS

I. Environmental Management of SSP and ISP

Comprehensive documents of Environmental Management of Sardar Sarovar and Indira Sagar Projects were circulated to the Members vide NCA Office letter Nos. Env-4(8)/2000/4561-66 and Env-3(34)/2000/4567-85 dated 9.11.2000 for views of the Members. The proposal to get the document on SSP published by a reputed publishing house for wider dissemination of the information on SSP was noted by the Sub-group. However, the Govt. of Madhya Pradesh requested some more time to offer observations on the document.

II. Submission of Catchment Area Treatment Plans for freely draining critically degraded sub-watersheds (Item No.XXII-2(112))

As per the decision of GOI of June, 1992, the Project Authorities were required to submit the Action Plan for treatment of balance of the critically degraded sub-watersheds.

The State Govts. Madhya Pradesh submitted the information on progress of works during the meeting which is placed at **Annex-XXXVI.Min.(6) page-9** Regarding establishment of Silt Monitoring Stations and presentation of the results thereof Govt., of Madhya Pradesh requested for some more time. The Govt., of Maharashtra agreed to submit the information at the earliest.

Regarding decentralization of the funding components of the watershed management schemes and placement of funds at the disposal of the respective State Govts. It was felt that needed steps should be taken for continued supports to the soil moisture conservation works as envisaged. The Vice Chairman, NVDA, informed that against the provision of Rs.6.00 crores for the Narmada Schemes an allotment of Rs.18.00 crores for the programmes of Department of Agriculture, Govt., of Madhya Pradesh last year a total allotment of Rs.6.00 crores was provided. This resulted in drastic shift away from the Narmada Scheme. However, during the current year, a budget allocation of Rs.3.00 crores was provided for Narmada programme. Dr. Samsher Singh, informed the Sub-group that in response to the communication received from the NCA, Secretary, Ministry of Agriculture, has addressed the Chief Secretary, Govt. of Madhya Pradesh for providing allotment at least equal to Rs.6.00 crores. A copy of the letter was made available by him during the meeting is placed at **Annex-XXXVI-Min.(7) page-10-11**. The Vice Chairman, NVDA, however, requested,

for placement of the funds meant for the Narmada Valley Scheme directly at the disposal of the NVDA. The Addl. Commissioner, Ministry of Agriculture, pointing out that de-centralisation was in pursuance of the part of the policy of the Govt. of India. He, however, suggested that the Secretary, MOEF, may like to address Secretary, Ministry of Agriculture for earmarking the funds for Narmada Programmes while making the allotment, if possible.

III. Cost Estimates for preparation of Action Plans and implementation of Environmental Safeguard Measures

In order to frame yard sticks on the cost estimates of the water resources Projects, the Chairman of the Sub-group during earlier meeting desired compilation of the estimates and expenditure incurred on survey, studies and implementation of the suggested safeguard measures for the SSP. Accordingly, the information compiled is being presented for information to the Sub-group at **Annex-XXXVI.Min.(8) page-12**. This may please be confirmed by the State Govts.

IV. Monitoring works in Maharashtra

Govt. of Maharashtra representative have expressed difficulties in receiving funds from the Project Authorities for implementation of the environment safeguard like Health, Fisheries, Flora, Fauna, etc. This issue was discussed and it was informed that a policy decision is to be taken by the appropriate authorities of the SSNNL after studying availability of the funds and financial consequences thereof. Further information is awaited from the Govts. of Maharashtra and Gujarat. This issue was not discussed. However, the needed information may please be provided.

V. Publication of Environment

During its earlier meetings it was desired that good works being done by the Project Authorities are to be published. This issue was not discussed. However, the needed information be provided.

During the 33rd meeting, the Sub-group desired that NCA should organise Seminar / Workshops on the Thrust Areas of the Environmental Ameliorative Measures. Details for organizing the seminar at the earliest are under formulation. This was for the information of the Members.

Item No. XXXVI-5(169) : Any other item

The Commissioner (PP), Ministry of Water Resources, circulated a letter dated 2.5.2000, during the meeting ~~the meeting~~ for information of the Sub-group towards the consideration for providing 3m. high Humps on truncated Spill Way Blocks (30-46) of the Sardar Sarovar Dam as per the recommendations of the Dam Safety Panel for safety of the Dam. He also informed that the matter would be discussed in Sardar Sarovar Construction Advisory Committee and Narmada Control Authority meetings under the Chairmanship of Secretary, MOWR, scheduled for 3rd and 4th May, 2001 respectively. Copy enclosed as **Annex – XXXVI-Min.(9) page No.13-14.**

In view of the above, the Sub-group did not discuss the issue

The meeting ended with vote of thanks to the Chair.

ANNEXURES

ANNEX-XXXVI-Min-I

**LIST OF PARTICIPANTS OF THE 36TH MEETING OF ENVIRONMENT
SUB-GROUP OF NCA HELD ON 2ND MAY, 2001 AT ARYAVARAN BHAWAN,
NEW DELHI.**

GOVERNMENT OF INDIA

Ministry of Environment & Forests

S/Shri/Smt.

1. P.V. Jayakrishnan, IAS, Secretary, MOEF, New Delhi
2. V. Rajagopalan, IAS, Joint Secretary, MOEF, New Delhi
3. Dr. Nalini Bhat, Director, MOEF, New Delhi

Ministry of Water Resources

1. A.C. Tyagi, Commissioner (PP), MOWR, New Delhi

Ministry of Agriculture

1. Dr. Shamsheer Singh, Addl. Commissioner, MOA, New Delhi

Narmada Control Authority

1. Suresh Chandra, Executive Member, NCA, Indore
2. N.D. Tiwari, IFS, Member (E&R), NCA, Indore
3. Jhu Jhar Singh, Member (Civil), NCA, Indore
4. Dr. Pawan Kumar, Specialist (Environment), NCA, Indore

Sardar Sarovar Construction Advisory Committee

1. A.K. Mahana, Secretary, SSCAC, Vadodara

Indian Council of Medical Research

1. Dr. Rashmi Arora, Dy. Director, ICMR, New Delhi

National Institute of Communicable Diseases

1. Dr. R.C. Sharma, Joint Director, NICD, New Delhi

Botanical Survey of India

1. Dr. R.D. Dixit, Botanist, BSI, Allahabad

National Hydropower Development Corporation

1. V.B. Bhatt, Dy. Manager (Env.) , NHDC, Bhopal.
2. M.Krishnamoorthy, C.E. (C) NHDC, Bhopal.
3. Arvind Garg, C.E. (C), NHDC, Bhopal.

GOVERNMENT OF GUJARAT

1. K.C. Kapoor, IAS, Managing Director, SSNNL, Gandhinagar.
2. Dr. S.A. Chavan, IFS, CCF, SSNNL, Gandhinagar

GOVERNMENT OF MADHYA PRADESH

1. Ravindra Sharma, IAS, Addl. Chief Secretary, Narmada Dev. Deptt., GOMP.
2. K.N. Dubey, Director (CAT), NVDA, Bhopal
3. R.K. Gupta, D.F.O. (Monitoring), NVDA, Bhopal
4. G.L. Mitra, Project Engineer, Archaeology & Museum, Bhopal.

GOVERNMENT OF MAHARASHTRA

1. Nand Lal, IAS, Principal Secretary, (Forests), Revenue & Forests Deptt., GOM, Mumbai

GOVERNMENT OF RAJASTHAN

1. K.L. Ahuja, Executive Engineer, Irrigation Dept. GOR, Jaipur.

EXPERT MEMBERS

1. Dr. R.K. Katti, Prof. Emeritus, IIT, Mumbai and Director & Consultant, UNEECS, Mumbai
2. B.G. Varghese, Research Professor, Centre for Policy Research, New Delhi.

IN THE SUPREME COURT OF INDIA
CIVIL ORIGINAL JURISDICTION

ANNEX-XXXVI-Min. (2)

492871

REVIEW PETITION (C) NO. 1259 OF 2000
IN
WRIT PETITION (C) NO. 319 OF 1994

Narmada Bachao Andolan

... Petitioner

VERSUS

Union of India & Ors.

O R D E R

Certified to be true copy
... Respondent
Assistant Registrar (Judl.)
3/4/2001
Supreme Court of India

This petition has been filed for the 'review and recall' of the majority judgment of this Court in Writ Petition (C) No. 319 of 1994.

Prayer for oral hearing is declined.

We have carefully gone through the review petition and the connected record but we do not find any error apparent on the face of the record which may call for a review of the majority judgment. The contentions raised in the review petition, in effect, seek to challenge the correctness of the said judgment and that is impermissible being outside the parameters of review. The only ambiguity, if any, has been clarified with the recording of the statement of the counsel for the Union of India and the State of Gujarat on November 23, 2000 in I.A. No. 17 (filed by the Petitioner) that even if humps are required to be constructed, the effective height of the dam shall not be

...2/-

- 2 -

raised beyond 90 meters for purposes of submersion until further construction is permitted as per the conditions laid down in the judgment.

The review petition is accordingly dismissed.

Sd/-

G.J.

Sd/-

(B.N. KIRPAL)

New Delhi,
March 29, 2001.

N/-
29/3/01



भारतीय लोक प्रशासन संस्थान

इन्द्रप्रस्थ एस्टेट, रिंग रोड, नई दिल्ली-110 002 • दूरभाष : 331 7309 (8 लाइनें)

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INDRAPRASTHA ESTATE, RING ROAD, NEW DELHI-110 002

GRAMS : ADMINIST • FAX : 011-331-9954 • PHONES : 331-7309 (8 LINES)

MOST IMMEDIATE

1 May, 2001

Dear Shri Jaya Krishnan,

While reading the Minutes of the 35th meeting of the Environment Sub-Group of the Narmada Control Authority, I saw that in response to my letter to you of 17 January 2001, concerning the permission to raise the height of the Sardar Sarovar dam to 100m, it was recorded that "the Chairman referred to the judgement of 18th October, 2000 of the Apex Court in Civil Writ Petition No. 319/1994 of NBA v/s Union of India and Others and observed that the matter was discussed and settled, particularly under the caption "Catchment Area Treatment". He further stressed that the directions given are quite clear and the Sub-group has to function in accordance with the operative part of the judgement". (p3-4)

2. For one, it is not clear to me what part of the judgement can be understood to have 'discussed and settled' the matter of non-compliance with the conditions of clearance. I would be grateful if you could get your Ministry to kindly clarify this to me.

3. Further, I draw your attention to the operative part of the said judgement, especially the Directions. Therein, it is clearly stated that "While issuing directions and disposing of this case, two conditions have to be kept in mind, (i)..... (ii) ensuring compliance with conditions on which clearance of the project was given including.....". From this it is clear that compliance with conditions of clearance is part of the directions of the Supreme Court.

4. My letter of 17 January, 2001 has clearly established that many of the conditions of clearance have not been complied with. This letter, along with my earlier letter of 31 October, 2000, makes it clear that there is still no clarity of what would tantamount to 'pari passu' and that without this we cannot even monitor some of the conditions of clearance.

5. The minutes of the 34th meeting of NCA sub-group on environment state that the Chairman "assured Dr Shekhar Singh that he would send a reply on the points raised by him." However, no reply has yet been received.

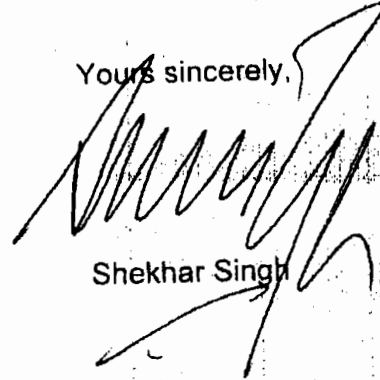
6. Given the situation described above, I would reiterate my earlier position that it would be a grave contempt of the Supreme Court if the sub-group gave permission for any further raising of the height of the dam before the various conditions of clearance were complied with.

7. I was hoping to be able to discuss all this at the next meeting of the sub-group which, according to the minutes of the last meeting, was to be held sometime in April. However, I have till today not received any intimation of the meeting. Accordingly, I am sending you this letter.

8. I trust you will ensure that adequate notice is given of the next meeting and the agenda papers are sent well in time so that we could study them properly prior to the meeting.

With regards,

Yours sincerely,

A handwritten signature in black ink, appearing to be 'Shekhar Singh', written over the typed name.

Shekhar Singh

Shri P.V. Jaya Krishnan, IAS
Secretary
Ministry of Environment and Forests
Chairman, NCA Sub-group on Environment
Government of India
New Delhi

नर्मदा घाटी विकास प्राधिकरण के अंतर्गत सीधे जल निकासी करने वाले उपजलग्रहण क्षेत्रों में उपचार कार्यों की प्रगति का विवरण सरदार सरोवर जलग्रहण क्षेत्र																				
क्र.सं.	उपजलग्रहण का विवरण	एकशन प्लान के अनुसार			माघ-2001 तक उपलब्धता			क्षेत्र का विवरण			(31.3.2001 की स्थिति में) एवं शेष कार्य हेतु योजना									
		लक्ष्य			नवाविष्ट द्वारा			अन्य एजेंसी द्वारा			अवशेष क्षेत्र			वर्ष 2001-02 में प्रस्तावित			वर्ष 2002-03 में प्रस्तावित			
		गैर वन क्षेत्र	वन क्षेत्र	योग	गैर वन क्षेत्र	वन क्षेत्र	योग	गैर वन क्षेत्र	वन क्षेत्र	योग	वन क्षेत्र	गैर वन क्षेत्र	वन क्षेत्र	योग	गैर वन क्षेत्र	वन क्षेत्र	योग	गैर वन क्षेत्र	वन क्षेत्र	योग
	2	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	जलाशय 100 मी. उचाई तक सीधे बहने वाले 15 उपजलग्रहण क्षेत्र	8665	31575	40240	5405	26165	31570	3260	5410	8670	1162	3260	4248	7508	3260	4248	7508	--	--	--
2	शेष 27 उपजलग्रहण क्षेत्र (138.48 मी. तक जलाशय में सीधे बहने वाले)	65130	20355	85485	44822	10821	55643	20308	9534	29842	2190	20308	7344	27652	8524	1548	10072	11784	5796	17580
	महायोग :-	73795	51930	125725	50227	36986	87213	23568	14944	38512	3352	23568	11592	35160	11784	5796	17580	11784	5796	17580

ANNEX-XXXVI-Min. (5)

Annexure-E

**Progress of work on Health Services
being created in ISP**

S.No.	Rehabilitation site	Provision	Work Progress
1.	Bedhani	Ayurvedic Hospital	Work in progress
2.	Anjanika Khurd	Ayurvedic Hospital	Work in progress
3.	Saralya	Sub Health Centre	Work Completed
4.	Chainpur	Ayurvedic Hospital	Work in progress
5.	Narmada Nagar I.S.P. construction site	Medical unit with 20 Bedded Hospital for work force of I.S.P.	Functioning at Punasa Dam site

केन्द्र प्रवर्तित नदी घाटी योजनांतर्गत भारत सरकार द्वारा स्वीकृत सबवाटर शेड के संबंध में

					क्षेत्र हेक्टर में सब वाटर शेड नम्बर में
स0क0	परियोजना का नाम	क्षेत्रफल, हेक्टर (सब वाटर शेडों की संख्या)	भारत सरकार द्वारा स्वीकृत सब वाटर शेड की संख्या	उपचारित सबवाटर शेड	रिमाक
1	2	3	4	5	6
1	इंदिरा सागर परियोजना	108430 [478]	11249 [12]	3554 [3]	
2	सरदार सरोवर परियोजना	78368 [138]	18801 [32]	8206 [9]	
			30050 [44]	11760 [12]	
भारत सरकार द्वारा वर्ष 2000-2001 में स्वीकृत सबवाटर शेड					
1	इंदिरा सागर परियोजना	-- --	6680 [4]	-- --	आरव्ही.पी. की मे के कारण आबंट जिससे इन सबवा किया जा सका
2	सरदार सरोवर परियोजना	-- --	8287 [3]	-- --	रु. 721.14 लाख प्राप्त हुये, जिसमें
	Total :-	-- --	14967 [7]	-- --	मनेजमेंट में शामिल कर लेने नप्राप्त रहा । शेड में कार्य प्रारंभ नहीं वर्ष 2000-01 में प्रावधान विरुद्ध 372.23 लाख ही 277 लाख शामिल नहीं है।
	Grand Total :-		45017 [54]	11760 [12]	



श्री श्री भूत सरकार

Secretary
Government of India

कृषि

ANNEX-XXXVI-Min. (7)

कृषि और स.
कृषि भवन, नई दिल्ली-110 001

Ministry of Agriculture
Department of Agriculture & Cooperation
Krishi Bhavan, New Delhi-110001

दूरभाष/Phone : 3382651
फैक्स सं./Fax No. : 3386004

D.O.No.4-14/97-NRM-I

April 30, 2001

Dear

You are aware that the treatment of Sardar Sarovar catchment has been going on under the Centrally Sponsored Scheme of Soil Conservation for Enhancing Productivity of Degraded Lands in the catchments of River Valley Projects and Flood Prone Rivers (RVP & FPR). The catchment falls in the States of Madhya Pradesh, Maharashtra and Gujarat and each State Government has taken up the programme for treatment of the catchment area in their respective States. In Madhya Pradesh the nodal agency for treatment is Narmada Valley Development Department. The Sardar Sarovar project is of national importance and, therefore, the treatment of catchment area of the Sardar Sarovar is important in order to minimise siltation in the reservoir.

2. (Since 2000-2001 the Scheme of River Valley Project has been subsumed under Macro-Management Mode. Secretary, Department of Agriculture is the nodal officer in Madhya Pradesh for providing the funds for various schemes subsumed under Macro-Management. Narmada Control Authority have informed that during 2000-2001, only Rs.100 lakh was provided for treatment of Sardar Sarovar catchment which was a meager amount considering the size of the catchment area in the State. It may be recalled that an amount of Rs.600 lakh was allocated for 2000-2001 by The Ministry of Agriculture before RVP scheme was subsumed under Macro-Management Mode. It was expected that keeping in view the importance of the programme the State would also provide similar or higher amount in their Work Plan to enable smooth implementation of the scheme. For 2001-2002, only Rs.300 lakh is proposed by the State under Macro-Management Mode..

3. I shall be grateful if you review the provisions in

contd.....2

-2-

the State and consider enhancing the amount for treatment of Sardar Sarovar catchment in consultation with the Narmada Control Authority. You may like to ensure that the implementing agency receives the funds in a timely manner.

Yours sincerely,

(J.N.L. Srivastava)

Shri K.S. Sharma,
Chief Secretary,
Government of Madhya Pradesh,
Bhopal

Copy forwarded for information and necessary action to:

1. Dr. Pawan Kumar, Specialist (Environment), Narmada Control Authority, BG-79, Scheme No.74-C, Vijay Nagar, Indore - 452010 (M.P.) with reference to his letter No. Env-39(36)/2001/120-8 dated 11-4-2001
2. Principal Secretary, Agriculture, Govt. of Madhya Pradesh, Bhopal
3. Principal Secretary, Narmada Valley Development Department, Vallabh Bhawan, Bhopal

(Shamsher Singh)
Additional Commissioner (WP)

Annexure- G
(Status-March 2001)

Environment cost of Sardar Sarovar Project

(A) Expenditure by Project Authorities:

1. Cost of Survey & Studies (Rs. In lacs) :

<u>S.No.</u>	<u>Component</u>	<u>Estimated/Actual Expenditure</u>
1.	Compensatory Afforestation	2.44/2.44
2.	Catchment Area Treatment	3.28/2.80
3.	Flora & Fauna	20.33/20.33
4.	Health	29.63/28.59
5.	Archaeology/Anthropology	59.00/36.33
6.	Seismicity & Rim Stability	23.00/13.59

II Cost of Implementation (Rs. In lacs) :

<u>S.No.</u>	<u>Component</u>	<u>Estimated/Actual Expenditure</u>
1.	Compensatory Afforestation	1800.00/1062.16
2.	Catchment Area Treatment	8835.005/7342.79
3.	Flora & Fauna	1650.00/Nil
4.	Health	848.48/21.66
5.	Archaeology/Anthropology	6819.20/74.90
6.	Seismicity & Rim Stability	NA/NA

* includes expenditure on establishment.

ANNEX-XXXVI-Min. (9)

No. 5/20/2001-PP
 Government of India
 Ministry of Water Resources
 (Policy and Planning Wing)

Shram Shakti Bhawan
 Rafi Marg
 New Delhi - 110 001

Dated: 2.5.2001

To

The Secretary
 Ministry of Environment and Forests &
 Chairman, Environment Sub-Group of
 Narmada Control Authority
 CGO Complex
 Paryavaran Bhawan
 New Delhi - 110 003.

Subject:- Construction of 3 m high streamlined humps on Sardar Sarovar Spillway Blocks over EL 90.0 m on Block Nos. 30 to 46.

Sir,

I would like to inform you that the Dam Safety Panel (DSP) of Sardar Sarovar (Narmada) Project (SSP), in its 41st meeting held on 12th March 2001 and 19-21 March 2001 reviewed hydraulic model studies for construction of a 3 m high hump over uncompleted truncated spillway block Nos. 30 to 46 above EL 90.0 m prior to the onset of monsoon 2001 to improve the hydraulics of flood over these blocks for mitigation of flood damages to permanent works under various stages of construction on the downstream side. The DSP, on the basis of hydraulic model and the detailed discussions with the Research and Project Engineers at CWPRS, Pune recommended as follows:

" The construction of 3 m high hump of geometry as proposed to be built over the uncompleted truncated spillway dam blocks (Nos. 30 to 46) is not only desirable, but essential for mitigation of damages to the permanent works under varying stages of construction on the downstream side of the spillway dam. It could be rightly argued that the height of the hump could be somewhat reduced for the increased height of the truncated section. However, the Panel suggested no change in the height and profile of the hump primarily because the proposed hump is not causing any additional afflux at 100 year frequency flood and introduction of hump does not, therefore, have adverse affect on R&R works as contemplated for the ensuing season. The

panel also concurred with the geometry of the hump as evolved and proposed for construction prior to the forthcoming monsoon limiting to the ultimate 1 in 100 year flood condition, the flood level will be contained to a level as would be obtained even if the hump was not constructed. Thus, the obvious advantage of providing such a hump, as recommended, would be to contribute towards improvement of the structural safety of permanent works under construction and that too without raising the flood level in the reservoir above it would have prevailed with 100 year frequency flood even without the construction of the hump. The recommendation of the panel is based primarily on technical ground only and the implication of construction of a 3 m hump above the truncated spillway dam blocks Nos. 30 to 46 at EL 90.0 m may be examined if necessary by the project organization before taking up the construction of the hump".

The Central Water Commission (CWC) has also scrutinized the matter related to computation of Reservoir Water Level (afflux) corresponding to 1 in 100 year flood with minimum block level at 90.0 m without and with 3 m hump and found generally to be in order.

According to CWC the flux levels at dam site for 1 m in 100 year flood works out to be 112.80 m in both the cases without hump and with 3 m hump using the coefficient of discharge (Cd) values based on model studies carried out in CWPRS, Pune. The adopted Cd values based on model studies are 1.474 for dam profile at EL 90.0 m without hump and 1.850 for dam profile at 93.0 m (with 3 m hump). The backwater levels at different chainages for the above dam profile for 1 in 100 year flood have also been checked using HEC-2 programme and found to be in order. As such, it is inferred that the effective height of the dam for the purpose of submergence due to 1 in 100 year flood with 3 m humps over the existing dam height of 90 m remains the same.

The issue of construction of 3 m humps over the existing height of dam at 90 m is being put up for consideration in the next meeting of SSCAC and NCA on 3rd and 4th May 2001 respectively. It is, therefore, requested that the above matter may please be placed before the Environment Sub-Group of NCA for information.

Yours faithfully,


(A.C. TYAGI)
COMMISSIONER (PP)



नर्मदा नियंत्रण प्राधिकरण

NARMADA CONTROL AUTHORITY

सं: पर्यावरण-3-(37)/2002/ 814-52

दिनांक: 31 जनवरी, 2002

स्पीड पोस्ट द्वारा

सेवामें,

न.नि.प्रा. के पर्यावरण उपदल के सभी सदस्य/आमंत्रितगण,
संलग्न सूची के अनुसार ।

9/1/02

विषय: नर्मदा नियंत्रण प्राधिकरण के पर्यावरण उपदल की सैतीसवी बैठक के सम्बन्ध में ।

संदर्भ : इस कार्यालय का पत्र क्र० सं० पर्या-3-(37)/ 2002/646-684 दिनांक 24 जनवरी, 2002

महोदय,

कृपया उपरोक्त संदर्भित पत्र का अवलोकन करें । इसमें थोड़ा परिवर्तन है । ननिप्रा के पर्यावरण उप-दल की 37वीं बैठक अब 10-30 बजे के स्थान पर 11-30 पूर्वाह्न को पूर्व नियोजित तिथि एवं स्थान पर, (दिनांक 8 फरवरी को 10-30 बजे पूर्वाह्न में समिति कक्ष संख्या-403, पर्यावरण एवं वन मंत्रालय, पर्यावरण भवन, सी०जी०ओ० काम्पलेक्स, लोदी रोड, नई दिल्ली) होनी निश्चित हुई है । इस बैठक की कार्यसूची इस पत्र के साथ संलग्न है ।

आपसे अनुरोध है कि कृपया उक्त बैठक में भाग लेने का कष्ट करें एवं भागीदारी को सुनिश्चित करें ।

भवदीय,

संलग्नक:उपरोक्त

नरेन्द्र देव तिवारी
(नरेन्द्र देव तिवारी)
सदस्य (पर्यावरण एवं पुनर्वास) एवम
सदस्य सचिव, पर्यावरण उपदल

प्रतिलिपि सूचनार्थ प्रेषित :

1. सचिव, जल संसाधन मंत्रालय एवं अध्यक्ष, न.नि.प्रा., भारत सरकार, श्रम शक्ति भवन, रफी मार्ग, नई दिल्ली - 110 001.
2. मुख्य सचिव, महाराष्ट्र शासन, मंत्रालय, मुम्बई ।
- 3- मुख्य सचिव, राजस्थान शासन, सचिवालय, जयपुर ।
- 4- उपाध्यक्ष, सरदार सरोवर नर्मदा निगम लि०, ब्लॉक सं० 12, नया सचिवालय परिसर, गाँधीनगर ।

(नरेन्द्र देव तिवारी)
सदस्य (पर्यावरण एवं पुनर्वास) एवम
सदस्य सचिव, पर्यावरण उपदल

११६- बी०जी०, स्कीम नं० ७४-सी, विजय नगर, इन्दौर - ४५२ ०१० (म०प्र०)
116-BG, Scheme No.74-C, Vijay Nagar, Indore - 452 010 (M.P.)
Phone: Member (E&R)- 554333, SPL (Env.) - 571587, DIR (R)-558603, APPO-557691

Gram : NARCONTROL
Fax : 91-731-554333



नर्मदा नियंत्रण प्राधिकरण

NARMADA CONTROL AUTHORITY

No. Env. 3(37)/2002/

Dated: 31st January, 2002
BY SPEED POST

To

All the Members & Invitees of Env. Sub-group of NCA
As per list attached.

Sub: 37th meeting of Environment Sub-group of NCA.Ref: This office letter No. Env-पर्या-3-(37)/ /2002/646-684 Dated 24th January, 2002

Sir,

Please refer to the above cited letter. There is slight modification in the letter. The 37th meeting of Environment Sub-group of NCA now shall be held at **11.30 A.M.** instead of 10.30 A.M. at the same date & venue (on **8th February, 2002 at 11.30 A.M.** in the committee Room No. 403 of Ministry of Environment & Forests, Paryavaran Bhawan, C.G.O. Complex, Lodhi Road, New Delhi – 110 003). The agenda of this meeting is enclosed.

You are requested to attend the above meeting & confirm your participation.

Yours faithfully,

Encl: As above.

(N. D. Tiwari)

**Member (Environment & Rehab.) &
Member Secretary to the Environment Sub-group**

Copy for kind information to :

- 1) The Secretary, MOWR & Chairman, NCA, Shram Shakti Bhawan, Rafi Marg, New Delhi – 110 001.
- 2) The Chief Secretary, Govt. of Maharashtra, Mantralaya, Mumbai.
- 3) The Chief Secretary, Govt. of Rajasthan, Secretariat, Jaipur.
- 4) Vice Chairman, Sardar Sarovar Narmada Nigam Ltd., Block No.12, New Sachivalaya Complex, Gandhinagar.

(N. D. Tiwari)

**Member (Environment & Rehab.) &
Member Secretary to the Environment Sub-group**

११६- बी०जी०, स्कीम नं० ७४-सी, विजय नगर, इन्दौर - ४५२ ०१० (म०प्र०)
116-BG, Scheme No.74-C, Vijay Nagar, Indore – 452 010 (M.P.)
Phone: Member (E&R)- 554333, SPL (Env.) – 571587, DIR (R)-558603, APRO-557691

Gram : NARCONTROL
Fax : 91-731-554333

पर्यावरण उपदल के सदस्यगण

- १- श्री पी०वी० जय कृष्णन, सचिव, भारत सरकार, पर्यावरण एवं वन मंत्रालय, सी०जी०ओ० काम्पलेक्स, लोदी रोड, नई दिल्ली-११० ००३ - अध्यक्ष
- २- श्री आर जेयाशीलन, कार्यकारी सदस्य, न.नि.प्रा., बी.जी.११३, योजना क्रमांक-७४-सी, विजय नगर, इन्दौर - ४५२ ०१० म.प्र.
- ३- श्री प्रदीप भार्गव, उपाध्यक्ष, नर्मदा घाटी विकास प्राधिकरण, नर्मदा भवन, तुलसी नगर, भोपाल-४६२००३.
- ४- श्री ए० शेखर, आयुक्त, पी.आर, भारत सरकार, जल संसाधन मंत्रालय, श्रम शक्ति भवन, रफी मार्ग, नई दिल्ली - ११० ००१.
- ५- सचिव पर्यावरण, महाराष्ट्र सरकार, पर्यावरण विभाग, चौथी मंजिल, मंत्रालय, मुम्बई-३८
- ६- श्री के०सी० कपूर, प्रबन्ध निदेशक, सरदार सरोवर नर्मदा निगम लि०, नया सचिवालय परिसर, गाँधीनगर - ३८२ ०१०
- ७- सचिव, पर्यावरण, राजस्थान सरकार, पर्यावरण विभाग, सचिवालय, जयपुर - ३०२००५
- ८- महानिदेशक, नृवंशविज्ञान सर्वेक्षण विभाग, पश्चिम ब्लॉक-२, प्रथम मंजिल, स्कंध-६, रामकृष्ण पुरम, नई दिल्ली - ११००६६
- ९- महानिदेशक, भारतीय आयुर्विज्ञान अनुसंधान परिषद, अंसारी नगर, पोस्ट बाक्स नं०-४५०८, नई दिल्ली - ११० ०२९
- १०- उपमहानिदेशक, मृदा कृषि विज्ञान एवं इंजीनियरी, भारतीय कृषि अनुसंधान परिषद, कृषि भवन, डा० राजेन्द्र प्रसाद मार्ग, नई दिल्ली - ११०००१
- ११- श्री एस०के० मुखर्जी, निदेशक, भारतीय वन्य जीव संस्थान, पोस्ट बाक्स नं० १८, देहरादून - २४८ ००१
- १२- डा० आर०के० कट्टी, सलाहकार, ४०१/बी०, पूनम चेम्बर्स, शिव सागर स्टेट, डा० एनी बेसेन्ट रोड, मुम्बई - ४०० ०१८
- १३- डा० एस० रामाशेषन, सलाहकार, प्रोफेसर, सिविल इंजिनियरिंग विभाग, कोन्गू इंजिनियरिंग कालेज, पेरुन्दुरई, इरोड - ६३८०५२
- १४- डा० शेखर सिंह, प्रोफेसर, भारतीय लोक प्रशासन संस्थान, इन्द्र प्रस्थ स्टेट, रिंग रोड, नई दिल्ली - ११० ००२
- १५- उप-महानिरीक्षक, वन, भारत सरकार, पर्यावरण एवं वन मंत्रालय, पर्यावरण भवन, सी.जी.ओ.काम्पलेक्स, लोदी रोड, नई दिल्ली-११० ००३
- १६- महानिदेशक, भारतीय पुरातत्व सर्वेक्षण, ११, जनपथ, नई दिल्ली - ११०००१
- १७- श्री नरेन्द्र देव तिवारी, सदस्य, पर्यावरण एवं पुनर्वास, न०नि०प्रा०, इन्दौर - सदस्य सचिव

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आमंत्रितगण

1. श्री नवीन कुमार, प्रधान सचिव, वन, राजस्व एवं वन विभाग, महाराष्ट्र सरकार, मंत्रालय, मुम्बई - ४०० ०३२
2. श्री एस० ए० चव्हाण, प्रमुख वन संरक्षक, गुजरात सरकार, ब्लॉक संख्या-१२, सचिवालय, गोंधलीनगर - ३८२०१०
3. श्री सुरेश चन्द्र, सदस्य, पर्या० एवं वन, नर्मदा घाटी विकास प्राधिकरण, नर्मदा भवन, तुलसी नगर, भोपाल - ४६२ ००३
4. श्री एन०के०माधुर, अति० सचिव पर्यावरण, राजस्थान सरकार, पर्यावरण विभाग, कमरा नं० ३२१-ए, एस०एस०ओ० भवन, सचिवालय, जयपुर - ३०२ ००५
5. डा० सुभाष सालुंके, महानिदेशक, स्वास्थ्य सेवायें, ४थी मंजिल, सरकारी दंत चिकित्सा भवन, सेन्ट जार्ज हास्पिटल कम्पाउण्ड, मुम्बई - ४०० ००१
6. श्री वी० राजगोपालन, संयुक्त सचिव, भारत सरकार, पर्यावरण एवं वन मंत्रालय, सी.जी.ओ.काम्पलेक्स, लोदी रोड, नई दिल्ली-११० ००३
7. संयुक्त सचिव, मृदा संरक्षण, कृषि मंत्रालय, भारत सरकार, कृषि भवन, डा० राजेन्द्र प्रसाद मार्ग, नई दिल्ली ।
8. श्री एस०वी० सोन्डुल, सचिव, कैड, महाराष्ट्र शासन, सिंचाई विभाग, मन्त्रालय, मुम्बई - ४०००३२
9. श्री मान दाहिमा, आयुक्त, संचालनालय, पुरातत्व, अभिलेखागार एवं संग्रहालय विभाग, मध्य प्रदेश शासन, बाणगंगा, टी०टी० नगर, भोपाल ।
10. श्री इन्द्र राज, सचिव, सरदार सरोवर निर्माण सलाहकार समिति, ए-ब्लॉक, चौथी मंजिल, नर्मदा भवन, इन्दिरा एवेन्यू, बडोदरा - ३९० ००१
11. मुख्य वन संरक्षक -मध्य- भारत सरकार, पर्यावरण एवं वन मंत्रालय, क्षेत्रीय कार्यालय, ई-३/२४०, अरेरा कालोनी, भोपाल ।
12. डा० शमशेर सिंह, अति० निदेशक, भारत सरकार, कृषि एवं सहकारिता विभाग, शास्त्री भवन, नई दिल्ली - ११० ००१
13. डा० आर०डी० दीक्षित, संयुक्त निदेशक, पर्यावरण एवं वन मंत्रालय, भारतीय वनस्पति सर्वेक्षण, केन्द्रीय वृत्त, १० चेयम लेन, इलाहाबाद - २११००२
14. डा० आर०सी० शर्मा, उप-निदेशक, राष्ट्रीय संक्रामक रोग संस्थान, २२, ग्र्याम नाथ मार्ग, नई दिल्ली - ११० ००७
15. मुख्य अभियन्ता -इएपी- एवं संयुक्त सचिव, सिंचाई, महाराष्ट्र सरकार, सिंचाई विभाग, मंत्रालय मुम्बई - ४०० ०३२
16. प्रबन्ध निदेशक, नेशनल हाइड्रो पावर डेवलपमेन्ट कॉर्पोरेशन लि०, द्वितीय खण्ड, ५वीं मंजिल, पर्यावास भवन, जेल रोड, अरेरा हिल्स, भोपाल ।
17. श्री बी०जी० वर्गीज, अनुसंधान प्रोफेसर, सेन्टर फार पालिसी रिसर्च, धर्मा मार्ग, चाणक्यपुरी, नई दिल्ली - ११००२१
18. श्री एस०ए० थोरत, वन संरक्षक, धुले सर्कल, महाराष्ट्र शासन, धुले ।

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18. Shri S.A. Thorat, Conservator of Forests, Dhule Circle, Dhule, Maharashtra.



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पर्यावरण उपदल
ENVIRONMENT SUB-GROUP

सैंतीसवीं बैठक की कार्यसूची
Agenda for the 37th Meeting

स्थान : पर्यावरण भवन,
नई दिल्ली

दिनांक : 8 फरवरी, 2002
DATE : 8th February, 2002

Venue : Paryavaran Bhawan,
New Delhi

समय : 11.30 बजे (पूर्वाह्न)
Time : 11:30 A.M.

नर्मदा नियंत्रण प्राधिकरण
NARMADA CONTROL AUTHORITY

इन्दौर
जनवरी, 2002

Indore
January, 2002

ENVIRONMENT SUB-GROUP 37TH MEETING AGENDA PAPERS

I N D E X

Item No.	Contents	Page No.
XXXVII-1(170)	CONFIRMATION OF MINUTES OF THE 36TH MEETING	1
XXXVII-2(171)	<p>SARDAR SAROVAR PROJECT: REVIEW OF THE STATUS OF ENVIRONMENTAL CONSIDERATIONS IN RELATION TO THE PROPOSED RAISING OF THE DAM HEIGHT AT RL 100M. :</p> <p>A) Action taken report :</p> <ul style="list-style-type: none"> • Catchment Area Treatment. • Flora Fauna & Carrying Capacity. • Command Area. • Health. • Archaeology. <p>B) Review of the progress of works on the suggested parameters in relation to the proposed filling of the reservoir upto RL 100m by June 2002 :</p> <ul style="list-style-type: none"> • Phased Catchment Area Treatment. • Compensatory Plantations. • Survey of Flora, Fauna and Carrying Capacity Studies. • Fisheries Conservation and Development. • Archaeological & Anthropological Aspects. • Seismicity and Rim Stability of Reservoir. • Health Aspect. • Command Area Development. • Down stream environment. 	<p>2</p> <p>2</p> <p>3-9</p>
XXXVII-3(172)	<p>REVIEW OF THE STATUS OF INDIRA SAGAR PROJECT MADHYA PRADESH :</p> <ul style="list-style-type: none"> • Catchment Area Treatment. • Compensatory Afforestation. • Survey of Flora Fauna & Carrying Capacity studies. • Archaeological & Anthropological Survey. • Seismicity and Rim Stability of Reservoir. • Health Aspects. • Command area Development. 	10-11
XXXVII-4(173)	<p>REVIEW OF ACTION TAKEN ON THE DECISION OF THE PREVIOUS MEETINGS :</p> <ul style="list-style-type: none"> • Sardar Sarovar Project : Environment Management. • CAT Phase-I – Establishment of Silt Monitoring Stations. • CAT Phase-I – Reconciliation of the extent of areas treated by the Govt., of Madhya Pradesh for the SSP and ISP. • CAT Phase-II – Submission of Catchment Area Treatment Plans for freely draining critically degraded sub-watersheds (Item No.XXII-2(112). • Cost Estimates for preparation of Action Plans and implementation of Environmental Safeguard Measures. • Monitoring works in Maharashtra. • Publication of Environment. 	12-14

ANNEXURES

XXXVII- (1)	Catchment Area Treatment : • CAT : Details for completion of works received from Madhya Pradesh.	16
XXXVII- (2)	Flora & Fauna and Carrying Capacity : • Tabular information on recommendations, action plans and present status of various studies and surveys carried out for Shoolpaneshwar Sanctuary. Submitted by SSNNL.	17-25
XXXVII- (3)	• Write-up on recommendations, action plan and present status of various studies and surveys relating to flora and fauna affected due to impoundment. Proposal for felling of trees in the submergence zone prior to impoundment of the reservoir.	26-32
XXXVII- (4)	• Phased felling plan for forests coming under submergence at EL 100m.	33-36
XXXVII- (5)	• Information on recommendations of the study group on flora and fauna and the proposed action plan for their dispersal / migration.	37-41
XXXVII- (6)	Command Area Development : • Command Area Development details, particularly with reference to the proposed monitoring and controlled release of water for avoiding water logging, salinity, etc.	42
XXXVII- (7)	Health : • Final Health Plan incorporating the preventive and curative measures proposed for malaria control and other diseases. .	43-45
XXXVII- (8)	• Report on health aspects and the additional districts required to be covered by NICD.	46
XXXVII- (9)	• An updated Health Action Plan.	47-51
XXXVII- (10)	Archaeology • Minutes of the 3 rd meeting to review the progress on Archaeological & Anthropological aspects in relation to SSP & ISP held on 27.7.2001 at Bhopal.	52-73
XXXVII- (11)	• A copy of the map showing the reservoir and the river stretch.	74-75
XXXVII- (12)	• A copy of the status report on environmental management – SSP & ISP, for quarter ending September, 2001.	76-173
XXXVII- (13)	• A map of the areas treated / under treatment of the sub-watershed.	174
XXXVII- (14)	• A map delineating the submergence, catchment, areas under tree cover, areas of sanctuaries.	175
XXXVII- (15)	• The progress of the fisheries development programme received from Govt. of Gujarat.	176-177
XXXVII- (16)	• A copy of the map indicating location of the Monument vis-à-vis impoundment.	178
XXXVII- (17)	• The report on rim stability received from Govt. of Gujarat.	179-182
XXXVII- (18)	• Recommendations of the report of the Experts on Health for the areas in Madhya Pradesh, Maharashtra and Gujarat.	183-184
XXXVII- (19)	• The status of works in relation to impoundment at RL 100m. is brought out in the map.	185-186
XXXVII- (20)	• The current status of works on development of Narmada Main Canal and distributaries.	187-192
XXXVII- (21)	• The key expected impacts on downstream environment are outlined in the note.	193
XXXVII- (22)	• A copy of the thematic maps delineating improvement of the vegetal cover due to CAT works.	194-196
XXXVII- (23)	• Copy of the letters received from ISRO Office Ahmedabad.	197-200
XXXVII- (24)	• A copy of the letter received from the Ministry of Agriculture.	201-202
XXXVII- (25)	• Compilation of the estimates and expenditure incurred on survey, studies and implementation of the suggested safeguard measures for the SSP.	203
XXXVII- (26)	• Copies of the letters addressed to the Govt., of Maharashtra for eliciting needed response.	204-213

ENVIRONMENT SUB-GROUP AGENDA FOR THE 37TH MEETING

Item No. XXXVII-1(170) : CONFIRMATION OF MINUTES OF THE 36TH MEETING

Minutes of 36th Meeting of Environment Sub-Group of Narmada Control Authority were circulated to all Members and Invitees vide NCA Office letter No.Env-3(36) /2001 / 2319-2351 dated 01.06..2001.

No comments were received and, therefore, the Minutes are put up for confirmation.

Item No. XXXVII-2(171): SARDAR SAROVAR PROJECT: REVIEW OF THE STATUS OF ENVIRONMENTAL CONSIDERATIONS IN RELATION TO THE PROPOSED RAISING OF THE DAM HEIGHT AT RL 100M.

Works on the Sardar Sarovar Project commenced after the historic Judgement delivered by the Apex Court on 18.10.2000, in Civil Writ Petition No.319 of 1994 filed by Narmada Bachao Andolan (NBA) against the Sardar Sarovar Project (SSP).

Accordingly the construction programme of the SSP approved by the NCA in its 61st meeting held on 17.11.2000, construction of dam upto a height of 100 m is to be achieved by June, 2002.

Sub-group reviewed the programme of Survey, Studies and implementation of the Environment Safeguard Measures in relation to 100 m height during its last 2 meetings. Status of compliance by the State Govts. on the issues brought out by the Environment Sub-group are presented in form of an action taken report.

A. Action taken report is given below :

During this review a need was felt for seeking more information on some of the issues. In response to this, the information received, from the States was complied, collated analysed and is presented below for a review by the Members.

Dam Construction at EL 100 m. would submerge an area upto 105 km. from the dam site resulting in impoundment of 24% of the area.

Sl. No	Pre-requisite as per minutes of 36 th meeting of the Environment Sub-group.	Status of works
	Catchment Area Treatment Proposal for completion of remaining Catchment Area Treatment covering an area of 36,163 ha. for Phase-I by June, 2002. [Action NVDA]	Catchment Area Treatment Details for completion of works received from Madhya Pradesh is given in Annex-XXXVII-(1) Page 16.
	Flora & Fauna and Carrying Capacity Tabular information on recommendations, action plans and present status of various studies and surveys carried out for Shoolpaneshwar Sanctuary. [Action Gujarat] Write-up on recommendations, action plan and present status of various studies and surveys relating to flora and fauna affected due to impoundment. Proposal for felling of trees in the submergence zone prior to impoundment of the reservoir. [Action NVDA] Phased felling plan for forests coming under submergence at EL 100m. [Action Maharashtra]	Submitted by SSNNL and placed at Annex-XXXVII-(2) Page 17-25. Information available and placed at Annex-XXXVII-(3) Page 26-32 Information received is placed at Annex-XXXVII-(4) Page 33-36.

<p>Information on recommendations of the study group on flora and fauna and the proposed action plan for their dispersal / migration.</p> <p>[Action Maharashtra]</p>	<p>Information received is placed at Annex-XXXVII-(5) Page 37-41</p>
<p>Command Area Development</p> <p>Command Area Development details, particularly with reference to the proposed monitoring and controlled release of water for avoiding water logging, salinity, etc.</p> <p>[Action Gujarat]</p> <p>Command area Development Plan for the areas in Rajasthan</p> <p>[Action Rajasthan]</p>	<p>Information received is placed at Annex-XXXVII-(6) Page 42</p> <p>Information awaited.</p>
<p>Health</p> <p>Final Health Plan incorporating the preventive and curative measures proposed for malaria control and other diseases.</p> <p>[Action Gujarat]</p> <p>Report on health aspects and the additional districts required to be covered by NICD.</p> <p>[Action NVDA]</p> <p>An updated Health Action Plan</p> <p>[Action Maharashtra]</p>	<p>Information received is placed at Annex-XXXVII-(7) Page 43-45</p> <p>Information received is placed at Annex-XXXVII-(8) Page 46</p> <p>However this relates to Indira Sagar Project.</p> <p>Information received is placed at Annex-XXXVII-(9) Page 47-51</p>
<p>Archaeology</p> <p>Plan for relocation of archaeological sites / monuments getting affected at EL 100m. including the ones in villages getting affected due to backwater effect.</p> <p>[Action NVDA]</p>	<p>Information received is placed at Annex-XXXVII-(10) Page 62-64</p>

B. Review of the progress of works on the suggested parameters in relation to the proposed filling of the reservoir upto RL 100m by June 2002

As per the approved construction programme of the SSP the height of the dam will be 100 m by the end of June, 2002. The impoundment upstream of SSP would extend up to 105 km. from dam site. Thus the submergence will be 8900 hectares, forming only 24% of the submergence at FRL. A copy of the map showing the reservoir and the river stretch is placed at Annex-XXXVII-(11) **Page 74-75**

A copy of the status report on environmental management – SSP & ISP, for quarter ending September, 2001 is placed at Annex-XXXVII-(12) **Page 76-173** for a review by the Members.

Phased Catchment Area Treatment

For the Project as a whole, against a target of 1,79,180 ha. of CAT an area of 1,43,251 ha. i.e., 80% has been treated. A map of the areas treated / under treatment of the sub-watershed is placed at Annex-XXXVII-(13) **Page 174.**

Gujarat

The targeted area of 29,157 ha. was treated completely.

Maharashtra

As the actual area available for treatment was found 23,295 ha, the same had been treated. Thus, the planned target of 24,298 ha., may be taken as achieved.

Madhya Pradesh

By the end of November, 2001, an area of 90,799 ha has been treated against the target area of 1,25,725 ha.

Compensatory Plantations

Against the usual requirement of plantations over an area equivalent to the forest area diverted, the Project Authorities were directed to raise the plantations over 3 ha., of land (2 ha degraded forests plus 1 ha non forest land) in lieu of each ha., of land diverted for the Project.

Accordingly, for the project as a whole the concerned States, through their respective Forest Department(s), prepared Action Plans and have achieved the planned targets of 42,064 ha., (actual target 42,155 ha.), against 13,386 ha of the forest land diverted for the Project.

Gujarat

Govt. of Gujarat had completed plantation works in the entire planned area of 13,950 ha. (including both non forest and degraded forest areas).

Maharashtra

Govt. of Maharashtra had completed plantation works in the entire planned area of 19,378 ha. (including both non forest and degraded forest areas).

For the land released for R&R works, progress achieved was 4,198 ha. against a target of 4,200 ha.

Madhya Pradesh

The progress reported was 8,736 ha. against the target of 8,737 ha.

Survey of Flora, Fauna and Carrying Capacity Studies

In view of the suggestions received from the Secretary, MoEF in 1988 the regions which are affected due to the project were surveyed with reference to the following.

- 1) Gene pool, if any, likely to be affected.
- 2) Details of wildlife habitat in the region

- 3) Measures proposed to rehabilitate endangered species of flora-fauna, if any.
 - 4) Assessment of the carrying capacity of the neighbouring areas wherein the wildlife would disperse if the scheme were implemented.
 - 5) Plan for rehabilitation of endangered flora & fauna.
- ◆ Details of wildlife habitat in the region have been studied and documented. Accordingly, there was no endemic endangered species of either Flora or Fauna in the submergence area.
 - ◆ Studies have indicated that there was no species of key wildlife, which could be referred to as migratory. The migration, if any, was purely local, restricted to search of food and shelter due to phenological cycle. No corridors for the migrations were, therefore, needed. The Island to be formed during progressive filling of the reservoir and thereafter, are proposed to be left undisturbed.
 - ◆ Aimed at improving the Carrying capacity of the ecosystem for providing sustenance to the wildlife which was expected to move out of the submergence zone to the area adjoining the submergence, massive plantations and soil moisture conservation works have been undertaken in the critically degraded / denuded areas under CAT and CAF programme. These works have been completed in the State of Gujarat & Maharashtra. In Madhya Pradesh these works are nearing completion.

There was one sanctuary known as Dhumkhal sloth bear sanctuary, outside the submergence area, but in the vicinity of the reservoir in the state of Gujarat. Details of this sanctuary were studied and its area was enlarged about four times and a comprehensive management plan was prepared. The extended area of this sanctuary now touches the shore line of the reservoir to enable inhabitants access to the fresh water of the SSP.

A map delineating the submergence, catchment, areas under tree cover, areas of sanctuaries is placed at Annex-XXXVII-(14) **Page 175** for a review by the Members. This map shows that the submergence area is a part of large & contiguous tracks of forest land on either bank & that most of this has been treated with Soil Moisture Conservation (SMC) works. The map also shows the protected area in the vicinity of the dam.

Fisheries Conservation and Development

Studies as brought out in the Status Report annexed, have been carried out to establish a baseline and help to predict future conditions for aquatic life.

According to IUCN, red data list fishes of Narmada are not included as rare or threatened species. CICFRI compiled a list of 8 species, which could be considered vulnerable in Narmada basin. However they are present elsewhere in India in abundance. There are two species of fish viz., Hilsa and Mahaseer which are migratory in nature. While Hilsa fish is anadromous which breeds in fresh water in the rocky areas downstream of SSP, Mahaseer breeds in shallow rocky areas at the confluence

of the tributaries with the main river in Madhya Pradesh. Though, dam being far away, will not act as physical barrier to the migration of Hilsa, but would certainly upon completion of all up-stream Projects would lead to reduction in the breeding of Hilsa on Narmada estuaries on West coast. A situation not likely in the near future given the current level of progress on development works up-stream of SSP.

The Govt., of Madhya Pradesh have addressed the issue of locating and protecting the probable breeding grounds of Mahaseer on up-stream locations.

The current progress of work on fisheries development and conservation is presented below:

Gujarat

- ❖ To improve the quality of seed to be stocked and to lessen the pressure on land deployment, the possibility of cage / pen rearing of fish seed is being examined, in consultation with the Central Institute of Fisheries Aqua culture, Bangalore, who have offered a consultancy package to the State Fisheries Department. It was further informed that SSNNL has already appointed a Fisheries consultant to gear up the fisheries sector activities under SSP.

The progress of the fisheries development programme received from Govt. of Gujarat is placed at Annex-XXXVII-(15) **Page 176-177.**

Maharashtra

Following the desk review studies on conservation of fish fauna in SSP carried out by the Central Inland Capture Fisheries Research Institute (CICFRI), GOM assigned a short term study to the Vadodara Centre of CICFRI. Report of the study is yet awaited.

Felling of trees from the submergence zone.

The status of felling of trees from the forest areas in each state is summarised below :

Gujarat

- ◆ Regarding felling of trees from submergence areas, the entire reservoir bowl was cleared of vegetation and even coppice crops was also removed.

Maharashtra

- ♦ The forest area under submergence at FRL 138.68 m. in Maharashtra State is 6489 ha. The area to be cleared is up to a level 4 m below FRL and this is 5892.07 ha. In this 1036.19 ha is encroachment, 2753.93 is forest land and 2101.95 ha is the river bed portion. The status of felling is presented in the following table.

Sl.No.	Year	Progress (ha.)
1.	93-94	25.970
2.	94-95	NIL
3.	95-96	616.47
4.	96-97	105.58
Total		748.02

After the year 1997 the work was stopped for want of grants. About 940 ha., areas was to be felled for consideration of submergence at RL 100m.

Madhya Pradesh

The progress of felling in relation of 100 m EL is presented below, a copy of the statement indicating the areas to be felled is placed at Annex-XXXVII-(4) **Page 33-36.**

Archaeological & Anthropological Aspects

The three party states completed surveys of cultural and religious sites within the submergence zone with a view to list all archaeological sites requiring protection / relocation / excavation. There was no Centrally / State protected Monument within the submergence of the Sardar Sarovar Project. However, the State Govts., of Gujarat and Madhya Pradesh have prepared plans for relocation / protection / excavation of certain Monuments.

In follow-up of the discussions in the last meeting of the Environment Sub-group, a Review Meeting on Archaeological aspects was taken by the Member (E&R), NCA, on 27.07.2001. A copy of the Minutes of the meeting is enclosed at Annex-XXXVII-(10) **Page 52-73.** Accordingly, no monument will be impacted by 100m RL impoundment. With regards to impact of backwater there would not be any change in the Status of the monuments as compared to with dam not in place. A copy of the map indicating location of the Monument vis-à-vis impoundment is placed at Annex-XXXVII-(16) **Page- 178.**

The status of these works was as under :

Gujarat

- ♦ All works related to Shoolpaneshwar & Hampsheshwar temple were completed.

Madhya Pradesh

The status of work is summarized in the table placed at Annex-XXXVII-(10) **Page 62-64**

Maharashtra

- ◆ There was one temple namely Shoolpaneshwar temple on the border of Gujarat and Maharashtra in village Manibeli. Gujarat accepted the responsibilities in this regard. All works regarding relocation of temple were completed earlier.

Seismicity and Rim Stability of Reservoir

Rim stabilities studies have been completed and well equipped 9 monitoring stations along the periphery of the reservoir are functioning. Data collected by these observatories are being analysed by expert institutions.

The report on rim stability received from Govt. of Gujarat is placed at Annex-XXXVII-(17) **Page 179-182**.

Health Aspects

A field visit of the Experts on Health to the areas in Madhya Pradesh, Maharashtra and Gujarat was undertaken during 7th to 11th August, 2001, recommendations are brought out at Annex-XXXVII-(18) **Page 183-184**. The status of works in relation to impoundment at RL 100m. is brought out in the map placed at Annex-XXXVII-(19) **Page 185-186**.

Command Area Development

The SSP will provide irrigation water for a cultivable command area of 18 lacs hectares in Gujarat and 75,000 hectares in Rajasthan. The SSP water for irrigation purposes would start flowing in the canal once the dam height was raised to 110 m. The introduction of fresh water to the drought-prone areas of Gujarat will create obvious benefits for the farming communities. In order to safeguard these benefits, control and monitoring was suggested by the Secretary, Ministry of Environment & Forests and Chairman of the Environment Sub-group in the following areas from time to time :

- drainage, water logging and soil salinity
- water quality
- forest loss
- potential impact on flora and fauna
- effects on public health
- socio-economic impacts.

There is substantial progress in the construction of canal network. The current status of works on development of Narmada Main Canal and distributaries is placed at Annex-XXXVII-(20) **Page 187-192** The status of works related to the Command Area Development are summarized in the Status Report annexed with these Agenda papers.

Rajasthan

EIA studies for the Command area in Rajasthan were entrusted to WAPCOS by the Govt., of Rajasthan, on the suggestions of the Environment Sub-group. WAPCOS submitted its report in 1998. The Govt., of Rajasthan, had earlier informed that the Project planning would require drastic changes for which International Competitive Bidding was invited. Further progress is awaited.

Down stream environment

The construction of dam would result into more regulated and perennial flow into the river with an overall beneficial impact. It is unlikely that any significant negative environmental impacts will occur over the next 30 years as a result of the project. Some possible adverse effects might manifest during raising the dam height further to 100m. The expected key impacts are outlined in the note placed at Annex-XXXVII-(21) **Page - 193** for a review by the Members.

Item No. XXXVII - 3 (172) : REVIEW OF THE STATUS OF INDIRA SAGAR PROJECT MADHYA PRADESH

A copy of the Status Report on Environment Management of Indira Sagar Project for the quarter ending September, 2001 is placed at **Annex -XXXVII - (12) Page 150-176** for a ready reference

Catchment Area Treatment

By the end of September, 2001, against a target of 73,456 ha. an area of 51,810 ha. has been treated-up. The progress is about 70% of the final targets. The data may please be updated.

Compensatory Afforestation

By the end of September, 2001 an area of 70,031 ha has been covered against a target of 80,945 ha., This status may please be updated.

Survey of Flora-Fauna & Carrying Capacity studies

In accordance with the recommendations of the study conducted by the Wildlife Institute of India regarding declaration of National Parks / Sanctuary it was informed by the Subject Matter Specialist, NVDA that the issue was taken up by a committee formed for placing the issue before the Cabinet. But now it has been decided to take up the issue directly to the cabinet. The Chairman desired that this issue be expedited at the earliest. Progress may please be represented by the NVDA.

Archaeological & Anthropological Survey

The action plan for protection of Joga Fort was prepared by the ASI at an estimated cost of Rs.1.67 crores. As per the opinion of Director (Conservation) ASI, "The construction of a RCC retaining wall is an original work and does not come within the delegated power of Director General, ASI for sanction. As such it would be appropriate that the design and construction of this wall is taken up by the NVDA. The aesthetic appearance of this wall shall however be as per the requirement of the ASI".

In view of the above, NVDA may like to present the current status.

Seismicity and Rim Stability of Reservoir

The final analysis of the data of observatories shall have to be done in consultation with Indian Meteorological Department (IMD), New Delhi. To have a final inference regarding the status of Seismicity these are to be given to the experts in the field of Seismicity. The present status may please be informed.

Health Aspects

- ❖ Final report of disease surveillance studies is awaited from Gandhi Medical College, Bhopal / NVDA. An updated health action plan – ISP may please be put up to the members of the Sub-group.
- ❖ The present status regarding creation of a health cell in NVDA as per the discussion held in 35th meeting of Environment Sub-group, may please be informed.

Command area Development.

The terms of references (TOR) for command area development (CAD) were to be formulised by the NVDA. Its status may please be informed.

Item No. XXXVII-4(173) REVIEW OF ACTION TAKEN ON THE DECISION OF THE PREVIOUS MEETINGS

Sardar Sarovar Project : Environment Management

A Comprehensive draft document titled as above was circulated to the Members of the Sub-group in November, 2000 for their views. The views from Govt. of Gujarat were received. It is proposed to publish the above document. This is for the information of the Members.

CAT Phase-I – Establishment of Silt Monitoring Stations.

Gujarat

Sardar Sarovar Narmada Nigam Ltd. has decided to entrust this work to Central Soil & Water Conservation Research & Training Institute, Vasad. The Chief Engineer (Design) will have to coordinate the work. The present status may please be informed to the Sub-group. A copy of the thematic maps delineating improvement of the vegetal cover due to CAT works is placed at Annex-XXXVII-(22) **Page 194-196.**

Madhya Pradesh

During the earlier meetings, it was informed that the Govt., of Madhya Pradesh is drawing up a plan for installing indigenous equipment for measuring silt outflows from the treated areas of the catchment as suggested by the Sub-group. Progress may please be informed.

ISRO Office Ahmedabad was approached by the NCA for possibility of undertaking comparative study on the pattern, which was earlier carried out for Gujarat areas. The correspondence letters are placed at Annex-XXXVII-(23) **Page 197-200.**

Members may like to discuss and review.

CAT Phase-I – Reconciliation of the extent of areas treated by the Govt., of Madhya Pradesh for the SSP and ISP.

During the last meeting of the Environment Sub-group, NVDA (Govt., of Madhya Pradesh) vide their letter 589/वन/तकनीकी/2000 dated 1.5.2001 presented that 90,565 ha., of the area of the catchment was treated up. Subsequently, vide letter No. NVDA / Forest / 2001 / 1052 dated 6.8.2001, it was presented that only 87213 ha., of the area was treated up. In view of this, there is a need for re-conciliation of the extent of area treated up by the Govt., of Madhya Pradesh for Sardar Sarovar as well as Indira Sagar Projects.

CAT Phase-II – Submission of Catchment Area Treatment Plans for freely draining critically degraded sub-watersheds (Item No.XXII-2(112))

The State Govts. of Maharashtra and Madhya Pradesh may please present the following information :

- (i) Status of submission of the schemes the funding Agencies for both forest and non forest areas.
- (ii) Current status of the implementation of the schemes already approved.

In view of the de-centralisation scheme subsuming the previous pattern of funding State Govt., of Madhya Pradesh and Maharashtra may please present the availability of the funds for treating Phase-II programme of the Sardar Sarovar Catchment.

It was observed during the 35th meeting that due to decentralization of the funding components of the watershed management schemes and placement of funds at the disposal of the respective State Govts., needed steps should be taken for continued supports to the soil moisture conservation works as envisaged. In this connection it was suggested that Secretary, Agricultural be approached for soliciting his cooperation in expeditious completion of the phase-II works related to SSP and ISP. A copy of the letter received from the Ministry of Agriculture in this regard is placed at Annex-XXXVII-(24) **Page 201-202**

Present position may please be indicated by the Govt., of Madhya Pradesh for a review by the Members.

Cost Estimates for preparation of Action Plans and implementation of Environmental Safeguard Measures

In order to frame yard sticks on the cost estimates of the water resources Projects, the Chairman of the Sub-group during earlier meeting desired compilation of the estimates and expenditure incurred on survey, studies and implementation of the suggested safeguard measures for the SSP. Accordingly, the information compiled is being presented for information of the Sub-group at Annex-XXXVII-(25) **Page - 203**. The latest updates on these issues based on the information received from the State Govts. is presented below for information of the Members.

Updating at the current price level of the estimate and expenditure on environmental components of the Sardar Sarovar and Indira Sagar Project is requested from the Govts. of Gujarat, Madhya Pradesh and Maharashtra.

Monitoring works in Maharashtra

Govt. of Maharashtra representative have expressed difficulties in receiving funds from the Project Authorities for implementation of the environment safeguard like Health, Fisheries, Flora, Fauna, etc. This issue was discussed and it was informed that

a policy decision is to be taken by the appropriate authorities of the SSNNL after studying availability of the funds and financial consequences thereof. Further information is awaited from the Govts. of Maharashtra and Gujarat.

Regarding inter departmental coordination for the SSP related works in Maharashtra, Govt. of Maharashtra had suggested that the Officers nominated by the Govt. of Maharashtra on to the Field Visit Committee might suffice. However, no officers from Maharashtra has participated during the second field visit undertaken during July, 2000 and therefore, progress in Maharashtra could not be reviewed by the Committee for the areas in Maharashtra. Similarly during the last meeting of the Environment Sub-group also there was a lack of participation at appropriate level due to which progress on various issues for the areas in Maharashtra could not be ascertained. Copies of the letters addressed to the Govt., of Maharashtra for eliciting needed response are placed at Annex-XXXVII-(26) **Page 204-213.**

Members may like to discuss and review.

Publication of Environment

During its earlier meetings it was desired that good works being done by the Project Authorities are to be published . Progress on these aspects may please be presented by the State Govts. Copies of the publications brought out by NCA would be circulated during the meeting.

During the 33rd meeting, the Sub-group desired that NCA should organise Seminar / Workshops on the Thrust Areas of the Environmental Ameliorative Measures. First draft of the details for organizing the seminar shall be furnished during the meeting.

Item No. XXXVII-5(174) : Any other item

Date and venue of the next meeting

नर्मदा घाटी विकास प्राधिकरण के अंतर्गत सीधे जल निकासी करने वाले उपजलग्रहण क्षेत्रों में उपचार कार्यों की प्रगति का विवरण सरदार सरोवर जलग्रहण क्षेत्र																						
उपजलग्रहण का विवरण		एवम् क्षेत्र के अनुसार			माघ-2001 तक उपलब्धता			क्षेत्र का विवरण			(31.3.2001 की स्थिति में) एवं शेष कार्य हेतु योजना											
											अन्य एजेंसी द्वारा उपचारित क्षेत्र			अवशेष क्षेत्र			वर्ष 2001-02 में प्रस्तावित				वर्ष 2002-03 में प्रस्तावित	
		तहसील			गैर वन क्षेत्र वन क्षेत्र योग			गैर वन क्षेत्र वन क्षेत्र योग			गैर वन क्षेत्र वन क्षेत्र योग			गैर वन क्षेत्र वन क्षेत्र योग			गैर वन क्षेत्र वन क्षेत्र योग			गैर वन क्षेत्र वन क्षेत्र योग		



Dr. SANAT A. CHAVAN, IFS,
Chief Conservator of Forests

ANNEX – XXXVII – (2)
Sardar Sarovar Narmada Nigam

(Gujarat Govt. Undertaking)

Sachivalaya, Gandhinagar - 382 010.

Phone : 24179, 52811, Fax No. : 02712 - 23056

No. SSNNL/ENV/ESG/ 2001
Date: 30th May, 2001.

Dear Shri Tiwariji,

In the 36th meeting of Environment Sub-Group held on 2nd May, 2001 at New Delhi, the agenda for giving environmental clearance up to 100mt. of the Sardar Sarovar dam height was discussed. During course of discussion, it was felt that the required progress in the areas identified in the 35th meeting of Environment Sub-group were quite satisfactory except some reservation from some members regarding progress made in Shoolpaneshwar Sanctuary areas with respect to measures suggested in the action plan.

While inquiring about the progress from the Rajpipla (East) Division, the implementing agency in the sanctuary area, it is learnt that, the progress they have submitted, was only of the works done by their Circle under wildlife budget. They did not include the work executed by Sardar Sarovar Plantation Division, Development of Forest Settlement Office and various schemes of the State Forest Department. Now, they have provided a comprehensive information on each of the activities which are being carried out in the sanctuary area.

The status has been updated by including progress made during the year 2000-2001. Moreover, the Soil Moisture Conservation works done by Gujarat Land Development Corporation in private agriculture land inside the sanctuary has also been included. Now with the inclusion of all these activities, the progress made in each component is more than satisfactory. As can be revealed from the status, the progress in most of the component is more than 100%, while, for the remaining, the progress far exceeds

1/7/01

SH (Env)

12-17

the percentage submergence at FRL of the reservoir i.e. 24% at proposed dam height of 100 mt. This, in turn, also satisfies the parri-passu conditionalities stipulated by MOE&F.

The revised statement exhibiting a comprehensive status of each of the components suggested in the Shoolpaneshwar Action Plan is furnished herewith for your information and appropriate consideration.

With regards.

Yours Sincerely
Sanat A Chavan
(Sanat A Chavan)

Encl.: As above.

To,
Shri N. D. Tiwari.
Member (E&R)
Narmada Control Authority,
INDORE-

ANNEX - A (VII) (2)

REVISED STATEMENT OF ACTIVITIES BEING CARRIED OUT IN SHOOLPANESWAR SANCTUARY
VIS-A-VIS ACTIVITIES SUGGESTED IN THE ACTION PLAN

Sr. No.	GROUP PRIORITY	Recommd in Action plan	Year-wise Achievements								Total progress	Remarks
			1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01		
1	Afforestation											
	(A) Plantation of fuel wood, timber, MFP and bamboo)											
	I By Rajpipla Divison		0	15 ha	0	0	62 ha	92 ha	20 ha	0		More than 100% (2087%) targets have been achieved
	II By SSP Divison		1528 ha	1764 ha	1102 ha	2129 ha	1661 ha	1897 ha	0	160 ha		
	SUB TOTAL	500 ha	1528 ha	1764 ha	1102 ha	2129 ha	1661 ha	1989 ha	20 ha	160 ha	10435 ha	
	(B) Plantation for making animal corridor and local migration (gap plantation, to make compact corridors)											More than 100% (1541%) targets have been achieved
	I By Rajpipla Divison		0	0	0	0	0	0	0	0		
	II By SSP Divison		633 ha	521 ha	875 ha	825 ha	500 ha	0	0	500 ha		
	SUB TOTAL	250 ha	633 ha	521 ha	875 ha	825 ha	500 ha	0	0	500 ha	3854 ha	
	(C) Providing and Planting fruit tree species bamboos and other mfp species to tribals around their cultivated fields (Under RDFL components CFP programme											More than 100% (134%) targets have been achieved (3500 Mangografts and 1.27 lac fruit trees distributed to the villagers for their
	I By Rajpipla Divison		0	0	0	0	0	0	0	0		
	II By SSP Divison		0	0	0	10.75 ha	51.5 ha	52.05 ha	20 ha	0		
	SUB TOTAL	100 ha	0	0	0	10.75 ha	51.5 ha	52.05 ha	20 ha	0	134.3 ha	Maliki land.)

GROUP PRIORITY	Reccomd In Action plan	Year-wise Achievements.								Total progress	Remarks
		1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01		
Soil & Moisture Cons. Works											
(A) Check dam											
(i) Pacca											
I By Rajpipla Divison		2 No	1 No	5 No	1 No	4 No	1 No	2 No	0		More than 100% (300%) targets have been achieved
II By SSP Divison		0	0	0	13 no	29 No	13 No	0	4 No		
SUB TOTAL	25 No.	2 No	1 No	5 No	14 No	33 no	14 no	2 No	4 No	75 No	
(ii) Kachcha											
I By Rajpipla Divison		0	0	0	0	0	0	0	0		More than 100% (1100%) targets have been achieved
II By SSP Divison		14 No	0	50 No	127 No	62 No	13 No	0	0		
III Under DFS Programme					4 No	5 No	1 No				
SUB TOTAL	25 No.	14 No	0	50 No	131 No	67 No	14 No	0	0	276 No	
(iii) Desilting of check dams.	25 No.	Operation required after silting of the dam i.e. normally after 5 to 7 Years.									Not required at present
(B) Gully Plugging											
I By Rajpipla Divison		0	0	0	0	0	0	0	1265		More than 100% (9015%) targets have been achieved
II By SSP Divison		13405	13974	5126	4448	4448	2092	0	317		
SUB TOTAL	500 No.	13405	13974	5126	4448	4448	2092	0	1582	45075	
(C) Van Talavadi											
I By Rajpipla Divison		6 No	0	1 No	5 No	2 No	4 No	3 No	0		More than 100% (124%) targets have been achieved
II By SSP Divison		0	0	2 No	0		6 No	0	0		
SUB TOTAL	25 No.	6 No	0	3 No	5 No	4 No	10 No	3 no	0	31 No	

Sr. No.	GROUP PRIORITY	Reccomd In Action plan	Year-wise Achievements.								Total Progress	Remarks
			1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01		
3	ECO DEVT. PROGRAMME											
	IN & AROUND VILLAGES.											
	(A) Water facility for villages and cattle											
	(i) Well (New)											
	a) By Rajpipla Divison		0	0	0	0	0	0	0	0		
	b) Under DFS Programme		3	1	2	2	1	4	0	0		
	SUB TOTAL	25 No	3	1	2	2	1	4	0	0	13 No	
	(ii) Deepening of well/ Ponds	25 No	5	0	0	5	2	4	1	0	17 No	
	(iii) Hand pumps	25 No	0	0	0	0	1 No	1 No	1 No	0	3 No	
	(iv) Repairs of Hand Pump	25 No	3	3	2	3	4	5	4	6	30 No	
	(v) Bore wells	5 No	0	0	0	1 No	1 No	1 No	1 No	0	4 No	
	(vi) Aveda											
	a) By Rajpipla Divison		0	0	0	1 No	1 No	0	1 No	0		
	b) Under DFS Programme		0	0	0	0	1 No	0	0	0		
	SUB TOTAL	25 No	0	0	0	1 No	2 No	0	1 No	0	4 No	
	(B) SMC Work in agricultural fields.											
	I By Rajpipla Divison		0	0	0	0	0	0	0	0		More than 100%
	II By GLDC		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		(145%) targets have been achieved
	SUB TOTAL	500 ha	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	727.81 ha	
	(C) School Building/ Anganvadi	5 No	14	0	0	0	0	0	0	0	14 No	More than 100% (280%) target achieved
	(D) Mobile Stores, facilities of WFP programme to be utilized.											

Sr. No.	GROUP PRIORITY	Reccomd In Action plan	Year-wise Achievements.								Total Progress	Remarks
			1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01		
	(E) Mobile Medical unit	1 No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1 No	Presently Dediapada Unit is helping
	(F) Providing better breed of live stock											
	a) By Rajpipla Divison		0	0	0	0	0	0	0	0		More than 100% (2600%)
	b) Under DFS Programme		0	0	0	400	1000	1200	0	0		targets have been achieved
	SUB TOTAL	100 No.	0	0	0	400	1000	1200	0	0	2600 No	
	(G) Veterinary camps & vaccination of non Sanctuary cattle.	Not Specified	0	3 No	3 No	3 No	3 No	3 No	3 No	3 No	21 No	Every year from December to June, three camps are held
	(H) Gobar Gas Plant	100 No.	-	-	-	-	-	-	-	-	-	Most of the villages have been electrified, hence need not to take up
	(I) Development of non-conventional energy sources (Solar implements) wind power generation etc.	Not Specified										
	(J) Employment oriented Training	1 No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1 No	Facility available at Rajpipla
	(K) Nature Education Camps											
	I By Rajpipla Divison		5 No	0	4 No	0	18 No	37 No	20 No	0		On going every year
	II By WWF and other agencies		0	12 No	12 No	14 No	16 No	12 No	16 no	16 No		planned activities
	SUB TOTAL	150 No	5 No	12 No	16 No	14 No	34 No	49 No	36 No	16 No	182 No	
	(L) Poultry Development	Not Specified										
	(M) Crematoria	Not Specified										

Sr. No.	GROUP PRIORITY	Recommend Action plan	Year-wise Achievements.								Total Progress	Remarks
			1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01		
4	PROTECTION											
	(A) Demarcation of Sanctuary Boundary	Not Specified	0	0	0	0	0	1263 mt	1408 mt	0	2671 mt	Most of the work compone are being taken up as per requirment in the sanctua areas
	(B) Erection of dry rubble wall to stop encroachment	Not Specified	0	0	0	0	8.05 km	10.21 km	7.54 km	5.243 km	42.04 km	
	(C) Setting of wireless network (Already existing, reinforcement required)	Not Specified	0	0	0	1 set	0	0	0	0	1 Set	
	(D) Purchase of fire fighting equipment	Not Specified	0	0	0	0	0	35 No	0	0	35 No	
	(E) Fireline works	Not Specified	1675 km	338 km	1130 km	215 km	62 km	100 km	0	0	3520 km	
	(F) Watch Tower	30 No	3 No	0	0	2 No	0	18 No	5 no	0	28 No	

Sr. No.	GROUP PRIORITY	Recommend Action plan	Year-wise Achievements.								Total Progress	Remarks
			1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01		
5	Wildlife Management & Research											
	(A) Habitat improvement (Removal of weeds and increase of fodder species)	Not Specified	0	0	0	0	0	0	15 ha	0	15 ha	
	(B) Establishment of meteorological station	2 No	-	-	-	-	-	-	-	-	-	- It is proposed for next year
	(C) Research station at sagai.	1 No	0	0	0	0	0	0	0	1 No	1 No	
	(D) Periodical wildlife census	Not Specified	0	0	0	0	0	0	1 No	0	1 No	
	(E) Captive Breeding											
	(i) Construction of cage (Animals & Birds)	Not Specified	0	2 No	0	0	0	0	1 No	0	3 No	- Taken up at Sakkarbagh
	(ii) Regular supply of food.	Not Specified	-	-	-	-	-	-	-	-	-	- Salt licks is being provided to wildlife
	(iii) Veterinary Service	Not Specified	-	-	-	-	-	-	-	-	-	- This facility is already available at Dediapada
	(iv) Transport	Not Specified	-	-	-	-	-	-	-	-	-	
	(v) Bird ringing	Not Specified	-	-	-	-	-	-	-	-	-	- BNHS has been contacted and programme will be fixed for the next year
	(vi) Permanent waterholes for wildlife	Not Specified	0	4 No	10 No	10 No	1 No	1 No	2 No	0	28 No	

Sr. No.	GROUP PRIORITY	Recommend Action plan	Year-wise Achievements.								Total Progress	Remarks
			1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01		
6	TOURISM DEVELOPMENT											
	(A) Orientation Center	Not Specified	1 Part	0	1 Part	0	0	0	0	0	2 Parts	One is already established at Kevadia One at Ninaighat and one at Chopdi
	(B) Birds observation huts	1 No	0	0	0	1 No	1 No	0	0	0	2 No	
	(C) Audio visual aids (T.V, V.C.R, Tape-recorder etc)	Not Specified	0	0	0	1 Set	0	0	0	0	1 Set	
	(D) Publicity & Display material	Not Specified	0	0	0	0	15 No	0	0	0	15 No	

001

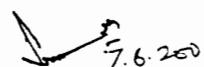
5-40411

1	2	3
2. Production of fodder through agro-forestry or silvipasture system through management of village wastelands.	CAT Plan as mentioned above takes care of the fodder production on suitable areas.	The CAT plan is in implementation.
3. Production of bamboo through agroforestry.	This aspect is also covered under the CAT Plan. Bamboo sp. is also proposed to be raised under Social Forestry Programme being taken up under the S.S.P.	CAT Plan is under implementation. This aspect is also covered under Social Forestry Programme.
4. Using state-of-art technology for devising the management plans for the forests under study area with special reference to protection from fire and stringent control of grazing in the development area.	The forest areas falling under the impact zone of SSP are included in the Working Plans prepared by State Forest Department for Badwani, Dhar & Jhabua Districts for management purposes. Fire and Grazing Control measures are suitably dealt with as per the standard practices being followed by the Forest Department.	The Working Plans are under implementation by the State Forest Department.

1	2	3
5. Intensive campaign for forestry-cum-environment awareness, people participation backed by development legislation should also be launched.	The Action Plan is prepared which takes care of this aspect.	'Joint Forest Management' & 'Social Forestry' Schemes are being run by the State Forest Department. These schemes have adequate involvement of local people. Peoples' participation is sought while carrying out CAT works.
6. To cater to increase requirement of timber, fuelwood etc. Social forestry Programme should simultaneously be launched.	An action plan for Social Forestry has been prepared and submitted to the concerned authorities for the needful.	The Action Plan is under consideration of the State Forest Department.
7. Introduction of quick growing exotics in interest of soil stabilization and meeting the requirement of people in short time.	This aspect is covered under Action Plans.	The recommendation is being taken care of through the implementation of the said action plans.

1	2	3
<p>8. The area is stated comparatively scarce in wildlife with no species that was endemic but to provide alternate habitat for the wildlife two sanctuaries namely Mathwad (34659 sq.km.) in Jhabua district and Bokarata (3559 sq.km.) in Khargone district are proposed.</p>	<p>While according approval to diversion of forest land for Sardar Sarovar Project, GoI, Ministry of Environment & Forests has imposed a condition stating that a committee shall be constituted for management and conservation of wildlife. This committee has not approved the creation of these sanctuaries keeping in view the local conditions. Accordingly the Action Plan does not propose to establish these sanctuaries. NCA has also agreed to this action.</p>	<p>No action is required now.</p>
<p>9. 60 islands which will be found in the reservoir varying in extent from 1 ha to 75 ha should be left undisturbed for study of the process of natural succession and to provide refuge to bird life in the area.</p>	<p>As per study report, the islands are to be left undisturbed for study of the process of natural succession and to provide refuge to bird life in the area.</p>	<p>Recommendation is noted.</p>

1	2	3
10. Studies of the forests with particular reference to topography, physical and chemical properties of the soil and soil moisture regime are necessary.	This recommendation is not brought out in the Chapter VII of the study report.	As such it does not require any action from the Project Authority. It may be added here that the catchment area treatment works are bound to improve/modify the conditions of the soil & terrain.


 Member (Environment & Forests)
 Narmada Valley Development Authority,
 Bhopal (M.P.)

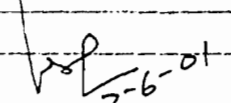
(42) CCF (Forest)

5-6-2001

**सरदार सरोवर परियोजना अन्तर्गत डूब से प्रभावित वन भूमि पर खड़े वृक्षों के विदोहन संबंधी जानकारी
सामान्य वन मण्डल झाबुआ (म.प्र.)**

अ.क्र.	डूब से प्रभावित वन कक्ष क्रमांक		डूब से प्रभावित वन भूमि हे. में	कुल मार्किंग किये गये वृक्षों की संख्या	कुल पातन किये गये वृक्षों की संख्या	प्राप्त वनोपज			138 मी. से 134 मी. पर छोड़े गये वृक्षों की संख्या	बिक्री से शेष माल	रिमार्क
	नये कक्ष क्र.	पुराने कक्ष क्र.				नग	घ.मी.	जलाऊ चट्टे			
1	2	3	4	5	6	7	8	9	10	11	12
1	803	1 आकडिया	205.200	18147	12907	4624	129.416	505	5240	-	138 मी. सीमा लाइन के आधार पर 134 मी. के अन्तराल पर अनुमानित छोड़े गये वृक्षों की संख्या
2	805	2 आकडिया	81.600	4383	1600	489	9.311	23	2783	-	
3	804	16 आकडिया	7.600	1134	556	404	25.164	24	578	-	
4	795	22 आकडिया	6.800	360	360	269	9.317	21	-	-	
5	802	17 बाकनेर	91.800	5903	4028	2335	118.884	546	1875	-	
6	801	18 जलसिंधी	119.000	2104	825	281	14.880	63	1279	-	
7	770	58 सकरजा	35.000	76	76	56	1.345	-	-	-	
8	769	58 सकरजा	4.800	319	319	413	7.992	3	-	-	
9	762	60 सिरखिडी	2.000	59	59	-	1.345	-	-	-	
10	761	75 सिरखिडी	8.000	63	63	-	0.211	-	-	-	
11	760	76 सिरखिडी	1.200	बांध विरोधियों द्वारा किसी प्रकार से कोई कार्य नहीं करने दिया जा रहा है।							साथ ही जो वनोपज प्राप्त होगी उसकी कीमत 80 प्रतिशत ज्यादा निकासी मार्ग पर व्यय होगा
12	799	19 जलसिंधी	52.400	Part for 100 mts.	-	-	-	-	-	-	
13	800	20 जलसिंधी	0.400	x	-	-	-	-	-	-	
14	798	37 जलसिंधी	0.800	x	-	-	-	-	-	-	
15	788	38 जलसिंधी	120.000	Part for 100 mts.	-	-	-	-	-	-	
16	787	55 बाकनेर	55.600	Part	-	-	-	-	-	-	
17	748	77 बाकनेर	5.600	Part	-	-	-	-	-	-	

1	2	3	4	5	6	7	8	9	10	11	12
18	747	87 वाकनेर	32.800				काटने योग्य वृक्ष नहीं है।				
19	746	88 वाकनेर					—"				
20	849	120 वाकनेर	20.800				—"				
21	734	95 वाकनेर	50.400				—"				
22	735	96 वाकनेर	11.600				—"				
23	728	99 वाकनेर	6.400				—"				
24	729	100 वाकनेर	7.600				—"				
25	730	101 वाकनेर	6.800				—"				
26	731	102 वाकनेर	13.600				—"				
27	727	358 वाकनेर	24.000				—"				
28	726	359 वाकनेर					—"				
29	725	360 वाकनेर	23.200				—"				
30	724	361 वाकनेर									
			999.000	32553	20799	8878	325.865	1194	11765		


 वन मण्डलाधिकारी,
 सामान्य वन मण्डल, झाबुआ

ANNEX - XXXVII (4)

Office of the Conservator of Forests, Dhule Circle,
Dhule.

Letter:

Subject: Meeting to be held on
8.6.2001 reg. Sardar
Sarovar Project at
Indore.....

No.: D-2/LND/ 274/01-02.
Dhule-424 001, dt. 6.6.2001.

To

Dr. Pawan Kumar,
Specialist (Environment),
Narmada Central Authority,
BG-79, Scheme No. 74-C,
Vijay Nagar,
INDORE - 452010 (M.P.)

Ref.: Your letter No. ENV-4/2001, dt. 31.5.2001

As per your above letter, the information regarding
tree felling in the submergence area of Sardar Sarovar
Project is enclosed herewith for further necessary action.

Encl: As above.

(Dr. H.N. Patil)
Conservator of Forests,
Dhule Circle, Dhule.

कायान्यायन टिप्पणी
=====

तळोदा

दिनांक : ६.६.२००१

मा.महादय,

मेवाती वनविभागच्या अधिकार क्षेत्रात सरदार सरोवर प्रकल्पाखाली व्हीत हांगा-या वनक्षेत्रातील जाडिरा काटण्याबाबत आतापर्यंत जी कायवाही करण्यात आलेली आहे त्याबाबतचा ताबडोरा तपशील कायान्यायन दस्तऐवज उ पडताळून खालीलप्रमाणे आपल्या मार्गदर्शकांना सादर करावे आहोत.

१) सरदार सरोवर प्रकल्पा अन्वये व्हीत हांगा-या सर्व क्षेत्रांमधील झाडांची मोजणी झालेली दिसून येत नाही. पणत प्रयोगा दाखून काहीक्षेत्रांमध्ये मोजणी करण्यात आलेली आहे. त्याचा तपशील खालील प्रमाणे

अ.क्र.	गावाचे नाव	एकूण मोजणी केलेले क्षेत्र हेक्टर	एकूण वृक्ष	शेता.	
			साग : झाडात : एकूण		
१	माणिकेती	२०.३१	२०००	२२३१३	३२०८३
२	जगडी	१.६२	-	४१३०	४१३०
३	अरेठी	१.२१	१९४	२६०	४६१
४	धुतळीडी	१९.२२	४१०८	६८४६	१०९५४
५	चिपलछेडी	१०.११	८०३०	१३६५२	२१६८२
६	सिंदूरी	१५.१०	५८००	८८०५	१४६०५
७	गमण	४.०४	४५०३	६२३४	११५०७
८	बामणी	१०.११	४८०१	७६३९	१२४४०
९	डन	१८.२१	११९५१	२६११३	३८०६४
१०	माडवा	२.९३	८३	१३८	२२१
११	मुठाडी	२०.२३	४५१९९	३०२८८	७५४८७
एकूण - १३८.०६			२४५०९३३	१३४१२५	२२८००४
				तरासरी	१७५८.४५ झाडे प्रति हे.

२) सरदार सरोवर प्रकल्पात व्हीत क्षेत्रातील झाडांचा काटण्याचे काम वनविकास महामंडळ, पुणे वनप्रकल्प विभाग, नंदुरबार यांचे व्हीत क्षेत्रात आल्यावर त्यांनी दि.१६.५.२००१ ते १०.६.२० या काळात नमुना दाखून आलेले गावाच्या हद्दीतील झाडांची मोजणी केली त्याचा तपशील खालील प्रमाणे

अ.क्र.	गावाचे नाव	मोजणी केलेले क्षेत्र हे.	झाडांची संख्या
१.	धुतळी	०.७५	७१०
२.	सिंदूरी	२.३२	७१३
३.	चिपलछेडी	०.१०	१०५
४.	गमण	२२.४०	३५०
५.	माणिकेती	०.४००	१४२
एकूण - २५.९७			२०२० प्रति हे. ७७.७८ झाडे

३) दि.१०.५.२००१ रोजी वनविकास महामंडळाने एकूण ७२२.०५ हे. क्षेत्रात वरील झाडांचा काटण्याचे काम केले असून त्यात ५००१५६ झाडांची तडि केली आहे. याची तरासरी प्रति हेक्टर ७८०.६६ झाडे अशी येते.

वरील परिच्छेद दोन मधील तडि झालेल्या झाडांची संख्या विचारात घेता वनविकास महामंडळाने एकूण ७४८.०२० हे. क्षेत्रातील झाडांचा काटण्याचे काम केले असून

... ..
त्यात एकूण ५०२१७६ स्वट्या झाडांची तोड केली आहे. व याची सरासरी प्रतिहेक्टर ७६४.९२ झाडे किंवा ७६५/- झाडे अशी येते वनावकास महामंडळाने गावदार वकिलेला झाडोरा काटण्याच्या कामाचे क्षीत्रा संबंधित्या प्रपत्रात दिलेले आहे.

४) वरील नमूना दाखल झाडांची मोजणी या प्रमाणे आहे.

अ.क्र. : मोजणी कोणीकेली	मोजणी केलेले हेक्टर [हेक्टर मध्ये]	मोजणी केलेली झाडे [संख्या]	सरासरी झाडे संख्या [प्रति हेक्टर]
१. रकबातपा मापत	१२०.०६	२२८७०४	१७५८.४५
२. वनावकास महामंडळ मापत.	७४८.०२	५७२१७६	७६४.९२

वरील दोन्ही संख्या मध्ये मोठ्या प्रमाणात तपसुवत दिसते असे असले तरी वनावकास महामंडळाने पुढील झाडोरा काटण्याचे काम केलेले असल्याने ते प्रमाण मानून शिस्तबद्ध क्षीत्रातील झाडोरा काटण्याच्या कामाचे अंदाजपत्रक तयार केलेले आहे. सरदार सरावर प्रकल्पा मर्यादा अंतर्गत व्हीताखाली येणा-या झाडो-याचे माकींग करत स. साविस्तर अंदाजपत्रक तयार या कार्यालयास सादर करणे बाबत वनक्षेत्रपाल, वडपकी व काठी यांनी या कार्यालयाचे पत्र क्र. ब/२०/जमीन/१८/ दि. १४.४.२००१ तसेच ब/२०/जमीन/११३ दि. १८.४.२००१ अन्वये मागविणेत आलेली होती व त्यांना या कार्यालयाचे पत्र क्र. ब/२०/जमीन/२०२ दि. ५.५.२००१ व ब/२०/जमीन/६५२ दि. ४.६.२००१ अन्वये स्मरणापत्री दुसरे सध्या वनक्षेत्रपाल, काठी व वडपकी यांचे व्हीत व्हीत क्षीत्रातील झाडो-याची माकींग करत साविस्तर अंदाजपत्रक या कार्यालयास अपाव पावलेले प्राप्त झालेले नाही यास्तव सरदार सरावर प्रकल्पांतर्गत व्हीता खालील क्षीत्रातील झाडोरा व त्यासाठी लागणा-या रकमे बाबत अंदाजपत्रक तयार करता आलेले नाही. वनक्षेत्रपाल काठी यांनी दि. ६.६.२००१ रोजी दिलेल्या पत्रा नुसार सरदार सरावर प्रकल्पांतर्गत १०० मोटर पातळी खालील व्हीत होणा-या क्षीत्राच्या तिमोकराचे काम तयार करून सदरचे काम बर्फ हफेड अक्ष अक्ष अक्ष एका आठवड्यात पूर्ण होईल असा अंदाज आहे. व त्यानंतर लगेच शिस्तबद्ध अंदाजपत्रक तयार करता येईल.

अ. व. वनक्षेत्रपाल,
महाराष्ट्र, विभागीय, तलाक
कर्मचारी

SARDAR SAROVAR PROJECT

statement showing the forest area to be cleared in affected village of Sardar Sarovar Project

Name of Village.	Total area affected @ RL 138.68m.		Total area affected @ RL 134.68m.		Area to be cleared.				
	H	A	H	A	R.L. at 90m. H A	R.L. at 100m. H A	R.L. at 110m. H A	R.L. at 121m. H A	R.L. at 134.68m. H A
AKKALKUNA TALUKA									
Manibeli.. 142-61	312.00		279.60		80.48	62.13	64.76	40.83	31.40
Dhankhedi.. 72-21	125.97	11	117.69		50.76	21.45	21.87	14.47	9.13
Chimalkhadi.. 62-57	122.90		112.83		45.20	23.37	25.62	10.45	8.19
Sinduri.. 61-19	148.87		130.73		35.22	25.97	29.03	22.47	18.03
Gaman.. 31-29	54.81		48.19		27.44	3.95	4.33	7.92	4.95
Bamari.. 42-29	85.10		76.02		27.19	15.20	15.50	10.20	7.93
Danel.. 24-23	175.84		149.63		54.16	30.13	38.26	15.20	11.88
Mukhadi.. 92-63	186.39		175.68		56.76	35.87	37.99	25.17	19.89
Mandwa.. 5	11.02		7.68		-	-	-	3.00	4.60
ngathi 5-24	17.96		42.96		3.17	2.07	2.36	3.54	1.82
athli.. 0	4.80		-		-	-	-	-	-
Kukadipadar 0	-		-		-	-	-	-	-
TOTAL (A) :-	1244.08		1111.33		380.38	220.14	239.72	153.25	117.82
AKRANI TALUKA									
Paula.. 35-55	82.73		78.78		23.19	13.36	14.12	14.56	13.45
Pimpalchouk.. 27-44	69.12		60.19		20.20	7.24	7.64	13.57	11.54
Shelgada 0	1.89		1.63		-	13.20	60.47	0.60	0.56
Atti.. 12-21	133.75		121.30		-	13.80	66.93	26.39	14.18
Keli.. 0	17.50		3.47		-	-	0.90	1.30	1.27
Thuwani.. 17-72	42.32		39.35		11.80	5.92	6.46	9.59	5.58
Bharad 20-22	98.42		63.37		10.95	9.27	7.55	21.40	14.20
Shikka 22-49	65.61		50.89		10.62	11.87	12.45	9.60	6.35
Domkhedi 21-97	66.05		62.35		12.17	9.82	11.03	14.40	11.93
inchkhedi 0	19.61		14.43		-	-	-	6.30	8.15
Roshmal 0	8.40		7.18		-	-	-	3.25	5.95
Surung 1-50	25.78		25.12		1.25	2.75	3.898	9.12	8.02
Nimgavan 6-35	33.65		27.57		-	6.35	9.59	6.75	4.88
Shelda 3-95	65.56		58.58		-	3.95	29.33	13.20	12.10
Junawane 34-07	17.46		14.88		-	3.07	4.48	4.02	3.31
Bhusha 25-26	176.23		149.05		8.17	17.69	18.83	55.30	49.06
Savriya 0	35.22		34.21		-	-	-	23.17	11.04
Bilgaon 0	24.68		23.97		-	-	-	15.62	8.35
Varvali 4-52	38.48		23.60		1.25	3.27	3.46	9.45	6.17
Sadri 27-40	382.72		345.17		7.35	90.05	81.10	98.15	68.52
Udadya 0	116.71		106.14		-	-	63.40	22.40	20.34
Bhadal 4-12	319.40		283.42		-	34-12	141.11	56.07	52.12
Khardi 0	27.96		26.56		-	-	16.86	6.59	3.11
Mal 0	44.80		43.52		-	-	16.04	19.25	8.12
TOTAL (B) :-	1912.95		1664.65		106.95	232.53	515.73	460.05	349.31
GRAND TOTAL	3157.03		2775.98		487.33	452.67	755.45	613.30	467.21

ANNEX - XXXVII (5)OFFICE OF THE CONSERVATOR OF FORESTS,
DHULE CIRCLE, DHULE.Letter:Sub.- Action Plan on the Flora and
Fauna(Sardar Sarovar Project)

To,

No.D-2/Plan/OW-522 of 2000-01
Dhule-424 001, Dated : 30/12/2000

3-9-2009

✓ The Deputy Director (Environment),
Narmada Control Authority,
BG-79, Scheme No.74-C,
Vijay Nagar INDORE-452 010
MADHYA PRADESH.

Sir,

I am submitting herewith the Action Plan on recommendations made by the Project Director, School of Environmental Sciences, University of Poona on Flora and Fauna of Sardar Sarovar Project Areas. While preparing the Action Plan only one recommended activity of creation of atleast 500 Mtr wide area around the wet land area of the reservoir is taken into consideration as a buffer zone for native trees and shrubs species which will be benefitted to the wildlife as food and shelter.

According to the conditions laid down by the Govt. of India for clearing the project Catchment Area Treatment Programme was implemented in Dhule Forest Circle from the year 1992-93 to 1997-98 over an area of 20283.48 ha. This man-made forest is now flourished successfully along the bank of Narmada river. Due to CAT programme there is massive vegetation growth for shifting of wildlife. Hence special management for the corridors is not that much essential.

Seed bank status of soil low lying in the valley bottom areas and multi regions seed bank in iso-climate regions will be established with the help of Forest Protection Committees working in the remote tribal areas of the Satpuda Ranges. This activity will be carried out voluntarily without any cost.



(S.A. Thorat)

Conservator of Forests,
Dhule Circle, Dhule.

Encl.:- As above.

Copy forwarded with compliments to the Scientist Grade-I, Environment Department, 15th floor, New Administrative Building, Madam Cama Road, Mantralaya, Mumbai-400 032 for favour of information.

Copy forwarded with compliments to the Nodal Officer, Maharashtra State, Nagpur for favour of information.


27

Plan Gen

PROJECTED OUTLAY PORPOSED FOR THE DEVELOPMENT OF 500 METER WIDE AREA AROUND RESERVIOR OF SARDAR SAROVAR PROJECT.

DHULE FOREST CIRCLE, DHULE MAHARASHTRA STATE (Area In ha & Rs. In lakh)

Sr.No.	Year of operation	2000-01		2001-02		2002-03		2003-04		2004-05		2005-06		2006-07		2007-08		2008-09		2009-10		Total	
		Area	Amt.	Area	Amt.	Area	Amt.	Area	Amt.	Area	Amt.	Area	Amt.	Area	Amt.	Area	Amt.	Area	Amt.	Area	Amt.	Area	Amt.
1	PYO+PPO	500	57.80	500	57.80	500	57.80	500	57.80	500	57.80	0	0	0	0	0	0	0	0	0	0	2500	289.00
	Rs.11560																						
2	FYO	0	0	500	37.85	500	37.85	500	37.85	500	37.85	500	37.85	0	0	0	0	0	0	0	0	2500	189.25
	Rs.7570																						
3	SYO	0	0	0	0	500	14.30	500	14.30	500	14.30	500	14.30	500	14.30	0	0	0	0	0	0	2500	71.50
	Rs.2860																						
4	TYO	0	0	0	0	0	0	500	9.10	500	9.10	500	9.10	500	9.10	500	9.10	0	0	0	0	2500	45.50
	Rs.1820																						
5	lvth YO	0	0	0	0	0	0	0	0	500	4.38	500	4.38	500	4.38	500	4.38	500	4.38	0	0	2500	21.90
	Rs.875																						
6	Vth YO	0	0	0	0	0	0	0	0	0	0	500	4.38	500	4.38	500	4.38	500	4.38	500	4.38	2500	21.90
	Rs.875																						
	Total	0	57.80	0	95.65	0	109.95	0	119.05	0	123.43	0	70.01	0	32.16	0	17.86	0	8.76	0	4.38	2500	639.05


 (S.A. Thorat)
 Conservator of Forests
 Dhule Circle, Dhule.

STATUS OF FLORA AND FAUNA IN AND AROUND SARDAR SAROVAR PROJECT : MAHARASHTRA

SUMMARY AND RECOMMENDATIONS

The study was conducted by Deptt. Of Environment Sciences, University of Pune at the instance of Deptt. Of Environment, Govt. of Maharashtra. The study encompasses the SSP impact areas in Maharashtra only. The Tor of the study was discussed in the ESG meetings.

It is worth mentioning that the study has been based on remote sensing data (1990) for vegetation & land cover identification. B/W Aerial photographs areas 1.60000 scale also used. Ground truth checking was done on a few prots. The study included Land use pattern of study area, soil characteristics, water reasoruces which included ground water potential & its quality.

Chapter-2 of the study relates to Plant Resources in the study area in which the frequency, abundance, & density of the trees were found by the transect mentioned the objectives of the study were :

- Making including of the plant wealth
- Estimation of value of existing forests.
- Identification & Assessment of submergence area & biological elements that would be lost in submergence.

The plant inventory thus prepared revealed that nopne of the species are endeamic, sare on endangered (29). In all 511 plant species were listed in the area. Phytoeciology, shifting agriculture, Herbaeeous flora, Biomass & carrying capacity studies were included in this chapter. The carrying capacity studies revealed that the soil cover in the study area is much difference eroded & opoor. No reference of carrying capacity of wildlife has been made in the study, but carrying capacity of seeds has been discoursed.

Chapter-3, relates to animal resources win which studies on insects areas, Raptiles & imandia fauna has been made. It also covered phytoplanktion & 200 plantations. In all 90 insect species ewere identified by the study group indicating richles diverse insect fauna and it's a been listed in the study.

For studying wildlife indirect wetlands were used overall 263 species biologing to class aves & 12 each of Mammals & reptiles are listed.

The recommendations are finally listed on chapter 4 & overall summary of recommendations are at the end of the chapter which are as follows.

The study was conducted by School of Environmental Sciences, University of Pune at the instance of Department of Environment, Govt. of Maharashtra. The study was conducted along the Maharashtra border for a period of 18 months (1992-1994). The area covers roughly 70 Km long and 20 Km wide belt along the southern bank of Narmada River in Maharashtra. The survey was carried out in the submergence and catchment areas of Sardar Sarovar Project. The study area is hilly and dissected in nature

The methodology applied to detect, identify, characterise and demarcate various land use and land cover types, is as follows :

- a) The satellite images (1:50,000) and aerial photographs (1:60,000) were used to analyse a number of observable spectral elements such as brightness, colour, texture, space such as relief, shadow, shape, location and association and temporal nature in order to combine these elements into distinctive pathways whose limits serve to determine land use and cover types.
- b) The vegetation and faunal studies were carried out at more than 35 localities using quadrants of different sizes, line and belt transect methods.
- c) Soil analysis was carried out for the samples collected from submergence and catchment areas.
- d) Survey was done to identify ground water potential and the area was classified into different types, depending upon ground water potential.

The area under study has rugged and highly undulating topography with very narrow 'V' shaped valleys that hardly show any development of floodplain. The foot-hill zones, however, show very narrow colluvial patches. The hills and plateau have very thin (less than 10 cm) reddish-brown soil cover. The soil profile is ill-developed and poorly defined. The organic content of these soils is low in the uppermost horizon because of poor vegetation cover. The clay content of these soils is very low and they have very poor fertility. On the other hand, narrow patches of land on valley floors have shown thicker (20-60cm) grayish-black to brownish-black soils that have well defined horizons and well developed profiles. The upper-most organic horizon is rich in clay and is relatively more fertile.

The ecological studies carried out at more than 35 localities reveal that the density of forest is in the range of 0.1 to maximum of 0.6 at Pimpalkuntha in the catchment area of Sardar Sarovar Project. The minimum cover of canopy on the basis of 0.1 to 1 scale indicates poor vegetation cover in the region as a whole with some patches of good vegetation in the areas inaccessible to the local population. In submergence zone, the canopy cover was found to vary between from 0.1 to 0.2. The

submergence villages such as Manibeli, Chimankhedi, Dhankhedi, Bhusha, Bilgaon bear poor vegetation cover

Recommendations

To minimize the loss of biomass and life, including wildlife, anticipated due to submergence on account of filling the reservoir, following measures are recommended :

1. Management of corridors for shifting of wildlife, several corridors, passing through moderate to good ($0 > 3$) vegetation cover are suggested.
2. Seed bank status of soils of low-lying (e.g. valley bottoms) areas having found to be good hence; it is suggested that surface soils from such areas be used to develop vegetation (natural) in degraded areas.
3. It is further suggested that these soils should be deposited, rather than spread thin at the end points of transformation, to facilitate diverse vegetation growth, comparable to natural vegetation.
4. tree species with high diversity in the region (e.g. *Buchanania lanzan*) should be conserved on large scale, in the form of multi-region seed banks. Some of these seeds from each variety, should be planted in iso-climate regions, with care, if such regions fall in degraded areas.
5. It will be futile exercise to concentrate on one or other methods for conservation of soil since there are various types of terrains. Therefore, it is necessary to go in for a combination of more than one method as locally feasible. Small storages of run-off water, should be aimed at.
6. Based on the abundance of vegetation growth in different terrains such as vegetation along the crevices and slopes, suggestion is made to use these species with spreading habit which are already identified from this area could be effectively used for soil conservation and to develop microhabitats on difficult terrain. Such efforts will form a pioneer stages of secondary succession on distributed habitats, help to consolidate the substratum and pave the way for further regeneration on steep slopes and areas with poor soil cover.
7. Efforts should be made to encourage conservation of soil on slopes and crests and restore adequate soil cover on undulating grounds, through deposition of soil, restoration of degraded lands, formation and retention of plant cover and eventually improvement of water potential. Reciprocally supplementary phenomena of improvement of high diversity vegetation cover and soil potential should be exploited and encouraged through meticulous planning and its execution. This for ultimate aim of improvement of carrying capacity of the region.

ANNEX - XXXVII (6)

A REPORT ON DRAINAGE, WATER LOGGING AND SALINITY

➤ Drainage Studies:

- Two Studies catering to surface drainage have been completed covering the whole of command area as under;
 - a) Narmada- Mahi Doab covering Regions 1 to 4 through Core Consultants,
 - b) SSP Command beyond Mahi covering Regions 5 to 13 through, CES, New Delhi.

The two studies together have provided a dependable base for planning agriculture drainage of irrigated lands as well as networks of agriculture drains to be constructed.

- Piezometer network is established in the command area and ground levels are monitored. In phase-I area i.e. Region 1 to 4 ground levels are well below 5m from surface. In Region 4 i.e. 'Bara Tract Area' special strategy is planned for irrigation. In other parts of command area i.e. Region 5 to 13, some pockets where ground water tables are at or above 5m from surface have been identified and planning for drainage is being done. For Region 7 i.e. for Bhal area Expert Group for planning for irrigation has been constituted.

➤ Water logging and Soil Salinity:

Considering the importance of the problems of water logging and salinity, Narmada Planning Group has taken advance actions as follows:

- Studies on survey and investigation of Ground Water Resources:

Following infrastructure have been established in the alluvial plain of SSP command to get regular data of water levels and water quality and other hydro-meteorological data.

- a) Installation of piezometers,
- b) Installation of automatic water level recorders,
- c) Drilling observation wells,
- d) Conducting long duration pumping tests,
- e) Installation of hydro-meteorological stations,
- f) Establishment of piezometer -net.

A similar study for SSP Command in Saurashtra and Kachchh is under progress through Gujarat Water Resources Development Corporation Ltd.

- Mathematical models have been developed using the services of Indian Consulting Firm for the SSP command area as under to predict change in ground level and quality applying various sets of assumptions.
 - a) Narmada-Mahi Doab. - ORG, Vadodara,
 - b) Shedhi- Sabarmati Area - CES, New Delhi,
 - c) Sabarmati-Banas Area - ORG, Vadodara,
 - d) Beyond Banas upto Rajasthan Border - Dalal Consultant, Ahmedabad.

Thus the GOG is actively considering the problem of water logging and salinity and taking due measures wherever required.

ANNEX - XXXVII (7)

"Health action plan SSP 2001-2005"

Calendar of Activity 2001-2002

1. May 2001, review of situation.
2. June 2001, reorientation training under "Prevention and Control of Malaria" for MO & peripheral workers, working at PHCs in project area and MO of mobile dispensaries & female health workers, providing health care at RR site areas.
3. July 2001,
 - 1) Identification of perennial water bodies in project area, command area phase-I & RR site areas and introducing "*Guppy / Gambusia fish*" in all such water bodies for biological control of mosquito breeding and converting them into perennial hatcheries.
 - 2) Review and finalisation of two draft proposals on "Environmental Impact Assessment studies" (EIA studies), in project and command areas under phase-I by MRC Nadiyad, an ICMR institute and entomological wing under Jt. Director Health Services (M&F) GOG, respectively.
 - 3) Establishing linkages and coordination between newly/recently created health infrastructure under SSPA and existing health infrastructure (Sub Centers, PHCs, CHCs, Hospitals) under state health department in the concerned areas.
 - 4) Review of system of data collection, compilation and analysis and redesigning the same for understanding the current disease profile in PAPs and redesigning the formats for final reports to be sent to SSNNL by medical cell SSPA.
4. August 2001, reorientation training of MO and peripheral health workers under "prevention and control of vector borne diseases", i.e. Dengue, Japanese Encephalitis, Filariasis.
5. September 2001, reorientation training of MOs and laboratory technicians in project, command and RR site areas, under Revised National Tuberculosis Control Programme (RNTCP).
6. October 2001, reorientation training of peripheral health workers ~~for~~ *under RNTCP*
7. November 2001, reorientation training of MOs in project, command and RR site areas National Leprosy Elimination Programme (NLEP).
8. December 2001, reorientation training of peripheral health workers in project, command and RR site areas, under NLEP.
9. January to March 2002, review of progress & taking corrective measures for short falls if any and preparation of action plan for the year 2002-2005

Health Action plan 2001-2002.

Progress Report

Regular health-medical services are provided by SSPA, through 69 sub-center health worker, 21 mobile dispensaries and also by organising diagnostic & treatment camps with services of specialists in all RR sites. Copy of the last month report with progressive performance detail is appended here with. Hospital services are provided at the project site, through "Govt. hospital Kevadia".

A reorientation-training workshop of MO and peripheral health workers and supervisors including MSW under irrigation department, on "prevention and control of malaria" was organised at Vadodara Narmada Guesthouse and Circuit house at Kevadia, from 26th to 28th June 2001. It was organised in five batches, in joint effort with SSPA, Regional Director II&FW GOI and Jt. Director Health Services (Malaria & Filaria).

26-6-2001

1. 18 MO of mobile Dispensaries of SSPA
2. 03 MO from PHCs in project area (Boria, Garudeshvar & Jaria)
3. 01 MO from Govt. hospital Kevadia
4. 03 Specialist (pediatrician, Gynecologist & physician) of SSPA

Total 25 participants successfully completed training with very active participation in form of questions, which were all, addressed by the faculty.

27-6-2001

1. 08 Male workers and
36 Female workers in all 44 workers of SSPA successfully completed training at Vadodara.
2. 14 Male workers (12) & supervisors-2 (including ECSS & SI) and
13 Female workers (9) and supervisors (4)
01 Dist. level supervisor -(PHC Boria & Garudeshvar), Epidemiologist Cum Sanitary Supervisor (ECSS) and
01 SI of Govt. Hospital Kevadia, in all 29 participants successfully completed the training at Kevadia

28-6-2001

1. 12 Male workers and
30 Female workers in all 42 workers of SSPA successfully completed the training at Vadodara
2. 07 Male workers (6) & Male supervisors-1 and
12 Female workers (9) & Female supervisors (3) successfully completed the training at Kevadia. (PHC Jetpur & Jaria)

The response from participants in from questions related to application of knowledge in field practice was very encouraging for faculty and indicated enthusiasm of

participant. We are very hopeful that it will go long way in disease surveillance and treatment as well as reporting of impending outbreak and its prevention & control.

Following literature was sent to the MOs in advance, with request to go through it before workshop, so as to participate effectively.

1. **Operational Manual** for "prediction, detection and control of Malaria Epidemics".
2. Malaria- "A Glance at the diagnosis and treatment for Family Physician"
3. "Epidemiological Investigations under the Modified Plan of Operations (MPO)-NMEP.

A Brochure on Malaria covering:

- An introduction to the problem of malaria and its control,
 - Parasitological, Entomological and Epidemiological aspects,
 - Clinical aspects, Chemotherapy of malaria and Emergence of *drug resistance*,
 - Pathological process in severe *Falciparum* malaria,
 - Treatment and management of *severe P. malaria etc* is also provided on day of workshop.
- ❖ Literature provided in vernacular language to peripheral health workers as reference material for him/her self and "Flip Books" for effective health education activities with other Information, Education & Communication (IEC) material.

Monthly work evaluation meetings, during entire monsoon are planned to be utilised for discussion on "prevention and control of water-borne and vector-borne diseases".

ANNEX - XXXVII (8)

DEPARTMENT OF COMMUNITY MEDICINE
GANDHI MEDICAL COLLEGE BHOPAL

No. 300-302/Comm. Med/2001
To,

Bhopal, dated 25.4.2001

Dr. R.C. Sharma
Joint Director
NICD
Sham Nath Nagar
DELHI

Sub:- Follow up of the minutes of the 35th meeting of the Environment Sub-group.

Ref:- Vide NVDA letter No/ ENV/24/2001/175 dated 23.4.2001

Sir,

As per our discussion held in the meeting on 19th Feb 2001 at Kewadia, it was agreed upon that a team of experts will be sent by you to two districts of Indira Sagar Dam where incidence of Vector borne diseases has increased for helping in conducting surveillance in these two districts namely Khandwa and Khargone.

Initially two villages were proposed for conducting surveillance along with estimation of Helminthic load.

Therefore, I request to please send your proposal to the Member Secretary for helping in conducting survey with financial implications.

Thanking You,

Yours Sincerely,

(DR.S.C.TIWARI)
PROF & HEAD
DEPTT OF COMMUNITY MEDICINE
GANDHI MEDICAL COLLEGE BPL

Copy to:-

1/ Dr. Pawan Kumar, Specialist Environment
BE-79 Scheme No. 74-C
Vijay Nagar, INDORE

2/ Shri Pradeep Bhargava, Member (E&F)
Narmada Valley Development
Narmada Bhavan, BHOPAL

(DR.S.C.TIWARI)
PROF & HEAD

ANNEX - XXXVII (9)

MAHARASHTRA (ACTION PLAN - HEALTH ASPECTS)

Sardar Sarovar, a mega Irrigation and Power Project has been taken up for construction on the Narmada River at Kevadia in Gujarat State. The Project is combined effort of Gujarat, Madhya Pradesh, Maharashtra and Rajasthan States. Because of the back water of the dam, 33 villages of Akkalkuwa and Akrani Tehsil will undergo submergence. It is estimated that more than 15,000 persons from about 3,500 families will be displaced because of the submergence. About 15,000 people are proposed to be rehabilitated at four different sites at (i) Rojwe, (ii) Amli, (iii) Dekati and (iv) Valheri (Narmada Nagar) in Taloda Tehsil of Dhule District, Maharashtra. It would be necessary to provide adequate health coverage to these oustees families being resettled at rehabilitation sites.

The submergence water would affect an area measuring 10 x 40 kms. directly and also would affect indirectly about 80 nearby villages in this belt. They also need proper health coverage as the water collection may lead to several water borne diseases like Dysentery, Diarrhoea, Cholera, etc., and vector borne diseases like Malaria, Filariasis, Dengue, etc.

Usually, the health infrastructure is established on the guidelines given by the Govt., of India time to time. The norms prescribed for tribal areas and non tribal areas are different. The smallest unit of health infrastructure is sub-centre where one male and one female worker look after the population of 5,000 in non tribal and 3,000 in tribal area. Above the Sub-centre, there is a Primary Health Centre for every 3,000 population in non-tribal area and 20,000 population in tribal areas. As a first level referral center, a Community Health Centre for every 4-5 Primary Health Centres is established.

The State Govt., has taken decision recently that in addition to establishment of sub-centres, Primary Health Centres and Community Health Centres for smaller pockets of population, there should be a Mobile Health Unit wherever villages are scattered and for compact population static unit i.e., Primary Health Unit is considered.

There are 166 villages in Dhadgaon Tehsil (population 96,851) and 170 villages in Akkalkuwa Tehsil, out of which 24 villages in Dhadgaon and 9 villages in Akkalkuwa are undergoing submergence. Nearby this belt of submergence, there are 24 villages and 40 padas with 8,000 population which also needs critical attention in relation of Public Health problems.

In the light of the population, number of submerging villages and number of affected villages, the additional infrastructure is proposed. The existing health infrastructure, at present in both the Talukas is as under. Names of the Institutions are shown as below:

INSTITUTION	DHADGAON TEHSIL	AKKALKUWA TEHSIL
R.H.	Dhadgaon	Akkalkuwa
P.H.Cs	1. Dhadgaon	1. Akkalkuwa
	2. Toranmal	2. Kathi
	3. Chulwad	3. Moramba
	4. Khuntamodi	4. Molgi
	5. Roshmal	5. Pimpalkhuta
	6. Bilgaon	6. Horafalli
	7. Mandvi	7. Jamana
	8. Dhanaje	8. Bamni
M.H.U	1. Sadri	1. Pimpalkhuta
	2. Mundalvad	2. Horafalli
	3. Khunta Modi	3. Jamana
	4. Roshmal	4. Bamni
	5. Bilgaon	
	6. Mandvi	
P.H.U.	1. Telkhedi	1. Urmilamal
	2. Katri	2. Wadfali
		3. Kanjala

It must be mentioned here that comparatively Taluka Dhadgaon is more hilly and tribal as compared to Taluka Akkalkuwa. Hence, more institutions like Primary Health Centres/Sub-centres are already sanctioned in Dhadgaon Tehsil. Average population per sub-centre in Dhadgaon Taluka is 1950 and per Primary Health Centre is 7,800 and in Akkalkuwa Taluka the average population per sub-centre is 2,300 and per Primary Health Centre is 15,250.

Since last rainy season, the water started collecting in the dam, hence, the health services are delivered through 15 rescue camps to the people staying at the submergence site. Nine more rescue camps are being opened considering that the water level may rise during forthcoming rainy season (i.e., total 24 rescue camps). These camps are manned by one Medical Officer C.I.III, Health Assistant / MPW Male and attendant along with the Police and Revenue machinery. This staff is pulled from other Health Institution in the District considering the difficulty of availability of Medical Officer, it is proposed to appoint honorary B.A.M.S. Doctors at fixed honorarium of Rs.4,000/- per month at these rescue camps for a period of six months (i.e., May to October).

The Health Institutions going under submergence

		Dhadgaon	Akkalkuwa
1.	Primary Health Centre	2 Roshmal Bilgaon	1 Bamni
2.	Primary Health Unit	1 Sadri	--
3.	Sub-centres	3 Sadri, Bilgaon Roshmal	2 Manibeli Bamni

These institutions will be shifted when they will be actually submerged.

Existing infrastructure functioning in the 10 x 40 kms. area at the dam site next to site of submergence.

		Dhadgaon	Akkalkuwa
1.	Primary Health Unit	--	2 Kanjala Wadphali
2.	Sub-centres	4 Kuktar, Chikhali Bhabri	3 Kamjala, Mokas Wadphali

Existing and proposed infrastructure at Rehabilitation Sites

The population from the villages which are being submerged is being rehabilitated in Taloda Taluka at the following 4 sites i.e., Rojwe, Dekati, Amlu and Valheri (Narmada Nagar). The total population which is being rehabilitated is about 15,000 to 16,000. Initially, the population has been rehabilitated at the site Valheri where new Primary Health Centres have been created and started functioning. The other sites of rehabilitation are close to Health Centre already functioning at Somawal. It has been decided that Primary Health Centre Valheri which is newly sanctioned will be looking after the implementation of Health programmes at all the rehabilitation sites.

In addition, to Valheri a newly created Primary Health Centre separate dispensaries at Rojwe, Dekati and Amlu will be established. Staff for every dispensary would be a Medical Officer, Pharmacist, ANM and one CI.V. These Dispensaries will be giving outreach services by house to house visit through ANM and also run the OPD in the Dispensaries. Similarly, Primary Health

Centre, Valheri will run the OPD at the Headquarters and AMN will give outreach services for the rehabilitated population.

To have sufficient referral services, the fullfledge Community Health Centre at Dhadgaon is functioning where 30 indoor beds, X-ray Machines, diet facilities, Ambulance and Laboratory services are available.

Additional Services proposed in the Water Poundage Area

In view of expected problems like Malaria, Water Borne diseases in the vicinity of pondage areas following services are proposed to be established.

Sl.No.	Type of Service	Nos.	Total Cost
1.	Floating Dispensary	1	Rs.19.50 lacs
2.	Laboratory Technicians	16	Rs. 7.20 lacs
3.	Mobile Public Health Lab.	1	Rs.20.00 lacs
4.	Anti Malarial Activities	--	Rs. 2.00 lacs

(a) Establishment of Floating Dispensary

There are 28 villages along with 42 padas with 6,800 population on the bank of water pondage. It would be difficult to give medical services to these population, through Primary Health Centres, Primary Health Units, Sub-centres, hence, it is proposed to establish one floating dispensary with following staff:

- | | | |
|----|-----------------|---|
| 1. | Medical Officer | 1 |
| 2. | Pharmacist | 1 |
| 3. | A.N.M. | 1 |
| 4. | Class IV | 1 |

Functioning of the dispensary would be with the help of existing launch which has been already provided by the State Govt. The team will daily move from Kevadia Camp and will cover all the villages except on holidays. They will provide preventive as well as curative services. However, later on new launch would have to be procured.

(b) Creation of posts of Lab. Technicians

As there would be a pondage effect of dam water in the belt 10 x 40 kms. it will increase the density of Mosquito population and thereby increase in malaria cases. With this view, for examining blood smears collected from every fever case 16 posts of Laboratory Technicians are proposed at 16 Primary Health Centres so that the examination of slides will be quicker and subsequently it will help in starting radical treatment of positive malaria cases quickly.

(c) Mobile Public Health Laboratory

One Mobile Public Health Laboratory along with post of one Chemical Assistant, one Bacteriological Assistant, a Class-IV and a Driver has been proposed. Due to high chances of water contamination, it is necessary to collect and examine the water samples from drinking water sources to take corrective measures. Necessary reagents and material required for laboratory is also proposed along with a vehicle and driver.

(d) Anti-malarial Activities

In addition to the above mentioned health infrastructures and activities to be carried out, it is proposed to provide insecticides for spraying to the tune of Rs.2.00 lacs per year. As mosquitos are partially resistant to DDT it is proposed to procure Deltamethrin for spraying.

Study of Disease Pattern in Submergence Area

Public Participation

- ⇒ Posters, Pamphlets, Leaflets distributed.
- ⇒ Slogans are written on Walls
- ⇒ Bhajan Mandali organized in local language
- ⇒ Musical orchestra organized in local language.
- ⇒ Folk dances with jokes organized.

Group meetings organized.

ANNEX-XXXVII-(10)



केवल सरकारी प्रयोग के लिए
For Official Use Only

सरदार सरोवर परियोजना के पुरातत्वीय एवं मानवशास्त्रीय
सम्बन्धित प्रगति के पुनरीक्षण

**Review Of the Progress on Archaeological and Anthropological
Aspects in Relation to Sardar Sarovar and Indira Sagar Projects**

तीसरी बैठक का कार्यवृत्त
Minutes for the 3rd meeting

27 जुलाई, 2001 को न.घा.वि.प्रा. के समिति कक्ष,
नर्मदा भवन, तुलसी नगर, भोपाल में हुई ।

Held at Committee Room of NVDA, Narmada Bhawan,
Tulsi Nagar, Bhopal on 27th July, 2001

नर्मदा नियंत्रण प्राधिकरण
NARMADA CONTROL AUTHORITY

इन्दौर

अक्टूबर, 2001

Indore
October, 2001



नर्मदा नियंत्रण प्राधिकरण

NARMADA CONTROL AUTHORITY

क्रमांक- पर्या-4(11)/2001/ 4215 - 28

दिनांक: 22/10-2001

प्रति,

माननीय सदस्य/ आमंत्रितगण
(संलग्न सूची के अनुसार)।

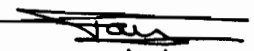
विषय: सरदार सरोवर परियोजना के पुरातत्वीय एवं मानवशास्त्रीय सम्बन्धित प्रगति के पुनरीक्षण के कार्यवृत्त के सम्बन्ध में ।

महोदय,

इस पत्र के साथ सरदार सरोवर परियोजना के पुरातत्वीय एवं मानवशास्त्रीय सम्बन्धित प्रगति के पुनरीक्षण के सम्बन्ध में दिनांक 27-7-2001 को सदस्य (पर्यावरण एवं पुनर्वास), नर्मदा नियंत्रण प्राधिकरण, इन्दौर की अध्यक्षता में तीसरी बैठक जो नर्मदा भवन, तुलसी नगर, भोपाल में सम्पन्न हुई थी, के कार्यवृत्त की एक प्रति संलग्न कर भेजी जा रही है । यदि इस पर आपकी कोई टिप्पणी / राय है तो उसे कृपया इस पत्र की प्राप्ति के 15 दिनों के अन्दर इस कार्यालय को भेजने का कष्ट करें ।

कृपया इसकी प्राप्ति स्वीकार करें ।

संलग्नक- कार्यवृत्त


22/10/01
(डा० पवन कुमार)
विशेषज्ञ (पर्यावरण)

BG-113, Scheme No. 74-C, Vijay Nagar, Indore - 452 010 (M.P.)

113, बी.जी., स्कीम नं. 74-सी, विजय नगर, इन्दौर - 452 010 (म.प्र.)

Phone No. : Exe. Mem. - 557276, Mem. (C)-553344, Mem. (P) - 551144, Secretary- 554477
Dir (A & C) - 552172, DD (Admn) - 557888

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Fax : 91-731-55986

53

B

LIST OF INVITEES

NARMADA CONTROL AUTHORITY

1. Shri N.D. Tiwari, Member (E&R), Narmada Control Authority, BG-121, Scheme No.74-C, Vijay Nagar, Indore – 452010 - **Chairman**
2. Dr. Pawan Kumar, Specialist (Environment), Narmada Control Authority, BG-121, Scheme No.74-C, Vijay Nagar, Indore. - **Member Secretary**
3. Shri R.G. Pandey, Dy. Director (Env.), NCA, Indore.

NARMADA VALLEY DEVELOPMENT AUTHORITY

1. Shri Suresh Chandra, Member (E&F), Narmada Valley Development Authority, Narmada Bhawan, Tulsi Nagar, Bhopal.
2. Shri J.P. Vyas, Member (Rehab.), Narmada Valley Development Authority, Narmada Bhawan, Tulsi Nagar, Bhopal.
3. Dr. A.P. Singh, Advisor (Archaeology), Narmada Valley Development Authority, Narmada Bhawan, Tulsi Nagar, Bhopal.

STATE DEPARTMENT OF ARCHAEOLOGY & MUSEUM, M.P.

1. Shri Maan Dahima Commissioner, State Department of Archaeology & Museum, Banganga, Govt. of Madhya Pradesh, Bhopal.
2. Superintendent Archaeologist/Project Officer, State Department of Archaeology & Museum, Govt. of Madhya Pradesh, Banganga, Bhopal.
3. Shri P.C. Mathur, Archaeologist, State Deptt., of Archaeology & Museum, Rajwada, Indore.

ARCHAEOLOGICAL SURVEY OF INDIA

1. Mrs. Komal Anand, Director General, Archaeological Survey of India, Janpath, New Delhi .110011.
2. Shri Hari Manjhi, Director (EE), Archaeological Survey of India, 11 Janpath, New Delhi - 110011.
3. Dr. P.K. Mishra, Superintendent Archaeologist, Archaeological Survey of India, Bhopal Circle, Guru Tej Bahadur Complex, T.T. Nagar, Bhopal 462003.

NARMADA HYDROPOWER DEVELOPMENT CORPORATION

1. V.B. Bhatt, Dy. Manager (Env.), NHDC, Bhopal.
2. M. Krishnamoorthy, C.E. (C), NHDC, Bhopal.

**MINUTES FOR THE STATE LEVEL 3RD MEETING ON ARCHAEOLOGICAL
AND ANTHROPOLOGICAL ASPECTS OF SARDAR SAROVAR &
INDIRA SAGAR PROJECTS IN MADHYA PRADESH**

I N D E X

Item No.	Contents	Page No.
	Introduction	1
III-(1)	CONFIRMATION OF THE MINUTES OF THE 2ND MEETING HELD ON 23RD JUNE, 1999	2
III-(2)	THE PLAN FOR RELOCATION / PROTECTION OF ARCHAEOLOGICAL MONUMENTS AND EXCAVATION OF MOUNDS GETTING AFFECTED AT 100 M. EL - STATE DEPARTMENT OF ARCHAEOLOGY AND MUSEUM, GOMP / NVDA.	3
III -(3)	PROGRESS OF WORKS ON SARDAR SAROVAR AND INDIRA SAGAR PROJECT BY THE STATE DEPARTMENT OF ARCHAEOLOGY AND MUSEUM, GOVT. OF MADHYA PRADESH / NVDA.	3
III -(4)	CURRENT STATUS OF IMPLEMENTATION FOR ACTION PLAN OF 1993/1997 AS AVAILABLE IN NCA OF SSP AND ISP IS PRESENTED BELOW.	4
III-(5)	RE-VISITING THE SUBMERGENCE ZONE OF INDIRA SAGAR PROJECT BY THE STATE DEPARTMENT OF ARCHAEOLOGY AND MUSEUM, GOVT., OF MADHYA PRADESH / NVDA FOR VERIFICATION OF THE DATA MADE AVAILABLE BY THE ASI OF ARCHAEOLOGICAL SIGNIFICANCE.	4
III- (6)	THE FOLLOWING MONUMENTS WERE TO BE HANDED OVER BY THE STATE DEPARTMENT OF ARCHAEOLOGY AND MUSEUM TO ASI. WORK ENTRUSTED TO ARCHAEOLOGICAL SURVEY OF INDIA (ASI) BY THE NVDA / STATE DEPTT., OF ARCHAEOLOGY AND MUSEUM, GOMP	4
III- (7)	PROTECTION OF JOGA FORT WHEN NORTH BASTION IS TO BE IMPACTED BY THE SCOUR ACTION OF THE ISP WATERS	5

ANNEXURES

SL. NO.	DESCRIPTION	PAGE NO.
III-(1)	List of participants	6
III-(2)	Levels & status of progress presented during the meeting	7-10
III-(3)	Correspondence letters of NVDA & ASI.	11-18

**MINUTES FOR THE STATE LEVEL 3RD MEETING ON ARCHAEOLOGICAL
AND ANTHROPOLOGICAL ASPECTS OF SARDAR SAROVAR &
INDIRA SAGAR PROJECTS IN MADHYA PRADESH**

The 3rd meeting to review the progress on Archaeological and Anthropological aspects in relation to Sardar Sarovar and Indira Sagar Projects was held on 27.07.2001 under the chairmanship of Member (E&R), NCA in the committee room of NVDA, Narmada Bhawan, Tulsi Nagar, Bhopal.

The list of participants is at **Annex – III (1) (page No. 6)**

The Chairman welcomed the participants and after brief introduction urged the committee to discuss the issues listed in agenda.

Item No. III-(1) : **Confirmation of the minutes of the 2nd meeting held on 23.6.1999.**

The 2nd meeting of the Committee on Archaeological and Anthropological aspects in relation to Sardar Sarovar & Indira Sagar Project was held on 23.6.1999 at Narmada Bhawan, Tulsi Nagar, Bhopal.

Minutes were confirmed as circulated vide this office letter No. Env.4(11)/2000/1166-67 dated 6.7.2000 along with the comments placed at Annex -I and Annex – II of the agenda.

**ITEM-III (2) : THE PLAN FOR RE-LOCATION / PROTECTION OF
ARCHAEOLOGICAL MONUMENTS AND EXCAVATION OF
MOUNDS GETTING AFFECTED AT 100M. EL. STATE
DEPARTMENT OF ARCHAEOLOGY AND MUSEUM
(GOMP) / NVDA –**

Status of the protection / relocation / excavation works under progress in Madhya Pradesh in relation to proposed raising of dam height to 100 m EL was discussed and is placed at **Annex-III (2) (page No.7-10).**

Shri Maan Dahima, Commissioner, State Department of Archaeology & Museum, Govt. of M.P. informed that due to submergence and its backwater, there would not be any effect on the approach to the monuments.

**ITEM-III (3) : PROGRESS OF WORKS ON SARDAR SAROVAR AND INDIRA
SAGAR PROJECT BY THE STATE DEPARTMENT OF
ARCHAEOLOGY AND MUSEUM, GOVT. OF MADHYA
PRADESH / NVDA**

All the levels of monuments tallied with the records of State Deptt. of Archaeology & Museum and NVDA and except for some monuments other levels were agreed. The level finally accepted are placed in Col.(7) of Annex-III-(2) page (7-10). This was also decided that in future, representatives from NVDA, NCA and State Department of Archaeology and Museum may jointly visit the site to sort out the differences if any.

ITEM-III (4) : CURRENT STATUS OF IMPLEMENTATION FOR ACTION PLAN OF 1993/1997 AS AVAILABLE IN NCA OF SSP AND ISP AS BROUGHT OUT DURING THE MEETING AS PRESENTED BELOW.

The current status of all these monuments was presented & summarized in Annex-III(2) page (7-10) in last column.

ITEM-III (5): RE-VISITING THE SUBMERGENCE ZONE OF INDIRA SAGAR PROJECT BY THE STATE DEPARTMENT OF ARCHAEOLOGY AND MUSEUM, GOVT., OF MADHYA PRADESH / NVDA FOR VERIFICATION OF THE DATA MADE AVAILABLE BY THE ASI OF ARCHAEOLOGICAL SIGNIFICANCE.

According to the letter written by Romila Thapar to Dr. Shekhar Singh, the submergence area of Indira Sagar Project was revisited by the State Department of Archaeology & Museum. In this context 78 villages were revisited. It was informed that the survey was making progress .

AGENDA ITEM-III (6) : THE FOLLOWING MONUMENTS WERE TO BE HANDED OVER BY THE STATE DEPARTMENT OF ARCHAEOLOGY AND MUSEUM TO ASI. WORK ENTRUSTED TO ARCHAEOLOGICAL SURVEY OF INDIA (ASI) BY THE NVDA / STATE DEPTT., OF ARCHAEOLOGY AND MUSEUM, GOMP

This matter was discussed. Superintending Archaeologist, ASI, Bhopal informed that the work could be taken by Archaeological Survey of India only after taking permission from Director General, ASI, New Delhi. NVDA representative however pointed out that the permission was already given by the ASI as reflected in **Annex- III(3) page (11-18)**. It was agreed that ASI, Bhopal would get in touch with their headquarter and would convey their view point shortly.

**ITEM-III (7) : PROTECTION OF JOGA FORT WHEN NORTH BASTION IS TO
BE IMPACTED BY THE SCOUR ACTION OF THE ISP
WATERS**

The issue was discussed in detail. The ASI, Bhopal was of the view that they do not have adequate resources to carry out the works and that since the retaining wall is a new structure and as such is not covered up by the archaeological act & therefore construction can be undertaken by the NVDA.

Member (Rehabilitation), NVDA informed that the estimate prepared by the ASI, Bhopal for construction of the retaining wall is required to be approved by the appropriate authority of the ASI either Director General or Secretary of the Department of Culture. He further expressed that since the Joga Fort is a Centrally protected monument, and the estimate of Rs.1.67 crores is yet to be sanctioned, therefore NVDA cannot take-up the work. After some discussion Shri S.B. Ota agreed to have further discussion with Director General, ASI, New Delhi & convey back the final view point of the ASI.

Member (Rehabilitation), NVDA reiterated that the construction work should be undertaken by the ASI. However resources like funds & technical support would be provided by the NVDA. He requested Member (E&R), NCA to hold discussion with Director General & to sort out the issues at the earliest.

ANNEX- III - (1)

LIST OF PARTICIPANTS OF THE MEETING ON ARCHAEOLOGICAL ASPECTS HELD ON 27th JULY, 2001 AT NARMADA BHAWAN, TULSI NAGAR, BHOPAL.

Narmada Control Authority

1. Shri N.D. Tiwari, Member (E&R), NCA, Indore - **Chairman**
2. Dr. Pawan Kumar, Specialist (Environment), NCA, Indore.
3. Shri R.G. Pandey, Deputy Director (Env.), NCA, Indore
4. Kuldeep Malik, Dy. Director (Env.), NCA, Indore

Archaeological Survey of India

1. Shri S.B. Ota, Superending Archaeologist, ASI, Bhopal.
2. Dr. Narain Aiyar, Deputy Superintending Archaeologist, ASI, Bhopal.

Narmada Valley Development Authority

1. Shri J.P. Vyas, Member (Reh.), NVDA, Bhopal.
2. Shri Suresh Chandra, Member (E&F), NVDA, Bhopal.
3. Dr. A.P. Singh, Advisor (Arch.), NVDA, Bhopal.
4. Shri R.K. Behre, SMS (H&S), NVDA, Bhopal.
5. Shri Anil K. Sharma, Jt. Director (Reh.), NVDA.
6. Shri Ajay Righi, SDO, NVDA

State Dept. of Archaeology & Museum

1. Shri Maan Dahima, Commissioner, Archaeology & Museum, Bhopal.
2. Shri Shalesh V. Kohad, Dy. Director, Archaeology & Museum, Bhopal.
3. Dr. Prakashendra Mathur, Archaeologist, Archaeology & Museum, Bhopal.
4. Shri V.P. Nagaich, Project Officer, Archaeology & Museum, Indore

N.H.D.C., Bhopal

1. Shri M. Krishnamorthy, Chief Engineer, NHDC, Bhopal.
2. Shri V.B. Bhatt, Dy. Manager (Env.), NHDC, Bhopal.

G.M.C., Bhopal

1. Dr. Sunil Nandeshwar, Asstt. Professor, GMC, Bhopal.
2. Dr. S.C. Tiwari, Prof. & Head of Dept. PSM, GMC, Bhopal.
3. Dr. A.N. Mittal, Joint Director

LEVELS AND STATUS OF PROGRESS PRESENTED DURING THE MEETING

ANNEX - III - (2)

Sl. No	Particulars of monuments / mounds as per action plan of 1997 prepared by State Deptt. of Archaeology & Museum, Govt. of M.P.						Agency to execute work	Impact at 100 mt. Impoundment	Status
	Chainage	Name of Monuments	Village	Tehsil	District	RL in m			
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
Temple by ASI									
1	84425	Shiv Mandir	Roligaon	Alirajpur	Jhabua	130.64	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
2	117037	Koteshwar Mandir	Kothara	Dhramपुरi	Dhar	137.61	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
3	125876	6 tombs	Bheelkheda	Barwani	Barwani	134.25	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
4	128181	Neel Kantheshwar Mandir	Chikalda	Barwani	Barwani	134.86	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
5	128181	Pashumateshwar Mandir	Chikalda	Barwani	Barwani	134.86	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
6	131667	Shiv Mandir	Chhoti Kasrawad	Barwani	Barwani	138.98	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
7	171594	Jalaleshwar Mandir	Khujawa	Dharamपुरi	Dhar	149.47	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
8	173427	Vilvamriteshwar Mandir	Dharamपुरi	Dharamपुरi	Dhar	148.56	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
9	173427	Nageshwar Mandir	Dharamपुरi	Dharamपुरi	Dhar	154.27	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
10	194757	Kanjleshwar	Semalda	Manawar	Dhar	136.10	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
Mounds by ASI :									
11	114903	Mound	Jangarwa	Khargone	Khargone	131.820	Archaeological Survey of India	No	Awaited from ASI / NVDA.
12	122523	Mound	Khapar-kheda	Manawar	Dhar	Not relevant	Archaeological Survey of India	-	Completed earlier to 1997 as per 199 plan.
13	129228	Mound	Kheda	Manawar	Dhar	136.620	Archaeological Survey of India	No	Progress Awaited from ASI / NVDA.
14	138982	Mound	Kavathi	Manawar	Dhar	132.670	Archaeological Survey of India	No	Progress Awaited from ASI / NVDA.
15	139286	Mound	Utawad	Barwani	Barwani	Not relevant	Archaeological Survey of India	-	Progress Completed earlier to 1997. as per 1993 plan.
16	143553	Mound	Chota Barda	Barwani	Barwani	136.600	Archaeological Survey of India	No	Progress Awaited from ASI / NVDA.
17	152697	Mound	Kirmohi	Thikri	Barwani	Not relevant	Archaeological Survey of India	Not relevant	Experimental excavation was done in 1995. Now these mounds vanished due to soil erosion by agricultural practices.

Page 7-18
110m (2000)

127m

133m

135m

135.5m

135.5m

136.0m

145.5m W/O.

145.2

145.2

154. W/O

62

①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
18	160012	Mound	Navadakhedi	Thikri	Barwani	155.040	Archaeological Survey of India	No	Progress Awaited from ASI / NVDA.
19	167327	Mound	Brahman-gaon	Thikri	Barwani	Not relevant	Archaeological Survey of India	Not relevant	Experimental excavation was done in 1995. Now these mounds vanished due to soil erosion by agricultural practices.
20	199939	Mound	Navadatoli	Kasrawad	Khargone	149.340	Archaeological Survey of India	No	Awaited from ASI / NVDA.
Temples by State Deptt. of Archaeology & Museum									
21	111551	Narmadesh-war Mandir	Dehar	Kukshi	Dhar	129.95 (NVDA)	State Deptt. of Archaeology & Museum, MP	No	Scrapping, numbering, drawing, photography is completed. Land allotment is awaited from Collector, Dhar
22	132581	Shiv Mandir	Bodhwada	Kukshi	Dhar	134.73 (NVDA)	State Deptt. of Archaeology & Museum, M.P.	No	Scrapping, numbering, drawing, photography is completed. Land allotment is awaited from Collector, Dhar
23	143553	Shiv Mandir	Bada Barda	Manavar	Dhar	130.970	State Deptt. of Archaeology & Museum, GOMP.	No	Relocated completely two kms. away from the original place in the year 1997-98.
24	171594	Shomeshwar Mandir	Khujawa	Dharampur i	Dhar	130.795	State Deptt. of Archaeology & Museum, M.P.	No	Progress is nil, due to agitation.
25	171594	Big statues	Khujawa	Dharampur i	Dhar	149.415	State Deptt. of Archaeology & Museum, M.P.	No	Copying in fibre glass completed and the same is placed at Kasrawad Museum. Further relocation work is stopped due to public resentment.
26	171594	Bhawani Mata Mandir	Khujawa	Dharampur i	Dhar	151.260	State Deptt. of Archaeology & Museum, M.P.	No	Scrapping of lime plaster done for numbering and detailed drawing. Further work of relocation stopped due to public resentment.
27	171594	Shiv (S.No.1) Mandir	Khujawa	Dharampur i	Dhar	136.675	State Deptt. of Archaeology & Museum, M.P.	No	Drawing numbering and photography completed. Work of relocation started but due to public resentment, it was stopped by the collector.
28	171594	Shiv (S.No.2) Mandir	Khujawa	Dharampur i	Dhar	136.675	State Deptt. of Archaeology & Museum, M.P.	No	Drawing numbering and photography completed. Work of relocation started but due to public resentment, it was stopped

①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
29	171594	Shiv Mandir (S.No.3)	Khujawa	Dharampur	Dhar	136.425	State Deptt. of Archaeology & Museum, M.P.	No	Drawing numbering and photography completed. Work of relocation started but due to public resentment, it was stopped
30	171594	Rock-cut caves	Khujawa	Dharampur	Dhar	130.005	State Deptt. of Archaeology & Museum, M.P.	No	Silt deposited inside the cave is totally cleaned. Numbering is done and further work is stopped due to public resentment.
31	180432	Rock-cut-sculptures	Pipaldagarhi	Dharampur	Dhar	130.440	State Deptt. of Archaeology & Museum, M.P.	No	Relocated completely in village Nimbola in the year 1998-99.
32	180432	Shiv Mandir (Mauni Baba Ashram)	Pipaldagarhi	Dharampur	Dhar	153.775	State Deptt. of Archaeology & Museum, M.P.	No	Relocated completely in village Nimbola. In the year 1998-99.
33	199939	Baneshwar Mandir (Shiv Mandir)	Navadatoli	Kasrawad	Khargone	141.755	State Deptt. of Archaeology & Museum, M.P.	No	Scrapping work is completed.
Mound by State Deptt. of Archaeology & Museum									
34	120999	Mound	Katnera	Kukshi	Dhar	140.860	State Deptt. of Arch. & Museum, GOMP	No	Completed in April, 2001. Material is stored in the office of Dy. Director, State Deptt. of Archaeology & Museum, Rajwada, Indore.
35	138982	Mound	Ekalwara	Manawar	Dhar	140.870	State Deptt. of Arch. & Museum, GOMP	No	Completed in April, 2001. Material will be displayed at Kasrawad Museum.
36	162755	Mound	Maru Chichali	Thikari	Barwani	150.635	State Deptt. of Arch. & Museum, GOMP	No	Completed by ASI Nagpur branch.
37	165193	Mound	Kalyanpura	Manawar	Dhar	145.030	State Deptt. of Arch. & Museum, GOMP	No	Completed in April, 2001, material is stored in the office of Archaeologists, State Deptt. of Archaeology & Museum, Banganga, Bhopal.
38	183480	Mound	Khalghat (Khalkhurd)	Dharampur	Dhar	150.315	State Deptt. of Arch. & Museum, GOMP	No	Excavated, records or with the office of the Archaeologists, State Deptt. of Archaeology & Museum, Rajwada, Indore.

INDIRA SAGAR PROJECT :

Sl. No.	Particulars of monuments / mounds as per action plan of 1997 prepared by State Deptt. of Archaeology & Museum, Govt. of M.P.						Status
	Chainage	Name of temple / mounds	Village	Tehsil	District	RL in m	
		Shiv Mandir,	Dharikotia	Khandwa	Khandwa	229.500	Relocated completely at village Saralya, Distt. Khandwa. Pran Pratishtha ceremony on 16.7.2001.
		Shiv Mandir,	Punghat	Harsud	Khandwa	240.315	Land allotment awaited from Collector, Khandwa.
		Shiv Mandir,	Badkeshwar	Harsud	Khandwa	263.805	Scrapping, numbering, drawing, photography completed. Land allotment awaited from Collector, Khandwa
		Shiv Mandir (Durga Mandir)	Chandel	Khandwa	Khandwa	254.917	Land allotment awaited from Collector, Khandwa.
		Chhatri	Ghisor	Harsud	Khandwa	239.300	Land allotment awaited from Collector, Khandwa.
		Shiv Mandir (2),	Khudiamal	Harsud	Khandwa	266.215	Land allotment awaited from Collector, Khandwa.
		Ridheshwar Mandir,	Handia	Harda	Harda	273.380	Estimate ready, retaining wall is to be made and not to be relocated.
		Abdul Hasan's Tomb	Handia	Harda	Harda	269.680	Only model is to be prepared and not to be relocated.
		Rock-cut statues	Deyat	Khatagaon	Dewas	267.830	Estimates are ready. Land allotment from Collector, Dewas.
		St. Singhaji's Samadhi	Singaji	Khandwa	Khandwa	247.915	Progress is nil
		Mound	Bijalpur Khurd	Khandwa	Khandwa		Progress is nil
		Mound	Chhalpakhla	Khandwa	Khandwa		Progress is nil
		Mound	Gajanpur	Bagli	Dewas		Progress is nil
		Mound	Navalpur	Khandwa	Khandwa		Progress is nil
		Mound	Gannor	Harsud	Khandwa		Progress is nil
							Progress is nil

III-(6)

ANNEX - III - (3)
Page 11-18

विषय : नर्मदा परियोजनान्तर्गत स्मारकों का पुनर्स्थापन एवं पुरातात्वीय टीलों का उत्खनन ।

तन्दर्भ : इस कार्यो का पत्र क्र० 75/टी05क्यू0सेत/ए.एत.आई./97/42, दिनांक 22/03/97 ।

(D.M.) 2/4/97

नर्मदा परियोजना के अंतर्गत कुछ में आने वाले स्मारकों के पुनर्स्थापन एवं पुरातात्वीय टीलों के उत्खनन कार्य निष्पादित कराने संबंधी अपने अर्थात्तकीय पत्र क्र० 9-6/93-ई.ई. दि० 12.2.97 का अवतीर्ण करने की कृपा करें, जिसके द्वारा अपनी उक्त कार्य हेतु उम्मीदपूर्ति दी गई है जिसके तारतम्य में आयुक्त पुरातत्त्व, उम्मेदवागार एवं संग्रहालय मध्यप्रदेश मीपात द्वारा अपने पत्र क्र० 3459/न०/185/97 दि० 11.7.97 द्वारा तरदार तरीयर परियोजना के 10 अंतरिक्ष स्मारकों के पुनर्स्थापन के लिये तथा 6 टीले उत्खनन के लिये उम्मेदवाग पुरातत्त्वविद्, भारतीय पुरातत्त्व सर्वेक्षण, मीपात मण्डल, मीपात को तौपा गया है [सुची संलग्न है] ।

अतः अनुरोध है कि कुछ क्षेत्र के इन स्मारकों के पुनर्स्थापन एवं टीलों की उत्खनन संबंधी कार्यवाही शीघ्र निष्पादित कराना सुनिश्चित करने का कष्ट करें । इन कार्यो पर होने वाले आदायक व्यय की पूर्ति हेतु प्राप्तिकरण द्वारा पढा समय बचट उपलब्ध कराना चाहेगा ।

संलग्न : उपरीक्षानुसार.

महोदय,

(रवीन्द्र शर्मा)
2/4/97

प्रति,

श्री अजय शर्मा,
महानिदेशक,
भारतीय पुरातत्त्व सर्वेक्षण,
बनस्पति, नई दिल्ली - 110 011.

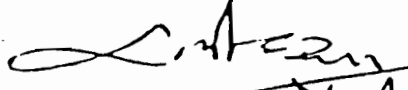
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पुष्ठांकन नं० :

मोपान, दि० ..०१/९८.

प्रतिनिधि :

अधिकांश पुरातत्त्वविद्, भारतीय पुरातत्त्व सर्वेक्षण, मोपान मण्डल, मोपान की आयुक्त, पुरातत्त्व अभिलेखागार एवं संग्रहालय के पत्र नं० ३५५९/न./१३५/९७, दिनांक ११.७.९७ के तारतम्य में आवश्यक कार्यवाही हेतु ।


 २१/११
 (रवीन्द्र शर्मा)

o/c

67

भारतीय पुरातत्त्व तर्पण्य सिमाना को पुनरुद्घापन एवं उद्घनन के लिए
दिए जाने वाले स्मारकों एवं टीकों की सूची.

स्मारक :

1. कर्कशगढ़ मंदिर, तेभन्दा, पार.
2. नागेश्वर मंदिर, चरमपुरी, पार.
3. कर्कशगढ़ मंदिर, कुशावा, पार.
4. श्रीकृष्णेश्वर मंदिर, पिछित्दा, पार.
5. परमेश्वर मंदिर, पिछित्दा, पार.
6. चित्पामेश्वर मंदिर, चरमपुरी, पार.
7. कोटेश्वर मंदिर, कोठना, पार.
8. शिव मंदिर, छोटी कतरावद, जरगोन.
9. शिव मंदिर, रानी गाँव, झाबुड़ा.
10. श्रीमखड़ा स्थित ४: ४ स्तूप, जरगोन.

टीके :

1. खेड़ा, जिला पार.
2. कपठी, जिला पार.
3. गोलदखेड़ी, जिला जरगोन.
4. छोटा बड़दा, जिला जरगोन.
5. नापदा टोली, जिला जरगोन.
6. जागरवा, जिला जरगोन.

-00-0-

साधारण आयुक्त, पुरातत्त्व अभिलेखनार एवं संग्रहालय
म. प्र. भोपाल

सं. प्र.
प्रति.

/न. प्र. /185/97

भोपाल, दिनांक

अधीन पुरातत्त्वविद,
भारतीय पुरातत्त्व सर्वेक्षण विभाग
भोपाल भण्डन, जी. टी. सी. बाम्बे रोड
टी. टी. नगर, भोपाल.

विषय:- नर्मदा परियोजनांतर्गत तमारकों/मंदिरों का पुनर्स्थापन तथा
पुरातत्त्व टीनों का उत्खनन ।
संदर्भ:- नर्मदा भाटी विज्ञान प्रालिखन का पत्र क्र. 75/टी. डबल्यू. तैल/ए.
स्त. आई. /97/41 दिनांक 22. 3. 97

उपर्युक्त विषय एवं संदर्भ में नर्मदा परियोजनांतर्गत तमारकों तरोवर
द्वारा प्रभावित होने वाले इतिहास पुरातत्त्व तमारकों के पुनर्स्थापन तथा
पुरातत्त्व टीनों के उत्खनन का कार्य भारतीय पुरातत्त्व सर्वेक्षण विभाग को
सौंपा जाता है । इस संबंध में भारतीय पुरातत्त्व सर्वेक्षण विभाग को सौंपे जाने
वाले तमारकों एवं पुरातत्त्व टीनों की जानकारी साप्ताहिक पत्र क्रमांक 88
2413/न. प्र. /185/97 दिनांक 16. 5. 97 द्वारा नर्मदा भाटी विज्ञान प्रालिखन
को उपलब्ध कराया गया है, जो कि समाप्तः आने लगाने में नर्मदा विज्ञान
प्रालिखन के माध्यम से प्राप्त हो गई है । फिर भी तमारकों भाटीकारी
के पुनर्स्थापित एवं उत्खनन विदे जाने वाले तमारकों एवं टीनों की जानकारी
का सूचना वितरण के भेजी जा रही है ।

संदर्भ:- यथोक्त

अधीन
पुरातत्त्व अभिलेखनार एवं संग्रहालय
म. प्र. भोपाल

क्र. 3460 /न. प्र. /185/97

भोपाल, दिनांक 11-7-97

प्रतिनिधि:-

1. तमारकों पुनर्स्थापन, नर्मदा भाटी विज्ञान प्रालिखन, नर्मदा भवन
भोपाल की ओर सूचना दी ।

अधीन
पुरातत्त्व अभिलेखनार एवं संग्रहालय
म. प्र. भोपाल



प्रलकीर्तिमपावण

भारत सरकार GOVERNMENT OF INDIA

अत्यावश्यक

फैक्स : 0755 - 558250

टेलीफोन : 0705 / 325 ए.एस.आई.सी

फोन : 558250, 558270

आओक कुमार सिन्हा

अधीक्षण पुरातत्वविद

भारतीय पुरातत्व सर्वेक्षण

जी.टी.सी. कॉम्प्लेक्स, टी.टी. नगर,

भोपाल - 462 003

Superintending Archaeologist

Archaeological Survey of India

G.T.B. Complex, T.T. Nagar

Bhopal - 462 003

No. 112/16/76-3-6192

Date 26/03/97

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8-4-97

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तदस्य प्रयत्न एवं वन,
नर्मदा घाटी विकास प्राधिकरण,
नर्मदा भवन, भोपाल म.प्र.

विषय:- नर्मदा घाटी परियोजना से छूब में आनेवाले पुरातत्वीय महत्व के स्मारकों/मंदिरों की पुर्नस्थापना एवं टीलों के उत्खनन बाबत ।

महोदय,

महोदय, भारत की पुरातत्व सर्वेक्षण, नई दिल्ली को प्राप्त आपसे उपरोक्त विषयार्थ पत्र क्रमांक 22/78/11/टी.डि.सर्वेक्षण/म.प्र.वन/307 दिनांक 31/10/76 के उत्तर में निदेशक, उत्खनन एवं अन्वेषण, भारतीय पुरातत्व सर्वेक्षण, नई दिल्ली ने अपने अर्थशास्त्र पत्र क्रमांक 9-6/73-ई.ई. दिनांक 12/02/1977 के द्वारा नर्मदा घाटी परियोजना से छूब में आने वाले राजा जंजीर/जंजीर/जंजीर स्मारकों की पुर्नस्थापना, उत्खनन एवं अन्वेषण का कार्य भारतीय पुरातत्व सर्वेक्षण द्वारा करने को महानदेशक, भारतीय पुरातत्व सर्वेक्षण को तत्काल इत शक्ति के साथ प्रेषित की है कि उक्त कार्य हेतु आवश्यक धनराशि नर्मदा घाटी विकास प्राधिकरण द्वारा उपलब्ध कराई जायगी ।

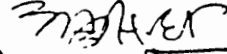
अतः आपसे अनुरोध है कि नर्मदा घाटी परियोजना के कारण छूब में आने वाले स्मारकों/मंदिरों तथा टीलों की छुपी प्रोपर्टी करने का कष्ट करें ताकि संबंधित स्मारक मंदिरों की पुर्नस्थापना के प्रावधान एवं टीलों के उत्खनन के ऑकलन तैयार कर आपकी ओर स्वीकृति एवं आवश्यक धनराशि के आवंटन हेतु प्रेषित किये जा सकें ।

निरन्तर----- 2/-----

- 2 -

कृपया उपरोक्त जानकारी शीघ्र उपलब्ध कराने का कष्ट करें ताकि आवश्यक प्राप्ति एवं अंकन शीघ्र तैयार कर स्वीकृत हेतु आपकी ओर प्रेषित किया जा सके ।

भवदीय



१ अशोक कुमार तिन्हा १

अपीक्ष्य पुरातत्त्ववेत्त

24/11/20

542

भारत सरकार
GOVERNMENT OF INDIA

सि.मि.पा.वृ.गु

अर्थ शा.पत्र क्रं. 112/6/96-संरक्षण-5005

प्रिय श्री तितारजी,

कोश्वर पुरातत्व एवं संग्रहालय मध्यप्रदेश, भोपाल को इन्दिरा सरोवर एवं सरदार सरोवर योजना की डूब रहे आने वाले स्मारकों की पुर्नस्थापना एवं टीलों & Mounds की खुदाई का कार्य भारतीय पुरातत्व सर्वेक्षण को हस्तान्तरित करने के लिए लिखे गये पत्र क्रमांक-75/अ.उ.क.क.1/भा.पु.सर्वे/97 दिनांक 22/03/1997 के तन्दर्भ में आपकी कार्दिक धन्यवाद देना चाहूंगा। गौतमदेशक, भारतीय पुरातत्व सर्वेक्षण, नई दिल्ली द्वारा उक्त कार्य को भारतीय पुरातत्व सर्वेक्षण द्वारा करने की दी गयी सहमति आपके ही प्रयासों का फल है।

भारतीय पुरातत्व सर्वेक्षण, भोपाल कक्ष के प्राप्त आपके लक्ष्य एवं सद्भावना के ताल में आपका कर्म से आभारी हूँ और आशा करता हूँ कि हमें भविष्य में भी आपका मार्गदर्शन और सहयोग मिलता रहेगा।

सादर,

सि.मि.पा.वृ.गु
11-4-97

प्रति,

श्री सच.सं.निवासी,
निदेशक & पुर्नवास/अ.उ.क.क.,
नर्मदा घाटी विकास प्राधिकरण,
नर्मदा भवन, तुलसी नगर,
भोपाल

फैक्स : 0755 - 558250
टेलीफोन : 0705 / 325 ए.एस.आई.बी
फोन : 558250, 558270

अशोक कुमार तिनहा
अधीक्षण पुरातत्वविद
भारतीय पुरातत्व सर्वेक्षण
जी.टी.बी. कॉम्प्लेक्स, टी.टी. नगर,
भोपाल - 462 003

Superintending Archaeologist
Archaeological Survey of India
G.T.B. Complex, T.T. Nagar
Bhopal - 462 003

No.

Date 27/03/97

आपका
अशोक कुमार तिनहा
& अशोक कुमार तिनहा

**नर्मदा घाटी विकास प्राधिकरण,
नर्मदा मयन, तुलसी नगर, भोपाल.**

पत्र क्रमांक: 75/पुरातत्व/न्याधिप्रा/97/ 1900

भोपाल, दिनांक 30/10/98.

प्रति,

अधीक्षक पुरातत्वधिस,
भारतीय पुरातत्व सर्वेक्षण,
जी.टी.बी. कॉम्प्लेक्स,
टी.टी. नगर, भोपाल.

विषय:- तरदार तरोवर/नर्मदा परियोजनान्तर्गत, भारतीय पुरातत्व सर्वेक्षण को सौंपे गये स्मारकों के पुनर्स्थापन एवं टीलों के उत्खनन के प्राधिकरण देने संबंधित.

संदर्भ :- प्राधिकरण का अर्थ शा.प.पूठानं क्र. : 104/न्याधिप्रा/स.पु. दिनांक 9.1.98

उपरोक्त विषयान्तर्गत कृपया संदर्भित अर्थ शासकीय पत्र का अध्ययन कीजिये। आपको तरदार तरोवर परियोजना के 10 स्मारकों के पुनर्स्थापन के लिए तथा 6 टीलों के उत्खनन का कार्य सौंपा गया है। सुधी संलग्न है। इस अर्थ के स्मारकों के पुनर्स्थापन की कार्यवाही शीघ्र ही जाना है।

आपके द्वारा स्मारकों के पुनर्स्थापन एवं टीलों के उत्खनन के प्राधिकरण प्राधिकरण को नहीं भेजे गये हैं और अतः आपके द्वारा कार्य संपादन हेतु कष्ट राशि की मांग भी नहीं की गई है। अतः स्मारकों के पुनर्स्थापन के प्राधिकरण प्राधिकरण को शीघ्र भेजें ताकि आवश्यक व्यव की पूर्ति हेतु प्राधिकरण द्वारा समय पर कष्ट उपलब्ध कराया जा सके।

कृपया प्राथमिकता के आधार पर उक्त जानकारी प्रेषित की जावे।

स्वहस्ताक्षर :- उपरोक्तानुसार

पूठानं क्र. : 75/पुरातत्व/न्याधिप्रा/97/ 1901

प्रतिलिपि:

महानिदेशक, भारतीय पुरातत्व सर्वेक्षण, जनमय नई दिल्ली-110011
की ओर प्राधिकरण के अर्थ शा.प.पूठानं क्र. : 103/न्याधिप्रा/स.पु./
दिनांक 9.1.98 के संदर्भ में आवश्यक कार्यवाही हेतु प्रेषित.

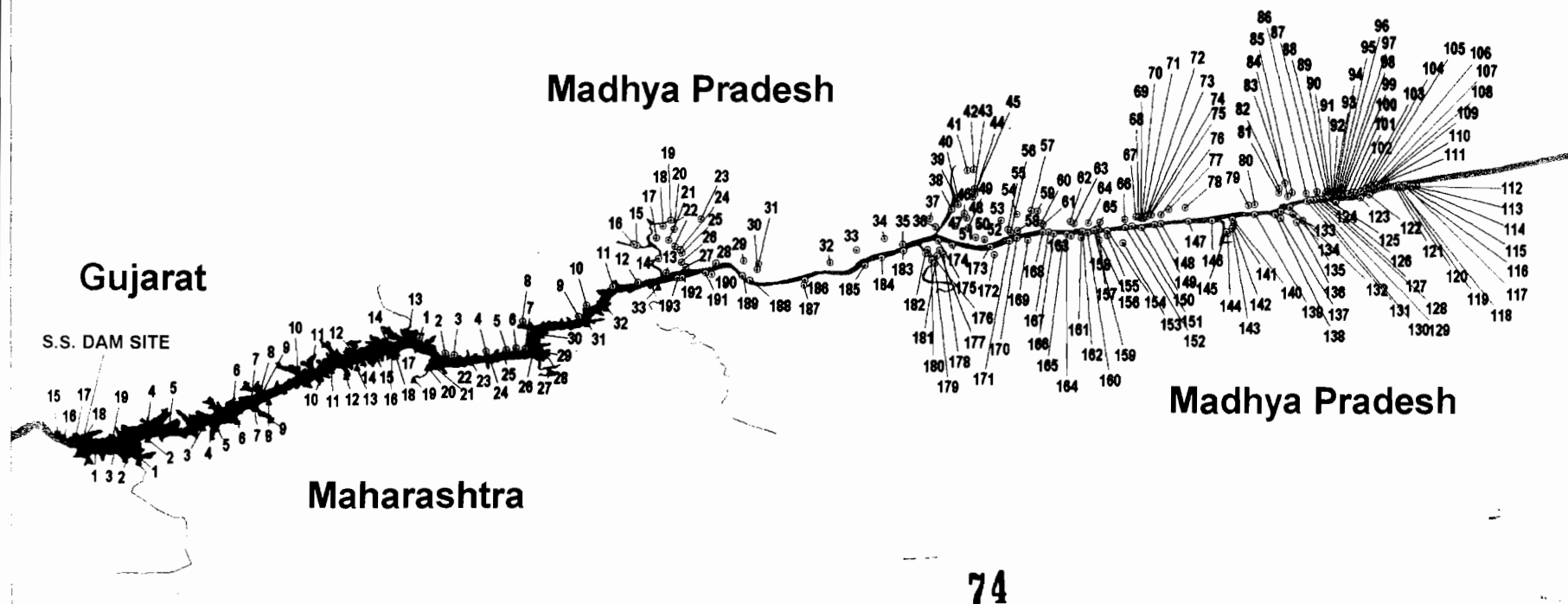
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नर्मदा घाटी विकास प्राधिकरण, भोपाल.

ANNEX - XXXVII (11)

Sardar Sarovar Project:
Reservoir to be formed at El 100M and river stretch

Villages affected by the Submergence at FRL



Sardar Sarovar Dam: List of Villages to be affected by the Submergence at FRL

No	Village	Chargage	State	Level	Tahsil	No	Village	Chargage	State	Level	Tahsil	No	Village	Chargage	State	Level	Tahsil
1	Adala	42,000	MP	Upto 81.5m	Almora	105	Kashir Barwad	126,619	MP	80.0 - 85.0m	Barwad	103	Gopur	0	MP	Above 110.0m	Dharwad
2	Chikada	44,051	MP	Upto 81.5m	Almora	103	Dahada	132,276	MP	80.0 - 85.0m	Barwad	104	Lamangan	0	MP	Above 110.0m	Dharwad
3	Jaladhi	46,073	MP	Upto 81.5m	Almora	101	Sargan	126,214	MP	80.0 - 85.0m	Barwad	105	Buganda	0	MP	Above 110.0m	Dharwad
4	Kalavadi	51,254	MP	Upto 81.5m	Almora	100	Shadi	135,324	MP	80.0 - 100.0m	Barwad	106	Banadi	0	MP	Above 110.0m	Dharwad
5	Bala Adala	53,365	MP	Upto 81.5m	Almora	156	Gopur	132,143	MP	80.0 - 85.0m	Barwad	107	Margadi	0	MP	Above 110.0m	Dharwad
6	Baladi	60,426	MP	Upto 81.5m	Almora	157	Piyadi	136,726	MP	80.0 - 100.0m	Barwad	108	Banadi	0	MP	Above 110.0m	Dharwad
7	Khandi	0	MP	Above 110.0m	Almora	158	Urad	136,266	MP	80.0 - 100.0m	Barwad	109	Urad	0	MP	Above 110.0m	Dharwad
8	Angaradi	64,024	MP	Upto 81.5m	Almora	159	Pipari	136,266	MP	80.0 - 100.0m	Barwad	110	Jaladi	0	MP	Above 110.0m	Dharwad
9	Bhadi Chik	67,267	MP	85.0 - 90.0m	Almora	160	Bugadi	134,410	MP	80.0 - 100.0m	Barwad	111	Jaladi	0	MP	Above 110.0m	Dharwad
10	Bhadi	71,666	MP	85.0 - 90.0m	Almora	65	Gangadi	136,018	MP	80.0 - 100.0m	Barwad	112	Ragun	0	MP	Above 110.0m	Dharwad
11	Digadi	74,462	MP	Upto 81.5m	Almora	175	Urad	136,266	MP	80.0 - 100.0m	Barwad	121	Urad	0	MP	Above 110.0m	Dharwad
12	Jandara	78,102	MP	81.5 - 85.0m	Almora	154	Sargan	136,272	MP	80.0 - 100.0m	Barwad	120	Jaladi	0	MP	Above 110.0m	Dharwad
13	Nari	70,024	MP	80.0 - 85.0m	Barwad	83	Bodhadi	132,281	MP	80.0 - 85.0m	Kutch	119	Rahadpur	0	MP	Above 110.0m	Dharwad
14	Urad	81,072	MP	85.0 - 100.0m	Barwad	84	Kashir	136,092	MP	80.0 - 100.0m	Barwad	118	Chikadi	0	MP	Above 110.0m	Dharwad
15	Kandi	0	MP	Above 110.0m	Kutch	62	Mahadi	131,971	MP	80.0 - 85.0m	Kutch	115	Kashir	0	MP	Above 110.0m	Dharwad
16	Kandi	81,426	MP	Upto 81.5m	Almora	81	Kandi	136,266	MP	80.0 - 100.0m	Kutch	117	Mahadadi	0	MP	Above 110.0m	Dharwad
17	Chikadi	0	MP	Above 110.0m	Almora	80	Bugadi	130,752	MP	80.0 - 85.0m	Kutch	116	Chikadi	0	MP	Above 110.0m	Dharwad
18	Bhadi	81,426	MP	Upto 81.5m	Almora	57	Bugadi	0	MP	Above 110.0m	Kutch	114	Kashir	0	MP	Above 110.0m	Dharwad
19	Kandi	84,426	MP	105.0 - 110.0m	Almora	59	Chikadi	128,181	MP	80.0 - 85.0m	Kutch	113	Kashir	0	MP	Above 110.0m	Dharwad
20	Chikadi	81,377	MP	105.0 - 110.0m	Almora	66	Urad	136,266	MP	80.0 - 100.0m	Barwad	112	Gopur	0	MP	Above 110.0m	Dharwad
21	Kandi	0	MP	Above 110.0m	Almora	67	Urad	147,820	MP	105.0 - 110.0m	Barwad	119	Bhadi	112,426	MP	85.0 - 90.0m	Barwad
22	Kandi	0	MP	Above 110.0m	Almora	68	Shahadpur	131,266	MP	100.0 - 105.0m	Barwad	7	Dub Khadi	55,175	MP	Upto 81.5m	Almora
23	Kandi	80,864	MP	80.0 - 85.0m	Almora	80	Bhadi	143,523	MP	100.0 - 105.0m	Barwad	135	Ragun	121,914	MP	105.0 - 110.0m	Thakur
24	Mahadpur	87,860	MP	Upto 81.5m	Almora	70	Gopur	133,465	MP	80.0 - 85.0m	Barwad	136	Mahadpur	163,688	MP	105.0 - 110.0m	Thakur
25	Kandi	84,600	MP	Upto 81.5m	Almora	71	Mahadpur	155,745	MP	105.0 - 110.0m	Barwad	137	Brahmadpur	167,327	MP	105.0 - 110.0m	Thakur
26	Bhadi	0	MP	Above 110.0m	Almora	153	Bhadi	141,725	MP	80.0 - 100.0m	Thakur	15	Nagpur	0	MP	Upto 81.5m	Barwad
27	Kandi	0	MP	Above 110.0m	Almora	152	Anadi	140,355	MP	80.0 - 100.0m	Thakur	16	Ladi	0	MP	Upto 81.5m	Barwad
28	Kandi	0	MP	Above 110.0m	Almora	151	Kashir	140,266	MP	100.0 - 105.0m	Thakur	17	Pandhadi	0	MP	Upto 81.5m	Barwad
29	Kandi	83,511	MP	81.5 - 85.0m	Barwad	151	Bhadi	143,563	MP	100.0 - 105.0m	Thakur	18	Kashir	0	MP	Upto 81.5m	Barwad
30	Bhadi	81,862	MP	100.0 - 105.0m	Barwad	148	Kashir	152,867	MP	100.0 - 105.0m	Thakur	1	Mahadi	0	MP	Upto 81.5m	Barwad
31	Bhadi	85,741	MP	Upto 81.5m	Kutch	146	Kandi	145,982	MP	100.0 - 105.0m	Thakur	19	Zar	0	MP	Upto 81.5m	Barwad
32	Kashir	85,860	MP	Upto 81.5m	Kutch	76	Shahadi	164,757	MP	100.0 - 105.0m	Barwad	3	Vadpur	2,438.28	MP	Upto 81.5m	Barwad
33	Chikadi	87,252	MP	Upto 81.5m	Kutch	77	Shahadi	149,426	MP	80.0 - 100.0m	Barwad	2	Bugun	2,438.28	MP	Upto 81.5m	Barwad
34	Bhadi	88,666	MP	Upto 81.5m	Kutch	75	Dahadpur	140,266	MP	105.0 - 110.0m	Barwad	4	Kashir	8,530.88	MP	Upto 81.5m	Barwad
35	Turkadi	88,568	MP	85.0 - 90.0m	Barwad	74	Anadi	0	MP	Above 110.0m	Barwad	5	Gadpur	11,581.83	MP	Upto 81.5m	Barwad
36	Chikadi	121,914	MP	100.0 - 105.0m	Barwad	73	Ragun	157,878	MP	105.0 - 110.0m	Barwad	6	Mahadpur	17,677.54	MP	Upto 81.5m	Barwad
37	Bhadi	123,342	MP	85.0 - 100.0m	Barwad	72	Pandhadi	160,806	MP	105.0 - 110.0m	Barwad	7	Dhumi	20,725.38	MP	Upto 81.5m	Barwad
38	Kandi	98,816	MP	85.0 - 100.0m	Barwad	147	Dahadi	148,125	MP	100.0 - 105.0m	Thakur	8	Chikadi	22,773.24	MP	Upto 81.5m	Barwad
39	Kandi	99,821	MP	Upto 81.5m	Kutch	148	Mahadpur	149,648	MP	100.0 - 105.0m	Thakur	11	Turkadi	26,821.08	MP	Upto 81.5m	Barwad
40	Dhumi	108,238	MP	81.5 - 85.0m	Kutch	140	Chikadi	162,735	MP	105.0 - 110.0m	Thakur	10	Kandi	26,821.08	MP	Upto 81.5m	Barwad
41	Mahadi	108,085	MP	100.0 - 105.0m	Barwad	141	Pandhadi	154,221	MP	100.0 - 105.0m	Thakur	12	Turkadi	32,818.79	MP	Upto 81.5m	Barwad
42	Bhadi	108,868	MP	85.0 - 90.0m	Barwad	142	Pandhadi	154,526	MP	100.0 - 105.0m	Thakur	14	Pandhadi	45,108.2	MP	Upto 81.5m	Barwad
43	Anadi	110,941	MP	80.0 - 85.0m	Barwad	143	Kashir	154,830	MP	100.0 - 105.0m	Thakur	13	Kashir	45,108.2	MP	Upto 81.5m	Barwad
44	Dahadi	111,254	MP	85.0 - 90.0m	Kutch	144	Ladi	0	MP	Above 110.0m	Thakur	8	Anadi	23,773.24	MP	Upto 81.5m	Barwad
45	Ragun	108,503	MP	81.5 - 85.0m	Kutch	145	Mahadpur	156,254	MP	105.0 - 110.0m	Thakur	1	Mahadi	5,486.12	MP	Upto 81.5m	Barwad
46	Bhadi	117,847	MP	100.0 - 105.0m	Barwad	139	Ladi	155,135	MP	100.0 - 105.0m	Thakur	2	Dahadi	11,581.83	MP	80.0 - 85.0m	Barwad
47	Chikadi	0	MP	Above 110.0m	Barwad	80	Gopur	164,888	MP	105.0 - 110.0m	Barwad	3	Chikadi	14,829.88	MP	Upto 81.5m	Barwad
48	Pandhadi	133,800	MP	105.0 - 110.0m	Barwad	79	Mahadpur	163,000	MP	105.0 - 110.0m	Barwad	4	Bhadi	17,677.54	MP	Upto 81.5m	Barwad
49	Chikadi	0	MP	Above 110.0m	Barwad	78	Pandhadi	145,077	MP	100.0 - 105.0m	Barwad	5	Gopur	17,677.54	MP	Upto 81.5m	Barwad
50	Bhadi	117,847	MP	105.0 - 110.0m	Barwad	81	Jaladi	0	MP	Above 110.0m	Barwad	6	Bhadi	20,725.38	MP	Upto 81.5m	Barwad
51	Adala	0	MP	Above 110.0m	Barwad	82	Jaladi	0	MP	Above 110.0m	Barwad	7	Dahadi	23,773.24	MP	Upto 81.5m	Barwad
52	Jandara	114,003	MP	85.0 - 90.0m	Barwad	83	Jaladi	165,180	MP	105.0 - 110.0m	Barwad	8	Mahadi	23,773.24	MP	Upto 81.5m	Barwad
53	Bhadi	117,861	MP	85.0 - 90.0m	Barwad	85	Ragun	163,264	MP	105.0 - 110.0m	Barwad	9	Mahadi	23,773.24	MP	80.0 - 85.0m	Barwad
54	Pandhadi	121,914	MP	80.0 - 85.0m	Barwad	84	Brahmadpur	165,538	MP	105.0 - 110.0m	Barwad	10	Pandhadi	26,821.08	MP	Upto 81.5m	Barwad
55	Mahadi	130,360	MP	80.0 - 85.0m	Barwad	138	Ladi	158,864	MP	105.0 - 110.0m	Thakur	11	Pandhadi	32,818.79	MP	Upto 81.5m	Barwad
56	Nagpur	123,427	MP	80.0 - 85.0m	Barwad	133	Mahadpur	160,912	MP	105.0 - 110.0m	Thakur	12	Bhadi	35,894.84	MP	Above 110.0m	Barwad
57	Pandhadi	124,362	MP	80.0 - 85.0m	Barwad	132	Gopur	161,340	MP	105.0 - 110.0m	Thakur	13	Jaladi	35,894.84	MP	Above 110.0m	Barwad
58	Bhadi	125,330	MP	80.0 - 85.0m	Barwad	134	Gopur	161,221	MP	105.0 - 110.0m	Thakur	14	Kandi	35,894.84	MP	Upto 81.5m	Barwad
59	Chikadi	115,488	MP	80.0 - 85.0m	Kutch	86	Kashir	162,896	MP	105.0 - 110.0m	Barwad	15	Thakur	38,912.8	MP	Upto 81.5m	Barwad
60	Mahadpur	116,427	MP	105.0 - 110.0m	Kutch	87	Bhadi	0	MP	Above 110.0m	Dharwad	16	Bhadi	42,000.28	MP	Upto 81.5m	Barwad
61	Mahadi	116,170	MP	80.0 - 85.0m	Kutch	88	Bhadi	0	MP	Above 110.0m	Dharwad	17	Dahadi	54,251.75	MP	Upto 81.5m	Barwad
62	Bhadi	121,608	MP	80.0 - 85.0m	Kutch	89	Bhadi	0	MP	105.0 - 110.0m	Dharwad	18	Bhadi	45,108.2	MP	Upto 81.5m	Barwad
63	Bhadi	0	MP	80.0 - 85.0m	Kutch	90	Kashir	0	MP	Above 110.0m	Dharwad	19	Chikadi	54,251.75	MP	85.0 - 90.0m	Barwad
64	Kandi	117,807	MP	85.0 - 90.0m	Kutch	91	Mahadpur	0	MP	Above 110.0m	Dharwad	20	Ragun	54,251.75	MP	Above 110.0m	Barwad
65	Mahadi	116,591	MP	85.0 - 90.0m	Kutch	92	Mahadpur	0	MP	Above 110.0m	Dharwad	21	Bugun	54,251.75	MP	Upto 81.5m	Barwad
66	Anadi	121,608	MP	80.0 - 85.0m	Kutch	93	Bhadi	0	MP	Above 110.0m	Dharwad	22	Nagpur	54,251.75	MP	Upto 81.5m	Barwad
67	Bhadi	116,881	MP	85.0 - 90.0m	Kutch	94	Hagun	0	MP	Above 110.0m	Dharwad	23	Bhadi	57,289.6	MP	Upto 81.5m	Barwad
68	Nagpur	126,864	MP	80.0 - 85.0m	Kutch	95	Pandhadi	0	MP	Above 110.0m	Dharwad	24	Jandara	57,289.6	MP	80.0 - 85.0m	Barwad
69	Mahadpur	122,323	MP	80.0 - 85.0m	Kutch	96	Ladi	0	MP	Above 110.0m	Dharwad	25	Mahadi	60,347.48	MP	Above 110.0m	Barwad
70	Mahadi	116,881	MP	80.0 - 85.0m	Kutch	97	Bhadi	0	MP	Above 110.0m	Dharwad	26	Shahadi	66,443.16	MP	Above 110.0m	Barwad
71	Bhadi	126,888	MP	85.0 - 90.0m	Kutch	98	Dahadpur	0	MP	Above 110.0m	Dharwad	27	Bhadi	66,443.16	MP	Above 110.0m	Barwad
72	Anadi	121,914	MP	80.0 - 85.0m	Kutch	99	Bhadi	0	MP	Above 110.0m	Dharwad	28	Vadpur	66,443.16	MP	81.5 - 85.0m	Barwad
73	Kandi	124,465	MP	80.0 - 85.0m	Kutch	100	Mahadpur	0	MP	Above 110.0m	Dharwad	29	Bhadi	72,538.88	MP	Upto 81.5m	Barwad
74	Kandi	126,388	MP	80.0 - 85.0m	Kutch	101	Mahadpur	0	MP	Above 110.0m	Dharwad	30	Urad	72,538.88	MP	Upto 81.5m	Barwad
75	Bugadi	123,															

ANNEX-~~XXXVII~~-(12)

नर्मदा नियंत्रण प्राधिकरण

NARMADA CONTROL AUTHORITY

संख्या-पर्या: 2(1) 2001/115-125

दिनांक: 7-1-2002

सेवा में,

श्री पी0वी0 जयकृष्णन,
भारत सरकार के सचिव,
पर्यावरण एवं वन मंत्रालय, सी.जी.ओ. काम्पलेक्स,
पर्यावरण भवन, लोदी रोड
नई दिल्ली - 110 003

विषय:-सरदार सरोवर एवं नर्मदा सागर परियोजनाओं के पर्यावरण प्रबन्धन से सम्बन्धित
स्थिति विवरण - सितम्बर, 2001.

महोदय,

इस पत्र के साथ उक्त रिपोर्ट की एक प्रति सादर अवलोकनार्थ एवम् आवश्यक
कार्यवाही हेतु भेजी जा रही है ।

भवदीय,

संलग्नक: उपरोक्तानुसार ।

(डा. पवन कुमार)
विशेषज्ञ पर्यावरण

कमश : ... 2/

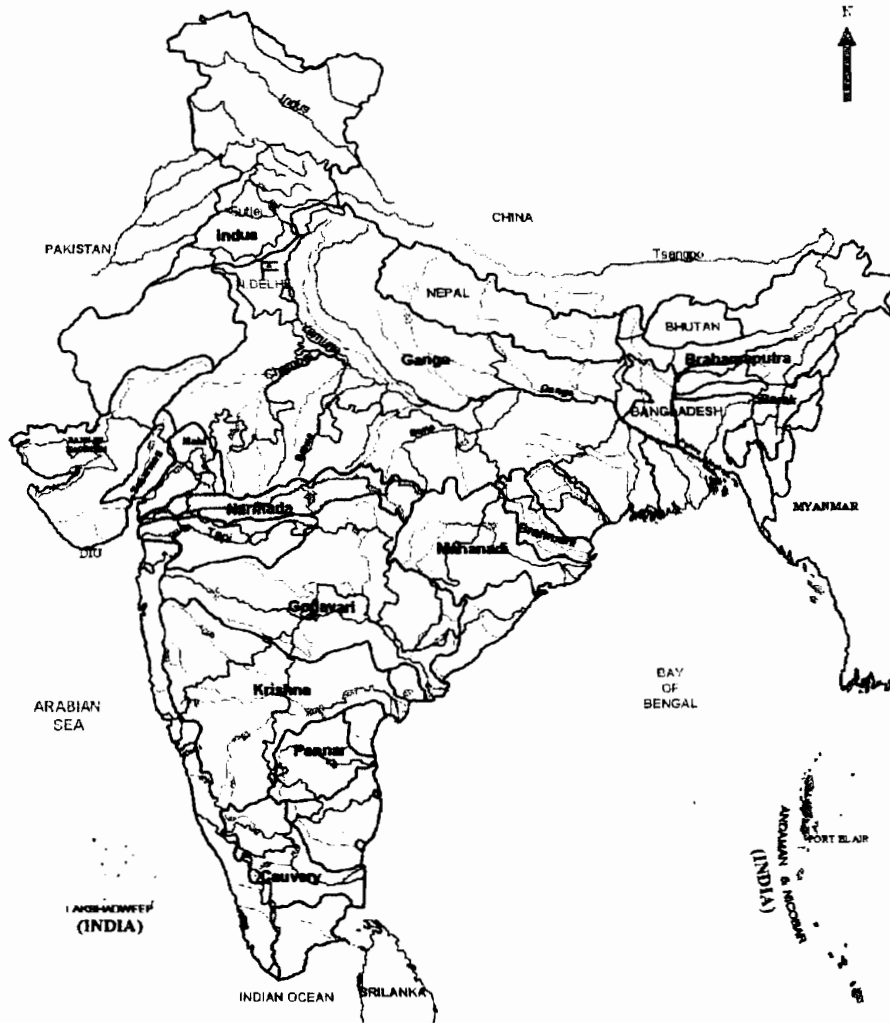
Environment Management Sardar Sarovar and Indira Sagar Project September - 2001	
I N D E X	
	Page No.
Chapter 1	
INTRODUCTION	
❖ Master Plan For The Development Of Narmada River Basin: NWDTA	2
❖ Principal Levels and apportioning of the irrigation and power benefits by the NWDTA	2
❖ Key Directives By The NWDT On Environment & Rehabilitation	3
❖ Environmental Clearance by Govt. of India	3
❖ Forest Clearance	5
❖ Investment Clearance	5
❖ Monitoring by the NCA.	5
❖ Environment and Rehabilitation Wing Of The NCA	6
❖ Environment Sub-Groups Of NCA	6
❖ Functions Of The Environment Sub-Group.	6
❖ Important Sub-Groups and Sub-Committees On Environment	7
SARDAR SAROVAR PROJECT	
❖ Salient Features of the Project	8
❖ Key benefits from the proposed project	8
❖ Additional benefits	8
❖ The submergence	9
DEVELOPMENT AND CURRENT STATUS OF THE MANAGEMENT OF SSP ENVIRONMENT	10
Chapter 2	
CATCHMENT AREA TREATMENT	
❖ Studies	11
❖ Planning	12
❖ Phase-I: directly draining sub-watersheds	12
❖ Action plans	12
❖ Implementation	13
❖ Phase-II: indirectly draining sub-watersheds	16
Chapter 3	
COMPENSATORY AFFORESTATION	
❖ Studies	20
❖ Action plans	21
❖ Implementation	21
❖ Additional plantation activities	24
❖ (a) Plantation along canal banks	24
❖ (b) Dam vicinity plantation	24
❖ (c) Ravine land afforestation	24
Chapter 4	
COMMAND AREA DEVELOPMENT	
❖ (A) Current scenario : Government of Gujarat	26
❖ Agriculture Practices and Socio Economic	26
❖ Drainage, Waterlogging and Salinity	27
❖ Ground Water Studies	27
❖ Drainage and studies	28
❖ Floral and Faunal Studies	28
❖ Fisheries	30
❖ Health	30

❖ Water Quality	30
❖ Flora and Fauna	31
❖ Sanctuaries	32
❖ Public Health	34
❖ Proposed Management Measures	35
❖ Waterlogging and Salinity	36
❖ Action Plan	38
❖ Implementation	38
❖ B) Current Scenario : Government of Rajasthan	39
▪ Narmada Main Canal	39
▪ Water Delivery Network	39
▪ The Distribution System of VSAs	40
▪ Drainage System	41
Chapter 5	
FLORA, FAUNA, WILDLIFE AND CARRYING CAPACITY	
❖ Studies / surveys	43
❖ Action plans	45
❖ Wildlife (Terrestrial)	45
❖ B) Fisheries (Aquatic):	46
❖ Summary of Status of Environmental Planning: Fisheries	47
❖ Enhance Nature Conservation Outside the Immediate Catchment Area of the Narmada	47
❖ Implementation	48
❖ Ongoing Fisheries Activities in the Sardar Sarovar	48
Chapter 6	
SEISMICITY	
❖ Studies	49
❖ Implementation	50
❖ Status of implementation of Seismicity aspects	50
Chapter 7	
HEALTH ASPECTS	
❖ Studies and Action Plan	51
❖ Status of Implementation of Actions for Public Health	52
❖ Implementation	54
❖ A) Govt. of Gujarat:	54
❖ B) Govt. of Maharashtra	55
❖ C) Govt. of Madhya Pradesh	56
Chapter 8	
ARCHAEOLOGICAL ANTHROPOLOGICAL	
ARCHAEOLOGICAL SURVEY	
❖ Studies	58
❖ Action Plans & implementation	60
❖ Particulars of proposed actions	62
❖ Particulars of monuments / mounds as per action plan of 1997 prepared by State Deptt. of Archaeology & Museum, Govt. of M.P.	63
❖ Collection and display at Museum	66
❖ Summary of the proposed actions	66
ANTHROPOLOGICAL SURVEY & STUDIES	67

INDIRA SAGAR PROJECT	
Phased catchment area treatment	
• Studies	68
• Phased programme:	69
• Phase-I Programme	69
• Action Plan	70
• Implementation	71
• Freely Draining Area (Excluding Directly Draining Sub-watersheds)	72
• Action plan :	72
• Implementation :	72
• Requirement of Funds	73
Compensatory afforestation:	
• Action plan	75
• Implementation :	77
Command area development	
• Studies and findings	77
• Suggested strategies	79
• Action plan :	80
• Implementation	80
Flora, fauna and carrying capacity	
• Suggested strategies	83
• Action plan and implementation	83
SEISMICITY AND RIM STABILITY	
• Studies	85
• Suggested strategies	85
• Reservoir rim stability	86
Health aspect:	
• Studies and findings :	87
• Suggested strategies :	88
• Action plan :	89
• Implementation :	89
Archaeological & anthropological survey:	
Archaeological aspects	
• Surveys :	90
• Action plan :	90
• State protected monuments :	90
• Centrally protected monuments :	91
• Implementation :	91
• Plan of Archaeological Survey of India	91
Anthropological aspects:	
• Surveys/studies :	93
• Action plan :	94
• Implementation :	94

STATUS REPORT

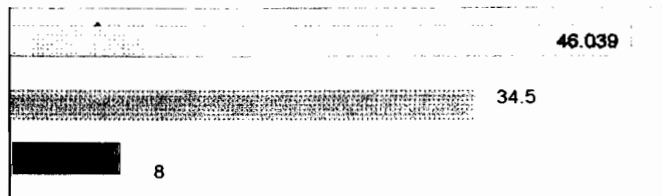
September, 2001

Chapter 1**Environment Management****Sardar Sarovar and Indira Sagar Project**

Narmada is the fifth largest river of India. It is also the largest west flowing, least polluted river. Its length from Amarkantak to Arabian Sea is - 1312 Km. The mean Annual Rainfall in the basin is 1,180 mm (46.45 inches) and Average Annual Run-Off is 41,000 M.Cu.M (33.21 MAF). Its catchment area is about 98,000 Sq.Km, which is spread to the State of Madhya Pradesh, Maha-rashtra and Gujarat. The current utilization of the Narmada water is as follows (Units in MAF.).

Average Annual Potential
Estimated Utilisable Water

Present Use



Master Plan For The Development Of Narmada River Basin: NWDTA

In 1965, India appointed a committee to develop a master plan for the Narmada Basin. The committee's recommendations were not accepted by the riparian states. This impasse led to the constitution of the Narmada Water Disputes Tribunal in 1969 by Government of India under Inter State Water Dispute Act of 1956, for adjudication of water disputes of Narmada among riparian States. Its deliberations continued until 1979. The Tribunal considered the Sardar Sarovar Projects and the Narmada Sagar Projects together using the best hydrological, engineering, and other evidence available and passed the order which was notified in Gazette on December 16th, 1979.

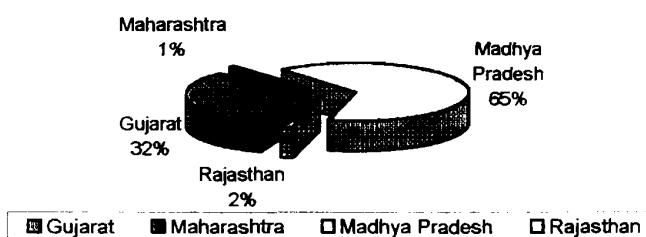
NWDT: Award

In its 1979 award, the Narmada Water Disputes Tribunal made many of the most fundamental decisions about the Projects. These included the dam location, regulation of flows, reservoir levels etc. There are points in the Tribunal award that bear on the environmental aspects of Sardar Sarovar Project which are summarised below:

- + The utilizable quantum of Narmada waters at the Sardar Sarovar dam site is specified at 28 million acre feet (MAF) on the basis of 75 per cent dependability.
- + Apportionment is to be 18.25 MAF for Madhya Pradesh, Gujarat 9.00 MAF, Rajasthan 0.50 MAF, and Maharashtra 0.25 or in that ratio.

UTILISABLE WATER 28 MAF (34,537.44 MCM)

Share of water



- + The canal and dam water levels are fixed. Madhya Pradesh is to provide regulated releases of water from the Narmada Sagar Projects to the Sardar Sarovar Projects.

Sardar Sarovar Dam

Full Reservoir Level = + 138.68 M [+455']

Maximum Water Level = + 140.21 M [+460']

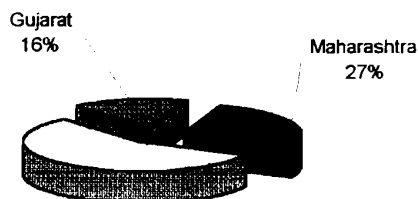
Indira Sagar Dam [M.P.]

Full Reservoir Level = + 262.13 M [860']

Narmada Main Canal

Full Supply Level = + 91.44 M [+300']

- + the multi-purpose character of the project, including hydroelectric power, is affirmed.
- + The apportionment /sharing of water are subject to review after 45 years.



SHARE OF POWER



Estimates of Govt. of Madhya Pradesh anticipate that over the next half century there will be 29 major, 135 medium, and about 3,000 minor projects in the Narmada River valley. The Sardar Sarovar, one of the first to be built on the main river, is the terminal project on the river system and its benefits and impacts, are linked to developments of Indira Sagar Project upstream.

Key Directives By The NWDT On Environment & Rehabilitation

Fisheries development (NWDTA clause XI, sub-clause V (6) & (7) : The NWDT direction regarding this is in para- 5 & 7 of Sub-clause V of final order and decision of NWDT in Chapter XX of the Report of Volume II. The decision is reproduced below:

- V(6) "Notwithstanding vesting in Gujarat of the lands coming under submergence, Madhya Pradesh and Maharashtra shall continue to enjoy all rights of sovereignty intact over the submerged area in the respective States".
- V(7) "Madhya Pradesh and Maharashtra respectively shall be exclusively entitled to all rights of fishing, boating and water transportation over the part of lake over the submerged land within Madhya Pradesh and Maharashtra respectively provided, however, that such right is not exercised to the prejudice of any utilities of the legitimate performance of their duties by the project personnel".
- Monitoring of the protection shifting/relocation of the monuments of archaeological significance being affected by the submergence of Sardar Sarovar, Narmada Sagar, (NWDT clause XI-sub-clause III (4) & XIV-7,8(3)(iv).
- Studies related to Downstream scenario for estimating impacts of project activities (NWDT clause IX (Vii) related to indenting of water for downstream by Gujarat.
- Clause XI{sub clause I to VI, page 110-115}deals with the provision for rehabilitation of oustees (PAFs) from submergence area of Madhya Pradesh and Maharashtra who are likely to be resettled in Gujarat or in their home states.

Environmental Clearance by Govt. of India

It is recognised that the creation of reservoir will bring in environmental, social and economic impacts and that there will be changes in environmental regime in the upstream, downstream and in the command basically due to submergence and displacement of people and wildlife and irrigation in the command. Such changes are required to be assessed and evaluated for taking decision before proceeding with the project.

Ministry of Water Resources the then Ministry of Irrigation & Power had developed detailed guidelines framed during October, 1980 for project formulations which included a detailed check-list by the Ministry of Environment & Forests, the then department of Environment of the department of Science & Technology of the Govt. of India, for assessment of environmental impact of the projects and planning for Environmental Safeguard Measures.

In accordance with the requirement of the Department of Environment, project authorities submitted the detailed project report (DPR) along with the needed information on environmental issues during February to October, 1980. Environmental Appraisal Committee of the Ministry of Environment & Forests approved the project in principle during its 12th meeting held in 1983. More information & data on certain parameters of Environmental impact & management were subsequently provided through additional documentations over a period of time in various stages of completeness by three states i.e. Maharashtra, Gujarat and Madhya Pradesh. The information provided was also updated from-time-to-time. The studies action and data were considered at levels and the projects namely Sardar Sarovar in Gujarat and Indira Sagar in Madhya Pradesh were formally cleared from environmental angle on 24th June, 1987 by the Ministry of Environment & Forests, Govt. of India. Permission for diversion of the forestland was also subsequently accorded for both the projects separately by the MOEF during December, 1987 and October, 1987. The Investment Clearance for the Sardar Sarovar and Indira Sagar Project was received from the Planning Commission during October, 1988 and November, 1988 respectively, thus paving the way for implementation of these projects.

Before a formal clearance by the Ministry of Environment & Forests, Narmada Control Authority was expanded and was entrusted with the increased responsibilities in the areas of environment and rehabilitation. The clearances issued subsequent to the expansion of the NCA by the Central Government departments, contained certain conditions to be complied with during the course of project implementation.

The Parameters

- + rehabilitation master plan;
- + phased catchment area treatment scheme;
- + compensatory afforestation plan;
- + command area development,
- + survey of flora and fauna; carrying capacity of surrounding area;
- + seismicity and
- + health aspects.

The Narmada Control Authority was given the responsibilities to ensure that the environmental safeguard measures would be planned and implemented in depth and the pace of its implementation would be *pari passu* with the progress of the work on the Projects. The four conditions of the clearance were:

- the Narmada Control Authority would ensure that the environmental measures are planned and implemented *pari passu* with the progress of the work on the project;
- the detailed surveys/studies would be done
- catchment area treatment and rehabilitation programs would be completed ahead of reservoir filling.
- The Department of Environment would be kept informed of progress.

Forest Clearance

In September 1987, under the Forest (Conservation) Act, 1980 the Central government gave approval for the diversion of over 13,386 hectares of forest land for the Sardar Sarovar Projects. This approval was subject to eleven conditions in all three states, of which the following are especially relevant.

- detailed compensatory afforestation plans would be submitted.
- a proposal for non-forest areas for rehabilitation of oustees would be submitted.
- compensatory afforestation would be in double the area of degraded forest lands in addition to the afforestation of equivalent non-forest land, and a scheme for this would be submitted.
- a catchment area treatment plan will be prepared by November 30, 1987, failing which a central government team would be appointed at a cost to the project.

Investment Clearance

The Planning Commission, Govt. of India approved investment for an estimate cost of Rs. 6,406 crores for SSP in Gujarat vide their letter dated 15.10.88. The Planning Commission of the Government of India granted the State of Gujarat approval for the Sardar Sarovar Projects subject to seven conditions that bear on the environment (as well as resettlement and rehabilitation).

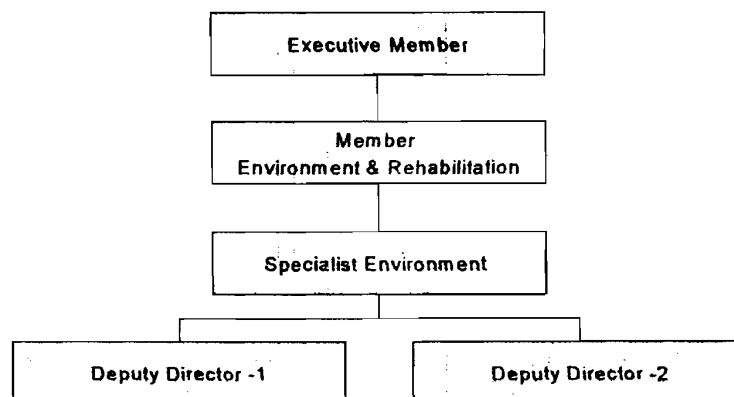
- compliance with the 1987 environmental and forestry clearances;
- adequate funding to meet the construction schedule;
- submission of a detailed program for drainage and ground water balance studies beyond the Mahi River;
- adoption of measures to ensure project revenue from water rates to pay for annual operation and maintenance charges;
- setting up an expert group to study siltation in the main canal.
- drawing up a detailed schedule and plans for the micro-level-irrigation network system; and an implementation schedule for completion of the canal network so that irrigation benefits do, in fact, start accruing from the financial investment.

Monitoring by the NCA.

Following the recommendations of the Ministry of Environment & Forest, the scope of the Narmada Control Authority was enlarged on 4th June, 1987 through amendment brought out by MOWR under clause 9(i)4 9(2)a, through gazette notification. The functions of NCA were modified to include major functions of coordination & direction of the implementation of all the projects including the environmental protection measures to ensure the faithful compliance of the conditions attached by GOI while granting clearance to these projects.

Environment and Rehabilitation Wing Of The NCA

The Environment & Rehabilitation(E&R) wing of NCA is headed by Member (E&R), NCA, Indore. Member (E&R), The organizational structures of the Environment unit of the E&R wing is as given here :



Environment Sub-Group of NCA

NCA had constituted among others, a sub-group namely Environment sub-group under the Chairmanship of Secretary, Ministry of Env.& Forests, GOI. Member (E&R), NCA is Member Secretary to this sub-group. The 36th Meeting of the Subgroup was held on 2nd May, 2001.

Functions of the Environment Sub-Group.

- i) To work out the environmental safeguard measures to be planned and implemented for the entire Narmada Basin so that environmental safeguard measures are executed and remain fully in consonance with the clearance accorded to the Narmada Sagar and Sardar Sarovar Projects.
- ii) To determine, the terms of reference of required surveys and studies necessary for implementation of environmental safeguard measures inclusive of data base required, the methods by which the data base is to be prepared and also to identify the institutions/individuals to undertake the preparation of such documents.
- iii) To get prepared, for clearance by the Ministries and NCA the action plans with regard to all environmental safeguard measures and the assessment criteria thereof.
- iv) To devise, a suitable monitoring and evaluation mechanism so that the action plans are effectively implemented in consonance with stipulations at the time of clearance of the projects.
- v) To assess the necessary organisation with management capability being set up for adequate implementation of environmental safeguard measures.
- vi) To undertake, all measures necessary to assist Narmada Control Authority in the planning and implementation of environmental safeguard measures.

Important Sub-Groups and Sub-Committees On Environment

1. There is a Environment Committee headed by the Member (E&R), NCA. The Committee visits the impacted areas in all the three states by rotation for assessing compliance and submits its reports to the sub-group and necessary recommendations are forwarded to concerned State Governments for compliance.
2. High level expert group on fisheries development and conservation in Sardar Sarovar reservoir. This is chaired by the Joint Secretary, MOE&F. Member (E&R), NCA is the Member Secretary for this committee.
3. Committee on flora and fauna aspect of Sardar Sarovar and Narmada Sagar Project. This committee is chaired by Member (E&R), NCA.
4. Committee on archaeological and anthropological aspects. This committee is chaired by Member (E&R), NCA.
5. Committee on Health aspects. This committee is chaired by Member (E&R), NCA.
6. There are four high level expert multi disciplinary groups directing, coordinating and monitoring various studies commissioned by Govt. of Gujarat for the vast command area of SSP formed in pursuance of the directives of the Environment Sub-group for initiating such studies. Member (E&R) is included as regular member. Meeting of the expert group are convened by NPG from time to time to discuss the progress/interim reports of the studies commissioned by the Govt. of Gujarat.
7. Govt. of Maharashtra had formed Focus Group consisting of Secretaries of the various departments of the Govt. of Maharashtra to review issues related to SSP.
8. The Govt. of M.P. had constituted Wild Life Committee to review the environmental issues related with the SSP and ISP including studies, action plans and implementations.

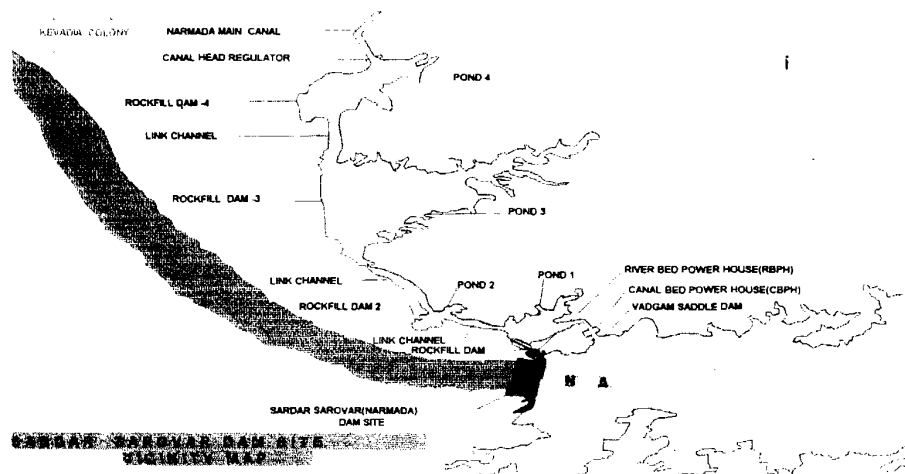
THE PROJECTS;

The height of the dam, the supply level of the canal and other level (s) of the Sardar Sarovar and Indira Sagar projects were fixed by the Award of the Tribunal. Thus submergence of the land, displacement of the people and related impacts also gets fixed. Once it was determined that no environmental concern is serious enough to threaten the viability of the project what remained to be done was to identify the source of impacts and the impacts. Their evaluation, quantification and assessment with an objective of devising mitigatory measures. In the following chapters the salient features of the twin, projects have been briefly presented and the current status of the survey studies and implementation on the suggested parameters is briefly appraised.

SARDAR SAROVAR PROJECT

Salient Features of the Project

Locations	Near village Navagam, distt. Narmada
Height	163.00 m
Length	1,210.00 m
Gross storage	9.5 (7.70) b cum (MAF)
Live storage	5.8 (4.73) b cum (MAF)
Annual irrigation	18.65 lakh ha.
Installed capacity	1,450 mw (1200 mw + 250 mw)
Cost of Project Rs.6,406.00 crore (at 1986-87 price level)	Rs.13,180.62 crore (at 1991-92 price level)
Annual irrigation Per ha submergence of cultivable land	of About 165 ha



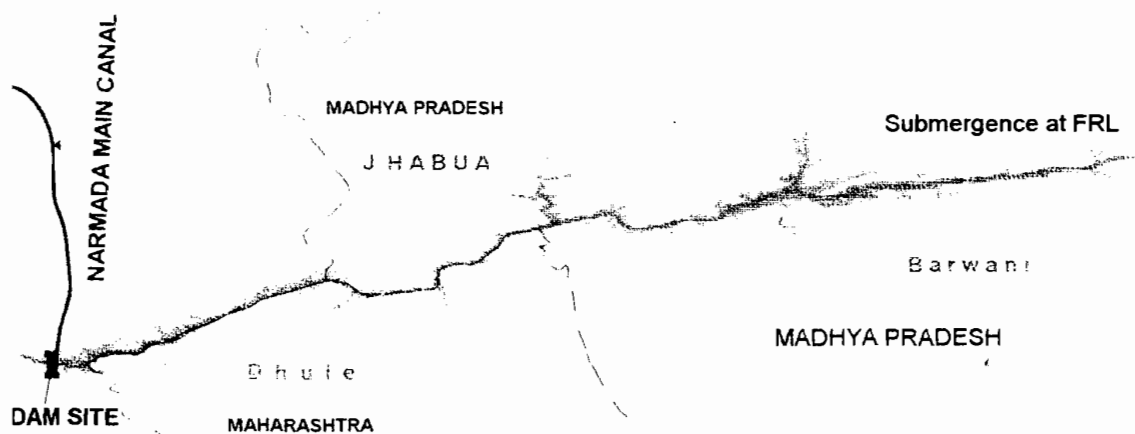
Key benefits from the proposed project.

Irrigation	Hydropower	Flood control
Gujarat 18.65 lakh ha Rajasthan 75,000 ha. Maharashtra 37,500 ha	1450 MW	210 villages and Bharuch city 750,000 population
Additional benefits		
<ul style="list-style-type: none"> Drinking water supply to 135 urban centres and 8215 villages and Water supply for industries Wild life sanctuaries development and Fisheries development 		

Source of impacts: the submergence

The submergence zone of the project lies within the State of Maharashtra, Madhya Pradesh & Gujarat as depicted in the table & map below.

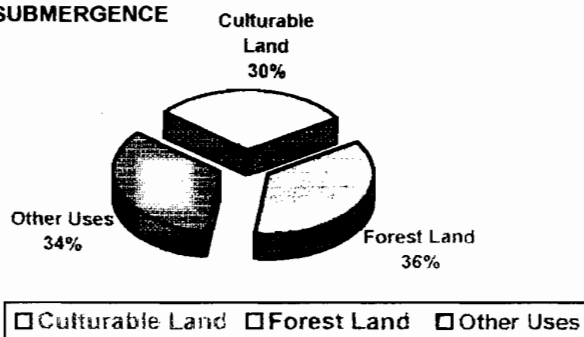
State	Culturable land (ha)	Forest land (ha)	Land under other uses (ha)	Total land (ha)	Affected number of villages	Affected number of PAFs
Madhya Pradesh	7,883	2,731	10,208	20,822	193	33,014
Maharashtra	1,519	6,489	1,592	9,599	33	3,213
Gujarat	1,877	4,166	1,069	7,112	19	4,600
Total	11,279	13,386	12,869	37,533	245	40,827



Sardar Sarovar Dam



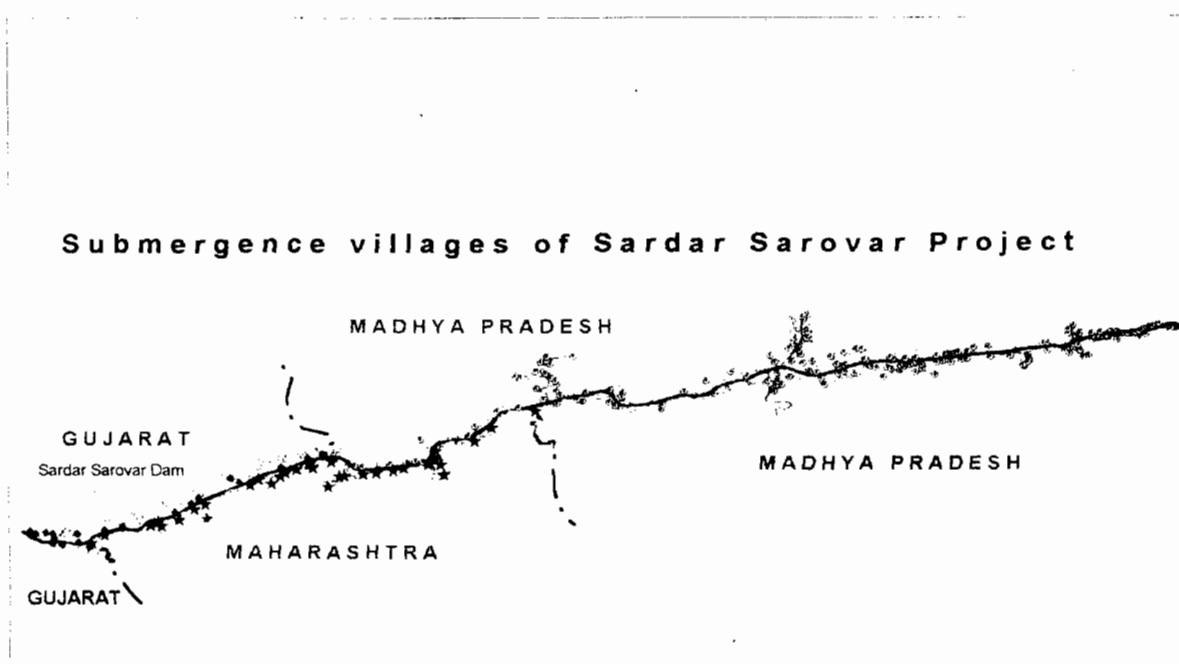
LAND USE PATTERN OF LAND UNDER SUBMERGENCE



Development and current status of the management of SSP environment

The environmental clearance had suggested the following parameters for Environmental Management.

- Resettlement & Rehabilitation.
- Compensatory Afforestation
- Catchment Area Treatment
- Command Area Development.
- Flora Fauna & Carrying Capacity of Surrounding area
- Seismicity
- Health
- Archaeology & Anthropological aspects



While resettlement & rehabilitation is dealt with separately other issues have been discussed in the following chapters.

Chapter 2**CATCHMENT AREA TREATMENT**

The MOEF clearance granted in 1987 contained two conditions pertaining to CAT, as follows:

- More detailed surveys for prioritisation of the sub-catchments in the SSP area should be undertaken;
- A phased CAT programme should be prepared and implemented ahead of reservoir filling.

Studies

Surveys and studies have been undertaken to aid the development of a management plan for CAT in the SSP catchment. They include : -

- Report of Inter-Departmental Committee on Soil Conservation and Afforestation, (the Dewan Committee Report), 1985.
- Report on Prioritisation of Sub-watersheds in Sub-catchments of Narmada Catchment, 1991 by AIS&LUSO, New Delhi.

According to the above studies, the total catchment area of Sardar Sarovar Project below Narmada Sagar Dam is 24,42,440 ha. Out of this, 6,82,769 ha area spread to 500 sub-watersheds having silt yield index 1,200 and above was identified as critically degraded.

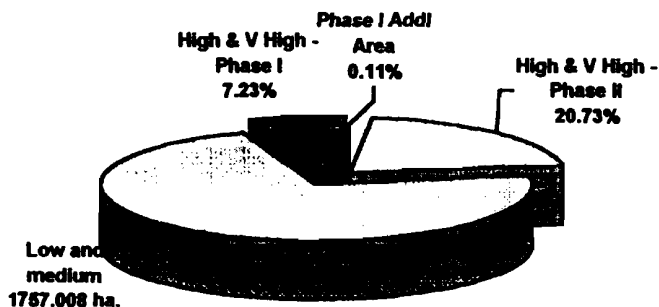


Chart-1: Status of degradation in SSP catchment
(area in ,000 ha)

GOI issued a directive in July 1992 that, for the SSP, the project would bear the costs of the treatment of all critically degraded sub-watersheds draining directly into the reservoir. These watersheds were identified amongst those classified as either very high or high-priority categories by the All India Soil & Land Use Survey Organisation (AISLUSO). The project

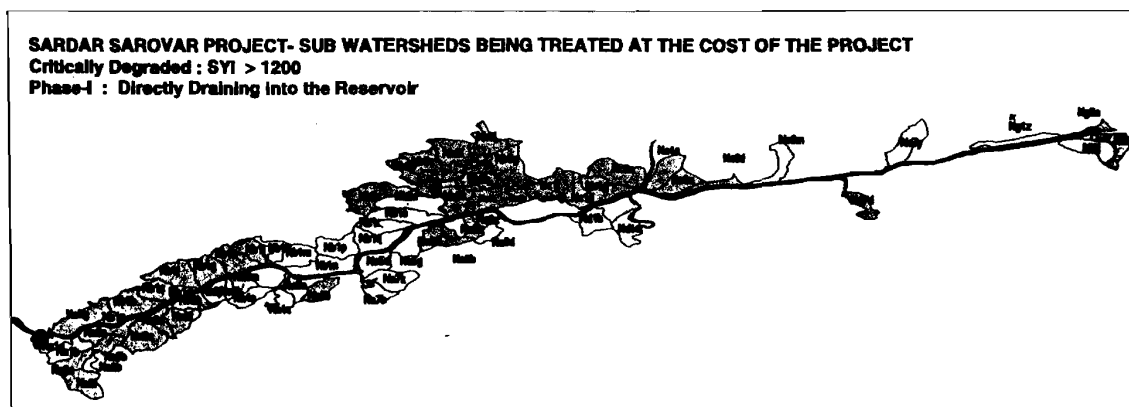
would also be responsible for the treatment of those areas of the catchment, which are directly damaged by the project activities. In addition, plans are required to be prepared for the treatment of the balance of the critically degraded sub-watersheds but the cost of this will be met from other ongoing schemes and in a timeframe to be determined.

Project authorities were required to prepare the plans, as phase-I programme, for treating those critically degraded sub-watersheds which were identified as *directly draining* into the reservoir. The balance sub-watersheds were to be treated as Phase-II programme.

Particulars			Madhya Pradesh	Gujarat	Maharashtra	Total
Very High & High	Planned to Treat	Phase- I	125725	29157	24298	179180
		Phase- II	349892		77568	427460

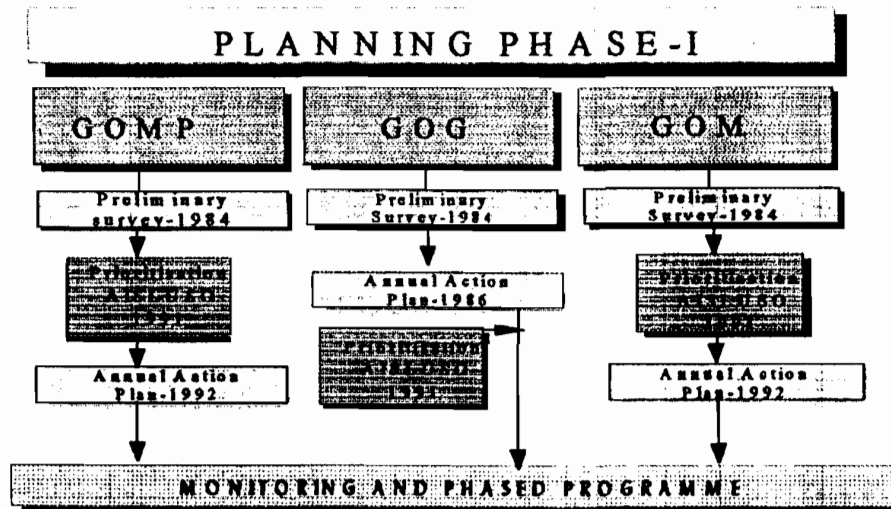
I. .PHASE-I: DIRECTLY DRAINING SUB-WATERSHEDS

Project authorities have prepared the plans for treating total area of 1,79,180 ha as shown in the *table -1* above. This area is required to be treated pari-passu with the project works.



The project authorities have submitted the Action Plans in varying stages of completeness. These plans contained information related to survey work, management options, monitoring & phased programme of treatment besides provisions for annual budget. The various stages in planning for each item of the plan are given in the *Fig.-1 below*.

Fig. 1. Flow chart of CAT phase-I planning by Gujarat, Madhya Pradesh and Maharashtra



Elements of Action Plan

Key elements of the Action Plan which includes time-table, menu, budget etc. received from GOG, GOMP & GOM are depicted in Fig.-2

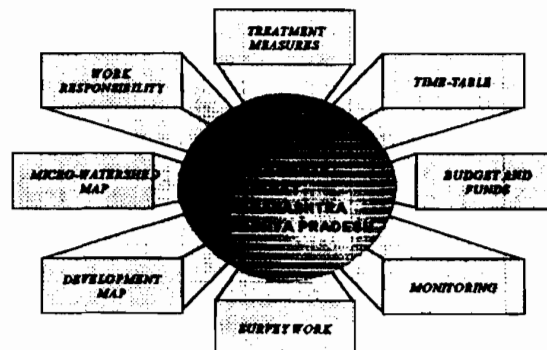


Figure 2 : Action Plan components.

IMPLEMENTATION:

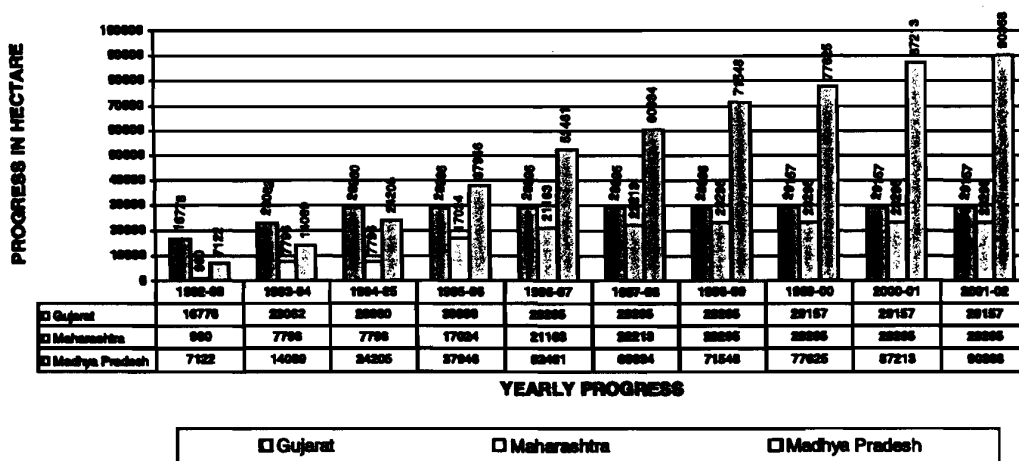
Project authorities have prepared the plans for treating 1,79,180 ha area in about 10 years time. Govt. of Gujarat started the treatment works w.e.f. monsoon of 1990 whereas Govt. of Maharashtra and Govt. of Madhya Pradesh could start the work in the year 1992. The progress of treatment work is detailed in the table – 2 and the bar chart-I drawn below:

Area under treatment 1,79,180 ha **Progress** 1,42,820 ha * **Balance** 36,360 ha *

Table -2: Year wise progress of CAT Works

YEAR	GOG			GOM			GOMP *		
TARGETS	F A 27204	N FA 1953	TOTAL 29157	FA 21122	N FA 3176	TOTAL 24298	F A 51930	N FA 73795	TOTAL 1,25,725
1990-91	4,528	898	5,426	0	0	0	0	0	00
1991-92	4,770	230	5,000	0	0	0	0	0	0
1992-93	6,014	336	6,350	960	0	960	0	7,122	7,122
1993-94	6,000	286	6,286	6,514	322	6,836	966	6,001	6,967
1994-95	5,730	168	5,898	6,542	2,686	9,228	4,348	5,768	10,116
1995-96	0	35	35	4,735	4	4,739	4,390	9,351	13,741
1996-97	0	0	0	450	0	450	8,158	6,357	14,515
1997-98	0	0	0	1082	0	1082	4,441	3,732	8,173
1998-99	0	0	0	0	0	0	8,583	2,331	10,914
99-2000	162	0	162	0	0	0	2,830	3,247	6,077
2000-01	-	-	-	-	-	-	3,270	6,318	9,588
2001-02	-	-	-	-	-	-	2,233	922	3,155
Total	27,204	1,953	29,157	20,283	3,012	23,295	39,219	51,149	90,368

Cumulative progress of the CAT works in the States of Madhya Pradesh, Gujarat and Maharashtra.



Govt. of Gujarat

As the Catchment area of Sardar Sarovar was little in Gujarat, GOG accepted the recommendations of Diwan Committee and commenced the work of treating entire catchment area in the year 1990. By the end of March' 1995 forest area of 27,204 ha & non-forest area of 1953 ha were treated. Treatment work is almost completed. Graphic presentation of the progress is given in the chart-4.

Panoramic View of the CAT Works – Initial Years

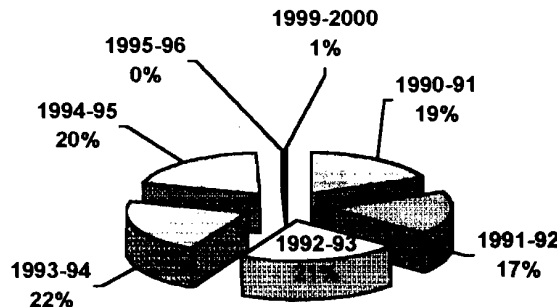
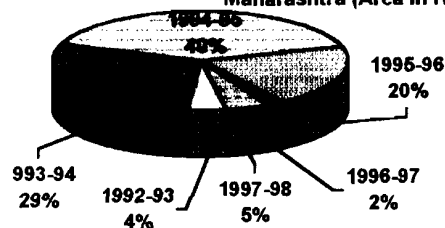


CHART-4 Progress of CAT Phase I in Gujarat (Area in Ha.)



CHART 5: Progress of CAT Phase I in Maharashtra (Area in Ha.)



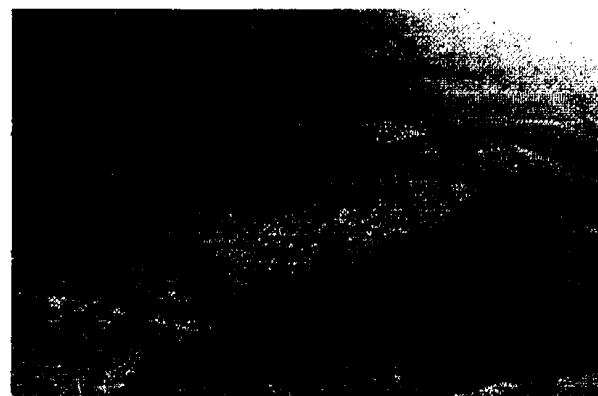
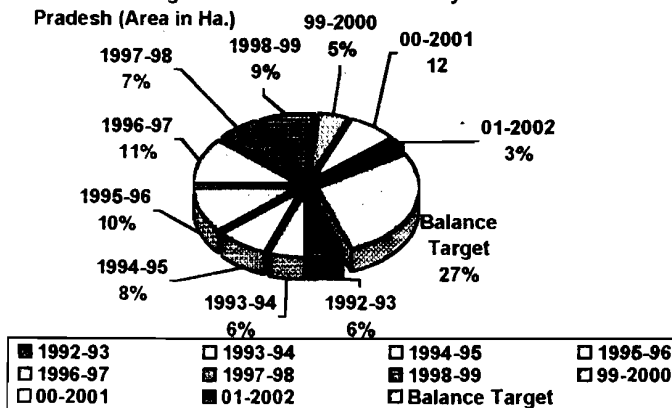
Govt. of Maharashtra:

Treatment works in Maharashtra could commence in the year 1992. By the end of September, 2001 forest area of 20,283 ha and non-forest area 3,012 ha were treated. Thereby almost completing the Phase-I work in Maharashtra. Graphic profile of the progress is given in *chart-5*.

Govt. of Madhya Pradesh

Treatment works in Madhya Pradesh could commence after submission of the revised work plan in 1992. By the end of September, 2001 a total of 90,368 ha area including both, forest & non-forest areas was treated-up. Progress is depicted in *Chart-6*

CHART 6: Progress of CAT Phase I in Madhya Pradesh (Area in Ha.)



Sardar Sarovar Project: Balance Targets :

Against the planned target of 179,180 ha of CAT works for the SSP as a whole, an area of 1,42,842 ha was treated up by the end of September, 2001. It is proposed to treat the balance area as shown in the pie chart below and detailed in the table-3

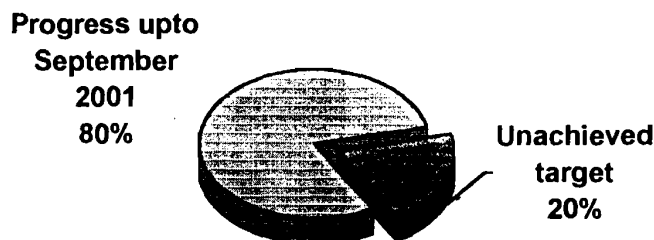


Table-3: CAT Works remaining

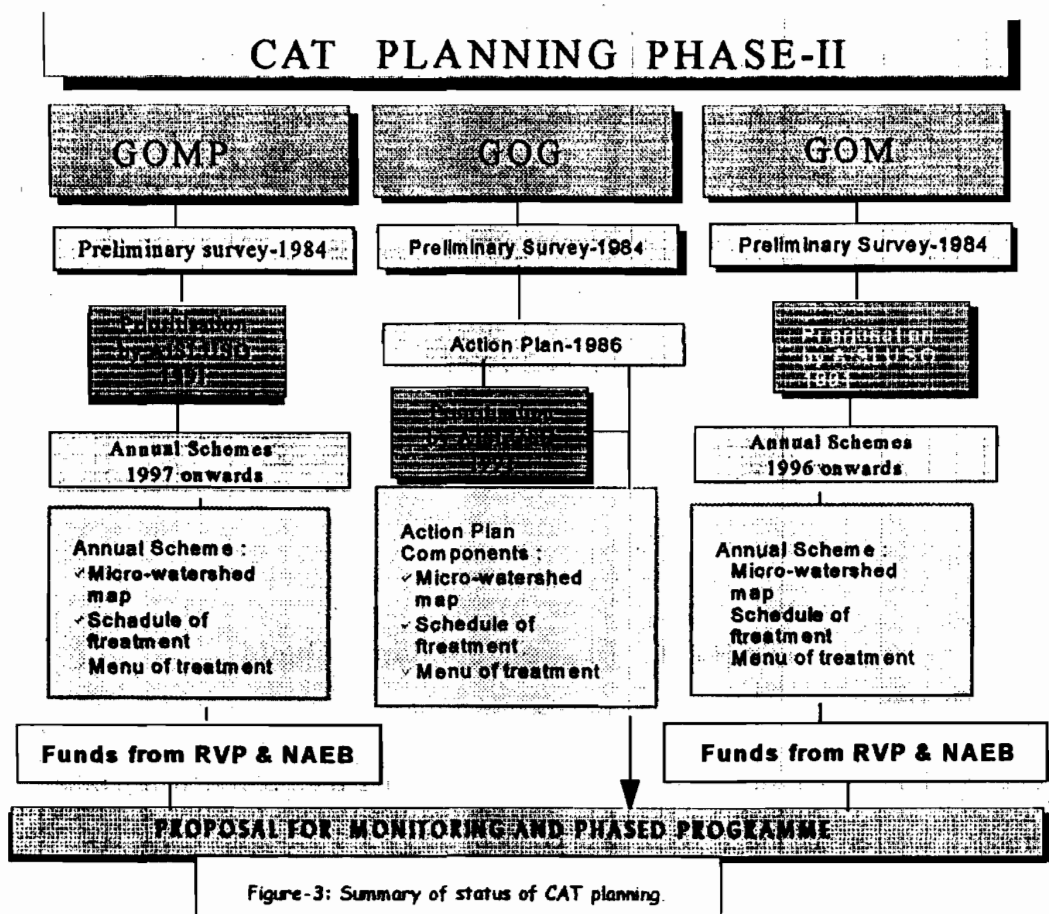
PARTICULARS	GUJARAT			MAHARASHTRA			MADHYA PRADESH		
	F.A.	N.F.A	TOTAL	F.A.	N.F.A.	TOTAL	F.A.	N.F.A.	TOTAL
TARGET	27204	1953	29157	21122	3176	24298	51930	73795	125725
WORK DONE	27204	1953	29157	20283	3012	23295	39219	51149	90368
Balance	0	0	0	839*	164*	1003*	12711	22646	35357

* Areas not available for treatment

PHASE-II: INDIRECTLY DRAINING SUBWATERSHEDS:

Project authorities were required to prepare plans for treating balance of the critically degraded sub-watersheds. The planning process is summarised in the figure below :

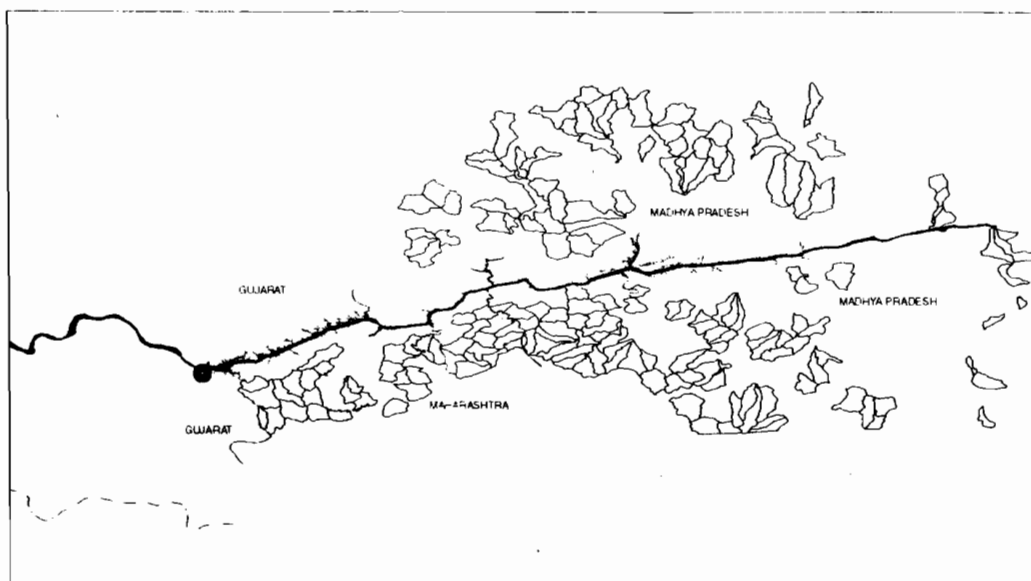
State Govts. of Maharashtra and Madhya Pradesh have submitted the plans. The funds for treating these areas have been promised by the RVP Scheme of Planning Commission, National Afforestation and Eco-development Board etc. The plans are being revised in a phased manner in accordance with the guidelines of the funding agencies. The RVP and NAEB have approved some of these plans. Works have commenced. Planning Commission has agreed for inclusion of Narmada River catchment for treatment under its programme of River Valley Project Scheme. MOE&F also promise funds from National Afforestation & Eco-Development Board. Work commenced on 6 schemes in Maharashtra & a few others in Madhya Pradesh. Further 7 more schemes were approved during 1997-98.



Maharashtra

Govt. of Maharashtra have prepared a macro-watershed plan for 77,568 hectare in Phase-II of CAT works, out of total 80,881 hectare in 35 sub-watersheds. Apart from this separate micro-watersheds plans are prepared for forestland and non-forestland. Micro-watershed plans for forestland in all 35 watersheds have been submitted, which covers 42,867 hectare area. Progress on such schemes is 7,050 hectare. In case of non-forestland, the schemes are not available with NCA but the progress of 7,854 hectare. is reported on 13 micro-watershed schemes covering an area of 15,656 hectare.





SSP CAT Phase-II sub-watersheds

Madhya Pradesh:

Catchment area of Sardar Sarovar Project below Narmada Sagar in Madhya Pradesh is 5,44,505 ha. This area includes the freely draining area attributable to Jobat, Man, Maheshwar, and Omkareshwar Projects also as per the details given in the table-4. After subtracting such areas, the gross area of critically degraded sub-watersheds is 4,75,617 ha. Out of this, Govt. of Madhya Pradesh has prepared plans for treating 1,25,725 ha area, as Phase-I already described above, under directly draining category at the cost of the project. Therefore, the gross area for which plans are required to be submitted for Phase-II programme was 3,49,892 ha.

Table-4

Total Area of Freely Draining Critically Degraded Sub-watersheds	5,46,702 ha
Catchment below NSP	3,52,089 ha
Net Treatable area	3,18,118 ha

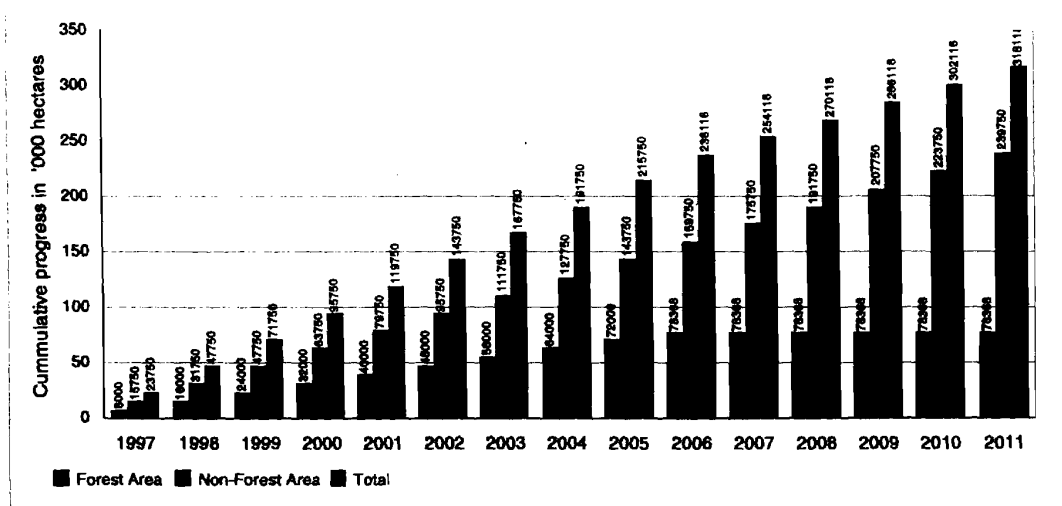
Project	Phase-I (Directly Draining)	Phase-II (Balance area)	Total Area
Jobat			28,211
Man			12,720
Maheshwar			13,209
Omkareshwar			14,748
SSP	1,25,725	3,49,892	4,75,617
		Total :	5,44,505

Schedule of Treatment

Project authorities have prepared the plans for treating the 3,49,892 ha of catchment in 139 sub-watersheds of Phase-II areas by the end of year 2011. The schedule of treatment planned is given in Bar Chart. However, annual micro-watershed plans are under implementation as presented below.

Progress of Implementation:

Under River Valley Project Schemes 43 schemes covering an area of 87884 ha had been approved by the GOI. Out of these, 30 schemes pertain to SSP. These 30 schemes envisages CAT over an area of 59566 ha of which 21036 ha area has been treated. Schedule of implementation is given in the Bar Chart-8.



Chapter 3**COMPENSATORY AFFORESTATION**

Approval for the diversion of forestland for the SSP was granted by the MOEF in 1987, 1990 & in 1993 (including for R&R works) but several conditions were attached relating to the planning and implementation of CAF. Principals amongst these are the following stipulations.



Plantations in Madhya Pradesh

- ❶ For every hectare of forestland submerged or diverted for construction of the project there should be Compensatory afforestation on one hectare of non-forest land plus reforestation on two hectares of degraded forest.
- ❷ For the 4,200.00 hectares of forestland in Maharashtra, which is to be used for R&R, an equal area of non-forest land or double the area of degraded forest should be planted.
- ❸ The governments of the three states involved should prepare plans detailing their proposals for Compensatory Afforestation and submit these to the MOEF before work in the forest area is due to commence.
- ❹ The project should supply firewood to its construction workers, at its own cost, to prevent them from having to meet their fuel needs from the surrounding forests.

STUDIES

There have been a number of studies in three states aimed at assessing the extent and significance of the loss of forestland attributable to the SSP.

- ❶ Sardar Sarovar (Narmada) Project Development Plan, Volume-II prepared by the Narmada Planning Group (NPG) in 1983.
- ❷ Studies on Eco and Environment by M.S. University of Baroda (MSU) in 1983.
- ❸ Sardar Sarovar Project: Preparation of Environmental Work Plan by the Forest Department of Maharashtra in 1988.
- ❹ Eco-Environment and Wildlife Management Studies in Sardar Sarovar Submergence Area in Gujarat by MSU, in 1992.
- ❺ Impact Assessment of Madhya Pradesh Land to be submerged Under Sardar Sarovar Project and Adjoining Ecosystems by State Forest Research Institute, Jabalpur (1989-92).
- ❻ Report on Flora and Fauna In and Around Sardar Sarovar Project, Maharashtra by the University of Pune, August 1997.

ACTION PLANS

In compliance with the conditions set by the MOEF, each state has prepared an Action Plan for the CAF of areas within it's boundaries. The relevant documents are:

- ❶ Government of Gujarat Work Plan for Management of Environmental Effects, Section on Forests and Wildlife: The Compensatory Afforestation Plan for the Rann of Kachchh, 1986.
- ❷ Project for Afforestation in Sardar Sarovar Project Impact Areas due to Diversion of forestlands for Sardar Sarovar Project (GOG), 1991.
- ❸ Compensatory Afforestation Scheme in Lieu of Sardar Sarovar Project in Dhule District, Maharashtra State (1989).
- ❹ Government of Madhya Pradesh Forest Department Action Plan of Compensatory Afforestation for Sardar Sarovar Multipurpose River Valley Project (1989).

These plans were submitted in varying stages of completeness but each has now been revised and updated. Action Plans of three State Govt. contained following components:

Implementation

The Action Plans spell out a programme of tree planting in the three states on both non-forest and degraded forest areas as shown in bar *Chart-12* and *Table-6 & 7*.

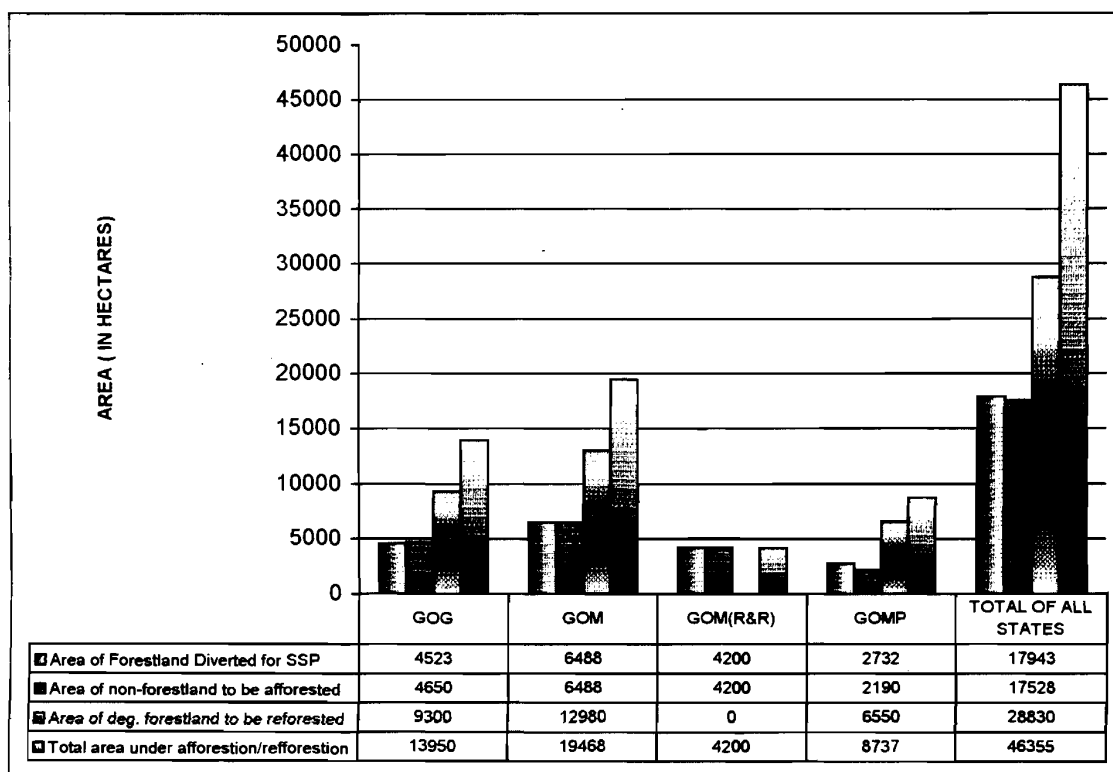
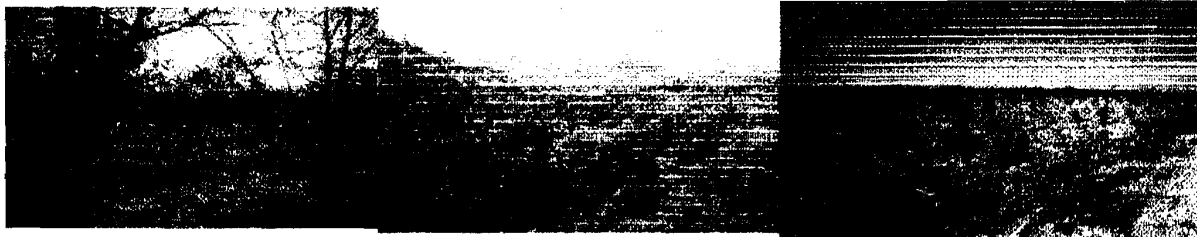
Planning

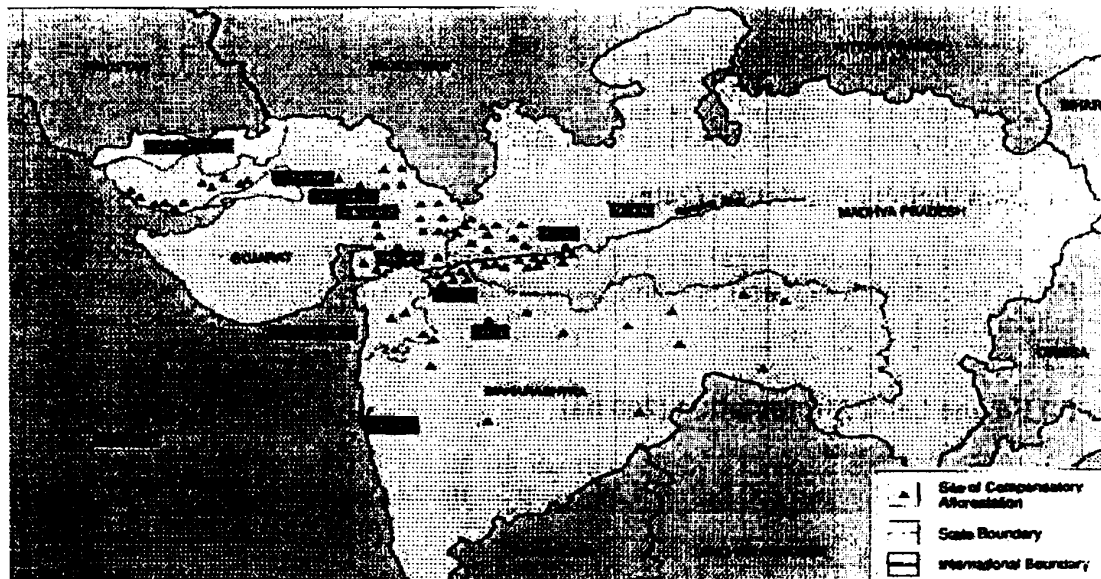
An area of 13386 ha was diverted by MOEF vide it's order of 1987. It was stipulated in this order that plantations shall be carried out in equal non forest land in addition to the plantations on degraded forest land double in extent of the area diverted. Thus for every ha of the area diverted three ha of plantations were to be carried out by the project authorities. In addition to the area diverted by the MOEF in 1987 an area of 357 ha was diverted by GOG earlier. State Govts. have prepared the plans for plantations of 46,358 ha besides reforestation of 28,830 ha area including plantations over 4,200 ha of non-forest land in lieu of the land released for R&R works in Maharashtra. Statewise details of the total area taken for SSP and the planning in lieu thereof are given in the chart-11.

In Maharashtra State 4200 ha forest land was released for R&R works in two phases. In 1990 an area of 2700 ha was released in Taloda taluka. Further 1500 ha was released during 1993 in the same taluka. State Govt. was required to carry out plantations on equal non-forestland. Detailed programme and progress of plantations is given in the table 6 below:

Table-6. Compensatory Afforestation against 4200 ha forest land released for R&R works in Maharashtra vide MOEF order dated 1990 (2700ha) and 1993 (1500 ha).

Year	Land released	Progress 1993-94	Progress 1994-95	Progress 1995-96	Progress 2000-01	Cumulative Progress	Balance targets
1990	2,700.00	2,192.37	311.00	184.50	9.63	2697.5	2.5
1993	1,500.00	0.00	0.00	896.00	604	1500.00	00
TOTAL	4,200.00	2,192.37	311.00	1,080.50	613.63	4197.5	2.5

**Chart-11:** Showing forest areas taken for SSP. This includes 357 ha taken for SSP in Gujarat prior to formal clearance under FCA, 1980 besides the area diverted for R&R works in Maharashtra and targets for afforestation/reforestation

Map: 2 Showing locations of sites of plantations in the States of Gujarat, Maharashtra and Madhya Pradesh**Table-7:** Showing detailed progress of CAF, against the target area of 42,155 ha. in lieu of 13,386 ha. diverted for submergence of SSP vide MOEF order dated December, 1987. (Area in ha)

Monsoon year	GUJARAT		MAHARASHTRA		MADHYA PRADESH	
	Degraded forest	Non-forest	Degraded forest	Non-forest	Degraded forest	Non-forest
90-91	-	2,150.00	-	-	132.00	716.00
91-92	2,834.00	350.00	8,383.00	-	1,200.00	373.00
92-93	2,450.00	847.00	4,552.00	2,276.00	2,532.00	-
93-94	2,500.00	460.00	20.00	1,156.00	1,623.00	86.00
94-95	1,516.00	843.00	-	2,894.00	827.00	200.00
95-96	Completed	Completed	22.00	NIL	60.00	-
96-97	-	-	-	NIL	-	-
97-98	-	-	-	NIL	178.00	506.00
98-99	-	-	-	75.00	-	277.00
99-2000	-	-	-	-	-	26.00
Sub-total	9,300.00	4,650.00	12,977.00*	6,401.00	6,552.00	2184.00
Total	13,950.00		19,378.00		8,736.00 *	

* Area classification, reconciled.

Figures shown are as per NVDA letter No. 1235/वन/मा चि/ 1199 दिनांक 1-9-2001

In addition to the above following additional plantations have been taken-up by the Govt. of Gujarat.

Additional Plantation Activities**(a) Plantation along Canal Banks**

The total potential of canal bank plantations is estimated to be 5,300 ha. A project report prepared for this purpose by Gujarat Forest Department is under scrutiny by SSNNL. The plantation programme was launched from the year 1990-91. Plantations on 1,870 ha have already been established till monsoon of 1999.

(b) Dam Vicinity Plantation (240ha)

The plantation in total area 551 ha. In the vicinity of dam have been completed by the forest department as well as project authorities. This is being maintained by project authorities.

(c) Ravine Land Afforestation (200 ha)

On the left bank of river Sabarmati an area of 200ha in two villages i.e. Ratanpur (120ha.) and Phirojpur (80 ha) was taken up for model plantation. Entire work has now been completed

An area of 311 ha. had been planted in the project area and the work is completed.



Canal Bank Plantations

Chapter 3

COMMAND AREA DEVELOPMENT

The command area of the project is fixed based on the areas included by NWDT for purposes of considering requirement of Narmada water for irrigation in Gujarat. Accordingly, the GCA of the project is 3.43 million hectares of which culturable command is estimated to be 2.12 million hectares. Thus, the command encompasses a very large area of the state of Gujarat and about 75000 ha area in Rajasthan and is characterized by wide diversity in agro-climatic and socio-economic conditions.



- 9 The Narmada Main Canal also known as Navagam Main Canal off-takes from Sardar Sarovar Dam in Gujarat at a full supply level (FSL) of 91.44 m (300 ft.) and traverses through a distance of 458.30 km before entering Rajasthan near village Silu, Tehsil Sanchore, district Jalore.
- 9 In Rajasthan, the Canal runs for a distance of 74 km. The Topography of the area is suitable for a contour canal upto 54.00 km as such in this reach irrigation has been restricted to portion of command on river side only. From Km 54.00 onwards up-to the tail end (km 74.00) the canal has been aligned as a ridge canal to irrigate areas on either side.

To safeguard development of irrigation in the vast command, it is important to ensure that the transfer of water to the Command Area does not give rise to the environmental problems, which have been experienced by some water developments in the past. In view of the potentially far-reaching effects of water distribution in the SSP command area, mitigating measures have been determine requiring , control and monitoring in the following areas :

- drainage, waterlogging and soil salinity;
water quality;
- forest loss;
potential impact on flora and fauna;
- effects on public health:
socio-economic impacts.

A large number of studies have been undertaken by the project authorities most of these studies are now complete. The result of the studies available by the end of 1993 were used to prepare and assessment report of the development of the Command Area simultaneously by the H.R. Wallingford and Narmada Planning Group during March / April, 1993. An updated environmental management plan for the Command Area is under formulation.

(A) Current Scenario : Government of Gujarat

Government of Gujarat have undertaken several studies related to the command area development. Most of these have been completed and the remaining are in progress. The various studies are listed below:

Agricultural Practices and Socio-Economic

- + Some Aspects of Role of Panchayats and Institutional Arrangements for Canal Irrigation in Two Talukas of Ahmedabad District. Institute of Cultural and Urban Anthropology, Ahmedabad, 1982
- + A Study of Settlement Pattern (6 Talukas in the Narmada Command Area of Mahesana, District of Gujarat).
- + Department of Geography, Gujarat University, Ahmedabad, 1982.
- + Regionalisation of Narmada Command, Operations Research Group, Vadodara, 1982.
- + Socio-Economic Bench Mark Survey of 62 Talukas (Sub-districts) of Narmada Command Area. Fourteen Different Agencies including Universities Research Institutions etc. 1983
- + Population Projection and Migration Study for Narmada Command Area. Operations Research Group, Vadodara, 1983.
- + Consumer Expenditure, Assets and Indebtedness of Rural Households of the Command Area of Sardar Sarovar (Narmada) Project Directorate of Economics & Statistics, Gandhinagar, 1983.
- + State of Adoption of Improved Technology in Narmada Command and Rest of Gujarat State (Based on Analysis of Crop cutting Experiments Data). Operations Research Group, Vadodara, 1985.
- + Land Use and Cropping Pattern Survey and Mapping of Narmada Command Area Zone 4A & 4B. Department of Geography, M.S. University, Vadodara, 1986.
- + Growth of Agro-Processing Industries in Phase-I of the SSP. Gujarat Industrial & Technical Consultancy Organisation Ltd., Gandhinagar, 1990.
- + Studies in Water Rates Policy, in 3 parts:
- + Pricing of a Public Utility Survey of Literature. Department of Economics, South Gujarat University, Surat.
- + Financial working of Irrigation Projects - A Case of Four Projects in Gujarat. Department of Economics, Sardar Patel University, Vallabh, Vidyanagar.
- + Some Policy Issue for Canal Water Rates in Gujarat. Department of Economics, Sardar Patel University, Vallabh, Vidyanagar, 1992.
- + Economic Dimension of the Sardar Sarovar Project. S.P. Institute of Social & Economic Research, Ahmedabad, 1995.
- + Wasteland Development Project for Command Area of Narmada Canal (Region 11 and 12). Gujarat State Rural Development Corporation Ltd., Gandhinagar, 1984.
- + Cropping Pattern and Waste Demand Study in Narmada Command Area. Operations Research Group, Vadodara, 1987.

- ✦ Study on Preparation of a Detailed Integrated Command Area Development Plan for SSP.M/s. Wamana Consultants Pvt. Ltd., Hyderabad, 1994.

Drainage, Waterlogging and Salinity

Groundwater Studies

- » Mathematical Modeling of Ground Water System for single layer model-Narmada Mahi-Doab by Operations Research Group, Vadodara. Completed in 1982.

This study was taken up as a preliminary study, to deal with recharges due to rainfall and due to irrigation inputs of varying levels and rise of varying level of pumping. The study provided initial insights for planning for future ground water development on introduction of surface irrigation.

- » Mathematical Modeling of Ground Water System Narmada Mahi Doab. By Operations Research Group, Vadodara. Completed in 1985.
- And
- » Additional work of Mathematical Modeling of Ground Water System Single Layer Model-Narmada Mahi-Doab. By Operations Research Group, Vadodara. Completed in 1985.

These detailed modeling studies dealt with recharges due to rainfall and due to irrigation inputs of varying levels and rise of Ground Water over time with varying levels of pumping. Based on these results, the ground water development in command area is visualised in planning of the SAP.

- » Survey and Investigation Work of Ground Water Resources in Narmada Mahi-Doab by Gujarat Water Resources Development Corporation Ltd. Gandhinagar. Completed in 1987.

This study was carried out for determination of hydro geological and hydrological parameters of the aquifers. The study has provided useful information regarding water levels and water quality for conjunctive use and to control the problem of water logging after surface irrigation starts.

- » Mathematical Modeling of Ground Water System for SSP Command between Rivers Shedhi and Sabarmati by Consultancy Engineering Services, New Delhi. Completed in 1993.
- And
- » Mathematical Modeling of Ground Water System for SSP Command between Rivers Sabarmati and Banas by Operations Research Group, Vadodara.
- And
- » Mathematical Modeling of Ground Water System for SSP Command beyond Banas upto Rajasthan Border by Dalal Consultants, Ahmedabad. Completed in 1993.

These modeling studies dealt with recharge due to rainfall and due to irrigation inputs of varying levels and rise of ground water overtime with varying levels of pumping. The studies provided insights for planning for future ground water development on introduction of surface irrigation.

- » Hydro geological Impact Assessment Study by H.R. Wallingford. Completed in 1995.

This was a review of earlier drainage studies. It has provided information about the revised drainage co-efficient.

- » Survey and Investigation of Ground Water Resources beyond river Mahi upto border of Rajasthan in SSP Command Area.

This study was carried out for determination of hydro-geological and hydrological parameters of the aquifers. The study provides useful information regarding water levels and water quality for conjunctive use and to control the problem of waterlogging after surface irrigation starts.

Drainage Studies

- » Pre-feasibility Level Drainage Study of Narmada Mahi-Doab of SSP Command, by Core Consultants, Ltd., Ahmedabad. Completed in 1982.

This study has been carried out for assessing the drainage requirements of the command area upto Mahi. Drainage co-efficient for each region are worked out and accordingly surface and sub-surface drainage requirements are planned.

- » Pre-feasibility level Drainage Study for SSP Command beyond River Mahi. By Consultancy Engineering Services, New Delhi. Completed in 1993.

This study has been carried out for assessing the drainage requirements of the command area. Drainage co-efficient for each region are worked out and accordingly surface and sub-surface drainage requirements are planned.

Floral and Faunal Studies

- » The Sardar Sarovar Narmada Project Studies on Ecology and Environment by Department of Botany, M.S. University, Vadodara. Completed in 1983.

The objective of the study was to suggest ways and means of achieving optimum utilisation of the Narmada Waters without any appreciable damage to the river ecosystem and to collect the data on various parameters of ecosystem, to assess likely changes and to suggest remedial measures for negative impacts, if any. Based on the findings of the report, work plans for Forest and Wildlife, Public Health and Fish and Fisheries have been prepared for implementation.

- » Study on Flora and fauna of the Command Area of Sardar Sarovar (.Narmada) Project lying between the Narmada and Sabarmati Rivers (EIA studies) by Sardar Patel University, Vallabh Vidhyanagar. Completed in November 1995.

The study was taken up to assess the Environmental Impact of the SSP on Flora and Fauna based on experience of Mahi irrigation Project. Based on recommendation of the study, the floral and faunal management plan is to be prepared.

- » Study on Flora and Fauna of the command area of Sardar Sarovar (Narmada) Project lying in Saurashtra and Kachchh Area (EIA) Studies by Saurashtra University, Rajkot. Completed in January 1996.

The study was taken up to assess the Environmental Impact of die SSP on Flora and Fauna based on experience of Mahi irrigation Project. Based on recommendations of this study, the floral and faunal management plan is to be prepared.

- » Study on Flora and Fauna of die Command Area of Sardar Sarovar (Narmada) Project lying between Sabarmati and Rajasthan Border (EIA studies) by Gujarat University, Ahmedabad. Completed in March 1998.

The study was taken up to assess the environmental impact of the SSP on flora and fauna based on experience of Mahi Irrigation Project. Based on recommendations of this study, the floral and faunal management plan is to be prepared.

- » EIA on Downstream of Sardar Sarovar Dam upto Gulf of Cambay by M/s. H. R. Wallingford. U.K. Completed in April 1995.

This was taken up to evaluate die environmental impacts on the down stream in the initial stage of 25 years of this project. The results of this study will be used for downstream area planning.

- » Ecological study on Wild Ass Sanctuary and surrounding Area Using Remote Sensing Technology for Environmental Impact Assessment by Gujarat Ecological Education and Research Foundation, Gandhinagar. Completed in 1997.

This study was taken up to determine various land use classes by remote sensing to monitor the trend of *prosopis*, salt and grass land in and around the sanctuary. The information of the study report will be utilised for detailed EIA study of the sanctuary.

- » Environmental impact Assessment of Nal Sarovar Bird Sanctuary by Gujarat Ecological Education and Research Foundation, Gandhinagar. Completed in 1998.

The study was taken up to assess the impacts of canal irrigation in and around the Sanctuary area. Based on the recommendations of this study, the Action Plan for Nal Sarovar Bird Sanctuary is to be prepared

- » Environmental Impact Assessment of Velavadar Black Buck National Park b Gujarat Ecological Education and Research Foundation, Gandhinagar Completed in 1997.

The study was taken up to assess the various impacts of surface irrigation) and around Sanctuary area. Based on the recommendations of the study, a draft action plan has been prepared and as per tile suggestions of experts, the final Action Plan is being prepared.

Fisheries

- » Environmental Impact Assessment Studies on Inland Marine Fisheries relevant to the Command Area of Sardar Sarovar (Narmada) Project, by M.S. University, Vadodara. Completed in 1995.

This study was taken up to assess the impacts of SSP Canal water on fisheries. Based on recommendations of the study, fisheries development programme (an Action Plan) for Phase-I area has been prepared by the Commissioner of Fisheries.

Health

- » Environmental Impact Assessment (EIA) studies on Water Related Diseases in Sardar Sarovar Project (SSP) Command Area including the Area Down Stream of the SSP Dam by Commissionerate of Health, Medical Services Medical Education, Government Of Gujarat, Gandhinagar. Completed in October, 1995,

The study was taken up to assess the impacts of canal water on water related diseases. Based on recommendation of this study an action plan for health sector for the SSP Command is being prepared.

Water Quality

- ➔ GWSSB(1983) Study to detremine Municiple and Industrial demand; parallel study on Sabarmati basin by GPCB(1989).
- ➔ GPCB Compilation of water quality data for 10 selected rivers in Gujarat under GEMS (WHO Supported) and national MINARS Project; Limited ground water monitoring by GPCB.

The command area encompasses twelve districts, viz. Bharuch, Vadodara, Panchmahals, Kheda, Ahmedabad, Gandhinagar, Mahesana, Bhavnagar, Surendranagar, Rajkot, Banaskantha and Kutch. Total number of 'the talukas of these districts wholly or partially covered in the command is 62 and about 3344 villages of these talukas are expected to be served by the project for irrigation.

The Canal system would command a gross area of 3.43 M ha. and cultivable area of 2.124 M ha It is envisaged to irrigate annually 1.792 M ha. with the availability of 9 MAF of surface water from the project. From management point of view, for laying down a set of prescriptions for crop pattern, water allocation and management, conjunctive use etc., the command has been divided into regions based on the following factors:

- (a) Annual rainfall
- (b) Land irrigability class including drainage characteristics
- (c) Ground water quantity and quality in terms of ground water table and salinity of water in the upper aquifers
- (d) Alignment and the command of major branches.

Considering these factors, the command has been divided into 13 regions. The main regions, their names, GCA and CCA are as follows:

Sl.No.	Name of the region	Region No.	GCA	CCA
1.	Sankheda-Savli	1	253100	161900
2.	Sinor-Vadodara	2	273100	187600
3.	Bharuch-Amod	3	153200	84900
4.	Vagra-Jambusar	4	111300	36800
5.	Mehmedabad-Daskroi	5	295700	192300
6.	Sanand-Kadi	6	181700	125700
7.	Dholka-Dhandhuka	7	476000	264300
8.	Limdi-Botad	8	294000	182600
9.	Halvad-Malia	9	268400	168000
10.	Viramgam-Dasada	10	344600	242100
11.	Sami-Harij	11	191700	115200
12.	Radhanpur-Vav	12	462800	319700
13.	Rapar-Mundra	13	122900	42800
	All regions	14	3428500	2123900

The Soil Survey Manual (IARI 1970) recognises six irrigability classes.

- Class 1 : Lands that have few limitations for sustained use under irrigation.
 Class 2 : Lands that have moderate limitations for sustained use under irrigation.
 Class 3 : Lands that have severe limitations for sustained use under irrigation.
 Class 4 : Lands that are marginal for sustained use under irrigation because of very severe limitations.
 Class 5 : Lands that are temporarily classified as not suitable for sustained use under irrigation pending further investigations.
 Class 6 : Land not suitable for sustained use under irrigation.

Flora and Fauna

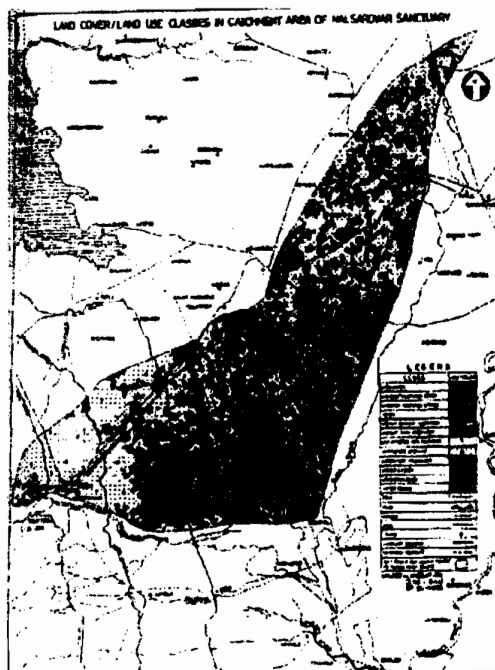
Based on the reports received from the three universities, which conducted the E.I.A. studies, the following are the identified impacts.

- + Irrigation will bring about sub-humid conditions in the various regions. This would be favourable for most crops trees of the area. Thus, semiarid regions of northern part of North Gujarat (region 12), Bhal area of Saurashtra (region 7) and Kutch (region 13) will also have partially sub-humid conditions in irrigated tracts.

- + SSP aims at diversified cropping patterns. Introduction of dry land horticultural crops on fallow and on areas not otherwise irrigable by gravity is also on the anvil.
- + Overall agricultural and tree-shrub biomass base will be substantially augmented. The range of biomass diversity adapted to sub-humid conditions is also likely to be larger. The following depicts the crop ranges of the area with stabilisation of irrigation and indicates that monocultures or limited ranges of cultures are not likely.
- + Studies show a rich potential for farm forestry, agro-silviculture, and forestry on saline and marginal lands. Including the canal side plantations on 18,000 ha, a conservative estimate indicates potential for plantations and tree culture of at least 3.27 lakh ha for the command area as a whole. Yields of grasslands in regions 4, 7, 8,9,10,11, and 12 will improve significantly with better propagation of perennial varieties like *Cynodon dactylon*, *Dichanthium annulatum*, *Panicum*, *Paspalidium* etc.
- + Certain grass species and vegetation belonging exclusively to arid or desert climates may not thrive well as found from experience of Rajasthan Canal. However, since over 30 per cent of the geographical area will not have irrigation networks, the species may continue in these areas and this aspect is to be studied in depth.
- + Certain weeds may show accelerated growth of farmlands, drains, etc. and weed control strategies may have to be used. Weed problems in canals will not arise (when these are well maintained) because of lining down to 8 ha units.
- + If waterlogging develops in certain areas, new aqua vegetative systems with weeds are likely to develop.
- + There will be no impacts on major fauna since this is a present trend to agricultural regimes. Certain avifauna reptiles and rodents may proliferate. Avi fauna diversity will increase with a number of tanks and water bodies kept full as seen from the experience of Mahi command.
- + Steps for protection of the following flora and fauna species indicated presently as rare in the region to be taken are in the form of conservation measures in specific areas identified or setting up herbaria etc. Universities will be involved for creation of gene bank pools to the extent required.

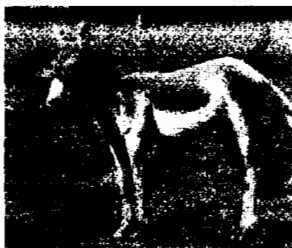
Sanctuaries

- For Nal Sarovar Bird Sanctuary (area 115 sq.kms. contribution from Sardar Sarovar Project waters will arise only when there are droughts and the lake does not fill up due to natural run-off from the catchment area. Studies done hitherto indicate that positive impacts can be expected with zoning out the lake area, protecting the habitat of migrant birds on the shore and a sound scientific plan which accommodates needs of the local communities for fishing



and grazing. Utility of Nal Sarovar as a storage mechanism for supporting lift irrigation not likely to be favourable. Quality of agricultural run off to Nal Sarovar from the catchment area (which will be irrigated) is planned to be regularly monitored in the long run.

- As regards Wild Ass Sanctuary (area 4,953 sq kms), the overall impact is likely to be positive mainly because of availability of fresh water in waterholes for the wild Asses and better growth and sustenance of grasses. However, the sanctuary is under some



of pressure because of salt industries and intrusion cattle. Wild asses often damage crops on the periphery. The Kachchh Branch crosses the neck dividing the Little Rann and the Great Rann and the most appropriate structure for the crossing is being worked out so as not to impede the movements of wild asses. Siphon type structure appears to be quite promising. Management plans will be worked out considering the salt industries, which have entered the Little Rann in a big way as also the pressure of cattle on the periphery. Better development of bio-mass on the islands, if brought about as a part of planned development, may reduce damages to the agriculture crops on the periphery by wild asses as observed at present. However, if the interior is not conserved, the impacts can be the just opposite.

- As regards the Black Buck Sanctuary (area 34 sq kms), the Sardar Sarovar Project will create a very positive environment because of supply of fresh water which is highly deficient in the area. However identified negative impacts are listed below :

- + Wildlife habitat may be reduced in ecological zone due to the change in the land use and cropping pattern.
- + With increase in agricultural production, Blackbuck may start frequenting the fields, thus possibly increasing human/animal conflict.
- + Through there is very little likelihood of water-logging in ecological zone, some patches may face waterlogging creating small patches of saline marshes for short period.
- + Likely increase of pesticides and insecticides may affect migratory harriers and some other avi-fauna in ecological zone.

- + There is very little likelihood of a change in the microclimate in or around the park area.
- + Possibility of increase in water/moisture content in the soil may bring some change in plant communities especially Cyperaceae, Gramineae and some herbaceous species. There is likelihood of increase in area under *Prosopis juliflora* in parts of ecological zone.
- + There may be some increase in human activity, disturbing some wildlife in the ecological zone.
- + Increase in Blue bull population, due to the changed circumstances may cause problems of crop damage in surrounding areas of the National Park.

In general, for all the three sanctuaries, the networks are so planned as not to create problems of wild life movement and these are not extending anywhere inside the sanctuary limits.

Public Health

Major environmental apprehensions are with reference to the water-related diseases of malaria, filaria and schistosomiasis. As regards schistosomiasis, studies done by the National Institute of Communicable Diseases under WHO auspices indicate no snail-based foci for the disease in Narmada Valley. There are no prospects of occurrence of this disease for Narmada Project and monitoring will be ensured.

Malaria is found to occur naturally in epidemic cycles in Gujarat, partly Influenced by climatic factors. Effectiveness of the chosen control strategy has also a significant influence on transmission rates. Malaria is important both for urban and rural areas. Two of the three mosquito species are considered as principal vectors responsible for transmission, viz. *Anopheles stephensi* in urban areas and *A. culicifacies* in rural areas.

Experience of surface irrigation in Mahi Project of Kheda District has shown enhanced transmission rates during the dry months of April to June which may be ascribed to irrigation but, in general, there is no clear relationship between average annual malaria incidence and irrigated areas in the 19 districts in Gujarat. Irrigation, thus is not the principal causative factor for malaria. It may have, however, impacts if stagnations of water bodies, seepages from canal, etc. are not controlled. Under SSP the infra-structure itself, at a large cost, takes care of avoiding or minimising seepages and stagnations.

The following control strategies are expected to address to malarial problems arising on account of Sardar Sarovar Project .

- (a) Special health units to monitor and treat migrants (workers and resettled people) intensively under malaria control programmes.)
- (b) Effective monitoring and surveillance under the operative malaria control programmes.
- (c) Emphasis on 'tidy' irrigation and drainage.

- (d) Creating awareness among Sardar Sarovar Project staff as well as among command population through health education and extension programmes. This also includes preparation of a manual on malaria control.
- (e) Use of identified carnivorous fish in tanks, ponds, etc. inside and near command area.

Filaria which is caused by the mosquito species of *Culex quinquefasciatus* (fatigan) will also be controlled. It is confined to coastal areas of Saurashtra and South Gujarat and not significant for the command area as such. However, monitoring of the disease will be required.

As regards other water related diseases like dysentery, typhoid, hepatitis, gastroenteritis etc. these are related in a very limited context to irrigation. Other major factors like sewage disposals, septic tank discharges, overall hygiene of the rural population and quality of domestic water supply under cities and towns which often gets infected due to old pipe networks predominate. With current emphasis on health programmes under of the State Government and those of Municipal Corporations and municipal bodies and with increasing financial outlays and operationalisation of health care as well as health education programmes (in the context of overall commitment of "Health for all by 2000 AD"), these diseases will be kept in control. Effective monitoring and surveillance will be a part of the Health Plan for the command area of Sardar Sarovar Project.

Positive impacts due to reduction in scabies and skin diseases and availability of potable drinking water and bathing water through the SSP systems, as planned, would significantly prevail not only in the command area but also in the entire areas of Saurashtra, Kutch, and North Gujarat being served for domestic water by Sardar Sarovar Project. For scabies and skin diseases, the area benefited will not be only 20,000 sq. km. of Sardar Sarovar Project but about 80,000 sq. kms. of Saurashtra and Kutch.

Proposed Management Measures

The Sardar Sarovar Project service area has been classified into 13 agro climatic regions based on broad topographical, hydro meteorological and soil surveys. The drainage density is good in most of the regions except in regions 4, 7, and 11. Outfall conditions are sluggish in regions 4 and 7, parts of which are also affected by salinity. Sub areas or pockets likely to get waterlogged or saline due to irrigation in future have been identified for planning special measures to prevent development of such a situation.

The Phase-1 area of the project covering the command between the Narmada and the Mahi rivers has been taken up for detailed surveys, monitoring and planning. This comprises agro climatic regions 1 to 4. Detailed soil surveys and contour surveys have been carried out. Groundwater fluctuations in all the wells and special piezometers are being measured at regular intervals. Automatic water level recorders have also been installed at selected places. Hydro meteorological observation stations have been established. Studies for groundwater availability, annual recharge and mathematical modeling for surface and groundwater interaction have been carried out. Based on all these surveys and information

as well as the data of rainfall intensities, the drainage plan for the Phase-1 area has been drawn up. The irrigation water allowances for the various regions in this area have been decided keeping in view the soil classification, groundwater availability, crops grown, and climatological factors. In poorly drained flat lands with relatively high water tables, limited water allowance and conjunctive use of surface and ground waters has been planned.

Similar exercises have been taken up for the command area beyond the Mahi river also. Regions 1 and 8 have very good surface topography and internal drainage. Surface drainage requirement, if any, will be in the form of minor drains for local patches. No sub-surface drainage works are required. A large part of region 9 is also similar. Regions 2, 5 and 13 also have good surface and internal drainage. Limited minor drains, remodeling of existing channels and ground water extraction for conjunctive use is considered adequate. Regions 3, 6, 10, 11, and 12 have relatively flat ground slope and moderate internal drainage. Minor drains, remodeling of existing channels, groundwater extraction, and a limited use of moderately saline ground water have been planned.

Regions 4, 7 and 11 together with bordering areas of regions 9, 10 and 12 are relatively difficult for drainage. The Bhal tract of Gujarat falls within these regions. A well-planned intensive drainage network is being worked out for these regions. A very limited irrigation water allowance would be permitted. Ground water extraction, part mixing of saline water, improved water management and agricultural practices, leaching of surface salts by flooding with surplus spill waters of Narmada, salinity resistant agriculture and continuous careful monitoring of the groundwater table and salinity status through observation wells and piezometers etc. will constitute the multipronged strategy for tackling the problem areas.

The following are the proposed measures to prevent environmental degradation.

waterlogging and salinity:

1. *Mechanised, well-controlled canal lining*

This would reduce seepage loss to only about 10% of that in unlined canals. The canal system planning, design and operation are also inherently tuned to ensure that these problems do not arise. Thus, all the canals right down to the 8 ha blocks would be carefully lined to reduce the seepage losses. The main canals and branches will be concrete lined with mechanical pavers. The distribution system will be brick lined with a sandwiched rich mortar layer. Use of polyethylene membranes is also contemplated. The lining will reduce the seepage losses to about one tenth of the losses that would have occurred if the canals were unlined. The risk of waterlogging from seepage would be reduced to that extent.

2. *Provision of surface drains.*

The drainage excess rainfall, storm water from agricultural land for better crop productivity has been proposed at farm levels as well as at regional level. Whole of command has been divided into two regions in respect of preparation of operational design

and layout of surface drainage network commencing from 40 ha chak. The construction of the drainage system shall go on concurrently with the canals.

3. *Conjunctive utilisation of surface and ground water, limited water delta.*

The amount of water supplied per unit of area in the SSP command will be amongst the lowest in the country. The average depth of surface water supplies for the entire year measured at the main canal head will be only about 53 cm over the command area as compared to 75 to 100 cm per crop season on most of the projects in the country. This will naturally call for very judicious and economical use of water. If the farmers want to grow water intensive crops, they will have to supplement the canal water with well waters or reduce the area of their crops under irrigation. The project authorities have contemplated, conjunctive use of surface and ground waters. In the existing irrigated areas of other prefects where well irrigation is concurrently practiced, the problem of waterlogging has reduced.

4. *Better water management ,Automated canal regulation, Rotational water supply on volumetric basis ,and active participation of farmers*

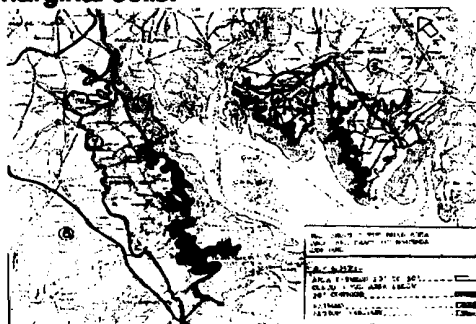
A draft legislation has been already prepared to regulate the distribution and use of canal and ground water in the state. On the Sardar Sarovar Project there will be volumetric supply of water through a computerized semi-automated operation system. Under this system, the discharge from the canals down to 8.5 cumecs (300 cusecs) capacity will be regulated through automatic computer control. These measures will not allow the canals to draw more water than planned. As the tariff for the water will be on the basis of the quantity supplied, the farmers will naturally try to use it most economically. This will be further ensured through better water management through farmers' associations and rotational water supply. The irrigation water depths actually required will be worked out through a system of soil moisture sensors and observations of hydro meteorological and climatological parameters as related to crop growth stages and the supplies will be regulated accordingly. Wherever possible drip and sprinkler methods of water application will also be encouraged.

5. *Carrying out water balance and salt balance studies and the necessary monitoring.*

During monsoon, when surplus waters are likely to be available in the canal, such waters will be used for flooding and leaching the saline soils. Continuous monitoring of salt and water balance has also been planned for such marginal soils.

6. *Bhal and Bara Tract*

Special problematic areas of Bhal and Bara are difficult for irrigation in view of high water table and salinity. A possible way of developing this area can be through suitable forest development programme. Salt loving plants, having a high evapo-transpiration rate can be preferred. These



plants can help in controlling the water table. In the initial stage of development of irrigation in the command, there will be excess water available. This can be used over this area for initial leaching by way of surface diffusion. This can promote initial growth till the plants develop some resistance. Species like *Prosopis juliflora*, *Eucalyptus Artiplex* and other suitable plants can be tried. No irrigation system can be thought of for this area.

ACTION PLANS

Integration of all developmental activities related to irrigation, drainage, agriculture, co-operation, roads, marketing, forests, rural electrification etc. is considered as a basic requirement for the command area development programme targeted for SSP. The emphasis is on long term balanced and environment-friendly growth. Action Plans have been drawn up on the issues like health, fisheries, flora fauna etc. for the Command Area.

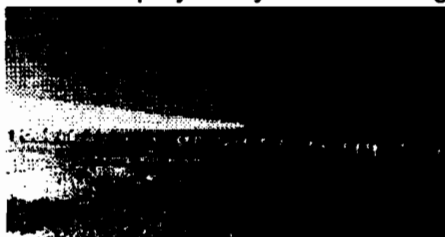
IMPLEMENTATION

Construction of Canal Phase -1 Ch 0.00 Km to 144.500 Km (Mahi crossing) along with the distributaries have been completed in all respects. Construction works in the reach between kms., 144.500 and kms., 263.165 i.e., NMC Phase-II-A have been completed in all respect. The construction works in the canal reach between kms., 263.165 and kms., 388.164 i.e., NMC Phase-II-B are in advance stage of completion. Surface drainage is being provided up to 40 ha chaks concurrently with the construction of canals. The command coming under Phase - 1 extends up to Narmada-Mahi doab and areas coming under this belongs to agro-climatic zone no 1 to 4. Development of the command area is a long drawn process. Gujarat has taken steps in accordance with the covenants of the investment clearance accorded to the project by the Planning Commission and *pari-passu* clause stipulated by the

MOEF. By now, almost all the major studies have been completed and impacts are known. Action points have also been determined.

State Govts. have taken steps for implementation of the identified action points in

accordance with the requirement of the environmental control. The command area development activities and environmental safeguard measures will be taken when water starts flowing in the canals.



(B) Current Scenario : Government of Rajasthan

The Government of Rajasthan had submitted a report on Environmental and Ecological aspects and remedial measures for 'Narmada Canal Project'. Copy of the report was submitted to Ministry of Environment and Forests. Government of Rajasthan have assigned studies on EIA of Command area in Rajasthan portion to WAPCOS. Revised draft final report is available, which is in the process of approval by State Government. Current status of studies & works is summarised below :

Narmada Main Canal

Rajasthan has been allocated 0.5 MAF (616 MCM) of Narmada water under the final award of NWDT. To utilise its share of the Narmada water, Govt. of Rajasthan have planned a 74 km long Narmada Canal to irrigate 73,157 ha. of land in the drought prone districts of Jalore and Barmer. The canal system will cover Gross Command Area (GCA) of 1,42,020 ha. of which 1,35,476 ha. is culturable Command Area (CCA). Besides irrigation benefit to 89 villages (74 in Jalore & 15 in Barmer), the project also envisages to provide drinking water to a population of about 3.0 lakhs living in 124 villages around the irrigation canal.

The canal will be trapezoidal in section and will be lined by cement concrete. Maximum capacity of the canal at the head is 74.58 cumec while discharge requirement is 69.43 cumec. There are 9 major distributories with a total length of 282.30 km. The total length of minors and sub-minors is 485.0 and 636.0 km respectively. Additional project activities would include construction of head regulators, bridges, cross drainage works, escapes etc.

A map showing the command area and the layout plan of the canal system is given at plate-III. The detailed Project Report (revised) for appraisal was submitted to Central Water Commission for approval during February, 1990. The project was considered in the 51st meeting of Technical Advisory Committee on Irrigation, Flood Control and Multi-purpose Project held on 04.12.91 and investment clearance was accorded by Planning commission vide their letter No.2(307)/92-I & C AD, dated 23.01.1996 for Rs.467.53 crores at 1989-90 price level including Rs.280.14 crores share cost payable to Gujarat. The benefit cost ratio and internal rate of return of the project are 1.01 and 10.42% respectively.

The construction of Main Canal in the first 48.0 Km reach has been taken up and the earthwork and masonry structures between 0 and 30 kms., have been completed, except in few patches due to land acquisition problem. Concrete lining completed in the initial reach of 7.88 kms. The entire Narmada Main Canal works in Rajasthan is scheduled for completion by 2005-2006.

Water Delivery Network

The water delivery system will cater to irrigation needs of the vast areas through irrigation units. Each unit of irrigation service area, called Village Service Area (VSA), has

been planned to be served through a single outlet from the distributory. This outlet will remain fully open for a fixed period during irrigation water demand and will be closed during periods of no water demand and no water availability. Water will be delivered only on the basis of the demand to a group of organised cultivators on a volumetric basis at the head of VSA, and not to individual cultivators.

In the VSAs, network for water distribution is planned through minors and sub-minors feeding different chaks and sub-chaks. For the entire system below VSA outlets, water will be supplied in proportion to the area served. Within the chak, the water will be rotated to individual fields over fixed times in proportion to the holdings.

The Distribution System Under VSAs

A Village Service Area (VSA) will generally constitute an area between 300-500 ha. of a village under command. For villages extending over areas larger than 500 ha. or if required on the basis of topography or other physical features, the VSA may cover a larger area. The VSA is planned to be divided into chaks of 30 to 60 ha.. In a chak there will be 4 to 6 sub chaks. A minor will lead the water from the VSA outlets to the heads of chaks. A sub minor will convey water into the chak up to heads of sub chaks. Field channels will carry water from heads of sub-chaks to individual fields. The chaks will be ungated and water will be rotated into sub-chaks through turnouts. In a sub chak, water will be rotated to individual farms.

The VSA outlets will either be 'on' or 'off'. A constant discharge will be released. The flow will be divided proportionately at each chak head, by fixed proportional devices. Within the chak, the flow will be rotated. The flow will continue over a fixed continuous period during a week. Generally, it will run over a period of one week. The schedule of rotation among farmers during the period of supply to the service area will be fixed for each season so that each farmer will know the day of the week and precise hours during which he is required to draw. Prior to the commencement of each crop season, the schedule may be altered so that night operations can be rotated among all farmers.

The water will flow in the VSA when demanded. Depending upon water availability, the number of waterings will be made available, at intervals, to the entire VSA. Each watering will start on a prefixed day of a week every time. During periods of peak demand, water can be supplied for consecutive weeks also. The periods between the irrigation will generally be in increments of seven days. Irrigation water will be delivered at an approximate rate of around 30 litres/sec to farmers. The actual stream size will be proportional to the area of the chak.

The farmers within a service area will, in association with the agricultural extension staff, collectively determine their common schedule for delivery of allocated water to the VSA in terms of size and number of irrigation waterings and dates of delivery. Any changes in the schedule during a cycle will be likewise determined. Short term altering of the delivery schedule to a VSA as a sequel to the rainfall, will be carried out under codes/procedures agreed upon between the agency and the VSA Committee.

Drainage System

Surface drainage would be an integral part of irrigation net work and is being provided for to cover 40 ha. chak unit in all the areas needing surface drainage. The vertical drainage as required will be through Tube Wells and Open Wells. The drainage system would consist of surface network of open channels and ground water control wells. The natural drainage shall be suitably modified and additional drainage will be provided where ever necessary to take care of excess water during monsoon to ensure that the flood water gets drained out in a reasonable period and there is no spill over and choking of drainage. The sub-surface water drainage control will be through judicious ground water exploitation and with adequate planning so that there is no water logging in the areas. The drainage system shall be constructed and maintained up to 40 ha. block synchronising in general with a chak distribution unit. The maintenance of drainage within the chak will be left to the farmers. The construction of the drainage network will be completed simultaneously with the construction of major distribution network and completed on block to block basis so that it is ready for use by the farmers by which time the surface water becomes available for irrigation.

Chapter 5**FLORA, FAUNA, WILDLIFE & CARRYING CAPACITY**

Several aspects of the SSP have potential to cause adverse effects on the terrestrial ecology of areas upstream of the dam, principal amongst these are:

- ☐ The submergence of forestland,
- ☐ And the resettlement of people in new areas



The SSP also has considerable potential to have beneficial effects on ecological resources, owing to:

- ☐ The creation of new and regenerated forest habitat:
- ☐ The establishment and improvement of wildlife sanctuaries:
- ☐ The greater availability of fresh water for irrigated forestry or for wildlife



The guidelines of the MOEF required that while seeking environmental clearance for the hydropower projects, surveys should be conducted so that the status of the flora and fauna present can be assessed, listed (rare and endangered) species can be detected, if present, and appropriate conservation measures devised.

On the basis of relevant details supplied by the various states, MOEF issued clearance for the SSP in 1987. A condition of this clearance, as far as it related specifically to the Flora & Fauna, was that the Narmada Control Authority would ensure in-depth studies on flora & fauna needed for implementation of Environmental Safeguard measures. The issues identified with respect to submergence area were identification of endangered species, rare & habitat sufficiency. Accordingly, the rehabilitation of flora fauna action plans were expected to cover the Surveys of flora & fauna in the region going to be affected due to implementation of the SSP with reference to the following

- 1) Gene pool, if any, likely to be affected.
- 2) Details of wildlife habitat in the region
- 3) Measures proposed to rehabilitate endangered species of flora fauna, if any.
- 4) Assessment of the carrying capacity of the neighbouring areas wherein the wildlife would dispose if the scheme were implemented.
- 5) Plan for rehabilitation of endangered flora & fauna.

STUDIES / SURVEYS

Important survey work included the following:

- ❶ The Environmental Impact Study of 1983 prepared by MSU.
- ❶ Preliminary Report on First Botanical Exploration and Plant Collection from Narmada Valley by the Botanical Survey of India in 1986.
- ❶ Report on the Survey of the Narmada Sagar Area by Zoological Survey of India, 1988.
- ❶ Note on Sardar Sarovar Project - Preparation of Environmental Work Plan for Forest and Wildlife by the State Forest Department, GOM, 1988.
- ❶ Status of Flora and Fauna in and Around Sardar Sarovar Project, Maharashtra is studied by the University of Pune (1992-94). Final report is received in NCA.
- ❶ Eco-Environmental and Wildlife Management Studies in the Sardar Sarovar Area in Gujarat, 1992, by MSU.
- ❶ Impact Assessment of Madhya Pradesh Land to be Submerged Under Sardar Sarovar Project and Adjoining Ecosystems. The study was conducted by the State Forest Research Institute (SFRI) in Jabalpur and financed by the NVDA. This study was completed & report was submitted in 1994.
- ❶ Workshop on Approaches to Integrated Wildlife Management in Gujarat: A Report by the SSNNL, October 1990.
- ❶ People's Involvement in Wildlife Management, by VIKSAT in 1991.
- ❶ Wildlife Management Studies in the Submergence and Catchment Area of Narmada Project: With Special Reference to Shoolpaneshwar Wildlife Sanctuary, by the SSNNL, 1992.
- ❶ Narmada Basin Water Development Plan: Development of Fisheries, 1987, was prepared by the Narmada Planning Agency, GOMP.
- ❶ Rapid Reconnaissance Survey of Limnological Aspects Part I, II and III, 1987, were undertaken by the Bhopal, Vikram and Rani Durgavati Universities for GOMP.
- ❶ The Central Pollution Control Board, Central Water Commission, the State Pollution Control Boards and the National Institute of Oceanography have collected water quality data.
- ❶ Narmada River Basin Development Project: Fisheries Component, 1991 by the German Consultants to the World Bank, GOPA.
- ❶ Sociological Survey of the Fishing Families of the Narmada River by CICFRI, 1991.

- ❖ Aquatic Fauna (Fish) Studies in Indira Sagar Submergence Area, prepared by the Friends of Nature Society in 1991 on behalf on the NVDA reported on the fish fauna of the Narmada.
- ❖ Pre-and Post-Impoundment Limnological Studies of Narmada Basin, by three universities coordinated by Barkatullah University for the NVDA. (1989-92) Study report was available in 1994.
- ❖ Studies on Fish Conservation in Narmada Sagar, Sardar Sarovar and it's Downstream, is a desk review sponsored by the NCA and undertaken by CICFRI, 1993.
- ❖ Ecology and Fisheries of the Narmada Estuarine System with Special Reference to Proposed Impoundment (Sardar Sarovar Dam) is an ongoing study begun in 1988 by CICFRI.

RECOMMENDATIONS OF THE KEY STUDIES

- For areas in Gujarat, the study was conducted by the Department of Botany & Zoology M.S. University, Vadodara. The study concentrates upon ecology & environmental aspects of the submergence & catchment area. The study is actually an extension of the earlier bench-mark study conducted during 1983 which highlighted the positive & negative aspects in the upstream, downstream & command of the Dam and environmental impact statement". The present study concentrates upon the study area was about 20 km. On each side of Sardar Sarovar in Gujarat & extended Shoolpaneshwar sanctuary encompassing about 1599 sq.km. area. A chapter of this study contains suggested "Management strategies & action plans to mitigate the adverse impacts.
- For areas in Madhya Pradesh, the study was conducted by the State Forest Research Institute, Jabalpur ,Madhya Pradesh. The MOU for the study was signed in June 1990 and study was submitted in 1994. The object of the study was to suggest compensatory conservation measures with particular reference to the floral & faunal status. Main focus of attention was to investigate into the impacts of the project on the flora & fauna of the impact area of SSP falling in the state of Madhya Pradesh. The submergence(impact) areas were mainly falling in the three districts called Dhar, Jhabua and Khargone."The study indicate that the forests in the impact area were highly under stocked and their distribution by girth class very erratic the condition of impact area is not conducive to support good wildlife and as such it appears less likely that some corridor would be needed to act as escape route for wild animals. In the study the carrying capacity of forests of the impact area can not be estimated with any accuracy.
- For areas in Maharashtra, the study was conducted by Deptt. Of Environment Sciences, University of Pune at the instance of Deptt. Of Environment, Govt. of Maharashtra. The study encompasses the SSP impact areas in Maharashtra only. The study was conducted by School of Environmental Sciences, University of Pune at the instance of Department of Environment, Govt. of Maharashtra. The study was conducted along the Maharashtra border for a period of 18 months (1992-1994). The area covers roughly 70 Km long and 20 Km wide belt along the

southern bank of Narmada River in Maharashtra. The survey was carried out in the submergence and catchment areas of Sardar Sarovar Project.

In over all conclusion, all the investigators reported the presence of a large number of animal and plant species some of which were not reported from this region earlier. However, none of the species was found to be endemic. As most of the species found in the region were cosmopolitan the construction of the Project was not likely to affect gene-pool of any animal or plant species. All the study reports described the wildlife habitats within the area of their studies and measures proposed to rehabilitate the endangered species of flora and fauna. The important measures recommended as they relate to SSP by the study groups included enlargement of the Shoolpaneshwar sanctuary located in Gujarat. This sanctuary was earlier known as Dhumkhal Sloth Bear Sanctuary whose area was 153 sq.kms. The area of the sanctuary was enlarged initially up to the shore line of the reservoir to enable animals of the sanctuary to have access to the fresh water. Later the area of the sanctuary was further enlarged to cover up a total area of about 607 sq.kms.

ACTION PLANS

A) Wildlife (Terrestrial)

To ensure that the wildlife conservation measures are implemented effectively, Action Plans for the three states were prepared as follows:

- 21 Felling plans for the forest area coming under submergence in Maharashtra and Madhya Pradesh will avoid the possibility of animals being trapped in the submergence area
- 21 Plans for improvement works in the wildlife sanctuaries of Gujarat. Shoolpaneshwar sanctuary development Action Plan prepared by GOG in 1996 and submitted to Forest Department GOG for implementation.
- 21 Action Plan on Flora & Fauna by Govt. of Madhya Pradesh, 2000. The plan prepared by the NVDA was submitted to MOEF & NCA during November, 2000.

Table-11: Summary of Status of Environmental Planning :

Wildlife

	Gujarat	Maharashtra	Madhya Pradesh
• Preliminary Surveys	Completed	Completed	Completed
• in-depth Studies	Completed	Completed,	Completed
• Development of Management Options	Completed	Completed	Completed
Action Plans :			
• Migratory corridors	Not needed	Not needed	Plan ready
• Sanctuary development	Shoolpaneshwar sanctuary Management Plan prepared	Not needed.	Not needed.
• Wildlife conservation measures in adjoining	Massive afforestation in catchment of SSP.	Massive afforestation in	Catchment treatment works and social forestry plantations.

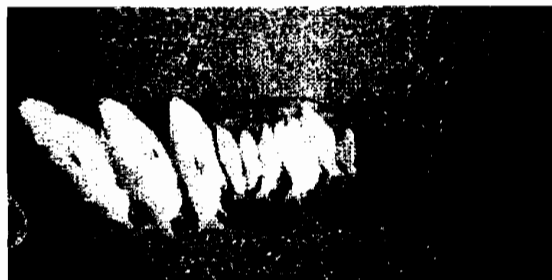
forest(s)		catchment of SSP.	
• Implementation	Shoolpaneshwar Sanctuary Plan under implementation. CAT work (increasing carrying capacity) nearing completion.	CAF & CAT nearly completed. Plan under formulation.	Substantial CAT works in the catchment completed. Social forestry plantation to be implemented by the State Forest department under its programme. Funds are proposed to be provided by the project.

B) Fisheries (Aquatic):

Three State Govt.(s) submitted the fisheries development plans, which are as follows:

- The Narmada Basin Water Development Plan: The Development of Fisheries, 1984. This comprehensive plan for GOMP addressed the development of fisheries in the Omkareshwar, Maheshwar and SSP areas. Phasing and programming with respect to pre and post-impoundment, clearance of the forests, training of fishermen, cooperative societies and post-impoundment management was proposed.

- Environmental Work Plan Sector Fish and Fisheries, GOG, 1986. This work plan, prepared in compliance with the agreement with the World Bank included the establishment of fish hatcheries and fish farms, training of fishermen, establishing primary cooperatives, and establishing an Inter State Fisheries Board. In addition, it included proposals for conducting hydro-biological studies, studies on the morphology of the river, investigations into the physical and chemical characteristic of the water and soil, and studies on flora, fauna, fish yield, plankton, and productivity in the reservoir. This plan was again revised by GOG in August 1997 & resubmitted to NCA during November 1997.



- A Note on SSP: Preparation of Environmental Work Plan for Fisheries Development in Maharashtra, 1987.

This plan included proposals for the felling in the reservoir submergence zone, fish seed, hatcheries, stocking, fishing, manpower requirements, and training and management through the Inter-State Board. Some more studies have been proposed by GOM through CICFRI. Subsequently, the state governments have revised their plans with a view to address to issues as they arose. The revised plan for GOM included proposals for the fishing population to be resettled on the periphery of the reservoir or in R&R sites in Maharashtra. In addition, the establishment of low-cost hatcheries and irrigation tanks, the development of pen cage culture fisheries, and intensive fish farming were proposed.

♦♦ GOG also revised their plan by end 1994.

The plan contained four volumes covering upstream, downstream & command areas. In view of the progressive impoundment which commenced in March 1994. NCA has constituted an expert group to lay down the guidelines for conservation & development of fisheries & its ecosystem. The plans submitted by state governments are under scrutiny of this expert group. The summary of status of planning is given in *table-10* and *table-11*.

Table-10. Summary of Status of Environmental Planning: Fisheries

	Govt. of Gujarat	Govt. of Maharashtra	Govt. of M.P.
❖ Preliminary surveys work plan	Yes	Yes	Yes
❖ Updating of detailed surveys/studies of fish fauna	Yes	-	Yes
❖ Updated Action Plans	Yes	Yes	Submitted in 1997
Implementation :			
1. Plan for clear felling	Completed	Yes, to synchronise with submergence about 886 ha felled in Dhule Dist. and 643 ha felled in Mewasi Division, Taloda. Only 80 ha is remaining.	Yes, to synchronise with submergence work held up due to decision regarding un-economical felling
2. Development of fish farms	Under implementation	Proposal under revision	Proposal under revision
3. Establishment of IFDB for future R&D Management	Agreed	Agreed	Agreed.
4. Expert group to lay down guidelines for Conservation & Development	Yes, agreed by the State & constituted by the NCA. Five meetings held, guidelines are on the move	As per col. No.2	As per col. No.2

To enhance nature conservation outside the catchment area of the Narmada

The SSP will also provide an opportunity to enhance nature conservation outside the immediate catchment area of the Narmada. In particular three wildlife sanctuaries located in the command area of the project will benefit from the increased freshwater availability resulting from

The project and there are plans by the GOG to further develop these. They comprise:

- Nal Sarovar, Bird Sanctuary;
- Wild Ass Sanctuary in the Rann of Kutch.
- Velavadar Black Buck National Park.

IMPLEMENTATION

CICFRI have also been commissioned to monitor the whole of the estuary and their study has been extended to examine pollution and to undertake Modeling studies in the downstream environment.

An expert group has been constituted by NCA to lay down the guidelines for fish conservation & development during progressive filling of the reservoir to advise the state executive agencies for follow-up action. Guidelines are on the anvil.

Creation of an Interstate Fisheries Development Board has been agreed to by party States, which is expected to be setup and fully functioning prior to reservoir filling. This Board would implement the guidelines for conservation of fisheries recommended by HLEG.

The Organisation is expected to be set up and fully functioning prior to reservoir filling.

On-going Fisheries Activities in the Sardar Sarovar

Some fisheries development activities are already going in the Sardar Sarovar from the year 1992 onwards. From 1993-94, these programmes received the financial support from the Sardar Sarovar projects. These activities are:

- Seed Stocking in the Sardar Sarovar
- Development of Rearing space for Fish Seed Production
- Mangrove Plantation Programme.

Till the March, 2000 State Forest Department and other Fisheries Development Agencies have stocked 382.35 lacs fingerlings / yearlings in the main reservoir as well as dykes of the Sardar Sarovar.

There is a provision to create rearing space for seed rearing in the Sardar Sarovar and the funds have been provided by the SSP.

The total amount for the rearing ponds is at present Rs.64.36 lakh. The site selected for the rearing ponds initially in the reservoir premises was found to be unsuitable on account of higher water permeability of the soil. Hence, another site has been located in the village of Timbi (Nanded Taluk) of Bharuch district, in the Survey No.303. The soil samples have been sent for analysis to decide the suitability.

In Gujarat, reservoir bowl is already cleared of all vegetative growth. Execution of felling in M.P. & Maharastra, as per felling plans prepared, await the commencement of impounding.

Chapter 6**SEISMICITY****STUDIES**

Studies of reservoir induced seismicity (RIS) and rim stability have been carried out by the Geological Survey of India (GSI), Central Water and Power Research Station (CWPRS), University of Roorkee and World Bank Consultants. The principal studies are described below.

- University of Roorkee. 1980. Geological and Seismological Investigations of the Environs of Narmada Valley around Navagam Dam site in Gujarat.
- GSI. 1981-82 and 1982-83. A Geotechnical Report on the Reservoir Competency Investigations in Parts of Sardar Sarovar Area, Bharuch & Vadodara Districts. Volumes II&I.
- Shenoi et al. 1982. Shenoi et al presented at the New Delhi Conference on the significance of Seismotectonic Aspects on Reservoir Development.
- Balasundaram, M.S. 1982 Sardar Sarovar Project: A Geotechnical Report compiled and edited for the Government of Gujarat.
- MSU. 1983. The Sardar Sarovar Narmada Project Studies on Ecology and Environment.
- NVDA published a Position Paper on Seismic Studies in January 1986.
- Krishna, Dr. J. 1989. Dams and Seismicity.
- GSI.1990. Study of the Rim Stability of the SSP.
- GOI.1993. Sardar Sarovar Project Seismicity and Sardar Sarovar Dam.

IMPLEMENTATION

The various recommendations for modification of the dam design which have all been implemented are summarised as:

- ❖ Adoption of horizontal design coefficient of 0.125g on the recommendation of the Dam Review Panel
- ❖ Installation of stress monitors in the main body of the dam
- ❖ Increase of the depth of the foundation to 18m below the lowest riverbed.

The Government of Gujarat has identified 9 locations for the installation of seismic monitoring stations, 4 each on either side and one at the downstream of the

Sardar Sarovar reservoir, out of a total of 9 stations, 3 are in M.P (Alirajpur, Kukshi and Badwani 1 in Maharashtra (Shahada) and 5 are in Gujarat (Kawant, Naswadi, Kevadia, Jitgaon and Sagbara). Construction and instrumentation installation work is completed at all the 9 seismic monitoring stations.

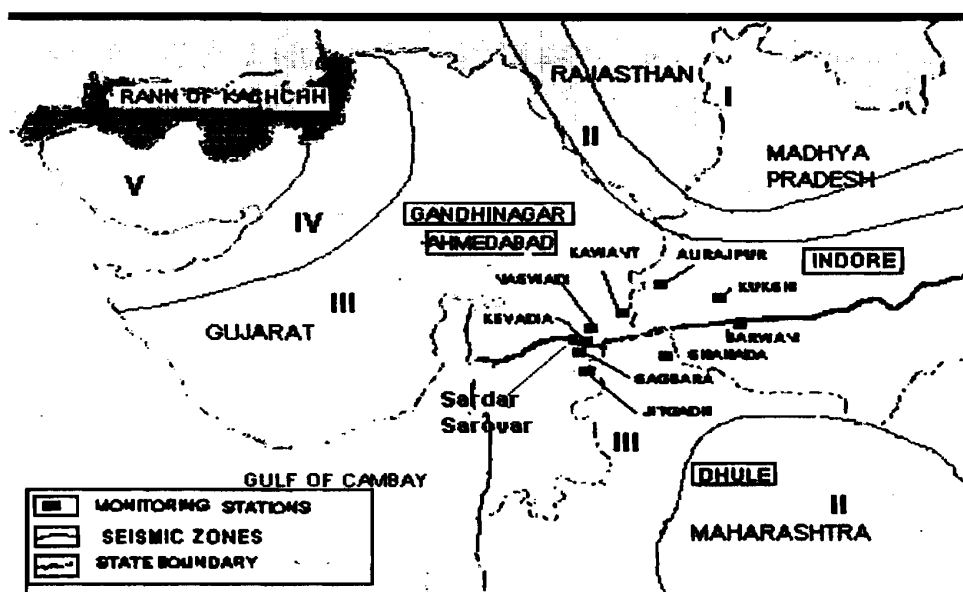
The seismological observatory at Kevadia Colony is in operation since 1973. The data of Kevadia Colony seismograph station for the period from 1973 to 1984 was analysed by CWPRS, Pune and GEAR, Vadodara. Also, Micro-earthquake surveys around Navagam Dam were carried out in the year 1980 by Dept. of Earthquake Engineering, University of Roorkee. The Micro-earthquake activity was found to be of low level and was generally scattered in the Narmada basin.

The seismological network with latest instruments was established in the year 1989. After the installation of new seismic instruments at new sites, local micro-earthquakes as well as global earthquakes are being recorded. The events which are recorded at network are analysed and located using the computer program 'FASTHYPO' incorporated with seismic Data processing and Analysis Computer (DAC - 300). The progress of implementation is illustrated in Table below.

Table-12 : Status of implementation of seismicity aspects

ACTION	STATUS
▪ Dam design modifications	Completed
▪ Monitoring stations	Rim stability studies have completed and well equipped 9 monitoring stations along the periphery of the reservoir are functioning.
▪ GSI (Nagpur Division) Rim Stability studies	Completed
▪ Tracer Studies by CWPRS	Reports submitted.
▪ Results of analysis of data from GSI, Nagpur	Awaited

Map-2: Showing locations of seismological station on periphery of the Sardar Sarovar reservoir



Chapter 7**HEALTH ASPECTS**

Health provision in India is defined by the National Health Policy (NHP) and national disease programmes such as the National Malaria Eradication Programme (NMEP). The NHP entitles access to medical facilities to all Indians, the number and distribution of which is determined by the local population density. The NMEP was developed, as a nation-wide strategy to combat the spread of malaria with regard to SSP all the three State Governments will integrate development of new facilities with proposals already made under the NHP and NMEP. Such integration will avoid duplication, maintain parity within the project area and provide better access to health care than would otherwise be achieved.



In addition to the general obligations of the State under national policy, a specific requirement for the SSP contained in the environment clearance order of GOI was that, that plans for the provision of health facilities to workers and residents of the affected areas should be prepared. Each State should take necessary measures to minimise the risk of malaria, filarial, schistosomiasis and other diseases associated with water that may result from implementation of the project. Preparation of an Action Plan for the surveillance and control of malaria was also stipulated.

STUDIES & ACTION PLANS

The two main potential sources of health impact associated with the reservoir and Irrigation projects are as follows:

- The occurrence of pools of standing water, during construction and operation of the reservoir, may provide breeding areas for disease vectors:
- Immigrant construction workers may bring with them diseases or parasites, to which the local population may have low immunity.

The SSP is expected to confer significant public health benefits since increased water availability will help to reduce the incidence of 'water-washed' and 'waterborne' diseases which are associated with poor hygiene and restricted water supply. Management of the potential health impacts of the SSP will focus, therefore, on the exclusion and/or control of the disease vectors which spread 'water-based' and 'water-related' diseases.

A large number of studies have been carried out on the health profile of villages in the three affected states. The key studies are summarised below:

- Narmada Programme-Schistosomiasis -Back-to-Office Report, 1986, assessment carried out by Goodland, consultant to the World Bank, the National Institute of Communicable Diseases (NICD) and the World Health Organisation (WHO).
- Proceedings and Recommendations of the Meeting on Schistosomiasis Research and Surveillance held at NICD on 22nd November 1985.
- Disease Profile of Command Area by the State Commissariat of Health, Medical Services and Medical Education (SCHMS), 1986.
- Health Statistics< GOM, 1987. The State Department of Health, Report on the health profile of 33 project-affected villages in Dhule district, Maharashtra.
- Health Statistics 1982-84, GOMP. This study published by GOMP in 1985 & updated in 1994.
- The Sardar Sarovar Narmada Project Studies on Ecology and Environment by MSU in 1983, considered public health in Chapter-3.
- Numerous studies have been conducted on the incidence of malaria in India, amongst others, by the Malaria Research Center (MRC).
- Revised Plan by GOM, 1995.
- Revised Health Plan by GOG, 1996.
- Draft Health Management Plan by GOG, 1997.
- Epidemiological Surveillance Studies by GOM, 1996.
- Epidemiological Surveillance Studies by Gandhi Medical College, Bhopal – Six interim reports received.

Status of Implementation of Actions for Public Health

Studies on the disease profile in the SSP region and past experience with major water resources projects suggested that health Action Plans for the project should focus on the following:

- + Provision of health care for displaced people and immigrant workers;
- + Control of malaria and potential breeding sites for malarial vectors;
- + Monitoring for the incidence of other water-related and waterborne diseases with a view of preventing their establishment.

Gujarat

An Initial work Plan for Environmental Effects: Sector Public Health for the Command Area of Gujarat was drawn up in 1986 by the NPG in coordination with SCHMS. This plan covers villages within a 10 km radius of the reservoir including resettled populations and makes provision for the monitoring, surveillance and

control of malaria. The 1986 plan is under implementation with certain modifications and additions.

The principal objectives of the work plan are:

- To provide for systematic and continuous monitoring of the health profile of the project area;
- To provide suitable Infrastructure for health provision in the project area.

The plan also outlines actions for the surveillance and control of malaria. The main components of the plan area summarised below.

- + Establishment of hospital at Kevadia.
- + Strengthening of laboratory facilities including establishment of mobile unit.
- + Provision for laboratory technicians in existing public health centers (PHC's).
- + Expansion of malaria treatment depots.

Proposal to establish Urban Malaria Scheme for centres over 40,000 (anti-larval operations) not currently covered. Strengthening of state level health organisations to ensure monitoring of malaria, filaria, dengue and encephalitis, strengthening of district level health organisations for monitoring or implementation, residual insecticidal spraying operations are included in the plan.

Maharashtra

GOM submitted an Initial Work Plan for Public Health Sector In 1987, which was modified and resubmitted for consideration in 1991 and further and updated in 1992 & 1993. The work plan was based on the state health department survey of Dhule District. The principal objectives of the plan were as

- ❖ To monitor closely health conditions in Dhule district
- ❖ To provide facilities for carrying out this monitoring
- ❖ To adopt precautionary measures against the spread of diseases
- ❖ To be prepared to combat epidemics that might arise.

The work plan also contained provisions for the strengthening of state and district health facilities in existing villages and in resettlement areas. The provisions included the establishment of a monitoring and laboratory cell at the Rural Hospital and strengthening of the existing Primary Health Centre. It contained full descriptions of the likely costs and staffing requirements of these measures.

Madhya Pradesh

An initial Work Plan for the Public Sector was submitted to the NVDA the state health department in 1988. This plan included a summary of existing health profile in

the submergence villages and discussed the likely impacts of the SSP. The plan contains specific provisions for:

- ❖ Strengthening of health facilities already in place under the NHP and Minimum needs programme of the Seventh Five Year Plan;
- ❖ Establishment of a Health Monitoring Cell;
- ❖ Strengthening of health centers for construction workers;
- ❖ Establishment of district organizations for malaria control established of the NMEP.

An extension to the MP Health Plan was published by the NVDA in January 1990 and was revised and re-submitted in 1991. This report provides additional detail concerning the provision and training of health care staff, numbers of specialist staff required, funding and responsibilities for management.

In addition to the State Health Plan, a Memorandum of Understanding was signed between Gandhi Medical College, Bhopal and the NVDA to provide further arrangements for the monitoring of malaria and other diseases. This memorandum included provisions for the following:

- ❖ Study of mosquito vectors in the Narmada area;
- ❖ Comparison of SSP with other similar project situations and analysis of lessons learned;
- ❖ Collection and analysis of time-series-data on disease incidence;
- ❖ Recommendation of health promotion and disease preventative measures in the SSP area.

Implementation

A) Govt. of Gujarat:

There is a dispensary at SSP dam site run by M/s Jai Prakash Associates. It has regular Medical Officer and other staff to diagnose and treat the malaria patient.



A medical cell with 20 mobile unit's and 61 dispensaries are working in R&R sites. The cell consists of physician, pediatrician and Gynecologist. The cell is also provided with two ambulances. The main functions includes :

- ≤ Regular visiting of sites
- ≤ Providing specialized services at the door steps of PAFs
- ≤ Medical check-up
- ≤ Pot chlorination through distribution of chlorine tablets.

- ≤ Providing nutritional supplements to children's, pregnant and lactic mothers.
 ≤ Other preventive and curative health measures

Action	Gujarat		
❖ Baseline studies	Initially conducted in 1986 subsequently EIA was conducted in 1993.		
❖ Preparation of state Action Plan – Health Aspects.	❖ Action plan updated for 2000-2001 prepared by Commissionerate of Health & Medical Services, Gandhinagar.		
❖ Health Survey	Routine surveillance activities for early diagnostic and prompt treatment of malaria cases are carried out.		
❖ Establishment of health facilities	❖ 50 bed hospital at Kevadia including a malaria unit. ❖ Medical laboratory and 20 mobile unit's. ❖ 61 dispensaries. ❖ 75 medical dispensaries are functioning at various R&R sites.		
❖ Vector control measures in place	❖ Insecticidal spray. ❖ Distribution of impregnated mosquito nets for all members of resettled families. ❖ Monitoring of malaria situation in command area every month.		
❖ Appointment of staff	❖ Designation	❖ Nos.	❖ Place of Posting
	Dy. Director	1	Medical Cell
	Physician	1	Medical Cell
	Pediatrician	1	Medical Cell
	Gyneacologist	1	Medical Cell
	Medical Officer	21	Mobile Medical Unit
	MPW (Male)	20	Mobile Medical Unit
	MPW (Female)	75	Medical Dispensaries
	Pharmacist	1	Medical Cell
	Lab technician	1	Mobile hospital van
	X-Ray technician	1	Mobile hospital van
	Staff Nurse	2	Mobile hospital van
	I.E.C. Officer	1	Medical Cell
	Statistical Asstt.	1	Medical Cell
	Ministerial Staff	8	Medical Cell
	Vehicle with Driver	23	Mobile + SSPA
❖ Disease monitoring and responsibility	❖ Has been entrusted to State Council of Health & Medical Services and EIA report has been submitted by SCHMS. ❖ Bi-weekly visits of 182 R&R sites by 20 mobile medical units. ❖ Referral services by expert team consisting of three medical specialist.		

B) Govt. of Maharashtra:

In accordance with State provision for health care facilities, two cottage hospitals, eight primary health centres and 55 primary health unit's have already been established in Dhule District. Taking into account the inaccessibility of some of the villages, provisions were made for eight additional public health unit's, 10 mobile unit's and a floating dispensary for



villages within 10 km of the submergence zone. One hospital at Somawal resettlement village, is already functional.

Photo : showing the Hospital at village Somawal in Maharashtra.

Action	Maharashtra
❖ Baseline studies	Complete in 1987 & being extended further.
❖ Preparation of state Action Plan	Original Action Plan was submitted in 1987 and subsequently revised in 1991 and 1992. Final revised Action Plan was submitted in 1993.
❖ Survey of existing facilities	Complete
❖ Establishment of health facilities	<ul style="list-style-type: none"> ❖ At following R&R sites the health facilities are provided. ❖ Amoni (Reva Nagar). ❖ Somawal (Narmada Nagar) ❖ Dekati (Sardar Nagar) ❖ Amli (Dev-Mahura Nagar) ❖ Rozva ❖ One floating launch is also proposed.
❖ Vector control measures in place	Under National Malaria Eradication Programme, guidelines for malaria control by Irrigation Department have been adopted.
❖ Appointment of staff	51 posts have been filled up.
❖ Disease monitoring and responsibility	<ul style="list-style-type: none"> ❖ Has been entrusted to State Health Department. ❖ Surveillance studies had commenced and survey report for Phase-I of the study has been submitted by Topiwala National Medical College, Mumbai. Phase-II of study is under implementation.

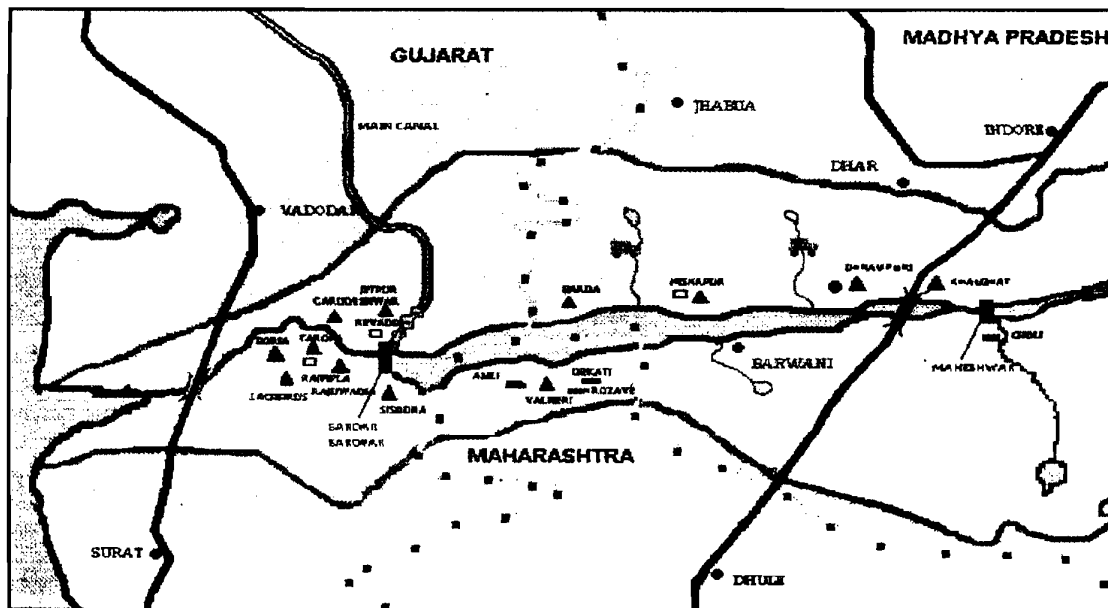
C) Govt. of Madhya Pradesh

During 1992, Gandhi Medical College continued surveillance studies of the impact area of Madhya Pradesh and work commenced on additional facilities for the Nisarpur village hospital, Dhar District. Extension of the Nisarpur hospital is due for completion commensurate with submergence of areas in Madhya Pradesh. Final six monthly report was submitted by Gandhi Medical College, Bhopal.

Action	Madhya Pradesh
❖ Baseline studies	Complete, 1994 being extended further.
❖ Preparation of state Action Plan	Original Action Plan was submitted in 1986 and then revised in 1988. Final plan was submitted in 1991. Cost details were incorporated in the Final Action Plan in 1996.
❖ Survey of existing facilities	Complete
❖ Establishment of health facilities	<ul style="list-style-type: none"> ❖ 30-bed hospital at Nisarpur will be completed by December, 2001. Provision for three mobile unit and civil dispensaries has been made in the Action Plan. In addition to this there are 17 Ayurvedic dispensaries and 2 PHCs proposed in R&R sites for oustees of SSPs. Out of these the building for Ayurvedic dispensaries at 11 sites are completed. The sites are Dharamrai, Chandankhedi, Sarikpure, Bhavati-1, Eklera, Golata, Datwara, Mohipure, Nalve and Chichti. Construction of building for Ayurvedic dispensaries at 3 sites and PHCs for 1 site is in progress. These are Borlai-2, Anjad, Chakeri and Borlai-1 (PHC). The sites where construction is yet to be started are Gwala (AD), Adalpura (AD),

	Pichhodi (AD), Nisarpura (PHC & VH).
❖ Vector control measures in place	Under National Anti Malaria Programme (NAMP) State malaria control organizations have been strengthened.
❖ Appointment of staff	Is yet to be done.
❖ Disease monitoring and responsibility	<ul style="list-style-type: none"> ❖ Has been entrusted to Evaluation Cell established by NVDA. ❖ Gandhi Medical College, Bhopal was entrusted with epidemiological surveillance studies. Six interim reports are received. Final report is awaited.

Fig. 3 Showing status of implementation of health plan in SSP impact are



Chapter 8**ARCHAEOLOGY & ANTHROPOLOGY****ARCHAEOLOGICAL SURVEY**

The Sardar Sarovar Project has necessitated afresh look at the archaeological and cultural heritage available in the Narmada valley. The Government of India recognises the value of such cultural sites and has enacted a series of laws to maintain and protect them from decay, misuse or development activities. Sites are classified into three categories as follows :



Type 1: monuments of national importance which are protected by central government:

Type 2: monuments of religious or cultural importance which are protected by the state governments;

Type 3: monuments which are neither centrally or State-protected but which are considered to be an Important part of cultural heritage.

In the case of SSP, where some sites may be submerged the NWDT award stipulated that, the entire cost of relocation and protection should be chargeable to GOG. Relocation work is to be supervised by the Department of Archaeology under the provisions of the 1958 Act.

STUDIES

The three State governments carried out a complete survey of cultural and religious sites within the submergence zone under the direction of the project proponents. The principal aim of these studies was to list all archaeological sites, identify and name any sites under state-protection and further identify sites of religious or cultural significance which, although not protected under national law, are of sufficient value to merit relocation. These studies are summarised below. Survey

conducted for identification of various sites & monuments of significance has included the following:

- ❖ Gujarat: Archaeological Survey of Nineteen Villages Submerged by Sardar Sarovar Reservoir, 1989.
- ❖ Maharashtra: Survey by Department of Archaeology.
- ❖ Survey was carried out by the State Department of Archaeology for cultural sites in 24 villages of Akrani taluk and nine villages from Akkalkuwa taluk, Dhule district.
- ❖ Madhya Pradesh: Survey by State Department of Archaeology and Museum (1992), in sixteen volumes.
- ❖ Anthropological Survey of India: Narmada Salvage Plan.
- ❖ Anthropological Survey of India: People's of India.
- ❖ Adivasi Kala Parishad: Survey of Material Cultural in the Narmada Valley.
- ❖ Rashtriya Manav Sanghralaya: Narmada Salvage Plan.

Gujarat

- + Archaeological Survey of Nineteen Villages submerged by Sardar Sarovar Reservoir, 1989: - The Department of Archaeology was instructed to carry out a survey of archaeological sites in 19 villages of the proposed SSP submergence zone in Gujarat. By June, 1989, 12 villages had been surveyed. The initial report, submitted by the Director of Archaeology, contained a full list of villages surveyed and photographs of the Shoolpaneshwar and Hamfeshwar temples. Two further studies of sites in the remaining seven villages were carried out in March 1992 and a supplementary report issued.

Maharashtra

- + **State Department of Archaeology :**

A survey was carried out by the Department of Archaeology of cultural sites in 24 villages of Akkrani Taluk and nine villages from Akkalkuva Taluk, Dhule District. A brief summary note was submitted by the Director of Archaeology in February 1992 which stated that no state-protected monuments were located in the area but recommended the preservation of monuments at the village of Manibeli, Dhule District.

Madhya Pradesh

- + **State Department of Archaeology and Museum**

The Archaeology Department of Madhya Pradesh compiled a detailed report of archaeological sites in 120 villages likely to be affected by SSP. A second study of 73 villages was completed in July, 1991. Each study contained photographs

together with detailed descriptions of the current use and historical significance of the sites.

In addition to baseline studies on archaeological aspects, work has been carried out on the anthropological heritage of the Narmada Basin including examination of evidence of ancient dwellings and cultural artifacts. The principal studies in this area are described below.

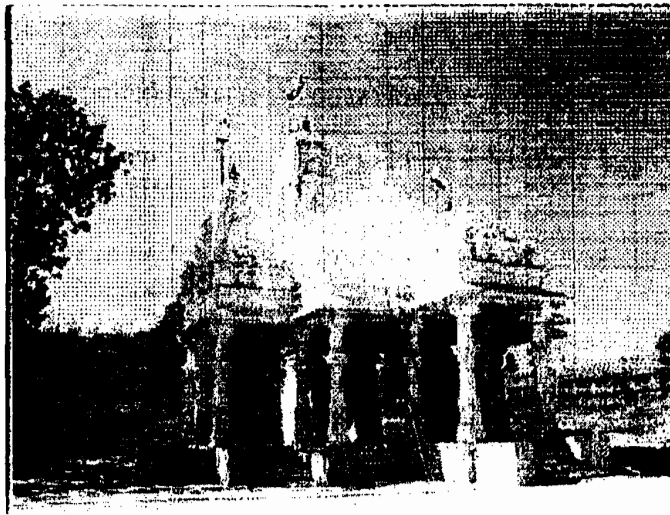
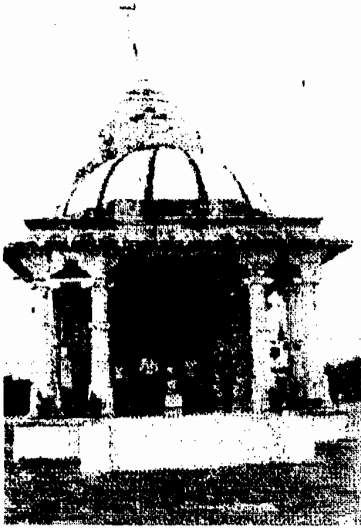
- + Anthropological Survey of India. Narmada Salvage Plan : The Narmada Salvage Plan contains detailed background data on palaeo-anthropological, human ecological and other aspects of the Narmada valley. By May 1992, surface scanning of 17 sample villages coming under submergence had been carried out, 424 specimens including ancient tools etc had been collected.
- + Anthropological Survey of India. Peoples' of India : This project entailed a complete survey of 33 tribes of India including those of the Narmada Basin. The study covered all aspects of tribal culture in India and was published in 61 volumes in 1992.
- + Parishad, A.K. Survey of Material Culture in the Narmada Valley : Work was completed and a report published by the National Museum of Humanity, Bhopal, on cultural objects from tribal artisans in Madhya Pradesh in 1990. Copies of the interim report were circulated to the Ministry of Environment and Forests and the Narmada Control Authority in April 1991.

ACTION PLANS AND IMPLEMENTATION

Gujarat

The Action Plan for two temples, i.e., Shoolpaneshwar and Hamfeshwar was prepared and implemented by GOG.

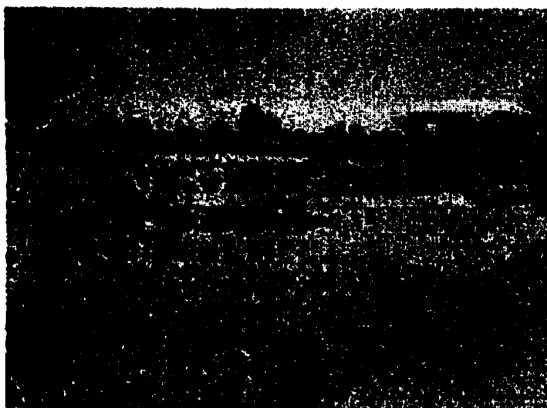
- ❖ Shoolpaneshwar temple which was on the border with State of Maharashtra is relocated 15 km. downstream of the SSP in village Gora. Relocation works already completed.
- ❖ Hamfeshwar Temple has been relocated at higher elevations within the same village. Construction of Temple was completed.



Maharashtra

The Director of Archaeology, Maharashtra reported that no state-protected sites would come under submergence.

Madhya Pradesh



A large number of sites were identified for relocation although none of these sites are protected under the 1958 Act. It was proposed, therefore, that any decision on whether they should be relocated would be made on a case-by-case basis by an independent expert panel. This panel comprised representatives of the Archaeological Survey of India, Central and State Governments and was established by GOMP. The panel's decisions were ratified by a joint Inspection committee of the Irrigation Department and

Archaeological Department.

The expert panel proposed, a 4-phase Action Plan framework for relocation operations :

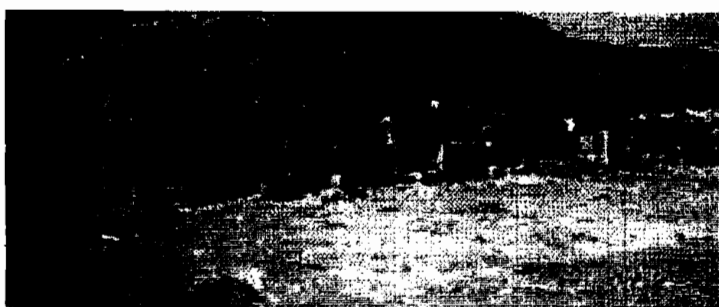
Phase-I - Survey work, survey report, listing of monuments and sculptures, estimates for shifting.

Phase-II – Action Plan, documentation, detailed estimates.

Phase-III – Building construction, shifting of sculptures, shifting of monuments.

Phase-IV – Display arrangements, model preparation, video library, publication report, excavation reports, new findings (if any).

- ❖ GOMP prepared an action plan in 1993. The plan was updated / revised in 1997. This plan identifies the relocation of 13 monuments and 5 mounds by State Dept. of Archaeology & Museum (**SDA&M**), this plan also includes the relocation of 10 monuments and 6 mounds by Archaeological Survey of India (**ASI**). This plan also includes the four mounds of 1993 plan.



Figure, on right, is of life size statue in Madhya Pradesh.

Figure at left top is of the Rock Cut Caves in Village Khujava, Madhya Pradesh

Figure in left lower is of a Temple under relocation in Madhya Pradesh

The status of implementation is summarized in the Table on the following pages

Narmada Control Authority

Status Report Environment Management September 2001 Vol XIV No 2

Sl. No	Particulars of monuments / mounds as per action plan of 1997 prepared by State Deptt. of Archaeology & Museum, Govt. of M.P.						Agency to execute work	Impact at 100 mt.	Status
	Chainage	Name of Monuments	Village	Tehsil	District	RL in m			
Temple by ASI									
1	84425	Shiv Mandir	Roligaon	Alirajpur	Jhabua	130.64	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
2	117037	Koteshwar Mandir	Kothara	Dhramपुर	Dhar	137.61	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
3	125876	6 tombs	Bheelkheda	Barwani	Barwani	134.25	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
4	128181	Neel Kantheshwar Mandir	Chikalda	Barwani	Barwani	134.86	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
5	128181	Pashumateshwar Mandir	Chikalda	Barwani	Barwani	134.86	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
6	131667	Shiv Mandir	Chhoti Kasrawad	Barwani	Barwani	138.98	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
7	171594	Jalaleshwar Mandir	Khujawa	Dharamपुर	Dhar	149.47	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
8	173427	Vilvamriteshwar Mandir	Dharamपुर	Dharamपुर	Dhar	148.56	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
9	173427	Nageshwar Mandir	Dharamपुर	Dharamपुर	Dhar	154.27	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
10	194757	Kanjleshwar	Semalda	Manawar	Dhar	136.10	Archaeological Survey Of India	No	Progress Awaited From ASI / NVDA
Mounds by ASI :									
11	114903	Mound	Jangarwa	Khargone	Khargone	131.820	Archaeological Survey of India	No	Awaited from ASI / NVDA.
12	122523	Mound	Khapar-kheda	Manawar	Dhar	Not relevant	Archaeological Survey of India	-	Completed earlier to 1997 as per 1993 plan
13	129228	Mound	Kheda	Manawar	Dhar	136.620	Archaeological Survey of India	No	Progress Awaited from ASI / NVDA.
14	138982	Mound	Kavathi	Manawar	Dhar	132.670	Archaeological Survey of India	No	Progress Awaited from ASI / NVDA.
15	139286	Mound	Utawad	Barwani	Barwani	Not relevant	Archaeological Survey of India	-	Progress Completed earlier to 1997. as per 1993 plan,
16	143553	Mound	Chota Barda	Barwani	Barwani	136.600	Archaeological Survey of India	No	Progress Awaited from ASI / NVDA.
17	152697	Mound	Kirmohi	Thikri	Barwani	Not relevant	Archaeological Survey of India	Not relevant	Experimental excavation was done in 1995. Now these mounds vanished due to soil erosion by agricultural practices.

Narmada Control Authority

Status Report - Environment Management September, 2001 Vol XIV No 2

18	160012	Mound	Navadakhedi	Thikri	Barwani	155.040	Archaeological Survey of India	No	Progress Awaited from ASI / NVDA.
19	167327	Mound	Brahman-gaon	Thikri	Barwani	Not relevant	Archaeological Survey of India	Not relevant	Experimental excavation was done in 1995. Now these mounds vanished due to soil erosion by agricultural practices.
20	199939	Mound	Navadatoli	Kasrawad	Khargone	149.340	Archaeological Survey of India	No	Awaited from ASI / NVDA.
Temples by State Deptt. of Archaeology & Museum									
21	111551	Narmadesh-war Mandir	Dehar	Kukshi	Dhar	134.665	State Deptt. of Arch & Mus M.P	No	Scrapping, numbering, drawing, photography is completed. Land allotment is awaited from Collector, Dhar
22	132581	Shiv Mandir	Bodhwada	Kukshi	Dhar	138.685	State Deptt. of Arch & Mus M.P	No	Scrapping, numbering, drawing, photography is completed. Land allotment is awaited from Collector, Dhar
23	143553	Shiv Mandir	Bada Barda	Manavar	Dhar	130.970	State Deptt. of Arch & Mus M.P	No	Relocated completely two kms. away from the original place in the year 1997-98.
24	171594	Shomeshwar Mandir	Khujawa	Dharampur i	Dhar	130.795	State Deptt. of Arch & Mus M.P	No	Progress is nil, due to agitation.
25	171594	Big statues	Khujawa	Dharampur i	Dhar	149.415	State Deptt. of Arch & Mus M.P	No	Copying in fibre glass completed and the same is placed at Kasrawad Museum. Further relocation work is stopped due to public resentment.
26	171594	Bhawani Mata Mandir	Khujawa	Dharampur i	Dhar	151.260	State Deptt. of Arch & Mus M.P	No	Scrapping of lime plaster done for numbering and detailed drawing. Further work of relocation stopped due to public resentment.
27	171594	Shiv (S.No.1) Mandir	Khujawa	Dharampur i	Dhar	136.675	State Deptt. of Arch & Mus M.P	No	Drawing numbering and photography completed. Work of relocation started but due to public resentment, it was stopped by the collector.
28	171594	Shiv (S.No.2) Mandir	Khujawa	Dharampur i	Dhar	136.675	State Deptt. of Arch & Mus M.P	No	Drawing numbering and photography completed. Work of relocation started but due to public resentment, it was stopped
29	171594	Shiv (S.No.3) Mandir	Khujawa	Dharampur i	Dhar	136.425	State Deptt. of Arch & Mus M.P	No	Drawing numbering and photography completed. Work of relocation started but due to public resentment, it was stopped

Narmada Control Authority.

Status Report Environment Management September 2001 Vol XIV No 2

30	171594	Rock-cut caves	Khujawa	Dharampuri	Dhar	130.005	State Deptt. of Arch & Mus, M.P.	No	Silt deposited inside the cave is totally cleaned. Numbering is done and further work is stopped due to public resentment.
31	180432	Rock-cut-sculptures	Pipaldagarhi	Dharampuri	Dhar	130.440	State Deptt. of Arch & Mus, M.P.	No	Relocated completely in village Nimbola in the year 1998-99.
32	180432	Shiv Mandir (Mauni Baba Ashram)	Pipaldagarhi	Dharampuri	Dhar	153.775	State Deptt. of Arch & Mus M.P.	No	Relocated completely in village Nimbola. In the year 1998-99.
33	199939	Baneshwar Mandir (Shiv Mandir)	Navadatoli	Kasrawad	Khargone	141.755	State Deptt. of Arch & Mus, M.P.	No	Scrapping work is completed.
Mound by State Deptt. of Archaeology & Museum									
34	120999	Mound	Katnera	Kukshi	Dhar	140.860	State Deptt. of Arch & Mus M.P.	No	Completed in April, 2001. Material is stored in the office of Dy. Director, State Deptt. of Archaeology & Museum, Rajwada, Indore.
35	138982	Mound	Ekalwara	Manawar	Dhar	140.870	State Deptt. of Arch & Mus, M.P.	No	Completed in April, 2001. Material will be displayed at Kasrawad Museum.
36	162755	Mound	Maru Chichali	Thikari	Barwani	150.635	State Deptt. of Arch & Mus	No	Completed. Records are with ASI office Nagpur.
37	165193	Mound	Kalyanpura	Manawar	Dhar	145.030	State Deptt. of Arch & Mus M.P.	No	Completed in April, 2001, material is stored in the office of Archaeologists, State Deptt. of Archaeology & Museum, Banganga, Bhopal.
38	183480	Mound	Khalghat (Khalkhurd)	Dharampuri	Dhar	150.315	State Deptt. of Arch & Mus M.P.	No	Excavated, records are with the office of the Archaeologists, State Deptt. of Archaeology & Museum, Rajwada, Indore.

Collection and display at Museum

Sculptures, 118 in nos. were collected from the regions coming under the submergence area of the Sardar Sarovar dam. These sculptures were obtained from Pipaldagarhi, Khujawa, Dharamapuri and different other villages. These are displayed at Distt. Museum in Dhar Distt.



Since these sculptures were lying open for a very long time they bear traces of weathering effect on them like salt formation, red-oxide deposition, besides accumulating dust, dirt and fungus on them. They were cleaned by the chemists using necessary chemicals like Ammonia, Sodium hydroxide, Benzene P.V.A. etc. After cleaning the sculptures were coated with preservative for saving them from further deterioration.

Museum

- + Narmada Park and Museum at Lalbagh at Indore, besides Museum at Barwani and Kasarawad proposed. Land for museum at Barwani and Kasrawad requested.
- + Construction of a section on 'Narmada Dirgha' in the museum at Bhopal has been started.

Besides, Film documentation of all the monuments of SSP is in progress through an agency 'Madhyam', engaged by State Department for Documentation of the important monuments.

Summary of the proposed actions

Madhya Pradesh

In Madhya Pradesh total 38 nos. of monuments / mounds are to be relocated / excavated. The following table depicts the progress of these monuments.

Sl. No.	Name of agencies	Total No. of		Progress		Remarks
		Monuments	Mounds	Monuments	Mounds	
1.	Archaeological Survey of India	10	10	Nil	2	2 mounds are vanished due to soil erosion by agricultural practices.
2.	State Dept. of Archaeology & Museum.	13	5	3	5	One mound namely Maruchichli was excavated by pre-history (ASI) Nagpur branch in the year 1999 & 2000.

Maharashtra

No work was required to be done.

Gujarat

Two Temples viz., Shoolpaneshwar and Hamfeshwar were to be shifted. Relocation of both the Temples have been completed.

Anthropological Survey & Studies

Anthropological salvage plan for Narmada Valley : To date, surface scanning of the anthropological sites of 17 villages has been completed and 424 specimens taken. In this plan the Udaipur Branch of the Anthropological Survey of India has collected information and specimens from 19 villages in Gujarat.

INDIRA SAGAR PROJECT

The Action Plans and status of studies and implementation of Environmental Safeguard Measures upto quarter ending September, 2001 are summarised in this report.

The parameters: The suggested environmental safeguard parameters are indicated below :

- ❖ *Phased Catchment Area Treatment*
- ❖ *Compensatory Afforestation*
- ❖ *Command Area Development*
- ❖ *Flora, Fauna, Wildlife and Carrying Capacity*
- ❖ *Seismicity*
- ❖ *Health Aspects*
- ❖ *Archaeological Survey, and Anthropological Studies*

As 'Resettlement and Rehabilitation' is dealt with separately, current status of other suggested parameters is presented hereunder.

1. PHASED CATCHMENT AREA TREATMENT

The MOEF clearance granted in 1987 contained two conditions pertaining to CAT, as follows:

- ❖ More detailed surveys for prioritisation of the sub-catchments in the ISP area should be undertaken;
- ❖ A phased CAT programme should be prepared and implemented ahead of reservoir filling. GOI issued a directive in July, 1992 that, the project would bear the costs of the treatment of all critically degraded sub-watersheds draining directly [Phase-I] into the reservoir. These watersheds were identified amongst those classified as either very high or high-priority categories by the All India Soil and Land Use Survey Organisation (AISLUSO). The project would also be responsible for the treatment of those areas of the catchment, which are directly damaged by the project activities.

In addition, plans are required to be prepared for the treatment of the balance of the critically degraded sub-watersheds but the cost of this will be met from other ongoing schemes and in a timeframe to be determined.

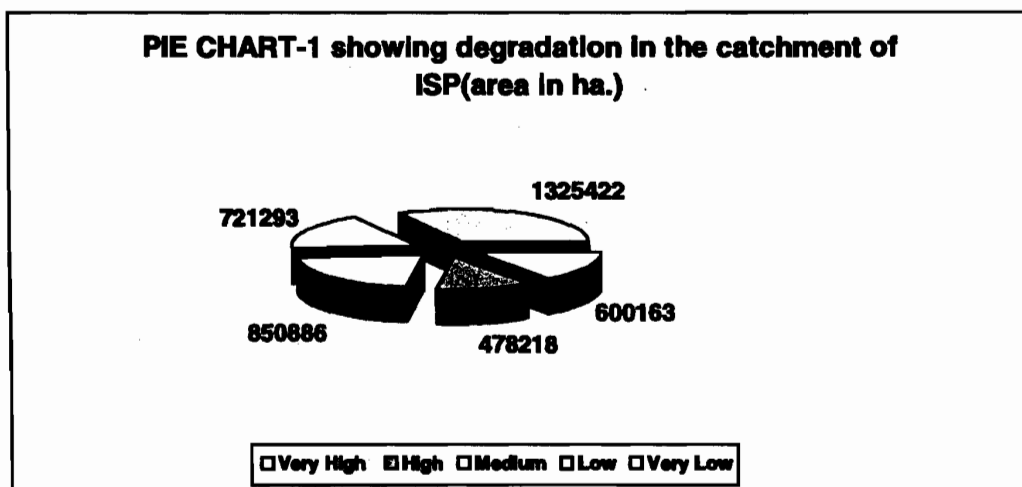
Studies

Surveys and studies have been undertaken to aid the development of a management plan for CAT in the ISP catchment. They are: -

- Report of Inter-Departmental Committee on Soil Conservation and Afforestation, (the Dewan Committee Report), 1985.

- Report on Prioritisation of Sub-watersheds in sub-catchments of the Narmada Catchment, 1991 by AIS&LUSO, New Delhi. Revised subsequently in 1994.

According to the above studies the freely draining area of Indira Sagar Project down stream of Bargi Dam is about 39,75,982 ha. Prioritisation survey of the watersheds was entrusted to the All India Soil & Land Use Survey Organisation, New Delhi. The Survey has been completed by AIS&LUSO, New Delhi and the survey reports have been received in the Narmada Valley Development Authority (NVDA) Government of Madhya Pradesh. Findings of the AIS&LUSO indicated that about 28% of the catchment was yielding SYI of 1200 and above. As such these were considered as critically degraded. Results of the prioritisation are summarised in pie chart -1.



AIS&LUSO in their final report have identified 508 no. of critically degraded sub-watersheds (having Silt Yield Index of 1200 and above), covering an area of about 10,78,381 ha.

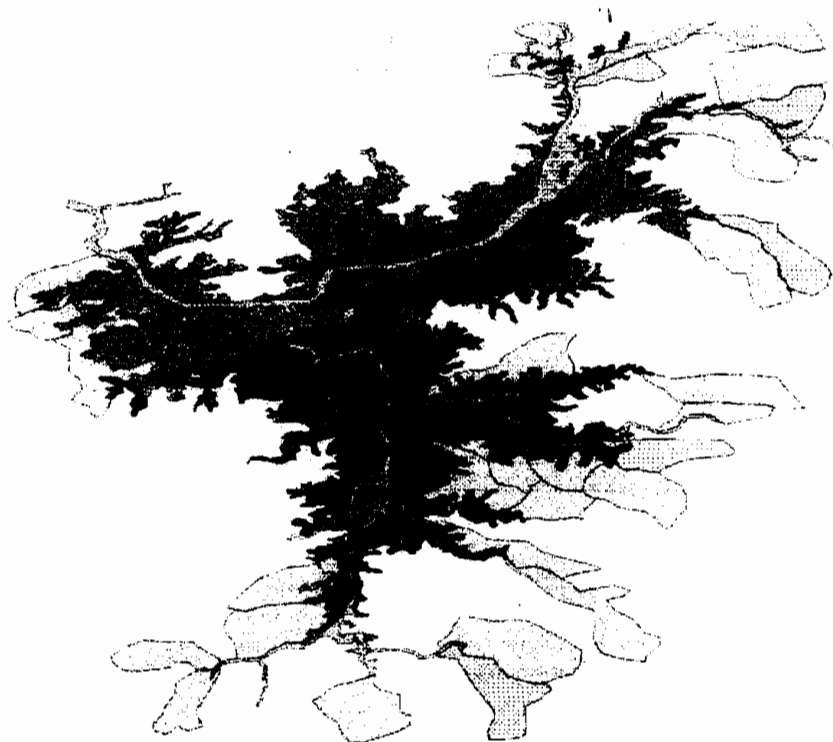
Phased Programme:

On the basis of their proximity to the reservoir these watersheds have been planned for treatment in two phases namely Phase-I and Phase-II

As per the guidelines of MOWR, directly draining watersheds of very high and high priority categories only, are to be treated *pari-passu* with the construction of the dam and at the project cost.

PHASE-I Programme

On the basis of the reports submitted by the AIS&LUSO, sub-watersheds belonging to the very high and high priority categories and directly draining into the reservoir have been identified for treatment. There are 30 such sub-watersheds. They cover an area of about 73,456 ha. Map showing the location of the identified sub-watersheds is depicted in Map-1.

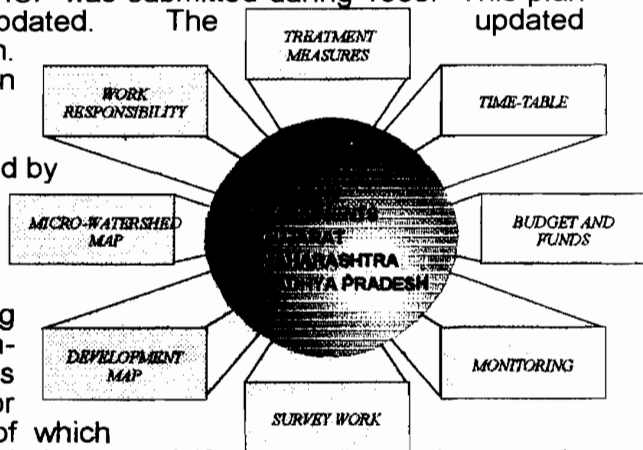


Map-1
Showing
submergence
area of
Indira Sagar
Project and
location of
critically
degraded
directly
draining
sub-
watersheds.

Action Plan :

Macro-watershed plan for the ISP was submitted during 1993. This plan was subsequently revised and updated. The plan of work is under implementation. Various components of the Action Plan are depicted in the Figure-1.

According to the plan submitted by the NVDA, 30 sub-watersheds covering an area of 73,456 ha have been identified as directly draining sub-watersheds. Out of the gross area of 73,456 ha, directly draining sub-watersheds, 57,697 ha is non-forest and the remaining 15,769 ha is forestland. The net area available for treatment, however, is 62,975 ha of which 51,927 ha area is non-forest and the balance 11,048 ha is forestland. Graphic presentation of the same is given below in Chart-1.



**CHART-1 : AREA STATISTICS OF CRITICALLY DEGRADED SUBWATERSHEDS
BELOW BARGI DAM & UPTO ISP**

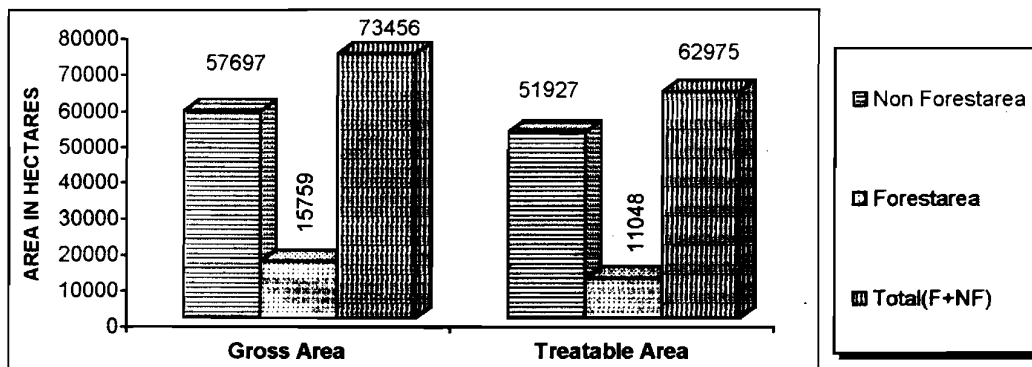
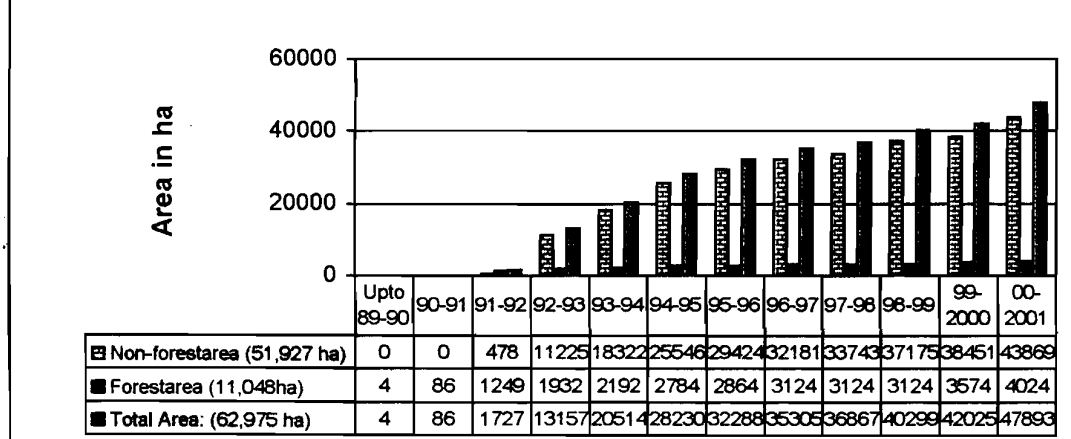


Chart-2 : Cumulative Progress of CAT works

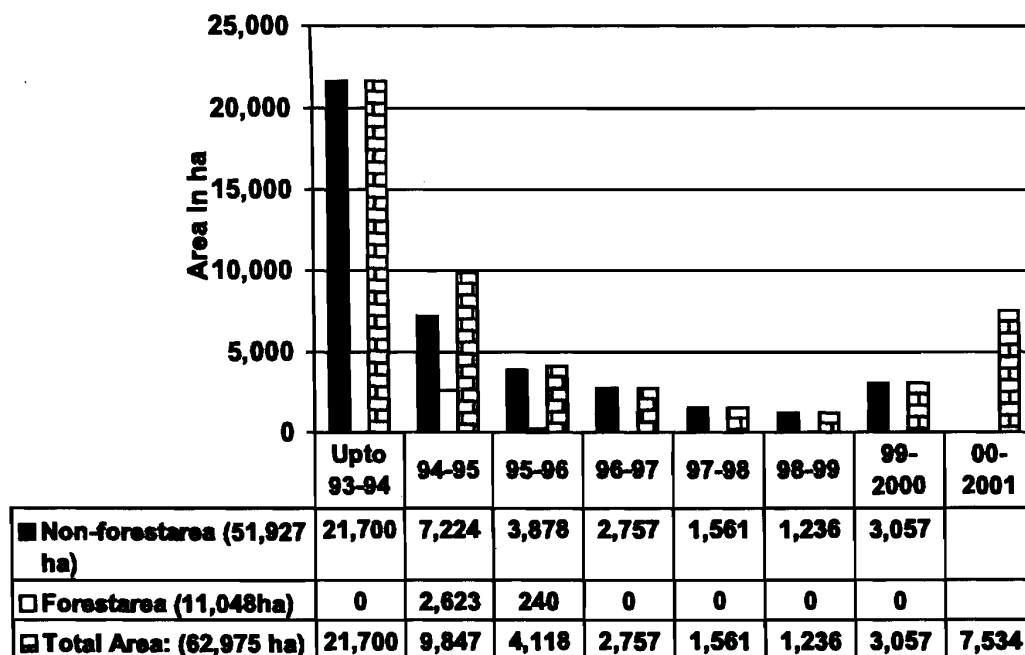


IMPLEMENTATION :

NVDA have planned to treat the Phase-I area in about 10 years' time commencing 1991, at the cost of the project and pari-passu with the construction work on the project.

By the end of September, 2001, the cumulative progress was 51810 ha. In addition an area of 1636 ha was treated up under pilot project earlier. NVDA proposes to treat the balance areas during the next four years.

Chart-3 : Schedule of treatment of Phase-I



II. FREELY DRAINING AREA (Excluding Directly Draining Sub-watersheds)

According to the plan submitted by the NVDA, 478 sub-watersheds, covering a gross area of 10,12,640 ha have been identified as freely draining (other than directly draining) sub-watersheds. The net area available for treatment, however, is 9,15,150 ha of which 806,720 ha area is non-forest and the balance 108,430 ha is forestland. Above details are graphically presented in Chart-4.

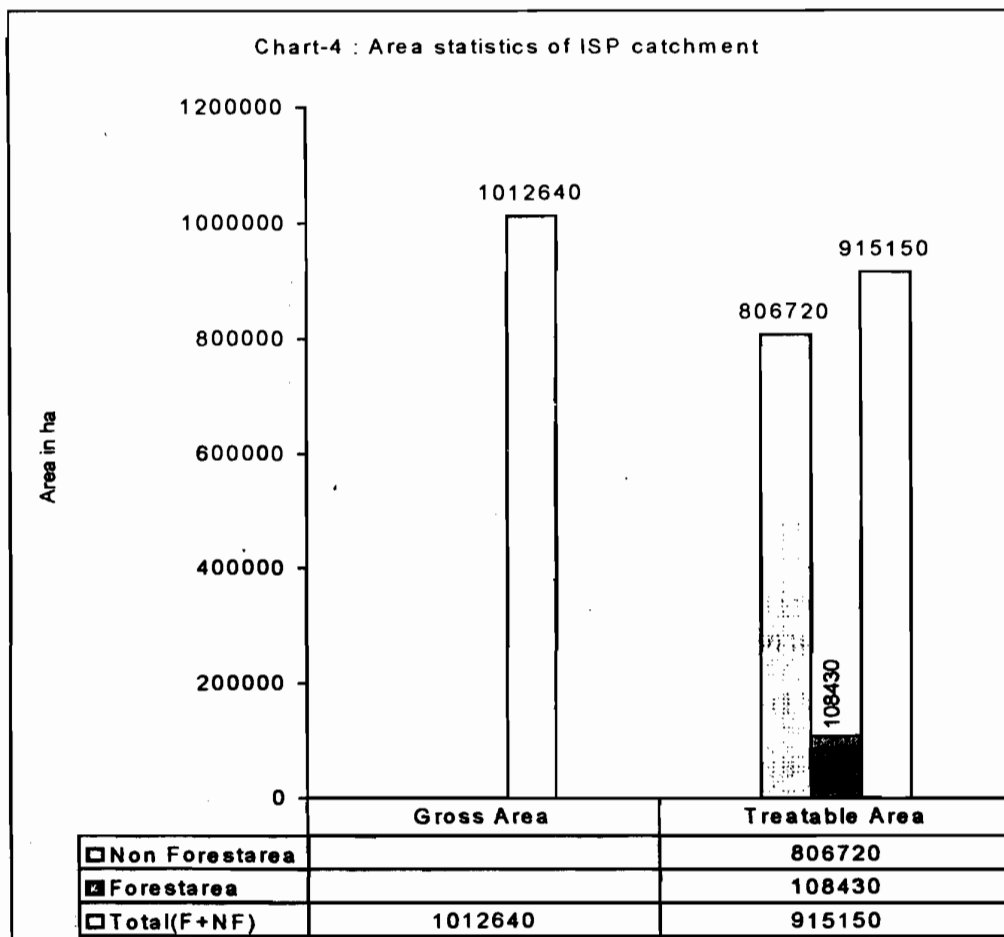
ACTION PLAN :

NVDA have submitted macro-watershed plans covering the above area during 1993. NVDA have planned to treat the Phase-II area in about 30 years' time commencing 1994-95, as per the schedule of implementation given in Table-5 below.

However, detailed micro-watershed schemes are required to be submitted to the funding agencies like NAEB, RVP etc. in accordance with the guidelines of these schemes. A few schemes have been submitted and got approved while the remaining schemes are under formulation.

IMPLEMENTATION :

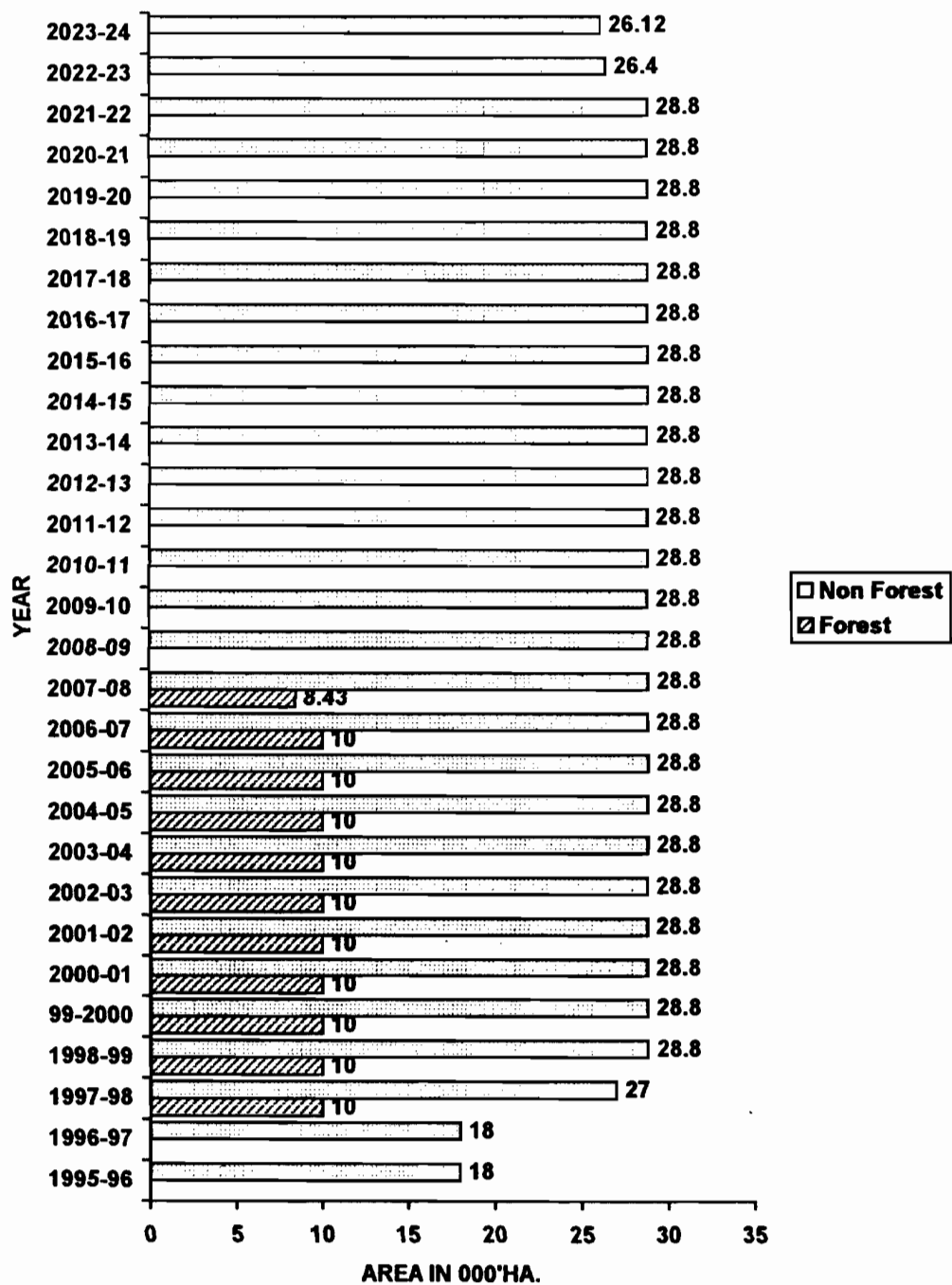
The Project Authorities have submitted CAT Phase-II plans for NAEB/RVP funding for seeking funds. Thirteen schemes covering the area of 28,318 ha. Were approved by the Govt. of India in RVP Schemes. By the end of September, 2001 the progress reported was 9,218 ha.



REQUIREMENT OF FUNDS :

The plan drawn up for treatment of Phase-II treatment works places requirement of total funds at Rs. 603 crores. It is proposed by GOMP to treat the non-forest area at an estimated cost of Rs.602.57 crores and forest area Rs.435.12 crores.

Chart-5 : Schedule of treatment of CAT works, Phase-II



2. COMPENSATORY AFFORESTATION:

A total of 40,332 ha forestland would come under submergence and an additional 779.90 ha. of forestland has been diverted for the residential colony, powerhouse complex, main dam, saddle dam and approach roads.

Subsequently, another 308.40 ha. of forestland was permitted to be diverted for powerhouse. Thus a total of 41,420 ha of forestland has been permitted to be utilised for the construction of ISP. Area proposed to be utilised for the ISP covers three districts as shown in Table-1 below.

TABLE-1 : Showing area taken by the ISP from three districts in M.P.

District	Area in hectares diverted for ISP
Khandwa	33,383
Dewas	4,528
Hoshangabad	3,678
Total	41,589

MOEF clearance granted in 1987 contained several conditions pertaining to compensatory afforestation. The key conditions among others was that

"Since the project involves violation of Forest (Conservation) Act, 1980, compensatory afforestation will be carried out over suitable degraded forest land double the diverted forest area in extent and in addition to the equivalent area in non-forest land. For this purpose, the area offered by the State Govt. vide their letter No.5/III/84-10-3, dated 14.10.1986 will be accepted and compensatory afforestation raised at the cost of the project in this area."

- State Forest Department re-conveyed the forestland for the purpose of ISP vide it's letter dated 28th November 1987 clarifying that-

"The plantations over the degraded forest, double in extent to the area which has been worked upon without the permission of the Forest Department, violating Forest Conservation Act thereby, shall be carried out, in addition to the usual plantations over non-forestland equal in extent to the area diverted."

ACTION PLAN :

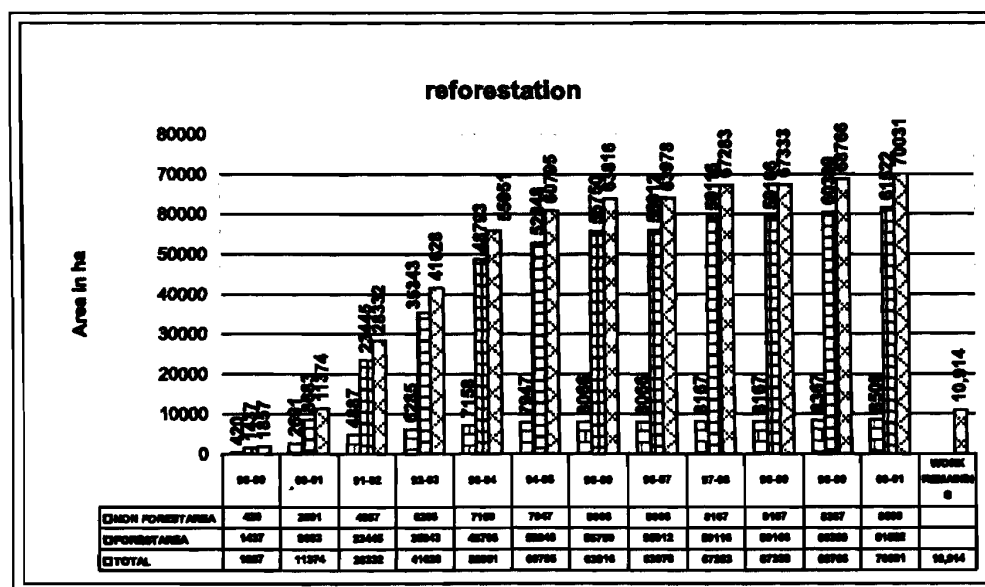
To compensate for this loss of forest the M.P. Forest Department had submitted an Action Plan for Compensatory Afforestation for the Indira Sagar Project in December, 1986. Area offered to this plan was accepted. The acceptance was acknowledged through the clearance order.

Accordingly, 10,143 ha of non-forest and 70,802 ha of degraded forestland has been identified for compensatory afforestation, in the districts of Khandwa, Hoshangabad, Dewas, Sehore, Dhar and Khargone as shown in Table-2.

TABLE-2 : Showing the district wise areas identified for compensatory plantation

District	Degraded Forest (In ha)	Area other than forest (In ha)
Khandwa	30,572	2,314
Hoshangabad	22,739	2,842
Dewas	17,491	802
Sehore	-	1,247
Dhar	-	1,001
Khargone	-	1,937
Total	70,802	10,143

The M.P. Forest Department has added additional areas to the prescribed afforestation hectare as a contingency to account for unforeseen circumstances. In selecting forestlands for the plantations, local requirements for grazing, firewood, and other nistar needs were kept in view. However, considering that with the dedication of vast areas to the proposed National Parks, some future adverse impacts on the local population's nistar needs may develop and that the wood from the submergence zone was expected to meet local fuel needs only for about 8 to 10 years, more emphasis was placed on fodder production in plantation areas in Khandwa and Dewas divisions. The plantations were to provide shelter and habitat to wildlife also.



* Figures are as per the NVDA letter No. 1235/ou@ek tp @ 1199 frukWad 1&9&2001 and are being

IMPLEMENTATION :

NVDA started the plantation works in the degraded forests within the Narmada catchment on the areas identified in the plan. Subsequently, however, many of these areas were included in the CAT program, as these areas were identified as critically degraded areas within the catchment. Such areas were, however, excluded from the compensatory afforestation works. By the end of September, 2001 the progress reported was 70031 ha as shown in Chart-6 above.

3. COMMAND AREA DEVELOPMENT

The Command area proposed to be irrigated by the NSP spreads on the left bank of the Narmada River. It comprises territory falling in the Khandwa tehsil of Khandwa District and six tehsils of Khargone District. The Satpura Ranges flank the command on the south. The northern boundary is formed by the Narmada River itself. The land of the command comprises Forest:10,055ha; Grasses and pastures:10,498ha; Cultivated land: 142,406ha; Culturable fallow : 8,116 ha; Barren:18,385 ha.

The command area has immense potential for development. The objectives of the command area development are :

- Optimum utilisation of created potential of irrigation.
- Introduction of multiple cropping patterns and increasing the levels of productivity and strengthening of agriculture research activities.
- Creation of adequate communication and storage facilities.
- Conservation management of integrated fisheries development.
- Intensification of dairy development.

The main components of the command area development program are

- On Farm Development,
- Conjunctive Use,
- Agro-Industries
- Regulated Market,
- Warehousing Facilities,
- Roads etc.

STUDIES AND FINDINGS

In 1975, at the request of the Narmada Water Dispute Tribunal (NWDT), the Gwalior Campus of J.N.K.V.V. University undertook a reconnaissance survey of the Narmada Sagar Command, using a 2-mile grid. Nearly 265 soil profiles were examined.

Reports on the quality of groundwater in the Indira Sagar Project area are limited, but the general assumption is that the quality is suitable for use in irrigation. Limited water quality testing was done in several blocks in the Indira Sagar Project area. These tests were apparently conducted in 1966 and 1967. In Barwaha block, five samples out of seven tested were of excellent quality.

During 1982-83, to appraise land irrigability, an area of about 2,80,000 ha falling within parts of Khandwa and Khargone districts was surveyed by the Department of Agriculture, M.P. Surveys were carried out on 1:50,000 – scale topo-sheets. Aerial photo-interpretation was carried out wherever possible. About 366 profiles and about 2787 auger bores were examined. The rate of profile examination was about 1 per 1000 ha. A total of 30 soil series were mapped. Areas falling under different classes of depth, erosion, slope, texture, and land irrigability subclasses were identified. This report indicated that typical vertisols are not extensive in the surveyed area.

A detailed reconnaissance soil survey of the Narmada Sagar Command Area was also carried out in January 1984 by the Directorate of Agriculture in co-ordination with the Govt. of India, National Bureau of Soil Survey and Land Use Planning Wing and the Agricultural University, Jabalpur in the command area of 2.10 lakh ha. The soils of the areas have been classified into 26 soil series taking into account the morphological features, topography, and physical and chemical characteristics. As per soil taxonomy (1970), altogether three orders, three suborders, three great groups, eight subgroups and ten families have been identified. Soils have been classified into various recognised classes in terms of their suitability for irrigation.

Table –3 : Showing land irrigability classification

Sl. No.	Land Irrigability Class	Slope Percent	Depth of Soil (in cms.)	Percentage of gross command area
1.	2	0-3%	More than 90	29.5
2.	3	1-5%	22.5 to 90	21.5
3.	4	3-10%	7.5 to 45	25.7
4.	6	5-15%	0 to 22.5%	23.3

In order to study whether full irrigation would lead to water logging and salinity problems, state govt. of Madhya Pradesh commissioned special studies on subsurface drainage and groundwater behavior to the Indian Institute of Science at Bangalore. For study purposes, the entire Narmada Sagar complex Area was divided into 34 hydro-geological zones. The studies considered the following :

- Rainfall data from stations around the composite command.
- Runoff as measured in nearby gauging stations.

- Evaporation rate data.
- Climatological data.
- Groundwater-level data from all types of wells.
- Pump test data.
- Hydro-geological information on wells and aquifers.
- Soil and soil moisture data.
- Agricultural land use data, including information on crops and the seasonal nature and extent of surface water and groundwater irrigation.
- Proposed crop-water requirements.

Jawahar Lal Nehru Krishi Vishwavidhyalaya, Jabalpur through their research centre are carrying out studies on impact of agro-chemicals run-off from fields on underground and surface water in command area with an objective of assessing the residues of toxic agricultural chemicals from fields in the ground water and surface water of command areas and ecological effects of the residues in irrigation water and their physiological effects on aquatic and terrestrial vegetation, crops, animal life and agro-ecosystem as a whole for devising measures to mitigate the same under the fallow and cropped yield conditions. Studies are commenced and are making progress.

SUGGESTED STRATEGIES

The Bangalore institute's study concluded that conjunctive use of surface water and groundwater on a significant scale would be required to avoid water logging and salinity problems in the Composite Command Area. Study data indicated that a water balance of 70% surface water and 30% groundwater would be suitable in most project areas to avoid waterlogged conditions.

Natural drainage conditions in the Narmada Sagar Complex Command Areas are quite favourable as Narmada Sagar area has a well-developed natural drainage system. The command complex lies on both flanks of the Narmada River, with a number of tributaries draining the area towards the Narmada River. The slope of the cultivable land generally ranges from 1 to 3% and it has good natural drainage. The groundwater aquifers are deeply incised, and major problems of surface drainage do not appear to exist. Surface drainage will, however, be required after irrigation is implemented through the provision of a proper network of field drains so that excess water will be removed from the cultivated fields.

Irrigation water from the Narmada River will be of good quality, and normal irrigation applications are considered sufficient to leach out the salts from saline/sodic soils. No additional leaching requirements will generally be necessary. Project planners do not expect any salinity problems if proper surface and subsurface drainage systems are installed.

ACTION PLAN :

The Government of Madhya Pradesh have submitted command area development plan, delineating the soil classifications and land irrigability in the Narmada Sagar Command Area showing the first three phases of irrigation development by area, the land irrigability map of the Narmada Sagar Command Area showing lands of classes 2 through 6 by location in the first three phases of irrigation development during 1986.

The project on completion will provide annual irrigation to 1.69 lakh ha. Waterlogging occurs when the groundwater table rises too close to the ground surface and the soils are unable to drain properly. This concern has been carefully planned to avoid the problems. The conjunctive use of surface and groundwater resources to the extent of 30% is proposed.

The provision of drainage systems to prevent the accumulation of excessive water in the soils, and water management planning and monitoring to control the proportions of surface water and groundwater used in irrigation and the water levels in the groundwater aquifers are some of the measures being planned for prevention of any such eventuality.

In keeping with the study conclusions, planning for the Indira Sagar Project includes maintaining a water balance of 70% surface water and 30% groundwater use, lining of the canal distribution system from the Main Canal upto the eight ha. service area, and installing and maintaining surface and field drainage systems. Because of the deeply incised aquifers, plans for surface and field drains, and plans for conjunctive use of surface water and groundwater, the planned groundwater monitoring program would be sufficient to indicate the needed remedial measures. Essentially all of the groundwater development will be undertaken by the farmers, however the State Govt. plan to take appropriate action to encourage planned groundwater development on schedule and to ensure that the required 30% of the total irrigation demand was met from the groundwater. If groundwater development does not occur on schedule because of the lack of farmer initiative or because of problems with water quality or adverse aquifer conditions, State Govt. plan to step in and install appropriate drainage systems whenever wherever needed

IMPLEMENTATION

The Government of Madhya Pradesh has submitted command area development plan. The project on completion will provide annual irrigation to 1.69 lakh ha. The implementation of the plan would be taken up in three phases for completion in December-2007. The study on impact of Agro chemicals, runoff from fields on surface & ground water quality in the command area has been assigned to J.L. Agricultural University, Jabalpur. An MOU for this work was

finalised. An allocation of Rs.24.5 lakhs was made. Studies have commenced and are making progress. The works of on farm development will be started 2 years in advance of the start of irrigation from canal system in a phased manner in the entire command area.

However the progress on the canal system is very slow. Earth work has been completed only in the first 20 kms of the main canal.

4. FLORA, FAUNA AND CARRYING CAPACITY

The guidelines of the MOEF require that while seeking environmental clearance for the hydropower projects, surveys should be conducted so that the status of the flora and fauna present can be assessed, listed (rare and endangered) species can be detected, if present, and appropriate conservation measures devised. Important survey work undertaken for the purpose had included the following

- Preliminary Report on First Botanical Exploration and Plant Collection from Narmada Valley by the Botanical Survey of India in 1986.
- Report on the Survey of the Narmada Sagar Area by Zoological Survey of India, 1988.
- Narmada Basin Water Development Plan: Development of Fisheries, 1987, was prepared by the Narmada Planning Agency, GOMP.
- Rapid Reconnaissance Survey of Limnological Aspects Part I, II and III, 1987, were undertaken by the Bhopal, Vikram and Rani Durgavati, Universities for GOMP.
- Water quality data has been collected by the Central Pollution Control Board, Central Water Commission, the State Pollution Control Boards and the National Institute of Oceanography

On the basis of relevant details supplied by the various states, MOEF issued clearance in 1987. A condition of this clearance, as far as it related specifically to the Flora & Fauna, was that the Narmada Control Authority would ensure in-depth studies on flora and fauna needed for implementation of environmental safeguard measures.

Further in-depth studies with focus on the following prime concerns were taken up.

- Relocating and protecting wildlife through setting up and maintenance of the permanent protection areas.
- Detailed surveys of both flora and fauna to determine the number of individuals of the various species, their habitat types and other needs, their status in terms of being endangered, threatened or protected under Indian

Legislation, and recommendations for minimising project impacts and maximising opportunities for protecting and enhancing plant and animal life.

- Studies to ascertain the capacity of the surrounding areas to accommodate additional wildlife

The objective of the suggested studies was to assess the environmental impacts as a result of the Narmada Sagar Complex, consisting of the three dams: the Narmada Sagar, Maheshwar and Omkareshwar, to ensure minimal adverse effects on wildlife as a result of the project development works. Studies were entrusted to Wildlife Institute of India and Friends of Nature Society. Institutes carried out exhaustive studies with a view to address the above concerns. Studies focused on the following

The reports submitted by the identified premier organisation during the period 1986 and 1997 included the following

- Sociological Survey of the Fishing Families of the Narmada River by CICFRI, 1991.
- Aquatic Fauna (Fish) Studies in Indira Sagar Submergence Area, prepared by the Friends of Nature Society in 1991 on behalf on the NVDA reported on the fish fauna of the Narmada.
- Pre-and Post-Impoundment Limnological Studies of Narmada Basin, by three universities coordinated by Barkatullah University for the NVDA. (1989-92) Study report was available in 1994.
- Studies on Fish Conservation in Narmada Sagar, Sardar Sarovar and its Downstream, is a desk review sponsored by the NCA and undertaken by CICFRI, 1993.
- Wetland and aquatic flora of Narmada Valley in Madhya Pradesh was also published in 1991 in Vol. 15 No.3 in J.Econ. Toxicology Bot.
- Studies on EIA of Flora & Fauna of NSP were entrusted to the Wildlife Institute of India, Dehradun in December, 1989 and were completed by March 1994.

Key concerns addressed on the terrestrial ecosystem were as follows:

- A wildlife inventory giving reliable estimates of the numbers of various species of wildlife in the project impact area.
- A catalogue of habitat types found in the project area.
- A status report on individual species indicating ones that are endangered, threatened, or protected under prevailing Indian wildlife Laws. The report on these special status species was also included the recommendations for actions to be taken to safeguard threatened species
- Recommendations for the creation of new protected areas for wildlife in the areas neighboring the submergence area.
- An assessment of the impact of the project gene pool reserves of wildlife in the project area.

SUGGESTED STRATEGIES

Establishments of protected areas in many parts of the country in the last three decades has largely been and outcome of the Govt. concern for mitigation of the environmental degradation specially for preservation of species diversity and the genetic valuation within them. Besides, maintaining productive capacities of Eco-system and safeguarding habitat critically for the local range of species. Three new protected areas were proposed to mitigate the losses. This includes Narmada National Park, Suryamanya Sanctuary and Omkareshwar Sanctuary.

Name of the Sanctuary/Park	Area in ha.
Narmada National Park	47522
Suryamanya Sanctuary	16370
Omkareshwar Sanctuary	11996
Total Area	75888

It is suggested that the severity of the impact resulting from direct and indirect losses could be minimised through restoration of some of the aquatic vertebrates and delineation of a substantial area of the contiguity forest which has similar conservation values that are being lost in submergence and to elevate its status to a protected area – a combination of a national park and sanctuary. Key aquatic vertebrates species like otter is proposed to be restored and translocated. It was suggested to explore the possibility of capturing and translocation of impacted otters of Narmada Sagar into identified localities of the vacant niches in central Indian rivers. Besides, a species restoration plan for aquatic reptile (turtle) was also suggested within the submergence zone and also in other stretches of the river with rocky structure and sandy banks. The restoration program for mugger crocodile as being practices in other districts of M.P. was also suggested.

ACTION PLAN AND IMPLEMENTATION

Actions have been taken by NVDA to implement the recommendation of the WLI regarding declaration of National Park & protected areas. Matter is under consideration of the State Govt.

The studies of certain aspects of fisheries and reservoir sciences have been included in the Limnological studies being conducted by the three

Universities of the State. Studies in the Upper Narmada, (Bargi Reservoir) by Rani Durgawati University, Jabalpur, studies in the Middle Narmada (Tawa, Barna and Kolar Reservoirs) by Barkatullah University, Bhopal, studies in the Lower Narmada by Vikram University, Ujjain. All the three Universities have completed the studies in their respective areas as per MOU and final report is available. Accordingly Action Plan has also been drawn up

Since the topography in the reservoir area consists of rolling hills, NVDA expected the higher peaks to remain above the water surface level and constitute islands in the reservoir. These islands would contain remnant flora and fauna that would remain isolated and would be subjected to changes in microclimate by virtue of being surrounded by a large body of water. NVDA scientists have expressed an interest in the possible effects these special circumstances could induce.

In addition to these small islands, two large islands will be formed to the north and south of the Narmada River just upstream of the Indira Sagar Dam. Present plans are to reserve the northern island of 17 km², for people and to link it to the mainland and the highways leading to Indore and Bhopal. The southern island of about 23 km², however, is earmarked for conversion into a wildlife sanctuary. This prospective island would be considered large enough to preserve existing flora and fauna.

Plans have been drawn up for retrieval and conservation of terrestrial wild life. Actions have been taken by NVDA to implement the recommendation of the WLI regarding declaration of National Park & protected areas. Matter is under consideration of the State Govt.

The studies of certain aspects of fisheries have been included in the limnological studies being conducted by the three Universities of the State. Studies in the Upper Narmada, (Bargi Reservoir) by Rani Durgawati University, Jabalpur, and studies in the Middle Narmada (Tawa, Barna and Kolar Reservoirs) by Barkatullah University, Bhopal, and studies in the Lower Narmada by Vikram University, Ujjain. All the three Universities have completed the studies in their respective areas as per MOU and final report is available. Accordingly Action Plan has also been drawn up.

Aquatic fauna has also been covered under the studies completed by Friends of Nature Society, Bhopal. The draft report of FONS is also available. Action Plan submitted earlier is being updated.

5. SEISMICITY AND RIM STABILITY

The Narmada Sagar reservoir has a gross capacity of 12,200 million cubic meters, or about 9.9 million acre-feet, by far the largest-capacity reservoir planned in the Narmada River basin. Therefore the issues of seismicity, the

potential for reservoir-induced seismicity (RIS) and the rim stability have been carefully studied and addressed.

Some of the staff of NVDA was trained by IMD for initial analysis of observed data and determining the magnitude of earthquake.

STUDIES

Investigations have considered the Narmada Sagar complex dam sites at Indira Sagar, Omkareshwar and Maheshwar together for the studies. Geological Survey of India, the Central Water and Power Research Station of Pune, the University of Roorkee, GOG, GOMP and World Bank Consultants Pinkerton, Markwell and others have been closely associated with the studies and the mitigation planning. Several reports on seismological factors affecting design of the dam, including the following are available

Technical Memorandum 3.09, Evaluation of the Earthquake Parameters of the Indira Sagar Dam, by the Department of Earthquake Engineering, Roorkee University. Technical Memorandum 4.12, Seismological Considerations for Indira Sagar Dam. Part-1: Evaluation of Earthquake Parameters for Design of Dam. Part-2: Assessment of Potential for Reservoir-Induced Seismicity in Narmada Basin. Induced Seismicity and Other Geodynamic Processes Associated with Man-made lakes, Guha, S.K., Visiting Seismology Consultant, North Eastern Council, Shillong, India, Sessional Report presented at IVth International Congress, International Association of Engineering Geology, New Delhi, India, 10-15 December 1982. Hazards Due to Reservoir-Induced Seismicity in India, Guha, S.K. (See item-3 above.)

SUGGESTED STRATEGIES

Major conclusions related to the effects of RIS considerations on seismic design requirements and the needed plans for seismic monitoring. As for design, it was suggested that reservoir impoundment's by general agreement can trigger significant earthquakes only where tectonic deformations already exist in the geological structures. Thus it was concluded that filling the Narmada Sagar reservoir might cause an earthquake to occur sooner, but it would not affect the magnitude or intensity of ground motion associated with the earthquake. Consequently, RIS was assumed to have no influence on seismic design requirements for structures near to the reservoir.

Detailed studies got done from the University of Roorkee, by consultancy with Dr. Guha and expert opinion obtained from Dr. Ray W. Clough, were placed before the Dam Review Panel. The Indira Sagar Dam Review Panel considered all available reports and data and recommended that

To monitor seismicity during the pre and post-impoundment phases.

Network of about five stations each be developed in the Narmada Sagar, Omkareshwar, and Maheshwar areas.

To record the ground motion intensity and response of the dams for any significant earthquake in the vicinity, installation of three strong motion seismographs at each dam site.

To record any significant ground motion that occurs during construction, one strong motion instrument near each dam site

Based on the recommendations of the Dam Review Panel, detailed designs for the dam have been prepared by the Central Water Commission.

At present, three experimental seismological stations have been established with the guidance of Central Water & Power Research Station, Pune, at Narmada Sagar, Omkareshwar and Maheshwar dam sites. The experimental station at Indira Sagar Dam site consists of a RV-320 Micro Earthquake Recorder, a Wood Anderson Seismograph and a Digital Recorder - 100 strong motion accellograph. The results are analysed by the Central Water & Power Research Station, Pune & IMD.

In order to study the seismic effects in the Narmada Sagar Complex Zone a network of 10 seismological observatories with sophisticated instruments is established based on the recommendations of Erstwhile Dam Review Panel, Central Water and Power Research Station, (CWPRS) Pune and Indian Meteorological department (IMD). It is proposed to monitor pre and post impoundment seismicity also at these seismic stations to help in assessing the adequacy of seismic parameters adopted for designs. The location of these seismic observatories finalised on the recommendations of IMD are (1) Bagli (2) Barwani (3) Chhanera (4) Harda (5) Indore (6) Kannod (7) Khandwa (8) Maheshwar (9) Narmada Nagar (10) Omkareshwar. Out of the 11 Micro Earthquake (MEQ) recorders of 800 B model procured, 10 are installed at above locations. One spare unit is also installed at Pandhana near Khandwa to monitor local activity in and around Pandhana area.

The dam is, in effect, over-designed in the interests of public safety. As for the Indira Sagar Dam, Seismic design coefficients, though higher than needed, also meaning higher costs have been preferred.

RESERVOIR RIM STABILITY

The reservoir competency survey has been done by GSI and report is submitted. In the report, GSI suggested further studies for some patches of narrow water divide. However environment sub-group decided not to have further studies as experts were of the opinion that there was no water loss between Mandla & Rajghat.

Establishment of 11 nos. of seismic observatories in the Narmada Sagar Complex area is completed by NVDA. All the 11 MEQ recorders have been installed. MEQ recorders are now in working condition at 9 stations. Action is also taken by Project Authority to make functional the remaining MEQ recorders. Besides, 12 nos. of Wood Anderson Seismometers and 6 nos. of photographic recorders are being procured from IMD. Procurement of Micro Earthquake recorders is completed. In the mean time on the initiatives taken by NVDA, CWPRS has already installed the instrument to record, pre-impounding data and for undertaking seismic studies at NSP, Omkareshwar & Maheshwar projects through Analogue Micro Earthquake Recorder & Strong Motion Occillograph as an interim measure. IMD will interpret data.

6. HEALTH ASPECT:

The Indira Sagar Project would create a 913 km² reservoir, a main canal of 332 km. and 1,820 km of distributaries. Surveys have been conducted in the Indira Sagar impact areas to investigate existing levels of health and to gather information on specific diseases.

STUDIES AND FINDINGS :

Three specific diseases namely Malaria, Schistosomiasis, and Filariasis were studied. Other diseases investigated were leishmaniasis and scabies and other water-washed diseases. The geographical reconnaissance study, to identify the potential breeding sites of malaria vector, is being explored.

Pre-impoundment and post-impoundment Limnological studies carried out by three Universities take care of water quality aspect. These studies have been completed and the final report is submitted.

Further regarding preventive aspects, Department of Preventive and Social Medicine, Gandhi Medical College, Bhopal are engaged for the epidemiological studies. Studies are making progress.

J.L. University which carried out initial studies for the planning commission on the aspects related with the use of insecticides and pesticides in the command through their research station at Khandwa have been entrusted with studies on impacts of application of insecticides etc.

According to the above studies, key findings included the following :

- Malaria is increasing in Khandwa and Khargone Districts surrounding the Indira Sagar Dam site.
- Cholera and gastroenteritis are endemic in Indore, Dhar and Jabua Districts for more than seven months each year.

- Other common diseases are typhoid and dengue fever, although they are not often found in the project area.
- Filariasis is endemic to at least eight districts of MP, including Chindwara, adjacent to the Narmada Sagar Site. The vector mosquito (mainly *Culex fatigans*) responsible for this parasitic disease proliferates in dirty water in ponded areas and artificial containers and also to a lesser extent in stagnant irrigation tributaries and lakes.
- Little or no autochthonous leishmaniasis exists at present in MP. This disease is not water related since it is spread by sand flies that do not need water to breed. However, according to NICD, Delhi, leishmaniasis flared up following the construction of the Rajasthan canal.
- Guinea worm disease (dracontiasis) affects 3,000 villages in MP. This disease is caused by a nematode worm and the vector for its transmission is Cyclops, the fresh water fleas.

SUGGESTED STRATEGIES :

Health problems related to these causes are expected to improve when the projects are implemented. The incidence of water-washed diseases should be reduced by the increased availability of water. The point has also been made that large water supply and irrigation projects often cause problems related to the expanded water environment. Plans have been prepared in both project areas to increase public health-related facilities, staffing, and services during project implementation. The incidence of water borne diseases in the Narmada Valley, as elsewhere in MP, is constantly being monitored by GOMP's Directorate of Health Services (DHS).

Means to control schistosomiasis include physical, chemical, and biological mitigation measures. Physical mitigation measures include draining area with standing water, clearing vegetation from water channels and banks, utilising flushing flows, and manipulating water levels. The primary chemical mitigation measure is the use of molluscicides. Biological mitigation measures would include the use of predator species that would eat the secondary host snails. Schistosomiasis is to be kept out of the project area through vigilant monitoring and the prompt use of eradication measures when needed.

Malaria is another disease that requires monitoring and control actions in the project areas. It was found that most of the existing diseases in the project area were related to prevailing socio-economic levels, mainly hygiene. Since the Anopheline mosquito vector has the potential to proliferate in the reservoir, the large draw down strip, and the canals and drains, preventive measures are to be in place to keep the mosquitoes in check. Some experimental resistance of adult mosquitoes to commonly used biocides has been noted under laboratory conditions. Thus research to maintain effective biocides will have to be continued on long term basis. Land levelling and land filling operations as well as

appropriate vegetation clearing are being integrated. Control measures will include larvae-eating fish in water bodies, mosquito-inhibiting plants, and clearing of vegetation and other actions to destroy breeding sites.

ACTION PLAN :

NVDA has submitted the revised plan costing Rs.278.95 lacs for the preventive and curative aspects of health. The plan includes establishment a 30 bed hospital at Punasa. Other facilities includes the following :

- Mobile unit
- PHC 3 nos., equipped with 5 beds each, equipments, vehicles, staff etc.
- 2 civil dispensaries with labs
- 24 sub-health centres with equipments etc.

Action Plan includes continued investigations of the Central and Western Zone of Narmada at selected sites for the identified parameters. In addition, plan proposes biological characteristic study, microphytes, phytoplankton, zooplanktons, micro invertebrates, biomass etc. The proposal includes among others continued limnological studies, ecological studies. A note on health aspects of NSP prepared by NVDA was examined in the Ministry of E&F and comments were sent for modifying the report. NVDA has submitted the revised plan costing Rs.748.73 lacs for the preventive and curative aspects of health. Regarding preventive aspects, a MOU has been signed with the Department of Preventive and Social Medicine, Gandhi Medical College, Bhopal. Six interim reports received. For studies on health aspect in project impact areas of SSP and NSP, work is proposed through a cell of monitoring and evaluation under the Directorate of Health Services, Bhopal. The approved plan is being implemented.

Pre-impoundment and post-impoundment Limnological studies carried out by three Universities will take care of water quality aspect. These studies have been completed and the final report is submitted. Action plan approved by NVDA is under scrutiny of NCA.

IMPLEMENTATION :

The above Action Plan is under implementation. For long term hydro-biological monitoring, one well equipped laboratory has been established at Barwani.

Progress on work on Health services being created in ISP.

Sl. No.	Rehabilitation sites	Provision	Status
1.	Bedhani	Ayurvedic Hospital	Work in progress

2.	Anjania Khurd	Ayurvedic Hospital	Work in progress
3.	Chainpur	Ayurvedic Hospital	Work in progress
4.	Saralya	Sub-Health Centre	Work completed
5.	Narmada Nagar	Medical Unit with 20 bedded Hospital for workforce of ISP	Functioning at Punasa Dam site.

7. ARCHAEOLOGICAL & ANTHROPOLOGICAL SURVEY:

Archaeological Aspects

Investigations of the basin revealed that valley was rich in archaeological belongings:

- ◆ Paleolithic sites are to be found in Nemavar, Kannod, Punjapura, Chirapahad, Sitabau, Dhardi, Moretakka, Maheshwar, Kasrawad, Sahastradhara, Khalghat, Dharampuri, Kalibaodi, Manawar, Budada, Barwani, and Kukshi.
- ◆ Mesolithic sites are to be found all over the valley.
- ◆ Cholelithic sites are to be found in Chikalda, Khedi, Badada, Mohipura, Hathnawar, Piplada, Khalghat, Maheshwar, Nawada, Todi, Kapila Sangam, Veda Sangam and Mardana.
- ◆ Rock-cut caves and sculptures are to be found at Piploda, Dharampuri, Bijagadha, Bagha and Mandogarh.

None of the archaeological sites mentioned above, that have special significance, would fall within the area of submergence of the projects.

SURVEYS :

A survey of the 254 villages for identification of the archaeological monuments falling within the submergence area was carried out by the State Department of Archaeology and Museum, Bhopal.

Archaeological Survey of India has also completed the survey for 167 villages for centrally protected monuments for identification of the monuments of significance. Implementation of the Action Plan is already initiated.

ACTION PLAN :

State Protected Monuments :

The State Department has submitted an Action Plan for relocation of monuments of archaeological significance earlier in 1993. According to this, the archaeological mound at village Khedinema is excavated.

Later on GOMP has revised its plan as Action Plan 1997. The details are depicted in the table below:

• **Relocation / Protection**

Sl. No	Particulars				Status
	Name of mounment	Village / Tehsil	Distt.	RL in m	
1.	Shiv Mandir, Dharikotla	Harsud	Khandwa	229.500	Work is in progress and likely to be completed in September, 2001.
2.	Shiv Mandir, Punghat	Harsud	Khandwa	240.315	Land allotment awaited.
3.	Shiv Mandir, Badkeshwar	Harsud	Khandwa	263.805	Pre-relocation work completed. Land allotment awaited.
4.	Shiv Mandir (Durga Mandir), Chandel	Khandwa	Khandwa	254.917	Land allotment awaited
5.	Chhatri Ghisor	Harsud	Khandwa	239.300	Land allotment awaited
6.	Shiv Mandir (2), Khudiamal	Harsud	Khandwa	266.215	Land allotment awaited
7.	Ridheshwar Mandir, Handia	Harda	Hoshanga bad	273.380	Estimate ready.
8.	Abdul Hasan's Tomb	Harda	Hoshanga bad	269.680	Site identification in progress.
9.	Rock-cut statues	Deyat	Dewas	267.830	Estimates are under preparation.
10.	St. Singhaji's Samadhi	Singhaji mafi	Khandwa	247.915	Progress is nil

• **Excavation**

Sl. No.	Particulars of archaeological mounds	Progress
1.	Mound at village Bijalpur Khurd, distt. Khandwa	Nil
2.	Mound at village Chhalpakala, distt. Khandwa	
3.	Mount at village Gajanpur, distt. Dewas	
4.	Mound at village Navalpura, distt. Khandwa	
5.	Mound at village Gannor, distt. Khandwa	

Centrally Protected Monuments :

Archaeological Survey of India have prepared a plan for protection of monuments coming under the submergence of Narmada Sagar Complex area. According to this plan, in the area of submergence of Indira Sagar Project, only lower bastion in north of the Joga Fort is likely to be affected by scour action of water.

IMPLEMENTATION :

Plan of Archaeological Survey of India

Environment Sub-group constituted a committee to look into the plans to protect the Joga Fort. The committee met twice and undertook field visits and observed as follows :

R.L. of plinth of Joga Fort	+ 274.80 M
R.L. of Top of Joga Fort	+ 284.75 M
R.L. of Main Gate of Joga Fort	+271.035 M
R.L. of Top of well	+ 261.39 M
F.R.L. of ISP	+ 262.10 M
Observed Highest Flood Level	+ 264.27 M
(54,000 cumecs)	
HFL corresponding to 1 in 100	+ 265.52 M
year Flood (62,500 cumecs)	
HFL corresponding to 1 in 100	+ 266.029M
year Flood (83,366 cumecs)	
BWL corresponding to 1 in 100	+265.00 M
year Flood	
BWL corresponding to 1 in 100	+ 266.637M
year Flood	
Water Level (20.7.98)	+ 252.00 M
River Bank	+ 259.14 M
River Bed	+ 248.00 M

From the above data, it was inferred that the well situated in the midst of north bastion will be fully submerged at FRL + 262.10 M. However, this will remain submerged for 2-3 months during monsoon when reservoir might be at FRL.

As far as backwater effect is concerned, the temporary rise due to backwater will be about 0.60 M near well, above HFL. Archaeological Survey of India has prepared an estimate of Rs.1.50 crores for construction of a wall to protect the in-take well.



About 134 statues were collected from districts Hoshangabad, Dewas and Khandwa and are displayed in the museums there.

Photo(s) shown here are of the statute displayed at Dewas



museum. About 100 statues were treated chemically. Construction of Museum is over.

Anthropological aspects:

The Narmada Valley can be divided into three physiographic units (1) Western Vindhyas (2) Narmada through West and South and (3) Western Satpuras. Some Indologists place the Narmada-Chambal civilisation of Malwa as a contemporary of Indus civilisation. Navada Toli is a site contemporary to Harappa where evidence of early farming villages were discovered. Findings of a hominoid skull from Hathnora indicated the possibilities of the existence of human bio-cultural remains within the basin.

SURVEYS/STUDIES :

A series of studies have been conducted for salvaging the Narmada Basin from anthropological point of view which includes Paleo-Anthropological, human ecological, ethnography and pre-historic aspects. Besides studies on contemporary culture and collection of ethnographic specimens were collected and leading anthropologists were associated.

- *Rashtriya Manav Sanghralaya* has constituted a working group for the retrieval of bio-cultural material in Narmada Basin this includes studies on taphonomy and paleo ecology, excavation of upper paleo lithic sites, collection and documentation of material culture objects from tribal, artisan and folk culture.
- Survey of tribal art and handicraft entrusted to *M.P. Adivasi Kala Parishad* is completed and report is available. The report gathered details from the 24 submergence villages and identified 75 sculptors and eight groups of exhibitionists besides documentation of identified important sculptures. Cultural aspects of the tribes including marriages and their lifestyle were collected.
- The Bhil Track, a study of displaced tribal, sponsored by NVDA, of the 17 submergence villages of SSP compiled the information on their status, layout of their resettlements, construction of houses, social structure, division into clans, economic structure, in-depth, dependence on forests for living, inter-community relationship, leadership pattern, women's role, religion, superstitions and festivals.
- Besides Anthropological Survey of India has covered these studies under its own project called "People of India". The report is in 61 volumes out of which 7 volumes are under final editing.

- A Narmada salvage plan is also launched by Anthropological Survey of India.

ACTION PLAN :

Archaeological Survey of India is carrying out excavation at selected sites. Reports are available.

State Department has reviewed the Action Plan and has proposed 5 excavation sites as shown in table -4, in addition to the earlier proposal of collection of sculptures and excavation at Khedinama.

Table-4 Showing status of works at excavation sites

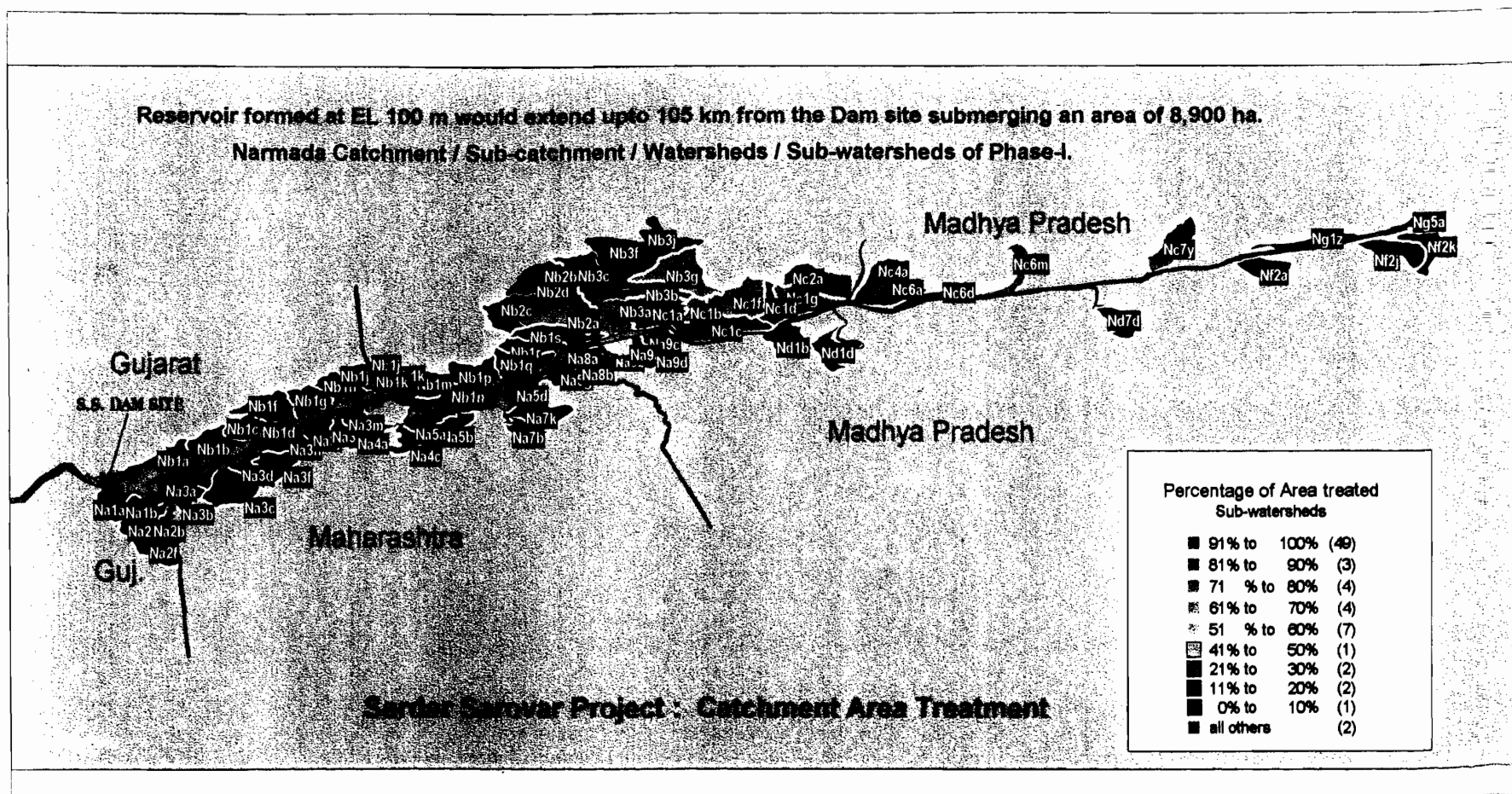
EXCAVATION SITES	STATUS
Bijalpur Khurd, Khandwa	Progress is nil
Chhalpa Kala, Khandwa	
Gajanpur, Dewas	
Nabalpura, Khandwa	
Gannaur, Khandwa	

Excavation works at Khedinama was completed earlier during 1993-94. Report is being published.

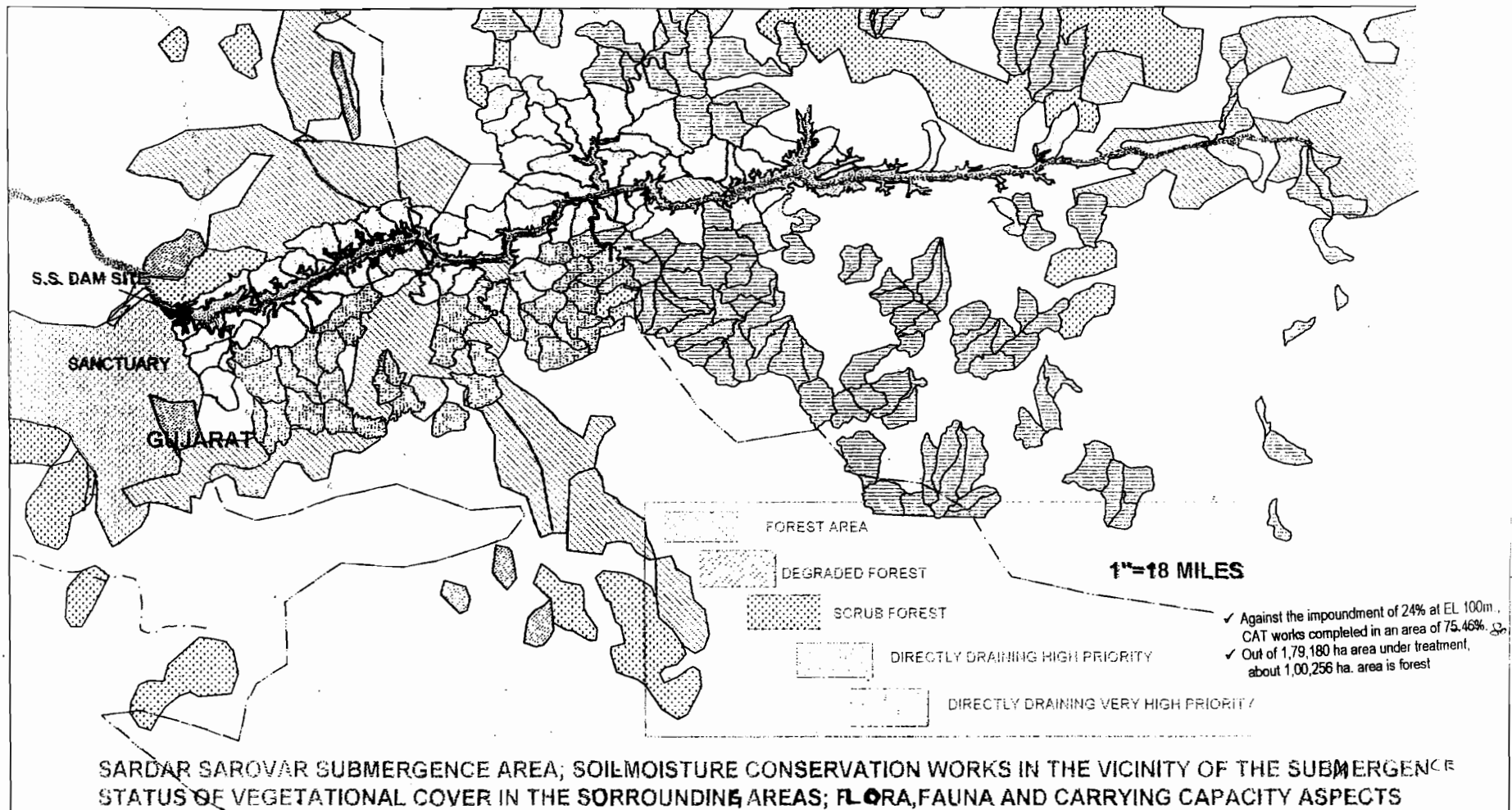
IMPLEMENTATION :

Excavation of the early historic mound in village Khedinama in Hoshangabad district is completed. Ancient tools and artifacts were found and report is available in NCA.

The entire area was scanned by the Anthropological Survey of India under Narmada Salvage Plan and some ancient tools have been found.



ANNEX - XXXVII (14)



ANNEX - XXXVII - (14)

ANNEX – XXXVII – (15)

**Extract from the Report on SSP, Environment Protection and
amelioration programme: Fisheries component : December 2001
received from the SSNNL, GOG**

4.2.1. Reservoir

A. Resource Building in the Reservoir

The Fisheries Development activities were already going on in the Sardar Sarovar from 1993 onwards through the State Fisheries Commissionerate. The Fisheries Department used to stock the Dykes of the Reservoir with the standard fingerlings (40-60 mm) of *Rohu* and *Mrigal* from their own resources, as no specific development programme had been adopted, at that time.

Year	Fund Allotted (Lakh Rs)	Expenditure (Lakh Rs)
1993-94	02.64	00.00
1994-95	23.00	00.00
1995-96	23.00	48.64
1996-97	18.06	18.06
1997-98	00.10	00.10
1998-99	14.00	14.00
1999-00	14.00	14.00
2000-01	19.28	19.28

It is proposed to sort out the needs of the SSNNL with the CIFCCA and streamline the seed stocking in reference to the size and species composition. Negotiations are progressing on these lines, at the instance of the Government of Gujarat in the Ports & Fisheries Department, with the concerned agencies for meeting the immediate requirement of seed for reservoir stocking. However, it is but natural, that the Seed Farms located about 300 Km. away from the reservoir cannot be depended on for supply. Therefore, the SSNNL is contemplating to establish a Major Carp hatchery at the dam site, with a production capacity of atleast 10 crore (100 million) spawn per annum.

It is worth mentioning in this connection that no major reservoir in Gujarat - except the Vallabh Sagar at Ukal - has the support of such a back-ward integration. This has resulted in inadequate seed stocking/resource building in the major reservoirs, resulting in low fish output from them.

In addition to the procurement arrangement for the Major Carp Seeds, the SSNNL has initiated steps to procure seeds of Mahseer through the Government/private agencies

B. Rearing Space Development for Seed Rearing.

The State of Gujarat, used import Major carp seeds from West Bengal in the initial stages. However, due to the success of Induced Breeding by the hypophysation technique in the State (1962) and the subsequent establishment of Carp hatcheries at Ukai, Pipodara, Wankaner, Valod, Kosmada (Surat district), Palan (Valsad district), Lingda, Navli, Bhadarania (Anand district) etc., the State is presently self reliant in fish seed production. It presently produces about 60 crore (600 million) Major Carp spawn. However, the recovery of fingerlings of stockable size is not more than 5 crore (50 million) presently.

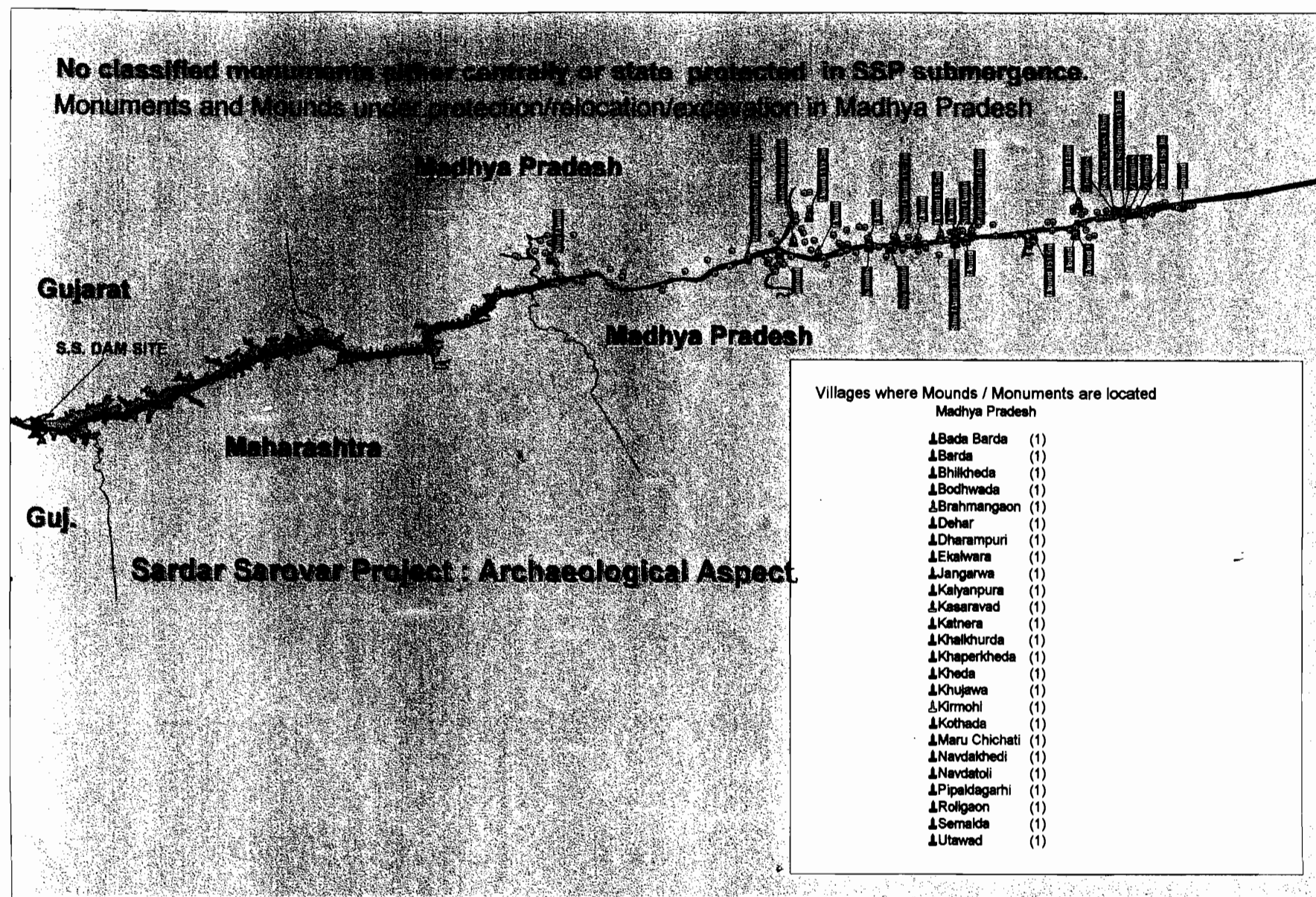
Although the Department / Government agencies are capable of producing Carp Spawn, their rearing to fingerling stage is a great task, as the rearing space is very scarce. The Seed farms in the State do not have even 10 ha. of rearing space each with them to rear the seed produced by them. This has a telling effect on the fingerling output of the State.

Therefore, it is imperative to have sufficient rearing space to raise the fingerling for stocking in the Sardar Sarovar. The component of rearing space development in the Sardar Sarovar Project for seed rearing was, therefore, incorporated in 1994, when the SSNNL initiated the fishery development. This was to take the spawn to the vicinity of the reservoir and rear them there to the stockable size. This arrangement would reduce/minimize the mortality and loss of the seed during transit from the Seed Farms to the reservoir.

Since the land earmarked by the SSNNL for the rearing space was found to be porous in nature, the water retainability was doubtful. Hence, the Department identified another land at Timbi, (about 40 Kms. away from the Reservoir) and the Government orders for the land transfer were obtained. This, however, did not materialize, as the land was subsequently required by the Government for some other use and the Fisheries Department had to identify an alternate land. Efforts are being made to procure an alternate land for the development of rearing space for fish seed by the State Fisheries Department in the nearby areas in Narmada district.

So far an amount of Rs. 64.36 lakhs was released by the SSNNL for rearing space development, (from 1993-94 to 1995-96). Due to non-availability of suitable land, this amount was not utilized by the State Fisheries Department.

In this connection, a team of officers from the Sardar Sarovar Narmada Nigam visited the Peninsular Division of the Central Institute of Freshwater Aquaculture (CIFA), Bangalore, and the Fisheries Set up of the Tungabhadra Project, Hospet, where pen culture is deployed within the reservoir for seed rearing on a large scale. The scientists of the CIFA, who visited the Sardar Sarovar Project area subsequently, are engaged now in working out necessary packages of consultancy for pen/oage culture in the dykes and/or the Sardar Sarovar.



ANNEX XXXVII (17)

A REPORT ON RIM STABILITY

The Sardar Sarovar Project has established a network of Nine Seismograph Stations along the periphery of Sardar Sarovar Reservoir. The brief details giving Station Location, Year of Commencement and Type of Instruments installed are given in table hereunder :

Sr. No.	Station Location	Year of Commencement	Instrument Installed				
			Short Period Seismograph	Long Period Seismograph	Strong Motion Seismograph	Digital Event Recorder	Wood Anderson Seismograph
1.	2.	3.	4.	5.	6.	7.	8.
1.	Kevadia	1970	3	1	1	2	1
2.	Naswadi	1989-90	3	1	1	2	1
3.	Jitgadh	1989-90	3	1	1	2	-
4.	Kawant	1989-90	1	-	1	1	-
5.	Alirajpur	1989-90	1	-	1	1	-
6.	Kukshi	1989-90	1	-	1	1	-
7.	Barwani	1989-90	1	-	1	1	-
8.	Shahda	1989-90	1	-	1	1	-
9.	Sagbara	1999	1	-	1	1	-

The Summary of the events recorded over the period 1990 through 1996 given in table herein below was presented to the Dam Safety Panel for Sardar Sarovar Project during its 34th Meeting held at Kevadia Colony/New Delhi In July 1997.

Sr. No.	Year of Record	NO. OF EVENTS (MAGNITUDE)				TOTAL EVENTS
		0 - 1.9	2 - 3	3.1 - 4	Above 4	
1.	2.	3.	4.	5.	6.	7.
1.	1990	9	8	-	-	17
2.	1991	2	10	4	-	16
3.	1992	11	18	2	-	31
4.	1993	11	21	5	-	37

5.	1994	10	17	1	1*	29
6.	1995	4	11	3	-	18
7.	1996	24	22	3	1*	50

The Dam Safety Panel has considered the events recorded at Seismograph Network of Sardar Sarovar Project during its 34th Meeting held in July 1997. Relevant extract from the Report of the Dam Safety Panel is given hereunder :

IV. NETWORK OF SEISMIC OBSERVATORIES AND THE RECORDED EVENTS :

2.4.1 Project organisation has established a network of Seismological Observatories in the Project area. Thgis had been providing useful data about the background Seismic activity in the area before the impoundment started in 1994 and continues to do so as the reservoir is being built up in stages gradually with the construction of the Dam.

2.4.2 The Panel visited the Seismological Observatories at Ghabhana (Kevadia) and Jitgadh and acquainted themselves with the instruments installed therein, technical staff, managing these and other stations.

Panel also visited the Electronic Data Processing Centre at Kevadia and examined the processing facilities available there. Panel is happy to note that these stations are functioning according to the standards set up by IMD.

2.4.3 Apart from the background data, these observatories would also serve to provide the following vital information.

- i) To assess the probable source(s) of seismic activity in the vicinity of the Dam
- ii) To monitor the seismic activity around the reservoir
- iii) To evaluate seismic activity if any that may be associated with the filling of the reservoir
- iv) To provide real time detailed information on the intensity and frequency characteristics of ground motions due to earthquakes(s) in the region
- v) To precisely determine the epicentral location and focal depth within 200 km. for any earthquake of engineering significance.

2.4.4 Brief details of the network of Seismograph stations established by the Project along with the location of observatories with respect to the Dam Site, year of commencement and instruments installed at each of these stations are given in Table I herein below. The locations of observatories and choice of instruments to be installed have been adopted in close co-operation with the Indian Meteorological Department, Government of India.

TABLE - 1
NETWORK OF SEISMOGRAPH STATIONS
AROUND PERIPHERY OF THE SARDAR SAROVAR RESERVOIR

Sr. No.	Station	Location	Year of commencement	Instruments installed				
				Short period seismograph	Long period seismograph	Strong motion accelograph	Digital Event Recorder	Wood Anders on Seismograph
1.	2.	3.	4.	5.	6.	7.	8.	9.
1.	Kevadia	10 kms d/s of Dam site	1970	3	1	1	2	1
2.	Naswadi	22 kms North	1989-90	3	1	1	2	-
3.	Jitgadh	18 KMS West d/s	1989-90	3	1	1	2	-
4.	Kawant	43 kms NE	1989-90	1	-	1	1	-
5.	Alirajpur	83 kms NE	1989-90	1	-	1	1	-
6.	Kukshi	108 kms ENE	1989-90	1	-	1	1	-
7.	Barwanl	120 kms ENE	1989-90	1	-	1	1	-
8.	Shaha	83 KMS se	1989-90	1	-	1	1	-

2.4.5. A review of the data for 15 years from 1974 to 1989 shows that Seismic activity conforms to characteristics normally expected in such area with events varying from 10 to 35 per year and magnitudes mostly below 2 and some upto magnitude 3.

2.4.6. Panel examined the Seismological events recorded in the network observatories in greater detail for the period 1990 to date. It was during this period from February 1994, that impounding of the reservoir started. For the past two years the reservoir stands at EL 80.3 m or below (i.e. the depth of reservoir is about 60 m or less). The following table summarises the recorded events during this period.

Earthquakes Above Magnitude 3

<u>Sr.No.</u>	<u>Year</u>	<u>No. of Events</u>
1.	1990	-
2.	1991	4
3.	1992	2
4.	1993	5
5.	1994	2
6.	1995	3
7.	1996	4

2.4.7 Examination of the events given in the above table as well as the plots of their epicenters provided by the Project Organisation suggest the following :

- (i) There is no perceptible increase in the number of events before and after the start of impoundment.

There are however two events of magnitude 4.2 and 4.5 respectively with epicenters at 18 km and 87 km from the Dam site towards the downstream side. Both appear to be natural events not necessarily related with impoundment.

- (ii) About 15% of the epicenters of all earthquakes including those below magnitude 3, fall on the northern side of the Narmada river and the rest 85% on the Southern side of the river between Barwani on the East and Rajpardi on the West, though a few extend upto Ankleshwar. The Barwani – Rajpardi area encompasses the Piplod fault and the thermal spring manifestations referred to earlier in this report.
- (iii) No event of engineering significance with respect to Sardar Sarovar Dam has been recorded.

The data collected by nine observatories for the period 1990 to 1996 was considered by the Dam Safety Panel and have observed that no event of engineering significance with respect to Sardar Sarovar Project has been recorded. As recommended by the Dam Safety Panel a memorandum containing yearly and cumulative data is going to be presented to the Dam Safety Panel during its next meeting due now.

ANNEX - XXXVII (18)

Sardar Sarovar Project : Health Aspects : Report of the Field Visit to areas (in Madhya Pradesh, Maharashtra & Gujarat State) from 7th to 10th August, 2001.

RECOMMENDATIONS

Substantial work has been carried out to identify health risks and diseases within the SSP-affected area, particularly on the prevalence of malaria. In future, efforts will be needed to follow-up the results of these studies and to take the necessary management steps to protect temporary and permanent populations. In order to ensure health protection in the SSP area, two principal tasks remain:

Firming up of the surveillance system for communicable diseases. This may have four facets – namely

- **Surveillance of communicable diseases** on the pattern of National Programme for Surveillance of Communicable diseases (NSPCD – NICD Delhi nodal agency).
- **Entomological Surveillance for vector borne diseases needs to be modified:** Regular Entomological Surveillance under appropriate authorities is suggested, keeping in view the possibilities of changes of vector prevalence and densities due to alterations in ecology of the area due to irrigation / impoundment .It could be on the line of studies proposed in Gujarat by MRC.
- **Bacteriological Surveillance** of drinking water needs to be strengthened for monitoring bacteriological quality of drinking water influencing the prevalence of water borne diseases.
- **Malaria Surveillance** by NAMP. The well established national anti malaria programme (NAMP) is already monitoring the malaria status in the area and providing control inputs. The EMCP has resulted in the reported decline of malaria. Coordination with the NAMP by the project authorities towards monitoring of Malaria in the project impacted districts is suggested .

This surveillance undertaken by concerned authorities at national level and by their state and district counterparts be culled out for the project impacted districts and used for reporting. Progress and status of the National Programmes under implementation should also be reflected in the reports brought out by the State

Project Authorities to present a comprehensive picture on the general status of the diseases surveillance and health delivery system in the Project areas. The inputs for control of related disease need to be tied up with the concerned programmes of the National & State agencies.

The control of water related / water based / water washed diseases on a long term basis through out the pre and post impoundment periods, through qualified Para-medical staff specially in Madhya Pradesh and Maharashtra needs to be strengthened. There are weaknesses in surveillance of diseases specially in Maharashtra and Madhya Pradesh. In Maharashtra the diseases surveillance is being handled and diseases diagnosed by Ayurvedic Doctors. This may not fit into Allopathically designed surveillance structure, it is suggested that the standard formats available with the NICD and or being followed by the Govt., of Gujarat might be used for this purpose. It is further suggested that the Computers might be used for diseases surveillance programmes and to begin with the records are generated on Computer compatible formats so that as soon as Computers are introduced, information about the status of diseases could be ascertained for proper surveillance and timely corrective measures.

As per the reports provided, Malaria is declining in all the three States due to inputs by EMCP of NAMP and the efforts of the corresponding state/ district Authorities. However, keeping in view of the high risk, close watch has to be kept for preventing its re-occurrence. District health officers/authorities should be identified and enlisted to monitor compliance with guidelines for malaria control and in drinking water supply areas under the national directives.

A limited study by the Team of the diseases pattern at the sites inspected showed a co-relation between open defecation and positive Bacteriological Test of the drinking water supplies and consequent increased cases of the Gastroenteric diseases as was the case with the Village Mandvi in Maharashtra and pattern in other areas in Madhya Pradesh and Maharashtra. As a precaution it is suggested that sanitary latrines be established at the R&R sites and Villagers may be educated to use these to keep the cases of Gastro diseases and check. All India Institute of Hygiene and Public Health may be requested for designing of Latrines for Project Areas. Alternatively, possibilities may also be explored for adapting UNICEF modal of Latrines. The team suggested that campaigning for use of Latrines as preventive measures for diseases, etc., be taken up, in the area through information, education programmes in the local dialects.

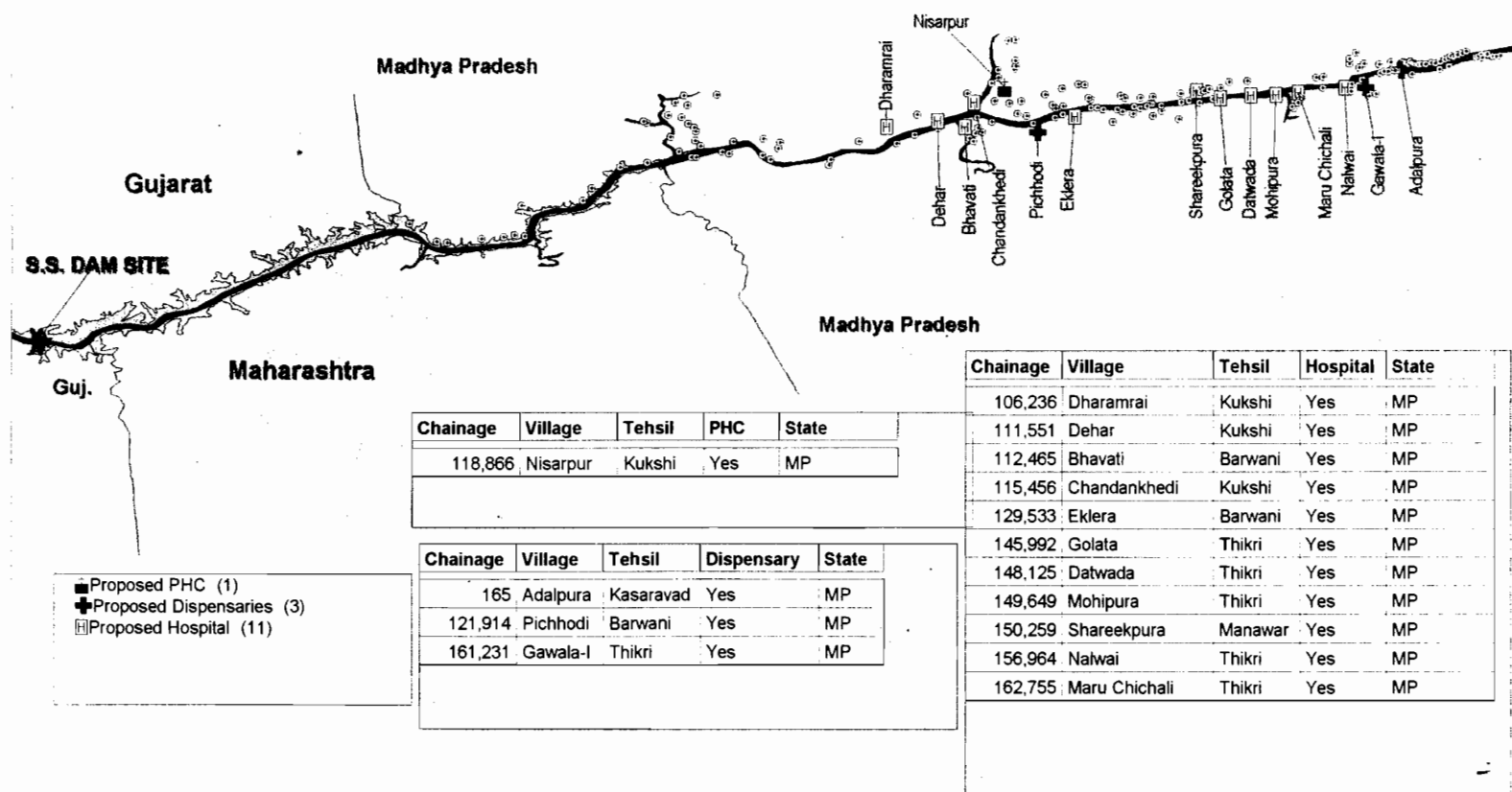
Some deficiencies were noticed in the strength of the Para-medical Staff actually deployed in relation to the strength sanctioned as outlined in the Plan. Keeping in view various factors, it is suggested that such deficiencies be made up by appointing Para-medical staff through contractual means / reemployment. Similarly, services of the qualified technicians may also be obtained at least during the high risk seasons that is July to October. Though it was observed that presently at this stage of the Project development, diseases are under control with the staff strength already deployed. However, upon full development, additional strength might be required.

It was observed that at many places the norms prescribed by the Ministry of Environment & Forests for disposal of the hospital waste were not being adhered to and therefore it was suggested to follow the prescribed norms.

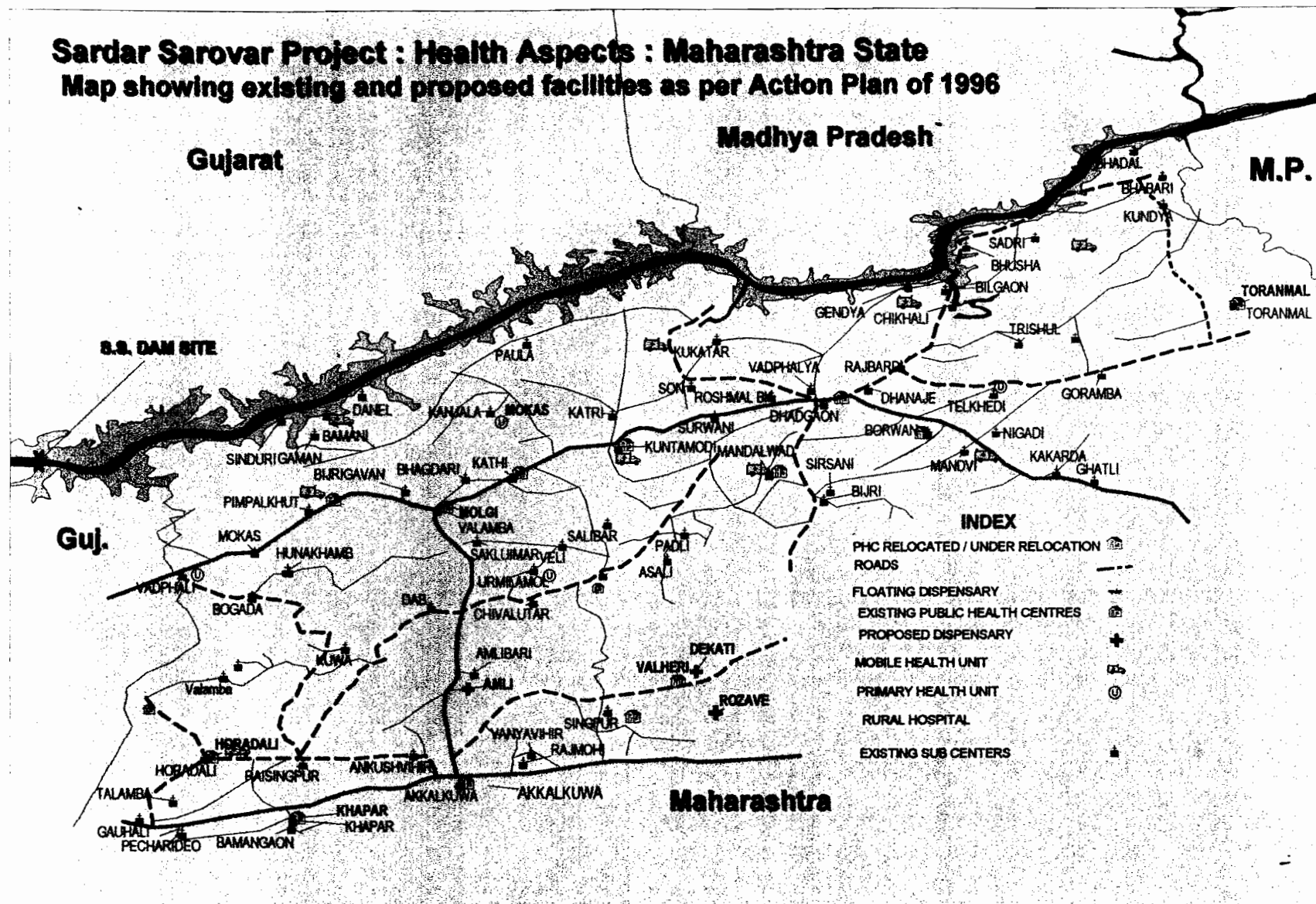
ANNEX - XXXVII (19)

SARDAR SAROVAR PROJECT : HEALTH ASPECTS

Affected villages : Thematic map showing location of proposed sites for health facilities in M.P.



Sardar Sarovar Project : Health Aspects : Maharashtra State **Map showing existing and proposed facilities as per Action Plan of 1996**



ANNEX - XXXVII (20)

Status Report of Canal System of Sardar Sarovar Project for the period ending September, 2001

EXECUTIVE SUMMARY

- ◆ The works under Narmada Main Canal Phase -I (Km 0 to Km 144.5) have been completed in all respects.
- ◆ The work of branch canals in phase-I has been completed in all respect.
- ◆ Works in the reach between Km 144.5 to Km 263.165 i.e. NMC phase. II-A have been distributed into ten packages pertaining to Canal earthwork and seven packages for major structures. Works in all ten packages have been completed in all respect.
- ◆ All the seven major structures in the above reach have been completed except Mohar Canal Syphon which is scheduled to be completed by December, 2002.
- ◆ The works in the canal reach between Km 263.165 to Km 388.164 i.e. NMC Phase- II B are in advance stage of completion.
- ◆ The works in the reach from Km 357.196 to Km 458.412 are scheduled to be taken up in December, 2001. Land acquisition is in progress in this reach.
- ◆ The work of Narmada Canal System in Rajasthan portion in the reach Km 0 to Km 48 is in progress. Earthwork and masonry structures between Km 0 to Km 30 have been completed, except in few patches where land acquisition problems have been encountered. Concrete lining in the initial reach from Km 0 to Km 7.88 has been completed. The tenders for execution of earthwork, structures and concrete lining for main canal from Km 7.88 to Km 51.50 have been invited and the works are likely to be started soon.

1.2.1 NMC Phase - I: Km 0 to Km 144.5

All the works under phase-I including structures have been completed in all respects. Under this phase an irrigation potential of about 4.3 lakh ha is envisaged. The main canal structures upto 144.5 Km include the head regulator, cross regulators (including single purpose regulators and cross regulator combined with head regulator), road bridges, head regulator for branch turnouts, aqueducts, drainage siphons, super passages, canal crossings and railway bridges. Major structures are provided on rivers Heran, Orsang, Deo, Karad, Meshri, Kun and Mahi.

The structures have been designed by the Sardar Sarovar Narmada Nigam Ltd. The design of all the major structures of NMC upto Mahi crossing have been completed. Only specific changes are being made in the design of these structures as necessitated by site conditions on the advice of the Board of Consultants (BOC) of SSNNL.

1.2.2 NMC Phase - II: Km 144.5 to Km 458.412

The NMC Phase-II has been divided in three reaches:

Phase-II A: Km 144.50 to Km 263.165 : The entire work of the reach consists of ten packages and seven major structures. The works in all ten packages & seven major structures have been completed except one structure (Mohar syphon) which is targeted to be completed by Dec, 2002.

Phase-II B: Km 263.265 to Km 388.164: The works in this reach upto Km 357.196 have been awarded to different agencies in 8 packages and three major structures. Earthwork, lining and structure concrete are in progress. The tendering process for works from Km 357.196 to Km 388.164 is in progress.

Phase-II C: Km 388.164 to Km 458.412 (Gujarat-Rajasthan Border): The works of Earthwork, Lining & Structures in this reach are divided into 4 packages. Geo-tech investigation for design of structures is taken up on hand. These works which were earlier planned to be taken up by June 2001, are now planned to be taken up in Dec., 2001.

1.2.3 Water Delivery Network

The water delivery system will cater to irrigation needs of the vast areas through irrigation units. Each unit of irrigation service area, called Village Service Area (VSA), has been planned to be served through a single outlet from the distributary. Water will be delivered only on the basis of the demand to a group of organized cultivators on a volumetric basis at the head of VSA, and not to individual cultivators.

In the VSAs, network for water distribution is planned through minors and sub-minors feeding different chaks and sub-chaks. For the entire system below VSA outlets, water

will be supplied in proportion to the area served. Within the chak, the water will be rotated to individual fields over fixed times in proportion to the holdings.

1.3 CANAL SYSTEM - RAJASTHAN PORTION

Rajasthan has been allocated 0.5 Maf (616 MCM) of Narmada water under the Award of NWDT. To utilize its share of the Narmada water, Govt. of Rajasthan have planned a 74 Km long Narmada Canal to irrigate 73,157 ha of land in the drought prone districts of Jalore and Barmer. The canal system will cover Gross Command Area (GCA) of 1,42,020 ha of which 1,35,476 ha is Culturable Command Area (CCA). Besides irrigation benefit to 89 villages (74 in Jalore district & 15 in Barmer district), the project also envisages to provide drinking water to a population of about 3.0 lakh living in 124 villages around the irrigation canal. The canal is trapezoidal in section and is lined by cement concrete. Maximum capacity of the canal at the head is 74.58 cumec while discharge requirement is 69.43 cumec. There are 9 major distributaries with a total length of 282.30 Km. The total length of minors and sub-minors is 485.0 Km and 636.0 Km respectively. Additional project activities include construction of head regulators, bridges, cross drainage works, escapes etc.

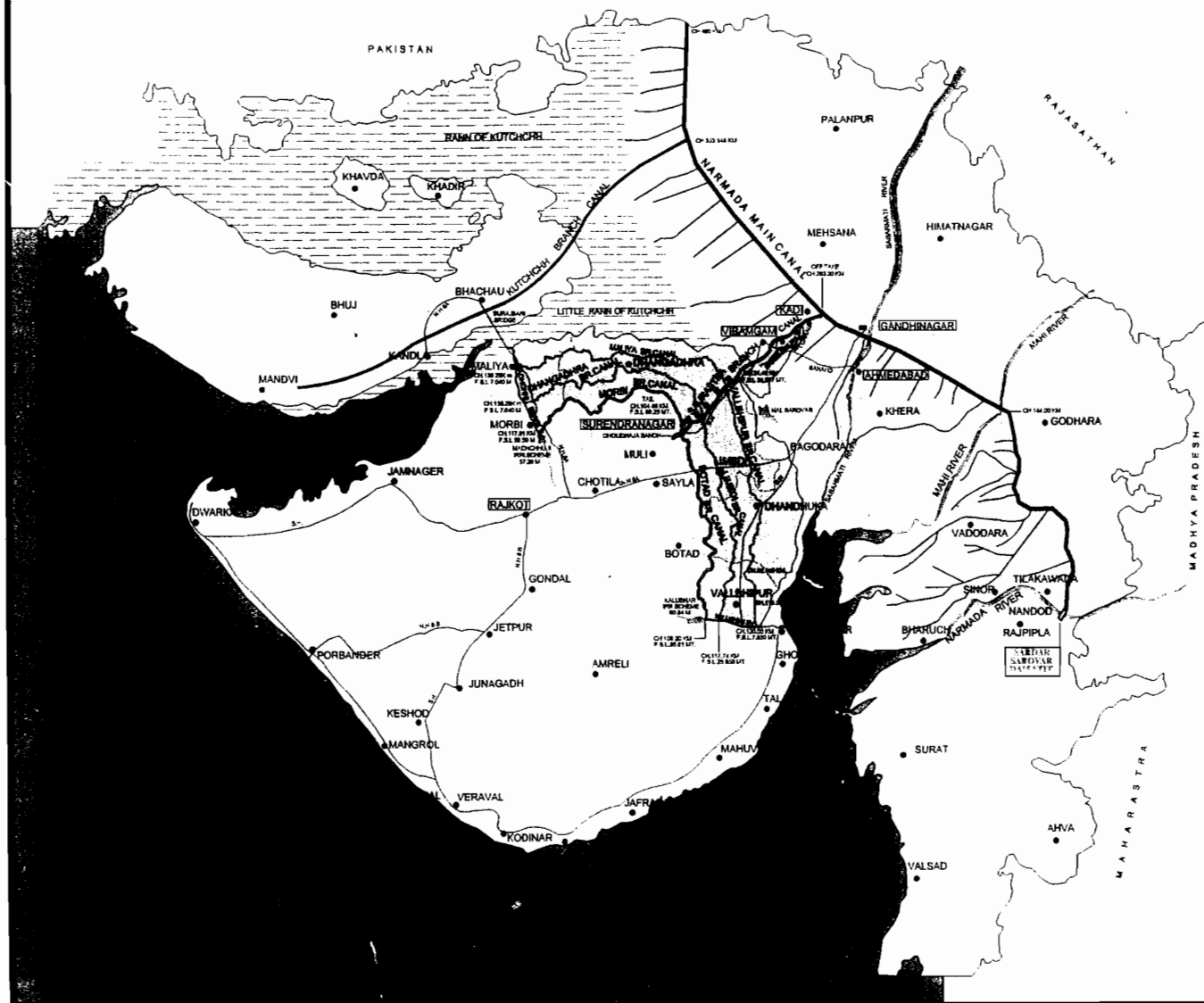
A map showing the command area and the layout plan of the entire canal system is given at PLATE-II.

Investment clearance was accorded by Planning commission vide their letter No.2 (307)/92-I & CAD, dated 23.01.1996 for Rs.467.53 crore at 1989-90 price level including Rs.280.14 crore share cost payable to Gujarat. The benefit cost ratio and internal rate of return of the project are 1.01 and 10.42% respectively.

Construction of Main Canal in the first 48.0 Km reach has been taken up and the earthwork & lining works are in progress. The entire Narmada Main Canal works in Rajasthan are scheduled for completion by 2009-2010.

Note V

**MAP OF GUJARAT
PLAN SHOWING
SARDAR SAROVAR PROJECT
MAIN CANAL
BRANCHES & COMMAND AREA**



SCALE: 1 INCH = 15 MILE

REFERENCE

1. SARDAR SAROVAR DAM SITE.
2. MAIN CANAL, SAU. BR. CANAL & SUB. BR. CANAL
3. RIVERS
4. COMMAND
5. FALL STRUCTURE
6. PUMPING STATION

SAURASTRA BRANCH CANAL SYSTEM			
INDEX MAP OF SAURASTRA BRANCH CANAL SYSTEM			
SARDAR SAROVAR (NARMADA) PROJECT SARDAR SAROVAR NARMADA HIGH-LEVEL GANDHINAGAR			
SUBMITTED	RECOMMENDED	APPROVED	
DESIGNER	ENGINEER	SUPERVISOR	PROJECT MANAGER
DATE	DRAWN		

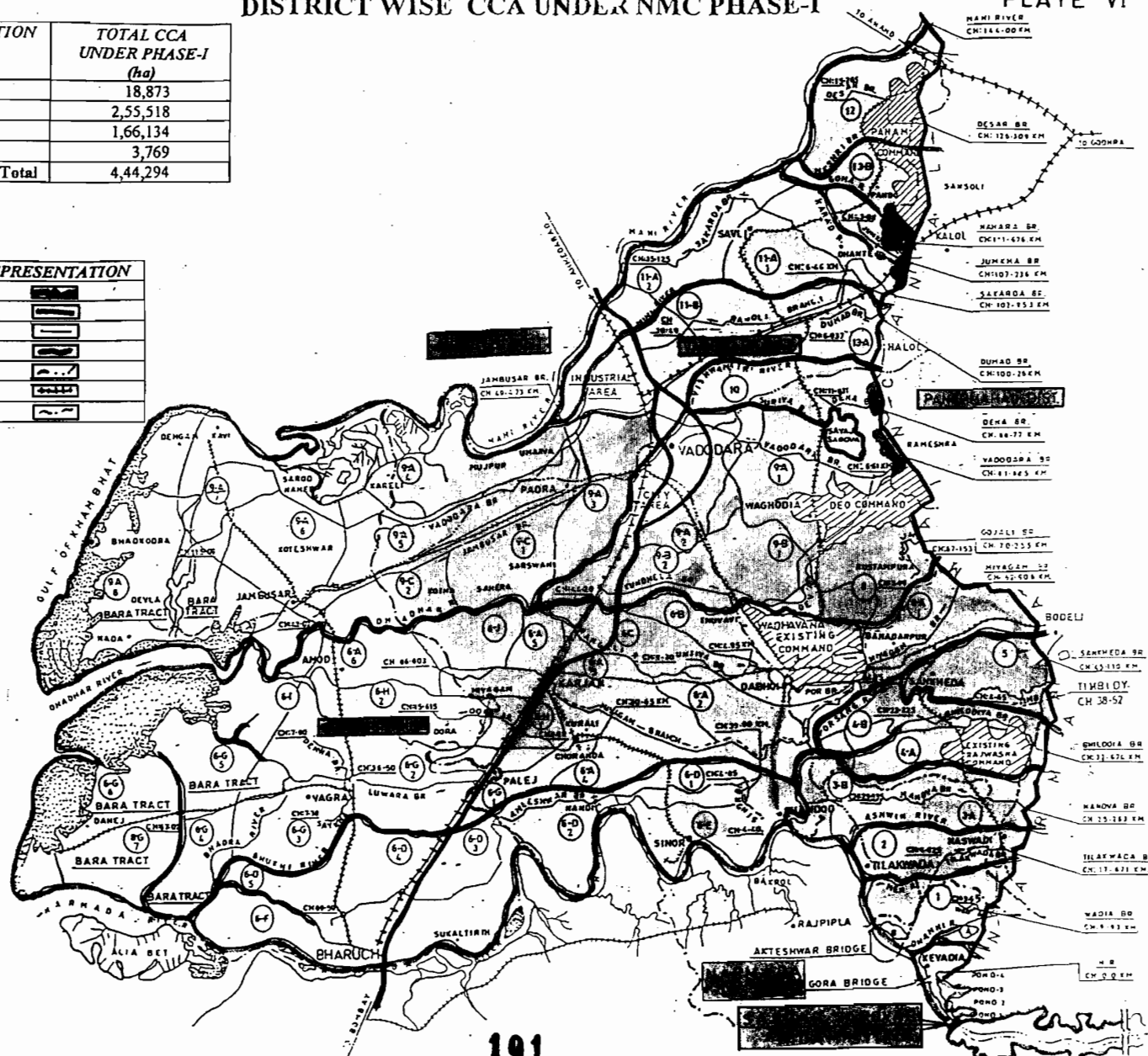
DISTRICT WISE CCA UNDER NMC PHASE-I

PLATE VI

S.NO.	NAME OF DISTRICT	REPRESENTATION	TOTAL CCA UNDER PHASE-I (ha)
1	Narmada		18,873
2	Vadodara		2,55,518
3	Bharuch		1,66,134
4	Panchmahal		3,769
Total			4,44,294

LEGEND













S.No.	PARTICULARS	REPRESENTATION
1	Sardar Sarovar Dam Site	
2	Narmada Main Canal	
3	Branch Canals	
4	National Highway	
5	State Highway	
6	Railway Line	
7	District Boundary	

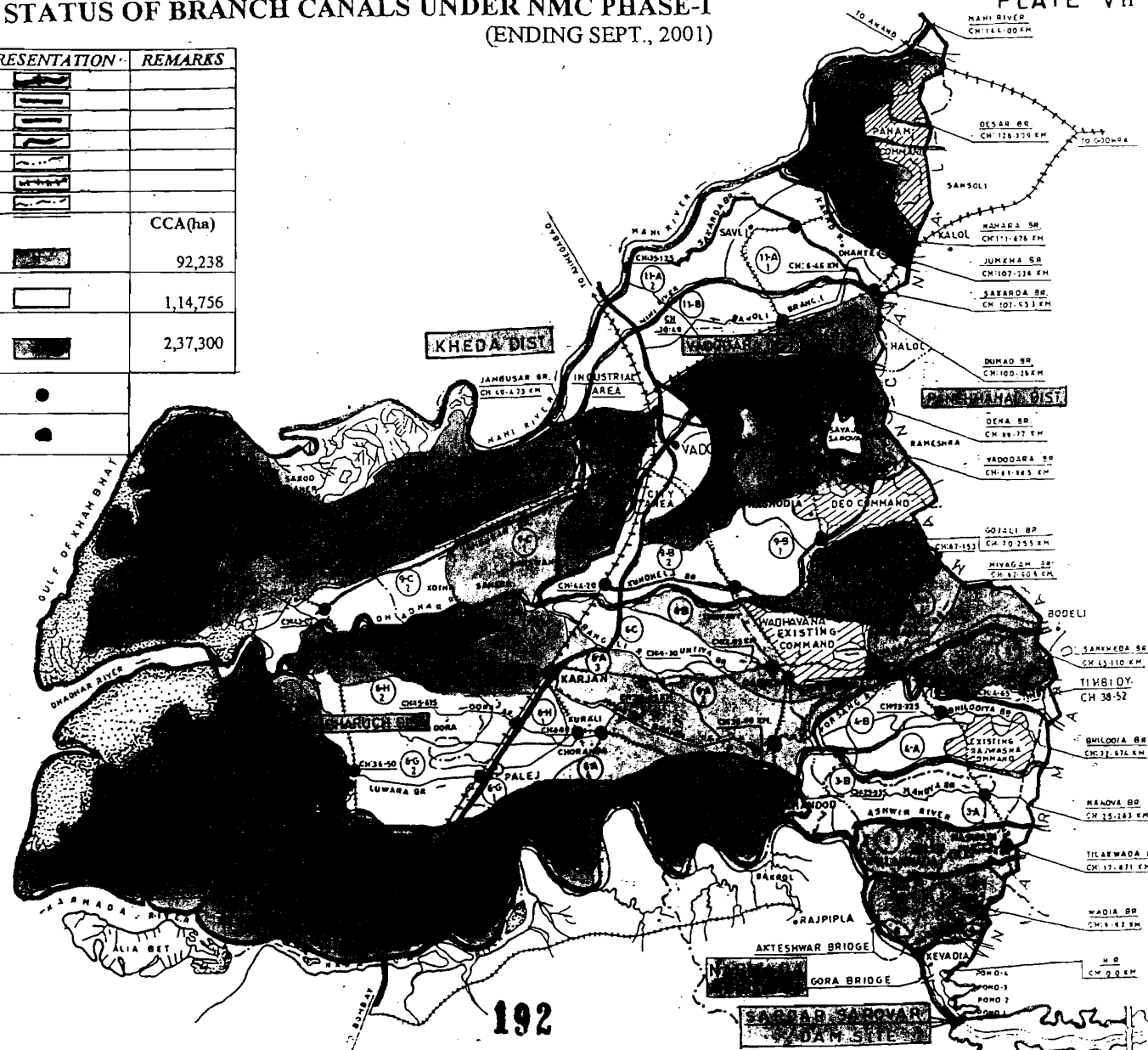


LEGEND

STATUS OF BRANCH CANALS UNDER NMC PHASE-I
(ENDING SEPT., 2001)

PLATE VII

S.No.	PARTICULARS	REPRESENTATION	REMARKS
1	Sardar Sarovar Dam Site		
2	Narmada Main Canal		
3	Branch Canals		
4	National Highway		
5	State Highway		
6	Railway Line		
7	District Boundary		
8	Civil works and gate works completed.		CCA(ha) 92,238
9	Civil works completed and gate works under progress		1,14,756
10	Civil Works completed and gate works to be taken up		2,37,300
11	Railway crossings completed		
12	Railway crossings under progress		



ANNEX - XXXVII (21)

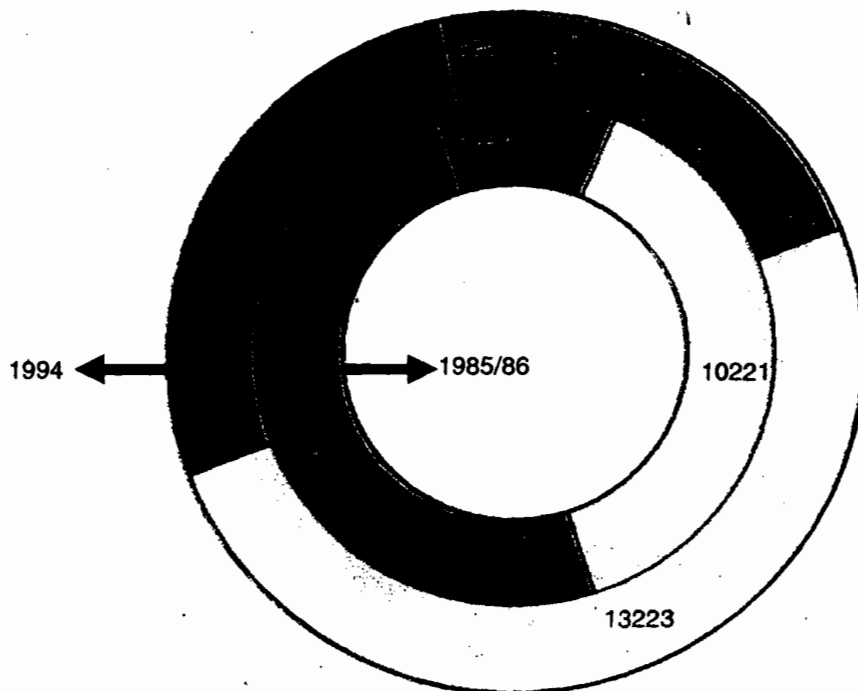
SUGGESTED SAFEGUARDS TO BE ADOPTED WHILE RAISING THE HEIGHT OF THE DAM UP TO RL 100M

Certain safeguards, as outlined below, however, would be necessary to protect the environment during progressive filling of the reservoir

- Period of progressive filling is required to be kept at the minimum for which releases from the upstream reservoir has to be ensured at the appropriate time.
- While raising the blocks water level has to be lowered from its present level and while refilling, there would be time lag during 10 to 15 days depending upon the hydrology and timing of the flow. Arrangements, therefore, have to be made for providing adequate supplies of water for downstream users and also to contain the salinity ingress up to the observed limits.
- There would be pressure on the downstream areas due to draw down and due to sudden upsurge of the water which would flow down after a gap of 10 to 15 days. This might catch some people unaware and they might be washed down and, therefore, arrangements have to be made for providing adequate sign boards at appropriate places and all necessary arrangements to warn the people.
- Arrangements would also be required to protect fishing in the deep pools down stream of the reservoir during these 10 to 15 days to protect aquatic organisms taking shelter there.
- Control measures would be needed to contain mosquito breeding in small ditches that would be formed downstream of the reservoir during the period of filling.

Changes in the water quality downstream of the reservoir, during and after filling period would be desirable and needed mitigating measures would be required.

ANNEX - XXXVII (22)



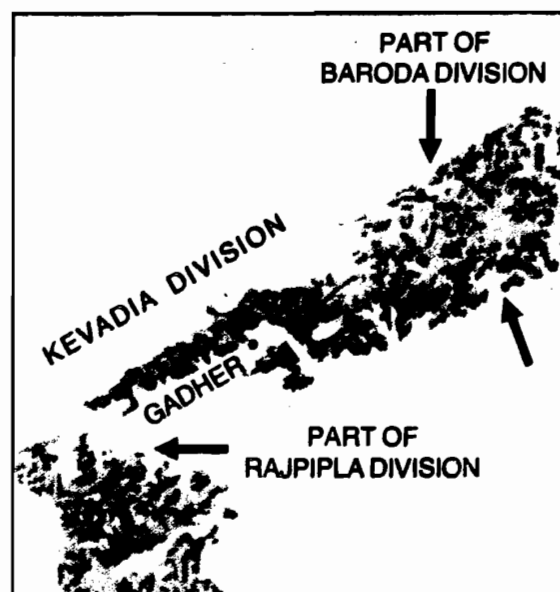
COLOUR / CODE CLASSIFICATION

Colour	Code	Class	Crown Cover
	1.	Closed forest area	40 – 100%
	2.	Open forest area	10 – 40%
	3.	Degraded forest area	Below 10%
	4.	Highly deg forest area/cultivation/grass growth	-

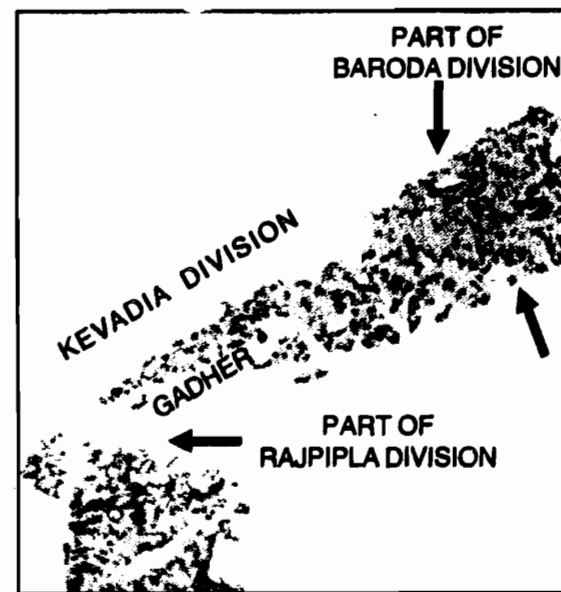
Fig. 6 Chart showing forest density classes in SSP catchment area in 1985/86 and 1994 (Area in ha.)

Remote sensing data of 1985/86 and 1994 have been used and visual interpretation method has been followed to analyse the data. It is observed that, closed forest and open forest area have been increased by 3,273 ha. and 3,001 ha. respectively. The degraded forest area has been decreased considerably from 12,746 ha. to 7,019 ha.

(Remote sensing study of CAT of SSP by ISRO and others)



1986



1994

COLOUR / CODE CLASSIFICATION





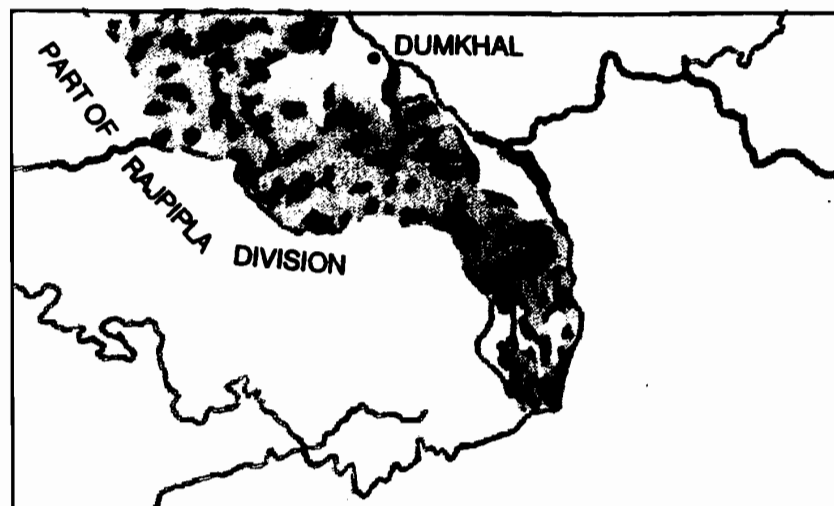
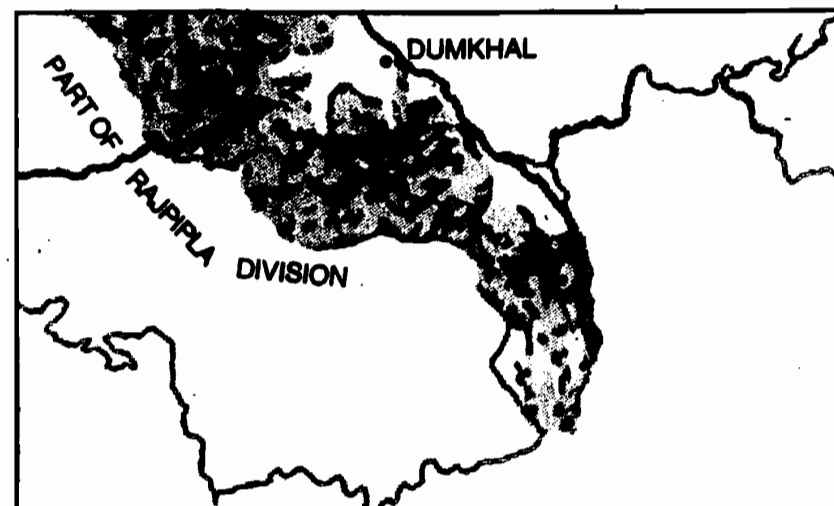
Colour	Code	Class	Crown Cover
	1.	Closed forest area	40 – 100%
	2.	Open forest area	10 – 40%
	3.	Degraded forest area	Below 10%
	4.	Highly deg forest area/cultivation/grass growth	- -

FIG. 4 Changes in status of forest cover from 1986 to 1994 in SSP catchment area (Impact of afforestation in catchment area) - Kevadia and part of Rajpipla division.



1986



1994

COLOUR / CODE CLASSIFICATION




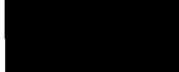
Colour	Code	Class	Crown Cover
	1.	Closed forest area	40 – 100%
	2.	Open forest area	10 – 40%
	3.	Degraded forest area	Below 10%
	4.	Highly deg forest area/cultivation/grass growth	-

FIG. 3 Changes in status of forest cover from 1986 to 1994 in SSP catchment area (Impact of afforestation in catchment area) - Part of Rajpipla division.

ANNEX - XXXVII (23)

No.Env-4(2)/2000/ 3275

August 24, 2000.

29

To

Shri A.K.S. Gopalan
 Director
 Space Application Centre
 Jodhpur Tekra
AHMEDABAD - 380 015
 (Gujarat).

Sub : Study change in forest cover of SSP catchment through satellite imageries - regarding

Sir,

NCA is entrusted with the responsibility of ensuring indepth studies, planning and implementation of the environmental safeguard measures for the Sardar Sarovar and Indira Sagar Projects. These safeguard includes

- ♦ rehabilitation master plan;
- ♦ phased catchment area treatment scheme;
- ♦ compensatory afforestation plan;
- ♦ command area development,
- ♦ survey of flora and fauna; carrying capacity of surrounding area;
- ♦ seismicity and
- ♦ health aspects.

Project authorities have prepared plans on each of the parameters and these plans are under advance stage of implementation. While reviewing the progress of works, it was considered to approach ISRO for possible help in ascertaining the efficacy of the measures adopted, e.g. CAT works.

We are interested in ascertaining the changes in the forest cover of SSP catchment with the following rides that :

1. The forest cover changes in digital, i.e., in electronic form.
2. Changes in the vegetation for density and type both.
3. 100 km. extra strip from the extremist boundary of the watershed is to be considered while interpreting satellite imageries.
4. The information for the base year as 1990 to be compared as on date upto of March 2000.

We shall appreciate receiving a definite proposal from your side. Shri R.G. Pandey, had discussed with your officer earlier during July and shall be in touch with you for any further information that you may require please.

A line in reply shall be appreciated.

Yours faithfully,

(N.D. TIWARI)
 Member (E&R)

ISSUED
 Syntel
 29/8/2000



नर्मदा नियंत्रण प्राधिकरण NARMADA CONTROL AUTHORITY

No. Env-4(2)/2000/ 2458

14th July, 2000

To

Shri K.L.N. Shastri,
Director
Additional Head (F&E),
Resa Space Application Centre,
Jodhpur Tekra,
AHMEDABAD – 380 053.

Sub: Study changes in forest cover of SSP catchment through Satellite imageries regarding...

Ref: 1) This office letter No. Env-4(2)/99/2399 dated 21.12.1999.
2) Your office letter No. FLP/ dated 27.1.2000.
3) This office letter No. Env. 4(2)/2000/314 dated 8.2.2000.

Sir,

In context with the cited subject and above referred letters the Deputy Director (Environment) will be visiting your office on 31.7.2000 for further discussion in the subject.

This is for favour of information and necessary action please.

Yours faithfully,

(R.G. PANDEY)
Dy. Director (Environment)

OFFICE
COPY

Issued
8/7/00

BG-79, Scheme No. 74-C, Vijay Nagar, Indore - 452 010 (M.P.)
बी.जी. - 79, स्कीम नं. 74-सी, विजय नगर, इन्दौर 452 010 (म.प्र.)
Phone No.: Mem (E&R)- 554333, SPL(Env)- 571587, IAO-558603, APRO-557691

Gram : NARCONTROL
Fax : 91-731-554333



नर्मदा नियंत्रण प्राधिकरण NARMADA CONTROL AUTHORITY

No. Env-4(2)/2000/314

February 7, 2000

To

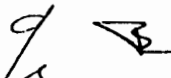
Shri Ajai
Group Director, FLPG &
Project Director, IMSD
Space Applications Centre
SAC P.O. AHMEDABAD - 380 053
(Gujarat).

Sub: **Study of changes in forest cover of SSP catchment through satellite
imaging - regarding**

Sir,

Please refer to your letter No. FLPG dated 27th January 2000 addressed to Shri N.D. tiwari, Member (E&R), NCA, on the subject mentioned and find enclosed herewith the maps showing the SSP catchment boundary, for further needful at your end.

Yours faithfully,


(Dr. Pawan Kumar)
Specialist (Environment)

Encl: As above.

OFFICE
COPY

BG-79, Scheme No. 74-C, Vijay Nagar, Indore - 452 010 (M.P.)
पि.जी. - 79, स्कीम नं. 74-सी, विजय नगर, इन्दौर 452 010 (म.प्र.)
Phone No.: Mem (E&R)- 554333, SPL(Env)- 571587, IAO-558603, APRO-557691

Gram : NARCONTROL
Fax : 91-731-554333

big speed 0.571

No.Env.4(2)/99/ 2399

Dated: 21st December, 1999.

To:

Dr. Navalgund,
Director,
Space Application Centre,
Satellite Road, Jodhpur Tekra,
Ahmedabad.

Sub: **Study of changes in forest cover of SSP Catchment through Satellite imaging.**

Sir,

This is with reference to the above study conducted by your organisation in which the changes occurred during 1986-94 in the forest cover of the SSP catchment were studied through Satellite imaging. The above study was confined to the SSP catchment falling in Gujarat only. We feel that similar study for Sardar Sarovar Project as a whole would be of immense use the project for obvious reasons.

It is therefore requested that a proposal on the above referred issue may be framed for consideration of this office. We may discuss the issue further if needed, on mutually convenient date.

An early response in the matter shall be appreciated.

Yours faithfully,

N.D. Tiwari
(N.D. Tiwari)
Member (E&R)

AL

*ISSUED
Subtel
21/12/99*

ANNEX - XXXVII (24)

भारत सरकार

Secretary
Government of India

कृषि और रा.
कृषि भवन, नई दिल्ली-110 001

Ministry of Agriculture
Department of Agriculture & Cooperation

Krishi Bhavan, New Delhi-110001

दूरभाष / Phone : 3382651

फैक्स / Fax No. : 3386004

D.O.No.4-14/97-NRM-I

April 30, 2001

Dear

You are aware that the treatment of Sardar Sarovar catchment has been going on under the Centrally Sponsored Scheme of Soil Conservation for Enhancing Productivity of Degraded Lands in the catchments of River Valley Projects and Flood Prone Rivers (RVP & FPR). The catchment falls in the States of Madhya Pradesh, Maharashtra and Gujarat and each State Government has taken up the programme for treatment of the catchment area in their respective States. In Madhya Pradesh the nodal agency for treatment is Narmada Valley Development Department. The Sardar Sarovar project is of national importance and, therefore, the treatment of catchment area of the Sardar Sarovar is important in order to minimise siltation in the reservoir.

2. Since 2000-2001 the Scheme of River Valley Project has been subsumed under Macro-Management Mode. Secretary, Department of Agriculture is the nodal officer in Madhya Pradesh for providing the funds for various schemes subsumed under Macro-Management. Narmada Control Authority have informed that during 2000-2001, only Rs.100 lakh was provided for treatment of Sardar Sarovar catchment which was a meager amount considering the size of the catchment area in the State. It may be recalled that an amount of Rs.600 lakh was allocated for 2000-2001 by the Ministry of Agriculture before RVP scheme was subsumed under Macro-Management Mode. It was expected that keeping in view the importance of the programme the State would also provide similar or higher amount in their Work Plan to enable smooth implementation of the Scheme. For 2001-2002, only Rs.300 lakh is proposed by the State under Macro-Management Mode.

3. I shall be grateful if you review the provisions in

contd....:2

-2-

the State and consider enhancing the amount for treatment of Sardar Sarovar catchment in consultation with the Narmada Control Authority. You may like to ensure that the implementing agency receives the funds in a timely manner.

Yours sincerely,

(J.N.L. Srivastava)

Shri K.S. Sharma,
Chief Secretary,
Government of Madhya Pradesh,
Bhopal

Copy forwarded for information and necessary action to:

1. Dr. Pawan Kumar, Specialist (Environment), Narmada Control Authority, BG-79, Scheme No.74-C, Vijay Nagar, Indore - 452010 (M.P.) with reference to his letter No. Env-39(36)/2001/120-8 dated 11-4-2001
2. Principal Secretary, Agriculture, Govt. of Madhya Pradesh, Bhopal
3. Principal Secretary, Narmada Valley Development Department, Vallabh Bhawan, Bhopal

(Shamsher Singh)
Additional Commissioner (WP)

ENVIRONMENTAL COST OF SSP

ANNEX - XXXVII (25)

RELATED TO UNIT-I DAM:

A) Expenditure by project authorities

i) Cost of Survey & Studies (in Rs. lacs)

	GOG		GOM		GOMP		GOR NCA		Total
	Estimate	Exp.	Estimate	Exp.	Estimate	Exp.	Estimate	Exp.	Total Estim.
	4.52	4.52	5.29	5.29	2.44	2.44			12.25
	8.77	8.77	7	7	3.28	2.8			19.05
	101.84	80.47	38	16	20.33	20.33	15.27	15.3	175.44
	2.5	2.5	10	2.5	29.63	28.59			42.13
	1.3	0.6	N.A.		59	36.33			60.3
	5.05	5.07	N.A.		23	18.59	1.98	1.98	30.03
	11.25	11.25					N.A.		11.25
							Total (i)		350.45

ii) Cost of Implementation (in Rs. lacs) lacs)

	GOG		GOM		GOMP		GOR NCA		Total
	Estimate	Exp.	Estimate	Exp.	Estimate	Exp.	Estimate	Exp.	Total Estim.
	1938.82	1769.02	2116.00	1650.27	1800.00	1055.10			5854.82
	3445.76	3810.07	2894.67	2218.27	8835.05	6804.87			15175.48
	663.31	126.26	117.00	2335.26	1650.00				2430.31
		71.52	102.10						102.10
	3800.00	583.47	546.60	9.26	848.48	21.66			5195.08
	329.00	174.04			6819.20	74.90			7148.20
	219.57	335.20			NA	NA			219.57
	NA	NA					NA		
							Total (ii)		36125.56
							Total (i & ii)		36476.01

N.A. Not available

ANNEX - XXXVII (26)

No.Env-3(37)/2001/4484

28th November, 2001

To

Secretary (Environment),
Environment Department,
Govt. of Maharashtra, 4th Floor, Mantralaya,
Madam Cama Road,
MUMBAI - 400 032.

Sub: Follow-up action of 36th meeting of Environment Sub-group of NCA.

Ref: i) Minutes of 36th meeting of Environment Sub-group sent vide letter No.Env-3(36)/2001/2319-2351 dated 01.06.2001

ii) Minutes of the meeting on Flora, Fauna and Carrying Capacity sent vide letter No. Env-4(5)/2001/2762-70 dated 10.7.2001

iii) Field visit report on health aspects sent vide letter No. Env-4(6)/2001/4229-52 dated 22nd October, 2001.

iv) Letter No.ENV-3(33)/2001/ September 22, 2001

Sir,

Please refer to the discussions of 36th meeting of Environment Sub-group held on 2nd May, 2001, minutes of the meeting were sent to you vide this office letter No. एम्-3(36)/2001/2319-51 दिनांक 28 मई, 2001. In pursuance, review meetings on Flora Fauna & Carrying Capacity, Health aspects were taken by Member (E&R), the minutes of these were forwarded to you vide letters under reference.

It may please be seen that No. of actions are required to be taken by your State Govt. on the issues reviewed during these meetings. In this connection please also refer to this office letter dated September 22, 2001. Response is still awaited. Key issues on which actions are expected are outlined in the enclosed sheet. It is requested that status of compliance of the issue referred to in these meeting may please be made available.

As it is proposed to convene the 37th meeting of Environment Sub-group shortly, an early response in this matter will be appreciated.

Yours faithfully,

Encl: As above.

Sd/-
(Dr. Pawan Kumar)
Specialist (Environment)

Issued

KEY ISSUES FOR GOM

Progress on following aspects are to be informed :

1) Catchment Area Treatment :

Phase-I - Completion report of works already completed is awaited. Progress may be made available, sub-watershed wise, showing location on the map.

Phase-II - Scheme for the CAT works on non-forest land not yet made available to NCA.
 - Sub-watershed wise details are not supplied after May, 1999. The same may be supplied, showing location on the map.

2) Compensatory Afforestation:

- The information supplied, village and district wise, where plantation works were undertaken was incomplete. The complete information may be made available showing location on the map.
- Compensatory Afforestation works were completed in about 96% area recently. Progress in the balance area may be made available.
- Latest evaluation of Survival percentage, species composition and year of count may please be provided.
- Steps taken to declare the non-forest areas taken up for plantation, as forest land under the forest Act 1927, as laid down by the MOEF while giving permission for diversion of forest land for the project in its order of 1987.

3) Flora, Fauna and Carrying Capacity:

- It was informed during June, 2001 that about an area of 748 ha. containing on the average of 765 trees per ha., was felled by Forest Development Corporation of Maharashtra by 1993. In addition, 138 ha., was felled earlier and that actions was already taken by the Govt., of Maharashtra for preparation of estimate for taking up the felling in the balance areas and that work of demarcation of the balanced area was expected to be completed within a week's time.

With regard to proposed impoundment at 100m. RL although marking of the area was not complete but of the villages falling on the periphery of the proposed impoundment, about 643 ha. was already felled and only about 80 ha., area remained of which 62 ha., area was in the village Manibali which was out of bound and, therefore, felling was required only in 15 ha., areas in village Bamni and 2 ha., area in Village Jagdhi. Detailed status of felling of trees, from the submergence area may please be made available.

- It was informed that the recommendations of the Study Group for creation of 500m. wide area around the wet land of the reservoir has been accepted by the GOM for creation of a buffer zone for native trees and shrub species which will be beneficial to the Wildlife for food and shelter. This area was outside the zone to be impacted by the proposed impoundment and was a general measures for improvement of the carrying capacity for the Wildlife. However, a detailed project for creation of this belt at an estimated cost of Rs.6.39 crores was submitted and that the work on this Project in the areas above the FRL was under implementation by the regular Forest Department. A tabular statement showing the recommendations of the study group of Pune University along with the suggested actions and implementation may please be made available.

4) Health Aspects:

- The latest up-dates on the activities carried out by the State Govt. as per the provisions contained in the Health Plan such as status of the Phase-II study for disease monitoring.
- Key recommendations of the committee on health aspects which visited the areas of Maharashtra as outlined below may also be attended for compliance please.

"Substantial work has been carried out to identify health risks and diseases within the SSP-affected area, particularly on the prevalence of malaria. In future, efforts will be needed to follow-up the results of these studies and to take the necessary management steps to protect temporary and permanent populations. In order to ensure health protection in the SSP area, two principal tasks remain:

Firming up of the surveillance system for communicable diseases. This may have four facets – namely

- **Surveillance of communicable diseases** on the pattern of National Programme for Surveillance of Communicable diseases (NSPCD – NICD Delhi nodal agency).
- **Entomological Surveillance for vector borne diseases needs to be modified:** Regular Entomological Surveillance under appropriate authorities is suggested, keeping in view the possibilities of changes of vector prevalence and densities due to alterations in ecology of the area due to irrigation / impoundment .It could be on the line of studies proposed in Gujarat by MRC.
- **Bacteriological Surveillance** of drinking water needs to be strengthened for monitoring bacteriological quality of drinking water influencing the prevalence of water borne diseases.
- **Malaria Surveillance** by NAMP. The well established national anti malaria programme (NAMP) is already monitoring the malaria status in the area and providing control inputs. The EMCP has resulted in the reported decline of malaria. Coordination with the NAMP by the project authorities towards monitoring of Malaria in the project impacted districts is suggested .

This surveillance undertaken by concerned authorities at national level and by their state and district counterparts be culled out for the project impacted districts and used for reporting. Progress and status of the National Programmes under implementation should also be reflected in the reports brought out by the State

Project Authorities to present a comprehensive picture on the general status of the diseases surveillance and health delivery system in the Project areas. The inputs for control of related disease need to be tied up with the concerned programmes of the National & State agencies.

The control of water related / water based / water washed diseases on a long term basis through out the pre and post impoundment periods, through qualified Para-medical staff specially in Madhya Pradesh and Maharashtra needs to be strengthened . There are weaknesses in surveillance of diseases specially in Maharashtra and Madhya Pradesh. In Maharashtra the diseases surveillance is being handled and diseases diagnosed by Ayurvedic Doctors. This may not fit into Allopathically designed surveillance structure , it is suggested that the standard formats available with the NICD and or being followed by the Govt., of Gujarat might be used for this purpose. It is further suggested

that the Computers might be used for diseases surveillance programmes and to begin with the records are generated on Computer compatible formats so that as soon as Computers are introduced, information about the status of diseases could be ascertained for proper surveillance and timely corrective measures.

As per the reports provided, Malaria is declining in all the three States due to inputs by EMCP of NAMP and the efforts of the corresponding state/ district Authorities. However, keeping in view of the high risk, close watch has to be kept for preventing its re-occurrence. District health officers/authorities should be identified and enlisted to monitor compliance with guidelines for malaria control and in drinking water supply areas under the national directives.

A limited study by the Team of the diseases pattern at the sites inspected showed a correlation between open defecation and positive Bacteriological Test of the drinking water supplies and consequent increased cases of the Gastroenteric diseases as was the case with the Village Mandvi in Maharashtra and pattern in other areas in Madhya Pradesh and Maharashtra. As a precaution it is suggested that sanitary latrines be established at the R&R sites and Villagers may be educated to use these to keep the cases of Gastro diseases and check. All India Institute of Hygiene and Public Health may be requested for designing of Latrines for Project Areas. Alternatively, possibilities may also be explored for adapting UNICEF modal of Latrines. The team suggested that campaigning for use of Latrines as preventive measures for diseases, etc., be taken up, in the area through information, education programmes in the local dialects.

Some deficiencies were noticed in the strength of the Para-medical Staff actually deployed in relation to the strength sanctioned as outlined in the Plan. Keeping in view various factors, it is suggested that such deficiencies be made up by appointing Para-medical staff through contractual means / reemployment. Similarly, services of the qualified technicians may also be obtained at least during the high risk seasons that is July to October. Though it was observed that presently at this stage of the Project development, diseases are under control with the staff strength already deployed. However, upon full development, additional strength might be required.

It was observed that at many places the norms prescribed by the Ministry of Environment & Forests for disposal of the hospital waste were not being adhered to and therefore it was suggested to follow the prescribed norms."



नर्मदा नियंत्रण प्राधिकरण NARMADA CONTROL AUTHORITY

No.ENV- 3(31)/2001/4453

December 13, 2001

To

The Secretary (Environment)
Govt., of Maharashtra
Mantralaya
MUMBAI 400038

Sub: Appraisal of Survey, Studies and Implementation of the Environment
Safeguard Measures of the areas of SSP – reg.

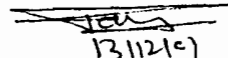
Sir,

Please find enclosed herewith a copy of the letter received from the MoEF relating to the constitution of a Committee for appraisal of the survey, studies and implementation of the Environment Action Plan. The first meeting of the Committee was held at New Delhi on 22.4.2001, during which the following information pertaining to the State of Maharashtra was requested.

- Sub-watershed wise details of the Phase-I and II programme and the status of implementation along with the result of the exercise undertaken for assessing the efficacy of the Catchment Area Treatment, as suggested by the Environment Sub-group.
- Details of the Compensatory plantation, species composition survival percentage along with year of count. The information on progress in notifying the areas planted up under Compensatory Plantation Programme of the SSP.
- Status of the execution of the felling plan for the areas to be submerged at EL' 100m and thereafter in Maharashtra.
- Status of the studies entrusted to CICFRI by Govt., of Maharashtra regarding organic loading of the reservoir.
- Status of the proposed Phase-II surveillance studies on Health Aspects and status on implementation the Action Plan on Health and the recommendations contained in the Phase-I surveillance studies submitted by the Govt., of Maharashtra earlier.
- Status of the implementation of the recommendations of the University of Pune on Flora and Fauna and Carrying Capacity aspects.

In view of the likelihood of the visit of the Committee referred to above, to the Project areas on 18.12.2001 an early action is requested.

Yours faithfully,


(DR. PAWAN KUMAR)
SPECIALIST (ENVIRONMENT)

16-बी. जी., स्कीम नं. 74-सी, विजय नगर, इन्दौर - 452 010 (म.प्र.)

16-BG, Scheme No. 74-C, Vijay Nagar, Indore - 452 010 (M.P.)

Phone : Mem (E&R)-554333, SPL(Env)-571587, DIR(R)-558603, APRO-557691

Gram : NARCONTR
Fax : 91-731-554333



नर्मदा नियंत्रण प्राधिकरण NARMADA CONTROL AUTHORITY

No.ENV-3(37)/2001/4444-47

December 14, 2001

To :

Shri V.M. Lall, IAS
Secretary (Environment)
Environment Department
Govt. of Maharashtra
4th Floor, Mantralaya
Madam Cama Road
MUMBAI 400 032

Shri Suresh Chandra, IFS
Member (E&R)
Narmada Valley Development
Authority, Tulsi Nagar
BHOPAL 462003

Shri K.C. Kapoor, IAS
Managing Director
Sardar Sarovar Narmada Nigam Limited
Block No. 12, 1st Floor
New Sachivalaya Complex
GANDHINAGAR 382 010

Smt. Krishna Bhatnagar, IAS
Principal Secretary (Environment)
Environment Department
Govt., of Rajasthan
Sachivalaya
JAIPUR 302005

Sub: ^{Sardar Sarovar Project} Information sought by the Appraisal Committee formed by the MoEF and its proposed visit to Indore during 19th to 21st December, 2001.

Sir,

The Committee under reference, constituted by the MoEF is scheduled to visit the Project sites in Gujarat on 18th and shall be at Indore from 19th to 21st December, 2001, in the Office of NCA. The main objective of the Committee is to appraise the adequacy of existing Reports and Surveys and to suggest, if any, additional Studies / Surveys / Measures are to be undertaken, independent of the existing monitoring mechanism. A copy of the Office Order received from the MoEF is enclosed for your ready reference.

This Committee had its first meeting on 23rd November, 2001, in which a general overview was discussed. Further information was sought by this Committee, especially, focusing on the following:

1. CATCHMENT AREA TREATMENT (CAT)

The total progress of CAT up to November, 2000 of Phase-I (directly draining) high and very high subwatershedwise separately. This progress should also be delineated on a Map.

Contd... P-2

116-बी. जी., स्कीम नं. 74-सी, विजय नगर, इन्दौर - 452 010 (म.प्र.)
116-BG, Scheme No. 74-C, Vijay Nagar, Indore - 452 010 (M.P.)
Phone : Mem (E&R)-554333, SPL(Env)-571587, DIR(R)-558603, APRO-557691

Gram : NARCONTROL
Fax : 91-731-554333

\\ 2 ///

Total progress of CAT up to November, 2000 of Phase-II. This progress should also be delineated on a Map. Break-up and classification and areas treated under various categories.

List of species selected for plantation in watersheds along with their rate of survival at a specific age of plantation (for Phase-I and Phase-II).

Present status of serviceability of various engineering measures like check dams, gully plugging, etc.

2. COMPENSATORY AFFORESTATION

The up-to date progress delineated on Map for forests and non forests area separately. List of species planted their survival rate and density of plantation.

Forests Map to the scale of the areas getting submerged. Schedule for forests felling vis-à-vis submergence.

Programmes initiated for people's participation in the compensatory afforestation activities including Joint Forest Management (JFM).

In order to have meaningful discussions with the Members of this Committee on various aspects of the Environmental Management including Catchment Area Treatment, Compensatory Afforestation, Flora & Fauna, Seismicity, Health and Command Area Development in Gujarat and Rajasthan, we request you to spare some of your valuable time for attending the discussions with this Committee in the afternoon by 03:00 PM on 16 December, 2001.

A line in confirmation shall be appreciated.

Yours faithfully,


14/12/01
(DR. PAWAN KUMAR)
SPECIALIST (ENV)



नर्मदा नियंत्रण प्राधिकरण NARMADA CONTROL AUTHORITY

No.Env-3(37)/2002/31-43

JPR/2002

To

MOST URGENT

Shri V.M. Lal
Secretary (Env.)
Environment Department
Govt., of Maharashtra
4th Floor, Mantralaya
MUMBAI 400038

BY FAX

Registered Post

Sub: Meeting of the Multi-disciplinary Committee for appraisal of Survey and Study Reports on various Environmental Aspects of SSP

Sir,

Please refer to this Office letter No Env-3(37)/2001/4444-47 dated 14.12.2001, through which it was informed that the Appraisal Committee constituted by the MoEF for appraising the Environmental Aspects of SSP was scheduled to visit the Project areas during 18th to 21st December, 2001. During this visit, the Committee was to have the detailed discussions on the issues connected with Survey, Studies and Implementation of the areas of SSP in Maharashtra, however, due to lack of participation of the Officers of the Govt., of Maharashtra, could not review the progress.

The Committee, however, desired that the concerned Officers of the Maharashtra may be deputed to attend the discussions with the Members of this Committee on 11th January, 2002, in the Committee Room of Ministry of Environment & Forests, Paryavaran Bhavan, Lodi Road, New Delhi, at 1100 hrs. Contact person for this is Dr. (Mrs.) Nalini Bhat, Director (IA), Ministry of Environment & Forests, Govt., of India, the Convener of the Committee, (Phone-011-4360478).

We request you once again to arrange to depute the Officers dealing with Catchment Area Treatment, Compensatory Afforestation, Flora & Fauna, Health, Fisheries, along with all necessary details and supporting data / Officers for a detailed presentation and discussions. The Chairman of the Committee further desired that the treatment Maps in colour for two sample sub-watersheds of SSP Phase-I, to which field trips could be organized for verification by the Committee, be presented to the Members of the Committee for their assessment.

In view of shortage of time, this may please be given priority. A line in reply shall be appreciated.

Yours faithfully,


21/01/02
(DR. PAWAN KUMAR)
SPECIALIST (ENVIRONMENT)

116-बी. जी., स्कीम नं. 74-सी, विजय नगर, इन्दौर - 452 010 (M.P.)
116-BG, Scheme No. 74-C, Vijay Nagar, Indore - 452 010 (M.P.)
Phone : Mem (E&R)-554333, SPL(Env)-571587, DIR(R)-558603, APRO-557691

Gram : NARCONTRO
Fax : 91-731-554333

Copy forwarded to:

1. Chief Secretary, Govt., of Maharashtra, Mantralaya, Mumbai 400038 and Member, NCA, Govt., of Maharashtra
2. Secretary (Forests), Govt., of Maharashtra, Mantralaya, Mumbai 400038, with a request to please arrange to issue necessary directions to the Field Staff for compliance.
3. Dr. (Mrs.) Nalini Bhat, Director (IA), Ministry of Environment & Forests, Paryavaran Bhawan, Lodi Road, New Delhi, for favour of information.
4. Conservator of Forests, Dhule Circle, Dhule, for needful at his level

(DR. PAWAN KUMAR)
SPECIALIST (ENVIRONMENT)

No.ENV-3(37)/2001/ 79-80

January 2001

To

Shri V. Rangnathan
Chief Secretary
Govt., of Maharashtra
Mantralaya
MUMBAI 400038

BY FAX & SPEED POST

Sub: Follow-up action on 36th meeting of Environment Sub-group of NCA.

- Ref: i) Minutes of the 36th meeting of Environment Sub-group sent vide letter No.Env-3(36)/2001/2319-2351 dated 1.6.2001.
ii) Minutes of the meeting on Flora, Fauna and Carrying Capacity sent vide letter No.Env-4(5)/2001/2762-70 dated 10.7.2001.
iii) Field Visit Report on Health aspects sent vide letter No.Env-4(5)/2001/4229-52 dated 22.10.2001.
iv) Letter No.Env-3(33)/2001 dated 22.9.2001.
v) Letter No.Env-3(37)/2001/4254-56 dated 26.11.2001.

Sir,

This is to bring to your kind notice that the Secretary (Environment), Govt., of Maharashtra, has been nominated as a Nodal Officer for ensuring monitoring of the Environment Safeguard Measures in case of Sardar Sarovar Project for the areas in Maharashtra. NCA is charged with the responsibilities in this regard. NCA has formed Environment Sub-group under the Chairmanship of the Secretary, Ministry of Environment & Forests, Govt., of India and the Secretary (Env.) Govt., of Maharashtra is a Member of the Sub-group. On the issues of the Environment, related to the SSP, NCA is guided by the deliberations of the Sub-group and its various Committee and Sub-committee.

The Environment Sub-group has conducted its 36th meeting of the Environment Sub-group held on 2.5.2001. Minutes of the meeting were sent to the Secretary (Environment), vide this Office letter No.Env-3(36)/2001/2319-2351 dated 1.6.2001. In pursuance of the discussions of this meeting, several review meetings were held, the Minutes of these meetings were also forwarded to the Secretary (Environment) vide letter cited above. These references point out that a number of actions are required to be taken by the Govt., of Maharashtra on the issues referred to in these meetings. However, no response has been received so far. Key issues on which actions are expected are out lined in the enclosed sheet.

It is requested that status of compliance on the issues brought out above, may please be arranged to be provided and suitable directions may be issued to concerned Officer to attend the deliberations / Field Visits arranged by the NCA / MoEF from time to time. The next such meeting of the Committee constituted by the MoEF is scheduled for 11th January, 2002, at New Delhi, for which separate request has been sent by this Office to the Secretary (Environment), Secretary (Forests). An early action is, therefore, requested.

Yours faithfully,

(N.D. TIWARI)
MEMBER (E&R)

Encl: As above.

N.O.O. Copy forwarded to Shri S.V. Sodal, Secretary (CAD), Govt., of Maharashtra, Mantralaya, Mumbai 400038, for favour of information and needful please.

(N.D. TIWARI)
MEMBER (E&R)

Issued.
4/10/01

etc

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केवल सरकारी प्रयोग के लिए

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पर्यावरण उपदल
ENVIRONMENT SUB-GROUP

सैंतीसवीं बैठक की कार्यसूची
Minutes of the 37th meeting

8 फरवरी, 2002 को
पर्यावरण भवन, नई दिल्ली में हुई
Held at Paryavaran Bhawan, New Delhi on 8th February, 2002

नर्मदा नियंत्रण प्राधिकरण
NARMADA CONTROL AUTHORITY

इन्दौर
मार्च, २००२

**Indore
March, 2002**

**MINUTES OF THE 37th MEETING OF THE ENVIRONMENT SUB-GROUP OF NCA
HELD ON 8th FEBRUARY 2002 AT PARYAVARAN BHAWAN, NEW DELHI**

I N D E X

Item No.	Contents	Page No.
	Introduction	1
XXXVII-1(170)	CONFIRMATION OF MINUTES OF THE 36 th MEETING	2
XXXVII-2(171)	SARDAR SAROVAR PROJECT: REVIEW OF THE STATUS OF ENVIRONMENTAL CONSIDERATIONS IN RELATION TO THE PROPOSED RAISING OF THE DAM HEIGHT AT RL 100M	3
	A. Action Taken Report	3
	B. Review of the progress of works on the suggested parameters in relation to the proposed filling of the reservoir up to RL 100m. by June, 2002	3
	▪ Narmada Valley Development Authority, Govt., of Madhya Pradesh.	5
	▪ Govt., of Maharashtra	6
	▪ Govt., of Rajasthan	6
	▪ Sardar Sarovar Narmada Nigam Ltd., Govt., of Gujarat	7
	Discussions & conclusions	7-8
XXXVII-3(172)	REVIEW OF THE STATUS OF INDIRA SAGAR PROJECT MADHYA PRADESH and	9
XXXVII-4(173)	REVIEW OF ACTION TAKEN ON THE DECISION OF THE PREVIOUS MEETINGS	
XXXVII-5(174)	Monitoring of the Indira Sagar Project	10

A N N E X U R E S

XXXVII-Min(1)	List of participants	11-12
XXXVII-Min(2)	Progress report of directly draining sub-watersheds in M.P	13
XXXVII-Min(3)	Status on archaeological monuments / mounds in M.P	14-23
XXXVII-Min(4)	Status of compliance submitted by GoMP	24-31
XXXVII-Min(5)	Status of constructions works on canal in Rajasthan.	32-36
XXXVII-Min(6)	Copy of the letter submitted by WAPCOS	37
XXXVII-Min(7)	A report on monitoring the impact of CAT using remote sensing & GIS in parts of Narmada Catchment area	38-51

**MINUTES OF THE 37th MEETING OF ENVIRONMENT SUB-GROUP OF THE NCA
HELD ON 8th February, 2002 AT PARYAVARAN BHAWAN,
CGO COMPLEX, NEW DELHI**

The 37th meeting of Environment Sub-group (ESG) of the Narmada Control Authority was held at Paryavaran Bhawan, CGO Complex, New Delhi, under the Chairmanship of Shri P.V. Jayakrishnan, Secretary, Ministry of Environment & Forests, Govt. of India. A list of participants is enclosed at **Annex-XXXVII-Min-(1) at Page-11 and 12.**

Members and Invitees of the Sub-group were welcomed and thereafter, agenda items were taken up by Member (E&R), NCA for discussion.

Item No. XXXVII-1(170) : CONFIRMATION OF MINUTES OF THE 36TH MEETING

Minutes of the 36th Meeting of Environment Sub-Group of Narmada Control Authority, as circulated to all Members and Invitees vide NCA Office letter No.Env-3(36)/2001/2319-2351 dated 01.06.2001, were confirmed.

Item No. XXXVII-2(171): SARDAR SAROVAR PROJECT: REVIEW OF THE STATUS OF ENVIRONMENTAL CONSIDERATIONS IN RELATION TO THE PROPOSED RAISING OF THE DAM HEIGHT AT RL 100M.

A. Action taken report:

Sub-group was presented with a review of the programme of Survey, Studies and implementation of the Environment Safeguard Measures in relation to 100 m height as contained in the detailed agenda of the meeting. The Member (E&R), NCA, brought out the status of compliance by the State Government(s) on the issues. It was stated by him that programme of Survey, Studies and Implementation of the Environment Safeguard Measures in relation to 100 m height were discussed by the Sub-group during its last two meetings wherein the Sub-group sought more information. Now that this information has been compiled by the State Govts., and presented in the Agenda Papers for assessment by the Members, he requested the party States to give updating, if any. He thereafter requested the Members of the Sub-group to consider the same.

Principal CCF, Govt., of Gujarat, stated that area of the Shoolpaneshwar Sanctuary, earlier known as Dhumkhal Sloth Bear Sanctuary, was enlarged four times to an area of 607 sq.kms. The Sanctuary is located outside the submergence zone but due to its extended boundaries now it touches the shore line of the reservoir and provides access to the fresh waters for the animals of the Sanctuary. The Sanctuary encloses part catchment of the Narmada which has been treated by soil moisture conservation works. Detailed and comprehensive management plan was already prepared and was made available to the Members of the Sub-group earlier. There has been substantial progress as reported during the last couple of meetings.

Secretary (CAD), Govt., of Maharashtra stated that Catchment Area Treatment and Compensatory Afforestation works were completed by Maharashtra much earlier and the Action Plan prepared on Health aspects was under implementation.

Member (E&R), NCA, circulated a copy of the report prepared by Forest Survey of India in collaboration with RRSSC, Nagpur. This report showed that there has been a substantial increase in the Forest cover in the areas treated.

B. Review of the progress of works on the suggested parameters in relation to the proposed filling of the reservoir up to RL 100m by June 2002

Member (E&R) stated that Dam Construction at EL 100 m. would submerge an area up to 105 km. from the dam site resulting in impoundment of 24% of the

area and that sub-group has been requested by the Govt. of Gujarat to consider clearance for raising the dam height from the present height of 90 m to 100 m as per the programme approved by the NCA.

Prof. Ramaseshan desired to know whether the proposal to raise the dam height up to 100 m is inclusive or exclusive of the coping (humps), as according to him this was relevant while considering the submergence. Vice Chairman, SSNNL expressed the opinion that NCA would take into consideration the actual submergence with respect to 100 m RL of the dam. Vice Chairman, NVDA stated that the issue was already decided by the RCNCA and that NCA will have to go along with the decision of Review Committee of NCA in this regard. Commissioner (PR), MOWR informed that NCA might consider raising the dam height to 97 m. with additional humps of 3 m height or raising the dam height to 100 m & part humps with end blocks open. Prof. Ramaseshan, desired a copy of the Study Report of CWPRS on this issue for his perusal.

Chairman stated that the Sub-group is considering the request of the Govt. of Gujarat for according clearance for raising of the dam height to 100 m RL in accordance with the operative part of the judgment and that the Sub-group has to consider the submergence to be caused at 100 m RL of the Dam.

Member (E&R), NCA, informed that a copy of the Status report on environmental management – SSP & ISP, for the quarter ending September, 2001 was placed as Annex-XXXVII-(12) of the agenda of the 37th meeting, circulated to the members & invitees of the sub-group for a review. He requested the officials of the State Govt(s), of Madhya Pradesh, Maharashtra and Gujarat to present the current status of compliances on the issues.

Dr. Shekhar Singh, IIPA had circulated his observations on the agenda during the meeting and sought certain clarifications on some of the issues which inter-alia included the following :

- He was of the view that planting of fuel wood/minor forest produce/timber/ fruit trees in the sanctuaries for the tribal living within the sanctuary is in violation of the wild life protection act 1972.
- He desired to know the arrangements made for rehabilitation of the wildlife for the SSP areas in Madhya Pradesh
- He referred to the page 34-35 of the agenda wherein it is mentioned that for the areas in Maharashtra, sample survey of the areas to be felled up to EL 100 m RL was carried out but no final survey or counting has been done. He was of the view that the progressive filling be treated as impoundment at FRL.
- He sought the revised schedule for Phase-II works in Madhya Pradesh.

- He referred to the incomplete works in some of the sub-watershed in Madhya Pradesh and desired to know the current status of works there.
- Recommendations on flora-fauna & carrying capacity aspects of the Sardar Sarovar Project in Madhya Pradesh, regarding recommendations on creation of Mathwad and Bokarata Sanctuaries.

The Chairman requested that while presenting the status, the issues brought out above, may also be addressed.

Narmada Valley Development Authority, Govt. of Madhya Pradesh

Director (CAT), NVDA informed that by the end of December, 2001, an area of 94,400 ha has been treated against a target of 1,25,725 ha. This represented a progress of about 75% of the final targets. A copy of the progress Chart submitted during the meeting is placed at **Annex-XXXVII-Min-(2) at Page-13**. It was explained by him that works are under progress in almost all the remaining sub-watersheds, but due to difficulty in taking up the private agriculture areas for treatment, some of the areas in these watersheds could not be treated. He also informed that the actual treatable area would be less and it would be possible for the NVDA to treat the entire area in time.

Member (E&R), NCA, pointed out that for the Project as a whole, entire area in Gujarat, Maharashtra and 94,400 ha area in Madhya Pradesh totalling 1,46,852 ha. area in all was treated. This represented 82.42% of the target.

Regarding felling of the forests in the submergence area for the Sardar Sarovar Project, the Vice Chairman, NVDA, informed that felling operations have almost been completed. However, there was difficulty for felling in about 200 ha. area due to agitation by those opposed to the Project.

Member (E&F), NVDA, informed that a study conducted for 2,732 ha. forest land indicated that this land was highly degraded and supported very little or no noticeable wildlife requiring any special measures. He further elaborated that in accordance with the conditions contained in the clearance Order, Govt., of Madhya Pradesh constituted a Wildlife Committee and the recommendations of the Study Group regarding creation of Sanctuaries in the SSP areas were not agreed by this Committee. In addition, the creation of these Sanctuaries was not considered necessary by the Expert Group on Flora and Fauna of the NCA. However, creation of Suryamanya, Omkareshwar Sanctuaries and Narmada National Park being created for the ISP areas is expected to take care of Wildlife conservation in the State.

Regarding recommendations of the Expert Committee on Health, the Vice Chairman, NVDA, informed that the comments are being obtained from the Director, Health Services and Department of Preventive & Social Medicines, Gandhi Medical

College, Bhopal. Dr. R.C. Sharma, pointed out that a better diseases surveillance system is required in Madhya Pradesh as per the recommendations of the Expert Committee on Health. The Vice Chairman, NVDA, however, requested that one Expert on Indian System of Medicine may be invited for the meeting to assess the diseases surveillance as per Indian Systems of Medicine.

An up-dated status on archaeological/anthropological aspects was submitted by the Commissioner, Archaeology & Museum, Govt., of Madhya Pradesh, during the meeting. A copy of the same is placed at **Annex-XXXVII-Min-(3) at Page-14-23**. Observations of the Govt. of Madhya Pradesh, on various items listed in the agenda papers, were received from Member (E&F), NVDA during the meeting. A copy of the same is placed at **Annex-XXXVII-Min-(4) at Page-24-31**.

Govt. of Maharashtra

Secretary (CAD), GoM informed that the Catchment area treatment works were started in the year 1994 and were completed by 1998. Similarly for the compensatory afforestation also, works were completed by 1999. Recommendations of the University of Pune have also been considered while preparing the action plan. He pointed out that, due to Catchment Area Treatment, the forest cover has improved along the bank of river Narmada. There is a substantial vegetation growth for shifting of wild life, and hence, special management for the corridor was not considered essential. Regarding status of felling in the submergence area, he referred to the note annexed in the Agenda papers according to which, 748 ha. area was already felled. He further informed that forest officials, though expected, could not make it to the meeting and therefore replies would be furnished after the meeting. He pointed out that multi region seed Bank in iso-climatic regions will be established by the Govt., of Maharashtra with the help of Forest Protection Committees working in the remote tribal areas. Regarding health, he informed that the action plan included existing & proposed infrastructures at rehabilitation sites, establishment of floating dispensaries, creation of posts for lab technicians, public health laboratory and anti malarial activities. He informed that this plan was under implementation.

Govt. of Rajasthan

Representative of the GoR submitted, during the meeting, details on the progress of the construction works on the canal in Rajasthan, a copy of the which is placed at **Annex-XXXVII-Min-(5) at Page-32-36**. Representative of the WAPCOS, informed that WAPCOS submitted its report in 1998. He desired to place before the sub-group, a copy of the Executive Summary of the studies carried out by them with a view of seeking approval of the Sub-group. A copy of the report received shall be

circulated to the members separately. A copy of the letter received from WAPCOS is placed at **Annex-XXXVII-Min-(6) at Page-37.**

Sardar Sarovar Narmada Nigam Ltd., Govt. of Gujarat

Managing Director, SSNNL informed that comprehensive information regarding the status of survey, studies and implementations aspects for the areas in Gujarat is already detailed in the Agenda notes. Director (Civil), SSNNL, pointed out that the Rim stability studies have been completed and well equipped 9 monitoring stations along the periphery of the reservoir are functioning. Data collected by these observatories are being analysed by expert institutions. Besides, the targeted area of 29,157 ha. of the Catchment in Gujarat was treated completely and the Govt. of Gujarat had already completed plantation works in the entire planned area of 13,950 ha. also. The entire reservoir bowl was cleared of vegetation and even coppice crops were also removed from the submergence areas. Simultaneously, all the works related to Shoolpaneshwar and Hampheshwar temples were completed. He further stated that the PCCF, Gujarat himself has explained the position on the issues raised by the Members of the Sub-group.

Vice Chairman, SSNNL, Vadodara, requested the Sub-group to consider the request of the Govt. of Gujarat for according clearance for raising the dam height up to RL 100 m.

Discussions and Conclusions

The Sub-group had already discussed on earlier occasions as to what constitutes pari-passu compliance. It noted the statements made by the Principal Chief Conservator of Forests, Gujarat, that plantations are being carried out on the periphery of the sanctuary and are not in violation of the Wild Life protection act. The Director (CAT), Madhya Pradesh informed regarding progress of CAT works in Madhya Pradesh where 75% of the works have been completed. However, for the Project as a whole, 82.42% area was treated up against 24% of the anticipated submergence at a dam height of 100m.

A copy of the report on "*Monitoring the Impacts of Catchment Area Treatment using Remote Sensing & GIS in Parts of Narmada Catchment Area*" in Maharashtra, prepared by the Officials of Forest Survey of India, Nagpur, RRSSC, Nagpur, was presented during the meeting. A copy of the Report is placed at **Annex-XXXVII-Min-(7) at Page-38-51.** This Report showed that the dense forest has increased from 574 ha. (1991) to 1079 ha. (1995) and 2044 ha. (1998) and the forest blanks has decreased from 6713 ha. (1991) to 5099 ha. (1995) and 4354 ha. (1998).

After reviewing and elaborate discussions, it emerged that :

- Government of Madhya Pradesh should complete treatment of remaining degraded watershed identified as Phase-I of CAT by 2003 and also undertake treatment of areas in the reservoir vicinity on priority.
- The State(s) should monitor and maintain the works undertaken for various environmental activities such as Catchment Area Treatment, Compensatory Afforestation, etc.
- Clearing of trees in the forest area getting submerged at EL 100m should be completed at the earliest for avoiding Eutrophication and degradation of water quality.
- Command Area Development Plan for Phase-I of the programme should be prepared on priority and should be submitted for review in due course.
- The seismological data collected at 9 monitoring stations established along the reservoir periphery should be got analyzed through concerned recognized institutions and submitted for information of the Sub-group.
- The compliance Report on the recommendations of the Expert Committee on health aspects should be submitted in the next meeting of the Environment Sub-group.

Keeping in view the implementation of environmental action plans up to EL 100 m by the party states as required for increasing the dam height up to 100 m, the Environment Sub-group recommended construction of the dam up to this height. However, before commencing construction to raise the dam beyond 90 m, project authorities should obtain separate clearance from R&R Sub-group and permission of Narmada Control Authority as detailed in the operative portion of the Supreme Court Judgment of October, 2000. During raising of the dam and filling of the reservoir, care should be taken to ensure release of regulated and adequate water in the downstream stretch, both for drinking purposes and to maintain aquatic life.

Dr. Shekhar Singh requested for recording his dissent to the view taken by the sub-group and stated that he would send his dissent note. The dissent note will be circulated to the members as soon as it is received.

**Item No.XXXVII-3(172) : REVIEW OF THE STATUS OF INDIRA SAGAR
PROJECT MADHYA PRADESH**

and

**Item No. XXXVII-4(173) : REVIEW OF ACTION TAKEN ON THE DECISION OF
THE PREVIOUS MEETINGS**

A copy of the Status Report on Environment Management of Indira Sagar Project for the quarter ending September, 2001 was included as Annex –XXXVII – (12) of the agenda papers. A copy of the responses of the GoMP submitted during the meeting is already placed at Annex-XXXVII-Min-(4) at Page-26-27. However due to shortage of time detailed discussions were deferred.

Item No. XXXVII-5(174) : Monitoring of the Indira Sagar Project.

Vice Chairman, NVDA, referred to the decision of the Review Committee of Narmada Control Authority regarding "monitoring mechanism" to be evolved by the Ministry of Environment & Forests for monitoring of the Indira Sagar Project. He requested the Chairman to look into the matter. Vice Chairman, SSNNL was of the view that decisions of the RCNCA, where Hon'ble Minister for Environment & Forest was present, be taken up. The Chairman stated that the matter would be examined in the light of the decisions taken by the Review Committee of the Narmada Control Authority.

The meeting ended with vote of thanks to the Chair.

ANNEXURES

ANNEX-XXXVII-Min-I

**LIST OF PARTICIPANTS OF THE 37th MEETING OF ENVIRONMENT SUB-GROUP
OF NCA HELD ON 8th FEBRUARY, 2002 AT PARYAVARAN BHAWAN, NEW DELHI.**

GOVERNMENT OF INDIA

S/Shri/Smt.

Ministry of Environment & Forests

1. P.V. Jayakrishnan, Secretary, MOEF, New Delhi
2. V. Rajagopalan, Joint Secretary, MOEF, New Delhi
3. Dr. Nalini Bhat, Director, MOEF, New Delhi

Narmada Control Authority

1. R. Jeyaseelan, Executive Member, NCA, Indore
2. N.D. Tiwari, Member (E&R), NCA, Indore
3. Dr. Pawan Kumar, Specialist (Environment), NCA, Indore
4. Kuldeep Malik, Dy. Director (Env.), NCA, Indore

Ministry of Water Resources

1. A. Sekhar, Commissioner (PR), MOWR, New Delhi
2. A.D. Bhardwaj, Jt. Commissioner, MOWR, New Delhi

Sardar Sarovar Construction Advisory Committee

1. Indra Raj, Secretary, SSCAC, Vadodara
2. N.K. Bhandari, Dy. Secretary, SSCAC, Vadodara.

Ministry of Agriculture

1. Dr. Shamsheer Singh, Addl. Commissioner, MOA, New Delhi

Indian Council of Agriculture Research

1. Dr. K.R. Solanki, ADG, ICAR, Krishi Bhawan, New Delhi.

Indian Council of Medical Research

1. Dr. Rashmi Arora, Dy. Director, ICMR, New Delhi

National Institute of Communicable Diseases

1. Dr. R.C. Sharma, Joint Director, NICD, New Delhi

Wild life Institute of India

1. Dr. Asha Rajvanshi, Faculty, Wild Life Institute of India, Dehradun.

EXPERT MEMBERS

1. Dr. S. Ramaseshan, HoD Dept. of Civil Engineering, Kongu Engineering College, Erode.
2. Dr. Sekhar Singh, Faculty, IIPA, New Delhi.
3. Dr. R.K. Katti, Prof. Emeritus, IIT, Mumbai and Director & Consultant, UNEECs, Mumbai

GOVERNMENT OF GUJARAT

1. V.B. Buch, Vice Chairman, SSNNL, Gandhinagar
2. K.C. Kapoor, Managing Director, SSNNL, Gandhinagar.
3. Dr. S.A. Chavan, PCCF, SSNNL, Gandhinagar
4. N.B. Desai, Director (Civil), SSNNL, Gandhinagar.
5. Dr. J.C. Gandhi, Consultant (Health), SSNNL, Gandhinagar
6. K.R. Narayanan, Consultant (Fisheries), SSNNL, Gandhinagar

GOVERNMENT OF MADHYA PRADESH

1. Pradeep Bhargava, Vice Chairman, NVDA, Bhopal
2. Suresh Chandra, Member (E&F), NVDA, Bhopal
3. Man Dahima, Commissioner, Archaeology & Museum, Bhopal
4. K.N. Dubey, Director (CAT), NVDA, Bhopal
5. R.K. Behre, SMS, NVDA, Bhopal.
6. M. Krishnamoorthy, C.E. (C) NHDC, Bhopal.
7. V.B. Bhatt, Dy. Manager (Env.), NHDC, Bhopal.

GOVERNMENT OF MAHARASHTRA

1. Shri S.V. Sodal, Secretary (CADA), Irrigation Department, Mumbai.
2. V.V. Gaikwad, Chief Engineer, Koyana Project,

GOVERNMENT OF RAJASTHAN

1. N.R. Mehta, S.E., Irrigation Dept., Narmada Project Circle, Jalore.
2. Dr. S. Mukherjee, Chief Environment, WAPCOS.
3. Vijay Garg, Dy. Chief Engineer (Env.), WAPCOS.

ANNEX - XXXVII - Min. (2)

ANNEXURE-A

नर्मदा घाटी विकास प्राधिकरण के अंतर्गत सीधे जल निकासी करने वाले उपजलग्रहण क्षेत्रों में उपचार कार्यों की प्रगति का विवरण

क्षेत्र हेक्टेयर में

एक्शन प्लान के अनुसार दिसम्बर 2001 तक उपलब्ध शेष क्षेत्र का विवरण											1.1.2002 में अन्य एजेन्सी द्वारा उपचारित क्षेत्र	शेष कार्यों हेतु योजना अवधि जून-2002 तक प्रस्तावित						
संक्र.0	उपजलग्रहण क्षेत्र का विवरण	गैर वन क्षेत्र	वन क्षेत्र	योग	गैर वन क्षेत्र	वन क्षेत्र	योग	गैर वन क्षेत्र	वन क्षेत्र	योग	वन क्षेत्र	गैर वन क्षेत्र	वन क्षेत्र	योग	गैर वन क्षेत्र	वन क्षेत्र	योग	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1	जलाशय 100 मी उंचाई तक सीधे बहने वाले उपजलग्रहण क्षेत्र	8665	31575	40240	5581	27230	32811	3084	4345	7429	1162	3084	3183	6267	3084	525	3609	
	शेड 27 उपजलग्रहण क्षेत्र 138.68 मी तक जलाशय में सीधे बहने वाले उपजलग्रहण क्षेत्र	65130	20355	85485	46248	11989	58237	18882	8366	27248	2190	18882	6176	25058	3000	539	3539	
	G.Total:-	73795	51930	125725	51829	39219	91048	21966	12711	34677	3352	21966	9359	31325	6084	1064	7148	

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कुल उपचारित 91048 by NVDA
3352 by State Agency
94400

ANNEX - XXXVII - Min. (3)

सरदार सरोवर परियोजनान्तर्गत डूब से प्रभावित स्मारकों का टी0बी0एम0 (R.L.) निर्धारण कार्य

क्रमांक	स्मारक/ उत्खनन टीले का नाम	ग्राम/ जिला	विभाग एवं न0घा0वि0प्रा0 द्वारा संयुक्त रूप से लिए गए T.B.M. (जो सही हैं)	रिमार्क
1	शिवमंदिर बड़ा बड़दा	बड़ा बड़दा, धार	130.97(Plinth Level)	पुनर्स्थापन कार्य पूर्ण
2	शिवमंदिर	पिपल्दागढ़ी, धार	150.01(Plinth Level)	पुनर्स्थापन कार्य पूर्ण
3	शैलोत्कीर्ण प्रतिमाएं	पिपल्दागढ़ी, धार	124.47(River Bank)	पुनर्स्थापन कार्य पूर्ण
4	शिवमंदिर क्रमांक-1	खुजावा, धार	136.675(Plinth Level)	जिलाध्यक्ष, धार द्वारा जनविरोध के कारण पुनर्स्थापन कार्य स्थगित
5	शिवमंदिर क्रमांक-2	खुजावा, धार	136.490(Plinth Level)	जिलाध्यक्ष, धार द्वारा जनविरोध के कारण पुनर्स्थापन कार्य स्थगित
6	शिवमंदिर क्रमांक-3	खुजावा, धार	136.425(Plinth Level)	जिलाध्यक्ष, धार द्वारा जनविरोध के कारण पुनर्स्थापन कार्य स्थगित
7	सोमेश्वर मंदिर	खुजावा, धार	130.795(Plinth Level)	जिलाध्यक्ष, धार द्वारा जनविरोध के कारण पुनर्स्थापन कार्य स्थगित
8	शैलोत्कीर्ण गुफाएं	खुजावा, धार	130.005(Plinth Level)	मलबा सफाई कार्य पूर्ण।
9	भवानी माता मंदिर	खुजावा, धार	151.260(Plinth Level)	चूना सफाई का कार्य पूर्ण किया गया।
10	3 विशाल प्रतिमाएं	खुजावा, धार	149.415(Plinth Level)	जिलाध्यक्ष, धार द्वारा जनविरोध के कारण पुनर्स्थापन कार्य स्थगित
11	वाणेश्वर मंदिर, नावदाटोली	कसरावद, खरगौन	141.755(Plinth Level)	पुनर्स्थापन का कार्य प्रारंभ किया गया परन्तु जनविरोध के कारण कार्य स्थगित।
12	देव प्रतिलिंग	बोधवाड़ा, धार	134.620(Plinth Level)	पुनर्स्थापन कार्य प्रथम चरण में ड्राइंग, नंबरिंग, चूना स्क्रेपिंग का कार्य पूर्ण किया जाकर पुनर्स्थापन कार्य प्रगति पर हैं।
13	नर्मदेश्वर मंदिर	डेहर, धार	129.95(Plinth Level)	चूना स्क्रेपिंग, नंबरिंग, रेखांकन, छायांकन आदि कार्य पूर्ण किए जाकर पुनर्स्थापन कार्य प्रगति पर हैं।
14	पुरातत्वीय संग्रहालय कसरावद के परिसर का विकास कार्य	कसरावद, खरगौन	-	प्रदर्शन कार्य लगभग पूर्ण किया जाकर परिसर का विकास कार्य प्रगति पर है।

उत्खनन स्थल

1	खलघाट	धार	150.315	उत्खनन अभिलेख कार्यालय पुरातत्ववेत्ता इंदौर के पास हैं।
2	कल्याणपुरा	धार	145.030	उत्खनन कार्य पूर्ण किया गया। उत्खनित सामग्री मुख्यालय, भोपाल में सुरक्षित है।
3	एकलवारा	धार	140.870	उत्खनन कार्य पूर्ण किया गया। उत्खनित सामग्री कसरावद संग्रहालय में प्रदर्शन हेतु सुरक्षित है।
4	कटनेरा	धार	139.860	उत्खनन कार्य पूर्ण किया गया। उत्खनित सामग्री कार्यालय उपसंचालक, इंदौर में सुरक्षित है।
5	मारुचीचली	बड़वानी	150.635	भारतीय पुरातत्व सर्वेक्षण नागपुर शाखा द्वारा उत्खनन कार्य पूर्ण किया गया।

इंदिरा सागर परियोजनान्तगत डूब से प्रभावित स्मारकों का टी0बी0एम0 (R.L.) निर्धारण कार्य

क्रमांक	स्मारक/ उत्खनन टीले का नाम	ग्राम/ जिला	R.L. in metre	रिमार्क
1	शिवमंदिर	धारीकोटला, खण्डवा	229.500	पुनर्स्थापन कार्य पूर्ण।
2	छत्री	घिसोर, खण्डवा	239.300	पुनर्स्थापन की कार्यवाही की जा रही है।
3	शिवमंदिर	बड़केश्वर, खण्डवा	263.805	चूना स्क्रेपिंग, नंबरिंग, रेखांकन, छायांकन कार्य पूर्ण
4	शिवमंदिर(दुर्गा मंदिर)	चांदेल, खण्डवा	254.917	प्रगति नहीं। भूमि आवंटन अपेक्षित है।
5	शिवमंदिर	पुनघाट, खण्डवा	240.315	प्रगति नहीं। भूमि आवंटन अपेक्षित है।
6	शिवमंदिर-2	खुदियामाल, खण्डवा	266.215	प्रगति नहीं। भूमि आवंटन अपेक्षित है।
7	रिद्धनाथ मंदिर	हंडिया, होशंगाबाद	273.38	प्रगति नहीं। भूमि आवंटन अपेक्षित है।
8	अब्दुल हसन का मकबरा	हंडिया, हरदा	269.68	प्रगति नहीं। भूमि आवंटन अपेक्षित है।
9	शैलोत्कीर्ण प्रतिमाएं	दैयत, देवास	267.83	प्रगति नहीं। भूमि आवंटन अपेक्षित है।
10	सिंघाजी की समाधि	सिंघाजी, खण्डवा	247.915	प्रगति नहीं। भूमि आवंटन अपेक्षित है।

उत्खनन स्थल

1	गाजनपुर	देवास		वित्तीय वर्ष 2001-2002 के लिए प्रस्ताव भारतीय पुरातत्व सर्वेक्षण, दिल्ली से अनुमोदित होने पर उत्खनन कार्य प्रारंभ किए जाएंगे।
2	नवलखेड़ा	खण्डवा		वित्तीय वर्ष 2001-2002 के लिए प्रस्ताव भारतीय पुरातत्व सर्वेक्षण, दिल्ली से अनुमोदित होने पर उत्खनन कार्य प्रारंभ किए जाएंगे।
3	बीजलपुर	खण्डवा		वर्ष 2002-2003 में भारतीय पुरातत्व सर्वेक्षण, नई दिल्ली को प्रस्ताव तैयार कर भेजा जाना प्रस्तावित है।
4	छालपाकला	खण्डवा		वर्ष 2002-2003 में भारतीय पुरातत्व सर्वेक्षण, नई दिल्ली को प्रस्ताव तैयार कर भेजा जाना प्रस्तावित है।
5	गन्नोर	खण्डवा		वर्ष 2002-2003 में भारतीय पुरातत्व सर्वेक्षण, नई दिल्ली को प्रस्ताव तैयार कर भेजा जाना प्रस्तावित है।

भारतीय पुरातत्व सर्वेक्षण को पूर्व में सौंपे गए स्मारक एवं टीले जो संचालनालय पुरातत्व, अभिलेखागार एवं संग्रहालय, भोपाल को पुनः सौंपे गए हैं

सरदार सरोवर परियोजनान्तर्गत डूब से प्रभावित स्मारकों का टी0बी0एम0 (R.L.) निर्धारण कार्य

क्रमांक	स्मारक/ उत्खनन टीले का नाम	ग्राम/ जिला	न0घा0वि0प्रा0 द्वारा R.L. प्रदाय किए गए	रिमार्क
1	शिवमंदिर	रोलीगांव, झाबुआ	122.71(Plinth Level)	नर्मदा नियंत्रक प्राधिकरण के पत्र क्रमांक 4457-61, दिनांक 16 दिसम्बर, 2001 के द्वारा भारतीय पुरातत्व सर्वेक्षण, मध्यवृत्त, भोपाल से सौंपे गये 10 स्मारक एवं 6 उत्खनन स्थल जो पुनः विभाग को सौंपे गए हैं इनके प्राक्कलन तैयार किए जाकर वित्तीय वर्ष 2002-2003 में कार्य प्रारंभ किए जावेंगे।
2	जलालेश्वर मंदिर	खुजावा, धार	149.47(Plinth Level)	---
3	कलजेश्वर मंदिर	समल्दा, धार	नर्मदा बचाओ आंदोलनकारियों ने सर्वे नहीं करने दिया।	---
4	नीलकण्ठेश्वर मंदिर	चिखल्दा, धार	नर्मदा बचाओ आंदोलनकारियों ने सर्वे नहीं करने दिया।	---
5	बीलबामृतेश्वर मंदिर	धरमपुरी, धार	148.56(plinth Level)	---
6	पशुपतेश्वर मंदिर	चिखल्दा, धार	नर्मदा बचाओ आंदोलनकारियों ने सर्वे नहीं करने दिया।	---
7	कोटेश्वर मंदिर	कोठरा, धार	133.39(Plinth Level)	---
8	नागेश्वर मंदिर	धरमपुरी, धार	154.27(Plinth Level)	---
9	भीलखंडा की छत्रियां	भीलखंडा, बडवानी	134.25(Plinth Level)	---
10	शिवमंदिर	छोटी कसरावद, बडवानी	123.23(Plinth Level)	---

प्राचीन टीले

1	खंडा	धार	143.90(Plinth Level)	---
2	नावडाखंडी	ठीकरी, बडवानी	147.32(G. L.)	---
3	कवठी	मनावर, धार	बाध विरोधी आंदोलन के कारण सर्वे नहीं किया जा सका।	---
4	नावदाटाली	कसरावद, खरगौन	162.81(Top Level) From Neem Tree	---
5	जागरवा	बडवानी	-	---
6	छोटा बडदा	ठीकरी, बडवानी	बाध विरोधी आंदोलन के कारण सर्वे नहीं किया जा सका।	---

कार्यालय आयुक्त, पुरातत्व, अभिलेखागार एवं संग्रहालय,
मध्यप्रदेश, भोपाल

नर्मदा परियोजनान्तर्गत कार्यो की प्रगति की अद्यतन स्थिति (वर्ष 1988 से जनवरी, 2002)

क्रमांक	परियोजना का नाम व कार्य	निर्धारित कार्ययोजना	कार्यो की स्थिति
अ-	सर्वेक्षण कार्य 1. सरदार सरोवर 2. इंदिरा सागर 3. ओंकारेश्वर 4. महेश्वर 5. जोबट एवं मान	193 ग्राम 254 ग्राम 31 ग्राम 61 ग्राम 30 ग्राम	सर्वेक्षण कार्य विभाग द्वारा वर्ष 1993 तक पूर्ण किया गया। सर्वेक्षण में चिन्हकित पुरासंपदा के संकलन, संवर्धन, संरक्षण तथा अध्ययन हेतु कार्ययोजना-1993, तदुपरांत संशोधित कार्ययोजना-1997 तैयार की गई।
ब-	स्मारकों का पुनर्स्थापन 1. सरदार सरोवर	13 स्मारक	धार जिले के तीन स्मारकों यथा शिवमंदिर, बड़ा बड़दा, शैलोत्कीर्ण प्रतिमाये, पिपल्दागढी एवं शिवमंदिर, पिपल्दागढी का पुनर्स्थापन कार्य पूर्ण एवं नर्मदेश्वर मंदिर, डेहर, जिला धार एवं देवप्रतिमिंग शिवमंदिर, बोधवाड़ा का पुनर्स्थापन कार्य जारी है। 3 विशाल प्रतिमाये खुजावा, जिला धार का पुनर्स्थापन कार्य जन विरोध के कारण स्थगित है। जिला धार में शिवमंदिर क्रमांक 1, 2 एवं 3 एवं सोमेश्वर मंदिर एवं खुजावा के पुनर्स्थापन कार्य के अंतर्गत विस्तृत छायांकन, रेखांकन, मानचित्रिकरण एवं नंबरिंग कार्य पूर्ण किए गए। वाणेश्वर मंदिर, कसरावद का पुनर्स्थापन कार्य के अंतर्गत विस्तृत रेखांकन, छायांकन एवं मानचित्रिकरण कार्य प्रारंभ किया गया, परन्तु जन विरोध के कारण कार्य स्थगित है।
	2. इंदिरा सागर	10 स्मारक	1) खंडवा जिले में स्थित शिवमंदिर, धारीकोटला का पुनर्स्थापन कार्य जुलाई, 2001 में पूर्ण हो चुका है। 2) शिवमंदिर, बड़केश्वर, खण्डवा के पुनर्स्थापन कार्य के अंतर्गत विस्तृत छायांकन, रेखांकन, मानचित्रिकरण एवं नंबरिंग कार्य पूर्ण किए गए। 3) हंडिया स्थित रिद्धनाथ मंदिर की रिटेनिंग वाल के निर्माण की कार्यवाही की जा रही है। 4) घिसोर स्थित छत्री का पुनर्स्थापन कार्य प्रारंभ किया जा रहा है। 5) शेष 6 स्मारकों के पुनर्स्थापन कार्य हेतु भूमि का आवंटन अभी तक प्राप्त नहीं हुआ है। आवंटन हेतु कार्यवाही की जा रही है।
स-	उत्खनन 1. सरदार सरोवर	5 स्थल कार्ययोजना -1997	1) कार्ययोजना-93 के अंतर्गत जिला खरगोन स्थित ब्राह्मणगांव एवं जिला धार स्थित खापरखेड़ा में ट्रायल ट्रेंच लेकर उत्खनन कार्य किया गया एवं प्रतिवेदन तैयार किया जा चुका है। 2) कार्ययोजना-1997 के अंतर्गत खलघाट, जिला धार में उत्खनन कार्य पूर्ण किया एवं उत्खनन प्रतिवेदन तैयार किया जा चुका है। 3) जिला धार के ग्रामों कटनेरा, कल्याणपुरा एवं एकलवारा में वित्तीय वर्ष 2000-2001 में उत्खनन कार्य पूर्ण किए गए हैं एवं एकलवारा का उत्खनन प्रतिवेदन तैयार किया जा चुका है एवं कटनेरा एवं कल्याणपुरा के प्रतिवेदन तैयार किए जा रहे हैं।

क्रमांक	परियोजना का नाम व कार्य	निर्धारित कार्ययोजना	कार्यों की स्थिति
	2. इंदिरा सागर	5 स्थल कार्ययोजना -1997	1) कार्ययोजना-1993 के अन्तर्गत खेड़ीनेमा, जिला होशंगाबाद में उत्खनन कार्य 1993-94 में पूर्ण कर प्रतिवेदन तैयार किया गया है। 2) कार्ययोजना-1997 के अन्तर्गत प्रस्तावित उत्खनन कार्यों में से वित्तीय वर्ष 2001-2002 में ग्राम गाजनपुर, देवास एवं नवलखेड़ा, खण्डवा के उत्खनन के प्रस्ताव तैयार किए गए हैं। भारतीय पुरातत्व सर्वेक्षण विभाग से अनुमति प्राप्त होने पर कार्य प्रारंभ किया जायेगा।
द-	संग्रहालय स्थापना 1. सरदार सरोवर	3 संग्रहालय एवं 1 नर्मदा वीथिका	खरगोन जिले के तहसील मुख्यालय कसरावद में नर्मदा घाटी विकास प्राधिकरण द्वारा भवन का निर्माण कार्य पूर्ण किया गया है। पुरासंपदा के प्रदर्शन एवं विकास कार्य पूर्ण किए जा रहे हैं। जिला बड़वानी में संग्रहालय निर्माण कार्य हेतु भूमि आवंटन प्राप्त हो चुका है। भवन निर्माण के प्राक्कलन तैयार किए गए हैं एवं प्रशासकीय स्वीकृति नर्मदा घाटी विकास प्राधिकरण से प्राप्त की जा रही है। भोपाल संग्रहालय में नर्मदा वीथिका निर्मित विद्युतीकरण कार्य शेष है।
	2. इंदिरा सागर	1 संग्रहालय	नर्मदा घाटी विकास प्राधिकरण द्वारा राशि का आवंटन जिला कलेक्टर, खंडवा को आवंटित कर संग्रहालय भवन का निर्माण कार्य कराया गया है। भवन पुरातत्व संग्रहालय के लिए उपयुक्त न होने के कारण आधिपत्य में नहीं लिया गया है। इस संबंध में कलेक्टर, खंडवा को पत्र लिख गया है।
य-	पुरासंपदा का संकलन 1. सरदार सरोवर	-	डूब क्षेत्र में स्थित ग्रामों से 266 प्रतिमाओं का संकलन कार्य किया गया है। वित्तीय वर्ष 2001-2002 में लगभग 100 प्रतिमाओं का संकलन कार्य पूर्ण किया जायेगा जिसमें से 20 प्रतिमाएं डूब क्षेत्र से संकलित कर कसरावद संग्रहालय में प्रदर्शन हेतु सुरक्षित रखी गयीं हैं।
	2. इंदिरा सागर	-	डूब क्षेत्र में स्थित ग्रामों से 118 प्रतिमाओं का संकलन कार्य किया गया है। वित्तीय वर्ष 2001-2002 में लगभग 150 प्रतिमाओं का संकलन कार्य पूर्ण किया जायेगा।
र-	डाक्यूमेंटेशन 1. सरदार सरोवर	-	रु. 20,12,500.00 की राशि से म.प्र.माध्यम से डाक्यूमेंटेशन कार्य पूर्ण कराया गया है।
	2. इंदिरा सागर	-	वित्तीय वर्ष 2001-2002 में डाक्यूमेंटेशन कार्य प्रथम चरण में 50 ग्रामों का किया जाना है।
ल-	रसायनीकरण 1. सरदार सरोवर	-	डूब क्षेत्र के ग्रामों से संकलित पुरासंपदा व पुनर्स्थापित स्मारकों एवं उत्खनित सामग्री का रसायनीकरण कार्य पूर्ण किया गया है। शेष प्रस्तावित स्मारकों का पुनर्स्थापन कार्य प्रारंभ होने पर रसायनीकरण कार्य किया जायेगा। वित्तीय वर्ष 2001-2002 में शिवमंदिर, घारीकोटला का रसायनीकरण कार्य पूर्ण किया जा चुका है।
	2. इंदिरा सागर	-	डूब क्षेत्र के ग्रामों से संकलित पुरासंपदा व पुनर्स्थापित स्मारकों एवं उत्खनित सामग्री का रसायनीकरण कार्य पूर्ण किया गया है। शेष प्रस्तावित स्मारकों का पुनर्स्थापन कार्य प्रारंभ होने पर रसायनीकरण कार्य किया जायेगा। वित्तीय वर्ष 2001-2002 में शिवमंदिर, घारीकोटला का रसायनीकरण कार्य पूर्ण किया जा चुका है।
व-	प्रतिकृति निर्माण 1. सरदार सरोवर	-	1) शैलोत्कीर्ण प्रतिमायें पिपल्दागढ़ी, जिला धार की प्लास्टर प्रतिकृति तथा शिवमंदिर बड़ा बड़दा, जिला धार की लघु प्लास्टर प्रतिकृति तैयार कराई जा चुकी है तथा 3 विशाल प्रतिमायें खुजावा, जिला धार के फाइवर प्रतिकृति का निर्माण कार्य पूर्ण किया गया है। 2) सरदार सरोवर परियोजनान्तर्गत डूब क्षेत्र में स्थित स्मारकों की प्रतिकृति(मॉडल) के निर्माण कार्य हेतु रेखांकन एवं छायांकन कार्य पूर्ण हो चुका है। प्रतिकृति(मॉडल) निर्माण कार्य के कार्ययोजना रु. 20,31,200.00 तैयार कर नर्मदा घाटी विकास प्राधिकरण को अनुमोदन हेतु प्रेषित की गई है। अनुमोदन उपरांत प्रतिकृति निर्माण की कार्यवाही की जावेगी।

क्रमांक	परियोजना का नाम व कार्य	निर्धारित कार्ययोजना	कार्यों की स्थिति
श-	प्रकाशन 1. सरदार सरोवर	-	1) नर्मदा परियोजनान्तर्गत निष्पादित कार्यों पर एक लघु पुस्तिका "Heritage Flourishing in Narmada Valley" प्रकाशित की गई है एवं उत्खनन कार्यों के प्रतिवेदन तैयार किये जा रहे हैं। इन उत्खनन प्रतिवेदनों का प्रकाशन इस वित्तीय वर्ष में प्रस्तावित है। 2) कसरावद संग्रहालय एवं खरगौन जिले के स्मारकों से संबंधित ब्रोशर, गाइड एवं स्मारिका के प्रकाशन संबंधी प्रस्ताव तैयार किए जा रहे हैं।
	2. इंदिरा सागर	-	होशंगाबाद जिले के ग्राम खेडीनेमा में किए गए उत्खनन कार्य का प्रतिवेदन तैयार किया गया है जिसका प्रकाशन इस वित्तीय वर्ष में प्रस्तावित है।
स-	स्थापना	-	नर्मदा परियोजनान्तर्गत सरदार सरोवर, इंदिरा सागर, आंकारेश्वर एवं महेश्वर परियोजना के अन्तर्गत डूब क्षेत्र के सर्वेक्षण तथा स्मारकों के पुर्नस्थापन, उत्खनन, संग्रहालय निर्माण, रसायनीकरण, डाक्यूमेंटेशन एवं प्रतिकृति निर्माण आदि कार्यों के निष्पादन हेतु अधिकारी एवं तकनीकी व लिपिकीय 35 कर्मचारी वर्तमान में कार्यरत हैं।

**कार्यालय आयुक्त, पुरातत्व, अभिलेखागार एवं संग्रहालय
मध्यप्रदेश, भोपाल
नर्मदा परियोजनान्तर्गत पुरातत्वीय कार्यो का वर्षवार प्रगति विवरण**

वर्ष	परियोजना का नाम	प्राप्त बजट (लाख)	कुल व्यय (लाख)	कार्य विवरण
1988-93	सरदार सरोवर इंदिरा सागर ओंकारेश्वर महेश्वर जोबट मान	24.42 14.00 8.75 8.75 1.50 1.50	24.42 14.00 8.75 8.75 1.50 1.50	राशि का उपयोग करते हुए सरदार सरोवर परियोजना के रूब क्षेत्र के 193 ग्राम इंदिरा सागर परियोजना के 254 ग्राम महेश्वर परियोजना के अंतर्गत 61 ग्राम ओंकारेश्वर परियोजना के 31 ग्राम जोबट तथा मान परियोजनाओं के कुल 30 ग्रामों के सर्वेक्षण कार्य पूर्ण कर पुरासंपदा का विन्हांकन कार्य पूर्ण किया गया है। प्राधिकरण द्वारा देय राशि समय-समय पर एक मुश्त दी गई तदुपरान्त काययोजना 93 एवं 97 तैयार की गई है। वर्तमान में कार्ययोजना-97 के अनुसार स्मारकों का पुनर्स्थापन, उत्खनन, संग्रहालय निर्माण रसायनिकरण आदि कार्य कराये जा रहे हैं।
1993-94	कुल	58.92	58.92	
1993-94	सरदार सरोवर	35.13	28.69	कुल व्यय 28.69 लाख में से रूपये 20,12,500/- की राशि से मध्यप्रदेश किन्म विकास निगम एवं मध्यप्रदेश माध्यम से सरदार सरोवर परियोजनातर्गत डाक्यूमेंटेशन रु.1,20.00 लाख की राशि से इंदिरा सागर परियोजना अंतर्गत खेडीनेमा, जिला होशंगाबाद का पुरातत्वीय उत्खनन कार्य किया गया। शेष राशि का उपयोग स्थापना तथा अन्य लघु कार्यो पर किया गया। मध्यप्रदेश माध्यम से प्राप्त डाक्यूमेंटेशन कार्य के केसेट्स एवं छायाचित्रों का परीक्षण किया जा रहा है।
1993-94	इंदिरा सागर	-	-	बजट आवंटन न होने के कारण कार्य नहीं किया जा सका है।
1994-95	सरदार सरोवर	20.00	17.32	राज्य संग्रहालय,भोपाल में नर्मदा गैलरी का निर्माण लोक निर्माण विभाग से कराया गया। इस कार्य हेतु लोक निर्माण को रु. 8.31 लाख का आवंटन प्रदान किया गया। इसके अतिरिक्त धार जिले से 49 प्रतिमाओं के सकलन एवं रसायनीकरण का कार्य किया गया। शेष राशि वित्तीय वर्ष के समाप्ति पर नर्मदा घाटी विकास प्राधिकरण को समर्पित की गयी।
1994-95	इंदिरा सागर	12.20	समर्पित	राशि नर्मदा घाटी विकास प्राधिकरण को समर्पित की गयी राशि का उपयोग नर्मदा घाटी विकास प्राधिकरण द्वारा अपने स्तर से किया जाकर संग्रहालय, खण्डवा का निर्माण जिला कलेक्टर,खण्डवा के माध्यम से कराया गया।

वर्ष	परियोजना का नाम	प्राप्त बजट (लाख)	कुल व्यय (लाख)	कार्य विवरण
1995-96	सरदार सरोवर	22.90	11.85	उक्त राशि का उपयोग कर परियोजनांतर्गत जिला धार एवं झाबुआ जिलों के डूब क्षेत्र से 79 प्रतिमाओं के संकलन, रसायनीकरण तथा ब्राह्मण गांव, जिला खरगन एवं खापरखेड़ा जिला धार स्थित पुरातत्वीय स्थलों पर परीक्षण निखात लेकर उत्खनन कार्य निष्पादित किये गये। इसी राशि में से इंदिरा सागर परियोजनांतर्गत 134 प्रतिमाओं का संकलन कार्य किया गया। शेष राशि सत्रांत में समर्पित की गयी।
1995-96	इंदिरा सागर	-	-	बजट आवंटन न होने के कारण कार्य नहीं किया जा सका है।
1996-97	सरदार सरोवर	20.00	16.75	उक्त राशि का उपयोग कर औकरेश्वर परियोजनांतर्गत खण्डवा जिले के डूब क्षेत्र से 51 प्रतिमाओं के संकलन एवं रसायनीकरण का कार्य तथा पिपल्दागढी स्थित शैलोत्कीर्ण प्रतिमाओं के प्रतिकृतियों का निर्माण कराये गये। व्यय की गई राशि में स्थापना व्यय पी.ओ.एल. एवं अन्य व्यय सम्मिलित हैं।
1996-97	इंदिरा सागर	-	-	बजट आवंटन न होने के कारण कोई प्रगति नहीं हो सकी।
1997-98	सरदार सरोवर	25.00	19.99	शिव मंदिर, बड़ा बड़दा जिला धार का पुनर्स्थापन कार्य पूर्ण किया गया। शेष राशि वित्तीय वर्ष के अंत में प्राप्त होने के कारण समर्पित की गई। व्यय की गई राशि में स्थापना एवं वाहन आदि अन्य व्यय सम्मिलित हैं।
1997-98	इंदिरा सागर	7.00	समर्पित	बजट वित्तीय वर्ष के समाप्ति पर प्राप्त होने के कारण नर्मदा घाटी विकास प्राधिकरण को समर्पित किया गया।
1998-99	सरदार सरोवर	33.00	26.91	शिव मंदिर, बड़ा बड़दा जिला धार के पुनर्स्थापन उपरांत पहुंच मार्ग का निर्माण शैलोत्कीर्ण प्रतिमाओं, पिपल्दागढी तथा शिव मंदिर, पिपल्दागढी का पुनर्स्थापन कार्य पूर्ण किया गया। व्यय राशि में स्थापना तथा अन्य कार्यों में व्यय की गई राशि सम्मिलित है।
1998-1999	इंदिरा सागर	6.00	6.06	शिव मंदिर धारी कोटला का पुनर्स्थापन लगभग 80 प्रतिशत कार्य पूर्ण किया गया। शेष बचा कार्य स्थानीय जन विरोध के कारण बंद करना पड़ा। इसके साथ ही शिवमंदिर, बड़केश्वर में सफाई, शिल्पखण्डों का चिन्हांकन, रेखांकन, नम्बरिंग एवं छायाचित्रांकन आदि कार्य संपादित किये गये।
1999-2000	सरदार सरोवर	27.00	21.24	जिला धार में स्थित नर्मदेश्वर मंदिर, डेहर तथा देवप्रतिलिंग मंदिर, बोधबाड़ा के पुनर्स्थापन कार्यायोजना के अंतर्गत शिल्पखण्डों का विस्तृत रेखांकन, चिन्हांकन, छायांकन तथा नम्बरिंग कार्य पूर्ण किये गये हैं। शेष राशि वित्तीय वर्ष के समाप्ति पर समर्पित की गई।
1999-2000	इंदिरा सागर	3.40	0.31	इंदिरा सागर परियोजना अंतर्गत खण्डवा जिले के डूब क्षेत्र से 19 प्रतिमाओं का संकलन कार्य किया गया। शेष बजट प्राधिकरण को समर्पित किया गया।

वर्ष	परियोजना का नाम	प्राप्त बजट (लाख)	कुल व्यय (लाख)	कार्य विवरण
1999-2000	इंदिरा सागर	3.40	0.31	इंदिरा सागर परियोजनातर्गत खण्डवा जिले के डूब क्षेत्र से 19 प्रतिमाओं का संकलन कार्य किया गया। शेष बजट प्राधिकरण को समर्पित किया गया।
2000-2001	सरदार सरोवर	41.50	33.99	<p>1- तीन विशाल प्रतिमार्थें, खुजावा, जिला धार की फाड़बर प्रतिकृति का निर्माण कार्य पूर्ण किया गया है। इस कार्य हेतु रु. 3.52 लाख की वित्तीय स्वीकृति जारी की गयी एवं कार्य माह मार्च 2001 में पूर्ण हो चुका है।</p> <p>2- बाणेश्वर मंदिर कसरावद के पुनर्स्थापन हेतु रु. 6.67 लाख की प्रशासकीय स्वीकृति देते हुए रु. 60,375.00 की वित्तीय स्वीकृति प्रदान की गई। जनविशेष के कारण कार्य स्थगित किया गया था। शिल्पखण्डों का रेखांकन एवं छायांकन कार्य पूर्ण किया गया शेष राशि रु. 48,962.00 जमा की गई।</p> <p>3- तीन विशाल प्रतिमाओं खुजावा के पुनर्स्थापन कार्य हेतु रु. 2,21,380.00 की वित्तीय स्वीकृति जारी की गई थी जन विशेष के कारण कार्य स्थगित किया गया एवं वित्तीय स्वीकृति समर्पित की गई।</p> <p>4- तीन पुरातत्वीय स्थल कल्याणपुरा, कटनेरा एवं एकलवारा जिला धार में उत्खनन कार्य पूर्ण किया गया उक्त कार्य हेतु कुल रु. 2,90,000.00 की वित्तीय स्वीकृति प्रदान की गई।</p> <p>5- कसरावद संग्रहालय में प्रदर्शित होने वाली 187 प्रतिमाओं के रसायनीकरण कार्य पूर्ण किया गया इस कार्य हेतु रु. 72,994.00 की स्वीकृति प्रदान की गई थी। कार्य रु. 70,254.00 में पूर्ण किया गया शेष राशि जमा की गई।</p> <p>6- शैलोत्कीर्ण गुफाएं खुजावा के पुनर्स्थापन कार्य के छायांकन रेखांकन एवं मलवा सफाई कार्य पूर्ण किया गया इस कार्य हेतु रु. 9,160.00 की वित्तीय स्वीकृति प्रदान की गई।</p> <p>7- कसरावद संग्रहालय जिला खरणोन में प्रदर्शन कार्य हेतु रु. 4,65,700.00 की वित्तीय स्वीकृति प्रदान की गई थी कार्य पूर्ण किया गया।</p> <p>8- कसरावद संग्रहालय हेतु प्रतिमा संकलन के लिए रु. 21,000.00 की वित्तीय स्वीकृति प्रदान की गई एवं कार्य पूर्ण किया गया। शेष बची धनराशि रु. 9,246.00 जमा की गई है।</p>

वर्ष	परियोजना का नाम	प्राप्त बजट (लाख)	कुल व्यय (लाख)	कार्य विवरण
2000-2001	इंदिरा सागर	2.50	0.81	कार्य योजना 97 के मुद्रण पर हुए व्यय की पूर्ति हेतु व्यय किया गया ।
2001-2002	सरदार सरोवर	24.50	12.49	<p>1) कल्याणपुरा, कटनेरा एवं एकलवारा उत्खनन कार्य हेतु कुल राशि रु.1.50 लाख की स्वीकृति प्रदान की गई कार्य पूर्ण किया गया ।</p> <p>2) कसरावद संग्रहालय विकास कार्य हेतु रु. 4,99,653.00 की वित्तीय स्वीकृति प्रदाय की जाकर कार्य लगभग पूर्णता की ओर है।</p> <p>3) सरदार सरोवर परियोजनातन्तर्गत खूब क्षेत्र में स्थित स्मारकों की प्रतिकृति निर्माण कार्य के प्रथम चरण के लिए रु. 20,000.00 की वित्तीय स्वीकृति जारी की जाकर स्मारकों के विस्तृत रेखांकन एवं छायांकन कार्य पूर्ण कर लिया गया है तथा प्रतिकृति निर्माण की कार्यवाही के लिए नर्मदा घाटी प्राधिकरण, भोपाल को रु. 20,31,200.00 की कार्ययोजना तैयार कर स्वीकृति हेतु प्रेषित की गई है।</p> <p>4) बोधवाड़ा स्थित देव प्रतिलिंग शिवमंदिर जिला धार के पुनर्स्थापन कार्य हेतु रु. 4,92,133.00 की वित्तीय स्वीकृति जारी की जाकर पुनर्स्थापन कार्य प्रारंभ किया जा रहा है।</p> <p>5) डेहर स्थित नर्मदेश्वर मंदिर जिला धार का पुनर्स्थापन कार्य हेतु रु. 3,64,655.00 की वित्तीय स्वीकृति जारी की जाकर मंदिर का पुनर्स्थापन कार्य पुरातत्वीय विधि से टाप-टू-बाटम मंदिर के प्रस्तर खण्डों को निकालने का कार्य प्रगति पर है।</p> <p>6) कसरावद संग्रहालय परिसर का विकास कार्य हेतु रु. 2.59 लाख की वित्तीय स्वीकृति प्रदान की जाकर कार्य प्रारंभ किया जा रहा है।</p>
2001-2002	इंदिरा सागर	25.00	4.18	<p>1) शिवमंदिर, धारीकोटला, जिला खंडवा का पुनर्स्थापन कार्य हेतु रु. 1,04,490.00 की वित्तीय स्वीकृति प्रदान की जाकर पुनर्स्थापन कार्य पूर्ण किया गया।</p> <p>2) वित्तीय वर्ष 2001-2002 में ग्राम नवलखेड़ा एवं गाजनपुर में उत्खनन कार्य प्रस्तावित किए गए हैं। भारतीय पुरातत्व सर्वेक्षण विभाग से अनुमति प्राप्त होने पर कार्य प्रारंभ किया जायेगा।</p> <p>3) शिवमंदिर धारीकोटला के स्मारक का रसायनीकरण कार्य हेतु रु. 28,040.00 की स्वीकृति दी जाकर रसायनीकरण कार्य पूर्ण किया गया।</p> <p>4) घिसोर स्थित छत्री, जिला खण्डवा का पुनर्स्थापन कार्य हेतु रु. 2,92,775.00 की स्वीकृति दी जाकर पुनर्स्थापन की कार्यवाही की जा रही है।</p> <p>5) पुनर्स्थापित शिवमंदिर धारीकोटला की शेष सुरक्षा दीवार के निर्माण कार्य का प्राक्कलन रु. 3.58 लाख का परीक्षण किया जाकर स्वीकृति प्रदान की जा रही है।</p>

ANNEX – XXXVII – Min. (4)**ENVIRONMENT SUB-GROUP
AGENDAWISE STATUS FOR THE 37TH MEETING****Item No. XXXVII-1(170) : CONFIRMATION OF MINUTES OF THE
36TH MEETING.**

No comments. The minutes may be confirmed.

**Item No. XXXVII-2(171): SARDAR SAROVAR PROJECT:
REVIEW OF THE STATUS OF
ENVIRONMENTAL CONSIDERATIONS
IN RELATION TO THE PROPOSED
RAISING OF THE DAM HEIGHT AT RL
100M.**

Directions of Hon'ble Supreme Court in the Writ Petition No. 319 of 1994 & Review Petition (C) No. 1259 of 2000 shall be abode with.

A. Action taken report is given below :

No comments are offered except the following :

- Annexure XXXVII-(1) is revised to depict updated progress & is at Annexure –A.
- Though the letter under Annexure XXXVII-(8) mentions the name of Indira Sagar Project only, but it includes districts Khandwa and Khargone representing ISP & SSP respectively.

**B. Review of the progress of works on the suggested parameters in
relation to the proposed filling of the reservoir upto RL 100m by
June 2002.**

No comments.

Phased Catchment Area Treatment:

By the end of December 2001, an area of 94400 ha has been treated against the target area of 1,25,725 ha.

Compensatory Plantations:

The progress reported is 8,736 ha. against the target of 8,737 ha.

Survey of Flora, Fauna and Carrying Capacity Studies.

No comments.

Fisheries Conservation and Development:

The State Fisheries department is requested to furnish details on the issue and initiate suitable actions to identify such locations and to suggest suitable measures to protect the breeding grounds of Mahaseer or alternative strategy to develop conducive environment in nearby regions in the Narmada river & its tributaries..

Felling of Forests in submergence of SSP:

Agrees with Annex-XXXVII-(4) page 31-32 of the Agenda.

Archaeological & Anthropological Aspects

Progress is being updated by the Commissioner, Archaeology & Museum, GoMP and the same will be presented in the meeting.

Seismicity & Rim stability of reservoir

It pertains to GoG

Health Aspects:

Comments/observations from Director Health Services & Department of Preventive & Social Medicines, Gandhi Medical College, Bhopal have been sought.

Command Area Development

No command area of SSP lies in Madhya Pradesh.

Down stream environment

Pertains to GoG.

**Item No. XXXVII – 3(172) : REVIEW OF THE STATUS OF INDIRA
SAGAR PROJECT MADHYA
PRADESH.**

Catchment Area Treatment

By the end of December, 2001, against a target of 62975 ha. an area 51280 ha has been treated-up. The progress is about 81.4% of the final targets.

Compensatory Afforestation:

By the end of December, 2001 an area of 76389 ha has been covered against a target of 80,945 ha.

Survey of Flora-Fauna & Carrying Capacity studies:

Sub-Committee of the Cabinet in Madhya Pradesh has recommended the creation of Omkareshwar National Park and two sanctuaries namely Surmanya & Mandhata to the Cabinet for its consideration.

Archaeological & Anthropological Survey:

NVDA has again requested ASI to take up protection measures for Joga Fort as per provision of the Act. As regards approval of estimates the competent authority may be approached in Govt. Authority preparing estimates should be able to design & construct the same.

Seismicity and Rim Stability of Reservoir:

Staff engaged to analyse the seismic data is trained by IMD. However, Indian Meteorological Department (IMD) is approached by the project authority to get the data analysed periodically.

Health Aspects:

Final report is still awaited from GMC, Bhopal. A meeting of State Health Deptt. & G.M.C. Bhopal is being held shortly to decide composition of cell in NVDA headquarter.

Command area Development.

During the third meeting of the Committee constituted for drawing up the CAD plan for Indira Sagar Project, it was decided that the guidelines (copy enclosed at Annexure-B) given in the report of a Working Group published by the Central Water Commission in 1980 will be broadly followed. However, these will be updated by referring to various circulars issued thereafter and technology provided in the revised water management manual published by GoI, Ministry of Water Resources. Terms of Reference for CAD have been prepared which will be finalised in the next meeting of the Committee being held shortly. While doing so, the ToRs received from GoG & GoR for Environment Impact Assessment (EIA) of command area will be kept in mind & will be incorporated to the extent of their adaptability under various conditions of agroclimate & terrain, prevailing within the ISP command area.

**Item No. XXXVII-4(173) REVIEW OF ACTION TAKEN ON THE
DECISION OF THE PREVIOUS
MEETINGS.**

No comments.

CAT Phase-I – Establishment of Silt Monitoring Stations.

Water and Land Management Institute (WALMI), Bhopal has agreed to take up the task. A proposal in this respect is being drawn up. This is expected shortly. However, it may be added that a set of well established & tested measures have been included in the treatment menu.

CAT Phase-I – Reconciliation of the extent of areas treated by the Govt. of Madhya Pradesh for the SSP and ISP.

Reconciliation of the extent of areas treated has been done & the same is communicated to NCA.

CAT Phase-II – Submission of Catchment Area Treatment Plans for freely draining critically degraded sub-watersheds (Item No. XXII-2(112))


Present position of submission of schemes, their approval & implementation is shown in annexure-C.

Present rate of funding is insufficient to treat the areas in the time frame envisaged i.e. by the year 2011 & 2023 for SSP & ISP respectively. Direct funding of RVP seems to be the only solution. Sub-group is requested to take-up this issue at their level.

Cost Estimates for preparation of Action Plans and implementation of Environmental Safeguard Measures.
Updated information is in Annexure-'D'.

Monitoring works in Maharashtra:
Pertains to GoM.

Publication of Environment:
Project Authority is revising the Publication of environment regarding ISP.


Member (E & F)
NVDA, BPL

ANNEXURE - C

केन्द्र प्रवर्तित नदी घाटी योजनांतर्गत भारत सरकार द्वारा स्वीकृत सब वाटर शेड के संबंध में
Phase II

संक्र०	परियोजना का नाम	कुल सब वाटर शेड उच्च एवं अति उच्च प्राथमिकता वाले	2002 तक एक्शन प्लान अनुसार लक्ष्य	क्षेत्रफल, हेक्टर, सब वाटर शेडों की संख्या भारत सरकार द्वारा स्वीकृत सब वाटर शेड की संख्या	उपचारित सब वाटर शेड पूर्ण	उपचारित सब वाटर शेड आंशिक पूर्ण	टिप्पणियाँ
1	2	3	4	5	6	7	8
1	INDIRA SAGAR	915150 [478]	267000 --	28949 [14]	4054 [3]	11328 [11]	11 सबवाटर शेडों के कार्य पूर्ण किये जाकर सूचित किया जा चुका है।
2	SARDAR SAROVAR	318118 [138]	143750 --	51493 [29]	8106 [8]	16908 [21]	आर०व्ही०पी० को मेको मैनेजमेंट में शामिल कर लेने के कारण आवंटन समय पर अर्थात् रहा जिससे इन सब वाटर शेड में कार्य प्रारंभ नहीं किया जा सका। वर्ष 2001-02 के लिये रुपये 250 लाख का प्रावधान रखा गया है जिसके विरुद्ध अब तक रुपये 143.50 लाख प्राप्त हुआ है। दिसम्बर 2001 तक रुपये 112.50 लाख व्यय हो चुके हैं। वर्ष के शेष कार्य को पूरा करने के लिये कुल प्रावधानित राशि रुपये 83.6 लाख की आवश्यकता है।
	TOTAL :-			80442 [43]	12160 [11]	28236 [32]	

2

1	2	3	4	5	6	7	8
		भारत सरकार डाटा वर्ष 2000-2001 में स्वीकृत सब वाटर शेड					
1	INDIRA SAGAR	--	--	6680	--	--	वर्ष 2000-2001 में स्वीकृत 7 सब वाटर शेडों में आवंटन के अभाव में कार्य पारंगत नहीं किया गया है ।
		--	--	[4]	--	--	
2	SARDAR SAROVAR	--	--	8287	--	--	* एक योजना आंशिक संशोधन वास्तु नक्काशियां की जापस की गई।
		--	--	[3]	--	--	
				1100 *			
				[1]			
				95409			
				[51]			

Annexure-D

Dec. 2002

Environment cost of Sardar Sarovar Project**(A) Expenditure by Project Authorities:****I. Cost of Survey & Studies Rs. in lacs):**

S.No.	<u>Component</u>	<u>Estimated/Actual Expenditure</u>
1.	Compensatory Afforestation	2.44/2.44
2.	Catchment Area Treatment	3.28/2.80
3.	Flora & Fauna	20.33/20.33
4.	Health	29.63/28.59
5.	Archaeology/Anthropology	59.00/36.33
6.	Seismicity & Rim Stability	23.00/13.59

II. Cost of Implementation (Rs. In lacs):

S.No.	<u>Component</u>	<u>Estimated/Actual Expenditure</u>
1.	Compensatory Afforestation	1800.00/1091.05
2.	Catchment Area Treatment	8835.005/7816.33
3.	Flora & Fauna	1650.00/Nil
4.	Health	848.48/21.66
5.	Archaeology/Anthropology	6819.20/74.90
6.	Seismicity & Rim Stability	NA/NA

- includes expenditure on establishment.

ANNEX – XXXVII – Min. (5)

**GOVERNMENT OF RAJASTHAN
IRRIGATION DEPARTMENT**

**37TH MEETING OF ENVIRONMENT
SUB COMMITTEE OF N.C.A.
TO BE HELD AT DELHI ON
08TH FEB. 2002**

**STATUS REPORT OF
NARMADA MAIN CANAL PROJECT
UP TO 1/2002
IN RAJASTHAN PORTION.**

STATUS REPORT ON NARMADA MAIN CANAL UPTO 1/2002 IN RAJASTHAN

CANAL SYSTEM

Rajasthan has been allocated 0.5 MAF (616 MCM) of Narmada water under the final award of NWDT to utilize its share of Narmada water, Government of Rajasthan have planned a 74 km long Narmada canal to irrigate 73,157 ha of land in the drought prone districts of Jalore and Barmer. The canal system will cover G.C.A. of 1,42,020 ha of which 1,35,476 ha is C.C.A. Besides irrigation benefit to 89 villages (74 in Jalore and 15 in Barmer) the project also envisages to provide drinking water to a population of 3.0 lacs living in 124 villages around the irrigation canal. The canal will trapezoidal in section & will be lined by cement concrete. Maxm. Capacity of canal at head is 74.58 cumecs while discharge requirement is 69.43 cumecs. There are 9 major distributaries with a total length of 282.3 km. The total length of minors is 485 km and sub minors is 636 km. Additional project activities would include construction of head regulators bridges, cross-drainage works, escapes etc.

The detailed project report (revised) for appraisal was submitted to central water commission for approval during February 1990. The project was considered in the 51st meeting of Technical Advisory Committee on Irrigation, Flood Control and Multipurpose project held on 02.12.91 and investment clearance was accorded by planning commission vide their letter No. 2(302)/92-I and CAD dated 23-1-96 for Rs. 467.53 crores at 1989-90 price level including Rs. 280.14 crores share cost payable to Gujarat. The benefit cost ratio and internal rate of return of the project are 1.01 and 10.42% respectively.

The Ministry of Environment and forests, Government of India and Planning Commission stipulated that an Environmental Action Plan (EAP) should be prepared and implemented pari-passu with the project implementation under the over all guidelines of Narmada Canal Authority. In compliance to above, M/s WAPCOS a government of India Enterprises was asked to prepare EAP Draft report from them has been received and revision of project was made in the light of following observations:

1. Semi detailed/detailed soil survey, assessing cropping pattern, appropriate water allowance to avoid/ minimize water logging and salinity problems in the command.
2. Hydro-geological studies, water quality tests, surface/subsurface drainage system.
3. Identification and possibilities of excluding problematic area and inclusion of additional areas by providing 15-20 m lift.
4. Adoption of water saving/ management techniques viz. sprinkler/ drip irrigation system.
5. Participatory Irrigation management and constitution of water users Association.
6. Socio economic survey of pre project in the command area and likely post project implementation impact.

In view of the above suggestions/observations revised project proposals was approved by cabinet committee vide Draft cabinet memo No. 151/99 order D157/c/c/99 dated 20-9-99.

M/s TAHAL Engineering and consultant is being entrusted with the work of framing detailed project report considering all factors including observations/suggestions made by WAPCOS. The revised proposals include following amendments.

		<u>Revised</u>
1. Water allowance (at outlet head per Th. acre)	Flow	3.06 cusecs
	Ned area	2.01 cusecs
	Lift	2.75 cusecs
2. G.C.A.	3.0 lac Ha	
3. <u>CCA</u> Ned Area	0.38	
Flow irrigation	1.13	
Lift irrigation	<u>1.00</u>	
	<u>2.51</u>	
4. I.C.A.	1.76	
5. Irrigation intensity	70 %	

Revised cost of project has been estimated to Rs. 1392.03 crores.

Upto January 2001, payment of compensation of about 335 ha of land amounting to Rs. 121.00 lac for construction of canal 0 to 30 km has been made. The lining of main canal km 0-7.88 has been completed. All road bridges between on 16 km, head and cross regulator at RD 7.88 km, 16 km and 29.30 km, canal syphon on river sukri (RD 52.75) had been completed. An amount of 119.96 lacs has been paid to land acquisition officer for payment to 112 cultivators, for the land coming under canal alignment km. 30-48, out of which Rs. 34.59 lacs has been paid to 46 cultivators. Excavation of canal upto 30 km has been done, service road (W.B.M.) parallel to main canal has been constructed Residential/ Non-residential buildings for officers/ employees of project have been constructed at Jalore / Sanchoe in addition to office of Additional Chief Engineer, Irrigation Zone at Jodhpur.

Tenders for construction of Narmada Main canal from km 7.88 to 51.50 and appointment of consultant to submit detailed project report are likely to be finalised during 3rd week of Feb. 2002.

The tender for construction of N.M.C. syphon at Luni River has been approved by Government on 1st February 2002. The work is likely to be started by 3rd week of Feb. 2002.

The survey work from 51.5 km to 74 km has been completed. The process of land acquisition is under progress.

As per decision taken in the meeting of Narmada Canal Authority; water is likely to be made available to Rajasthan during 2004-05. In the Gujarat portion, under phase III construction of canal in the reach 263 km-458 km (Rajasthan head is under progress)

(4)

ANNEX - XXXVII - Min. (6)

OFFICE OF THE ADDITIONAL CHIEF ENGINEER, IRRIGATION ZONE,
JODHPUR

No.: TF(B)2/ACE/2001/ 1046

Dated: 29/1/2002

The Chief Engineer (Finance),
Water & Power Consultancy Service Ltd.,
NEW DELHI.

Sub: Outstanding payment of your dues (Rs. 10,46,870/-).

Ref: The Superintending Engineer, Narmada Canal Circle, Jalore vide his letter
no. SE/NCP/T-27/2001-02/2910-12 dated 7.11.2001 Addressed to you and
copy to this office.

Sir,

Your kind attention is invited to above referred letter on the subject vide which
you were requested to get the final report of environmental studies cleared from Narmada
Canal Authority.

In this context, you are requested to get the environmental studies report cleared
at the earliest from N.C.A. so that the payments of outstanding dues may be released by
Executive Engineer, Narmada Canal Division Ist, Sanchores.

Yours faithfully,

gimv 32
Additional Chief Engineer,
Irrigation Zone, Jodhpur.

No.: TF(B)2/ACE/2001/

Dated:

Copy forwarded to the followings to pursue the matter with WAPCOS
Authorities, Delhi during the next visit to New Delhi for procurement surveying
instruments and others allied works of NCP. Progress in the matter be informed after
meeting with WAPCOS Authorities.

- (1) The Superintending Engineer, N.C.P. Circle, Jalore
- (2) The Executive Engineer, N.C.P. Division-Ist, Sanchores.

copy to - for follow up
SM/C 24
6/12
May ph. to C. U. N.
✓ C. U. N. (Exec)
24
6/12

S. C. T.
Additional Chief Engineer,
Irrigation Zone, Jodhpur.

Sh. Vikal Singh

M. P. K. immediately
37

6/2/02

ANNEX – XXXVII – Min. (7)

A REPORT ON

**MONITORING THE IMPACT OF CATCHMENT AREA TREATMENT USING
REMOTE SENSING & GIS IN PARTS OF NARMADA CATCHMENT AREA**

**T.S.K.Reddy,
Y.V.N.Krishna Murthy
S.Srinivasa Rao**
Forest Survey of India, Nagpur and
RRSSC-Nagpur, India

MONITORING THE IMPACT OF CATCHMENT AREA TREATMENT USING REMOTE SENSING & GIS IN PARTS OF NARMADA CATCHMENT AREA

Executive Summary

The Sardar Sarovar Project being constructed on Narmada River has become a boiling point between environmental organisations and administrators. The convict has caused loss of time and resources for completing the project. The recent Supreme Court of India Judgement might give a thrust in completing the project very soon.

Sardar Sarovar Project is a multi purpose project being constructed on the Narmada River. The project on completion would provide drinking water and irrigation facilities for Gujarat and Rajasthan states and the hydel power generated would be shared by Maharashtra, Madhya Pradesh and Gujarat. Government of India while according the approval of the project has stipulated various conditions to be followed by State Govts., and as per the condition II the three states, where submergence is going to take place namely Madhya Pradesh, Maharashtra and Gujarat, has to treat Catchment areas to arrest the siltation of the reservoir and hence to improve the life of the reservoir. Accordingly, the Maharashtra State Govt. has prepared action plans for treating the Catchment areas. The Catchment of Sardar Sarovar Project in Maharashtra State is covering an area of 1568.36 sq.km. and lies entirely on the left bank of Narmada river and is confined to parts of Akkalkuwa and Akrani Tehsils of Dhule district.

As per the guide lines issued by the Ministry of Water Resources, Govt. Of India, for the purpose of treatment of Catchment areas the sub-watershed will be considered as a unit. Out of the 80 sub-watersheds, 17 are considered as sensitive because they are directly draining in to the reservoir. The present study is confined to 6 sub-watersheds of Akkalkuwa tehsil. The CAT Plan implementation has started in the year 1993 and has completed in 1998. To study the impact of CAT plan implementation Remote Sensing and GIS techniques are used. The satellite data corresponding to 1991 (Pre Plan Implementation), 1995 (During Plan Implementation) and 1998 (After Plan Implementation) are used to determine the vegetation status. The NDVI map corresponding to three temporal seasons are generated and statistics are calculated at sub-watershed level and compartment level. **The result shows that the dense forest has increased from 574 ha (1991) to 1079 ha (1995) and 2044 ha (1998), and the forest blanks has decreased from 6713 ha (1991) to 5099 ha (1995) and 4354 ha (1998).** *The RS and GIS techniques have helped in monitoring the CAT plan implementation impact. The study will be extended to other sub-watersheds based on the encouraging results from the present study.*

A. INTRODOCTION

Sardar Sarovar Project is a multipurpose project being constructed on the Narmada River. The Narmada River forms a common boundary between the States of Madhya Pradesh, Maharashtra and Gujarat. The project on completion would provide

- Irrigation to 1.8 million hectares (44.5 lakh acres) in Gujarat, 75,000 hectares (1.8 lakh acres) in Rajasthan.
- The hydel power generated (1450 MW) will be shared between Madhya Pradesh(56%) , Maharashtra (27%) and Gujarat (16%).
- Also it provides drinking water to 8215 villages and 136 towns in Gujarat and 131 villages in Rajasthan.

The total submergence area envisaged of Sardar Sarovar Project in Maharashtra is 7725 ha out of which 6488 ha area is under forest. Government of India while according approval to the project has stipulated various conditions as contained in their letter No. 8-372/85/FC dated 8.9.87. As per the condition-II State government will prepare a plan for treatment of catchment areas. The catchment of Sardar Sarovar Project in Maharashtra State is covering an area of 1568.36 sq.km. and lies entirely on the left bank of Narmada river and is confined to parts of Akkalkuwa and Akrani Tehsils of Dhule District.

As per guidelines issued by the Ministry of Water Resources, government of India, for the purpose of treatment of catchment area the sub-watershed will be considered as an unit and further the cost of treatment of directly draining sub watershed will be charged to the cost of the project, and that the general catchment areas treatment will be treated as a separate development activity. Taking this into consideration the total number of sub watersheds directly draining into the reservoir have been identified from the total 80 sub watersheds of Narmada catchment falling in Maharashtra. The total number of such directly draining sub watersheds in Maharashtra is 17 out of which 8 sub water sheds are of very high priority and 9 sub watersheds are of high priority and these sub watersheds form the area for which SSP CAT Plan was formulated.

B. STUDY AREA

The present study of monitoring the vegetation improvement in the catchment area since commencement of CAT Plan from 1993-94 is confined to Akkalkuwa Tehsil where six out of seventeen directly draining sub watershed in SSP viz; Na3a, Na 3b, Na 3c, Na 3d, Na 3f and Na 3w on the basis of satellite remote sensing data of the study area. All these six sub water sheds are of very high priority sub watersheds- of CAT Plan.

Study Area

The present study area of six directly draining sub watersheds into SSP reservoir are situated on left bank of Narmada river of Manibeli and Kathi ranges of

Mewasi Division in Maharashtra. It extends from $73^{\circ} 45' - 74^{\circ} 0' N$ latitudes and $21^{\circ} 45' - 21^{\circ} 54' 45'' E$ longitudes. The tract lies in Satpuda mountain ranges with deep valleys and slopes, nearly 50% is having steep slopes ranging from steep to very steep slopes with or without tree cover. The main geological formation of the tract is deccan trap basalt characterised by different lava flows of 10-20 meters thickness almost horizontally deposited.

Soils

The study area mainly consists of shallow soils, medium black soils and deep black soils. Deep black soils occur in narrow fringes in the valley portion. The soil is deep black in colour and Fertile which generally supports luxuriant tree growth. Medium black soil and black cotton soil mixed with organic matter is found in flat and slightly undulating areas. These soils vary in colour texture and depth and supports good tree growth. The coarse soil mixed with stone or murrum are seen on hilly and undulating terrain areas and having depth of 10 to 30 cms, supports poor and stunted vegetative growth.

Forests

The forests of this area as per Champion and Seth 1968 (revised classification) belongs to southern Tropical Deciduous type which further sub divided into (1) Dry Teak forests and (2) Dry deciduous mixed forests. Teak occurrence varies from 30 to 60% in the dry teak forests and other species that occur in the area are *Anogeissus latifolia*, *Garuga pinnata*, *Lannea grandis*, *Pterocarpus marsupium*, *Diospyros melanoxylon*, *Boswellia serrata*, *Acacia catechu*, *Lagerstromia parviflora* and occasionally *Sterculia urens*. Bamboo clumps occur in valleys and moist sheltered pockets.

Climate

The climate of the area is typical sub-tropical climate created by its location between the tropic of cancer and the equator and the hill ranges are fed by South West monsoon. Therefore it rains during the period of June end to September end and the precipitation ranges from 600mm to 960mm. Maximum and Minimum temperatures; recorded in the area are 43° and 10° respectively. The rainfall data of Akkalkuwa Tehsil for the period 1992 to 1998 is given in the table below :

Year	
1992	953
1993	1137
1994	1387
1995	860
1996	740
1997	1082
1998	1258

Wildlife.

Large scale hunting and poaching by the local tribals and deterioration of forest crop and its density, the wild life has almost vanished. Tiger is occasionally seen while Panthers, wild cats. Barking deer, Sambhar, Hyena etc are found in small numbers.

Population:

17 villages of the Akkalkuwa Tehsil falls in the catchment of Sardar Sarovar Project. The population in this area over the decade increased at the rate of 18.12% based on 1981 and 1991 Census. The average per hectare population density in the catchment area as per 1991 census is 0.63.

Due to hilly and remote nature of terrain tribals in the tract are under developed. The tribals mainly depend on the cultivation for their livelihood. The landless are generally engaged on daily wages with cultivation as well as in government schemes under tribal sub plan. The villagers earn by collecting forest produce viz; bidi leaves, gum, honey, lac charoli etc. The main crops cultivated in this area are Jowar paddy hill millets, Udia, Mung, bauti etc. Due to unscientific practice of agriculture like shifting cultivation local tribals harvest very low yield of crops.

C. METHODOLOGY

CAT Plan:

The Catchment Area Treatment (CAT) Plan was prepared based on the existing condition of the forest (density, growth composition) biotic pressure and local requirements. The treatment is carried out under three afforestation schemes viz; i) Treatment Plan in Closed Forest (CAT: 1) 2) Treatment Plan in open/degraded and forest blanks (CAT 2) and iii) Treatment in grass land and waste land Area (CAT:3).

Treatment Plan in Closed Forest (CAT -1);

Areas having forest crown density more than 40% with better soil and minimum biotic interference are treated under CAT: I plan. The treatment is protecting the area from biotic interference, carrying out tending operations, afforestation of blanks and improving existing stocks by under planting. Nala bunding, check dams, bush wood dams. Rock fill dams are carried out to minimise run off and soil erosion. Trench cum mound stone wall construction and planting Sabar, agave species on these mounds was carried out to protect plantation works from Cattle-

Treatment Plan in open/degraded and Forest blanks (CAT 2):

Areas with forest crown density less than 40%, badly adopted and very much vulnerable to moderate to severe erosion are treated under this plan. Intensive afforestation works like planting 2500 seedlings per hectare planted in 30 cm³ pits

besides soil and moisture conservation works are done under this treatment plan. Broad leaved Miscellaneous species preferably indigenous nature are developed in nursery for one year in poly pots and used for planting purposes. Nala bunding, check dams, Gabion structure, bush wood dams, and other soil and moisture conservation works are carried out to minimise run off and soil erosion. Trench cum Mound, agave species on these mounds was done to protect the plantation works from biotic interference.

Treatment Plan in Grass lands and Waste land area (CAT;3);

Areas with severe erosion and having coarse soils and closure to the habitation are treated under this treatment plan. The treatment includes intensive soil and water conservation measures like community afforestation, soil pasture scheme and formation of engineering structure like Check dam, Gabian structure, nala bunding is done. Introducing improved grasses such as Cenchrus, Ber, Sheda, Pavanya, marvel, stylosanthus etc, is done. Fifty trenches of 2m x 0.6 m x 0.3m size and 100 grass beds of size 8 m x 1.75m x 1.15m are prepared per hectare. 200 gms of improved grass seed is sown in each grass bed. Soil and moisture conservation works like nala bunding, bush wood, gabion structure are done in these areas. Trench cum mound, stone wall construction and planting of sabai, agave species on these mounds was done to protect the plantation works from biotic interference.

The following materials are used for carrying out the project.

- **Remote sensing data**

Three period satellite data was used for monitoring the impact of developmental activities which are described above. The data used are

IRS IA LISS II	DOP : 22-12-1991
IRS 1 B LISS II	DOP : 13-12-1995
IRS IC.LISS III	DOP: 4-12-1998

- Survey Of India topographical maps on 1:50,000 scale
- Working plan maps of North Dhule Division
- Spatial and attribute information regarding the developmental activities – cost involved, zone of area where activities are carried out and time details specifying when the activities are carried out

The methodology adopted for the project is described in the flow chart. The sequence of steps that are carried out given below.

- Loading of-satellite data
- Registration of satellite data
- NDVI generation
- Digitisation of cultural features
- Generation of sub watershed, compartment mask
- Overlay of compartment and sub watershed boundaries

- Ground validation of output
- After ground validation, final Forest Density Map generation
- Statistics and Output generation

The satellite data was registered with map information using map-to-image transformation model and image-to-image transformation model. The Normalised Difference Vegetation Index (NDVI) is generated and segregated into 5 major categories based on the ground truth provided by the user department. The classes identified are dense forest, open forest, degraded forest, forest blank and water bodies. The watershed boundaries and compartment boundaries are digitised and are overlaid on the satellite data and classified map. The output is validated in the field. After ground validation, the final forest density map is generated.

The area statistics are generated for the three years 1991, 1995 and 1998 at compartment and sub watershed level. The hard copy output is generated on 1:50,000 scale depicting the three FCC and NDVI maps. Final output is generated on 1:50,000 scale and statistics are generated watershed wise and compartment wise. The results are enclosed in the table.

Remote Sensing

Remote Sensing is defined as a means of observing the earth's surface and environment from air or space by means of electromagnetic waves of the optical or microwave range. The restriction to electromagnetic waves is due to the fact that the observation from a spacecraft excludes other possibilities such as sonic waves, which require a medium like air, water or solid earth for propagation. Other means of indirect observation by, for example, stationary magnetic or electric fields are not sensitive enough for high geometric resolution measurements.

Remote sensing is characterized by the fact that it measures qualitatively and quantitatively features of the earth or its atmosphere without any material contact. The instruments applied are called sensors. If they consist of both a transmitter and a receiver, then we are talking about "active sensors". In the case of external signal sources it is possible to use just receivers' i.e. "passive sensors."

The Target's features can be measured indirectly through the interaction with electromagnetic waves. Various methods are applicable. Figures 1 and 2 show the proper arrangement for passive and active sensors, respectively. In the passive case one determines either

- the amount of electromagnetic emission of the target itself, or
- the reflectivity of optical signal power of the sun at the target, or
- The amount of scattered power, if the "target" is, for example, an aerosol of the atmosphere, or
- Absorption of solar radiation power in the media to be measured..

ELECTROMAGNETIC INTERACTION

Electromagnetic interaction is a function of the physical parameters of the target. It is especially a function of the dielectric properties (permmissivity) of the target's material. The material's behavior against microwaves can be classified into three categories:

- If the material behaves like a metal, then the waves cannot penetrate this matter. Electromagnetic waves irradiating such a metallic surface are almost completely reflected. The type of reflection (specular or diffuse) depends on the roughness of the surface.
- If the material is water, then the incident waves are reflected at the water surface to a large extent. Only some small fractions of the incident energy can enter and penetrate the target and will be attenuated to almost zero power after a short way, say a few wavelengths or fractions thereof.
- "Dry", non-metallic materials change the wavelength of the incoming signals because the refractive index is larger than in vacuum or air, and the signals split, in accordance with Snell's law, into a transmitted and a reflected component (see Figure 5). With increasing water content of the target the similarity of the material's properties with that of metallic matter under electromagnetic interaction increases.

Generally, interaction of the waves with matter and its characteristic features can be described to a large degree by the following factors;

- reflectivity/scatter, backscatter;
- absorptivity, and to some degree, by
- the transmissivity.

Reflection, Absorption and Backscatter.

They define the percentage of signal power reflected, absorbed and scattered by the target. The values of these quantities are functions of the microstructure, the chemical nature and the biological state of the target. As an example: the leaves of plants consist basically of a sponge-like structure, with many randomly distributed holes and droplets of water and other holes filled with some pigments. They can be modeled simply by a lossy layer of a certain permmissivity, where the loss is frequency-dependent. Dispersive multi-reflection, therefore, occurs in the leaves. The chlorophyll elements absorb radiation energy of the blue and red sections of the light spectrum. The reflected signal lacks these absorbed parts of the solar spectrum, and therefore, looks green. In the infrared parts almost all the signal energy is reflected, if the structure is in proper conditions. If, however, the structure is collapsed because of stress conditions, then the reflectivity is affected.

If photosynthesis no longer occurs, then the plant color changes to yellow, which shows that almost all spectral radiation components of the visible light are reflected. The typical spectral characteristics of healthy leaves is given in Figure 7. It is, of course, also a function of the season, i.e. of the phenological state of the vegetation.

Spectral Signatures.

The spectral bands generally used in Remote Sensing

- 1) 0.45 - 0.52 μm : Water penetration, differentiation, soil/vegetation and deciduous/coniferous flora.
- 2) 0.52 - 0.60 μm : Peak of "green" reflectance; assessment of vegetation-vigor.
- 3) 0.63 - 0.69 μm : Vegetation discrimination; chlorophyll absorption.
- 4) 0.76 - 0.90 μm : Biomass determination.
- 5) 1.55 - 1.75 μm : Moisture Content; soil moisture, snow/clouds discrimination.
- 6) 10.40-12.50 μm : Thermal mapping, vegetation stress analysis, soil moisture discrimination.
- 7) 2.08 - 2.35 μm : Hydrothermal mapping, rock type discrimination.

Vegetation Indices

Vegetation indices are particular combinations of spectral responses in different wavelength bands, which emphasize a particular feature of the vegetation. The development and use of vegetation indices is guided by three general objectives:

- To enhance, through an appropriate combination of spectral bands, the relevant vegetation features. Ideally, the indices should have a better-defined relationship with physiological properties of the crop and forest vegetation than individual spectral measurements.
- To standardize the representation of crop forest species spectral response (useful in region to region or year to year comparisons).
- To reduce the dimensions of the data sets (i.e. an index reduces to one data set then sets which contribute to its calculation),

It is also worth noting that ratio indices have the added advantage of being dimensionless; this renders the calibration of the radiance values to reference standards unnecessary (calibration of the index with respect to ground features remains, of course necessary),

The Normalized Difference Vegetation index (NDVI) and the Perpendicular Vegetation Index (PVI) are widely used in forestry studies.

THE NORMALIZED DIFFERENCE VEGETATION INDEX (NDVI)

The NDVI is defined as the ratio of the difference between the near infrared and red reflectance to their sum or

$$\text{NDVI} = (\text{near infrared} - \text{red}) / (\text{near infrared} + \text{red})$$

The index is called normalized because it is divided by the sum of radiance's and thus normalizes somewhat for differences in solar spectral irradiance's. The NDVI is dimensionless and can take values from -1 to +1. Negative values are found when the red reflectance is higher than the near infra red as for certain types of dry soils. The value of the NDVI is mainly determined by the difference between the near infrared response which increases with increasing vegetation in the scene, and the red response which decreases with decreasing vegetation.

Field measurements have established that there is a relationship between green biomass and the NDVI up to a certain value of the cover biomass above which the NDVI remains constant (saturation level).

A relationship of the type

$$\text{LAI} = a^{b \text{NDVI}} + c \quad \text{where LAI} = \text{Leaf Area Index, } \text{m}^2 / \text{m}^2$$

The reflectance data in the spectral band forming the NDVI provide indications on biophysical parameters (rates) such as primary productivity (via the local density of the chlorophyll and the photosynthetic capacity of the canopy) and evapotranspiration (via a variable stomatal resistance to gas and water vapour transfer).

D. RESULTS AND DISCUSSIONS

- This work has been carried out jointly by the Maharashtra State Forest Department Dhule, Regional Remote Sensing Service Centre, Nagpur and Forest Survey of India, Nagpur. This joint venture has resulted in to the monitoring of Catchment Area Treatment (CAT) plan of Sardar Sarovar Project using Remote Sensing and GIS in 6 sub-watersheds falling in Mewasi Forest Division of Dhule circle. The present work has shown potentiality of RS and GIS in monitoring the impact of CAT plan implementation- The total area treated is around 7,900 ha out of total area 13,932 ha in a span of 5 years during 1993 to 1998.
- The dense forest has increased from 574 ha (1993) to 1079 ha (1995) and 2044 ha (1998). This has resulted an increase of dense forest by nearly two times between 1991 and 1995 and again in between 1995 and 1998. The treatment has positive impact in improving the vegetation status in the Catchment.

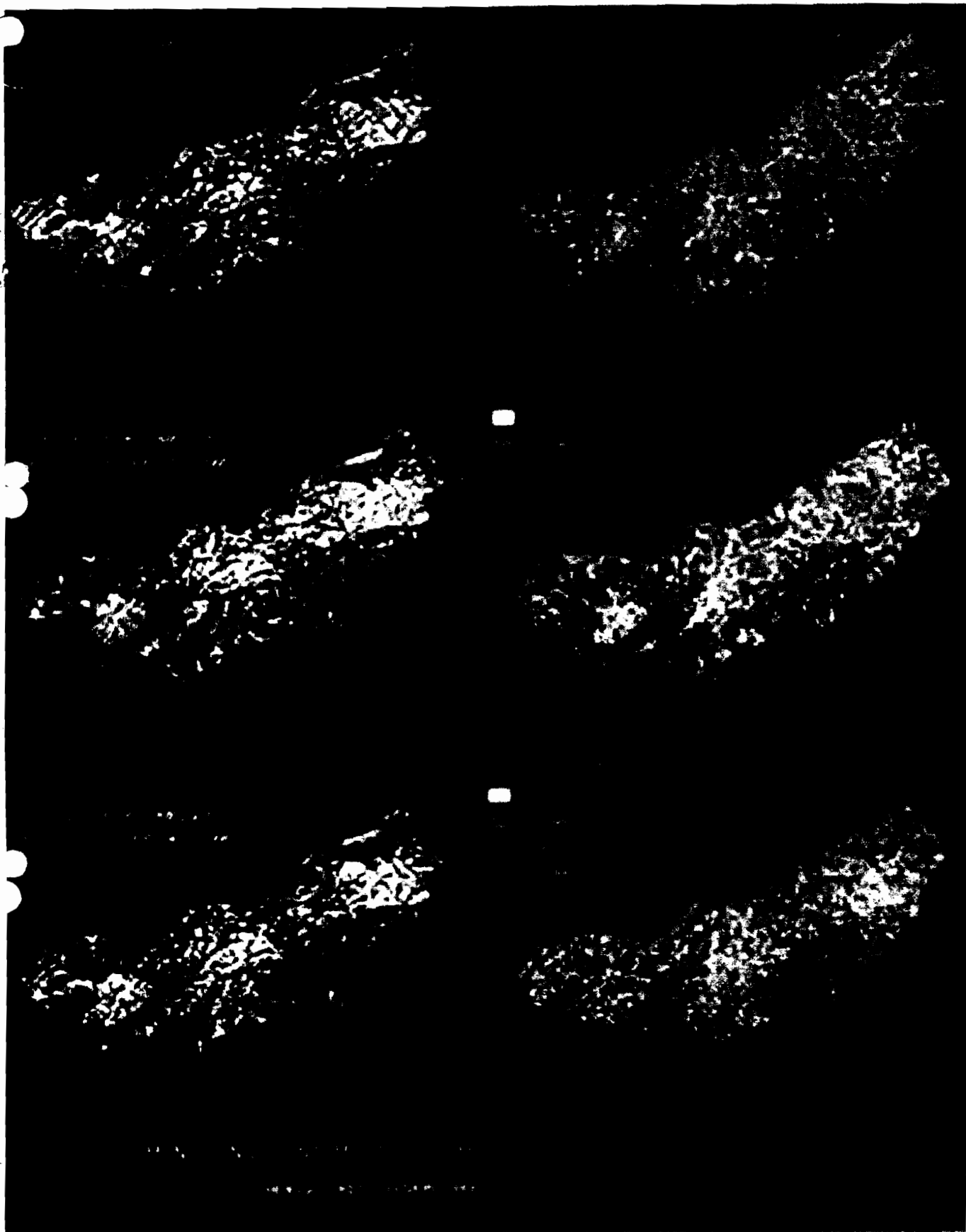
- The forest blanks has decreased from 6713 ha (1993) to 5099 ha (1995) and 4354 ha (1998). This has resulted mainly because of afforestation in new areas and preventing forest degradation according to CAT programs.
- The decrease in forest blanks is by 40% from 1993 to 1998. The forest blanks have been converted mainly into open forest.
- There is a phenomenal change in the vegetation intensity. During the treatment period, the blanks are changed from degraded forest to open forests to dense forests. The 3 season satellite data has helped in monitoring the changes periodically.
- The changes in forest density are ratified by ground validation by forest department and RS derived outputs.
- Due to the increase in height of the dam and the subsequent impounding of water in the reservoir, the area under water bodies has increased from 485 ha (1993) to 811 ha (1995) and 1114 ha in 1998. This increase is mainly in the river bed, along the river.

E. CONCLUSION

- The forest density/type map and statistics generation required an input in the preparation of Forest Management Plan preparation would typically take 6-9 months for a forest division having an area more than 3000 sq. km. This is much faster than the time required by conventional approaches which required around 2-3 years.
- Reliability of the maps generated by using RS & GIS would be high as subjectivity while mapping is least.
- Eliminating Subjectivity and scope for human errors.
- Accurate location of sample plots which aid in making more comprehensive and realistic plans.
- Quantification of land use/misuse and its precise location.
- Satellite data serves as reliable record and very useful in Detection of encroachments.
- Typical cost for this approach would be Rs. 1.75/Ha as compared to over Rs. 7/ha for conventional approach.
- The updating of information and hence change monitoring will be much faster as the earlier data is compatible for digital analysis.
- The monitoring of changes in Forest can be studied enabling almost near real-time as RS satellite data has repetitive coverage.
- Forest fire mapping and damage assessment for taking timely appropriate measures.
- The RS & GIS database for the state once established would facilitate analysis of various alternatives before arriving at the operational management model.
- The GIS would enable exploring various possibilities for improving the parameters such as Site quality which depend on various factors such as slope, groundwater, meteorological parameters etc.

S.No.	Water-shed No.	Water bodies			Forest blanks			Degraded forest			Open forest			Dense forest			Total		
		1991	1995	1998	1991	1995	1998	1991	1995	1998	1991	1995	1998	1991	1995	1998			
1.	Na 3a	269	437	562	1019	732	853	565	508	544	994	1063	686	138	245	341	2985	2985	2986
2.	Na 3 b	1	0	1	355	253	164	219	248	289	597	537	492	219	353	445	1391	1391	1391
3.	Na 3 c	3	15	32	1756	1160	1145	771	867	832	1166	1430	1030	130	356	788	3827	3827	3827
4.	Na 3 d	98	182	203	948	669	507	243	339	315	253	320	357	38	70	198	1580	1580	1580
5.	Na 3 f	3	6	17	1721	1535	1074	485	612	754	461	508	632	45	54	238	2715	2715	2715
6.	Na 3 h	111	171	199	913	750	611	247	366	342	156	144	246	4	1	34	1432	1432	1432
Total		485	811	1014	6712	5099	4354	2530	2940	3076	3627	4002	3443	574	1079	2044	13931	13931	13931

Sl. No.	Water Shed No.	1993	1994	1995	1996	1997	1998	Total	CAT - 1	CAT - 2	CAT - 3	Total
1.	Na 3a	***	***	480	***	***	***	480	171	309	0	480
2.	Na 3b	***	318.5	500	12	***	***	830.5	388	397.5	45	830.5
3.	Na 3c	560	1678	433	***	30	***	2701	568	1773	360	2701
4.	Na 3d	***	480	295	220	***	***	995	295	638	62	995
5.	Na 3f	***	1211	475	85	***	150	1921	301	1458	162	1921
6.	Na 3h	***	472	***	400	***	100	972	264	670	38	972
Total		560	4159.5	2183	717	30	250	7899.5	1987	5245.5	667	7899.5





केवल सरकारी प्रयोग के लिए
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पर्यावरण उपदल
ENVIRONMENT SUB-GROUP

अड़तीसवीं बैठक की कार्यसूची
Agenda for the 38th Meeting

स्थान : पर्यावरण भवन,
नई दिल्ली

दिनांक : 10 मार्च, 2003
DATE : 10th March, 2003

Venue : Paryavaran Bhawan,
New Delhi

समय : 3.00 बजे अपराह्न
Time : 3:00 P.M.

नर्मदा नियंत्रण प्राधिकरण
NARMADA CONTROL AUTHORITY

इन्दौर
फरवरी, 2003

Indore
February, 2003

ENVIRONMENT SUB-GROUP AGENDA FOR THE 38th MEETING **I N D E X**

Item No	Contents	Page No.
XXXVIII-1(175)	Confirmation Of Minutes of The 37th Meeting	1
XXXVIII-2(176)	Indira Sagar Project : Review of the status of Environment Safeguard Measures.	2
	Construction Schedule:	2
	Implementation of Environmental Safeguard Measures:	3
	(A) Catchment Area Treatment:	
	(B) Compensatory Afforestation:	
	(C) Survey of Flora-Fauna and Carrying Capacity Studies:	
	(D) Archaeological and Anthropological Surveys	
	1. Centrally Protected Monuments:	
	2. State Protected Monuments:	
	(E) Seismicity and Rim Stability of Reservoir:	
	(F) Health Aspects:	
	(G) Command Area Development:	
	(H) Project Cost:	
XXXVIII-3 (177)	Sardar Sarovar Project: review of the status of Environment Safeguard Measures	8
	A. Action taken report on the recommendations of the Sub-group:	8
	B. Review of the progress of works on the suggested parameters in relation to the proposed filling of the reservoir up to RL 110m by June 2003 and beyond	10
	1) Phased Catchment Area Treatment	
	2) Compensatory Plantations	
	3) Survey of Flora, Fauna and Carrying Capacity Studies	
	a. Fisheries Conservation and Development	
	b. Felling of trees from the submergence zone.	
	4) Archaeological & Anthropological Aspects	
	5) Seismicity and Rim Stability of Reservoir	
	6) Health Aspects	
	7) Command Area Development Gujarat Rajasthan	
	8) Down stream environment	
XXXVIII - 4 (178)	Review of the action taken on the decision of the previous meetings.	16
	A. Sardar Sarovar Project : Catchment Area Treatment:	16
	1.Phase-I Establishment of Silt Monitoring Stations.	
	2.Phase-II : Submission of Catchment Area Treatment Plans	
	B. Monitoring works in Maharashtra	17
	1. Funding of the works on implementation of action plans for mitigation of adverse impacts	
	2. Agency for Inter Departmental Coordination for effective implementation of the plans in time	
	C. Sardar Sarovar Project : Environment Management,	18
	1. Publications	
	2. Seminar / Workshops	
	D. Cost Estimates for preparation of Action Plans and implementation of Environmental Safeguard Measures	19
	E. Formation of Multi Disciplinary Committee by the MOEF for appraisal of survey and study reports on various environmental aspects of Sardar Sarovar Project,	19
	F. Monitoring of the Indira Sagar Project.	19
XXXVIII-5(179)	Any other item / Date and venue of the next meeting	21

**ENVIRONMENT SUB-GROUP
AGENDA FOR THE 38th MEETING**

ANNEXURES

XXXVIII-(1a)	Comments received from Govt. of Madhya Pradesh.	22
XXXVIII-(1b)	Comments received from Prof S. Ramaseshan	26a
XXXVIII-(2)	Profile of the dam.	27
XXXVIII-(3)	Area capacity curve for ISP.	29
XXXVIII-(4)	Back water curve corresponding to 1/100 year flood.	31
XXXVIII-(5)	The Committee constituted by the Environment Sub-group: ISP areas :Main body of the report.	32
XXXVIII-(6)	Status report for the quarter ending Sept., 2002.	58
XXXVIII-(7)	Final report of diseases surveillance studies from Gandhi Medical College, Bhopal / NVDA :key recommendations.	170
XXXVIII-(8)	Progress of Catchment Area Treatment works.	175
XXXVIII-(9)	The progress of felling in Maharashtra..	176
XXXVIII-(10)	The progress of felling in Madhya Pradesh.	177
XXXVIII-(11)	A copy of the map showing the reservoir and the river stretch.	178
XXXVIII-(12)	A map of the areas treated / under treatment of the sub-watershed.	179
XXXVIII-(13)	A map delineating the submergence, catchment, areas under tree cover, areas of sanctuaries.	180
XXXVIII-(14)	The progress of the fisheries development programme received from Govt. of Gujarat.	181
XXXVIII-(15)	A copy of the map indicating location of the Monument vis-à-vis impoundment.	183
XXXVIII-(16)	Proposed Health facilities in relation to impoundments in M.P. & Maharashtra.	184
XXXVIII-(17)	The current status of works on development of Narmada Main Canal and distributaries.	186
XXXVIII-(18)	Suggested Safeguards to be adopted while raising the dam height to 100m and beyond.	188
XXXVIII-(19)	SSP: Environment Action Plans: Estimates and expenditure.	189
XXXVIII-(20)	Monitoring of ISP : Copy of the letter From Narmada Control Authority addressed to GOMP.	190
XXXVIII-(21)	Relevant extracts from the Narmada Water Scheme exhibiting the duties entrusted to the Narmada Control Authority on Monitoring of Environment aspects of ISP.	193

ENVIRONMENT SUB-GROUP AGENDA FOR THE 38th MEETING

**Item No. XXXVIII-1(175) : CONFIRMATION OF MINUTES OF THE 37TH
MEETING**

Minutes of 37th Meeting of Environment Sub-Group of Narmada Control Authority were circulated to all Members and Invitees vide NCA Office letter No.Env-3(37) /2002 /1267-1301 dated 13th March, 2002.

Comments received from Govt. of Madhya Pradesh and Prof S Ramaseshsan are placed at Page-22-26 **Annex – XXXVIII-(1a & 1b)**.

Members may like to discuss and approve the minutes.

Item No. XXXVIII-2(176): INDIRA SAGAR PROJECT : REVIEW OF THE STATUS OF ENVIRONMENT SAFEGUARD MEASURES.

Indira Sagar Project (ISP) formerly known as Narmada Sagar Project has an installed capacity of 1000 MW and annual irrigation of 1.23 lacs ha. The project is very crucial due to regulated releases of 8.12 MAF of water for SSP.

Construction Schedule:

After getting clearances from Ministry of Water Resources (MoWR) & Ministry of Environment & Forests (MoEF). The construction works was started in May, 1992 and the dam was targeted to be completed by June, 2000. However, due to various reasons the progress lagged behind. Recently, the work was handed over to Narmada Hydroelectric Development Corp. (NHDC), a Joint Venture of Govt., of Madhya Pradesh and National Hydro Power Corporation. The targeted date of completion has been revised to May 2004. As per available information the concreting was completed up to RL 215m. in the central portion whereas side blocks were raised up to RL 245.13m. According to the schedule of construction, concreting is to be completed up to RL 231m by December, 2002, in the central portion. Profile of the dam is enclosed at Page-27 **Annex – XXXVIII – (2)**. Area capacity curve is at Page-29 **Annex-XXXVIII-(3)**. Accordingly the ISP would submerge an area of 91,000 ha. and consequently would impact the land. Flora and fauna etc.

Month / year	Level	Area in ha.	% in relation to FRL
Present level (Oct.02)	215	1250	1.37
December 2002	231	7516	8.25
June, 2003	254.13	56923	62.55
May 2004	MRL	91,000	100

Back water curves corresponding to 1/100 year flood are presented in Page-31 **Annex – XXXVIII – (4)**. The Committee constituted by the Environment Sub-group visited the areas of ISP and verified items of work which were verifiable in the field and assessed the status of compliance. Main body of the report is at Page-32 **Annex – XXXVIII – (5)** The status of compliances on Environmental parameters was assessed by the committee and the conclusions derived are presented in the following table :

Parameters	Status	Whether pari-passu
Catchment Area Treatment	Nearly completed	Yes
Compensatory Afforestation	Nearly completed	Yes
Archaeology	In progress	Yes
Seismicity & Rim Stability	In progress.	Yes
Health Aspects	In progress.	Area of concern
Command Area Development	TOR not yet framed	Area of concern
Flora Fauna & Carrying Capacity	Studies completed. Intention plan yet to be translated into Action Plan.	Possible infringement.

Committee suggested that actions be taken on top priority in the areas where there is possibility of infringement and accelerate the actions in the areas of concern for ensuring speedy implementation of the project.

Implementation of Environmental safeguard measures:

Ministry of Environment & Forests in its clearance order dated 24.6.1987 suggested the following parameters, the current status of works on each of them is as follows. A copy of the Status report is at Page-58-169 **Annex – XXXVIII(6)**.

(A) Catchment Area Treatment:

Phase-I

30 sub-watersheds of very high and high priority categories covering an area of 73,456 ha., were identified for treatment. The net area available for treatment was 62,975 ha. by the end of November, 2002, an area of 51,280 ha., was treated, which is 81.4% of final targeted area of 62,975 ha.

Phase-II

For Phase-II of Catchment Area Treatment works, NVDA submitted macro watershed plans as per the schedule of treatment, given at Page-143 of Annex-XXXVIII-(6)

(B) Compensatory Afforestation:

A total of 41,420 ha., of forest land was permitted to be utilised for the construction of ISP by the approval of Ministry of Environment & Forests in 1987 and 1990. To compensate for the loss of forests, Action Plan for Compensatory afforestation on 10,143 ha., of non forests land and 70,802 ha., degraded forests land submitted by Govt., of Madhya Pradesh was approved. By the end of November, 2002, an area of 76,389 ha., has been covered against a target of 80,945 ha.

(C) Survey of Flora-Fauna and Carrying Capacity Studies:

Studies on Flora & Fauna aspects was conducted mainly by the two agencies namely – The Wildlife Institute of India, Dehradun and Friends of Nature's Society, Bhopal.

- Wildlife Institute of India recommended creation of National Park and Sanctuaries and certain related measures. It is suggested that the severity of the impact resulting from direct and indirect losses could be minimised through restoration of some of the aquatic vertebrates and delineation of a substantial area of the contiguity forest which has similar conservation values that are being lost in submergence and to elevate its status to a protected area – a combination of a national park and sanctuary.

- Key aquatic vertebrates species like **Otter** was proposed to be restored and translocated. It was suggested to explore the possibility of capturing and translocation of impacted otters of Narmada Sagar into identified localities of the vacant niches in central Indian rivers. Besides, a species restoration plan for aquatic reptile **Turtle** was also suggested within the submergence zone and also in other stretches of the river with rocky structure and sandy banks. The restoration program for **Muggar** crocodile as being practices in other districts of M.P. was also suggested.
- Friends of Nature's Society, Bhopal (FoNS) prepared a detailed action plan for retrieval and conservation of terrestrial wildlife, Forest Clearance Plan, New location of wildlife, Endemism in the flora species etc. from the submergence area of ISP. The report recommended total expenditure of Rs. 9562.00 lacs over a period of 5 years.

Implementation

Tree felling i.e., clearance of reservoir bowl from vegetation was to be carried out prior to reservoir filling up to 4 meters., below the FRL. According to the plan of GOMP an area of 24,445.171 ha. was to be cleared in four phases, out of which 3638.461 ha area was in Dewas and Harda Production Division and rest 20,806.710 ha area was under three sub-divisions working under Narmada Sagar Forest Production Division, Khandwa.

The felling plan was divided into three phase. In the First Phase felling would be carried out upto 232 m RL. (Back water level of RL 215m of the dam) During the Second phase the felling would be carried out upto 244 m RL (Back water level of RL 225m of the dam) and in the Third phase felling would be completed in the balance areas upto 4m below the FRL i.e. 258.13 m.

It was noted that the felling was under progress and almost entire area covering first phase was felled during the year 2001-02. During 2002-03 except an area of 1643.691 ha. in Khandwa Division, the area of 2nd phase, was also felled. Thus out of 11029.633.ha area planned for felling corresponding to back water level of RL 225m of the dam an area of 9385.942 was already felled by the end of November, 2002.

From the Report of the Committee it is observed that, flora and fauna was already impacted as felling operations were in full swing for the areas likely to be inundated by the waters of the FRL. However, actions for mitigation as suggested by the study group were yet not discernible on the field.

Sub-group may like to discuss and review.

(D) Archaeological and Anthropological Surveys

Investigations of the Narmada Basin revealed that valley was rich in archaeological belongings. Paleolithic, Mesolithic, Chalceolithic sites, rock cut caves and sculptures were found at several places in the valley. Monuments identified for protection / relocation fall under the categories as follows :

1) Centrally Protected Monuments:

Archaeological Survey of India (ASI) carried out surveys of 167 villages for centrally protected monuments or identification of the monuments of significance. Only lower bastion in north of the Joga Fort is likely to be affected by scour action of water. Archaeological survey of India prepared a detailed plan for protection of North Bastion of this fort at an estimate cost of Rs. 1.67 crores. The work was to be undertaken by NVDA.

No progress is reported. Sub-group may discuss and review.

2) State Protected Monuments:

State Department of Archaeological and Museum, Bhopal, carried out survey of 255 villages for identification of the Archaeological Monuments falling within the submergence area. The State Department of archaeology prepared an Action Plan in 1993 for documentation of Monuments, collection of sculptures and construction of museum, etc. Again an Action Pan for relocation / protection of the monuments was submitted which was reviewed and up-dated in January, 1999.

Against 8 States protected monuments requiring relocation, 2 have been completed. Out of 6 sites for excavation one has been excavated.

Current status may be presented by NVDA.

(E) Seismicity and Rim Stability of Reservoir:

The Indira Sagar reservoir has a gross capacity of 12,200 million cubic meters, or about 9.9 million acre-feet, by far the largest-capacity reservoir planned in the Narmada River basin. Therefore the issues of seismicity , the potential for reservoir-induced seismicity (RIS) and the rim stability have been carefully studied and addressed.

In order to study the seismic effects in the Narmada Sagar Complex Zone a network of 10 seismological observatories with sophisticated instruments was proposed

based on the recommendations of Erstwhile Dam Review Panel, Central Water and Power Research Station, (CWPRS) Pune and Indian Meteorological department (IMD). It was proposed to monitor pre and post impoundment seismicity also at these seismic stations to help in assessing the adequacy of seismic parameters adopted for designs.

Only one experimental station at Indira Sagar dam site consists of a RV-320 Micro Earthquake Recorder, a Wood Anderson Seismograph and a Digital Recorder - 100 strong motion accelerometer was functional. It was informed by the NVDA that the staff engaged to analyze the seismic data is trained by IMD also the Indian Meteorological Department (IMD) is approached by the Project Authority to get the data analyzed periodically. However, difficulties are experienced by the Project Authorities in analysis work.

Members may like to discuss and review.

(F) Health Aspects:

As per the discussions of the 37th meeting of the Environment Sub-group, status of composition of Health Cell in NVDA may please be presented.

Final report of diseases surveillance studies from Gandhi Medical College, Bhopal / NVDA is received. Executive Summary of the report is enclosed at Page-170 **Annex-XXXVIII-(7)**. An up-dated Health Action Plan – ISP may please be presented.

(G) Command Area Development:

Targets of first phase of irrigation of 36100 ha has been fixed by the year June, 2004. The draft Terms of Reference for Command Area Development had been prepared and were to be finalised in the meeting of the Committee constituted for drawing up the Command Area Development Plan for ISP. It was proposed to entrust the work to Environmental Planning Coordination Organisation (EPCO). Further progress may please be reported.

Members may like to discuss and review.

(H) Project Cost:

The cost of Project was Rs.1392.85 crores at 1983-84 price level. The cost was revised to Rs.1993.67 crores at 1988 price level. To include environmental safeguard measures, the cost of the Project was estimated at Rs.2167.67 crores in

1989 which included Rs.125.00 crores for Catchment Area Treatment works and Rs.50.00 crores for Command Area Development works. After taking over of Unit-I and III by NHDC, the Project estimate is further revised to Rs.3867.20 crores during September, 2000.

Cost estimates of Environmental Safeguards Measures as received from GOMP is presented below :

ENVIRONMENTS SAFEGUARD MEASURES REVISED COST at SEPT'2000 Price Level.	ESTIMATES (Rs. In Crores)	EXPENDITURE (Rs. In Crores)
Compensatory Afforestation	118.03	
CAT works (Forest + Non-Forest). + restoration of land in construction area.	45.27	
Control of aquatic weeds in submergence area to provide improved habitat for aquatic life (Fisheries).	2.59	
Establishment of fuel depots etc. to meet fuel requirement of labour force to prevent indiscriminate felling of trees	2.00	
Relocation of monuments of archaeological significance	2.10	
Public health measures to control spread of water bound diseases.	3.38	
Removal of stumps and roots before filling the reservoir for the purpose of pisciculture.	2.60	
Setting up of a National Park & two wild life sanctuaries as per MoEF directions for Conservation of Flora & Fauna.	130.56	
TOTAL	306.53	

Expenditure on each item referred to above may please be provided by the GOMP / NHDC for a review by the Members.

Item No. XXXVIII-3 (177): SARDAR SAROVAR PROJECT: REVIEW OF THE STATUS OF ENVIRONMENT SAFEGUARD MEASURES.

Works on the Sardar Sarovar Project commenced after the historic Judgement delivered by the Apex Court on 18.10.2000, in Civil Writ Petition No.319 of 1994 filed by Narmada Bachao Andolan (NBA) against the Sardar Sarovar Project (SSP). In accordance with the directions of the Hon'ble Supreme Court and the construction programme approved by the NCA, the Sub-group during last meeting held on 8th February 2002, recommended raising of the dam height upto 100 m subject to certain riders. Subsequently, Narmada Control Authority considered various clearances and permitted raising of the dam height up to 95m RL. In pursuance thereof, the Project Authority raised the dam to this height. Raising of the dam beyond this height is under consideration of the R&R Sub-group & Narmada Control Authority.

Request in meanwhile was received from the Govt. of Gujarat for grant of permission for raising the dam height beyond 100m RL. A review of the current status of the works in relation to 100m, 110m RL and beyond for the works under progress for the areas of SSP in the State of Gujarat, Madhya Pradesh, Maharashtra and Rajasthan is presented below.

A copy of the status report on environmental management – SSP for quarter ending September, 2002 is placed at page-58 Annex-XXXVIII-(6) for a review by the Members.

Action taken report on the recommendations of the Sub-group, permitting, raising of the dam height to 100m RL is given below:

Dam Construction at EL 100 m. would submerge an area up to 105 km. from the dam site resulting in impoundment of 24% of the area. Status of compliance by the State Govts. on the issues discussed by the Environment Sub-group during its last meeting are presented in form of an action taken report as follows.

1.	<ul style="list-style-type: none"> Government of Madhya Pradesh should complete treatment of remaining degraded watershed identified as Phase-I of CAT by 2003 and also undertake treatment of areas in the reservoir vicinity on priority. (Action: GOMP) 	<ul style="list-style-type: none"> Catchment areas being treated up are above the zone of submergence. Substantial progress was made by the GOMP. Details are as at Page-175 Annex-XXXVIII-(8). Accordingly, the vicinity targets corresponding to 100m RL were completed by the end of Nov 2002. It is planned to complete the treatment of entire Phase-I by June 2003.
2.	<ul style="list-style-type: none"> The State(s) should monitor and maintain the works undertaken for various environmental activities such as Catchment Area Treatment, 	<ul style="list-style-type: none"> Works were being maintained and monitored by the project authorities for a specified period. Process of handing over such works to the regular

	Compensatory Afforestation, etc. (Action: GOG, GOM & GOMP)	departments was under progress. According to the information received from Maharashtra, the Compensatory Afforestation over non forest land of 6401.71 ha in lieu of submergence and 4197.5 ha in lieu of rehabilitation has already been declared as protected forest.
3.	<ul style="list-style-type: none"> Clearing of trees in the forest area getting submerged at EL 100m should be completed at the earliest for avoiding Eutrophication and degradation of water quality. (Action: GOM & GOMP) 	<ul style="list-style-type: none"> Current status of felling is presented in Page-176 & 177 Annex-XXXVIII-(9), & (10) Accordingly while there is compliance from GOMP, Works lagged behind in Maharashtra.
4.	<ul style="list-style-type: none"> Command Area Development Plan for Phase-I of the programme should be prepared on priority and should be submitted for review in due course. (Action: GOG) 	<ul style="list-style-type: none"> Draft plan was discussed and reviewed on 4th Dec 2002 by the GOG with experts. As per suggestion received by the GOG, the plan was under finalisation.
5.	<ul style="list-style-type: none"> The seismological data collected at 9 monitoring stations established along the reservoir periphery should be got analyzed through concerned recognized institutions and submitted for information of the Sub-group. (Action: GOG,) 	<ul style="list-style-type: none"> The computation of parameters of micro earthquake occurring in Narmada Basin is being carried out. Also, special reports of major earthquakes occurring in Gujarat, other parts of India like Uttarkashi, Latur, Jabalpur and other global earthquake are regularly prepared. The analysis of earthquake data and overall monitoring is being done by the office of Chief Engineer (Designs). These reports are periodically monitored by the Dam Safety Review Panel.
6.	<ul style="list-style-type: none"> The compliance Report on the recommendations of the Expert Committee on health aspects should be submitted in the next meeting of the Environment Sub-group. (Action: GOG, GOM & GOMP) 	<ul style="list-style-type: none"> There was a substantial compliance from the GOG. However, compliance from GOMP and GOM was awaited.
7.	<ul style="list-style-type: none"> During raising of the dam and filling of the reservoir, care should be taken to ensure release of regulated and adequate water in the downstream stretch, both for drinking purposes and to maintain aquatic life. (Action: GOG, GOM & GOMP) 	<ul style="list-style-type: none"> Steps were taken by the GOG. Officers of the Narmada Control Authority visited the areas no adverse impacts were reported.

Updated progress may please be reported by the States especially on Point No.2, 3 and 6 above. Adequacy of the steps taken by the State Govts. towards compliance of the recommendations of the Sub-group may please be discussed by the members.

Review of the progress of works on the suggested parameters in relation to the proposed filling of the reservoir up to RL 110m by June 2003 and beyond

As per the approved construction programme of the SSP the height of the dam will be 110 m by the end of June, 2003. The impoundment upstream of SSP would extend up to 121 km. from dam site. Thus the submergence will be about 11136 ha, forming about 1/3 of the submergence at FRL. A copy of the map showing the reservoir and the river stretch is placed at Page-178 **Annex – XXXVIII-(11)**.

1) Phased Catchment Area Treatment

A map of the areas treated / under treatment of the sub-watershed is placed at Page-179 **Annex – XXXVIII-(12)**.

Gujarat

The targeted area of 29,157 ha. was treated completely.

Maharashtra

As the actual area available for treatment was found 23,295 ha, the same had been treated. Thus, the planned target of 24,298 ha., may be taken as achieved.

Madhya Pradesh

By the end of November, 2002, an area of 1,00,818 ha has been treated against the target area of 1,25,725 ha.

2) Compensatory Plantations

Against the usual requirement of plantations over an area equivalent to the forest area diverted, the Project Authorities were directed to raise the plantations over 3 ha., of land (2 ha degraded forests plus 1 ha non forest land) in lieu of each ha., of land diverted for the Project.

Accordingly, for the project as a whole the concerned States, through their respective Forest Department(s), prepared Action Plans and have achieved the planned targets of 42,064 ha., (actual target 42,155 ha.), against 13,386 ha of the forest land diverted for the Project.

Gujarat

Govt. of Gujarat had completed plantation works in the entire planned area of 13,950 ha. (including both non forest and degraded forest areas).

Maharashtra

Govt. of Maharashtra had completed plantation works in the entire planned area of 19,378 ha. (including both non forest and degraded forest areas).

For the land released for R&R works, progress achieved was 4,198 ha. against a target of 4,200 ha.

Madhya Pradesh

The progress reported was 8,736 ha. against the target of 8,737 ha.

3) Survey of Flora, Fauna and Carrying Capacity Studies

In view of the suggestions received from the Secretary, MoEF in 1988 the regions which are affected due to the project were surveyed with reference to the following.

- 1) Gene pool, if any, likely to be affected.
 - 2) Details of wildlife habitat in the region
 - 3) Measures proposed to rehabilitate endangered species of flora-fauna, if any.
 - 4) Assessment of the carrying capacity of the neighbouring areas wherein the wildlife would disperse if the scheme were implemented.
 - 5) Plan for rehabilitation of endangered flora & fauna.
- ◆ Details of wildlife habitat in the region have been studied and documented. Accordingly, there was no endemic endangered species of either Flora or Fauna in the submergence area.
 - ◆ Studies have indicated that there was no species of key wildlife, which could be referred to as migratory. The migration, if any, was purely local, restricted to search of food and shelter due to phenological cycle. No corridors for the migrations were, therefore, needed. The Island to be formed during progressive filling of the reservoir and thereafter, are proposed to be left undisturbed.
 - ◆ Aimed at improving the Carrying capacity of the ecosystem for providing sustenance to the wildlife which was expected to move out of the submergence zone to the area adjoining the submergence, massive plantations and soil moisture conservation works have been undertaken in the critically degraded / denuded areas under CAT and CAF programme. These works have been completed in the State of Gujarat & Maharashtra. In Madhya Pradesh these works are nearing completion.

There was one sanctuary known as Dhumkhal sloth bear sanctuary, outside the submergence area, but in the vicinity of the reservoir in the state of Gujarat. Details of this sanctuary were studied and its area was enlarged about four times and a comprehensive management plan was prepared. The extended area of this sanctuary now touches the shore line of the reservoir to enable inhabitants access to the fresh water of the SSP.

A map delineating the submergence, catchment, areas under tree cover, areas of sanctuaries is placed at Page- 180 **Annex – XXXVIII-(13)**.

for a review by the Members. This map shows that the submergence area is a part of large & contiguous tracks of forest land on either bank & that most of this has been treated with Soil Moisture Conservation (SMC) works. The map also shows the protected area in the vicinity of the dam.

a) Fisheries Conservation and Development

Studies as brought out in the Status Report annexed, have been carried out to establish a baseline and help to predict future conditions for aquatic life. Action plans prepared by the state Govts were under review of the High Level Expert Group on development and conservation of the Fisheries. A meeting of this group is being convened deliberations shall be reported during the meeting

The current progress of work on fisheries development and conservation is presented below:

According to IUCN, red data list fishes of Narmada are not included as rare or threatened species. CICFRI compiled a list of 8 species, which could be considered vulnerable in Narmada basin. However they are present elsewhere in India in abundance. There are two species of fish viz., Hilsa and Mahaseer which are migratory in nature. While Hilsa fish is anadromous which breeds in fresh water in the rocky areas downstream of SSP, Mahaseer breeds in shallow rocky areas at the confluence of the tributaries with the main river in Madhya Pradesh. Though, dam being far away, will not act as physical barrier to the migration of Hilsa, but would certainly upon completion of all up-stream Projects would lead to reduction in the breeding of Hilsa on Narmada estuaries on West coast. A situation not likely in the near future given the current level of progress on development works up-stream of SSP.

Madhya Pradesh

A plan for development of fisheries, water quality and Limnological aspects was under formulation. Progress may please be reported. A centre was established by the NVDA at Barwani for R&D works related to development of fisheries in Madhya Pradesh. Progress may please be reported.

Gujarat

The progress of the fisheries' development programme received from Govt. of Gujarat is placed at Page-181 **Annex – XXXVIII-(14)**.

Maharashtra

Following the desk review studies on conservation of fish fauna in SSP carried out by the Central Inland Capture Fisheries Research Institute (CICFRI), GOM assigned a short term study to the Vadodara Centre of CICFRI. Report of the study is yet awaited.

b) Felling of trees from the submergence zone.

The status of felling of trees from the forest areas in each state is summarised below :

Gujarat

Regarding felling of trees from submergence areas, the entire reservoir bowl was cleared of vegetation and even coppice crops was also removed.

Maharashtra

The forest area under submergence at FRL 138.68 m. in Maharashtra State is 6489 ha. The area to be cleared is up to a level 4 m below FRL and this is 5892.07 ha. In this 1036.19 ha is encroachment, 2753.93 is forest land and 2101.95 ha is the river bed portion. The progress of felling in relation of 110 m EL and beyond is placed at Annex – XXXVIII-(9).

Madhya Pradesh

A copy of the statement indicating the areas to be felled is placed at page-177 Annex – XXXVIII-(10). The progress of felling in relation of 100 m EL may please be presented for a review by the Sub-group.

4) Archaeological & Anthropological Aspects

The three party states completed surveys of cultural and religious sites within the submergence zone with a view to list all archaeological sites requiring protection / relocation / excavation. There was no Centrally / State protected Monument within the submergence of the Sardar Sarovar Project. However, the State Govts., of Gujarat and Madhya Pradesh have prepared plans for relocation / protection / excavation of certain Monuments.

A copy of the map indicating location of the Monument vis-à-vis impoundment is placed at Page-183 **Annex – XXXVIII-(15)**.

Gujarat

All works related to Shoolpaneshwar & Hampsheshwar temple were completed.

Madhya Pradesh

The status of work is summarized in the table placed at page No. 134 Annex – XXXVIII-(6)

Maharashtra

There was one temple namely Shoolpaneshwar temple on the border of Gujarat and Maharashtra in village Manibeli. Gujarat accepted the responsibilities in this regard. All works regarding relocation of temple were completed earlier.

5) Seismicity and Rim Stability of Reservoir

Rim stability studies have been completed and well equipped 9 monitoring stations along the periphery of the reservoir are functioning. Data collected by these observatories was being analysed by experts/ institutions.

6) Health Aspects

A field visit of the Experts on Health to the areas in Madhya Pradesh, Maharashtra and Gujarat was undertaken during 2001, recommendations were enclosed with the agenda papers of 37th Meeting. Follow-up is awaited from the states. Proposed health facility in relation to impoundment at RL 100m. is brought out in the map placed at Page – 184 Annex – XXXVIII-(16).

7) Command Area Development

The SSP will provide irrigation water for a cultivable command area of 18 lacs hectares in Gujarat and 75,000 hectares in Rajasthan. The SSP water for irrigation purposes would start flowing in the canal once the dam height was raised to 110 m.

Gujarat

The introduction of fresh water to the drought-prone areas of Gujarat will create obvious benefits for the farming communities. In order to safeguard these benefits, control and monitoring was suggested by the Secretary, Ministry of Environment & Forests and Chairman of the Environment Sub-group in the following areas from time to time :

- drainage, water logging and soil salinity
- water quality
- forest loss
- potential impact on flora and fauna
- effects on public health
- socio-economic impacts.

There is substantial progress in the construction of canal network. The current status of works on development of Narmada Main Canal and distributaries is placed at Page – 186 **Annex – XXXVIII-(17)**.

during the last meeting The plan for development of the Phase-I command was requested. Draft plan was prepared by the GOG and was discussed on 4th Dec 2002 with experts. This plan is under finalisation as per deliberations and guidance of the subgroup.

Rajasthan

Rajasthan has been allocated 0.5 Maf (616 MCM) of Narmada water under the final award of NWDT. To utilize its share of the Narmada water, Govt. of Rajasthan have planned a 74 km long canal to irrigate 1.76 lakh ha of land in the drought prone districts of Jalore and Barmer. The canal system will cover Gross Command Area (GCA) of 3.00 lakh ha of which 2.51 lakh ha is culturable Command Area (CCA). Besides providing irrigation to 74 villages in Jalore district & 15 in Barmer district, the project envisages to provide drinking water to a population of about 10.88 lakh living in 770 villages around the irrigation canal. Construction of Main Canal in the first 48.0 km reach has been taken up and the earthwork & lining are in progress. The entire canal works in Rajasthan are scheduled for completion by 2009-2010.

Construction activities for the Narmada Main Canal in Rajasthan were started in the year 1993-94. Construction work (Earth work and Masonry works only) were taken up in the reach of km 0 to km 48. Works were completed in km 0 to km 30 reach except for few pockets where land acquisition problems was encountered. The lining of main canal km 0 to km 7.88 was also completed. The work on canal between 7.88 and 51.5 was making progress

Detailed Project Report based on detailed EIA report of WAPCOS is being revised. The Govt., of Rajasthan, had earlier informed that the Agency was short listed for the work of framing Detailed Project Report (DPR). Further progress is awaited.

8) Down stream environment

The construction of dam would result into more regulated and perennial flow into the river with an overall beneficial impact. It is unlikely that any significant negative environmental impacts will occur over the next 30 years due to this project. Some possible adverse effects might manifest during raising the dam height further to 110m. The expected key impacts are outlined in the note placed at Page – 188 **Annex-XXXVIII-(18)**

**Item No. XXXVIII - 4 (178) : REVIEW OF THE ACTION TAKEN ON THE DECISION
OF THE PREVIOUS MEETINGS.**

A. Sardar Sarovar Project Catchment Area Treatment:

1. Phase-I Establishment of Silt Monitoring Stations.

Gujarat

In pursuance to the recommendations of the Environment Sub-group for establishing silt monitoring stations to assess the efficacy of the treatment works Sardar Sarovar Narmada Nigam Ltd., decided to entrust this work to Central Soil & Water Conservation Research & Training Institute, Vasad. The present status of the studies may please be informed to the Sub-group.

Studies carried out by the Space Application Research Centre, Ahmedabad through satellite imaginary for the period 1985-86/ 1994 showed that there was considerable improvement in the conditions of the catchment. Details are at Page-56 Annex-XXXVIII-(6) It was however suggested to update these studies. Progress may please be reported.

Madhya Pradesh

During the last meeting it was informed that Water and Land Management Institute (WALMI), Bhopal, has agreed to take up the work. A proposal in this respect was being drawn up. Progress in this regard may please be informed.

It was suggested that the studies carried out by the Space Application Research Centre, Ahmedabad through satellite imaginary for the areas in Gujarat may be replicated for the areas in Madhya Pradesh also. Progress may please be reported.

Govt., of Maharashtra

Most of the catchment area under treatment in Maharashtra is forest. Studies for the areas treated carried out by the Forest Survey of India, Nagpur office, through satellite imaginary for the period 1991-95-98, showed that there was considerable improvement in the conditions of the catchment. Details are at Page-56 Annex-XXXVIII-(6) It was however suggested to update these studies. Progress may please be reported.

2. Phase-II Submission of Catchment Area Treatment Plans

The State Govt., of Madhya Pradesh & Maharashtra may please present the following information:

- (i) Action plan for freely draining areas.
- (ii) Updating of information on implementation of the plan for freely draining areas.

It was observed during the 35th meeting that due to decentralization of the funding components of the watershed management schemes and placement of funds at the disposal of the respective State Govts. It was felt that needed steps should be taken for continued supports to the soil moisture conservation works as envisaged. In this connection it was suggested that Secretary, Agricultural be approached for soliciting his cooperation in expeditious completion of the phase-II works related to SSP. Steps taken by the States of Maharashtra and Madhya Pradesh may please be reported. Availability of the funds, manpower and the annual plan of treatment may please be presented for a review by the members.

B. Monitoring works in Maharashtra

1. Funding of the works on implementation of action plans for mitigation of adverse impacts

Govt. of Maharashtra representative have expressed difficulties in receiving funds from the Project Authorities for implementation of the environment safeguard like Health, Fisheries, Flora, Fauna, etc. This issue was discussed and it was informed that a policy decision is to be taken by the appropriate authorities of the SSNNL after studying availability of the funds and financial consequences thereof. Further information is awaited from the Govts. of Maharashtra and Gujarat.

2. Agency for Inter Departmental Coordination for effective implementation of the plans in time :

A number of actions are required on part of the Govt., of Maharashtra on the issues related to drawing up of the action plan on Flora & Fauna aspects, issues related with felling of the trees of the forest areas likely to be submerged by raising the Sardar Sarovar Dam to EL 100m and beyond, follow-up of the recommendations of the Committee on health which visited the areas in Maharashtra, The issues related to Phase-II surveillance of the diseases pattern within the impact area of the SSP. However due to lack of participation and

subsequent needed follow up of the discussions / Field Visits, undertaken for speeding up the works and for removing the bottlenecks focusing the issues on Govt., of Maharashtra was lagging behind. The subgroup discussed these issues earlier and suggested formation of an authority/ cell to deal with exclusively for the SSP. On the request of the Govt. of Maharashtra, Terms of References (TOR) drawn-up by the Narmada Control Authority officials were made available to the Govt. of Maharashtra. Situation has not improved.

Members may like to discuss & review.

C. Sardar Sarovar Project : Environment Management,

1. Publications

During earlier meetings it was desired that good works being done by the Project Authorities are to be published. In response following publications were brought out.

1. Birds of the Shoolpaneshwar Sanctuary and Narmada Catchment, Gujarat (India) by Dr. Sanat Chavan, published by Govt. of Gujarat.
2. Heritage Flourishing in Narmada Valley published by Govt. of Madhya Pradesh.
3. Narmada River Basin Development: Indira Sagar Project "Environment Management" Published by Narmada Control Authority
4. Environment Safeguard : Sardar Sarovar Project: Published by Narmada Control Authority
5. A comprehensive draft document titled "Sardar Sarovar Project : Environment Management" prepared by the experts in Narmada Control Authority was circulated to the Members of the Sub-group in November, 2000 for their views. The suggestions were received from Govt. of Gujarat. These have been incorporated. It is proposed to publish the above document.

Regarding publications by the State Govts. the Sub-group was informed that thrust areas have been identified and that publication would be brought out soon. Progress on these aspects may please be presented by the State Govts.

2. Seminar / Workshops

During the 33rd meeting, the Sub-group desired that NCA should organise Seminar / Workshops on the "Thrust Areas of the Environmental Ameliorative Measures". Steps are being taken to organize the Seminar by Mid April, 2003.

D. Cost Estimates for preparation of Action Plans and implementation of Environmental Safeguard Measures

In order to frame yard sticks on the cost estimates of the water resources Projects, the Chairman of the Sub-group during earlier meeting desired compilation of the estimates and expenditure incurred on survey, studies and implementation of the suggested safeguard measures for the SSP. Accordingly, the information compiled is being presented for information of the Sub-group. The latest updates on these issues based on the information received from the State Govts. is presented at Page – 189 **Annex – XXXVIII-(19)**.

For information of the Members.

Updating at the current price level of the estimate and expenditure on environmental components of the Sardar Sarovar and Indira Sagar Project is requested from the Govts. of Gujarat, Madhya Pradesh and Maharashtra.

E. Formation of Multi Disciplinary Committee by the MOEF for appraisal of survey and study reports on various environmental aspects of Sardar Sarovar Project,

A Multi Disciplinary Committee had been constituted during October, 2001 by Ministry of Environment & Forests to examine the adequacy of existing reports and surveys as well as plans for mitigative steps and the implementation so far, and suggest any improvement on additional measures which in its opinion are required to supplement the existing plans under implementation. under the Chairmanship of Shri C.D. Thatte, Secretary General, ICID, New Delhi & Dr (Mrs.) Nalini Bhat, Director, MOEF, New Delhi as its Member Secretary.

Since the formation of the committee 4 meetings have already taken place in addition to the field visit to SSP dam site, Catchment area treatment sites in Gujarat and Madhya Pradesh. The committee is expected to submit its report by the extended period of March, 2003.

This is for information of the members..

F. Monitoring of the Indira Sagar Project.

In pursuance of the concern expressed by the Chairman ESG in 25th Meeting that RR aspects of the ISP should be monitored in terms of the order of Clearance of 1987, The Narmada Control Authority amplified the TOR of the RR subgroup of Narmada Control Authority constituted initially for monitoring of the SSP to include ISP also. The issue of monitoring of R&R was subsequently brought

before 8th meeting of Review Committee of the Narmada Control Authority held on 10.02.01 wherein it was stated that a separate mechanism would be suggested by the MOEF for monitoring of the R&R aspects of the ISP.

The issue of monitoring of environmental aspects of ISP was raised by the Vice Chairman, NVDA, and Vice Chairman, SSNNL, in the 37th meeting of the Sub-group and requested the Chairman, ESG, to take up the matter relating to evolving of suitable mechanism for monitoring of ISP as agreed in RCNCA meeting referred to above. The Chairman desired to examine the issue in the light of the decisions taken by the Review Committee of the Narmada Control Authority.

A copy of the letter from NCA addressed to GOMP is at Page – 190. **Annex – XXXVIII-(20)**. Relevant extracts from the Narmada Water Scheme exhibiting the duties entrusted to the NCA on Monitoring of Environment and R&R aspects of ISP is at Page – 193. **Annex – XXXVIII-(21)**. for ready reference.

To examine the issue a meeting was convened by the Secretary MOEF on 16th July 2002 wherein it was ruled that Environmental issues of the ISP would continue to be monitored by the Environment Subgroup.

This is for information of the members.

Item No. XXXVIII-5(179) : Any other item

Date and venue of the next meeting

ANNEXURES

ANNEX – XXXVIII (1-a)

Narmada Valley Development Authority
Narmada Bhavan, Tulsi Nagar Bhopal (M.P.)

No. NVDA/For/Tech/2002 /797

Bhopal date 03-05-2002

To,
 The Member (Env.& Reh.)
 Narmada Control Authority and
 Secretary Environment Sub-Group,
 116 BG Scheme No.
 74-C, Vijay Nagar, Indore 452010 (M.P.)

Subject - Minutes of the 37th meeting of ESG of NCA held on 8.2.2002
 Reference.- Your letter No. Env-3(37)/2002/1267-1301 dated 13.3.2002
 circulating the minutes.

Sir,

With reference to the letter cited above I am enclosing for your information a copy of our letter No.M(E&F) 638/dated 9.4.2002 written to the Union Secretary, Ministry of Environment and Forests on the basis of the deliberations in the 37th meeting of the Environment Sub Group (ESG) held on 8.2.2002, It is seen that the submissions made on behalf of GOMP and the acceptance of the same by the chairman ESG in the 37th meeting are not fully reflected in the minutes circulated vide letters under reference.

It is suggested that the minutes under items 3&4 and 5 may be amended as indicated below :-

Item	Page	As in the text	Modification Suggested
No.XXXVII-3(172)and XXXVII-4(173) Review of the status of Indira Sagar project and Review of action taken on the decisions of the previous meeting.	9	Last sentence on Page 9 However due to shortage of time detailed discussions were deferred.	Last sentence on page 9 of the minutes may be replaced by the following- However in view of the submission made by GOMP under Item No. XXXVII-5(174) which item was considered before these two items , the Chairman left out these items pertaining to the Indira Sagar project.

Item	Page	As in the text	Modification suggested
XXXVII-5(174) Monitoring of the Indira Sagar project	10	<p>Portion of the minutes on page 10</p> <p>-----</p> <p>He requested the Chairman to look into the matter. Vice Chairman SSNNL was of the view that decisions of the RCNCA where Hon'ble Minister for Environment and Forestry was present be taken up. The Chairman stated that the matter would be examined in the light of the decisions taken by the Review Committee of the Narmada Control Authority.</p>	<p>This portion of the minutes may be replaced by the following:-</p> <p>He submitted that the basic principles and reasons which justified the stand of GoMP that the monitoring of R&R aspects of ISP does not lie within the purview of NCA or any of its sub Groups, also hold good for limiting the jurisdiction pertaining to the monitoring of environmental safeguard measures of ISP by NCA or its Environment sub-Group. The Chairman ESG agreed with the view of GOMP that it was not necessary for the NCA or the ESG to monitor environmental safeguard measures of ISP and left out the items pertaining to monitoring of ISP.</p>

Encl - 1

Yours faithfully


 (PRADIP BHARGAVA)
 VICE CHAIRMAN

End-1

PRADIP BHARGAVA
Principal Secretary



No.....56...PS/NVDD/MP/ -

Government of M.P.
Narmada Valley Development Department

m(858) 638

Bhopal, Dated09/04/2002..

To,

The Secretary
Government of India,
Ministry of Environment & Forests
Paryavaran Bhavan
C.G.O. Complex
Lodhi Road
NEW DELHI 110 003.

Sub :- Indira Sagar Project - a mechanism for
monitoring of R&R and environmental safeguard
measures.

With reference to the above subject/^{it}is stated
as under :-

1. In the 8th meeting of RCNCA held on 10.1.2001, the Hon'ble Union Minister for Environment and Forests agreed with the stand of GOMP that the R&R Sub-Group of NCA need not extend its jurisdiction to monitor R&R under the Indirasagar project (ISP). It was recorded in the minutes of the said meeting of RCNCA under item No 8(6) that "Union Minister of Environment & Forests stated that his Ministry would work out a mechanism for monitoring of R&R aspects of ISP". It is submitted that the basic principles and reasons indicated below, which justified the stand of GOMP that the monitoring of R&R aspects of the Indira Sagar Project does not lie within the purview of NCA or any of its sub groups, also hold good for limiting the jurisdiction pertaining to the monitoring of environmental safeguard measures of ISP by NCA or its Environment Sub-Group :-

...2

Telephone : Office- 0755-551923 Resi.- 0755- 776258 Fax: 0755- 552592

24

...2

- (i) Indira Sagar is not an inter-State project and naturally the other three States will have no interest in it.
- (ii) The duty of the NCA is to do any or all things necessary, sufficient and expedient for the implementation of the order of the NWDT. As the NWDT has not given any orders regarding the environmental safeguard measures of ISP (NSP), there is no question of monitoring its implementation by the Environment sub-group of NCA or the NCA in presence of the representatives of other three States.

37

This issue was raised by the Principal Secretary, GOMP, Narmada valley Development Department in the 38th meeting of the Environment sub-group held on 8th February, 2002 in Paryavaran Bhawan and the then Chairman of the sub-group agreed with the view that it was not necessary for the NCA or the Environment Sub-Group to monitor environmental safeguard measures of ISP, and left out the items pertaining^{to} monitoring of Indira Sagar Project.

- 2. Though the approval of both the Narmada Sagar Project (now known as Indira Sagar Proejct, ISP) and the joint Sardar Sarovar Project, from environmental angle, was issued vide GOI, MOE&F office memorandum No. 3-87-IA dated 24.6.1987, the status of ISP & SSP basically remains to be that of intra-State & inter-State projects respectively.
- 3. Since GOI, MOE&F is going to work out a mechanism for monitoring of R&R aspect of ISP, independant of NCA, it would be helpful if monitoring of the environment safeguard measures is also included in the above mechanism. It is suggested that a Regional Committee of following officers may be

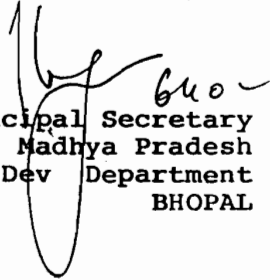
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....3

constituted to monitor the various issues linked with the planning & implementation of R&R and environmental safeguard measures of Indira Sagar Project :-

- 1 Head of the Regional Office of the Ministry of Environment & Forests at Bhopal-Chairman and Convenor
- 2 Member E&F NVDA or his representative
-Member
- 3 Member Rehabilitation & Resettlement NVDA or his representative - Member
- 4 Managing Director Narmada Hydroelectric Development Corporation or his representative
-Member

The above committee being nearer to the work sites can have close watch on the project. The committee will provide reports to the State Government & the Central Government for actions at their end.


Principal Secretary
Govt of Madhya Pradesh
Narmada Valley Dev Department
BHOPAL

ANNEX - XXXVIII (1-b)*By REGD Post.*

To,

Dr.N.D.TIWARI,
 MEMBER (E&R), ~~NCA~~ NCA
 116 BG, SCHEME NO. 74-C,
 VIJAI NAGAR,
 INDORE 452010, M.P.

*also sent to Secretary, Environ-
 ment for favour of informa-
 -tion please.*

Dear Dr.Tiwari,

Ref: Minutes of the 37th meeting

I am enclosing herewith my comments on the minutes of the 37th Meeting as circulated:

1. P3. Item No. XXXVII - 2 (171) B:

Member (E & R) stated that Dam Construction at EL 100 m would surcharge an area upto 105 km from the dam'site resulting in impoundment of 24% of area. Is this level pool level? If so what will be the backwater effect for median monsoon season flow?

The claim that humps do not increase the water level can not be accepted at the present stage unless they are technically proven.

Earlier experience at 64 m has clearly shown that free fall causes extensive damage to the apron. Is it acceptable to MOWR on the end bays as will happen if end bays are kept open? If so, why not for all bays? *Keeping end bays open is not a solution.*

What is the effect of such humps on backwater effect for median monsoon season flow and 100 years flood?

The provision of any hump above 100 m can not be accepted unless the consequent submergence is taken into account in the environmental safeguard measures,

26-a

which are certainly not contemplated; and are considered and specifically approved by environmental sub-group.

2. P8 14 "and also undertake treatment of areas in the reservoir vicinity on priority". Should be a condition for the clearance.

3. 18 "Clearing of trees in the forest area getting submerged at EL 100 m should be completed at the earliest for avoiding Eutrophication and degradation of water quality....."

"at EL 100 m" should be modified to "at or below levels affected by backwater due to monsoon season medium flow". This also should be a condition for clearance.

4. 120 "Keeping in view the implementation of environmental action plans up to EL 100 m by the party states as required for increasing the dam height up to 100 m....."

This is not enough for increasing the dam height upto 100 m. since humps if any, backwater effects, that sustain, say, upto 50% of the monsoon period and may cause eutrophication, flooding and consequent health hazard and also need for R & R etc; are also to be taken into account.


Hence delete in 120 "at EL 100 m" and add after 121 "height up to 100 m", "and with the stipulation that items 1 and 3 above are completed before June, 2002".

5. P10. Item No.XXXVII-5 (174): Since no decision is taken on an alternative monitoring mechanism, it is presumed that Environmental Sub-group will continue to monitor the same.

With best regards,

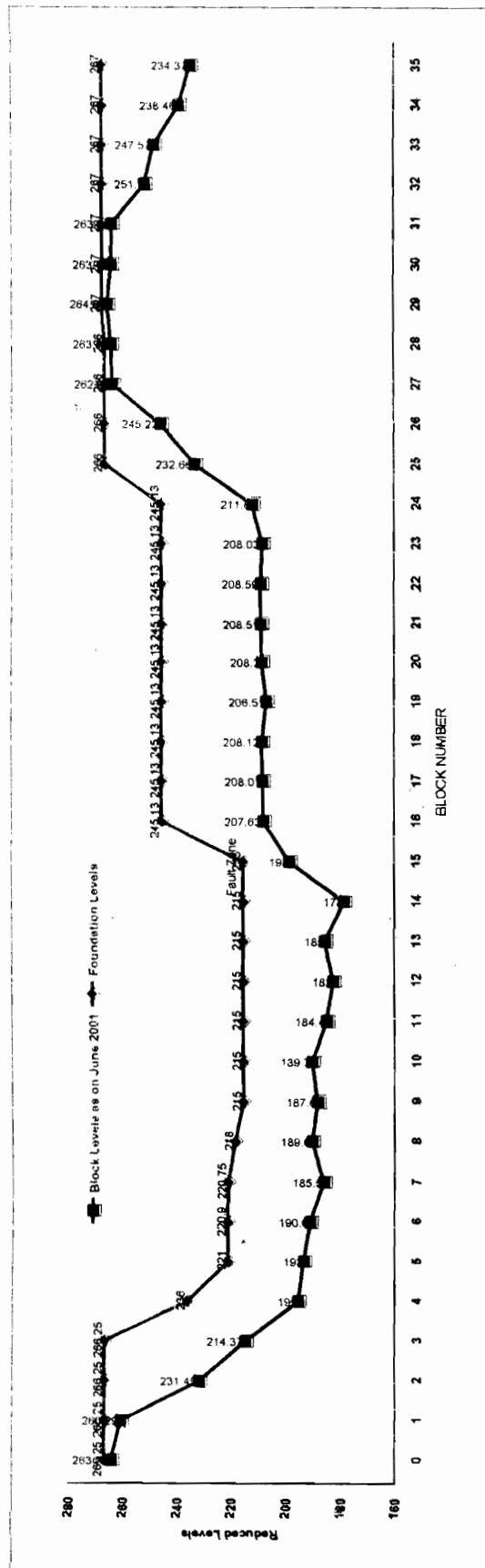
Yours sincerely,

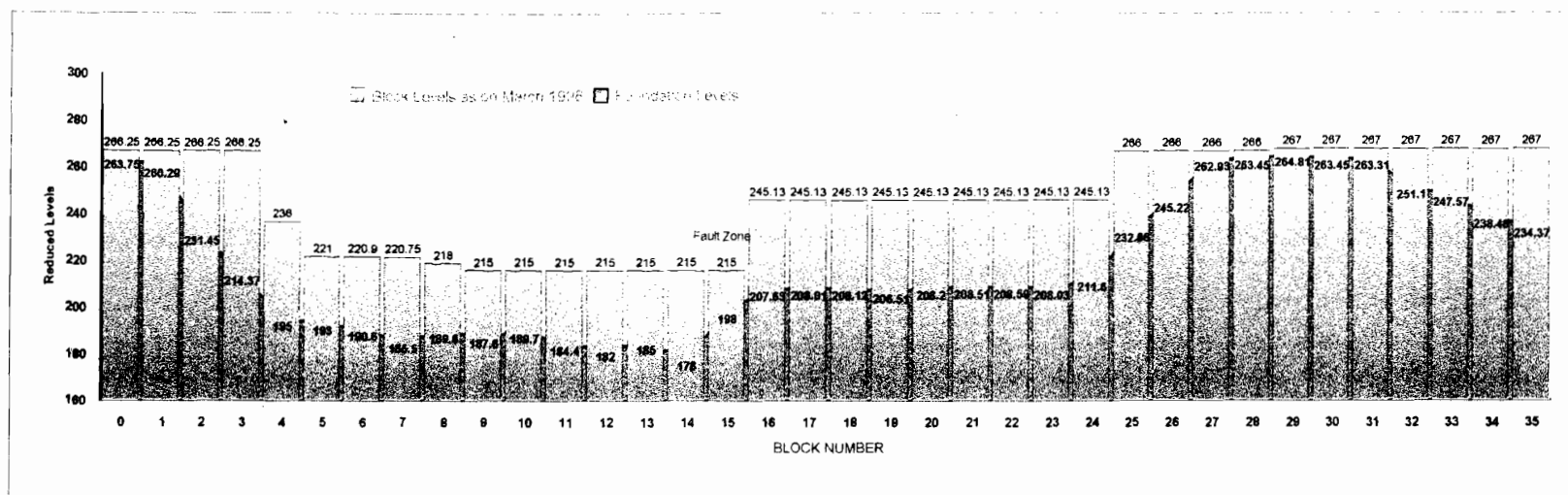
28/3/02.


(Dr.S.Ramaseshan)
724/4, FIFTH AV.

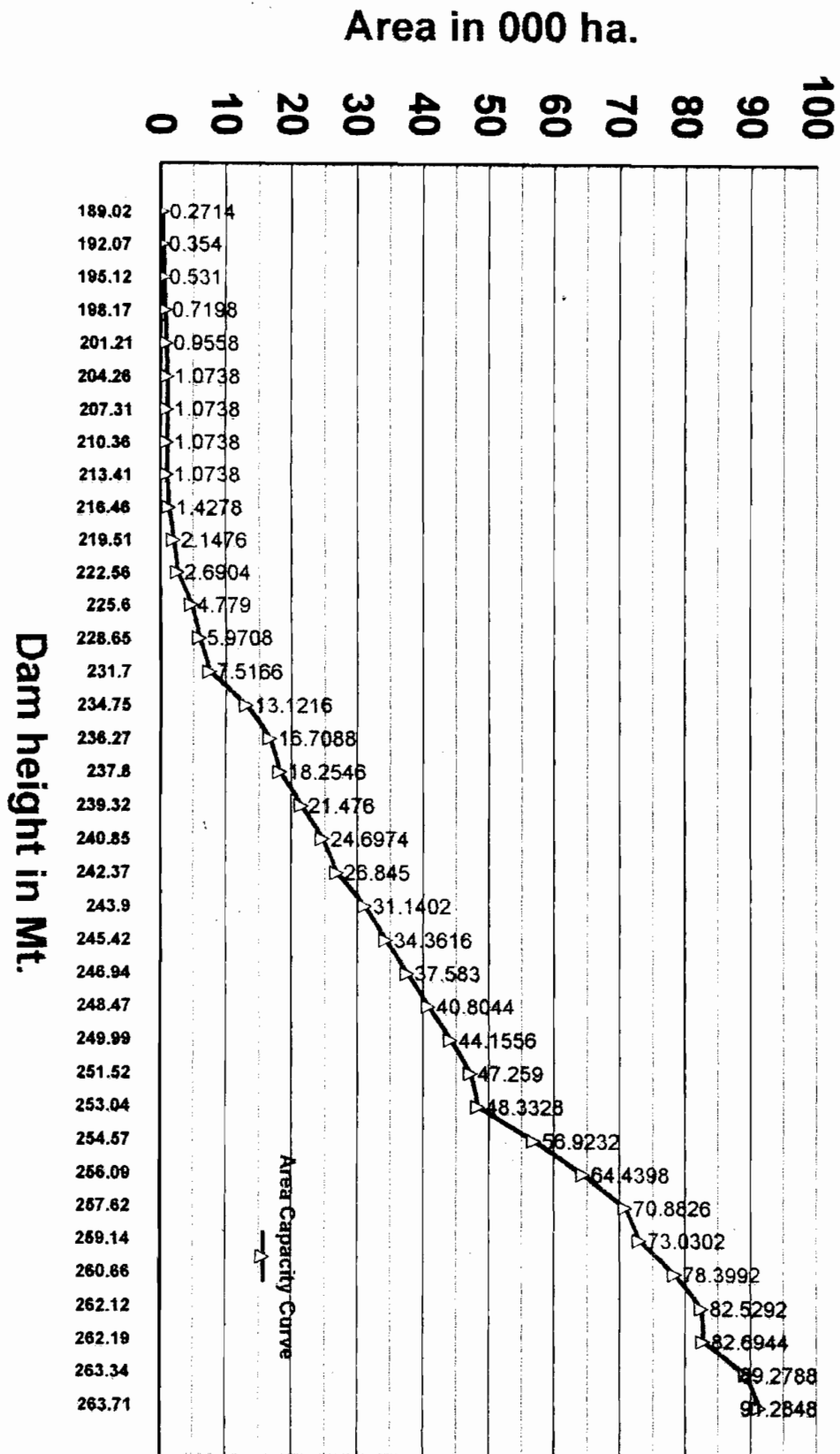
P. S. Please send all
communications to my Chennai Address:
724/4, FIFTH AVENUE, ANNA NAGAR, CHENNAI
PR: 628 1178.

26-b

ANNEX – XXXVIII –(2)

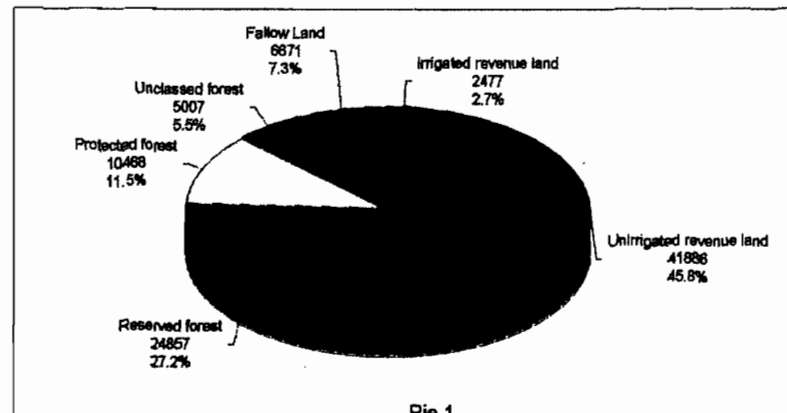


Indira Sagar Project : Area Capacity Curve

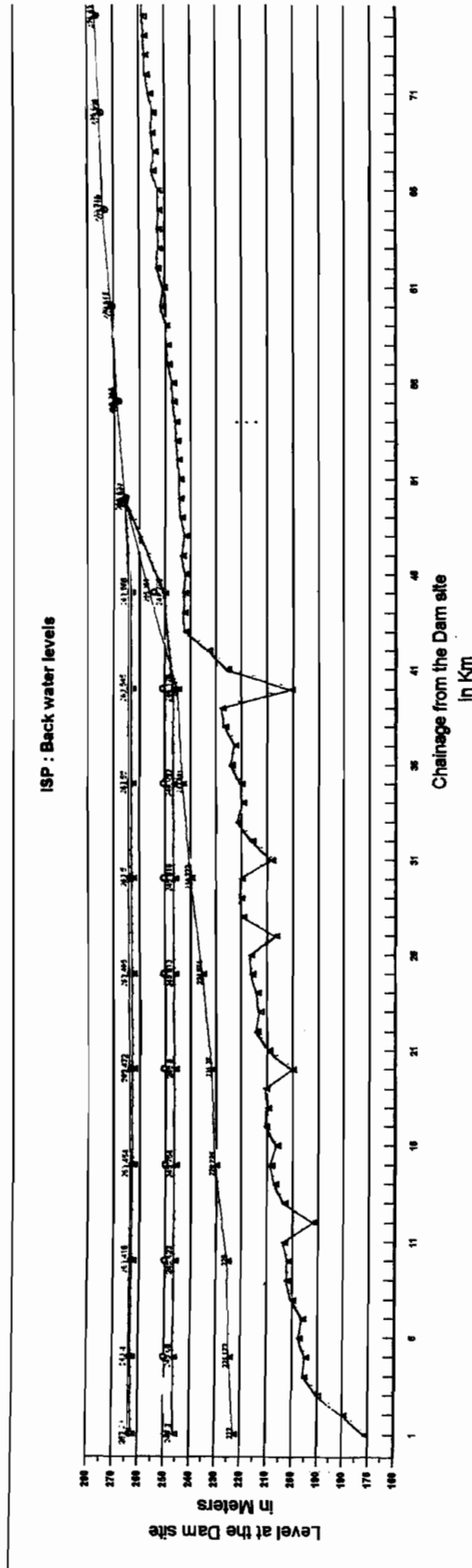


Land under submergence

Irrigated revenue land	2,477
Unirrigated revenue land	41,886
Reserved forest	24,857
Protected forest	10,468
Unclassed forest	5,007
Fallow Land	6,671
	91,366



Pie 1



ANNEX – XXXVIII –(4)

ANNEX – XXXVIII –(5)**FIELD VISIT REPORT OF THE COMMITTEE ON THE INDIRA SAGAR PROJECT AREA IN THE STATE OF MADHYA PRADESH****I N D E X**

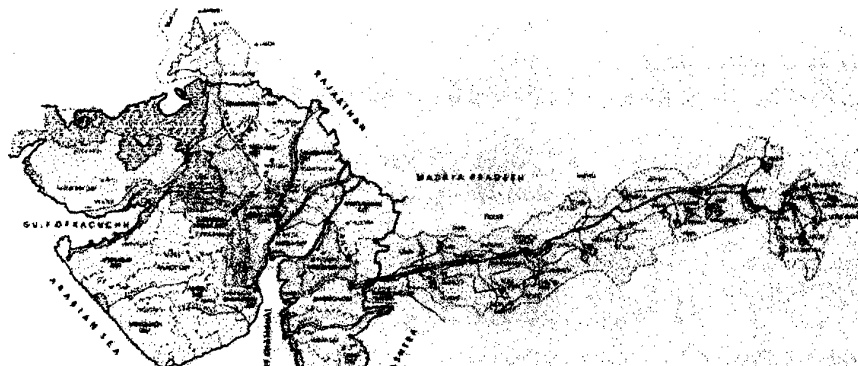
	Page No.
Indira Sagar Project	1
▪ Introduction	
▪ Environmental Considerations	2
▪ Environmental Angle : Regulatory regime.	3
▪ Review of the Status	4
A) Catchment Area Treatment	4
▪ Phase-I :	4
▪ Phase-II	6
○ Observations & Suggestions	6
B) Compensatory Afforestation:	6
○ Observations and Suggestions	7
C) Flora, Fauna & Carrying Capacity	8
▪ Strategies Suggested by the Study groups	9
▪ Status of Implementation	10
○ Observations & suggestions	10
Felling from the Forest areas	10
○ Observations & Suggestions	12
D) Archaeological Sites	12
1) Centrally Protected Monuments	12
2) State Protected Monuments:	12
▪ Excavation sites (mounds)	13
○ Observations & Suggestions	14
E) Seismicity And Rim Stability Of Reservoir	14
▪ Reservoir Rim Stability	15
○ Observations & suggestions	16
F) Health Aspects :	16
▪ Studies and Findings	16

▪ Strategies Suggested by the Study Groups	17	
▪ Action Plan	18	
▪ Observations & Suggestions	19	
G) Command Area Development	19	
H) Resettlement & Rehabilitation	19	
▪ Salient Features of the R&R policy of Govt. of M.P.:	19	
▪ The submergence	21	
▪ Status as on 15 th July, 2002	21	
▪ Progress of R&R as on 15 th July, 2002.	22	
Observations & Key Recommendations for implementation of Environment Safeguard Measures, pari-passu with the construction works on the project.	22	
▪ Key Recommendations	23	
▪ Conclusion	24	
▪ Acknowledgements	24	
ANNEXURES		
ANNEX-I	Salient features of Indira Sagar Project	25
ANNEX-II	MoU between NHDC & GoMP.	27
ANNEX-III	Copy of the letter dated 10th October, 2002 regarding monitoring of Indira Sagar Project by NCA from GOMP.	33
ANNEX-IV	Copy of the letter dated 30th October, 2002 from NHDC containing information desired by the committee during field visit .	38
ANNEX-V	List of participants	43
ANNEX-VI	Progress on construction works of Indira Sagar Project as on 15th July, 2002	44

FIELD VISIT REPORT OF THE COMMITTEE ON THE INDIRA SAGAR PROJECT AREA IN THE STATE OF MADHYA PRADESH DURING OCTOBER – [16TH TO 19TH] 2002

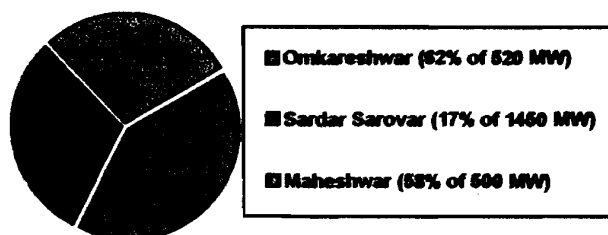
Indira Sagar Project

Indira Sagar Project (ISP) formerly known as Narmada Sagar Project is the key



project from river Narmada providing excellent storage site. The dam is on the main river near village Punasa in Khandwa District in M.P. It has an installed capacity of 1000 MW & annual irrigation of 2.65 lacs ha. The

Loss of power on D/s projects if ISP not commissioned



project is also very crucial due to regulated releases of 8.12 MAF of water for Sardar Sarovar Project and related benefits of irrigation & power for the states of Gujarat, Maharashtra, Madhya Pradesh & Rajasthan. Salient features of the project are at *Annex – I*. The construction works was started in May, 1992 & the dam was targeted to be completed by June, 2000. However for some reason work could not progress as planned.

The project was under implementation by the Govt. of M.P. until July 2000 when National Hydropower Development Corporation & Govt. of Madhya Pradesh entered into an agreement and formed a joint venture in the name of Narmada Hydroelectric Development Corporation (NHDC) to execute Indira Sagar and Omkareshwar Project on Narmada in M.P.. A copy of the Terms of References (ToR) is placed as *Annex-II*. After the work was handed over to Narmada Hydroelectric Development Corporation (NHDC), the work was rescheduled for expeditious completion. The targeted date of completion has been revised to May 2005.

It was informed by NHDC that project is proceeding as per the clearances received earlier by the Govt. of M.P. and also further clearances received in favour of the NHDC. The following clearances were already in place.

- Techno-Economic Clearance by CEA
- Techno Economic Clearance (TEC) Transferred to NHDC
- Notification U/s 18A of Electricity Act
- Power purchase Agreement (PPA) with GoMP
- Revised Cost Estimates Cleared by CEA
- Public Investment Board Cleared
- Cabinet Committee on Economic Affairs Cleared

However the Environment Clearance and by Forest Clearance were issued by the MoEF in favour of Central / State Govt. The clearance from the Environmental angle issued by the MoEF also prescribed the monitoring mechanism. Govt. of Madhya Pradesh was of the view that since Indira Sagar Project was not an interstate project and therefore NCA or its sub-group should not monitor the Indira Sagar Project. Request of the Govt. of Madhya Pradesh for transfer of these clearances in favour of NHDC was under consideration. Secretary MoEF, however directed that Environment subgroup would continue to monitor the ISP. The correspondence, subsequent to this received from the Vice Chairman, NVDA is placed at *Annex-III*. However, Govt. of Madhya Pradesh have agreed to cooperate for the visit of this committee

Environmental Considerations

Committee in its meeting, preparatory to the field visit, held on 16th October 2002, was informed of the background on formation of the committee, its constitution and responsibilities. The committee was informed that :

The two projects namely Sardar Sarovar & Indira Sagar projects were considered by the Ministry of Environment & Forests (MoEF) for giving clearance from environmental angle on the reference received from the Planning Commission during 1980. MoEF examined the projects in detail during the period 1980 till 1986. Forest Conservation Act 1980 and certain other Acts were enacted during the period. During this period policy issues related to catchment area treatment, command area development etc in relation to development were firmed up. The projects were assessed on environmental consideration by the MoEF. Based on the assessment MoEF prepared an Status paper on desirability of granting clearance to these two projects. In this note MoEF recommended clearance for these projects with certain observations for a final decision by the Hon'ble Prime Minister of India during 1986. After due consideration to the observations of the MoEF the Hon'ble Prime Minister desired formation of an independent authority for monitoring environmental considerations of these two projects

All the party states agreed for reconstitution of the Narmada Control Authority (NCA) for entrusting it with the responsibilities of monitoring these two projects. With all the party states agreeing to monitoring of the above two projects by the NCA, the projects were approved for clearance in principal by the Hon'ble Prime Minister on 13th April, 1987. However formal clearance awaited reconstitution of the NCA and enlargement of scope to include monitoring of these two projects.

MoWR with the agreement by the party states, in consultation with MoEF reconstituted the NCA and gazetted the same on 3rd June, 1987. MoEF considering this development issued the formal order of clearance on 23rd June 1987. The notification by the Union of India under amended section 6-a of the interstate water dispute act of 1956 and the order of the MoEF placed the responsibilities of monitoring Sardar Sarovar & Indira Sagar Projects on to the NCA. Subsequent clearances issued by the Planning Commission required state Govts. to adhere to the conditions imposed by the MoEF & other agencies of the Union of India. Narmada Control Authority & its Environment Sub-group has been monitoring both the projects regularly ever since.

According to the decision taken in the 32nd meeting of Environment Sub-group of NCA held on 14.10.98 at New Delhi, a committee for assessing the *pari-passu*

compliance of the implementation of the environment safeguard measures through undertaking field visits to the areas in the State of Maharashtra, Madhya Pradesh, Gujarat & Rajasthan was constituted vide letter No. Env-3(33)/99/475, dated 16th March 1999. The Committee comprised representatives of the Ministry of Environment & Forests, Narmada Control Authority, Botanical Survey of India, Wildlife Institute of India, Non-official Members and concerned officers of the State(s). The terms of reference for the committee were as under :

- a) The officers from State Departments related to environmental safeguard parameters will be associated with the field visit.
- b) Field visits would be coordinated by the Narmada Control Authority. Necessary inputs for data, information, maps etc. required by the committee during the field visit would be made available by the officers of the concerned States.
- c) The committee would assess the progress of works for ascertaining the *pari-passu* compliance of the environmental stipulations for the Sardar Sarovar and Indira Sagar Projects by undertaking field visits to the project areas and would place the report of the findings to the Sub-group.

Environmental Angle : Regulatory regime.

The following decisions and discussions of the Sub-group were informed to the committee :

- Environment Sub-group during its 15th meeting discussed the issue of *pari-passu* compliance and it was pointed out by the Chairman that the *pari-passu* clause should be read in terms of completion of works in the areas where impoundment is to commence.
- Environment Sub-group during its 18th meeting discussed the issue of *pari-passu* compliance and suggested that the *pari-passu* clause is to be so operated as to complete all works in the areas commensurate with the submergence which is an indicator of the progress of construction works. In order to get a clear view, it was suggested that progress of work on each component should be synchronised with the submergence and shown in the form of a chart accompanied by an explanatory statement.
- During its 22nd meeting, Chairman of the Sub-group stated that all the works which adversely affects the environment, steps for their mitigation have to proceed on *pari-passu* basis, whereas certain other works can be done on a different scheduling. It was emphasised that, all the directly draining critically degraded directly draining sub-watershed in the vicinity of the impoundment should be positively treated up in time.

The committee requested NHDC and NVDA for details regarding programme of construction in the given format for its assessment. The information received is summarized and presented in **Annex – IV**.

In pursuance to the above a visit of the committee to the Indira Sagar Project impact areas in Madhya Pradesh was conducted during 16th to 19th October, 2002. A list of members & invitees along with a list of the officers associated /interacted during the review in the field is given in **Annex- V**.

The committee visited the areas as per the following programme :

16th October 2002	Meeting of the committee members preparatory for the field visit for a detailed review.
17th to 18th October 2002	Visit to the ISP areas in Madhya Pradesh.
19th October 2002	Wrap-up meeting & preparation of draft report.

Review of the Status :

The committee reviewed the progress of planning and implementation of the environment safeguard measures taken by the State Governments and decided to visit the areas of catchment treatment and compensatory plantations, archaeological monuments etc Committee reviewed the status of the compliance as brought out in the notes circulated during the meeting on the issues/ parameters indicated in the order of clearance, with a view to ascertain the status of compliance commensurate with the programme of construction as directed by the Environment Sub-group of NCA.

The committee visited the areas for assessing the quality of work by visiting selected and accessible areas and verified the progress of works on the issues which were verifiable in the field through interaction with the local officers. The sites inspected and the information gathered about parameters, suggested viz. (A) Catchment area treatment (B) Compensatory afforestation (C) Flora Fauna & Carrying Capacity (D) Archaeological sites (E) Seismicity & Rim Stability (F) Health Aspects (G) Command Area Development (H) Resettlement & Rehabilitation is given below :

A) CATCHMENT AREA TREATMENT

Catchment area treatment works of Phase-I, vis-à-vis impoundment at FRL is shown in the map below. In accordance with the clearance granted by MoEF detailed surveys for prioritization of the sub-catchments were carried out. The work was entrusted to AISLUSO and accordingly sub watersheds with silt yield index (SYI) of 1200 and above are considered as critically degraded and required treatment on priority. AIS&LUSO had identified 508 No. of critically degraded sub-watershed (SYI = or > 1200) covering an area of 10,78,381 ha.

Phase-I :

In terms of the decision of the Union of India during July 1992 only those critically degraded sub-watersheds which drain directly into the reservoir shall be treated at the cost of the project *pari-passu* with the construction works on the project and are being treated accordingly under Phase-I programme.

There are 30 sub-watersheds belonging to high and very-high priority categories and directly draining into the reservoir. They cover an area of 73,456 ha. The area available for treatment in 62,975 ha. of which 51,927 ha. Area is non-forest and the balance 11,048 ha. in forest land. By the end of September 2002, an area of 52,751 ha. was treated up, which is 83.76% of final targeted area of 62,975 ha.



Visit to sub-watershed No. Nk 4n.

Committee visited the sub-watershed No. Nk 4n on 17th Oct 02. This sub-watershed has an area of 2931.00 ha out of which 2820.40 ha. Area was available for treatment. It covered the villages Dharampuri, Sarai, Machhondi & Kanwari. Works carried out included Vegetative-barrier, Small cross-section bunds, Rain-fed Horticulture, Farm forestry, Marginal Bunds, Intercepting drains, Gully checks, Runoff Management Structures & Gabion structures.

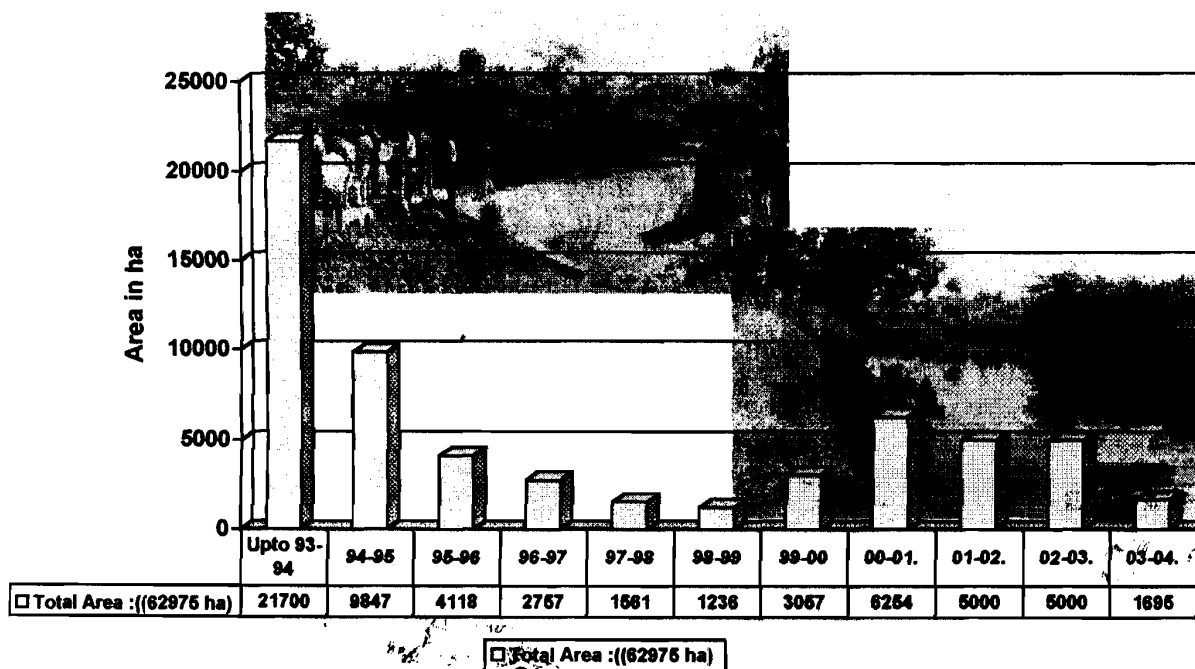


Village Kanwari

The committee inspected the works in village Kanwari on Rainfed horticulture covering plantations of Guava & oranges of 1996 & 1997. The committee interacted with the beneficiaries. Both the plantation were in very good conditions and had already started fruiting and thereby generating income for the farmer.

Village Sarai

Second CAT site visited was also in the same sub-watershed in village Sarai. Series of Run-off Management Structures (RMS) have been constructed on a Nalla which drains into Choti Tawa river. The RMS visited was constructed in year 2000-2001. It has a length of 30m, height 1.6 m and catchment area 1.07 sq. miles. At the time of visit back side of RMS was full of water and a little overflow was also observed.



It was informed that impounded water is being used as supplementary irrigation by the farmers in the adjoining areas. Impounded water was also being used for bathing purposes besides drinking for cattle. In addition it helped in recharging the ground water. The silt accumulated in the upstream of RMS was also taken out by farmers and used for increasing fertility of soil.

Visit to sub-watershed No. Nk 1a

Committee inspected sub-watershed No. Nk 1a near the Narmada Nagar in which CAT works have been carried out in forest area in 23 ha. Here afforestation was carried out in the year 2001. The tree planted included Teak, Bamboo, Amla etc. It was informed that survival rate was over 90%.

Phase-II

The balance of the critically degraded sub-watersheds are being treated as Phase-II programme from the cost being met from other ongoing schemes of Union of India & States. The time frame for treatment of Phase-II sub-watersheds is constrained by availability of the funds and resources.

According to the plan submitted by the NVDA, 478 sub-watersheds, covering a gross area of 10,12,640 ha have been identified as freely draining (other than directly draining) sub-watersheds. The net area available for treatment, however, is 9,15,150 ha of which 806720 ha area is non-forest and the balance 108430 ha is forestland.

Fourteen schemes covering the area of 28,949 ha were approved by the Govt. of India in RVP Schemes. By the end of June, 2002 the progress reported was 4,054 ha completed in 3 sub-watersheds and 11,328 ha partially completed in 11 sub-watersheds.

Observations & Suggestions :

Since these works are being done by the trained and qualified officials of the respective departments who otherwise are also entrusted with such activities were generally in order. Suggestions for improvement were welcomed by the participating officers of the Govt. of Madhya Pradesh. It was considered desirable to replicate works on Agro-forestry farms and Runn-off Management Structures to the extent possible.

B) COMPENSATORY AFFORESTATION:

A total of 40,332 ha. Forest land would come under submergence and an additional 779.90 ha of forest land has been diverted for various construction purposes and sub-sequently, another 308.40 ha. of forest land was permitted to be diverted for powerhouse. Thus a total of 41,420 ha of forest land has been permitted to be utilized for the construction of ISP.

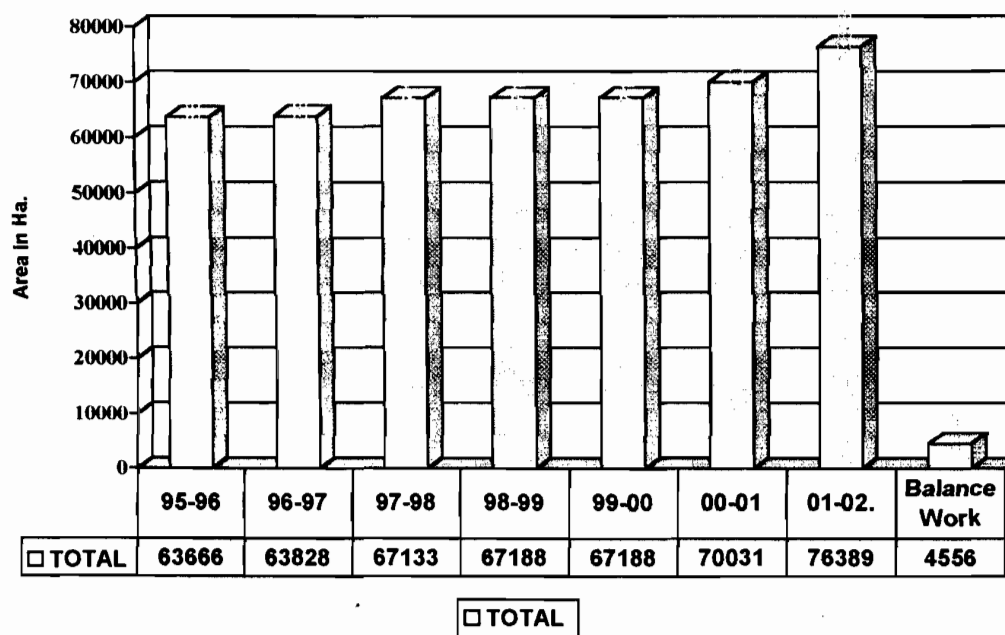


To compensate for this loss of forest, the M.P. Forest Department had submitted an Action plan for compensatory afforestation for the ISP in November, 1987. Area

offered in this action plan was accepted. Accordingly 10,143 ha. Of non forest and 70,802 ha of degraded forest land has been identified for compensatory afforestation in the districts of Khandwa, Hoshangabad, Dewas, Sehore, Dhar and Khargone. The plan submitted by the Govt of Madhya Pradesh was accepted by the MoEF and is under advance stage of implementation. By the end of September 2002, an area of 80,359 ha has been covered against a target of 80,945 ha. Which is 99.28%.

Visit to Sagadiyanv
Forest Compartment No. 550

Committee visited an afforestation site near Sagadiyanv in Compartment No.550, Distt. Khargone. Here the plantation was done on degraded forest land in 130 ha area. The area was hilly with hard murrum soil and practically no vegetational cover. Non irrigated model of plantation was adopted for this area. Plantation were carried out during rains of 2002, but due to less rainfall, work was stopped. The main species planted included Teak, Bamboo, Amla, Neem, Kastar, Khair, Subaboot, Kalasiris and. survival rate was reported as 85%.



Observations and Suggestions :

- Broad leaved plants like *Madhuca longifolia*, *Hardiwickia binnata* (Anjan) *Annona squamosa* (sharifa), *bamboo* (wild one) may be planted along edges. *Hardiwickia binnata* is widely used by local for its leaves throughout the year. This has driven this plant to the rarity in Madhya Pradesh. Therefore its plantation in large scale is desirable.
- Considering the prevailing drought condition in the area, a tube well or water harvesting devices like RMS, small check dams etc. are desirable to prevent

- Considering the prevailing drought condition in the area, a tube well or water harvesting devices like RMS, small check dams etc. are desirable to prevent large scale mortalities during the period of adversity. It is desirable to provide for such exigencies specially in large tract of plantations like in compartment No.550 where plantations spread to 130 ha. at an average cost of Rs.10,000/- per ha. involves an expenditure of over 13 lacs.
- It was desirable to explore the possibility of providing some temporary check bunds to store rain water which can be used for irrigating the plantation during lean season, because the topography of the contains member of small depressions which can be utilized for the purpose.
- For forest compartments like NO. 330 & 331, it was desirable to plant Hardwickia binata in the large scale besides Dedrocalamus (Bans) of local species, along the margins. It may develop into one of the best afforestation site in future specially due to rich soil and moist humus presence.
- The Forest Department has added additional areas in the action plan of compensatory afforestation, to the prescribed afforestation targets as a contingency to account for unforeseen circumstances. In selecting forest lands for the plantations, local requirements for grazing, firewood and other winter needs were kept in view. However, considering that with the dedication of vast areas to the proposed National Parks, some future adverse impacts on the local population's Nistar needs may develop and that the wood from the submergence zone was expected to meet local fuel needs only for about 8 to 10 years, more emphasis was therefore to be laid on fodder production in plantation area in Khandwa and Dewas divisions.

C) FLORA, FAUNA & CARRYING CAPACITY :

The guidelines of the MOEF required that while seeking environmental clearance for the hydropower projects, surveys should be conducted so that the status of the flora and fauna present can be assessed, listed (rare and endangered) species can be detected, if present, and appropriate conservation measures devised.

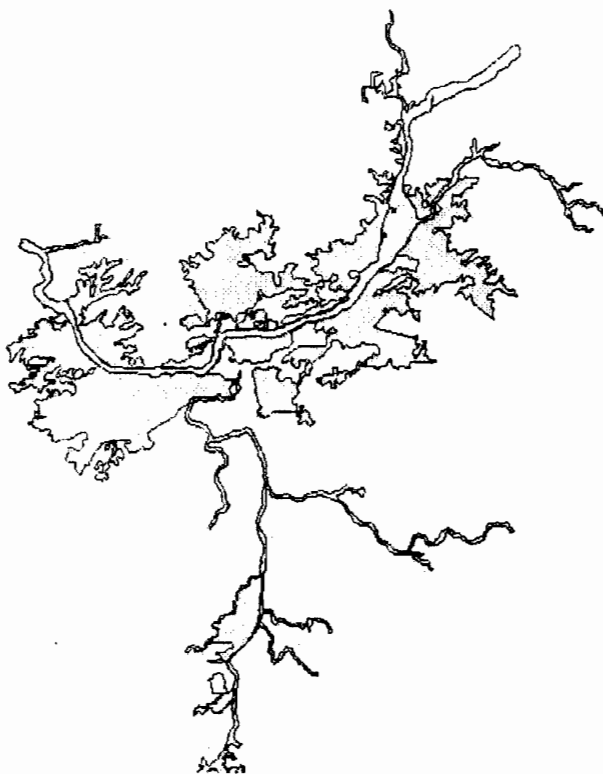
In-depth studies with focus on the following prime concerns were taken up.

- Relocating and protecting wildlife through setting up and maintenance of the permanent protection areas.
- Detailed surveys of both flora and fauna to determine the number of individuals of the various species, their habitat types and other needs, their status in terms of being endangered, threatened or protected under Indian Legislation, and recommendations for minimising project impacts and maximising opportunities for protecting and enhancing plant and animal life.
- Studies to ascertain the capacity of the surrounding areas to accommodate additional wildlife.

The objective of the suggested studies was to assess the environmental impacts as a result of the Narmada Sagar Complex, consisting of the three dams: the Narmada Sagar, Maheshwar and Omkareshwar, to ensure minimal adverse effects on wildlife as a result of the project development works. Studies were entrusted to Wildlife Institute of India and Friends of Nature Society. Institutes carried out exhaustive studies with a view to address the above concerns. Studies focused on the following.

Key concerns addressed on the terrestrial ecosystem were as follows:

- A wildlife inventory giving reliable estimates of the numbers of various species of wildlife in the project impact area.
- A catalogue of habitat types found in the project area.
- A status report on individual species indicating ones that are endangered, threatened, or protected under prevailing Indian wildlife Laws. The report on these special status species was also included the recommendations for actions to be taken to safeguard threatened species
- Recommendations for the creation of new protected areas for wildlife in the areas neighboring the submergence area.
- An assessment of the impact of the project gene pool reserves of wildlife in the project area.



Strategies Suggested by the Study groups.

Establishments of protected areas in many parts of the country in the last three decades has largely been an outcome of the Govt. concern for mitigation of the environmental degradation specially for preservation of species diversity and the genetic variations within them. Besides, maintaining productive capacities of Eco-system and safeguarding habitat critically for the local range of species. Three new protected areas were proposed to mitigate the losses. This includes Narmada National Park, Suryamanya Sanctuary and Omkareshwar Sanctuary.



Name of the Sanctuary/Park	Area in ha.
Narmada National Park	47522
Suryamanya Sanctuary	16370
Omkareshwar Sanctuary	11996
Total Area	75888

It is suggested that the severity of the impact resulting from direct and indirect losses could be minimised through restoration of some of the aquatic vertebrates and delineation of a substantial area of the contiguity forest which has similar conservation values that are being lost in submergence and to elevate its status to a protected area – a combination of a national park and sanctuary. Key aquatic vertebrates species like **Otter** was proposed to be restored and translocated. It was suggested to explore the possibility of capturing and translocation of impacted otters of Narmada Sagar into identified localities of the vacant niches in central Indian rivers. Besides, a species restoration plan for aquatic reptile **Turtle** was also suggested within the submergence zone and also in other stretches of the river with rocky structure and sandy banks. The restoration program for **Muggar** crocodile as being practices in other districts of M.P. was also suggested.

Status of Implementation

1. Regarding declaration of National Parks / Sanctuary, The committee was informed that a committee for Conservation & Management of Wildlife / Birds impacted by the submergence of the Narmada Sagar & Sardar Sarovar constituted by the Govt. of Madhya Pradesh through order dated 29th May, 1990 has recommended the creation of Omkareshwar National Park and two Sanctuaries namely – Surmanya and Mandhata to the Govt. for its consideration.
2. Friends of Nature Society, Bhopal (FoNS) prepared a detailed action plan for retrieval and conservation of terrestrial wildlife from the submergence area of Indira Sagar Project. The report recommended total expenditure of Rs.9562 lacs over a period of 5 years. No progress was reported to the committee.

Observations & suggestions :

- o That the proposal for creation of Narmada National Park, Surnmanya Sanctuary, Omkareshwar Sanctuary is long awaited. This proposal was to rehabilitate / absorb the impacted flora & fauna resulting from felling of the tree cover from the submergence area. Where as felling of the tree was in full swing, there is a lack of decision on urgent actions for declaration of the parks & sanctuary so disparately needed.
- o Creation of special zones for rehabilitation of Otter, Turtle, Mugger is also awaited.

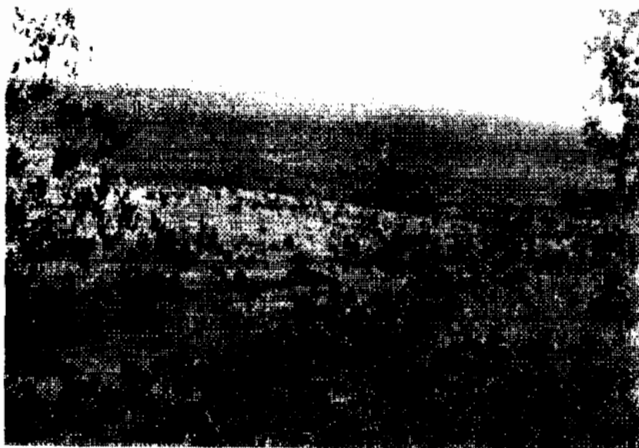
Felling from the Forest areas :

Tree felling i.e., clearance of reservoir bowl from vegetation was to be carried out prior to reservoir filling upto 4 mtrs., below the submergence. Present status of counting of trees and extent of trees felled, etc. and a detailed plan for felling of trees commensurate with felling of the trees from the submergence area was made available by the NVDA.

ha. was to be cleared in four phases, out of which 3638.461 ha forest area in Dewas and Harda Production Division and rest 20,806.710 ha area was under three subdivisions working under Narmada Sagar Forest Production Division, Khandwa.

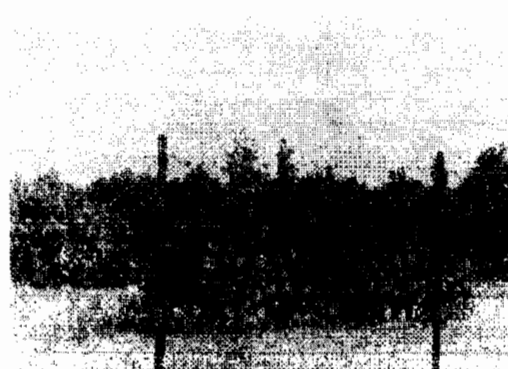
The felling plan was divided into three phase. In the First Phase felling would be carried out upto 232 m RL. During the Second phase the felling would be carried out upto 244 m RL and in the Third phase felling would be completed in the balance areas upto 4m below the FRL i.e. 258.13 m as summarised below.

Sl. No.	Name of Production Division (Forest)	Compartment No. Reserved / Protected Total	Submergence area in ha			Total
			First phase up to 232m. contour level	Second Phase up to 244 m contour level	Third Phase up to 258.13 m contour level	
1.	Forest Production Division, Khandwa	62/3 Total 65	1700.292	2099.574	4796.361	8596.227
2.	North Narmada Forest Production Division Khandwa	30/18 Total 48	1381.982	1293.862	2650.923	5326.767
3.	South Narmada Forest Production Division, Khandwa	31/17 Total 51	1089.837	2189.792	3604.08	6883.716
4	Forest Production Division, Harda	8/11 Total 19	12.502	400.428	1050.357	1463.287
5	Forest Production Division, Dewas	Forest Compt. 14 Protected 11	16.263	845.101	1313.81	2175.174
Total :			4200.876	6828.757	13415.531	24445.171



the area of 2nd phase, was also felled. Thus out of 11029.633 ha area to be felled up to RL 244 m an area of 9385.942 was completed by the end of September, 2002.

It was noted that the felling was under progress and almost entire area covering first phase was felled during last year. This year except an area of 1643.691 ha. in Khandwa Division,



Inspection : Compartment No. 332.

Inspection : Compartment No. 332.

During the visit of the committee in the Compartment No.332 felling operation were inspected. The details of area proposed for felling in this compartment were as follows :

Compartment No.	Area to be clear felled				Total
	Upto 225 m	Upto 232 m	Upto 244 m	Upto 258.13 m	
332	59.963 ha	39.975 ha.	17.563 ha	29.908 ha.	147.409 ha

Observations & Suggestions :

- Felling was required to be commensurate with progressive filling of the reservoir however the felling carried out on hillocks to be surrounded from all sides by the waters of the Indira Sagar Project though at lower level. This has resulted in higher felling then could be prescribed. The committee considered the problem of logistics in felling & logging in such areas and therefore considered this to be in order. It was however suggested that in such hillocks felling should be carried out from top to the bottom, where as in the fringes of the reservoir felling could proceed from bottom to the top.
- While felling in the submergence was permissible once the conditionality laid down in the order which permitted diversion of the forest land for the non forestry purposes, felling in progress was to be synchronized with progressive filling of the reservoir for safety of the wildlife (flora & fauna).

D) ARCHAEOLOGICAL SITES :

Investigations of the Narmada Basin revealed that valley was rich in archaeological belongings. Paleolithic, Mesolithic, Chalcolithic sites, rock cut caves and sculptures were found at several places in the valley. Monuments identified for protection / relocation were under the following categories:

1) Centrally Protected Monuments:

Archaeological Survey of India (ASI) carried out surveys of 167 villages for centrally protected monuments for identification of the monuments of significance. Only lower bastion in north of the Joga Fort is likely to be affected by scour action of water.

Archaeological survey of India prepared a detailed plan for protection of North Bastion of this fort at an estimated cost of Rs. 1.67 crores. The work was to be undertaken by NVDA.

NVDA informed that ASI has agreed to take up the work of protection of Joga Fort with the help of CPWD, however, technical supervision will remain with ASI.

2) State Protected Monuments:

State Department of Archaeological and Museum, Bhopal, carried out survey of 254 villages for identification of the Archaeological Monuments falling within the

submergence area. The State Department of archaeology prepared an Action Plan in 1993 for documentation of Monuments, collection of sculptures and construction of museum, etc. Again an Action Plan for relocation / protection of the monuments was submitted which was reviewed and up-dated in January, 1999. Out of the 10 monuments, selected for re-location Shiv Mandir at Dharikotla has been relocated.

It was informed by NVDA that in the revised action plan of 2002, Shiv Mandir, Khudiyamal previously proposed for relocation has not been included for relocation due to its deterioration. Similarly as decided by the Govt., maintenance of Singaji Samadhi has been handed over to NHDC. Whereas, Tomb of Abdul Hasan, Handia Distt. Harda being a new work, not included in the relocation plan. To delete above monuments from the list of relocation, Shiv Mandir, Sarswati Kund, Harsud has been included in the list. Therefore, in revised action plan 2002, 8 monuments have been selected for relocation of which Shiv Mandir, Dharikotla and Chatri Ghisor have already been relocated. The current status of monuments is as below.

- 254 villages surveyed for identification of Archaeological monuments coming under submergence.
- 8 Nos. of monuments have been identified which require relocation/ protection.
- 153 statues have already been collected and preserved at Museum at Dewas, Hoshangabad and Khandwa.
- Shiv Mandir Dharikotla has been relocated to Sarlaya R&R site.

Sl. No	Particulars				Status
	Name of mounment	Village / Tehsil	Distt.	RL in m	
1.	Shiv Mandir, Dharikotla	Harsud	Khandwa	229.500	Relocation completed.
2.	Shiv Mandir, Punghat	Harsud	Khandwa	240.315	Land allotment awaited.
3.	Shiv Mandir, Badkeshwar	Harsud	Khandwa	263.805	Pre-relocation work completed. Land allotment awaited.
4.	Shiv Mandir (Durga Mandir), Chandel	Khandwa	Khandwa	254.917	Land allotment awaited
5.	Chhatri Ghisor	Harsud	Khandwa	239.300	Relocation work completed.
6.	Shiv Mandir, Saraswati Kund,	Harsud	Khandwa	—	New proposal
7.	Ridheshwar Mandir, Handia	Harda	Hoshangabad	273.380	Estimate ready. Action is being taken for construction of retaining wall.
8.	Rock-cut statues	Deyat	Dewas	267.830	Estimates are under preparation.

Excavation sites (mounds)

- Gazanpur (Khatagaon, Dewas)
- Beejalpur (Khandwa)
- Gannore (Khandwa)



During the visit committee could see the relocated Dharikotla Shiv Mandir at Sarlaya village. Interaction with the rehabilitated people revealed that they are happy with the relocation work and performing puja in the mandir as earlier.

Observations & Suggestions

Archaeological monuments & mounds : Action should be taken and completed before commencement of the impoundment. A plan to this effect is desirable.

E) SEISMICITY AND RIM STABILITY OF RESERVOIR.

The Indira Sagar reservoir has a gross capacity of 12,200 million cubic meters, or about 9.9 million acre-feet, by far the largest-capacity reservoir planned in the Narmada River basin. Therefore the issues of seismicity, the potential for reservoir-induced seismicity (RIS) and the rim stability have been studied and addressed.

1. In order to study the seismic effects in the Narmada Sagar Complex Zone a network of 11 seismological observatories with sophisticated instruments are proposed to be established based on the recommendations of Erstwhile Dam Review Panel, Central Water and Power Research Station, (CWPRS) Pune and Indian Meteorological department (IMD). It is proposed to monitor pre and post impoundment seismicity also at these seismic stations to help in assessing the adequacy of seismic parameters adopted for designs. The location of these seismic observatories finalised on the recommendations of IMD are (1) Bagli (2) Barwani (3) Chhanera (4) Harda (5) Indore (6) Kannod (7) Khandwa (8) Maheshwar (9) Narmada Nagar (10) Omkareshwar (11) Pandhana.
2. Eleven Micro Earthquake (MEQ) recorders were procured by Feb.98 of which four were already installed and commissioned by March '98 at four observatories viz. (i) Narmada Nagar (ii) Omkareshwar (iii) Maheshwar and (iv) Khandwa. During the period under report two more MEQ's have been commissioned at Barwani and Chhanera. Thus, six (6) MEQs in all, have so far been installed and commissioned. Besides, 12 nos. of Wood Anderson Seismometers and 6 nos. of photographic recorders are being procured from IMD supply has commenced. Procurement of Micro Earthquake recorders was completed.

Based on the recommendations of the Dam Review Panel, detailed designs for the dam have been prepared by the Central Water Commission.

3. Status of construction of building is as follows :

47

Sl. No.	Name of Stations	Position/Progress of Works
1	Bagli (Chapra)	Status same as on 31.03.'98. Building is completed. Only electrification remains.
2	Barwani	Completed and commissioned.
3	Chhanera	Completed and commissioned.
4	Harda	Status same as on 31.03.'98. Building completed. Electrification in progress.
5	Indore	Building completed.
6	Kannod	Building completed.
7	Khandwa	Completed and commissioned.
8	Maheshwar	Completed and commissioned (The Equipment which were earlier functioning at a temporary accommodation, have since been shifted to the new building).
9	Narmada Nagar	Completed and commissioned.
10	Omkareshwar	Completed and commissioned. (The Equipment which were earlier functioning at a temporary accommodation, have since been shifted to the new building).

The dam is, in effect, over-designed in the interests of public safety. As for the Indira Sagar dam, Seismic design coefficients, though higher than needed, also meaning higher costs have been preferred.

Reservoir Rim Stability

The reservoir competency survey has been done by GSI and report is submitted. In the report, GSI suspected loss of water from the Mandla Rajghat reach and suggested further studies for some patches of narrow water divide. However studies carried out by the CWPRS confirmed that there was no loss of water. The water disappearing actually was reappearing after about 4 KM and that it was confirmed that there was no possibility of the impounded water to leach-out to any other basin. The rim was found to be generally stable.

It was informed by the NVDA that the staff engaged to analyze the seismic data is trained by IMD also the Indian Meteorological Department (IMD) is approached by the Project Authority to get the data analyzed periodically.

Inspection of experimental station at Narmada Nagar

At present, three experimental seismological stations have been established with the guidance of Central Water & Power Research Station, Pune, at Indira Sagar, Omkareshwar and Maheshwar dam sites.

Committee inspected working of the experimental station at Indira Sagar dam site



which consisted of a RV-320 Micro Earthquake Recorder, a Wood Anderson Seismograph and a Digital Recorder - 100 strong motion accelerometer. The results were being posed for analysis by the University of Roorkee & IMD.

It was informed that the earthquake which measured 6.9 on Richter scale and epicenter at Bhuj was also recorded in the observatory and its effect was only equivalent to 0.03 g at the dam site.

Observations & suggestions

Seismic monitoring stations : It is desirable to place trained staff at such stations and that proper arrangements should be made for analysis of the data by the identified institutes.

F) HEALTH ASPECTS :

The Indira Sagar Project would create a 913 km² reservoir, a main canal of 332 km. and 1,820 km of distributaries. Surveys have been conducted in the Indira Sagar impact areas to investigate existing levels of health and to gather information on specific diseases.

Studies and Findings :

Three specific diseases namely Malaria, Schistosomiasis, and Filaria were studied. Other diseases investigated were leishmaniasis and scabies and other water-washed diseases. The geographical reconnaissance study, to identify the potential breeding sites of malaria vector, was being explored.

Pre-impoundment and post-impoundment Limnological studies carried out by three Universities included water quality aspect. In addition J. L. University, Jabalpur through their research station at Khandwa in M.P. carried out detailed studies on the runn-off from the command of Indira Sagar project on, the water quality aspects related with the use of insecticides and pesticides.

Department of Preventive and Social Medicine, Gandhi Medical College, Bhopal were engaged for the epidemiological studies. The results of the studies were based on the survey carried out for the areas already impounded and simulations were applicable to the areas likely to be impounded. This included both Indira Sagar and Sardar Sarovar Project.

According to the above studies, key findings included the following :

- Malaria is increasing in Khandwa and Khargone Districts surrounding the Indira Sagar Dam site.
- Cholera and gastroenteritis are endemic in Indore, Dhar and Jhabua Districts for more than seven months each year.
- Other common diseases are typhoid and dengue fever, although they are not often found in the project area.
- Filariasis is endemic to at least eight districts of MP, including Chindwara, adjacent to the Narmada Sagar Site. The vector mosquito (mainly *Culex fatigans* responsible

- Cholera and gastroenteritis are endemic in Indore, Dhar and Jhabua Districts for more than seven months each year.
- Other common diseases are typhoid and dengue fever, although they are not often found in the project area.
- Filariasis is endemic to at least eight districts of MP, including Chindwara, adjacent to the Narmada Sagar Site. The vector mosquito (mainly *Culex fatigans* responsible for this parasitic diseases proliferates in dirty water in ponded areas and artificial containers and also to a lesser extent in stagnant irrigation tributaries and lakes.
- Little or no autochthonous leishmaniasis exists at present in MP. This disease is not water related since it is spread by sand flies that do not need water to breed. However, according to NICD, Delhi, leishmaniasis flared up following the construction of the Rajasthan canal.
- Guinea worm disease (dracontiasis) affects 3,000 villages in MP. This disease is caused by a nematode worm and the vector for its transmission is Cyclops, the fresh water fleas.

NICD through their letter dated 21st February, 2002 suggested

- continuous monitoring of vector behavior in the rest of the pre and post impoundment areas and also agreed to provide support to the state on estimation of helminthic load upon receiving a proposal from the GOMP in this regard.

Strategies Suggested by the Study Groups

Means to mitigation schistosomiasis include physical, chemical, and biological measures.

- Physical mitigation measures include draining area with standing water, clearing vegetation from water channels and banks, utilising flushing flows, and manipulating water levels.
- The primary chemical mitigation measure is the use of molluscicides.
- Biological mitigation measures would include the use of predator species that would eat the secondary host i.e. snails. Schistosomiasis is to be kept out of the project area through vigilant monitoring and the prompt use of eradication measures when needed

Malaria is another disease that requires monitoring and control actions in the project areas. Preventive measures are to be in place to keep the mosquitoes in check.

- Research to maintain effective biocides will have to be continued on long term basis.
- Land levelling and land filling operations as well as appropriate vegetation clearing are being integrated.
- Control measures will include larvae-eating fish in water bodies, mosquito-inhibiting plants, and clearing of vegetation and other actions to destroy breeding sites.
- The incidence of water-washed diseases would be reduced by the increased availability of water.

Plans have been prepared in both project areas to increase public health-related facilities, staffing, and services during project implementation. The incidence of water borne diseases in the Narmada Valley, as elsewhere in MP, is constantly being monitored by GOMP's Directorate of Health Services (DHS).

- PHC 3 nos., equipped with 5 beds each, equipments, vehicles, staff etc.
- 2 civil dispensaries with labs
- 24 sub-health centres with equipments etc.

Action Plan includes continued investigations of the Central and Western Zone of Narmada at selected sites for the identified parameters. In addition, plan proposes biological characteristic study, microphytes, phytoplankton, zooplanktons, micro invertebrates, biomass etc. The proposal includes among others continued limnological studies, ecological studies. For studies on health aspect in project impact areas of SSP and NSP, work is proposed through a cell of monitoring and evaluation under the Directorate of Health Services, Bhopal. The approved plan is being implemented.

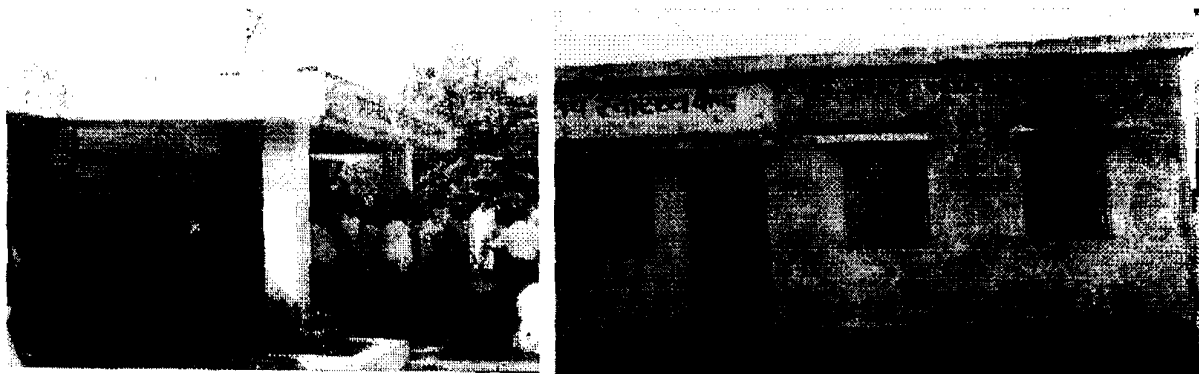
For long term hydro-biological monitoring, one well equipped laboratory has been established.

Progress on work on Health services being created in ISP.

Sl. No.	Rehabilitation sites	Provision	Status
1.	Bedhani	Ayurvedic Hospital	Work in progress
2.	Anjania Khurd	Ayurvedic Hospital	Work in progress
3.	Chainpur	Ayurvedic Hospital	Work in progresss
4.	Saralya	Sub-Health Centre	Work completed
5.	Narmada Nagar	Medical Unit with 20 bedded Hospital for workforce of ISP	Functioning at Punasa Dam site.

Inspection of the Public Health Unit at Narmada Nagar

Work was in progress for Ayurvedic Hospital at Bedhani, Chainpur and Anjania Khurd R&R sites, one sub health centre at Sarlaya completed. During discussions it was informed by the duty doctors that Malaria surveillance shows decreasing trend in that area.



Observations & Suggestions

- It is desirable that disease surveillance infrastructure with qualified staff are put in place in time.
- Preventing measures are required to be built in at the existing institutions as well as in the Institutions proposed to be provided as per the action plan commensurate with impoundment.

Observations & Suggestions

- It is desirable that disease surveillance infrastructure with qualified staff are put in place in time.
- Preventing measures are required to be built in at the existing institutions as well as in the Institutions proposed to be provided as per the action plan commensurate with impoundment.
- Since project area qualifies for spray of insecticides even though it may have API below two, it is desirable that the medical cell proposed in the NVDA be made functional urgently to coordinate various programme which might be already under way under different schemes of the Central and the State Govts.
- it was desirable that report of the Gandhi Medical College be translated into action plan for implementation.

G) COMMAND AREA DEVELOPMENT

Main components of the Command Area included on Farm development, Conjunctive Use, Agro industries, Regulated Market, Warehousing Facilities, Roads etc. with the objective of;

- Optimum utilisation of created potential of irrigation
- Introduction of multiple cropping patterns and increasing the levels of productivity and strengthening of agriculture research activities
- Creation of adequate communication and storage facilities
- Conservation management of integrated fisheries development
- Intensification of dairy development

It was informed that the action plan originally submitted in 1986 was under revision. In accordance with the suggestions in the environment sub-group, Terms of References were being drawn-up.

H) RESETTLEMENT & REHABILITATION

Committee was informed of the features of R&R policy enunciated and applicable to the Indira Sagar Project. Salient features of the policy were as follows :

Salient Features of the R&R policy of Govt. of M.P.:

- Provision of land in lieu of Agricultural Land if more than 25% of Agricultural land is coming under submergence.
- Minimum of 2 Ha Agricultural land is provided.
- If displaced family's 75% land is being acquired and displaced family wishes balance 25% land may also be acquired and payments may be made accordingly.
- Provision of Cash Compensation in one go if displaced family does not want land for land.
- Every major son and major unmarried daughter to be considered as a separate family and they will also be entitled to all the benefits of R&R policy which are for other families.

- Compensation for Agricultural land will be based on the value of agricultural land in the near by Command Area.
- Encroachers are also to be compensated for their land.
- Compensation provided for Private Houses which are coming under Submergence. The compensation will be based on cost on which reconstruction can be made.
- House owners allowed to take with them all goods/agricultural produce and other stored items. This will be in addition to compensation.
- Provision of homestead plot measuring 60 x 90 ft. (502 Sq.m.) at new resettlement location free of cost to displaced families.
- Provision for arrangement of irrigation facilities while providing agricultural land in lieu of agricultural land acquired. In case no agricultural facilities are available, a land measuring 4.0 Ha shall be given instead of 2.0 Ha.
- For those families who are living under Poverty Line, in addition to compensation for their houses, they will be provided with grants under Indira Awas Yojna as per eligibility.
- If the cost of new plot is more than the compensation paid for their acquired plots, balance amount shall be borne by Government.
- Those families who are residing in urban areas on rented accommodation, they will be provided plots for construction of houses on payment basis as per the Income group. However, if these families are living under Poverty Line they will be eligible for plot free of cost.
- Compensation of houses shall be based on cost of construction which is prevailing.
- New urban resettlement sites will be provided with all Civic facilities. Initially resettlement grants shall be paid. For Small & marginal farmers this grant is Rs. 18,700/-. Scheduled Caste & Schedule Tribes farmers Rs. 18,700/- and other land holders at Rs. 9,350/-.
- Provision for Vocational Training facilities.
- This package has been further liberalized in July'98 and various welfare measures added which are as follows:
 1. Now assessment of land (to be acquired) shall be on the basis of land rate (market Price) of Seoni Malwa instead of Harda area which is on the tail end.
 2. The assessment of acquired wells of the displaced agriculturists shall be now on actual basis which will be in line with CSR of PWD. Previously cost was reimbursed as per JEEVAN DHARA YOJNA.
 3. No compensation was being paid for Cement Concrete pipes/PVC pipes/Drains etc in the acquired land. Now this will also be assessed and compensated.
 4. Those displaced families who do not want to take residential plots at resettlement sites were being given Rs. 15,000/- as grant. Now decision has been taken by Government to increase this amount to Rs. 20,000/- as per Indira Awas Yojna.
- A new resettlement site shall be developed for the displaced families near Mundi town.
- Those families who give an undertaking to shift within one month shall be given compensation in one installment instead of two installments.
- If a family wants to purchase land at any other place which costs more than the compensation received, the balance amount shall be paid as interest free loan to be paid in 20 years.
- Provision for contingency measures for families who are to be shifted immediately. The measures include construction of temporary sheds, drinking

water, health measures, boats, diver/swimmer groups and free food during this period.

- Displaced families under new awards shall be paid compensation for their land at market rates with new procedure which includes discussion with displaced families of five village in assessment of land.
- In those old awards of Indira Sagar Project where complaints of low rates of compensation are received, a committee under the Chairmanship of Divisional Commissioner shall review the matter and decide. The balance money, as the case may be, will be sanctioned as special resettlement grant.
- The cost of Stamp Duty and Registration fee for those displaced families who purchase land at other place shall be borne by M. P. Government.
- The eligible members of displaced families in new resettlement sites will get preference in employment as Shiksha Karmi.
- Those encroachers on forest land who have lost their relevant papers, it will be checked from Government records and they will also paid compensation accordingly.
- In addition to land to be acquired for submergence, if land is required for other purposes like for construction of resettlement sites, bridges, roads, etc., the displaced families shall be entitled to all the benefits as per eligibility which are for other affected people in submergence area. The policy framed for Indira Sagar Project will be applicable to similar other ongoing projects in Narmada Valley Development Department.

The submergence

Families affected

(81 census)	16,100
(Estimated at 2000 level)	31,678

Population affected

(81 census)	80,572
(Estimated at 2000 level)	1,29,000

Break-up of Families Affected (present estimates)

-	General	:	15,191
-	SC/ ST	:	7,109
-	Landless	:	5,784
-	Major Sons	:	3,594

Land affected

Cultivated area (in Ha)	44,363
Other area (in Ha)	5,565
Forest area (in Ha)	41,420
TOTAL	91,348

Status as on 15th July, 2002

Expenditure estimates

Sanctioned	R s. 1160 Cr
Spent	Rs.. 106 Cr

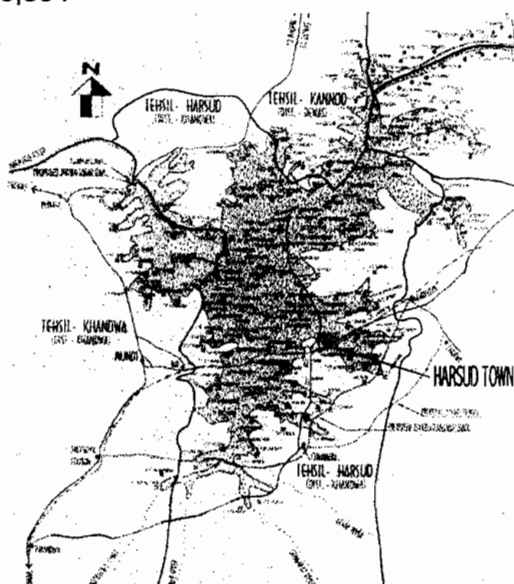
Land required

Rehabilitation sites : 2043.58 Ha.

Agriculture : 42727.61 Ha

Sites

Identified	38
Sites Developed (Min. Facilities)	4

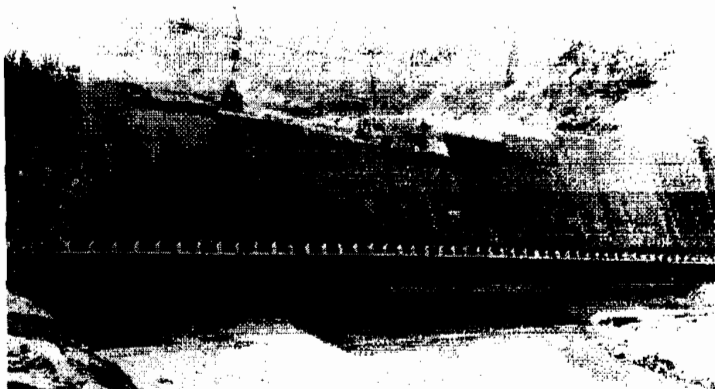


PHASE	DAM LEVEL	AFFLUX LEVEL	No. of Affected Village	No. of Families Affected	SECTION IV	SECTION VI	AWARD	No. of Families Shifted
I	215.00	235.00	27	5401	27	27	27	2050
II	225.00	246.00	32	6244	32	32	13	1025
III	245.13		60	20033	28	24		
III	262.13	262.13	130					
Total :			249	31678	87	83	40	3075

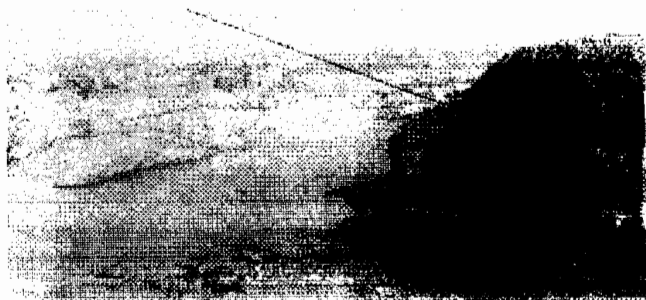
Observations & Key Recommendations for implementation of Environment Safeguard Measures, pari-passu with the construction works on the project.

As per available information the concreting was completed up to RL 215m. in the central portion whereas side blocks were raised up to RL 245.13m.

According to the construction schedule, concreting is to be completed up to RL 231m by December 2002, in the central portion. Profile of the dam is enclosed at Annex - VI.



- Considering that the diversion channel of ISP is not yet plugged, the areas likely to be impounded permanently at the existing R.L. of lowest block at 215 m would be nil.
- Considering that until diversion channel of ISP at 218 m was plugged, the areas likely to be impounded permanently at the proposed R.L. of lowest block at 225 m would also be nil.
- Considering that NHDC has a programme to plug the diversion channels by October, 2003 as per the existing construction programme, the issue of actual permanent impoundment would arise thereafter. However till then following considerations will be necessary.
 - The schedule of construction is to be considered in totality i.e. the afflux to be caused at the dam site and its consequential submergence in time and space. To ascertain the synchronization of the needed actions on various parameters of environment.



- The schedule of construction is to be considered in totality i.e. the afflux to be caused at the dam site and its consequential submergence in time and space. To ascertain the synchronization of the needed actions on various parameters of environment.

Key Recommendations

1. It was noted by the committee that extent of the coverage on catchment area treatment, compensatory afforestation, protection / relocation / collection of the monuments of importance was appreciable. Works on seismic monitoring were also in place.
2. Committee observed that there was a need for firming up and putting up the required actions in time for mitigation measures to be effective and / or of any concern specially in the areas of Public Health and water quality.
3. Committee noted with concern lack of synchronization in the activities related to implementation of the recommendations of the research institutions like Wild Life Institute of India and Friends of Nature Society, Bhopal, Barkatullah University, Bhopal etc. The specific concern included the following
 - That the proposal for creation of Namada National Park, Summanya Sanctuary, Omkareshwar Sanctuary is long awaited. This proposal was to rehabilitate / absorbed the impacted flora & fauna resulting from felling of the tree cover from the submergence area. Where as felling of the tree was in full swing, there is a lack of decision on urgent actions for declaration of the parks & sanctuary so disparately needed. Information on creation of special zones for rehabilitation of **Otter, Turtle, Mugger** was also awaited.
 - While felling in the submergence was permissible once the conditionality laid down in the order which permitted diversion of the forest land for the non forestry purposes was complied with. Felling in progress was to be synchronized with progressive filling of the reservoir for safety of the wildlife (flora & fauna). Though required, this has not yet happened.
4. Status of rehabilitation and resettlement was made available as it related to the construction activities. Committee looked into the details but without going into the quality and extent observed as follows :
 - As per the policy of the State Govts, depending upon the stage of construction, considering the observed flood of 1972 (1 in 50 years) rehabilitation was completed for 27 villages (level of 215 m) and 32 villages (level of 225 m) respectively with backwater levels of 235 and 246 respectively. Similar levels / considerations were needed for implementing the action plans on flora and fauna / felling etc.
 - Committee was of the view that R&R works should be completed prior to submergence in accordance with the policy of the State Govts.
5. For removing forest produce and felled trees from submergence area target date was 30th June, 2003, which has been extended to 30th June, 2004. Committee was

concerned on possibility of regeneration of trees in the areas felled in advance of the submergence and manifestation of related environmental consequences.

6. Limnological studies carried out by the three Universities jointly for the upper, middle & lower Narmada suggested long term hydro-biological studies. The action plan prepared by the NVDA for the water quality aspects was modified on the suggestions of the MoEF required collection of data before and after impoundment is yet to be put up in place. Committee recommended that the plan be made operational at the earliest.
7. Action plan prepared by the NVDA on fisheries development in 1984 required updating in view of the recommendations contained in the reports generated by the Central Inland Capture Fisheries Research Institute (CICFRI), Barrackpore.
8. Committee considered the construction schedule of canal and distributaries network and desired that updated action plan covering the aspects suggested by the environment sub-group from time to time be prepared and put into the place in time.

CONCLUSION

The status of compliances on Environmental parameters was assessed by the committee and the conclusions derived are presented in the following table :

Parameters	Status	Whether pari-passu
Catchment Area Treatment	Nearly completed	Yes
Compensatory Afforestation	Nearly completed	Yes
Archaeology	In progress	Yes
Seismicity & Rim Stability	In progress.	Yes
Health Aspects	In progress.	Area of concern
Command Area Development	TOR not yet framed	Area of concern
Flora Fauna & Carrying Capacity	Studies completed. Intention plan yet to be translated into Action Plan.	Possible infringement.
Resettlement & Rehabilitation	Work in progress	Not Assessed

Committee therefore suggested that actions be taken on top priority in the areas where there is possibility of infringement and accelerate the actions in the areas of concern for ensuring speedy implementation of the project.

ACKNOWLEDGEMENTS

The Committee wishes to place on record its appreciation for the arrangements made, for the visits, by Narmada Control Authority, Narmada Valley Development Authority and Narmada Hydroelectric Development Corporation.

ANNEX – XXXVIII –(6)

**Environment Management
Sardar Sarovar and Indira Sagar Project
June & September, 2002**

I N D E X

Page No.

Chapter 1	
INTRODUCTION	
❖ Master Plan For The Development Of Narmada River Basin: NWDTA	2
❖ Key Directives By The NWDT On Environment & Rehabilitation	3
❖ Environmental Clearance by Govt. of India	4
❖ Forest Clearances for SSP and ISP	5
❖ Investment Clearance for SSP	6
❖ Investment Clearance for ISP	6
❖ NHDC and Govt., of Madhya Pradesh (Joint Venture)	7
❖ Monitoring by the NCA.	7
❖ Environment Sub-group of NCA	8
❖ Functions Of The Environment Sub-Group.	8
❖ Environment and Rehabilitation Wing Of The NCA	8
❖ Environment Sub-Groups Of NCA	8
❖ Important Sub-Groups and Sub-Committees On Environment	9
SARDAR SAROVAR PROJECT	
❖ Salient Features of the Project	10
❖ The Project	10
❖ Additional benefits	10
❖ The submergence	10
❖ Land use pattern under submergence	11
Development and Current Status of the Management of SSP Environment	12
Chapter 2	
CATCHMENT AREA TREATMENT	
❖ Studies	13
❖ Planning	14
❖ Phase-I: directly draining sub-watersheds	14
❖ Action plans	14
❖ Implementation	15
❖ Phase-II: indirectly draining sub-watersheds	19
Chapter 3	
COMPENSATORY AFFORESTATION	
❖ Studies	22
❖ Action plans	22
❖ Implementation	23
Chapter 4	
COMMAND AREA DEVELOPMENT	
❖ (A) Current scenario : Government of Gujarat	26
❖ <i>Agriculture Practices and Socio Economic</i>	27
❖ <i>Drainage, Waterlogging and Salinity</i>	28
❖ <i>Ground Water Studies</i>	28
❖ <i>Drainage studies</i>	29
❖ <i>Floral and Faunal Studies</i>	29
❖ <i>Findings of the Study Groups</i>	31
❖ <i>Fisheries</i>	32
❖ <i>Health</i>	32
❖ <i>Water Quality</i>	32

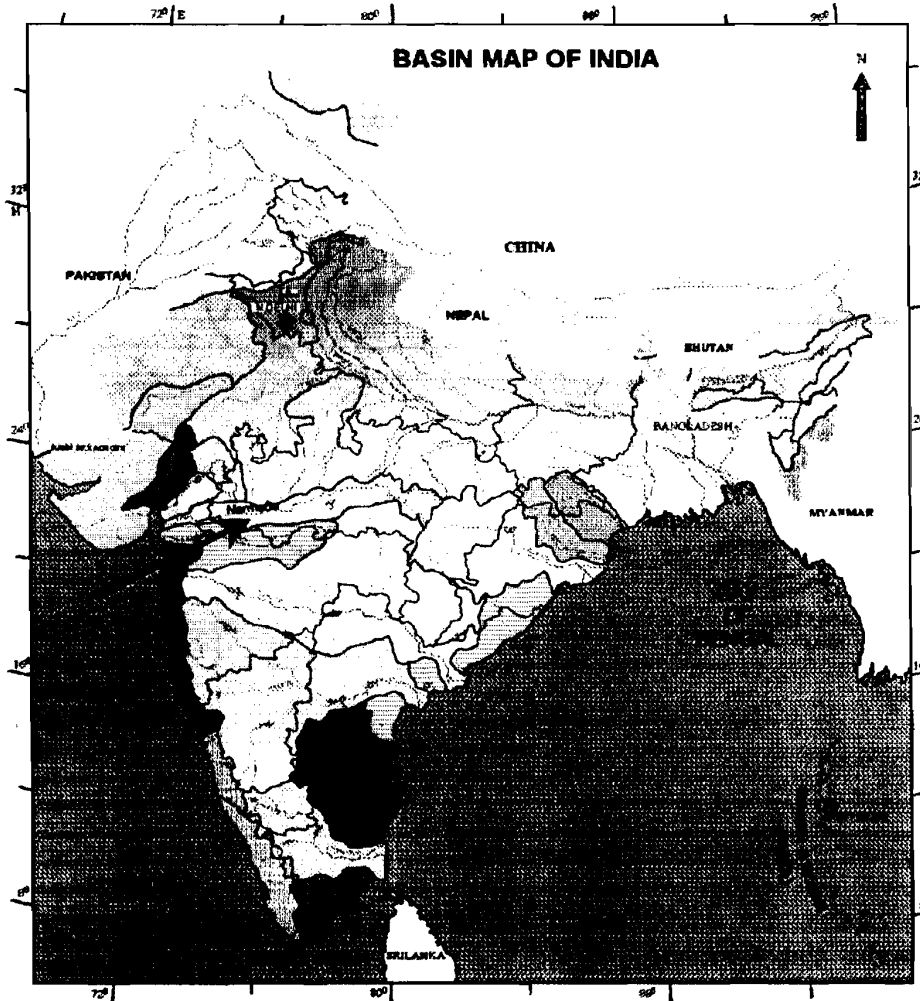
❖ <i>Command Area Development Planning</i>	33
❖ <i>Agro climatic zones</i>	33
❖ <i>Land irrigability classification</i>	33
❖ <i>Proposed Management Measures</i>	35
❖ <i>Water Logging and Salinity</i>	36
❖ <i>Biological Environment – Sanctuaries in the Command</i>	38
❖ <i>Biological Resources and issues in the Command</i>	40
❖ <i>Public Health</i>	41
❖ <i>Action Plan</i>	43
❖ <i>Implementation</i>	43
❖ B) Current Scenario : Government of Rajasthan <ul style="list-style-type: none"> ▪ Narmada Main Canal ▪ Water Delivery Network ▪ The Distribution System of VSAs ▪ Drainage System 	44
❖ Environment Planning	46
• Negative Impacts and Positive Impacts	46
• Implementation	48
Chapter 5	
FLORA, FAUNA, WILDLIFE AND CARRYING CAPACITY	
❖ Studies / surveys	50
❖ Recommendations of the key studies	51
❖ Action plans	52
❖ Wildlife (Terrestrial)	52
❖ Special measures like sanctuary development in the vicinity / additional plantations.	53
❖ Felling of the Forest from the submergence area	54
❖ Improving the carrying capacity of adjoining eco-system through catchment area treatment programme.	55
❖ B) Fisheries (Aquatic):	58
❖ Implementation	59
Chapter 6	
SEISMICITY	
❖ Studies	61
❖ Implementation	61
❖ Status of implementation of Seismicity aspects	62
Chapter 7	
HEALTH ASPECTS	
❖ Studies and Action Plan	63
❖ Status of Implementation of Actions for Public Health	64
❖ Implementation	66
Chapter 8	
ARCHAEOLOGICAL ANTHROPOLOGICAL	
ARCHAEOLOGICAL SURVEY	
❖ Studies and Action Plans	70
❖ Implementation	72
❖ Collection and display at Museum	72
ANTHROPOLOGICAL SURVEY & STUDIES	76
INDIRA SAGAR PROJECT	
❖ Indira Sagar Dam	77
❖ Plan of implementation	78
❖ Regulatory release to SSP	78

❖ Submergence of land	78
❖ Aquatic eco-system	79
❖ Downstream environment	80
❖ Key issues in Indira Sagar Project	80
Phased catchment area treatment	
• Studies	81
• Phased programme and Action Plan:	82
• Phase-I Programme	83
• Implementation	83
• Freely Draining Area (Excluding Directly Draining Sub-watersheds)	83
• Action plan :	84
• Implementation :	84
• Requirement of Funds	84
Compensatory afforestation:	
• Action plan	87
• Implementation :	88
Command area development	
• Studies and findings	89
• Suggested strategies	90
• Action plan :	90
• Implementation	91
Flora, fauna and carrying capacity	
• Studies	92
• Suggested strategies	93
• Action plan and implementation	94
SEISMICITY AND RIM STABILITY	
• Studies	95
• Suggested strategies	95
• Reservoir rim stability	97
Health aspect:	
• Studies and findings :	98
• Suggested strategies :	98
• Action plan :	99
• Implementation :	100
Archaeological & anthropological survey:	
Archaeological aspects	
• Surveys :	100
• Action plan :	100
• State protected monuments :	100
• Centrally protected monuments :	102
• Implementation :	102
• Plan of Archaeological Survey of India	102
Anthropological aspects:	
• Surveys/studies :	103
• Action plan :	103
• Implementation :	104
CLEARANCES ACCORDED TO SSP & ISP	
• Clearance from Environmental angle to SSP & ISP by MOEF	105
• Order of MOEF permitting diversion of forest land for SSP.	106
• Order of MOEF permitting diversion of forest land for ISP	108

Chapter - 1

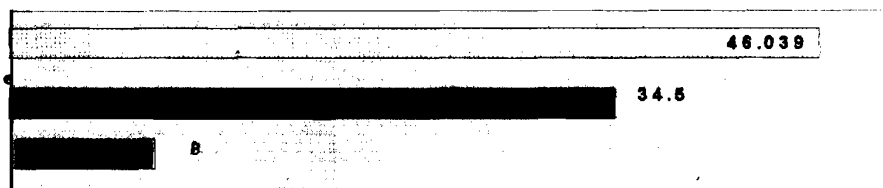
Environment Management

Sardar Sarovar and Indira Sagar Project



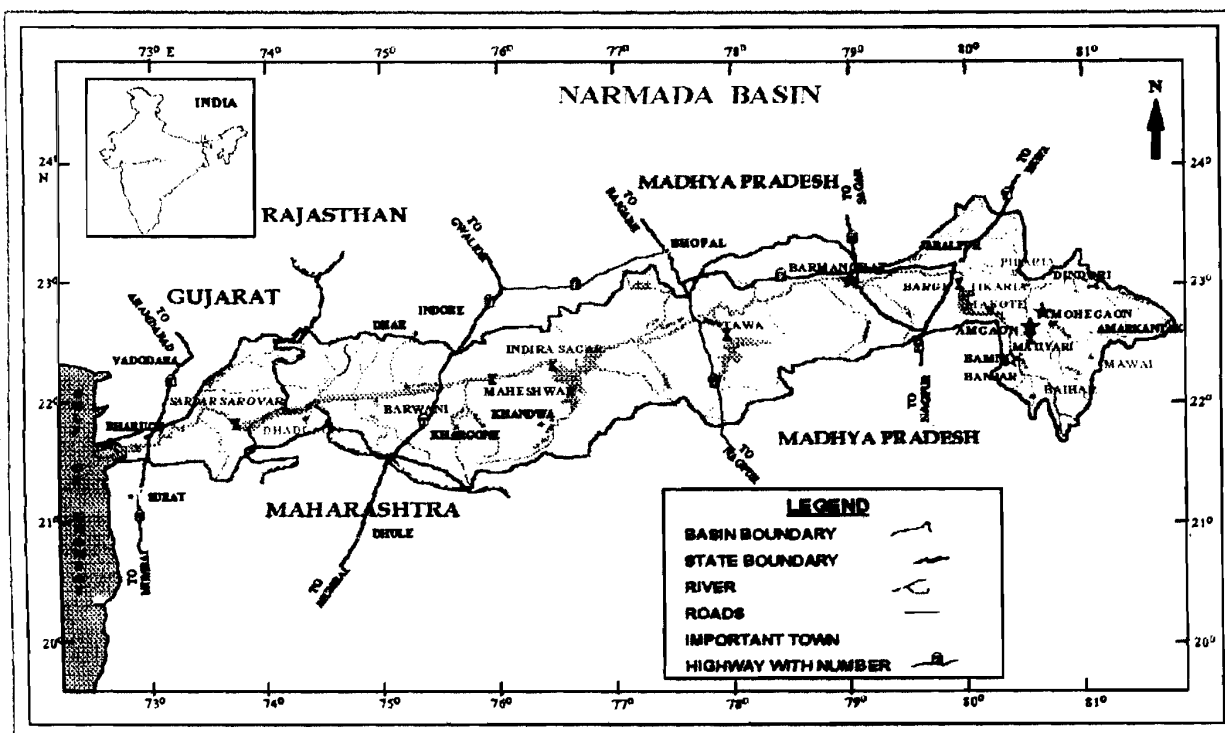
Narmada is the fifth largest river of India. It is also the largest west flowing, least polluted river. Its length from Amarkantak to Arabian Sea is - 1312 Km. The mean Annual Rainfall in the basin is 1,180 mm (46.45 inches) and Average Annual Run-Off is 41,000 M.Cu.M (33.21 MAF). Its catchment area is about 98,000 Sq.Km, which is spread to the State of Madhya Pradesh, Maharashtra and Gujarat. The current utilization of the Narmada water is as follows (Units in MAF.).

Average Annual Potential
Estimated Utilisable Water
Present Use



Master Plan For The Development Of Narmada River Basin: NWDTA

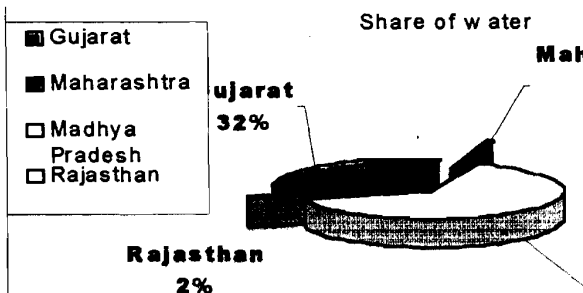
In 1965, Government of India appointed a committee to develop a master plan for the Narmada Basin. The committee's recommendations were not accepted by the riparian states. This impasse led to the constitution of the Narmada Water Disputes Tribunal in 1969 by Government of India under Inter State Water Dispute Act of 1956, for adjudication of water disputes of Narmada among riparian States. Its deliberations continued until 1979. The Tribunal considered the Sardar Sarovar Projects and the Narmada Sagar Projects together using the best hydrological, engineering, and other evidence available and passed the order which was notified in Gazette on December 16th, 1979.



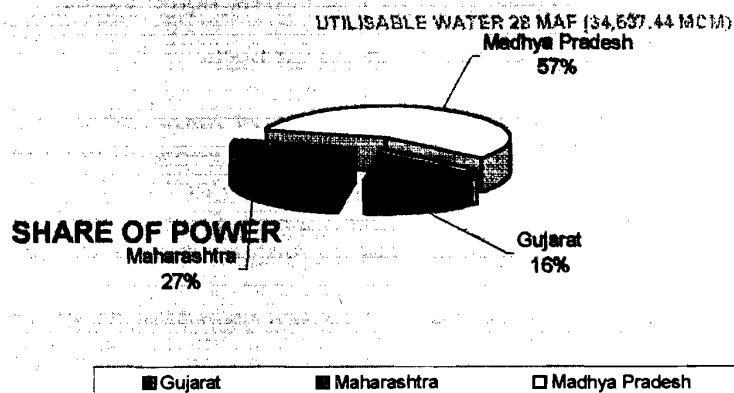
NWDT: Award

In its 1979 award, the Narmada Water Disputes Tribunal made many of the most fundamental decisions about the Projects. These included the dam location, regulation of flows, reservoir levels etc. There are points in the Tribunal award that bear on the environmental aspects of Sardar Sarovar Project which are summarised below:

- + The utilizable quantum of Narmada waters at the Sardar Sarovar dam site is specified at 28 million acre feet (MAF) on the basis of 75 per cent dependability.
- + Apportionment is to be 18.25 MAF for Madhya Pradesh, Gujarat 9.00 MAF, Rajasthan 0.50 MAF, and Maharashtra 0.25 or in that ratio.



- + The canal and dam water levels are fixed. Madhya Pradesh is to provide regulated releases of water from the Narmada Sagar Projects to the Sardar Sarovar Projects.
- + the multi-purpose character of the project, including hydroelectric power, is affirmed.
- + The apportionment /sharing of water are subject to review after 45 years.

**Sardar Sarovar Dam**

Full Reservoir Level = + 138.68 M [+455']
 Maximum Water Level = + 140.21 M [+460']

Indira Sagar Dam [M.P.]

Full Reservoir Level = + 262.13 M [860']

Narmada Main Canal

Full Supply Level = + 91.44 M [+300']

Estimates of Govt. of Madhya Pradesh anticipate that over the next half century there will be 29 major, 135 medium, and about 3,000 minor projects in the Narmada River valley. The Sardar Sarovar, one of the first to be built on the main river, is the terminal project on the river system and its benefits and impacts, are linked to developments of Indira Sagar Project upstream.

Key Directives By The NWDT On Environment & Rehabilitation

Fisheries development (NWDTA clause XI, sub-clause V (6) & (7) : The NWDT direction regarding this is in para- 5 & 7 of Sub-clause V of final order and decision of NWDT in Chapter XX of the Report of Volume II. The decision is reproduced below:

- V(6) "Notwithstanding vesting in Gujarat of the lands coming under submergence, Madhya Pradesh and Maharashtra shall continue to enjoy all rights of sovereignty intact over the submerged area in the respective States".
- V(7) "Madhya Pradesh and Maharashtra respectively shall be exclusively entitled to all rights of fishing, boating and water transportation over the part of lake over the submerged land within Madhya Pradesh and Maharashtra respectively provided, however, that such right is not exercised to the prejudice of any utilities of the legitimate performance of their duties by the project personnel".
- Monitoring of the protection shifting/relocation of the monuments of archaeological significance being affected by the submergence of Sardar Sarovar, Narmada Sagar, (NWDT clause XI-sub-clause III (4) & XIV-7,8(3)(iv).
- Studies related to Downstream scenario for estimating impacts of project activities (NWDT clause IX (Vii) related to indenting of water for downstream by Gujarat.

- Clause XI{sub clause I to VI, page 110-115}deals with the provision for rehabilitation of oustees (PAFs) from submergence area of Madhya Pradesh and Maharashtra who are likely to be resettled in Gujarat or in their home states.

Environmental Clearance by Govt. of India

It is recognised that the creation of reservoir will bring in environmental, social and economic impacts and that there will be changes in environmental regime in the upstream, downstream and in the command basically due to submergence and displacement of people and wildlife and irrigation in the command. Such changes are required to be assessed and evaluated for taking decision before proceeding with the project.

Ministry of Water Resources the then Ministry of Irrigation & Power had developed detailed guidelines framed during October, 1980 for project formulations which included a detailed check-list by the Ministry of Environment & Forests, the then department of Environment of the department of Science & Technology of the Govt. of India, for assessment of environmental impact of the projects and planning for Environmental Safeguard Measures.

In accordance with the requirement of the Department of Environment, project authorities submitted the detailed project report (DPR) along with the needed information on environmental issues during February to October 1980. Environmental Appraisal Committee of the Ministry of Environment & Forests approved the project in principle during its 12th meeting held in 1983 and sought more information & data on certain parameters of Environmental impact & management which were subsequently provided through additional documentations over a period of time in various stages of completeness by three states i.e. Maharashtra, Gujarat and Madhya Pradesh. The information provided was also updated from-time-to-time. The studies action and data were considered at levels and the projects namely Sardar Sarovar in Gujarat and Indira Sagar in Madhya Pradesh were formally cleared from environmental angle on 24th June 1987 by the Ministry of Environment & Forests, Govt. of India. Before a formal clearance by the Ministry of Environment & Forests, Narmada Control Authority was expanded and was entrusted with the increased responsibilities in the areas of environment and rehabilitation.

Permission for diversion of the forestland was also subsequently accorded for both the projects separately by the MOEF during October, 1987 and December 1987. The Investment Clearance for the Sardar Sarovar and Indira Sagar Project was received from the Planning Commission during October, 1988 and November, 1988 respectively, thus paving the way for implementation of these projects.

The clearances issued subsequent to the expansion of the NCA by the Central Government departments, contained certain conditions to be complied with during the course of project implementation

The Narmada Control Authority was given the responsibilities to ensure that the environmental safeguard measures would be planned and implemented in depth and the pace of its implementation would be pari passu with the progress of the work on the Projects namely the **Sardar Sarovar and Indira Sagar Projects**. The four conditions of the clearance were:

- **the Narmada Control Authority would ensure that the environmental safeguard measures are planned and implemented pari passu with the progress of the work on the project;**
- the detailed surveys/studies would be done
- catchment area treatment and rehabilitation programs would be completed ahead of reservoir filling.
- The Department of Environment would be kept informed of progress.

Forest Clearance For SSP

In September 1987, under the Forest (Conservation) Act, 1980 the Central government gave approval for the diversion of over 13,386 hectares of forest land for the Sardar Sarovar Projects. This approval was subject to eleven conditions in all three states, of which the following are especially relevant.

- detailed compensatory afforestation plans would be submitted.
- a proposal for non-forest areas for rehabilitation of oustees would be submitted.
- compensatory afforestation would be in double the area of degraded forest lands in addition to the afforestation of equivalent non-forest land, and a scheme for this would be submitted.
- a catchment area treatment plan will be prepared by November 30, 1987, failing which a central government team would be appointed at a cost to the project.

Forest Clearance For ISP

The key conditions attached with the order of Ministry of Environment & Forests, Government of India permitting diversion of forestland were as follows:

- The State Government of Madhya Pradesh will intimate by 31st December 1987, the complete details of equivalent non-forestland identified for compensatory afforestation, preferably in project impact area.
- Since the project involves violation of Forest (Conservation) Act, 1980, compensatory afforestation will be carried out over suitable degraded forestland double the diverted forest area in extent and in addition to the equivalent area in non-forestland. For this purpose, the area offered by the State Government vide their letter No.5/III/84-10-3, dated 14.10.1986 will be accepted and compensatory afforestation raised at the cost of the project in this area.
- For conservation and management of wildlife, a committee will be constituted by the State Government by 15th December 1987 which will include a representative from the Government of India. The Committee will suggest the necessary steps to be taken and draw up a plan, which will be implemented at the cost of the project.
- Forest clearance will be done only upto 4 M below FRL.
- Tree planting will also be done on either side of canal, road and foreshore of the reservoir lands under the control of the Irrigation Department in the command area.
- In order that the construction labour and staff while working on the project in the forest area may not cause destruction of forests for meeting their fuel wood free of cost to the labourers.
- Legal status of the forestland will remain unchanged.

The key conditions attached with the order of Department of Forest, Government of Madhya Pradesh reconveying diversion of forestland for the ISP were as follows:

1. वन भूमि का वैधानिक स्वरूप परिवर्तित नहीं होगा। भूमि पर स्वात्वाधिकार वन विभाग का ही रहेगा। परियोजना अधिकारियों को केवल वन भूमि के उपयोग की अनुमति रहेगी।
2. जितने वन क्षेत्र पर वन विभाग की अनुमति के बिना कार्य कर वन संरक्षण अधिनियम का उल्लंघन किया है उसके दुगुने बिगड़े वन क्षेत्र पर वृक्षारोपण किया जाये तथा समतुल्य अन्य क्षेत्र पर तो वृक्षारोपण किया ही जायेगा। शासन के समसंख्या पत्र दिनांक 14-10-1986 से भारत सरकार को प्रेषित वृक्षारोपण योजना के अन्तर्गत प्रस्तावित क्षेत्र इस कार्य हेतु मान्य होगा। वृक्षारोपण पर होने वाला पूर्ण व्यय परियोजना के लिये उपलब्ध राशि में से किया जायेगा।
3. वन्य प्राणियों के संरक्षण व प्रबन्ध हेतु गठित समिति की अनुशंसाये व उनके द्वारा बनाई गई परियोजना के व्यय पर क्रियान्वित की जायेगी।
4. परियोजना प्राधिकारियों से यह लिखित वचन पत्र लिया जाये कि इस संबंध में भविष्य में कोई शर्त निर्धारित की जाती है तो वे उसे मानने के लिये बाध्य होंगे।

Approval for modified Compensatory Afforestation Scheme by MoEF for ISP

MoEF vide its letter No 8-646/84-FC(Part) Vol-I, dated 12th Oct 1990 approved the scheme submitted the Govt., of Madhya Pradesh along with letter Nos.F.5/111/84/10/3 dated 18.11.1987. However, additional compensatory afforestation over 150 ha. degraded forest was directed. Accordingly, the conditions set out in the forest clearance stood modified to this extent.

Investment Clearance for SSP

The Planning Commission, Govt. of India approved investment for an estimated cost of Rs. 6,406 crores for SSP in Gujarat vide their letter dated 15.10.88. The Planning Commission of the Government of India granted the State of Gujarat approval for the Sardar Sarovar Projects subject to seven conditions that bear on the environment (as well as resettlement and rehabilitation).

- compliance with the 1987 environmental and forestry clearances;
- adequate funding to meet the construction schedule;
- submission of a detailed program for drainage and ground water balance studies beyond the Mahi River;
- adoption of measures to ensure project revenue from water rates to pay for annual operation and maintenance charges;
- setting up an expert group to study siltation in the main canal.
- drawing up a detailed schedule and plans for the micro-level irrigation network system; and an implementation schedule for completion of the canal network so that irrigation benefits do, in fact, start accruing from the financial investment.

Clearances by CWC and the Govt of Madhya Pradesh & Planning Commission for ISP

On 6.9.87, the Planning Commission issued the investment clearance of ISP at a cost of Rs.1993.67 crores. The State Government was required to comply with the conditions laid down by MOEF while according environment and forest clearances and also establish adequate network for ground water monitoring in the command within 2 years.

The techno-economic clearance by the Central Water Commission was given in 1984. Accordingly, the State Government of Madhya Pradesh have earlier accorded administrative

approval to the estimate amounting to Rs.1,392.85 crores in September 1984. The administrative approval for the updated estimated cost at December 1988 price level amounting to Rs.2,167.67 crores (including environmental cost etc.) was accorded by the State Government of Madhya Pradesh.

Narmada Hydroelectric Development Corporation (NHDC) joint venture in the name of National Hydropower Development Corporation & Govt. of Madhya Pradesh

The project was under implementation by the Govt. of M.P. until July 2000 when National Hydropower Development Corporation & Govt. of Madhya Pradesh entered into an agreement and formed a joint venture in the name of Narmada Hydroelectric Development Corporation (NHDC) to execute Indira Sagar and Omkareshwar Project on Narmada in M.P. on 01.08.2000 with authorized capital of Rs. 3,000 Crs. and assets worth Rs. 2,000 Crs. According to the MOU of this joint venture, it would, in addition to the conditionalities imposed in the clearances issued by various agencies of the Govt of India including the Planning Commission, Ministry of Environment and Forest (MoEF), Ministry of Social Justice and Empowerment would also comply with the provisions of the Narmada Water Disputes Tribunal Award and directions of the

1. Narmada Control Authority and it's various Sub-groups.
2. Review Committee of the Narmada Control Authority

The project is proceeding as per the clearances received earlier by the Govt. of M.P. and also further clearances received in favour of the NHDC. The following clearances were already in place.

- Techno-Economic Clearance by CEA
- Techno Economic Clearance (TEC) Transferred to NHDC
- Notification U/s 18A of Electricity Act
- Power purchase Agreement (PPA) with GoMP
- Revised Cost Estimates Cleared by CEA
- Clearance from Public Investment Board
- Clearance from Cabinet Committee on Economic Affairs

Monitoring by the NCA.

Following the recommendations of the Ministry of Environment & Forest, the scope of the Narmada Control Authority was enlarged on 4th June, 1987 through amendment brought out by MOWR under clause 9(i)4 9(2)a, through gazette notification. The functions of NCA were modified to include major functions of coordination & direction of the implementation of all the projects including the environmental protection measures to ensure the faithful compliance of the conditions attached by GOI while granting clearance to these projects. The NCA, originally as envisioned by the NWDT, consisted of 7 nos., of high ranking Engineers as Members, was expanded and made Multidisciplinary by inducting Union Secretaries of the Ministries of Environment & Forests, Social Justice and Empowerment, Ministry of Power, Ministry of Tribal Welfare as Ex-officio Members. In addition, Chief Secretaries of the States of Gujarat, Madhya Pradesh, Maharashtra and Rajasthan were also inducted as Members. One Full Time Member of the discipline Environment & Rehabilitation was added to the existing Full Time Members of the discipline Civil and Power Engineering. The Union Secretary of the Ministry of water Resources was inducted as Ex-officio Chairman of the NCA.

Environment Sub-Group of NCA

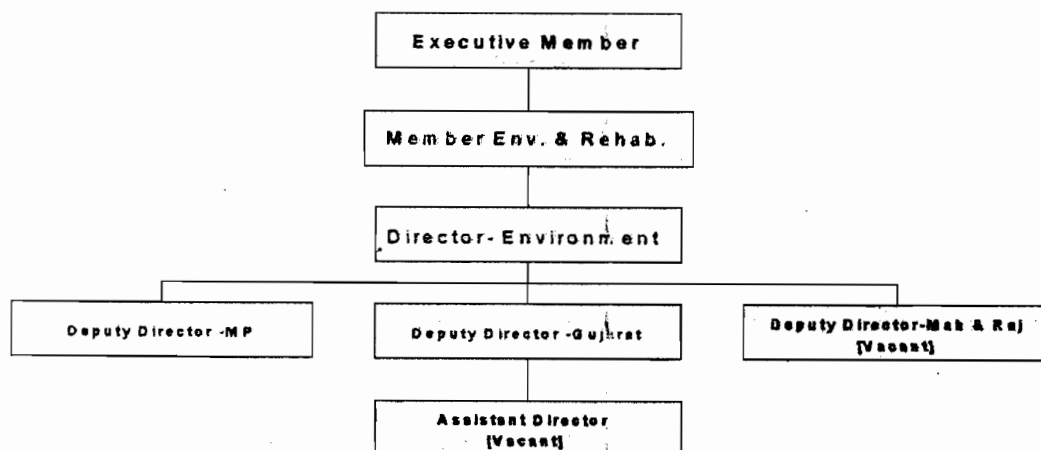
NCA had constituted among others, a sub-group namely Environment sub-group under the Chairmanship of Secretary, Ministry of Env.& Forests, GOI. Member (E&R), NCA is Member Secretary to this sub-group. The 37th Meeting of the Subgroup was held on 8th February 2002.

Functions of the Environment Sub-Group.

- i) To work out the environmental safeguard measures to be planned and implemented for the entire Narmada Basin so that environmental safeguard measures are executed and remain fully in consonance with the clearance accorded to the Narmada Sagar and Sardar Sarovar Projects.
- ii) To determine, the terms of reference of required surveys and studies necessary for implementation of environmental safeguard measures inclusive of data base required, the methods by which the data base is to be prepared and also to identify the institutions/individuals to undertake the preparation of such documents.
- iii) To get prepared, for clearance by the Ministries and NCA the action plans with regard to all environmental safeguard measures and the assessment criteria thereof.
- iv) To devise, a suitable monitoring and evaluation mechanism so that the action plans are effectively implemented in consonance with stipulations at the time of clearance of the projects.
- v) To assess the necessary organisation with management capability being set up for adequate implementation of environmental safeguard measures.
- vi) To undertake, all measures necessary to assist Narmada Control Authority in the planning and implementation of environmental safeguard measures.

Environment and Rehabilitation Wing Of The NCA

The Environment & Rehabilitation (E&R) wing of NCA is headed by Member (E&R), NCA, Indore. The organizational structures of the Environment unit of the E&R wing is as given here :



Important Sub-Groups and Sub-Committees On Environment

1. There is a Environment Committee headed by the Member (E&R), NCA. The Committee visits the impacted areas in all the three states by rotation for assessing compliance and submits its reports to the sub-group and necessary recommendations are forwarded to concerned State Governments for compliance.
2. High level expert group on fisheries development and conservation in Sardar Sarovar reservoir. This is chaired by the Joint Secretary, MOE&F. Member (E&R), NCA is the Member Secretary for this committee.
3. Committee on flora and fauna aspect of Sardar Sarovar and Narmada Sagar Project. This committee is chaired by Member (E&R), NCA.
4. Committee on archaeological and anthropological aspects. This committee is chaired by Member (E&R), NCA.
5. Committee on Health aspects. This committee is chaired by Member (E&R), NCA.
6. There are four high level expert multi disciplinary groups directing, coordinating and monitoring various studies commissioned by Govt. of Gujarat for the vast command area of SSP formed in pursuance of the directives of the Environment Sub-group for initiating such studies. Member (E&R) is included as regular member. Meeting of the expert group are convened by NPG from time to time to discuss the progress/interim reports of the studies commissioned by the Govt. of Gujarat.
7. The Govt. of M.P. had constituted Wild Life Committee to review the environmental issues related with the SSP and ISP including studies, action plans and implementations.

SARDAR SAROVAR PROJECT

Salient Features of the Project

Locations	Near village Navagam, distt. Narmada
Height	163.00 m
Length	1,210.00 m
Gross storage	9.5 (7.70) b cum (MAF)
Live storage	5.8 (4.73) b cum (MAF)
Annual irrigation	18.65 lakh ha.
Installed capacity	1,450 mw (1200 mw + 250 mw)
Cost of Project Rs.6,406.00 crore (at 1986-87 price level)	Rs.13,180.62 crore (at 1991-92 price level)

Annual irrigation Per ha of About 165 ha
submergence of cultivable land

Irrigation	Gujarat	18,65,000 ha
	Rajasthan	75,000 ha.
	Maharashtra	37,500 ha

Hydropower

1450 MW

Flood control

210 villages and Bharuch city 750,000 population

THE PROJECT

The height of the dam, the supply level of the canal and other level (s) of the Sardar Sarovar and Indira Sagar projects were fixed by the Award of the Tribunal. Thus submergence of the land, displacement of the people and related impacts also got fixed. Once it was determined that no environmental concern is serious enough to threaten the viability of the project what remained to be done was to identify the source of impacts and the impacts, their evaluation, quantification and assessment with an objective of devising mitigatory measures. In the following chapters the salient features of the twin, projects have been briefly presented and the current status of the survey studies and implementation on the suggested parameters is briefly appraised. While resettlement & rehabilitation is dealt with separately other issues have been discussed in this report.

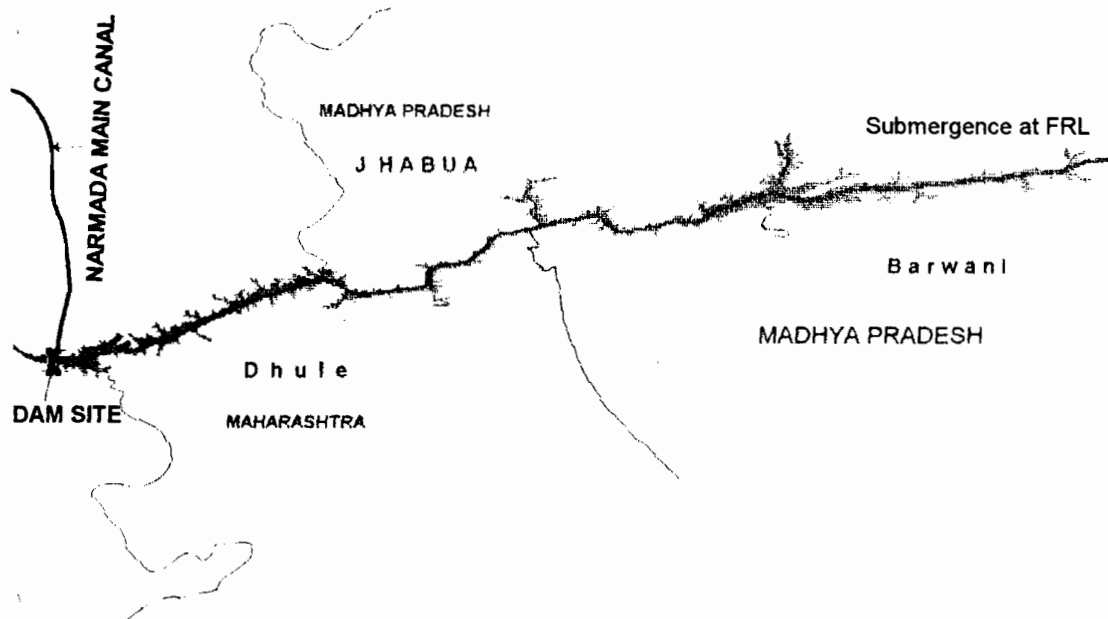
Additional benefits from the proposed project

- Drinking water supply to 135 urban centers and 8215 villages and Water supply for industries;
- Wild life sanctuaries development and Fisheries development

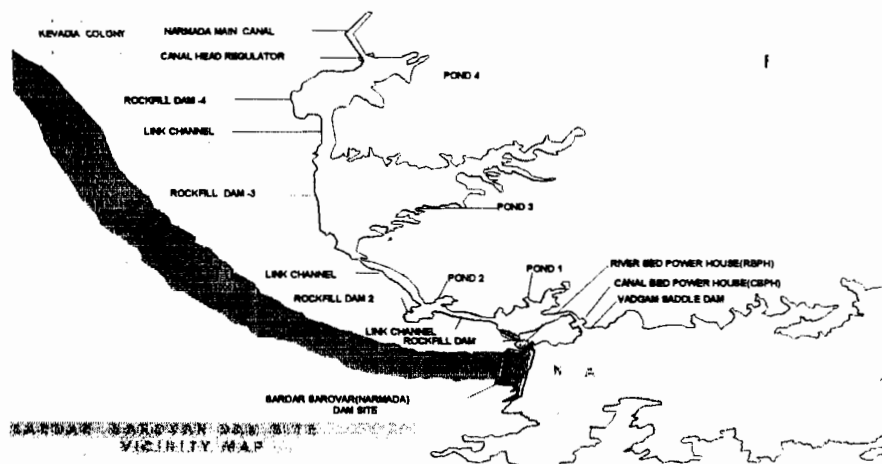
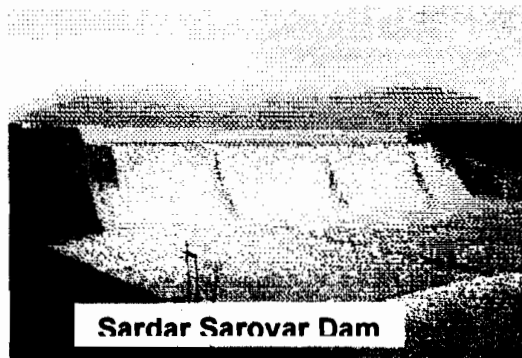
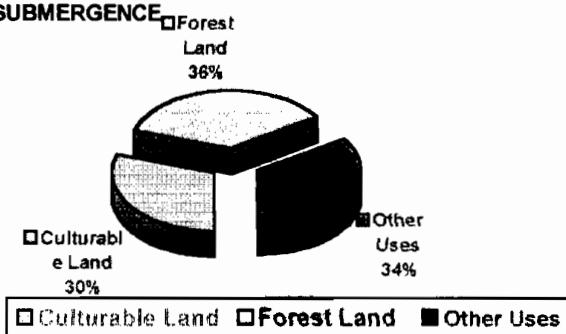
Source of Impacts: the submergence

The submergence zone of the project lies within the State of Maharashtra, Madhya Pradesh & Gujarat as depicted in the table & map below.

State	Culturable land (ha)	Forest land (ha)	Land under other uses (ha)	Total land (ha)	Affected number of villages	Affected number of PAFs
Madhya Pradesh	7,883	2,731	10,208	20,822	193	33,014
Maharashtra	1,519	6,489	1,592	9,599	33	3,213
Gujarat	1,877	4,166	1,069	7,112	19	4,600
Total	11,279	13,386	12,869	37,533	245	40,827



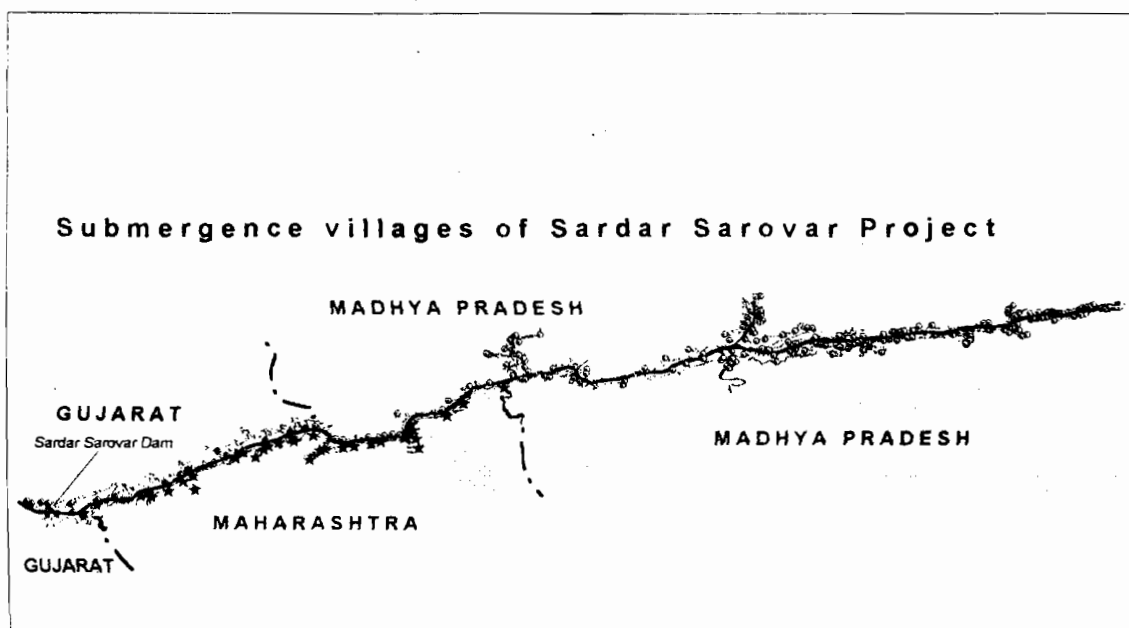
LAND USE PATTERN OF LAND UNDER SUBMERGENCE



Development and current status of the management of SSP environment

The environmental clearance had suggested the following parameters for Environmental Management.

- Resettlement & Rehabilitation.
- Catchment Area Treatment
- Compensatory Afforestation
- Command Area Development.
- Flora Fauna & Carrying Capacity of Surrounding area
- Seismicity
- Health
- Archaeology & Anthropological aspects



Chapter - 2

CATCHMENT AREA TREATMENT

The MOEF clearance granted in 1987 contained two conditions pertaining to CAT, as follows:

- More detailed surveys for prioritisation of the sub-catchments in the SSP area should be undertaken
- A phased CAT programme should be prepared and implemented ahead of reservoir filling.



Studies

Surveys and studies have been undertaken to aid the development of a management plan for CAT in the SSP catchment. They include :-

- Report of Inter-Departmental Committee on Soil Conservation and Afforestation, (the Dewan Committee Report), 1985.
- Report on Prioritisation of Sub-watersheds in Sub-catchments of Narmada Catchment, 1991 by AIS&LUSO, New Delhi.

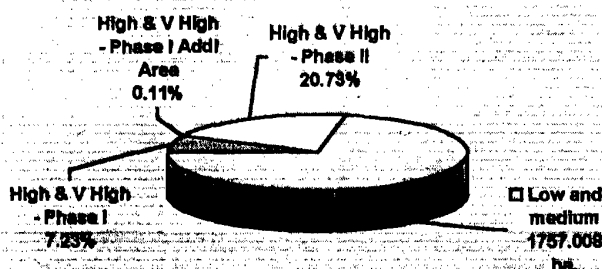


Chart-1: Status of degradation in SSP catchment (area in ,000 ha)

According to the above studies, the total catchment area of Sardar Sarovar Project below Narmada Sagar Dam is 24,42,440 ha. Out of this, 6,82,769 ha area spread to 500 sub-watersheds having silt yield index 1,200 and above was identified as critically degraded.

GOI issued a directive in July 1992 that, for the SSP, the project would bear the costs of the

treatment of all critically degraded sub-watersheds draining directly into the reservoir. These watersheds were identified amongst those classified as either very high or high-priority categories by the All India Soil & Land Use Survey Organisation (AISLUSO). The project would also be responsible for the treatment of those areas of the catchment, which are directly damaged by the project activities. In addition, plans are required to be prepared for

the treatment of the balance of the critically degraded sub-watersheds but the cost of this will be met from other ongoing schemes and in a timeframe to be determined.

PLANNING:

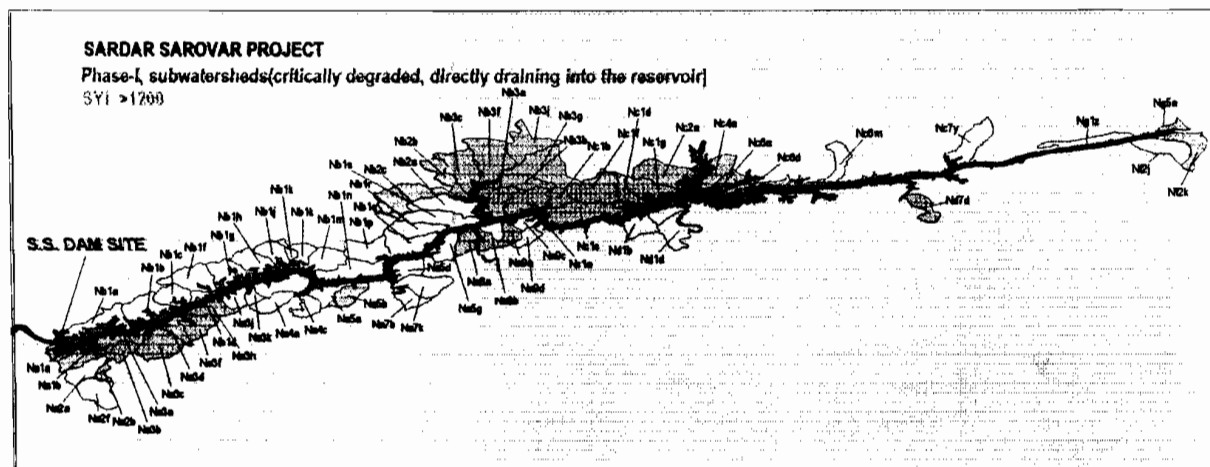
Project authorities were required to prepare the plans, as phase-I programme, for treating those critically degraded sub-watersheds which were identified as *directly draining* into the reservoir. The implementation of the plan would be pari-passu with the construction of the dam. The balance sub-watersheds were to be treated as Phase-II programme.

Particulars			Madhya Pradesh	Gujarat	Maharashtra	Total
Very High & High	Planned to Treat	Phase- I	125725	29157	24298	179180
		Phase- II	349892		77568	427460

Table 1: Area Statistics of Very High & High Priority Sub-watersheds in the Catchment of Sardar Sarovar Project

I. PHASE-I: DIRECTLY DRAINING SUB-WATERSHEDS

Project authorities have prepared the plans for treating total area of 1,79,180 ha as shown in the table -1 above. This area is required to be treated pari-passu with the project works



ACTION PLANS:

The project authorities have submitted the Action Plans in varying stages of completeness. These plans contained information related to survey work, management options, monitoring & phased programme of treatment besides provisions for annual budget. The various stages in planning for each item of the plan are given in the Fig.-2 on page 14..

Elements of Action Plan

Key elements of the Action Plan which includes time-table, menu, budget etc. receive from GOG, GOMP & GOM are as follows.

- 1) Survey work
- 2) Treatment measures
- 3) Micro watersheds map
- 4) Development maps
- 5) Budget & funds
- 6) Time table
- 7) Work responsibility
- 8) Monitoring

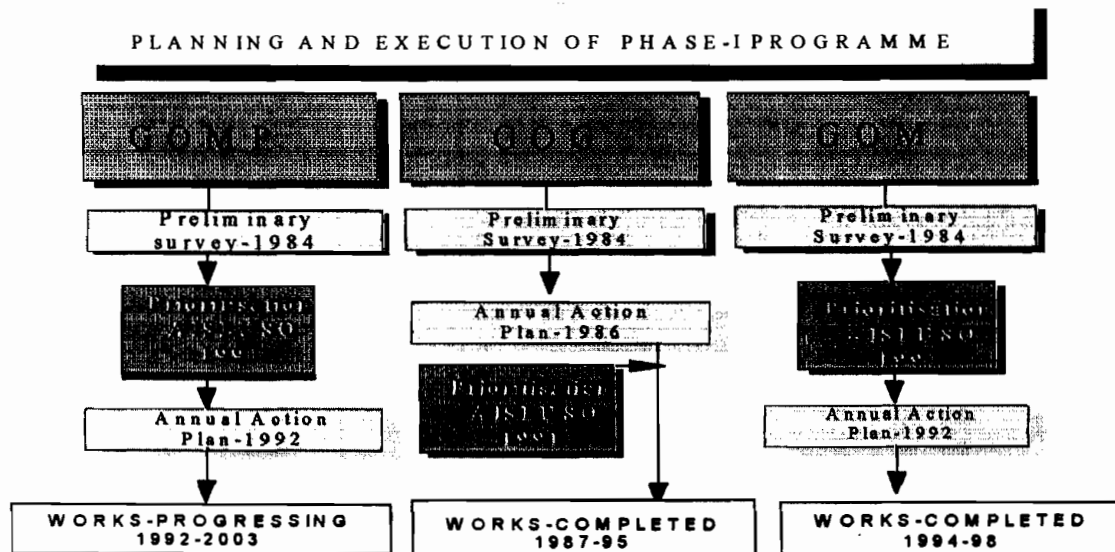
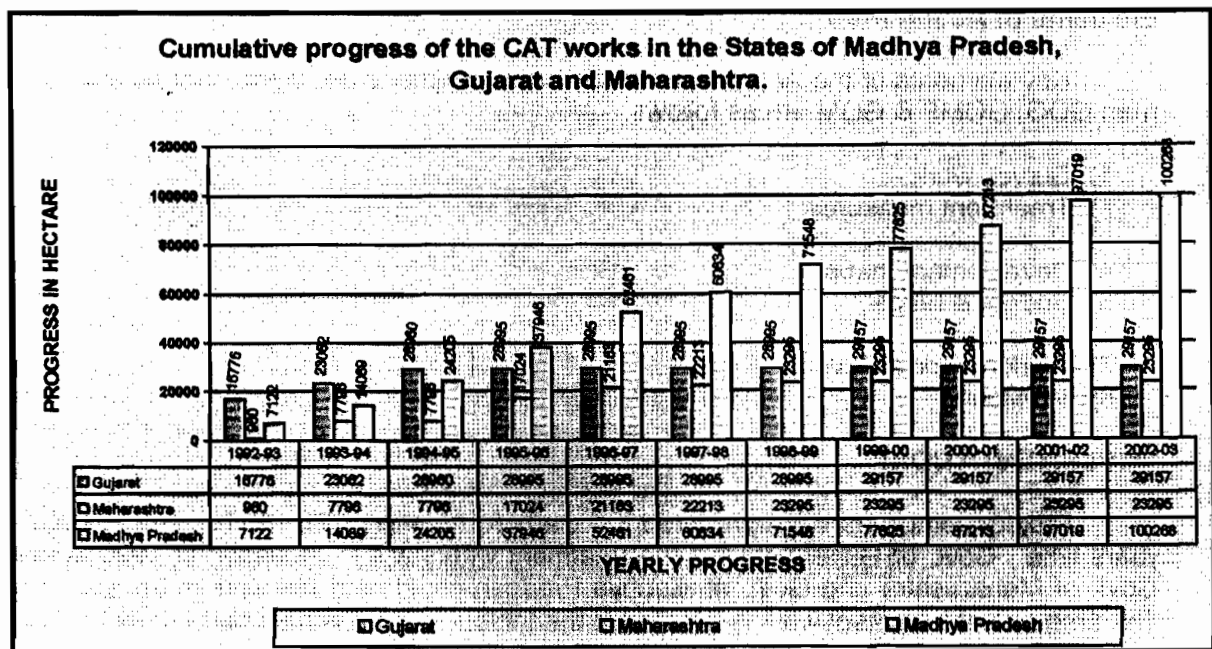
IMPLEMENTATION:

Project authorities have prepared the plans for treating 1,79,180 ha area in about 10 years time. Govt. of Gujarat started the treatment works w.e.f. monsoon of 1990 whereas Govt. of Maharashtra and Govt. of Madhya Pradesh could start the work in the year 1992. The progress of treatment work is detailed in the table – 2 and the bar chart-I drawn below:

Area under treatment 1,79,180 ha **Progress** 1,52,720 ha **Balance** 26,460 ha.

Table –2: Year wise progress of CAT Works

YEAR	GOG			GOM			GOMP *		
TARGETS	F A 27204	N FA 1953	TOTAL 29157	FA 21122	N FA 3176	TOTAL 24298	F A 51930	N FA 73795	TOTAL 1,25,725
1990-91	4,528	898	5,426	0	0	0	0	0	00
1991-92	4,770	230	5,000	0	0	0	0	0	0
1992-93	6,014	336	6,350	960	0	960	0	7,122	7,122
1993-94	6,000	286	6,286	6,514	322	6,836	966	6,001	6,967
1994-95	5,730	168	5,898	6,542	2,686	9,228	4,348	5,768	10,116
1995-96	0	35	35	4,735	4	4,739	4,390	9,351	13,741
1996-97	0	0	0	450	0	450	8,158	6,357	14,515
1997-98	0	0	0	1082	0	1082	4,441	3,732	8,173
1998-99	0	0	0	0	0	0	8,583	2,331	10,914
99-2000	162	0	162	0	0	0	2,830	3,247	6,077
2000-01	-	-	-	-	-	-	3,270	6,318	9,588
2001-02	-	-	-	-	-	-	2,233	4,221	6,454
2002-03	-	-	-	-	-	-	989	2,260	3,249
Total	27,204	1,953	29,157	20,283	3,012	23,295	40,208	56,708	96,916
Work by other agency							3,352	-	3,352
Grand Total							43,560	56,708	1,00,268



SATELLITE IMAGERIES FOR THE AREAS IN GUJARAT AND MAHARASHTRA
CONFIRM GOOD VEGETAL COVER

Flow chart of CAT phase-I planning by Gujarat, Madhya Pradesh and Maharashtra

Govt. of Gujarat

As the Catchment area of Sardar Sarovar was little in Gujarat, GOG accepted the recommendations of Diwan Committee and commenced the work of treating entire catchment area in the year 1990. By the end of March' 1995 forest area of 27,204 ha & non-forest area of 1953 ha were treated. Treatment work is almost completed. Graphic presentation of the progress is given in the *chart-4*.

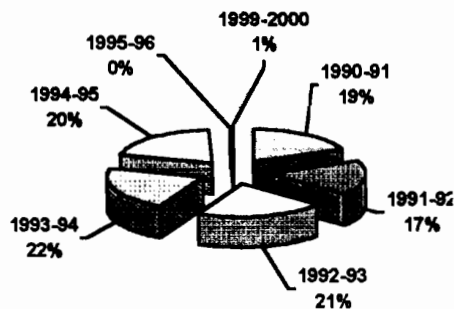
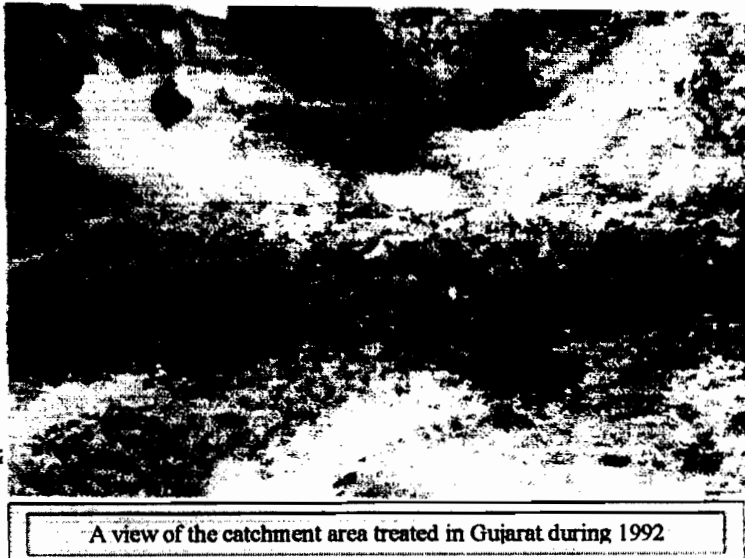
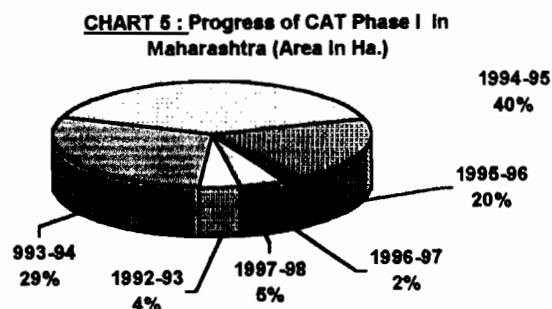


CHART-4 Progress of CAT Phase I (Area in Ha.)



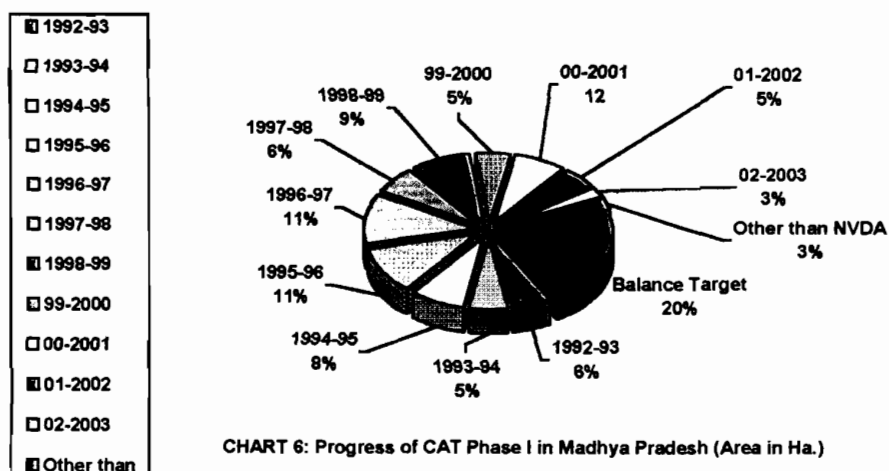
Govt. of Maharashtra:

Treatment works in Maharashtra could commence in the year 1992. By the end of September, 2001 forest area of 20,283 ha and non-forest area 3,012 ha were treated. Thereby almost completing the Phase-I work in Maharashtra. Graphic profile of the progress is given in *chart-5*.



Govt. of Madhya Pradesh

Treatment works in Madhya Pradesh could commence after submission of the revised work plan in 1992. By the end of September, 2002 a total of 1,00,268 ha area including both, forest & non-forest areas was treated-up. Progress is depicted in *Chart-6*



Sardar Sarovar Project: Balance Targets :

For the areas in Gujarat & Maharashtra, works are completed in the treatable areas. For the SSP as a whole, against the planned target of 179,180 ha of CAT works, an area of 1,52,720 ha were completed by the end of September, 2002. It is proposed to treat the balance area as shown in the pie chart below and detailed in the table-3

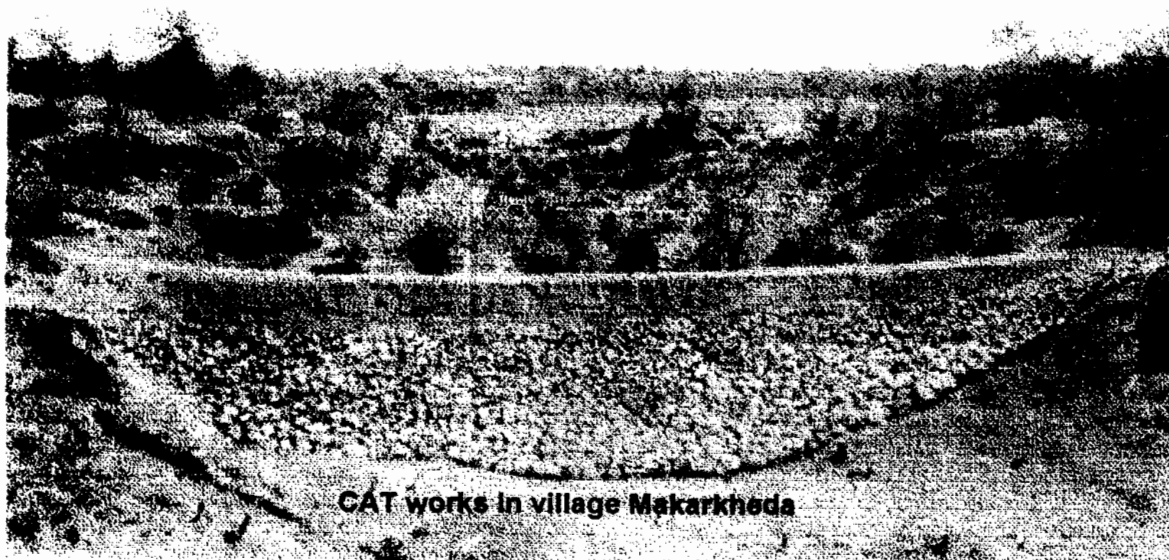


Table 3. CAT Works remaining

PARTICULARS	GUJARAT			MAHARASHTRA			MADHYA PRADESH		
	F.A.	N.F.A.	TOTAL	F.A.	N.F.A.	TOTAL	F.A.	N.F.A.	TOTAL
TARGET	27204	1953	29157	21122	3176	24298	51930	73795	125725
WORK DONE	27204	1953	29157	20283	3012	23295	42571	54448	100268
Balance	0	0	0	839*	164*	1003*	9359	19347	25457

* Areas not available for treatment

** Treatable area will be less.

PHASE-II: INDIRECTLY DRAINING SUBWATERSHEDS:

Project authorities were required to prepare plans for treating balance of the critically degraded sub-watersheds. The planning process is summarised in the figure below :

The funds for treating these areas have been promised by the RVP Scheme of Planning Commission, National Afforestation and Eco-development Board etc. In Gujarat entire area was treated up, whereas state Govts. of Maharashtra and Madhya Pradesh have submitted the plans. The plans are being revised in a phased manner in accordance with the guidelines of

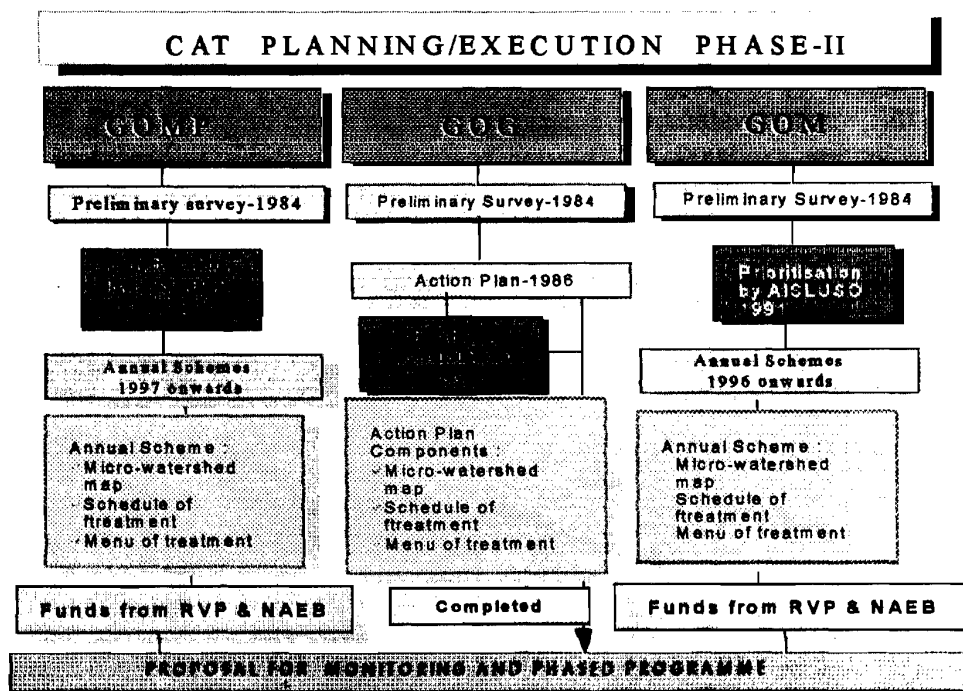
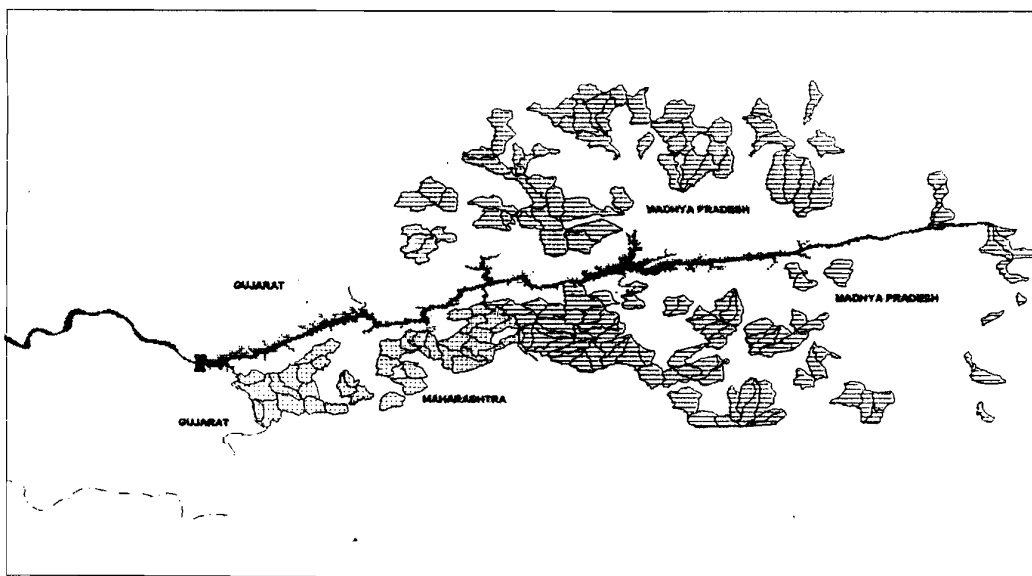


Figure-3: Summary of status of CAT planning.

the funding agencies. Some of these plans have been approved under River Valley Project Scheme / National Afforestation & Eco-Development Board etc. Work commenced on 6 schemes in Maharashtra & a few others in Madhya Pradesh.

Maharashtra

Govt. of Maharashtra have prepared a macro-watershed plan for 77,568 hectare in Phase-II of CAT works, out of total 80,881 hectare in 35 sub-watersheds. Apart from this separate micro-watersheds plans are prepared for forestland and non-forestland. Micro-watershed plans for forestland in all 35 watersheds have been submitted, which covers 42,867 hectare area. Progress on such schemes is 7,050 hectare. In case of non-forestland, the schemes are not available with NCA but the progress of 7,854 hectare. is reported on 13 micro-watershed schemes covering an area of 15,656 hectare.



SSP CAT Phase-II sub-watersheds

Madhya Pradesh:

Catchment area of Sardar Sarovar Project below Narmada Sagar in Madhya Pradesh is 5,44,505 ha. This area includes the freely draining area attributable to Jobat, Man, Maheshwar, and Omkareshwar Projects also as per the details given in the table-4. After

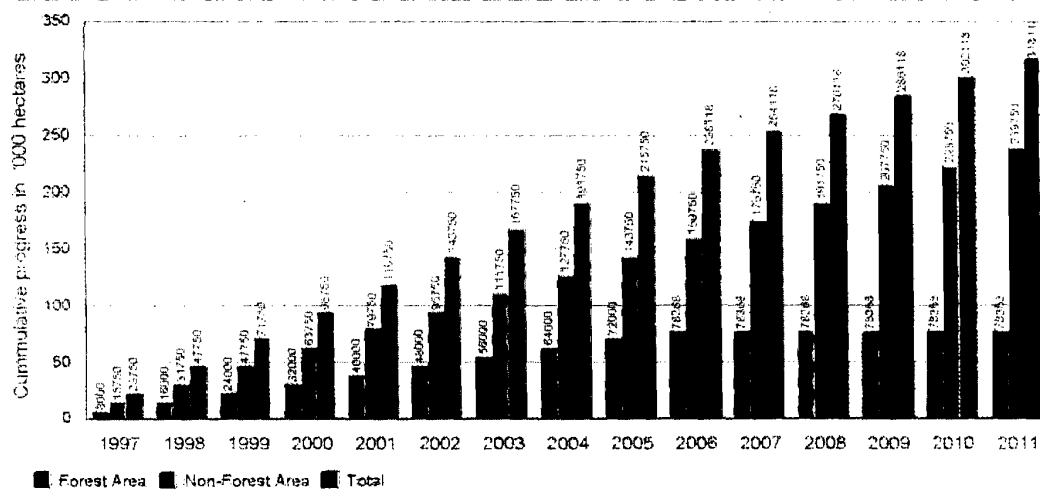
subtracting such areas, the gross area of critically degraded sub-watersheds is 4,75,617 ha. Out of this, Govt. of Madhya Pradesh has prepared plans for treating 1,25,725 ha area, as Phase-I already described above, under directly draining category at the cost of the project. Therefore, the gross area for which plans are required to be submitted for Phase-II programme was 3,49,892 ha.

Total Area of Freely Draining Critically Degraded Sub-watersheds = 5,46,702 ha
Catchment below NSP= 3,52,089 ha Net Treatable area = 3,18,118 ha

Project	Phase-I (Directly Draining)	Phase-II (Balance area)	Total Area
Jobat			28,211
Man			12,720
Maheshwar			13,209
Omkareshwar			14,748
SSP	1,25,725	3,49,892	4,75,617
		Total :	5,44,505

Schedule of Treatment

Project authorities have prepared the plans for treating the 3,49,892 ha of catchment in 139 sub-watersheds of Phase-II areas by the end of year 2011. The schedule of treatment planned is given in Bar Chart -8.



Progress of Implementation:

Under River Valley Project Schemes 43 schemes covering an area of 87884 ha had been approved by the GOI. Out of these, 30 schemes pertain to SSP. These 30 schemes envisages CAT over an area of 59566 ha of which 27689 ha area has been treated.

In this total area of 27689 ha, the progress in forest area is 6904 ha and progress in non-forest area is 20785 ha.

Chapter - 3

COMPENSATORY AFFORESTATION

Approval for the diversion of forestland for the SSP was granted by the MOEF in 1987, 1990 & in 1994 (including for R&R works) but several conditions were attached relating to the planning and implementation of CAF. Principals amongst these are the following stipulations.



Quality of Forests in MP Under SSP Submergence Photo of 1992

- For every hectare of forestland submerged or diverted for construction of the project there should be Compensatory afforestation on one hectare of non-forest land plus reforestation on two hectares of degraded forest.
- For the 4,200.00 hectares of forestland in Maharashtra, which is to be used for R&R, an equal area of non-forest land or double the area of degraded forest should be planted.
- The governments of the three states involved should prepare plans detailing their proposals for Compensatory Afforestation and submit these to the MOEF before work in the forest area is due to commence.
- The project should supply firewood to it's construction workers, at it's own cost, to prevent them from having to meet their fuel needs from the surrounding forests.

STUDIES

There have been a number of studies in three states aimed at assessing the extent and significance of the loss of forestland attributable to the SSP.

- Sardar Sarovar (Narmada) Project Development Plan, Volume-II prepared by the Narmada Planning Group (NPG) in 1983.
- Studies on Eco and Environment by M.S. University of Baroda (MSU) in 1983.
- Sardar Sarovar Project: Preparation of Environmental Work Plan by the Forest Department of Maharashtra in 1988.
- Eco-Environment and Wildlife Management Studies in Sardar Sarovar Submergence Area in Gujarat by MSU, in 1992.
- Impact Assessment of Madhya Pradesh Land to be submerged Under Sardar Sarovar Project and Adjoining Ecosystems by State Forest Research Institute, Jabalpur (1989-92).
- Report on Flora and Fauna, In and Around Sardar Sarovar Project, Maharashtra by the University of Pune, August 1997.

ACTION PLANS

In compliance with the conditions set by the MOEF, each state has prepared an Action Plan for the CAF of areas within it's boundaries. The relevant documents are:

- Government of Gujarat Work Plan for Management of Environmental Effects, Section on Forests and Wildlife: The Compensatory Afforestation Plan for the Rann of Kachchh, 1986.
- Project for Afforestation in Sardar Sarovar Project Impact Areas due to Diversion of forestlands for Sardar Sarovar Project (GOG), 1991.
- Compensatory Afforestation Scheme in Lieu of Sardar Sarovar Project in Dhule District, Maharashtra State (1989).
- Government of Madhya Pradesh Forest Department Action Plan of Compensatory Afforestation for Sardar Sarovar Multipurpose River Valley Project (1989).

These plans were submitted in varying stages of completeness but each has now been revised and updated. Action Plans of three State Govt. contained following components:

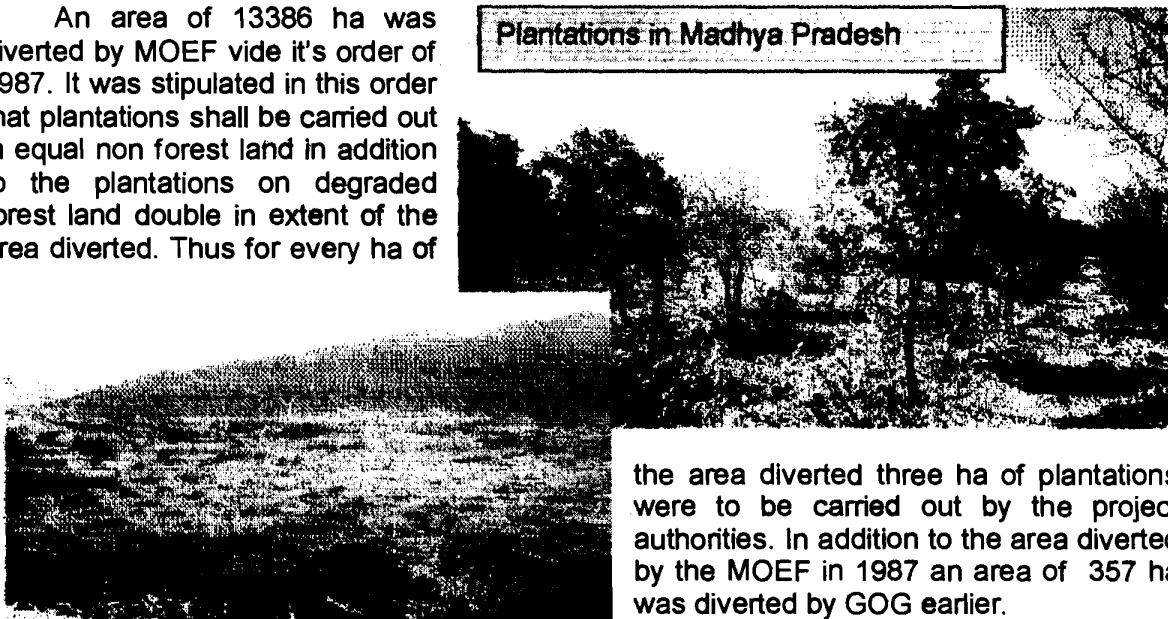
Implementation

The Action Plans spell out a programme of tree planting in the three states on both non-forest and degraded forest areas as shown in bar Chart-11 and Table-6 & 7.

Planning

An area of 13386 ha was diverted by MOEF vide it's order of 1987. It was stipulated in this order that plantations shall be carried out in equal non forest land in addition to the plantations on degraded forest land double in extent of the area diverted. Thus for every ha of

Plantations in Madhya Pradesh



the area diverted three ha of plantations were to be carried out by the project authorities. In addition to the area diverted by the MOEF in 1987 an area of 357 ha was diverted by GOG earlier.

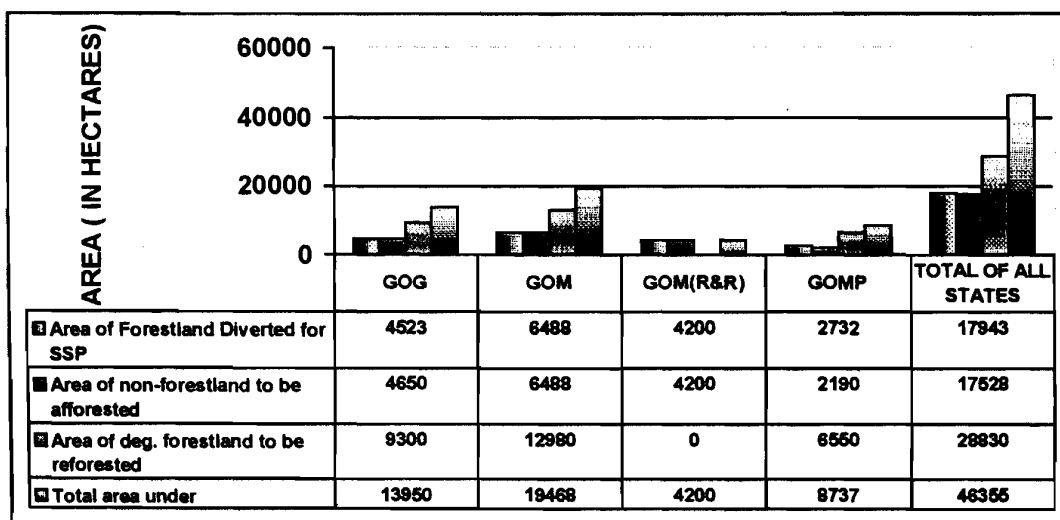
State Govts. have prepared the plans for plantations of 46,358 ha besides reforestation of 28,830 ha area including plantations over 4,200 ha of non-forest land in lieu of the land released for R&R works in Maharashtra. Statewise details of the total area taken for SSP and the planning in lieu thereof are given in the chart-11.

In Maharashtra State 4200 ha forest land was released for R&R works in two phases. In 1990 an area of 2700 ha was released in Taloda taluka. Further 1500 ha was released during 1993 in the same taluka. State Govt. was required to carry out plantations on equal non-forestland. Detailed programme and progress of plantations is given in the table 6 below :

Table-6. Compensatory Afforestation against 4200 ha forest land released for R&R works in Maharashtra vide MOEF order dated 1990 (2700ha) and 1993 (1500 ha).

Year	Land released	Progress 1993-94	Progress 1994-95	Progress 1995-96	Progress 2000-01	Cumulative Progress	Balance targets
1990	2,700.00	2,192.37	311.00	184.50	9.63	2697.5	2.5
1993	1,500.00	0.00	0.00	896.00	604	1500.00	00
TOTAL	4,200.00	2,192.37	311.00	1,080.50	613.63	4197.5	2.5

Chart-11: Showing forest areas taken for SSP. This includes 357 ha taken for SSP in Gujarat prior to formal clearance under FCA, 1980 besides the area diverted for R&R works in Maharashtra and targets for afforestation/reforestation



Map: 2 Locations of sites of

Plantations in Maharashtra

plantations in the States of

Gujarat, Maharashtra and Madhya Pradesh

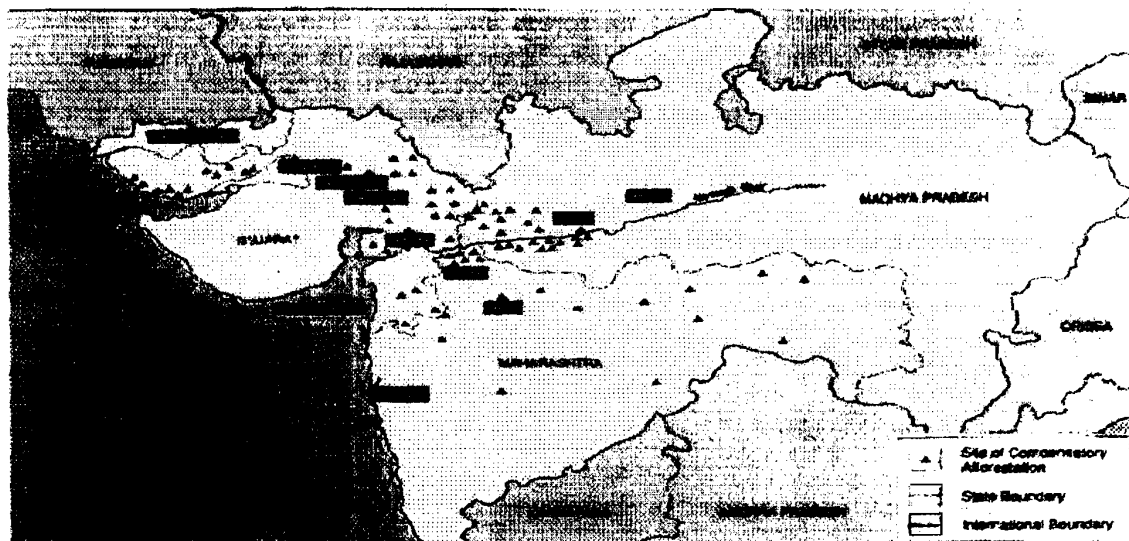
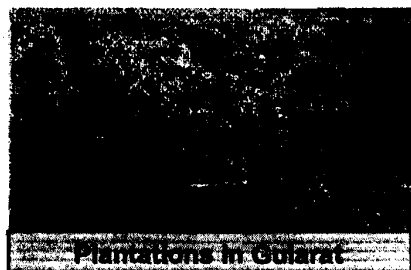


Table-7: Detailed progress of CAF, against the target area of 42,155 ha. in lieu of 13,386 ha. diverted for submergence of SSP vide MOEF order dated December 1987. (Area in ha)

Monsoon year	GUJARAT		MAHARASHTRA		MADHYA PRADESH	
	Degraded forest	Non-forest	Degraded forest	Non-forest	Degraded forest	Non-forest
90-91	-	2,150.00	-	-	132.00	716.00
91-92	2,834.00	350.00	8,383.00	-	1,200.00	373.00
92-93	2,450.00	847.00	4,552.00	2,276.00	2,532.00	-
93-94	2,500.00	460.00	20.00	1,156.00	1,623.00	86.00
94-95	1,516.00	843.00	-	2,894.00	827.00	200.00
95-96	Completed	Completed	22.00	NIL	60.00	-
96-97	-	-	-	NIL	-	-
97-98	-	-	-	NIL	178.00	506.00
98-99	-	-	-	75.00	-	277.00
99-2000	-	-	-	-	-	26.00
Sub-total	9,300.00	4,650.00	12,977.00*	6,401.00	6,552.00	2184.00
Total	13,950.00		19,378.00		8,736.00 *	

* Area classification, reconciled.

Figures shown are as per NVDA letter No. 1235(a)ou(a)ek tp(a) 1199 tnukad



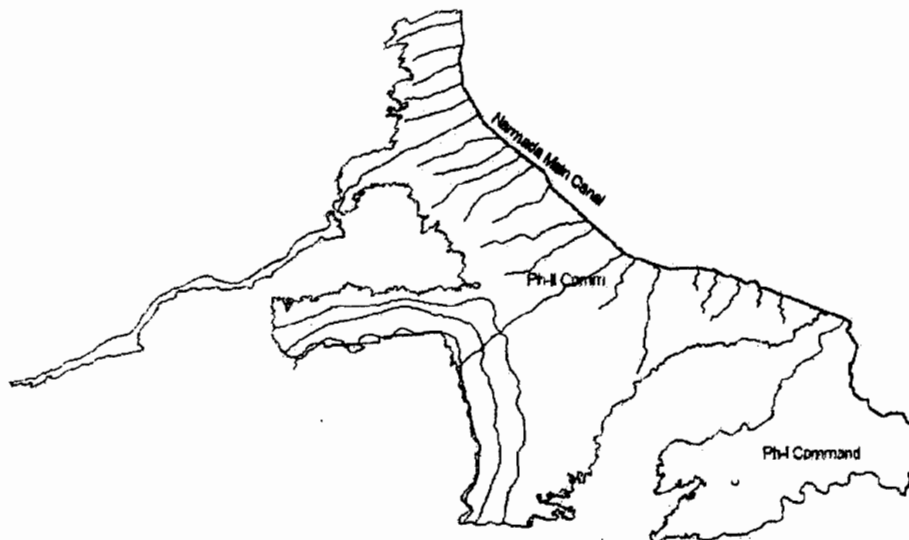
Plantations in Gujarat



Chapter - 3

COMMAND AREA DEVELOPMENT

The command area of the project is fixed based on the areas included by NWDT for purposes of considering requirement of Narmada water for irrigation in Gujarat. Accordingly, the GCA of the project is 3.43 million hectares of which Culturable command is estimated to be 2.12 million hectares. Thus, the command encompasses a very large area of



the state of Gujarat and about 75000 ha now revised to 0.30 million ha of GCA diversity in agro-climatic and socio-economic conditions. (CCA=0.251 million ha) area in Rajasthan and is characterized by wide diversity in agro-climatic and socio-economic conditions.

- ❖ The Narmada Main Canal also known as Navagam Main Canal off-takes from Sardar Sarovar Dam in Gujarat at a full supply level (FSL) of 91.44 m (300 ft.) and traverses through a distance of 458.30 km before entering Rajasthan near village Silu, Tehsil Sanchore, district Jalore.
- ❖ In Rajasthan, the Canal runs for a distance of 74 km. The Topography of the area is suitable for a contour canal upto 54.00 km as such in this reach irrigation has been restricted to portion of command on river side only. From Km 54.00 onwards up-to the tail end (km 74.00) the canal has been aligned as a ridge canal to irrigate areas on either side.

To safeguard development of irrigation in the vast command, it is important to ensure that the transfer of water to the Command Area does not give rise to the environmental problems, which have been experienced by some water developments in the past. In view of the potentially far-reaching effects of water distribution in the SSP command area, mitigating measures have been determine requiring, control and monitoring in the following areas :

- Drainage, water logging and soil salinity (quantity of water);
- Water quality(Both Surface and Ground water Quality)
- Resource loss (Forests, Monuments/ land etc.)
- Potential impact on flora and fauna(biodiversity ,sanctuaries)

- Effects on public health:
- Socio-economic impacts(infrastructure like roads, training centers ,seed godown, fisheries development)

The project authorities have undertaken a large number of studies and most of these studies are now complete. The result of the studies available by the end of 1993 were used to prepare and assessment report of the development of the Command Area simultaneously by the H.R. Wallingford and Narmada Planning Group during March / April, 1993. An updated environmental management plan for the Command Area is under formulation.

(A) Studies :Government of Gujarat

Government of Gujarat have undertaken several studies related to the command area development. Most of these have been completed and the remaining are in progress. The various studies are listed below:

Agricultural Practices and Socio-Economic

- ❖ Some Aspects of Role of Panchayats and Institutional Arrangements for Canal Irrigation in Two Talukas of Ahmedabad District. Institute of Cultural and Urban Anthropology, Ahmedabad, 1982
- ❖ A Study of Settlement Pattern (6 Talukas in the Narmada Command Area of Mahesana, District of Gujarat).
- ❖ Department of Geography, Gujarat University, Ahmedabad, 1982.
- ❖ Regionalisation of Narmada Command, Operations Research Group, Vadodara, 1982.
- ❖ Socio-Economic Bench Mark Survey of 62 Talukas (Sub-districts) of Narmada Command Area. Fourteen Different Agencies including Universities Research Institutions etc. 1983
- ❖ Population Projection and Migration Study for Narmada Command Area. Operations Research Group, Vadodara, 1983.
- ❖ Consumer Expenditure, Assets and Indebtedness of Rural Households of the Command Area of Sardar Sarovar (Narmada) Project Directorate of Economics & Statistics, Gandhinagar, 1983.
- ❖ State of Adoption of Improved Technology in Narmada Command and Rest of Gujarat State (Based on Analysis of Crop cutting Experiments Data).Operations Research Group, Vadodara, 1985.
- ❖ Land Use and Cropping Pattern Survey and Mapping of Narmada Command Area Zone 4A & 4B. Department of Geography, M.S. University, Vadodara, 1986.
- ❖ Growth of Agro-Processing Industries in Phase-I of the SSP. Gujarat Industrial & Technical Consultancy Organisation Ltd., Gandhinagar, 1990.
- ❖ Studies in Water Rates Policy, in 3 parts:
- ❖ Pricing of a Public Utility Survey of Literature. Department of Economics, South Gujarat University, Surat.
- ❖ Financial working of Irrigation Projects - A Case of Four Projects in Gujarat. Department of Economics, Sardar Patel University, Vallabh, Vidyanagar.
- ❖ Some Policy Issue for Canal Water Rates in Gujarat. Department of Economics, Sardar Patel University, Vallabh, Vidyanagar, 1992.

- ❖ Economic Dimension of the Sardar Sarovar Project. S.P. Institute of Social & Economic Research, Ahmedabad, 1995.
- ❖ Wasteland Development Project for Command Area of Narmada Canal (Region 11 and 12). Gujarat State Rural Development Corporation Ltd., Gandhinagar, 1984.
- ❖ Cropping Pattern and Waste Demand Study in Narmada Command Area. Operations Research Group, Vadodara, 1987.
- ❖ Study on Preparation of a Detailed Integrated Command Area Development Plan for SSP.M/s. Wamana Consultants Pvt. Ltd., Hyderabad, 1994.

Drainage, Waterlogging and Salinity

Groundwater Studies

- » Mathematical Modeling of Ground Water System for single layer model-Narmada Mahi-Doab by Operations Research Group, Vadodara. Completed in 1982.

This study was taken up as a preliminary study, to deal with recharges due to rainfall and due to irrigation inputs of varying levels and rise of varying level of pumping. The study provided initial insights for planning for future ground water development on introduction of surface irrigation.

- » Mathematical Modeling of Ground Water System Narmada Mahi Doab. By Operations Research Group, Vadodara. Completed in 1985.
- » Additional work of Mathematical Modeling of Ground Water System Single Layer Model-Narmada Mahi-Doab. By Operations Research Group. Vadodara. Completed in 1985.

These detailed modeling studies dealt with recharges due to rainfall and due to irrigation inputs of varying levels and rise of Ground Water over time with varying levels of pumping. Based on these results, the ground water development in command area is visualised in planning of the SAP.

- » Survey and Investigation Work of Ground Water Resources in Narmada Mahi-Doab by Gujarat Water Resources Development Corporation Ltd. Gandhinagar. (1987).

This study was carried out for determination of hydro geological and hydrological parameters of the aquifers. The study has provided useful information regarding water levels and water quality for conjunctive use and to control the problem of water logging alter surface irrigation starts.

- » Mathematical Modeling of Ground Water System for SSP Command between Rivers Shedhi and Sabarmati by Consultancy Engineering Services, New Delhi. Completed in 1993.
- » Mathematical Modeling of Ground Water System for SSP Command between Rivers Sabarmati and Banas by Operations Research Group, Vadodara.

- » Mathematical Modeling of Ground Water System for SSP Command beyond Banas upto Rajasthan Border by Dalal Consultants, Ahmedabad. Completed in 1993.

These modeling studies dealt with recharge due to rainfall and due to irrigation inputs of varying levels and rise of ground water overtime with varying levels of pumping. The studies provided insights for planning for future ground water development on introduction of surface irrigation.

- » Hydro geological Impact Assessment Study by H.R. Wallingford. Completed in 1995.

This was a review of earlier drainage studies. It has provided information about the revised drainage co-efficient.

- » Survey and Investigation of Ground Water Resources beyond river Mahi upto border of Rajasthan in SSP Command Area.

This study was carried out for determination of hydro-geological and hydrological parameters of the aquifers. The study provides useful information regarding water levels and water quality for conjunctive use and to control the problem of waterlogging after surface irrigation starts.

Drainage Studies

- » Pre-feasibility Level Drainage Study of Narmada Mahi-Doab of SSP Command, by Core Consultants, Ltd., Ahmedabad. Completed in 1982.

This study has been carried out for assessing the drainage requirements of the command area upto Mahi. Drainage co-efficient for each region are worked out and accordingly surface and sub-surface drainage requirements are planned.

- » Pre-feasibility level Drainage Study for SSP Command beyond River Mahi. By Consultancy Engineering Services, New Delhi. Completed in 1993.

This study has been carried out for assessing the drainage requirements of the command area. Drainage co-efficient for each region are worked out and accordingly surface and sub-surface drainage requirements are planned.

Floral and Faunal Studies

- » The Sardar Sarovar Narmada Project Studies on Ecology and Environment by Department of Botany, M.S. University, Vadodara. Completed in 1983.

The objective of the study was to suggest ways and means of achieving optimum utilisation of the Narmada Waters without any appreciable damage to the river ecosystem and to collect the data on various parameters of ecosystem, to assess likely changes and to suggest remedial measures for negative impacts, if any. Based on the findings of the

report, work plans for Forest and Wildlife, Public Health and Fish and Fisheries have been prepared for implementation.

- » Study on Flora and fauna of the Command Area of Sardar Sarovar (Narmada) Project lying between the Narmada and Sabarmati Rivers (EIA studies) by Sardar Patel University, Vallabh Vidhyanagar. Completed in November 1995.

The study was taken up to assess the Environmental Impact of the SSP on Flora and Fauna based on experience of Mahi irrigation Project. Based on recommendation of the study, the floral and faunal management plan is to be prepared.

- » Study on Flora and Fauna of the command area of Sardar Sarovar (Narmada) Project lying in Saurashtra and Kachchh Area (EIA) Studies by Saurashtra University, Rajkot. Completed in January 1996.

The study was taken up to assess the Environmental Impact of the SSP on Flora and Fauna based on experience of Mahi irrigation Project. Based on recommendations of this study, the floral and faunal management plan is to be prepared.

- » Study on Flora and Fauna of the Command Area of Sardar Sarovar (Narmada) Project lying between Sabarmati and Rajasthan Border (EIA studies) by Gujarat University, Ahmedabad. Completed in March 1998.

The study was taken up to assess the environmental impact of the SSP on flora and fauna based on experience of Mahi Irrigation Project. Based on recommendations of this study, the floral and faunal management plan is to be prepared.

- » EIA on Downstream of Sardar Sarovar Dam upto Gulf of Cambay by M/s. H. R. Wallingford. U.K. Completed in April 1995.

This was taken up to evaluate the environmental impacts on the down stream in the initial stage of 25 years of this project. The results of this study will be used for downstream area planning.

- » Ecological study on Wild Ass Sanctuary and surrounding Area Using Remote Sensing Technology for Environmental Impact Assessment by Gujarat Ecological Education and Research Foundation, Gandhinagar. Completed in 1997.

This study was taken up to determine various land use classes by remote sensing to monitor the trend of *prosopis*, salt and grass land in and around the sanctuary. The information of the study report will be utilised for detailed EIA study of the sanctuary.

- » Environmental impact Assessment of Nal Sarovar Bird Sanctuary by Gujarat Ecological Education and Research Foundation, Gandhinagar. Completed in 1998.

The study was taken up to assess the impacts of canal irrigation in and around the Sanctuary area. Based on the recommendations of this study, the Action Plan for Nal Sarovar Bird Sanctuary is to be prepared

- » Environmental Impact Assessment of Velavadar Black Buck National Park b Gujarat Ecological Education and Research Foundation, Gandhinagar Completed in 1997.

The study was taken up to assess the various impacts of surface irrigation) and around Sanctuary area. Based on the recommendations of the study, a draft action plan has been prepared and as per the suggestions of experts, the final Action Plan is being prepared.

Findings of the study groups

Based on the reports received from the three universities, which conducted the E.I.A. studies, the following are the identified impacts.

- + Irrigation will bring about sub-humid conditions in the various regions. This would be favourable for most crops trees of the area. Thus, semiarid regions of northern part of North Gujarat (region 12), Bhal area of Saurashtra (region 7) and Kutch (region 13) will also have partially sub-humid conditions in irrigated tracts.
- + SSP aims at diversified cropping patterns. Introduction of dry land horticultural crops on fallow and on areas not otherwise irrigable by gravity is also on the anvil.
- + Overall agricultural and tree-shrub biomass base will be substantially augmented. The range of biomass diversity adapted to sub-humid conditions is also likely to be larger. The following depicts the crop ranges of the area with stabilisation of irrigation and indicates that monocultures or limited ranges of cultures are not likely.
- + Studies show a rich potential for farm forestry, agro-silviculture, and forestry on saline and marginal lands. Including the canal side plantations on 5600 ha, a conservative estimate indicates potential for plantations and tree culture of at least 3.27 lakh ha for the command area as a whole. Yields of grasslands in regions 4, 7, 8,9,10,11, and 12 will improve significantly with better propagation of perennial varieties like Cynodon dactylon, Dichanthium annulatum, Panicum, Paspalidium etc.
- + Certain grass species and vegetation belonging exclusively to arid or desert climates may not thrive well as found from experience of Rajasthan Canal. However, since over 30 per cent of the geographical area will not have irrigation networks, the species may continue in these areas and this aspect is to be studied in depth.
- + Certain weeds may show accelerated growth of farmlands, drains, etc. and weed control strategies may have to be used. Weed problems in canals will not arise (when these are well maintained) because of lining down to 8 ha units.
- + If waterlogging develops in certain areas, new aqua vegetative systems with weeds are likely to develop.
- + There will be no impacts on major fauna since this is a present trend to agricultural regimes. Certain avifauna reptiles and rodents may proliferate. Avi fauna diversity will

increase with a number of tanks and water bodies kept full as seen from the experience of Mahi command.

- + Steps for protection of the following flora and fauna species indicated presently as rare in the region to be taken are in the form of conversation measures in specific areas identified or setting up herbaria etc. Universities will be involved for creation of gene bank pools to the extent required.

Fisheries

- » Environmental Impact Assessment Studies on Inland Marine Fisheries relevant to the Command Area of Sardar Sarovar (Narmada) Project, by M.S. University, Vadodara. Completed in 1995.

This study was taken up to assess the impacts of SSP Canal water on fisheries. Based on recommendations of the study, fisheries development programme (an Action Plan) for Phase-I area has been prepared by the Commissioner of Fisheries.

Health

- » Environmental Impact Assessment (EIA) studies on Water Related Diseases in Sardar Sarovar Project (SSP) Command Area including the Area Down Stream of the SSP Dam by Commissionerate of Health, Medical Services Medical Education, Government Of Gujarat, Gandhinagar. Completed in October, 1995,

The study was taken up to assess the impacts of canal water on water related diseases. Based on recommendation of this study an action plan for health sector for the SSP Command is being prepared.

Water Quality

- ➔ GWSSB(1983) Study to determine Municipal and Industrial demand; parallel study on Sabarmati basin by GPCB(1989).
- ➔ GPCB Compilation of water quality data for 10 selected rivers in Gujarat under GEMS (WHO Supported) and national MINARS Project; Limited ground water monitoring by GPCB.

The command area encompasses twelve districts, viz. Bharuch, Vadodara, Panchmahals, Kheda, Ahmedabad, Gandhinagar, Mahesana, Bhavnagar, Surendranagar, Rajkot, Banaskantha and Kutch. Total number of the talukas of these districts wholly or partially covered in the command is 62 and about 3344 villages of these talukas are expected to be served by the project for irrigation.

Command Area Development Planning

The Canal system would command a gross area of 3.43 M ha. and cultivable area of 2.124 M ha. It is envisaged to irrigate annually 1.792 M ha. with the availability of 9 MAF of surface water from the project. From management point of view, for laying down a set of prescriptions for crop pattern, water allocation and management, conjunctive use etc., the command has been divided into regions based on the following factors:

- (a) Annual rainfall
- (b) Land irrigability class including drainage characteristics
- (c) Ground water quantity and quality in terms of ground water table and salinity of water in the upper aquifers
- (d) Alignment and the command of major branches.

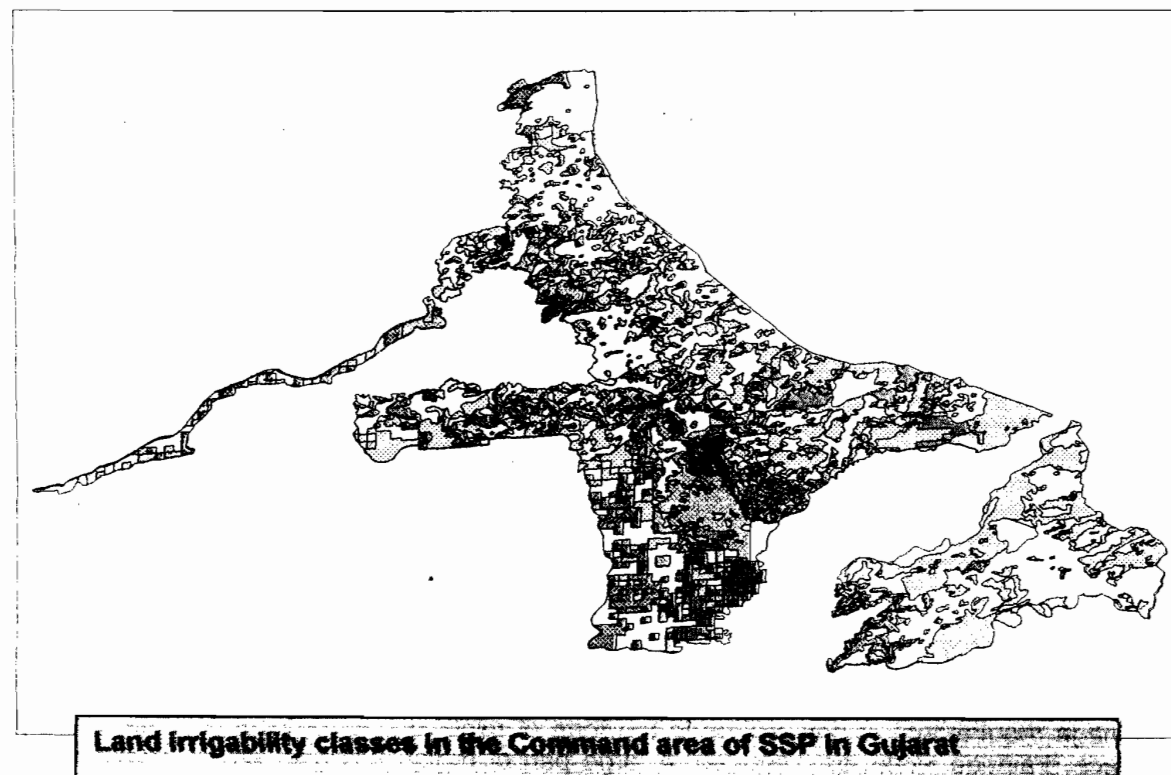
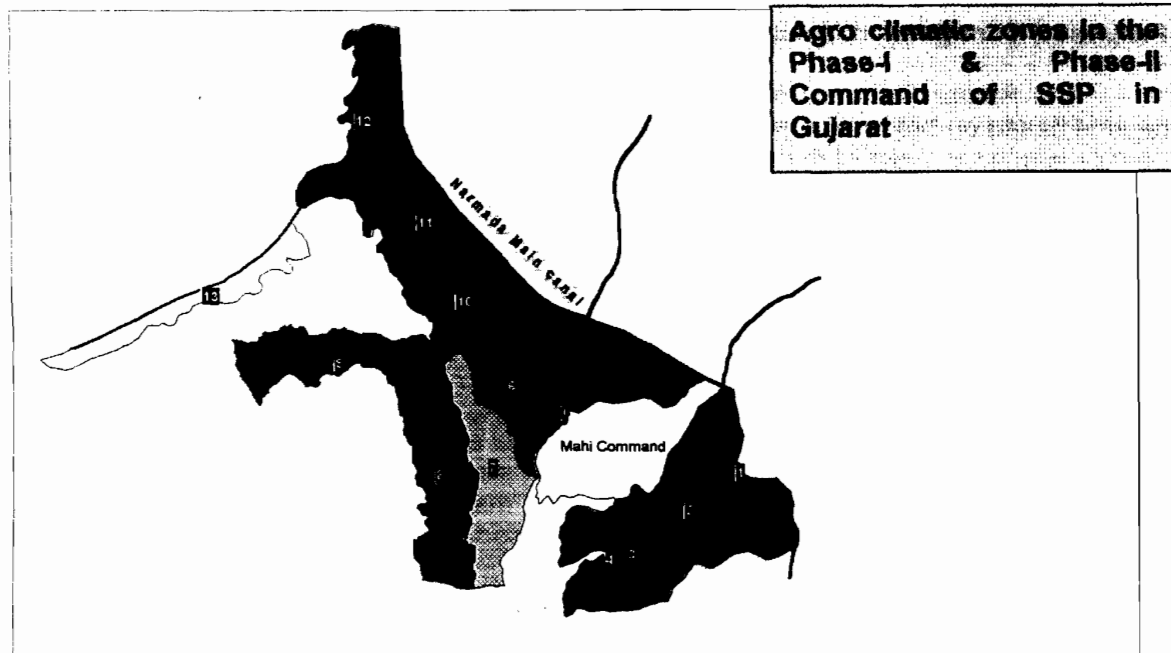
Considering these factors, the command has been divided into 13 regions. The main regions, their names, GCA and CCA are as follows:

Sl.No.	Name of the region	Region No.	GCA	CCA
1.	Sankheda-Savli	1	253100	161900
2.	Sinor-Vadodara	2	273100	187600
3.	Bharuch-Amod	3	153200	84900
4.	Vagra-Jambusar	4	111300	36800
5.	Mehmedabad-Daskroi	5	295700	192300
6.	Sanand-Kadi	6	181700	125700
7.	Dholka-Dhandhuka	7	476000	264300
8.	Limdi-Botad	8	294000	182600
9.	Halvad-Malia	9	268400	168000
10.	Viramgam-Dasada	10	344600	242100
11.	Sami-Harij	11	191700	115200
12.	Radhanpur-Vav	12	462800	319700
13.	Rapar-Mundra	13	122900	42800
14.	Total of all regions		3428500	2123900

Land Irrigability classification

The Soil Survey Manual (IARI 1970) recognises six irrigability classes.

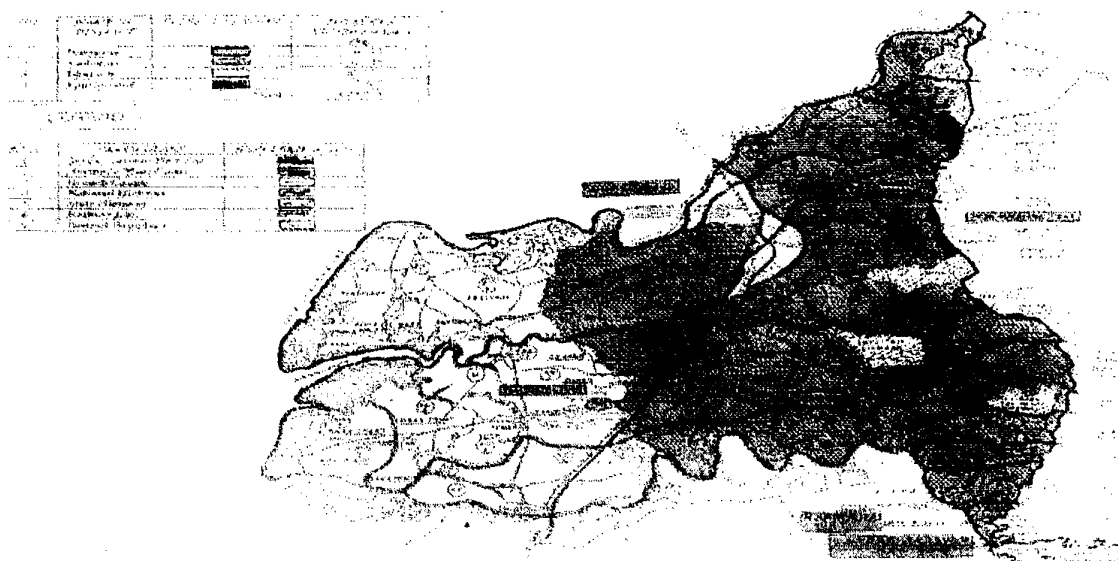
- Class 1 : Lands that have few limitations for sustained use under irrigation.
 Class 2 : Lands that have moderate limitations for sustained use under irrigation.
 Class 3 : Lands that have severe limitations for sustained use under irrigation.
 Class 4 : Lands that are marginal for sustained use under irrigation because of very severe limitations.
 Class 5 : Lands that are temporarily classified as not suitable for sustained use under irrigation pending further investigations.
 Class 6 : Land not suitable for sustained use under irrigation.



Proposed Management Measures

The Sardar Sarovar Project service area has been classified into 13 agro climatic regions based on broad topographical, hydro meteorological and soil surveys. The drainage density is good in most of the regions except in regions 4, 7, and 11. Outfall conditions are sluggish in regions 4 and 7, parts of which are also affected by salinity. Sub areas or pockets likely to get waterlogged or saline due to irrigation in future have been identified for planning special measures to prevent development of such a situation.

The Phase-1 area of the project covering the command between the Narmada and the Mahi rivers has been taken up for detailed surveys, monitoring and planning. This comprises agro climatic regions 1 to 4. Detailed soil surveys and contour surveys have been carried out. Groundwater fluctuations in all the wells and special piezometers are being measured at regular intervals. Automatic water level recorders have also been installed at selected places. Hydro meteorological observation stations have been established. Studies for groundwater availability, annual recharge and mathematical modeling for surface and groundwater interaction have been carried out. Based on all these surveys and information as well as the data of rainfall intensities, the drainage plan for the Phase-1 area has been drawn up. The irrigation water allowances for the various regions in this area have been decided keeping in view the soil classification, groundwater availability, crops grown, and climatological factors. In poorly drained flat lands with relatively high water tables, limited water allowance and conjunctive use of surface and ground waters has been planned.



Similar exercises have been taken up for the command area beyond the Mahi river also. Regions 1 and 8 have very good surface topography and internal drainage. Surface drainage requirement, if any, will be in the form of minor drains for local patches. No sub-surface drainage works are required. A large part of region 9 is also similar. Regions 2, 5 and 13 also have good surface and internal drainage. Limited minor drains, remodeling of

existing channels and ground water extraction for conjunctive use is considered adequate. Regions 3,6, 10, 11, and 12 have relatively flat ground slope and moderate internal drainage. Minor drains, remodeling of existing channels, groundwater extraction, and a limited use of moderately saline ground water have been planned.

Regions 4,7 and 11 together with bordering areas of regions 9, 10 and 12 are relatively difficult for drainage. The Bhal tract of Gujarat falls within these regions. A well-planned intensive drainage network is being worked out for these regions. A very limited irrigation water allowance would be permitted. Ground water extraction, part mixing of saline water, improved water management and agricultural practices, leaching of surface salts by flooding with surplus spill waters of Narmada, salinity resistant agriculture and continuous careful monitoring of the groundwater table and salinity status through observation wells and piezometers etc. will constitute the multipronged strategy for tackling the problem areas.

The following are the proposed measures to prevent environmental degradation.

Waterlogging and salinity:

1. Mechanised, well-controlled canal lining

This would reduce seepage loss to only about 10% of that in unlined canals. The canal system planning, design and operation are also inherently tuned to ensure that these problems do not arise. Thus, all the canals right down to the 8 ha blocks would be carefully lined to reduce the seepage losses. The main canals and branches will be concrete lined with mechanical pavers. The distribution system will be brick lined with a sandwiched rich mortar layer. Use of polyethylene membranes is also contemplated. The lining will reduce the seepage losses to about one tenth of the losses that would have occurred if the canals were unlined. The risk of waterlogging from seepage would be reduced to that extent.

2. Provision of surface drains.

The drainage excess rainfall, storm water from agricultural land for better crop productivity has been proposed at farm levels as well as at regional level. Whole of command has been divided into two regions in respect of preparation of operational design and layout of surface drainage network commencing from 40 ha chak. The construction of the drainage system shall go on concurrently with the canals.

3. Conjunctive utilisation of surface and ground water, limited water delta.

The amount of water supplied per unit of area in the SSP command will be amongst the lowest in the country. The average depth of surface water supplies for the entire year measured at the main canal head will be only about 53 cm over the command area as compared to 75 to 100 cm per crop season on most of the projects in the country. This will naturally call for very judicious and economical use of water. If the farmers want to grow water intensive crops, they will have to supplement the canal water with well waters or reduce the area of their crops under irrigation. The project authorities have contemplated,

conjunctive use of surface and ground waters. In the existing irrigated areas of other prefects where well irrigation is concurrently practiced, the problem of waterlogging has reduced.

4. Better water management, Automated canal regulation, Rotational water supply on volumetric basis, and active participation of farmers

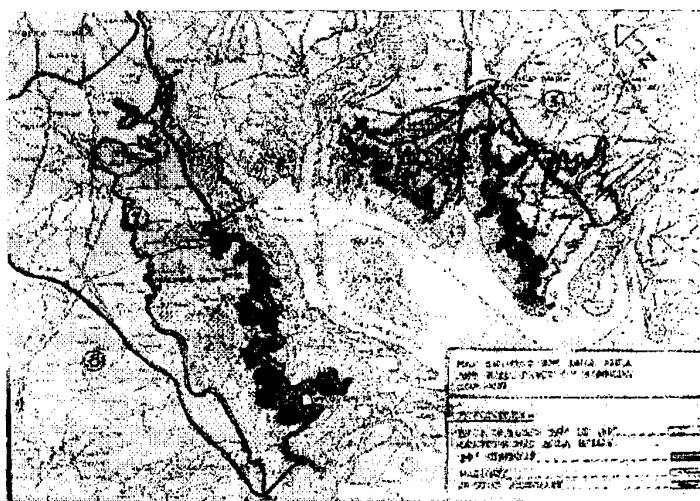
A draft legislation has been already prepared to regulate the distribution and use of canal and ground water in the state. On the Sardar Sarovar Project there will be volumetric supply of water through a computerized semi-automated operation system. Under this system, the discharge from the canals down to 8.5 cumecs (300 cusecs) capacity will be regulated through automatic computer control. These measures will not allow the canals to draw more water than planned. As the tariff for the water will be on the basis of the quantity supplied, the farmers will naturally try to use it most economically. This will be further ensured through better water management through farmers' associations and rotational water supply. The irrigation water depths actually required will be worked out through a system of soil moisture sensors and observations of hydro meteorological and climatological parameters as related to crop growth stages and the supplies will be regulated accordingly. Wherever possible drip and sprinkler methods of water application will also be encouraged.

5. Carrying out water balance and salt balance studies and the necessary monitoring.

During monsoon, when surplus waters are likely to be available in the canal, such waters will be used for flooding and leaching the saline soils. Continuous monitoring of salt and water balance has also been planned for such marginal soils.

6. Bhal and Bara Tract

Special problematic areas of Bhal and Bara are difficult for irrigation in view of high water table and salinity. A possible way of developing this area can be through suitable forest development programme. Salt loving plants, having a high evapo-transpiration rate can be preferred. These plants can help in controlling the water table. In the initial stage of development of irrigation in the command, there will be excess water available. This can be used over this area for initial leaching by way of surface diffusion. This can promote initial growth till the



plants develop some resistance. Species like *Prosopis juliflora*, *Eucalyptus Artiplex* and other suitable plants can be tried. No irrigation system can be thought of for this area.

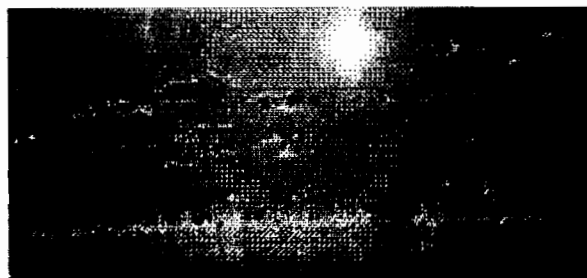
Biological Environment: Sanctuaries in the command

According to the Biogeography zonation, Gujarat has representation of four biogeography zones and five biotic provinces, as follows:

- | | |
|-------------------------|------------------------------|
| ➤ The Indian Desert (3) | Kuchchh (3 A) |
| ➤ Semi Arid (4) | Gujarat – Rajwara (4 B) |
| ➤ Western Ghats (5) | Malabar Coast (5 A) |
| | Western Ghat Mountains (5 B) |
| ➤ The Coasts (10) | West Coast (10 A) |

Of these, the first two would be touched upon by the waters of the Narmada due to the Sardar Sarovar Project. The consequential ecological shift has been studied and documented to as brought out below

- ➔ For **Nal Sarovar Bird Sanctuary** (area 115 sq.kms). contribution from Sardar Sarovar Project waters will arise only when there are droughts and the lake does not fill up due to natural run-off from the catchment



area. Studies done hitherto indicate that positive impacts can be expected with zoning out the lake area, protecting the habitat of migrant birds on the shore and a sound scientific plan which accommodates needs of the local communities for fishing and grazing. Utility of Nal Sarovar as a storage mechanism for supporting lift irrigation not likely to be favourable. Quality of agricultural run off to Nal Sarovar from the catchment area (which will be irrigated) is planned to be regularly monitored in the long run.

- ➔ As regards the **Black Buck Sanctuary** (area 34 sq kms), the Sardar Sarovar Project will create a very positive environment because of supply of fresh water, which is highly deficient in the area. However identified negative impacts are listed below :

- Wildlife habitat may be reduced in ecological zone due to the change in the land use and cropping pattern.

- With increase in agricultural production, Blackbuck may start frequenting the fields, thus possibly increasing human/animal conflict.

- Through there is very little likelihood of waterlogging in ecological zone; some patches may face waterlogging creating small patches of saline marshes for short period.

- Likely increase of pesticides and insecticides may affect migratory harriers and some other avi-fauna in ecological zone.

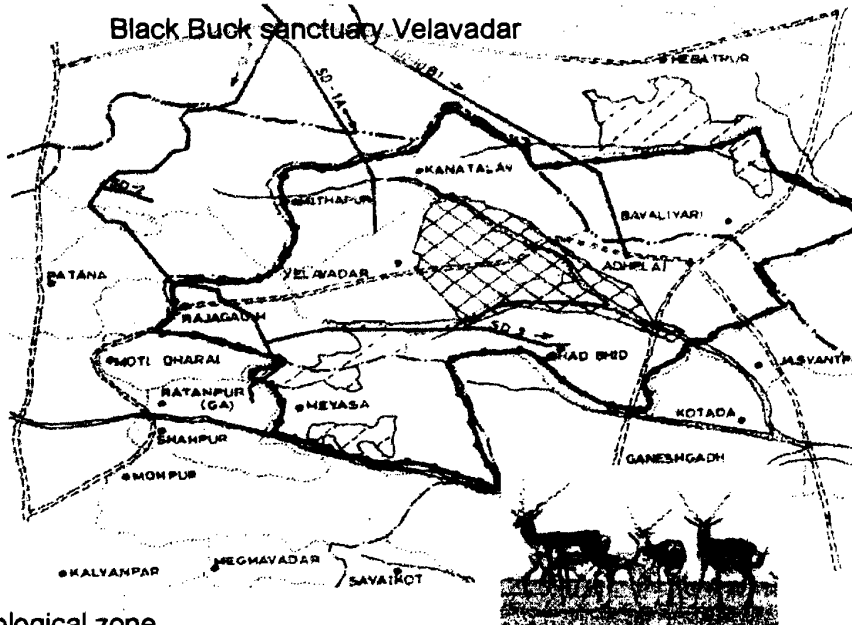
- There is very little likelihood of a change in the microclimate in or around the park area.

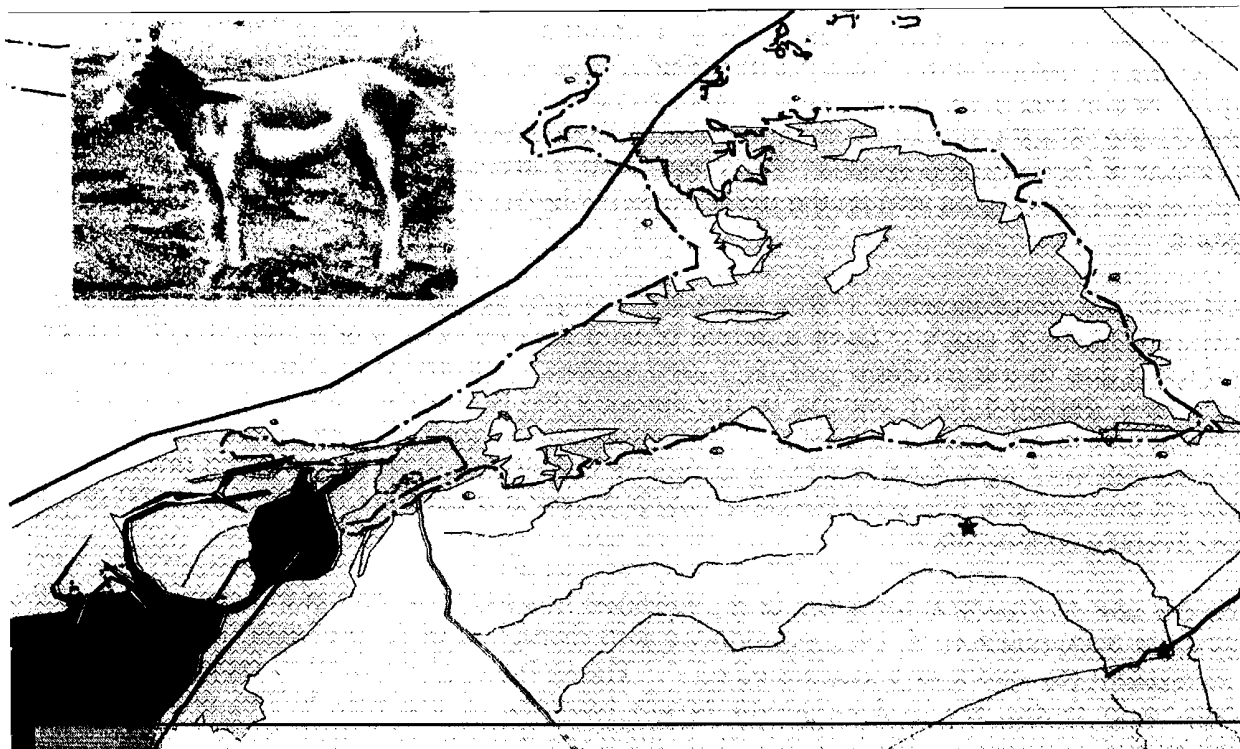
- Possibility of increase in water/moisture content in the soil may bring some change in plant communities especially Cyperaceae, Gramineae and some herbaceous species. There is likelihood of increase in area under *Prosopis juliflora* in parts of ecological zone.

- There may be some increase in human activity, disturbing some wildlife in the ecological zone.

Increase in Blue bull population, due to the changed circumstances may cause problems of crop damage in surrounding areas of the National Park.

- ⇒ As regards **Wild Ass Sanctuary** (area 4,953 sq kms), the overall impact is likely to be positive mainly because of availability of fresh water in waterholes for the wild Asses and better growth and sustenance of grasses. However, the sanctuary is under some pressure because of salt industries and intrusion of cattle. Wild asses often damage crops on the periphery. The Kachchh Branch crosses the neck dividing the Little Rann and the Great Rann and the most appropriate structure for the crossing is being worked out so as not to impede the movements of wild ass.





Wild Ass Sanctuary in Runn of Kutchh

- ➔ Siphon type structure appears to be quite promising. Management plans will be worked out considering the salt industries, which have entered the Little Rann in a big way as also the pressure of cattle on the periphery. Better development of bio-mass on the islands, if brought
- ➔ About as a part of planned development, may reduce damages to the agriculture crops on the periphery by wild asses as observed at present. However, if the interior is not conserved, the impacts can be the just opposite.

In general, for all the three sanctuaries, the networks are so planned as not to create problems of wild life movement and these are not extending anywhere inside the sanctuary limits.

Biological resources and issues in the command

In Gujarat forests constitutes only 6.92% of the geographical area. According to estimates of 1980-81, about 1.3% of the total command i.e. about 44,500 ha of the command area was forest of this about 200 ha shall be required for construction of canal net works. However none of the identified biodiversity hot spots will be impacted in any manner by the Sardar Sarovar Project.

The diversity of agro based plants and animals is crucial for the State's ecological security. Its present status changes therein and future trends are, therefore, important for biodiversity

conservation. Gujarat has nearly 50% of its land area under agriculture. Owing to the diversity of climatic and ecological conditions, wide range of crops are cultivated. This has given rise to many indigenous crops varieties in a number of crops in the State. On the other hand, the State's progressive farmers and Agricultural Universities have brought out a number of high yielding varieties. Thus, one comes across the most traditional cultivation of native land species as well as the most modern intensively framed cash crops species in the State.

Despite the domestication in the agricultural crops, various land varieties have existed in different types of crops. Over a period of time their cultivation and propagation has been affected due to the availability of high yield varieties. The relevant information pertaining to this now depleted land varieties with reference to its number, area of occurrence and distribution is not readily available. This information, which is very relevant in the overall conservation of agro-biodiversity, is a serious constraint. Effort have been undertaken to collect and compile this valuable data, which provided a base for holistic approach of agro-biodiversity conservation.

Heavy use of chemical fertilizers and pesticides has led to a drop in the productivity of the soil, bio-accumulation of toxic substances and disruption of food chains of the agricultural ecosystem (by direct and indirect effects). These have contributed to crop failure, steady decline in production and long-term health hazards all the way to the end users, i.e., humans.

The old native varieties (land races) are fast giving way to new hybrid / high yield varieties in a majority of crops. This is leading to impoverishment of the gene pool of native varieties of crops. In several cases, such native races have been lost forever. Relative unimportance of organic and natural farming is leading to continued reduction in land fertility and production. These have been addressed through series studies and recommendations would be integrated into the command area development plan on the anvil.

Public Health

Major environmental apprehensions are with reference to the water-related diseases of malaria, filaria and schistosomiasis. As regards schistosomiasis, studies done by the National Institute of Communicable Diseases under WHO auspices indicate no snail-based foci for the disease in Narmada Valley. There are no prospects of occurrence of this disease for Narmada Project and monitoring will be ensured.

Malaria is found to occur naturally in epidemic cycles in Gujarat, partly Influenced by climatic factors. Effectiveness of the chosen control strategy has also a significant influence on transmission rates. Malaria is important both for urban and rural areas. Two of the three mosquito species are considered as principal vectors responsible for transmission, viz. *Anopheles stephensi* in urban areas and *A. culicifacies* in rural areas.

Experience of surface irrigation in Mahi Project of Kheda District has shown enhanced transmission rates during the dry months of April to June which may be ascribed

to irrigation but, in general, there is no clear relationship between average annual malaria incidence and irrigated areas in the 19 districts in Gujarat. Irrigation thus is not the principal causative factor for malaria. It may have, however, impacts if stagnations of water bodies, seepages from canal, etc. are not controlled. Under SSP the infrastructure itself, at a large cost, takes care of avoiding or minimising seepages and stagnations.

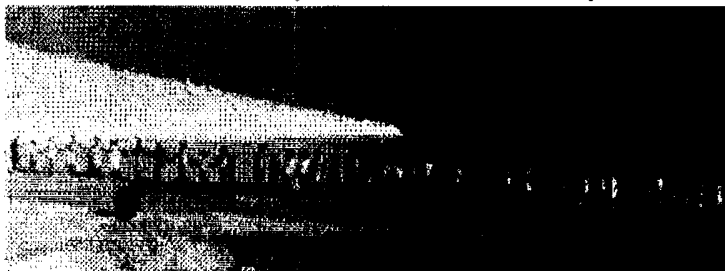
The following control strategies are expected to address to malarial problems arising on account of Sardar Sarovar Project.

- (a) Special health units to monitor and treat migrants (workers and resettled people) intensively under malaria control programmes.)
- (b) Effective monitoring and surveillance under the operative malaria control programmes.
- (c) Emphasis on 'tidy' irrigation and drainage.
- (d) Creating awareness among Sardar Sarovar Project staff as well as among command population through health education and extension programmes. This also includes preparation of a manual on malaria control.
- (e) Use of identified carnivorous fish in tanks, ponds, etc. inside and near command area.

Filaria which is caused by the mosquito species of *Culex quinquefasciatus* (fatigan) will also be controlled. It is confined to coastal areas of Saurashtra and South Gujarat and not significant for the command area as such. However, monitoring of the disease will be required.

As regards other water related diseases like dysentery, typhoid, hepatitis, gastroenteritis etc. these are related in a very limited context to irrigation. Other major factors like sewage disposals, septic tank discharges, overall hygiene of the rural population and quality of domestic water supply under cities and towns which often gets infected due to old pipe networks predominate. With current emphasis on health programmes under of the State Government and those of Municipal Corporations and municipal bodies and with increasing financial outlays and operationalisation of health care as well as health education programmes (in the context of overall commitment of "Health for all by 2000 AD"), these diseases will be kept in control. Effective monitoring and surveillance will be a part of the Health Plan for the command area of Sardar Sarovar Project.

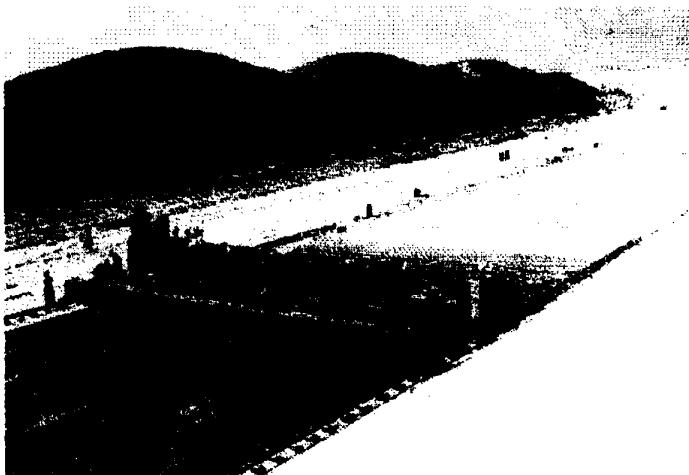
Positive impacts due to reduction in scabies and skin diseases and availability of potable drinking water and bathing water through the SSP systems, as planned, would significantly prevail not only in the command area but also in the entire areas of Saurashtra, Kutch, and North Gujarat being served for domestic water by Sardar Sarovar Project. For scabies and skin diseases, the area benefited will not be only 20,000 sq. km. of Sardar Sarovar Project but about 80,000 sq. kms. of Saurashtra and Kutch.



ACTION PLANS

Integration of all developmental activities related to irrigation, drainage, agriculture, co-operation, roads, marketing, forests, rural electrification etc. is considered as a basic requirement for the command area development programme targeted for SSP. The emphasis is on long term balanced and environment-friendly growth. Action Plans have been drawn up on the issues like health, fisheries, flora fauna etc. for the Command Area. The Comprehensive command area development plan is under formulation.

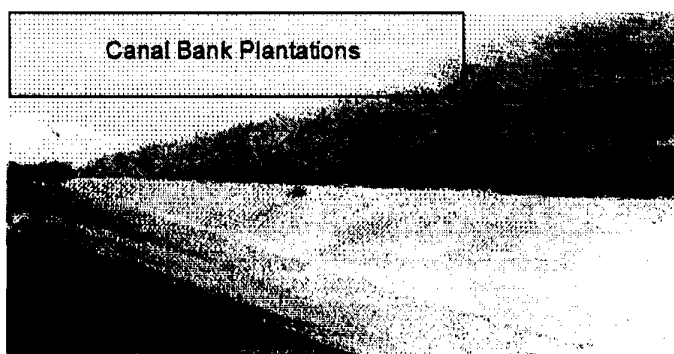
IMPLEMENTATION Construction of Canal Phase -1 Ch 0.00 Km to 144.500 Km (Mahi crossing) along with the distributaries have been completed in all respects. Construction works in the reach between kms., 144.500 and kms., 263.165 i.e., NMC Phase-II-A have been completed in all respect. The construction works in the canal reach between kms., 263.165 and kms., 388.164 i.e., NMC Phase-II-B are in advance stage of completion. Surface drainage is being provided



up to 40 ha chaks concurrently with the construction of canals. The command coming under Phase - 1 extends up to Narmada-Mahi doab and areas coming under this belongs to agro-climatic zone no 1 to 4. Development of the command area is a long drawn process. Gujarat has taken steps in accordance with the covenants of the investment clearance accorded to the project by the Planning Commission and *pari-passu* clause stipulated by the MOEF. By now, almost all the major studies have been completed and impacts are known. Action points have also been determined. State Govts. have taken steps for implementation of the identified action points in accordance with the requirement of the environmental control. The command area development activities and environmental safeguard measures will be taken when water starts flowing in the canals.

Plantations Activities

(a) Plantation along Canal Banks



The total potential of canal bank plantations is estimated to be 15,000 ha. A project report prepared for this purpose by Gujarat Forest Department is under scrutiny by SSNNL. The plantation programme was launched from the year 1990-91. Plantations on 2,900 ha have already been established till monsoon of 2001.

(b) Dam Vicinity Plantation (240ha)

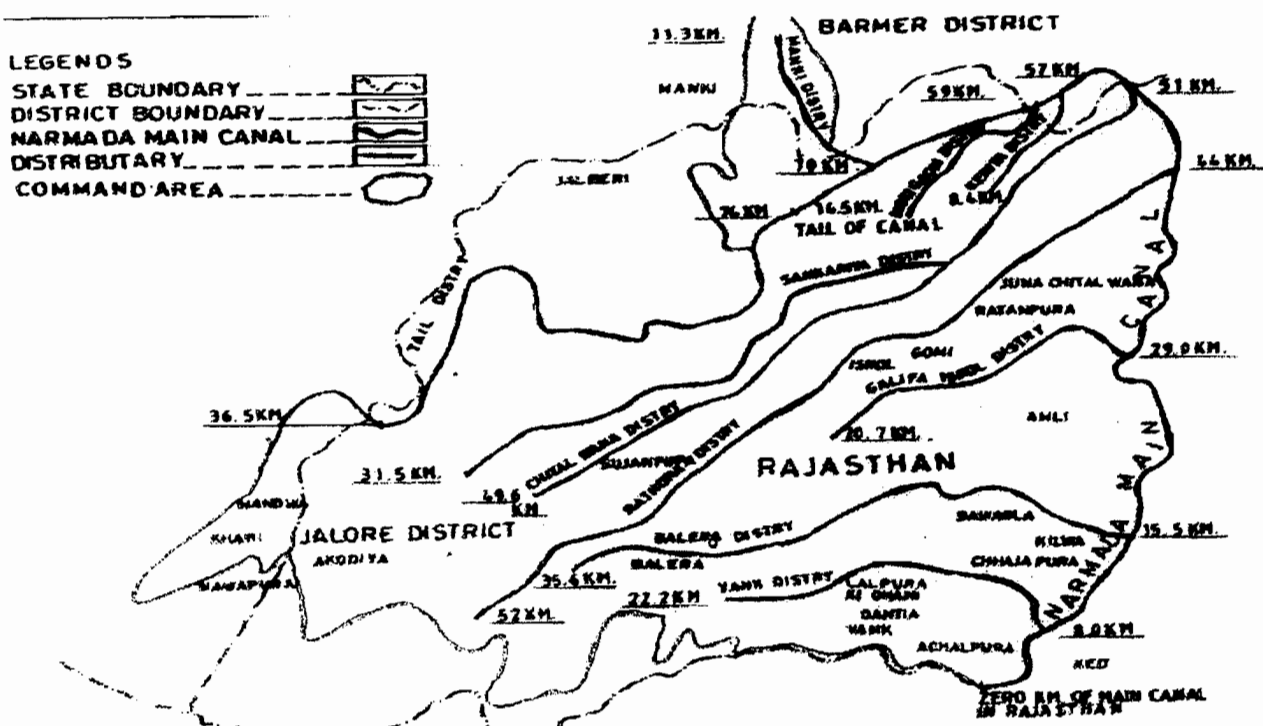
The plantation in total area 551 ha. In the vicinity of dam have been completed by the forest department as well as project authorities. This is being maintained by project authorities.

**(c) Ravine Land Afforestation (200 ha)**

On the left bank of river Sabarmati an area of 200ha in two villages i.e. Ratanpur (120ha.) and Phirojpur (80 ha) was taken up for model plantation. Entire work has now been completed

(B) Current Scenario : Government of Rajasthan**Source of Impacts****Narmada Main Canal**

Rajasthan has been allocated 0.5 MAF (616 MCM) of Narmada water under the final award of NWDT. To utilise its share of the Narmada water, Govt. of Rajasthan earlier had planned a 74 km long Narmada Canal to irrigate 73,157 ha. of land in the drought prone districts of Jalore and Barmer. Besides irrigation benefit to 89 villages(74 in Jalore & 15 in



Barmer), the project also envisaged to provide drinking water to a population of about 3.0 lakhs living in 124 villages around the irrigation canal.

The construction of Main Canal in the first 48.0 Km reach was taken up and the earthwork and masonry structures between 0 and 30 kms., were completed, except in few patches due to land acquisition problem. Concrete lining was completed in the initial reach of 7.88 kms. Service road (W.B.M.) parallel to main canal was constructed. The entire Narmada Main Canal works in Rajasthan was scheduled for completion by 2005-2006.

Water Delivery Network

The water delivery system will cater to irrigation needs of the vast areas through irrigation units. Each unit of irrigation service area, called Village Service Area (VSA), has been planned to be served through a single outlet from the distributory. This outlet will remain fully open for a fixed period during irrigation water demand and will be closed during periods of no water demand and no water availability. Water will be delivered only on the basis of the demand to a group of organised cultivators on a volumetric basis at the head of VSA, and not to individual cultivators.

In the VSAs, network for water distribution is planned through minors and sub-minors feeding different chaks and sub-chaks. For the entire system below VSA outlets, water will be supplied in proportion to the area served. Within the chak, the water will be rotated to individual fields over fixed times in proportion to the holdings.

The Distribution System Under VSAs

A Village Service Area (VSA) will generally constitute an area between 300-500 ha. of a village under command. For villages extending over areas larger than 500 ha. or if required on the basis of topography or other physical features, the VSA may cover a larger area. The VSA is planned to be divided into chaks of 30 to 60 ha.. In a chak there will be 4 to 6 sub chaks. A minor will lead the water from the VSA outlets to the heads of chaks. A sub minor will convey water into the chak up to heads of sub chaks. Field channels will carry water from heads of sub-chaks to individual fields. The chaks will be ungated and water will be rotated into sub-chaks through turnouts. In a sub chak, water will be rotated to individual farms.

The VSA outlets will either be 'on' or 'off'. A constant discharge will be released. The flow will be divided proportionately at each chak head, by fixed proportional devices. Within the chak, the flow will be rotated. The flow will continue over a fixed continuous period during a week. Generally, it will run over a period of one week. The schedule of rotation among farmers during the period of supply to the service area will be fixed for each season so that each farmer will know the day of the week and precise hours during which he is required to draw. Prior to the commencement of each crop season, the schedule may be altered so that night operations can be rotated among all farmers.

The water will flow in the VSA when demanded. Depending upon water availability, the number of waterings will be made available, at intervals, to the entire VSA. Each watering will start on a prefixed day of a week every time. During periods of peak demand, water can be supplied for consecutive weeks also. The periods between the irrigation will generally be in increments of seven days. Irrigation water will be delivered at an approximate rate of around 30 litres/sec to farmers. The actual stream size will be proportional to the area of the chak.

The farmers within a service area will, in association with the agricultural extension staff, collectively determine their common schedule for delivery of allocated water to the VSA in terms of size and number of irrigation waterings and dates of delivery. Any changes in the schedule during a cycle will be likewise determined. Short term altering of the delivery schedule to a VSA as a sequel to the rainfall, will be carried out under codes/procedures agreed upon between the agency and the VSA Committee.

Drainage System

Surface drainage would be an integral part of irrigation net work and is being provided for to cover 40 ha. chak unit in all the areas needing surface drainage. The vertical drainage as required will be through Tube Wells and Open Wells. The drainage system would consist of surface network of open channels and ground water control wells. The natural drainage shall be suitably modified and additional drainage will be provided where ever necessary to take care of excess water during monsoon to ensure that the flood water gets drained out in a reasonable period and there is no spill over and choking of drainage. The sub-surface water drainage control will be through judicious ground water exploitation and with adequate planning so that there is no water logging in the areas. The drainage system shall be constructed and maintained up to 40 ha. block synchronising in general with a chak distribution unit. The maintenance of drainage within the chak will be left to the farmers. The construction of the drainage network will be completed simultaneously with the construction of major distribution network and completed on block-to-block basis so that it is ready for use by the farmers by which time the surface water becomes available for irrigation.

Environmental Planning

The Government of Rajasthan had submitted a report on Environmental and Ecological aspects and remedial measures for Narmada Canal Project. Copy of the report was submitted to Ministry of Environment and Forests during 1990. Environment Sub-group of Narmada Control Authority suggested further studies on detailed EIA. In follow up Government of Rajasthan assigned studies on EIA of Command area in Rajasthan portion to WAPCOS. WAPCOS submitted its final report during 1998. The key recommendations were as follows :

Negative Impacts

- About 990 persons in 23 villages are likely to be displaced.
- Major water related diseases in the project area is malaria with API being as high as 11.0 in some areas. Thus there is a probability of increased incidence of malaria in project operation stage.

- 867 ha of land would be acquired of which 52.8% is B-I, 21.1% is B-II and 26.1% is B-III category.
- Increased irrigation impact and associated seepage and infiltration losses can lead to problem of water logging and soil salinization.
- Continuous irrigation can lead to reduction in permeability, which along with rise in groundwater levels can result in water logging.
- Increased cropping intensity can cause change in soil fertility, soil structure and texture.
- Introduction of irrigation replaces the xerophytic plants by new plants which become weeds in irrigated areas. The weeds likely to proliferate are *Asphodelus tennifolius* (Pyazi), *Carthamum oxycantha* (Piliphuki), *Fumasia indica* (Kilano), etc.
- Introduction of irrigation increases the runoff. The agro-chemicals are also transported along with runoff. This can create problem of Eutrophication in the post project phase.

Positive Impacts

- No impacts is anticipated on the forest lands, historical and cultural monuments.
- Project proposes provision of sustained irrigation over an area of 75,157 ha. The irrigation intensity would increased by 54%.
- Estimated net value of agricultural production would increase from Rs.303.7 million (pre-project) to Rs.1,022.85 million (post-project) at 1992-93 price levels;
- About 47,487.6 ha (31.09% of the GCA comes under the category of wastelands which can be utilized under social forestry and pasture development programmes.
- Commissioning of the project would lead to industrizlisation and urbanization of the area. Many agro based units such as oil extraction and flour mills are likely to come up in the area.
- Construction of the project would increase the fodder production by 84,500 tonnes/year which can satisfy the fodder requirements of about 9,260 cattles /year.
- Project will provide drinking water facilities to 124 villages in the command area. The population served will be about 3.20 lakhs (in the year 2030-31).
- Increased water availability will lead to domination of trees like *Prosopis juliflora*, *Zizyphus sp.* and *Acacia sp.*
- Introduction of irrigation will raise the moisture content from 0-7% to 15-22%. Under such conditions, there will be increase in the population of earthworms.
- Amongst the, microorganisms the dominant species would be *Aspergillus*, *Fusarium*, *Pencillum* and *Rhizopus*.
- Introduction of irrigation will increase the soil moisture, vegetal cover, and improve the land grading conditions. This will reduce the soil erosion by about 75%. Hence, the pre-project soil loss of 0.16 million tones / year will reduce to 0.04 million tones / year.

This report was approved by the Govt. of Rajasthan. The State Govt. have initiated actions related to the recommendations contained in the report. The action taken by the State Govts. on the recommendations of the WAPCOS included the following :

- To review the technical, operational and management parameters so as to make the Project sustainable and environment friendly.
- It is proposed to extend the command through lift irrigation,

- Increase in running days of the canal, differential reduction in duty,
- Increasing irrigation intensity,
- Conjunctive use of water,
- Participatory irrigation management,
- Volumetric delivery of water into storage tanks to water user.
- Setting up of the associations,
- Use of pressure irrigation captive power generation
- The use of unconventional source of power for pumping.

The revised project proposal, was estimated to cost Rs.1392.03 crores, the gross command area was increased to 3.0 lacs ha and the cultural command area to 2.51 lacs ha. This project proposal was approved by the Cabinet Committee vide dated 20.9.1999.

Salient features of Narmada Main Canal in Rajasthan

1.	Gross command area	3.00 lakh ha (Revised)
2.	Culturable command area	2.51 lakh ha (Revised)
3.	Area under irrigation (breakup (a) Kharif (b) Rabi (c) Intensity of Irrigation (d) Capacity Factor	Nil 2.51 lakh ha. 70% 0.456
4.	Cost per hectare of gross irrigation area	Rs.34,787
5.	Cost per 1000 cum of water delivered at the head of canal	Rs.8099

IMPLEMENTATION

Canal Network

For preparation of a detailed revised project report Govt. of Rajasthan invited International competitive bidding during January, 2001 and M/s. TAHAL Engineering Consultant was short listed for the work of framing detailed project report considering all factors including observations / suggestions made by WAPCOS.

However, construction activities for the Narmada Main Canal in Rajasthan were started in the year 1993-94. Construction work (Earth work and Masonry works only) were taken up in the reach of km 0 to km 48. Works were completed in km 0 to km 30 reach except for few pockets where land acquisition problems was encountered. The lining of main canal km 0 to km 7.88 was also completed.

The works of three major structures, namely Head and Cross Regulators at km 7.88, 16.00 and 29.30 and on major canal siphon on river Sukari (km 52.750) were completed. All the road bridges between km 0 to km 16.00 were also completed. The work on canal between 7.88 and 51.5 was making progress. The entire work is scheduled for completion by 2009-2010. This may however be revised if need required.

Chapter - 5

FLORA, FAUNA, WILDLIFE & CARRYING CAPACITY

Several aspects of the SSP have potential to cause adverse effects on the terrestrial ecology of areas upstream of the dam, principal amongst these were:

- ▣ The submergence of forestland,
- ▣ And the resettlement of people in new areas



The SSP also has considerable potential to have beneficial effects on ecological resources, owing to:

- ▣ The creation of new and regenerated forest habitat:
- ▣ The establishment and improvement of wildlife sanctuaries:
- ▣ The greater availability of fresh water for irrigated forestry or for wildlife

The guidelines of the MOEF required that while seeking environmental clearance for the hydropower projects, surveys should be conducted so that the status of the flora and fauna present can be assessed, listed (rare and endangered) species can be detected, if present, and appropriate conservation measures devised.

On the basis of relevant details supplied by the various states, MOEF issued clearance for the SSP in 1987. A condition of this clearance, as far as it related specifically to the Flora & Fauna, was that the Narmada Control Authority would

ensure in-depth studies on flora & fauna needed for implementation of Environmental Safeguard measures. The issues identified with respect to submergence area were identification of endangered species, rare & habitat sufficiency. Accordingly, the rehabilitation of flora fauna action plans were expected to cover the Surveys of flora & fauna in the region going to be affected due to implementation of the SSP with reference to the following

- 1) Gene pool, if any, likely to be affected.
- 2) Details of wildlife habitat in the region
- 3) Measures proposed to rehabilitate endangered species of flora fauna, if any.
- 4) Assessment of the carrying capacity of the neighbouring areas wherein the wildlife would dispose if the scheme were implemented.
- 5) Plan for rehabilitation of endangered flora & fauna.

STUDIES / SURVEYS

Important survey work included the following:

- The Environmental Impact Study of 1983 prepared by MSU.
- Preliminary Report on First Botanical Exploration and Plant Collection from Narmada Valley by the Botanical Survey of India in 1986.
- Report on the Survey of the Narmada Sagar Area by Zoological Survey of India, 1988.
- Note on Sardar Sarovar Project - Preparation of Environmental Work Plan for Forest and Wildlife by the State Forest Department, GOM, 1988.
- Status of Flora and Fauna in and Around Sardar Sarovar Project, Maharashtra is studied by the University of Pune (1992-94). Final report is received in NCA.
- Eco-Environmental and Wildlife Management Studies in the Sardar Sarovar Area in Gujarat, 1992, by MSU.
- Impact Assessment of Madhya Pradesh Land to be Submerged Under Sardar Sarovar Project and Adjoining Ecosystems. The study was conducted by the State Forest Research Institute (SFRI) in Jabalpur and financed by the NVDA. This study was completed & report was submitted in 1994.
- Workshop on Approaches to Integrated Wildlife Management in Gujarat: A Report by the SSNNL, October 1990.
- People's Involvement in Wildlife Management, by VIKSAT in 1991.
- Wildlife Management Studies in the Submergence and Catchment Area of Narmada Project: With Special Reference to Shoolpaneshwar Wildlife Sanctuary, by the SSNNL, 1992.
- Narmada Basin Water Development Plan: Development of Fisheries, 1987, was prepared by the Narmada Planning Agency, GOMP.
- Rapid Reconnaissance Survey of Limnological Aspects Part I, II and III, 1987, were undertaken by the Bhopal, Vikram and Rani Durgavati Universities for GOMP.
- The Central Pollution Control Board, Central Water Commission, the State Pollution Control Boards and the National Institute of Oceanography have collected water quality data.

- Narmada River Basin Development Project: Fisheries Component, 1991 by the German Consultants to the World Bank, GOPA.
- Sociological Survey of the Fishing Families of the Narmada River by CICFRI, 1991.
- Aquatic Fauna (Fish) Studies in Indira Sagar Submergence Area, prepared by the Friends of Nature Society in 1991 on behalf on the NVDA reported on the fish fauna of the Narmada.
- Pre-and Post-Impoundment Limnological Studies of Narmada Basin, by three universities coordinated by Barkatullah University for the NVDA. (1989-92) Study report was available in 1994.
- Studies on Fish Conservation in Narmada Sagar, Sardar Sarovar and it's Downstream, is a desk review sponsored by the NCA and undertaken by CICFRI, 1993.
- Ecology and Fisheries of the Narmada Estuarine System with Special Reference to Proposed Impoundment (Sardar Sarovar Dam) is an ongoing study begun in 1988 by CICFRI.

RECOMMENDATIONS OF THE KEY STUDIES

- For areas in Gujarat, the study was conducted by the Department of Botany & Zoology M.S. University, Vadodara. The study concentrates upon ecology & environmental aspects of the submergence & catchment area. The study is actually an extension of the earlier bench-mark study conducted during 1983 which highlighted the positive & negative aspects in the upstream, downstream & command of the Dam and environmental impact statement". The study concentrated upon the study area was about 20 km. On each side of Sardar Sarovar in Gujarat & extended Shoolpaneshwar sanctuary encompassing about 1599 sq.km. area. A chapter of this study contains suggested "Management strategies & action plans to mitigate the adverse impacts.
- For areas in Maharashtra, the study was conducted by Deptt. Of Environment Sciences, University of Pune at the instance of Deptt. Of Environment, Govt. of Maharashtra. The study encompasses the SSP impact areas in Maharashtra only. The study was conducted by School of Environmental Sciences, University of Pune at the instance of Department of Environment, Govt. of Maharashtra. The study was conducted along the Maharashtra border for a period of 18 months (1992-1994). The area covers roughly 70 Km long and 20 Km wide belt along the southern bank of Narmada River in Maharashtra. The survey was carried out in the submergence and catchment areas of Sardar Sarovar Project.
- For areas in Madhya Pradesh, the study was conducted by the State Forest Research Institute, Jabalpur, Madhya Pradesh. The MOU for the study was signed in June 1990 and study was submitted in 1994. The object of the study was to suggest compensatory conservation measures with particular reference to the floral & faunal status. Main focus of attention was to investigate



into the impacts of the project on the flora & fauna of the impact area of SSP falling in the state of Madhya Pradesh. The submergence(impact) areas were mainly falling in the three districts called Dhar, Jhabua and Khargone."The study indicate that the forests in the impact area were highly under stocked and their distribution by girth class very erratic the condition of impact area is not conducive to support good wildlife and as such it appears less likely that some corridor would be needed to act as escape route for wild animals. In the study the carrying capacity of forests of the impact area can not be estimated with any accuracy.

- Detailed survey of the flora & fauna in the areas to be submerged, in the zone above the submergence, downstream & in the command was carried out and thousand of animal and plant species were catalogued. In over all conclusion, all the investigators reported the presence of a large number of animal and plant species. However, none of the species was found to be endemic.
- As most of the species found in the region were cosmopolitan in distribution, the construction of the Project was not likely to wipe out the gene-pool of any animal or plant species.
- All the study reports described the wildlife habitats within the area of their studies, including the area getting submerged and the area described as impact zone above the submergence, in the downstream and also in the command.
- No wildlife sanctuary or its part is to be inundated
- Measures suggested by the study groups for improving the carrying capacity of the adjoining eco-system(s) were considered by the State Govts. while framing the action plan / implementing the programme of Catchment area treatment.
- The important measures recommended as they relate to SSP by the study groups included enlargement of the Shoolpaneshwar sanctuary located in Gujarat. This sanctuary was earlier known as Dhumkhal Sloth Bear Sanctuary whose area was 153 sq.kms. The area of the sanctuary was enlarged initially up to the shore line of the reservoir to enable animals of the sanctuary to have access to the fresh water. Later the area of the sanctuary was further enlarged to cover up a total area of about 607 sq.kms.



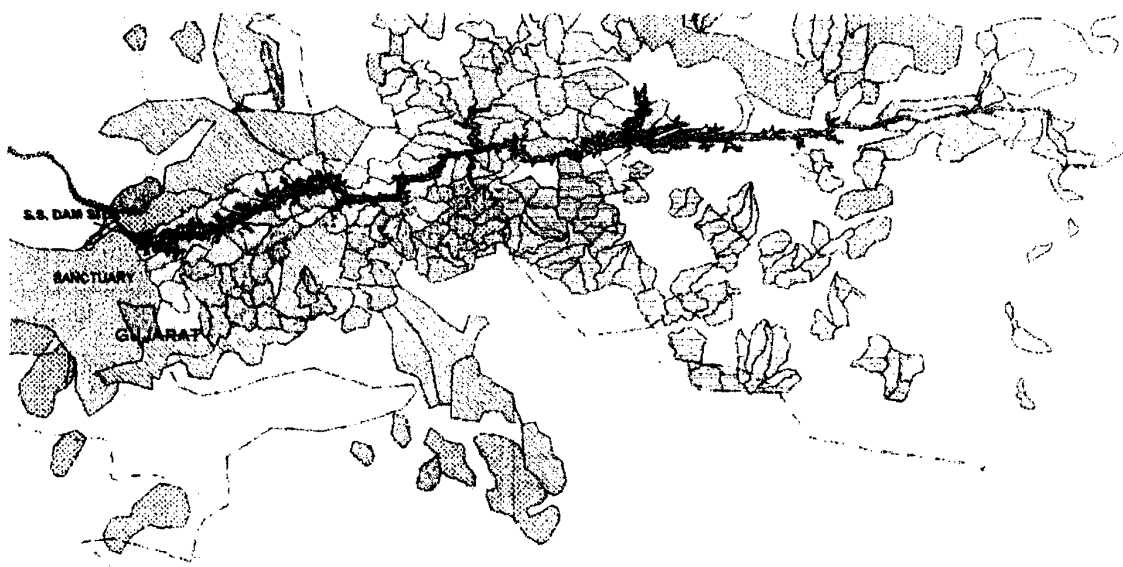
ACTION PLANS

A) Wildlife (Terrestrial)

To ensure that the wildlife conservation measures were implemented effectively, Action Plans for the three states were prepared. This included special measures like sanctuary development in the vicinity / additional plantations, felling of the Forest from the submergence area, improving the carrying capacity of adjoining eco-system through catchment area treatment programme.

Special measures like sanctuary development in the vicinity / additional plantations.

For the areas in Madhya Pradesh recommendations arising out of the report of the SFRI were considered by the Committee of experts on Flora and Fauna and decisions arrived at, were reported to the Sub-group. The recommendations were also put up to the Wildlife Committee constituted by the NVDA as per requirement of the conditions of the clearance. Action Plan on Flora & Fauna by Govt. of Madhya Pradesh, 2000. The plan prepared by the NVDA was submitted to MOEF & NCA during November, 2000.



For the areas in Gujarat plans for improvement works in the wildlife sanctuaries of Gujarat. Shoolpaneshwar sanctuary development Action Plan prepared by GOG in 1996 and submitted to Forest Department GOG for implementation. Additional plantation activities are covered under chapter on compensatory plantations

For the areas in Maharashtra, Key recommendation of the University of Pune included suggestion on planting of tree species with high diversity in the region (e.g. *Buchanania lanzan*). Accordingly Govt. of Maharashtra framed a proposal for taking up plantations in the vicinity of the reservoir. However in view of the plantations on massive scale already established in the catchment, the feasibility/desirability of additional plantation programme is under consideration.



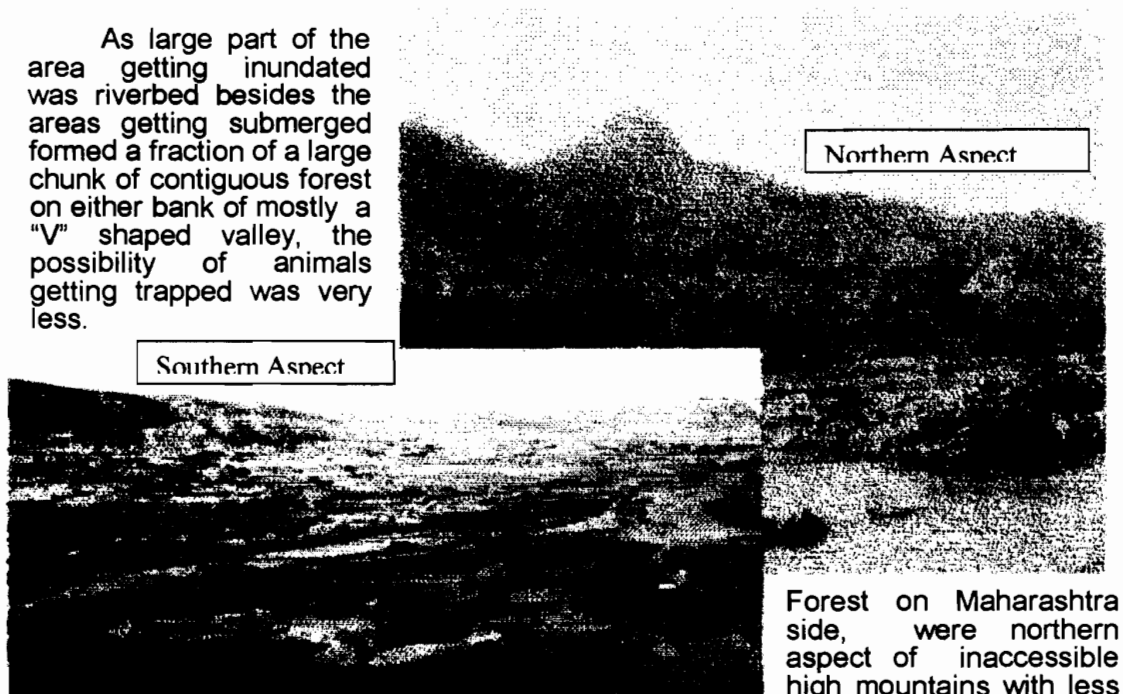
PLANTATIONS IN SANCTUARY 1992

Felling of the Forest from the submergence area

Felling plans for the forest area coming under submergence to avoid the possibility of animals being trapped in the submergence area were required for the areas in Gujarat, Maharashtra & Madhya Pradesh.

Current Status of Felling

As large part of the area getting inundated was riverbed besides the areas getting submerged formed a fraction of a large chunk of contiguous forest on either bank of mostly a "V" shaped valley, the possibility of animals getting trapped was very less.



Forest on Maharashtra side, were northern aspect of inaccessible high mountains with less

biotic pressure. This was in contrast to the southern aspects of low mountains on left bank in Gujarat. The possibility of animals crossing over by swimming across the river in search of food/shelter was remote.

However forest areas were taken up for felling in a systematic manner to avoid even remote possibility of the same for considerations of preventing Eutrophication and degradation of water quality.

Madhya Pradesh

Entire area below EL 100m was felled already except for about 200 ha area which remained to be felled. In this 200 ha area as per the total enumeration by the SFRI during 1992, there were about 5280 trees above 10 cm. DBH (badly hacked and pollarded) reported to be present in zone expected to be submerged.

Gujarat

In Gujarat the forest area diverted was 4165.91 ha in addition 356.78 ha was diverted earlier. Thus in all 4522.69 was utilized for the SSP. Of this 4152.68 ha of the Distt. Vadodara and Bharuch required felling. The felling in Gujarat was reported to be complete and that even the coppice crop was also removed.

Maharashtra

In Maharashtra the forest area of 6,488 ha was diverted for submergence of which 3,157.03 ha was forest. The balance area was under riverbed, nallah etc. Of this 2288.63 ha lied between 90 m & up to four meter below the FRL. In Akkalkua Taluka, the forest land affected at EL100m was 220.14 ha. out of this only 79.40 ha required felling. In Akrani Tehsil 3,173 trees of very poor quality required felling from the submergence area of 232.53 ha.

General view of vegetation around Damal village to be submerged. Note the low vegetation forming sparse cover, especially on slopes. The media cliffs face. Eroded slopes in foreground seen in Photo.



		Akkalkua Tehsil	Akrani Tehsil	Total
1.	Between 90 – 100 m	220.14	232.53	452.67
2.	Between 100-110 m	239.72	515.73	755.45
3.	Between 110-121 m	153.25	460.05	613.30
4.	Between 121-134.68m	117.82	349.39	467.21
	Total	730.93	1557.7	2288.63

Improving the carrying capacity of adjoining eco-system through catchment area treatment programme.

Maharashtra

University of Pune, though carried out survey during the period 1992-1994 submitted its report only during 1998. The recommendation pertained to improving the carrying capacity through plantations in the catchment. The Forest Department, however, have carried out plantations in the entire catchment during the period 1994-1998. The interpretation of the satellite imageries showed that the CAT has improved the vegetation in the area considerably, thus improving soil and moisture regime thereby. Refer plate below:

Madhya Pradesh

The Catchment Area Treatment Programme are aimed at improving the carrying capacity of the surrounding eco-systems where it is above the critical threshold / natural erosion process. The progress is detailed in the earlier chapter.

Gujarat

The Catchment Area Treatment Programme were aimed at improving the carrying capacity of the surrounding eco-systems where it is above the critical threshold / natural erosion process. The progress is detailed in the earlier chapter. The interpretation of the satellite imageries showed that the CAT has improved the vegetation in the area considerably, thus improving soil and moisture regime thereby. Refer plate below :

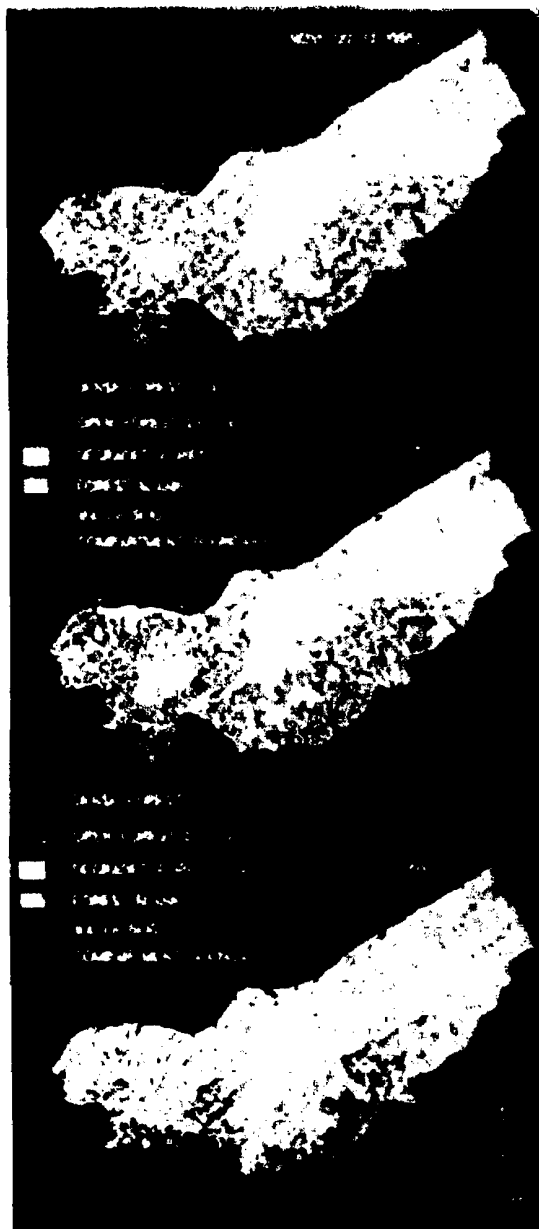
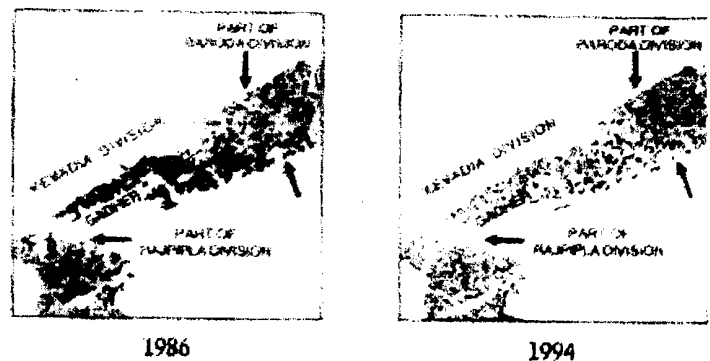


Figure on left side : Results of the Catchment in Maharashtra showing conversion of open forest (Green colour) into dense forest (Red colour) and conversion of degraded forest (yellow colour) into open forest. Similarly conversion of blanks (white patches) into degraded forest. The study was conducted by the Forest Survey of India, Nagpur branch on the data pertain to 1992-1996-1998.

Figures below : Results of the Catchment in Gujarat showing conversion of open forest (Peach colour) into dense forest (Green colour) and conversion of degraded forest (Red colour) into open forest. Similarly conversion of blanks (black patches) into degraded forest. The study was conducted by ISRO, Ahmedabad and data pertain to 1985 / 86 - 1994 .



COLOUR / CODE CLASSIFICATION

Colour	Code	Class
	1.	Closed forest area
	2.	Open forest area
	3.	Degraded forest area
	4.	Highly deg forest area/cultivation/grass growth

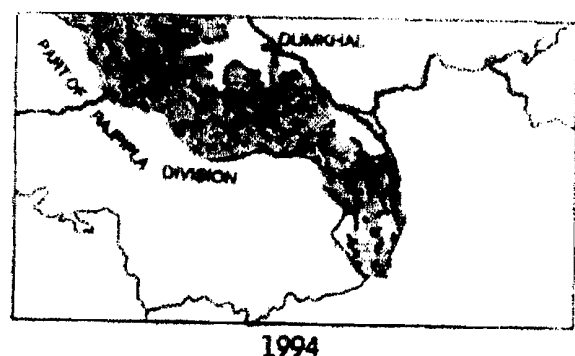
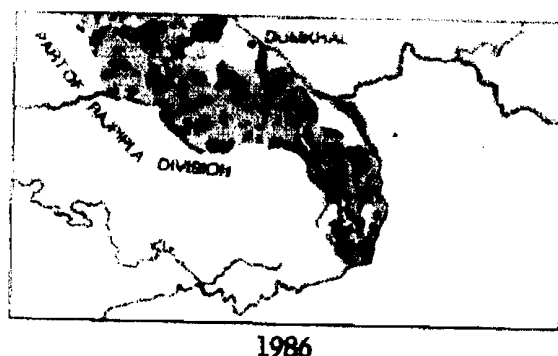


Table-10: Summary of Status of Environmental Planning : Wildlife

	Gujarat	Maharashtra	Madhya Pradesh
▪ Preliminary Surveys	Completed	Completed	Completed
▪ in-depth Studies / surveys	<ul style="list-style-type: none"> Completed, no endemic endangered species. Habitat detailed 	<ul style="list-style-type: none"> Completed, no endemic endangered species Habitat detailed 	<ul style="list-style-type: none"> Completed, no endemic endangered species Habitat detailed
Action Plans :			
• Migratory corridors	<ul style="list-style-type: none"> Not relevant Degraded areas contained little or no wildlife of significance / migratory in nature. Felling was completed much earlier. 	<ul style="list-style-type: none"> Not relevant Local migration in search of shelter & food requiring no specialized corridors. 	<ul style="list-style-type: none"> Not relevant Local migration in search of shelter & food requiring no specialized corridors.
• Sanctuary(s) within submergence zone	No	No	No
• Wildlife conservation measures (improvement in carrying capacity) in adjoining forest(s)	Shoolpaneshwar sanctuary Management Plan prepared. Massive afforestation in catchment of SSP.	Massive afforestation in catchment of SSP.	Catchment treatment works and social forestry plantations.
• Implementation	<ul style="list-style-type: none"> Shoolpaneshwar Sanctuary Plan under implementation. CAT work (increasing carrying capacity) completed. Felling of trees completed. 	<ul style="list-style-type: none"> CAF & CAT completed.. Felling of trees progressing pari-passu. 	<ul style="list-style-type: none"> Substantial CAT works in the catchment completed. Social forestry plantation under implementation by the State Forest department under its programme. Funds are to be provided by the project. Felling of trees progressing pari-passu.

To enhance nature conservation outside the catchment area of the Narmada

The SSP will also provide an opportunity to enhance nature conservation outside the immediate catchment area of the Narmada. In particular three wildlife sanctuaries located in the command area of the project will benefit from the increased freshwater availability resulting from

The project and there are plans by the GOG to further develop these. These are covered in the chapter on command area. They comprise:

- Nal Sarovar, Bird Sanctuary;
- Wild Ass Sanctuary in the Rann of Kuchch.
- Velavadar Black Buck National Park.

B) Fisheries (Aquatic):

Three State Govt.(s) submitted the fisheries development plans, which are as follows:

- The Narmada Basin Water Development Plan: The Development of Fisheries, 1984. This comprehensive plan for GOMP addressed the development of fisheries in the Omkareshwar, Maheshwar and SSP areas. Phasing and programming with respect to pre and post-impoundment, clearance of the forests, training of fishermen, cooperative societies and post-impoundment management was proposed.

- Environmental Work Plan Sector Fish and Fisheries, GOG, 1986. This work plan, prepared in compliance with the agreement with the World Bank included the establishment of fish hatcheries and fish farms, training of fishermen, establishing primary cooperatives, and establishing an Inter State Fisheries Board. In addition, it included proposals for conducting hydro-biological studies, studies on the morphology of the river, investigations into the physical and chemical characteristic of the water and soil, and studies on flora, fauna, fish yield, plankton, and productivity in the reservoir. This plan was again revised by GOG in August 1997 & resubmitted to NCA during November 1997.



- A Note on SSP: Preparation of Environmental Work Plan for Fisheries Development in Maharashtra, 1987.

This plan included proposals for the felling in the reservoir submergence zone, fish seed, hatcheries, stocking, fishing, manpower requirements, and training and management through the Inter-State Board. Some more studies have been proposed by GOM through CICFRI. Subsequently, the state governments have revised their plans with a view to address to issues as they arose. The revised plan for GOM included proposals for the fishing population to be resettled on the periphery of the reservoir or in R&R sites in Maharashtra. In addition, the establishment of low-cost hatcheries and irrigation tanks, the development of pen cage culture fisheries, and intensive fish farming were proposed.

- GOG also revised their plan by end 1994.

The plan contained four volumes covering upstream, downstream & command areas. In view of the progressive impoundment which commenced in March 1994. NCA has constituted an expert group to lay down the guidelines for conservation & development of fisheries & it's ecosystem. The plans submitted by state governments are under scrutiny of this expert group.

IMPLEMENTATION

CICFRI have also been commissioned to monitor the whole of the estuary and their study has been extended to examine pollution and to undertake Modeling studies in the downstream environment.

An expert group has been constituted by NCA to lay down the guidelines for fish conservation & development during progressive filling of the reservoir to advise the state executive agencies for follow-up action. Draft guidelines are available. Test fishing in the reservoir was carried out. The results were as follows :



Particulars	Sarovar
Craft	18 ft. LOA tin Boat Five Units
Gear	Gill Nets 9 Kg/ Unit of 8, 10 & 12" Mesh Size. 30 Ft. deep and 250 Ft. long
Duration	13 days
Catch (Kg)	142 Nos – 685 kg.
Species Composition	Catla - 586.0 kg. (85.5%) Rohu - 46.5 kg. (7.0%) Mrigal - 10.5 kg. (1.5%) Mahseer - 0.0 Kg. (0.0%) Silver Carp - 21.0 kg. (3.0%) Misc. - 21.0 kg. (3.0%)
Average catch per boat per day	10.54 Kg / boat / day
Average Landing price @ Rs.25/Kg.	Rs.263.46 / boat / day
Average income to fishermen	Rs.87.82/ person / day

Party States, have agreed to creation of an Interstate Fisheries Development Board, which is expected to be setup and fully functioning prior to reservoir filling. This Board would implement the guidelines for conservation of fisheries recommended by HLEG.

On-going Fisheries Activities in the Sardar Sarovar

Some fisheries development activities are already going in the Sardar Sarovar from the year 1992 onwards. From 1993-94, these programme received the financial support from the



Sardar Sarovar projects. These activities were as follows:

- Seed Stocking in the Sardar Sarovar
- Development of Rearing space for Fish Seed Production
- Mangrove Plantation Programme.

Till the March, 2002 State Forest Department and other Fisheries Development Agencies have stocked 398.09 lacs fingerlings / yearlings in the main reservoir as well as dykes of the Sardar Sarovar as detailed below :

Year	Fingerling (lacs)	Stocked in	
1990-91	2.05	Dyke 3 / 4	
1991-92	2.38		
1992-93	1.69		
Year (93-94) onward	Fingerlings	Yearlings	Stocked in
Upto 1999-00	358.95	17.28	Reservoir & dykes
2000-01	Nil	2.93	Reservoir
2001-02	10.55	Nil	Reservoir
	2.26	Nil	Dyke
Total (90 - 91 to 01-02)	377.88	20.21	

There is a provision to create rearing space for seed rearing in the Sardar Sarovar and the funds have been provided by the SSP.

The total amount for the rearing ponds is at present Rs.64.36 lakh. The site selected for the rearing ponds initially in the reservoir premises was found to be unsuitable on account of higher water permeability of the soil. Hence, another site has been located in the village of Timbi (Nanded Taluk) of Bharuch district, in the Survey No.303. The soil samples have been sent for analysis to decide the suitability.

The project affected persons on the periphery of the Dykes / Reservoir were being trained for capture fisheries by the SSNNL, by providing fishing implements (like small tin boats and gill nets) through appropriate funding agencies, with the support of the SSNNL. A fisheries co-operative was registered at Panchmuli (Nadod Taluka) in 1998, under the title, Panchmuli Narmada Jalashay Vistar Adivasi Matsyodyog Limited of 102 fishermen with a share capital of Rs.17,000. The membership generally consisted of the project affected people of Panchmuli and nearby areas. Accordingly 26 persons were identified by the Asst. Director of Fisheries, Narmada District and they were trained in the fishing methodology/ capture fisheries by the Fisheries Department. The cost of the training was borne by the Fisheries Commissionerate under the ongoing training schemes.

In Gujarat, reservoir bowl is already cleared of all vegetative growth. Execution of felling in M.P. & Maharashtra, is progressing pari passu with progressive filling of the reservoir

Bats hanging from a Mango tree



Chapter 6

SEISMICITY

STUDIES

Studies of reservoir induced seismicity (RIS) and rim stability have been carried out by the Geological Survey of India (GSI), Central Water and Power Research Station (CWPRS), University of Roorkee and World Bank Consultants. The principal studies are described below:

- University of Roorkee. 1980. Geological and Seismological Investigations of the Environs of Narmada Valley around Navagam Dam site in Gujarat.
- GSI. 1981-82 and 1982-83. A Geotechnical Report on the Reservoir Competency Investigations in Parts of Sardar Sarovar Area, Bharuch & Vadodara Districts. Volumes II&I.
- Shenoi et al. 1982. Shenoi et al presented at the New Delhi Conference on the significance of Seismotectonic Aspects on Reservoir Development.
- Balasundaram, M.S. 1982 Sardar Sarovar Project: A Geotechnical Report compiled and edited for the Government of Gujarat.
- MSU. 1983. The Sardar Sarovar Narmada Project Studies on Ecology and Environment.
- NVDA published a Position Paper on Seismic Studies in January 1986.
- Krishna, Dr. J. 1989. Dams and Seismicity.
- GSI.1990. Study of the Rim Stability of the SSP.
- GOI.1993. Sardar Sarovar Project Seismicity and Sardar Sarovar Dam.

IMPLEMENTATION

The various recommendations for modification of the dam design which have all been implemented are summarised as:

- ❖ Adoption of horizontal design coefficient of 0.125g on the recommendation of the Dam Review Panel
- ❖ Installation of stress monitors in the main body of the dam
- ❖ Increase of the depth of the foundation to 18m below the lowest riverbed.

The Government of Gujarat has identified 9 locations for the installation of seismic monitoring stations, 4 each on either side and one at the downstream of the Sardar Sarovar reservoir, out of a total of 9 stations, 3 are in M.P (Alirajpur, Kukshi and Badwani 1 in Maharashtra (Shahada) and 5 are in Gujarat (Kawant, Naswadi, Kevadia, Jitgaon and Sagbara). Construction and instrumentation installation work is completed at all the 9 seismic monitoring stations.

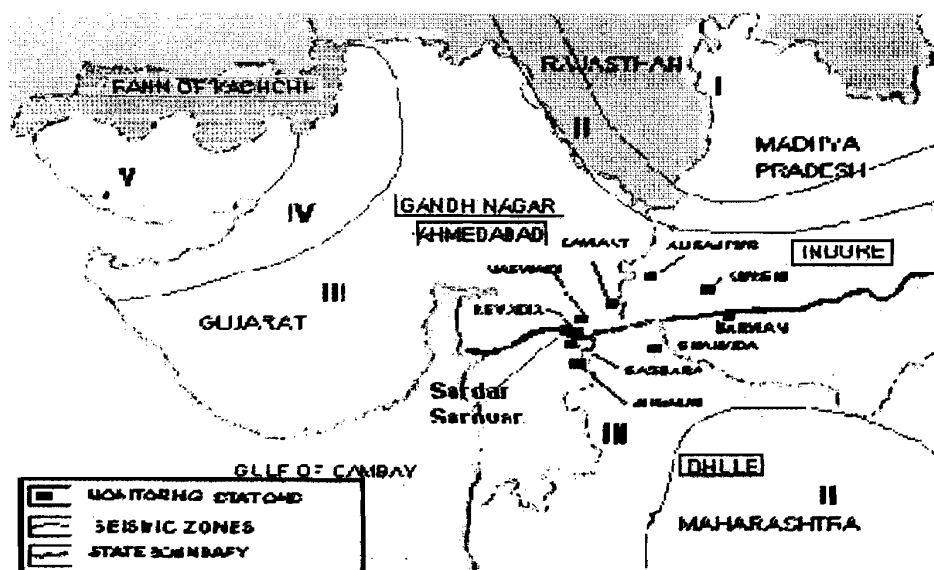
The seismological observatory at Kevadia Colony is in operation since 1973. The data of Kevadia Colony seismograph station for the period from 1973 to 1984 was analysed by CWPRS, Pune and GEAR, Vadodara. Also, Micro-earthquake surveys around Navagam Dam were carried out in the year 1980 by Dept. of Earthquake Engineering, University of Roorkee. The Micro-earthquake activity was found to be of low level and was generally scattered in the Narmada basin.

The seismological network with latest instruments was established in the year 1989. After the installation of new seismic instruments at new sites, local micro-earthquakes as well as global earthquakes are being recorded. The events which are recorded at network are analysed and located using the computer program 'FASTHYPO' incorporated with seismic Data processing and Analysis Computer (DAC - 300). The progress of implementation is illustrated in Table below:

Table-12 : Status of implementation of seismicity aspects

ACTION	STATUS
▪ Dam design modifications	Completed
▪ GSI (Nagpur Division) Rim Stability studies	Completed
▪ Tracer Studies by CWPRS	Reports submitted.
▪ Monitoring stations	Rim stability studies have completed and well equipped 9 monitoring stations along the periphery of the reservoir are functioning.
▪ Results of analysis of data from monitoring stations.	Received, analysed by the dam safety review panel of the SSP during October, 2001.

Map-2: Showing locations of seismological station on periphery of the Sardar Sarovar reservoir



Chapter 3

HEALTH ASPECTS

Health provision in India is defined by the National Health Policy (NHP) and national disease programmes such as the National Malaria Eradication Programme (NMEP). The NHP entitles access to medical facilities to all Indians, the number and distribution of which is determined by the local population density. The NMEP was developed, as a



nation-wide strategy to combat the spread of malaria with regard to SSP all the three State Governments will integrate development of new facilities with proposals already made under the NHP and NMEP. Such integration will avoid duplication, maintain parity within the project area and provide better access to health care than would otherwise be achieved.

In addition to the general obligations of the State under national policy, a specific requirement for the SSP contained in the environment clearance order of GOI was that, that plans for the provision of health facilities to workers and residents of the affected areas should be prepared. Each State should take necessary measures to minimise the risk of malaria, filarial, schistosomiasis and other diseases associated with water that may result from implementation of the project Preparation of an Action Plan for the surveillance and control of malaria was also stipulated.

STUDIES & ACTION PLANS

The two main potential sources of health impact associated with the reservoir and Irrigation projects are as follows:

- The occurrence of pools of standing water, during construction and operation of the reservoir, may provide breeding areas for disease vectors:
- Immigrant construction workers may bring with them diseases or parasites, to which the local population may have low immunity.

The SSP is expected to confer significant public health benefit's since increased water availability will help to reduce the incidence of 'water-washed' and 'waterborne' diseases which are associated with poor hygiene and restricted water

supply. Management of the potential health impacts of the SSP will focus, therefore, on the exclusion and/or control of the disease vectors which spread 'water-based' and 'water-related' diseases.

A large number of studies have been carried out on the health profile of villages in the three affected states. The key studies are summarised below:

- Narmada Programme-Schistosomiasis -Back-to-Office Report, 1986, assessment carried out by Goodland, consultant to the World Bank, the National Institute of Communicable Diseases (NICD) and the World Health Organisation (WHO).
- Proceedings and Recommendations of the Meeting on Schistosomiasis Research and Surveillance held at NICD on 22nd November 1985.
- Disease Profile of Command Area by the State Commissariat of Health, Medical Services and Medical Education (SCHMS), 1986.
- Health Statistics< GOM, 1987. The State Department of Health, Report on the health profile of 33 project-affected villages in Dhule district, Maharashtra.
- Health Statistics 1982-84, GOMP. This study published by GOMP in 1985 & updated in 1994.
- The Sardar Sarovar Narmada Project Studies on Ecology and Environment by MSU in 1983, considered public health in Chapter-3.
- Numerous studies have been conducted on the incidence of malaria in India, amongst others, by the Malaria Research Center (MRC).
- Revised Plan by GOM, 1995.
- Revised Health Plan by GOG, 1996.
- Draft Health Management Plan by GOG, 1997.
- Epidemiological Surveillance Studies by GOM, 1996.
- Epidemiological Surveillance Studies by Gandhi Medical College, Bhopal – Six interim reports received.

Status of Implementation of Actions for Public Health

Studies on the disease profile in the SSP region and past experience with major water resources projects suggested that health Action Plans for the project should focus on the following:

- + Provision of health care for displaced people and immigrant workers;
- + Control of malaria and potential breeding sites for malarial vectors;
- + Monitoring for the incidence of other water-related and waterborne diseases with a view of preventing their establishment.

Gujarat

An Initial work Plan for Environmental Effects: Sector Public Health for the Command Area of Gujarat was drawn up in 1986 by the NPG in coordination with SCHMS. This plan covers villages within a 10 km radius of the reservoir including

resettled populations and makes provision for the monitoring, surveillance and control of malaria. The 1986 plan is under implementation with certain modifications and additions.

The principal objectives of the work plan are:

- To provide for systematic and continuous monitoring of the health profile of the project area;
- To provide suitable Infrastructure for health provision in the project area.

The plan also outlines actions for the surveillance and control of malaria. The main components of the plan area summarised below.

- + Establishment of hospital at Kevadia.
- + Strengthening of laboratory facilities including establishment of mobile unit.
- + Provision for laboratory technicians in existing public health centers (PHC's).
- + Expansion of malaria treatment depots.

Proposal to establish Urban Malaria Scheme for centres over 40,000 (anti-larval operations) not currently covered. Strengthening of state level health organisations to ensure monitoring of malaria, filaria, dengue and encephalitis, strengthening of district level health organisations for monitoring or implementation, residual insecticidal spraying operations are included in the plan.

Maharashtra

GOM submitted an Initial Work Plan for Public Health Sector In 1987, which was modified and resubmitted for consideration in 1991 and further and updated in 1992 & 1993. The work plan was based on the state health department survey of Dhule District. The principal objectives of the plan were as

- ❖ To monitor closely health conditions in Dhule district
- ❖ To provide facilities for carrying out this monitoring
- ❖ To adopt precautionary measures against the spread of diseases
- ❖ To be prepared to combat epidemics that might arise.

The work plan also contained provisions for the strengthening of state and district health facilities in existing villages and in resettlement areas. The provisions included the establishment of a monitoring and laboratory cell at the Rural Hospital and strengthening of the existing Primary Health Centre. It contained full descriptions of the likely costs and staffing requirements of these measures.

Madhya Pradesh

An initial Work Plan for the Public Sector was submitted to the NVDA the state health department in 1988. This plan included a summary of existing health profile in the submergence villages and discussed the likely impacts of the SSP. The plan contains specific provisions for:

- ❖ Strengthening of health facilities already in place under the NHP and Minimum needs programme of the Seventh Five Year Plan;

- ❖ Establishment of a Health Monitoring Cell;
- ❖ Strengthening of health centers for construction workers;
- ❖ Establishment of district organizations for malaria control established of the NMEP.

An extension to the MP Health Plan was published by the NVDA in January 1990 and was revised and re-submitted in 1991. This report provides additional detail concerning the provision and training of health care staff, numbers of specialist staff required, funding and responsibilities for management.

In addition to the State Health Plan, a Memorandum of Understanding was signed between Gandhi Medical College, Bhopal and the NVDA to provide further arrangements for the monitoring of malaria and other diseases. This memorandum included provisions for the following:

- ❖ Study of mosquito vectors in the Narmada area;
- ❖ Comparison of SSP with other similar project situations and analysis of lessons learned;
- ❖ Collection and analysis of time-series-data on disease incidence;
- ❖ Recommendation of health promotion and disease preventative measures in the SSP area.

Implementation

A) Govt. of Gujarat:



There is a dispensary at SSP dam site run by M/s Jai Prakash Associates. It has regular Medical Officer and other staff to diagnose and treat the malaria patient.



A medical cell with 20 mobile unit's and 61 dispensaries are working in R&R sites. The cell consists of physician, pediatrician and Gynecologist. The cell is also provided with two ambulances. The main functions includes :

- Regular visiting of sites
- Providing specialized services at the door steps of PAFs
- Medical check-up
- Pot chlorination through distribution of chlorine tablets.
- Providing nutritional supplements to children's, pregnant's and lactic mothers.
- Other preventive and curative health measures

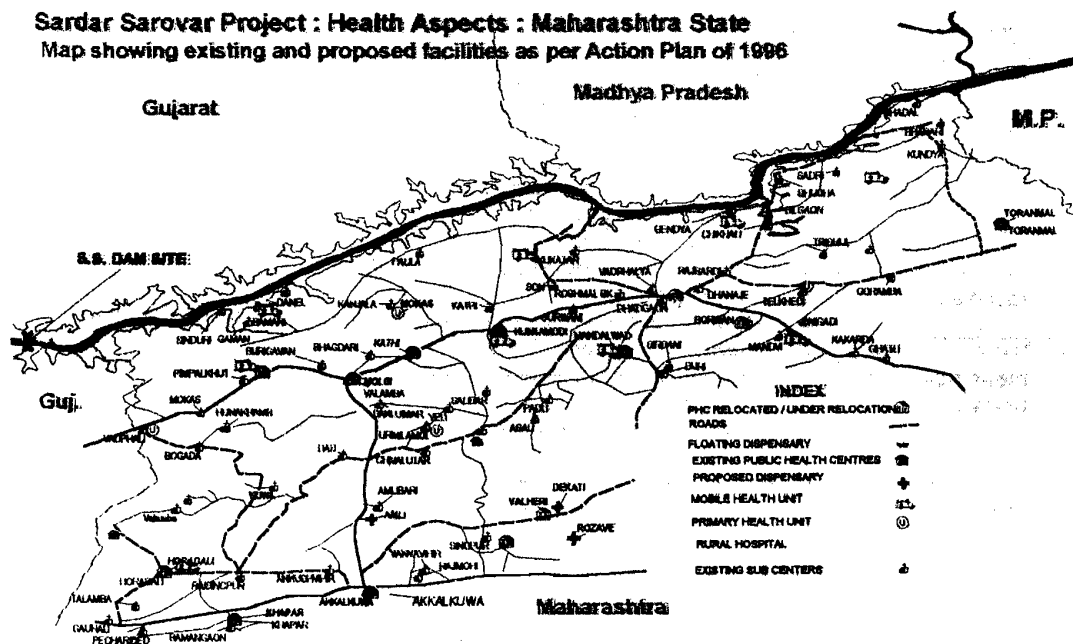
Action	Gujarat		
❖ Baseline studies	Initially conducted in 1986 subsequently EIA was conducted in 1993.		
❖ Preparation of state Action Plan – Health Aspects.	❖ Action plan updated for 2000-2001 prepared by Commissionerate of Health & Medical Services, Gandhinagar.		
❖ Health Survey	Routine surveillance activities for early diagnostic and prompt treatment of malaria cases are carried out.		
❖ Establishment of health facilities	❖ 50 bed hospital at Kevadia including a malaria unit. ❖ Medical laboratory and 20 mobile unit's. ❖ 61 dispensaries. ❖ 75 medical dispensaries are functioning at various R&R sites.		
❖ Vector control measures in place	❖ Insecticidal spray. ❖ Distribution of impregnated mosquito nets for all members of resettled families. ❖ Monitoring of malaria situation in command area every month.		
❖ Appointment of staff	❖ Designation	❖ Nos.	❖ Place of Posting
	Dy. Director	1	Medical Cell
	Physician	1	Medical Cell
	Pediatrician	1	Medical Cell
	Gyneacologist	1	Medical Cell
	Medical Officer	21	Mobile Medical Unit
	MPW (Male)	20	Mobile Medical Unit
	MPW (Female)	75	Medical Dispensaries
	Pharmacist	1	Medical Cell
	Lab technician	1	Mobile hospital van
	X-Ray technician	1	Mobile hospital van
	Staff Nurse	2	Mobile hospital van
	I.E.C. Officer	1	Medical Cell
	Statistical Asstt.	1	Medical Cell
	Ministerial Staff	8	Medical Cell
	Vehicle with Driver	23	Mobile + SSPA
❖ Disease monitoring and responsibility	❖ Has been entrusted to State Council of Health & Medical Services and EIA report has been submitted by SCHMS. ❖ Bi-weekly visits of 182 R&R sites by 20 mobile medical units. ❖ Referral services by expert team consisting of three medical specialist.		

B) Govt. of Maharashtra:

In accordance with State provision for health care facilities, two cottage hospitals, eight primary health centres and 55 primary health unit's have already been established in Dhule District. Taking Into account the inaccessibility of some of the villages, provisions were made for eight additional public health unit's, 10 mobile unit's and a floating dispensary for villages within 10 km of the submergence zone. One hospital at Somawal resettlement village, is already functional.



Sardar Sarovar Project : Health Aspects : Maharashtra State
Map showing existing and proposed facilities as per Action Plan of 1986



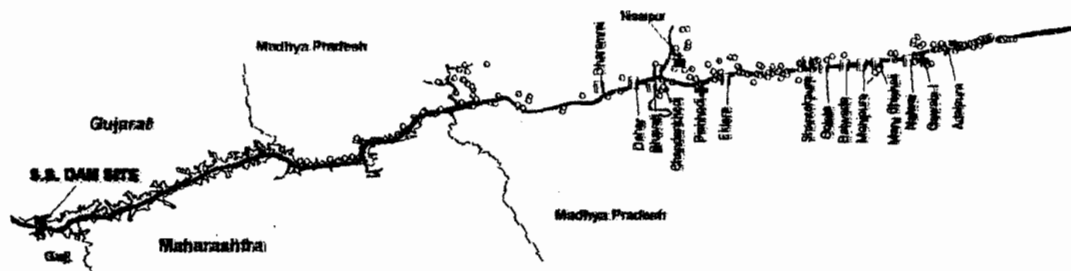
Action	Maharashtra
❖ Baseline studies	Complete in 1987 & being extended further.
❖ Preparation of state Action Plan	Original Action Plan was submitted in 1987 and subsequently revised in 1991 and 1992. Final revised Action Plan was submitted in 1993.
❖ Survey of existing facilities	Complete
❖ Establishment of health facilities	<ul style="list-style-type: none"> ❖ At following R&R sites the health facilities are provided. ❖ Amoni (Reva Nagar). ❖ Somaval (Narmada Nagar) ❖ Dekati (Sardar Nagar) ❖ Amla (Dev-Mahura Nagar) ❖ Rozva ❖ One floating launch is also proposed.
❖ Vector control measures in place	Under National Malaria Eradication Programme, guidelines for malaria control by Irrigation Department have been adopted.
❖ Appointment of staff	51 posts have been filled up.
❖ Disease monitoring and responsibility	<ul style="list-style-type: none"> ❖ Has been entrusted to State Health Department. ❖ Surveillance studies had commenced and survey report for Phase-I of the study has been submitted by Topiwala National Medical College, Mumbai. Phase-II of study is under implementation.

C) Govt. of Madhya Pradesh

During 1992, Gandhi Medical College continued surveillance studies of the impact area of Madhya Pradesh and work commenced on additional facilities for the Nisarpur village hospital, Dhar District. Extension of the Nisarpur hospital is due for completion commensurate with submergence of areas in Madhya Pradesh. Sixth, six monthly report was submitted by Gandhi Medical College, Bhopal. A consolidated final report was also submitted.

SARDAR SAROVAR PROJECT : HEALTH ASPECTS

Affected villages : Thematic map showing location of proposed sites for health facilities in M.P.



Action	Madhya Pradesh
❖ Baseline studies	Complete, 1994 being extended further.
❖ Preparation of state Action Plan	Original Action Plan was submitted in 1986 and then revised in 1988. Final plan was submitted in 1991. Cost details were incorporated in the Final Action Plan in 1996.
❖ Survey of existing facilities	Complete
❖ Establishment of health facilities	❖ 30-bed hospital at Nisarpur will be completed by December, 2001. Provision for three mobile unit and civil dispensaries has been made in the Action Plan. In addition to this there are Ayurvedic dispensaries and PHCs proposed in R&R sites for oustees of SSPs. Out of these the building for Ayurvedic dispensaries at 11 sites were completed. The sites are Dharamrai, Chandankhedi, Sarikpura, Bhavati-1, Eklera, Golata, Datwara, Mohipura, Nalve and Chichti. Construction of building for Ayurvedic dispensaries at 3 sites and PHCs for 1 site was in progress. These are Borlai-2, Anjad, Chakeri and Borlai-1 (PHC).
❖ Vector control measures in place	Under National Anti Malaria Programme (NAMP) State malaria control organizations have been strengthened.
❖ Appointment of staff	Is yet to be done. However one post of Subject matter Specialist on health has been created under Member (E&F) of NVDA, posting is awaited from the State Health Department.
❖ Disease monitoring and responsibility	❖ Has been entrusted to Evaluation Cell established by NVDA. ❖ Gandhi Medical College, Bhopal was entrusted with epidemiological surveillance studies. Final report is received. Action plan is to be prepared based on the recommendations.



Chapter 8

ARCHAEOLOGY & ANTHROPOLOGY

SURVEY

The Sardar Sarovar Project has necessitated afresh look at the archaeological and cultural heritage available in the Narmada valley. The Government of India recognises the value of such cultural sites and has enacted a series of laws to maintain and protect them from decay, misuse or development activities. Sites are classified into three categories as follows :

- Type 1 : Monuments of national importance which are protected by central government;
- Type 2 : Monuments of religious or cultural importance which are protected by the state governments;
- Type 3 : Monuments which are neither centrally or State-protected but which are considered to be an Important part of cultural heritage.



In the case of SSP, where some sites may be submerged the NWDT award stipulated that, the entire cost of relocation and protection should be chargeable to GOG. Relocation work is to be supervised by the Department of Archaeology under the provisions of the 1958 Act.

STUDIES

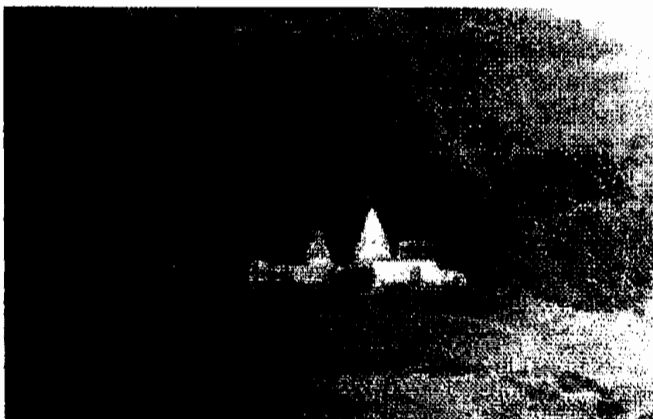
The three State governments carried out a complete survey of cultural and religious sites within the submergence zone under the direction of the project proponents. The principal aim of these studies was to list all archaeological sites, identify and name any sites under state-protection and further identify sites of religious or cultural significance which, although not protected under national law, are of sufficient value to merit relocation. These studies are summarised below. Survey conducted for identification of various sites & monuments of significance has included the following:

- ❖ Gujarat: Archaeological Survey of Nineteen Villages Submerged by Sardar Sarovar Reservoir, 1989.
- ❖ Maharashtra: Survey by Department of Archaeology.
- ❖ Survey was carried out by the State Department of Archaeology for cultural sites in 24 villages of Akrani taluk and nine villages from Akkalkuwa taluk, Dhule district.

- ❖ Madhya Pradesh: Survey by State Department of Archaeology and Museum (1992), in sixteen volumes.
- ❖ Anthropological Survey of India: Narmada Salvage Plan.
- ❖ Anthropological Survey of India: People's of India.
- ❖ Adivasi Kala Parishad: Survey of Material Cultural in the Narmada Valley.
- ❖ Rashtriya Manav Sanghralaya: Narmada Salvage Plan.

Gujarat

- Archaeological Survey of Nineteen Villages submerged by Sardar Sarovar Reservoir, 1989: - The Department of Archaeology was instructed to carry out a survey of archaeological sites in 19 villages of the proposed SSP submergence zone in Gujarat. By June, 1989, 12 villages had been surveyed. The initial report, submitted by the Director of Archaeology, contained a full list of villages surveyed and photographs of the Shoolpaneshwar and Hamfeshwar temples. Two further studies of sites in the remaining seven villages were carried out in March 1992 and a supplementary report issued.



Maharashtra

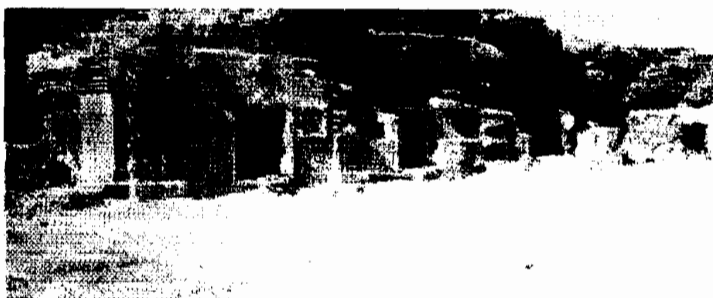
- **State Department of Archaeology :**

A survey was carried out by the Department of Archaeology of cultural sites in 24 villages of Akkrani Taluk and nine villages from Akkalkuva Taluk, Dhule District. A brief summary note was submitted by the Director of Archaeology in February 1992 which stated that no state-protected monuments were located in the area but recommended the preservation of monuments at the village of Manibeli, Dhule District.

Madhya Pradesh

- **State Department of Archaeology and Museum**

The Archaeology Department of Madhya Pradesh compiled a detailed report of archaeological sites in 120 villages likely to be affected by SSP. A second study of 73 villages was completed in July, 1991. Each study contained photographs together with detailed descriptions of the current use and historical significance of the sites.



In addition to baseline studies on archaeological aspects, work has been carried out on the anthropological heritage of the Narmada Basin including examination of evidence of ancient dwellings and cultural artifacts. The principal studies in this area are described below.

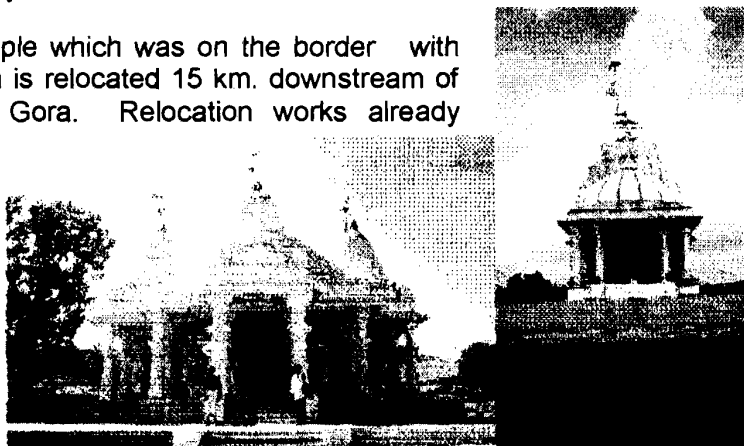
- Anthropological Survey of India. Narmada Salvage Plan : The Narmada Salvage Plan contains detailed background data on paleo-anthropological, human ecological and other aspects of the Narmada valley. By May 1992, surface scanning of 17 sample villages coming under submergence had been carried out, 424 specimens including ancient tools etc had been collected.
- Anthropological Survey of India. Peoples' of India : This project entailed a complete survey of 33 tribes of India including those of the Narmada Basin. The study covered all aspects of tribal culture in India and was published in 61 volumes in 1992.
- Parishad, A.K. Survey of Material Culture in the Narmada Valley : Work was completed and a report published by the National Museum of Humanity, Bhopal, on cultural objects from tribal artisans in Madhya Pradesh in 1990. Copies of the interim report were circulated to the Ministry of Environment and Forests and the Narmada Control Authority in April 1991.

ACTION PLANS AND IMPLEMENTATION

Gujarat

The Action Plan for two temples, i.e., Shoolpaneshwar and Hamfeshwar was prepared and implemented by GOG.

- ❖ Shoolpaneshwar temple which was on the border with State of Maharashtra is relocated 15 km. downstream of the SSP in village Gora. Relocation works already completed.
- ❖ Hamfeshwar Temple has been relocated at higher elevations within the same village. Construction of Temple was completed.



Maharashtra

No work was required to be done.

Madhya Pradesh

A large number of sites were identified for relocation although none of these sites are protected under the 1958 Act. It was proposed, therefore, that any decision on whether they should be relocated would be made on a case-by-case basis by an independent expert panel. This panel comprised representatives of the Archaeological

Survey of India, Central and State Governments and was established by GOMP. The panel's decisions were ratified by a joint Inspection committee of the Irrigation Department and Archaeological Department.

The expert panel proposed, a 4-phase Action Plan framework for relocation operations :

Phase-I – Survey work, survey report, listing of monuments and sculptures, estimates for shifting.

Phase-II – Action Plan, documentation, detailed estimates.

Phase-III – Building construction, shifting of sculptures, shifting of monuments.

Phase-IV – Display arrangements, model preparation, video library, publication report, excavation reports, new findings (if any).

- ❖ GOMP prepared an action plan in 1993. The plan was updated / revised in 1997. This plan identifies the relocation of 13 monuments and 5 mounds by State Dept. of Archaeology & Museum (SDA&M), this plan also includes the relocation of 10 monuments and 6 mounds by Archaeological Survey of India (ASI). This plan also includes the four mounds of 1993 plan. Presently all the 38 structures are being relocated/excavated by the state Department of Archeology & museum, Madhya pradesh



Excavation of mound vill Brahmanagaon



The status of implementation is summarized in the Table on the following pages

Sl. No	Particulars of monuments / mounds as per action plan of 1997 prepared by State Deptt. of Archaeology & Museum, Govt. of M.P.					Impact at 100 mt.	Status
	Chain age	Name of Monuments	Village	Tehsil	District		
Monuments/sculptures							
1.	84425	Shiv Mandir	Roligaon	Alirajpur	Jhabua	No	Work will be started in the financial year 2002-2003.
2.	117037	Koteshwar Mandir	Kothara	Dhramपुरi	Dhar	No	Work will be started in the financial year 2002-2003.
3.	125876	6 tombs	Bheelkheda	Barwani	Barwani	No	Work will be started in the financial year 2002-2003.

4.	128181	Neel Kantheshwar Mandir	Chikalda	Barwani	Barwani	No	Not surveyed due to interference of NBA.
5.	128181	Pashumateshwar Mandir	Chikalda	Barwani	Barwani	No	Not surveyed due to interference of NBA.
6.	131667	Shiv Mandir	Chhoti Kasrawad	Barwani	Barwani	No	Work will be started in the financial year 2002-2003.
7.	171594	Jaleshwar Mandir	Khujawa	Dharamपुरी	Dhar	No	Work will be started in the financial year 2002-2003.
8.	173427	Vilvamriteshwar Mandir	Dharamपुरी	Dharamपुरी	Dhar	No	Work will be started in the financial year 2002-2003.
9.	173427	Nageshwar Mandir	Dharamपुरी	Dharamपुरी	Dhar	No	Work will be started in the financial year 2002-2003.
10.	194757	Kanjleshwar	Semalda	Manawar	Dhar	No	Not surveyed due to interference of NBA.
11.	111551	Narmadesh-war Mandir	Dehar	Kukshi	Dhar	No	Relocation work under progress, about 60% work completed. The temple is being shifted to a hill 2 km away.
12.	132581	Shiv Mandir	Bodhwada	Kukshi	Dhar	No	Scrapping, numbering, drawing, photography is completed. Relocation works under progress.
13.	143553	Shiv Mandir	Bada Barda	Manavar	Dhar	No	Relocated completely two kms. away from the original place in the year 1997-98.
14.	171594	Shomeshwar Mandir	Khujawa	Dharamपुरी	Dhar	No	Detailed photography, numbering, drawing etc. completed.
15.	171594	Big statues	Khujawa	Dharamपुरी	Dhar	No	Copying in fibre glass completed and the same is placed at Kasrawad Museum. Further relocation work is stopped due to public resentment.
16.	171594	Bhawani Mata Mandir	Khujawa	Dharamपुरी	Dhar	No	Scrapping of lime plaster done for numbering and detailed drawing. Further work of relocation stopped due to public resentment.
17.	171594	Shiv Mandir (S.No.1)	Khujawa	Dharamपुरी	Dhar	No	Drawing numbering and photography completed. Work of relocation started but due to public resentment, it was stopped by the collector.
18.	171594	Shiv Mandir (S.No.2)	Khujawa	Dharamपुरी	Dhar	No	Drawing numbering and photography completed. Work of relocation started but due to public resentment, it was stopped

19.	171594	Shiv Mandir (S.No.3)	Khujawa	Dharampuri	Dhar	No	Drawing numbering and photography completed. Work of relocation started but due to public resentment, it was stopped
20.	171594	Rock-cut caves	Khujawa	Dharampuri	Dhar	No	Silt deposited inside the cave is totally cleaned. Numbering is done and further work is stopped due to public resentment.
21.	180432	Rock-cut-sculptures	Pipakdagarhi	Dharampuri	Dhar	No	Relocated completely in village Nimbola in the year 1998-99.
22.	180432	Shiv Mandir (Mauni Baba Ashram)	Pipakdagarhi	Dharampuri	Dhar	No	Relocated completely in village Nimbola. In the year 1998-99.
23.	199939	Baneshwar Mandir (Shiv Mandir)	Navadatoli	Kasarawad	Khargone	No	Scrapping work is completed. Relocation work stopped due to agitation.

Mounds

1.	114903	Mound	Jangarwa	Barwani	Barwani	No	Progress in nil.
2.	122523	Mound	Khapar-kheda	Manawar	Dhar	-	Completed earlier to 1997 as per 1993 plan.
3.	129228	Mound	Kheda	Manawar	Dhar	No	Progress is nil.
4.	138982	Mound	Kavathi	Manawar	Dhar	No	Not surveyed due to interference of NBA.
5.	139286	Mound	Utawad	Barwani	Barwani	-	Progress Completed earlier to 1997. as per 1993 plan,
6.	143553	Mound	Chota Berda	Thikri	Barwani	No	Not surveyed due to interference of NBA.
7.	152697	Mound	Kirmohi	Thikri	Barwani	Not relevant	Experimental excavation was done in 1995. Now these mounds vanished due to soil erosion by agricultural practices.
8.	160012	Mound	Navadakhedi	Thikri	Barwani	No	Progress is nil.
9.	167327	Mound	Brahman-gaon	Thikri	Barwani	Not relevant	Experimental excavation was done in 1995. Now these mounds vanished due to soil erosion by agricultural practices.
10.	199939	Mound	Navadatoli	Kasrawad	Khargone	No	Progress is nil.
11.	120999	Mound	Katnera	Kukshi	Dhar	No	Completed in April, 2001. Material is stored in the office of Dy. Director, State Deptt. of Archaeology & Museum, Rajwada, Indore.
12.	138982	Mound	Ekalwara	Manawar	Dhar	No	Completed in April, 2001. Material is displayed at Kasrawad Museum.
13.	162755	Mound	Maru Chichali	Thikari	Barwani	No	Completed . Records are with ASI office Nagpur.

14.	165193	Mound	Kalyanpura	Manawar	Dhar	No	Completed in April, 2001, material is stored in the office of Archaeologists, State Deptt. of Archaeology & Museum, Banganga, Bhopal.
15.	183480	Mound	Khalighat (Khalkhurd)	Dharamपुरी	Dhar	No	Excavated, records are with the office of the Archaeologists, State Deptt. of Archaeology & Museum, Rajwada, Indore.

Collection and display at Museum

Sculptures, 118 in nos. were collected from the regions coming under the submergence area of the Sardar Sarovar dam. These sculptures were obtained from Pipaldagarhi, Khujawa, Dharamapuri and different other villages. These are displayed at Distt. Museum in Dhar Distt.

Since these sculptures were lying open for a very long time they bear traces of weathering effect on them like salt formation, red-oxide deposition, besides accumulating dust, dirt and fungus on them. They were cleaned by the chemists using necessary chemicals like Ammonia, Sodium hydroxide, Benzene P.V.A. etc. After cleaning the sculptures were coated with preservative for saving them from further deterioration.

Museum

- Narmada Park and Museum at Lalbagh at Indore, besides Museum at Barwani and Kasarawad proposed.

Museum at Barwani is yet to be started.

Museum at Kasrawad is completed by NVDA. This is yet to be handed over to the State Department of Archaeology & Museum, Govt. of MP.

- Construction of a section on 'Narmada Dirgha' in the museum at Bhopal has been started.

Besides, Film documentation of all the monuments of SSP is in progress through an agency 'Madhyam', engaged by State Department for Documentation of the important monuments.

Anthropological Survey & Studies

Anthropological salvage plan for Narmada Valley : To date, surface scanning of the anthropological sites of 17 villages has been completed and 424 specimens taken. In this plan the Udaipur Branch of the Anthropological Survey of India has collected information and specimens from 19 villages in Gujarat.

INDIRA SAGAR PROJECT

Mrs. Indira Gandhi, the then Prime Minister of India laid the foundation stone of Indira Sagar Project located about 467 Km from the sea, roughly 320-Km upstream from the Sardar Sarovar dam site, on 24th October 1984. Later, the Project was renamed as Indira Sagar Project (ISP). The ISP Dam on completion would create a lake that will inundate about 91,300 ha of valley lands.



The area to be inundated constitute lands from five tehsils of three districts in Madhya Pradesh namely Khandwa and Harsud in Khandwa District, Kannod and Khategaon in Dewas Dist. and Harda in Hoshangabad District. Of the total area of 91,300 ha to be submerged about 67,000 ha. is in Harsud Tehsil, 11,500 ha is in Khandwa Tehsil and 12,800 ha area is divided among the other three tehsils.



UPSTREAM VIEW OF MAP OF INDIRA SAGAR DAM

Indira Sagar is a multipurpose project with the largest storage capacity in the country. It has an installed capacity of 1000 Mega Watt and an annual irrigation of 2.15 lakh ha. The project provides regulated releases of 8.12 Million Acre Feet to Sardar Sarovar Project (SSP), a terminal project on mainstream of the river in the State of Gujarat. The water on its way to the SSP would generate power at two intermediate projects in Madhya Pradesh.

INDIRA SAGAR DAM

The dam is proposed to be 92 m (302 Ft.) high and 653 m (2142 Ft.) in length with a slightly curved alignment of 880 m radius across river Narmada near village Punasa, about 845 km from the origin in District Khandwa with a gross storage of

12,220 Mm³ (9.9 MAF) and a live storage of 9,750 Mm³ (7.9 MAF) corresponding to FRL of 262.13 m (860 Ft.). It comprises of 27 blocks, of which 4 to 16 form the main spillway and 17 to 24, the auxiliary spillway. Blocks 1 to 3 and 25 to 27 form the non-overflow section of the dam. The hillock on the right of the dam is also proposed to be raised to the TBL of 267.00 m. For this, Block No.28 to 35 are proposed. There will also be a small saddle dam on the right side of the reservoir.

Plan of Implementation

The Project was proposed to be completed in different stages as follows :

i.) Dam and Power House

Stage-I

- Completion of concrete dam and saddle dam upto an elevation of 213 m (700 Ft.).
- Diversion of Railway track between Talvadia and Khirkiya railway stations.
- Rehabilitation of oustees in Harsud town.

Stage-II

- Completion of concrete dam upto crest level without radial gates, power house and installation of one unit of 125 MW and commissioning of 1st unit by September, 1997.

Stage-III

- Installation of radial gates and appurtenant works including remaining 7 units of 125 MW each.

REGULATED RELEASE TO SSP

In accordance with Clause-IX of Narmada Water Dispute Tribunal (NWDT) "Final Orders and Decisions", regulated flows corresponding to 10.01 B Cum (8.12 MAF) shall be released from Indira Sagar Project to Sardar Sarovar Project (SSP, ex-Maheshwar).

ii.) Canals

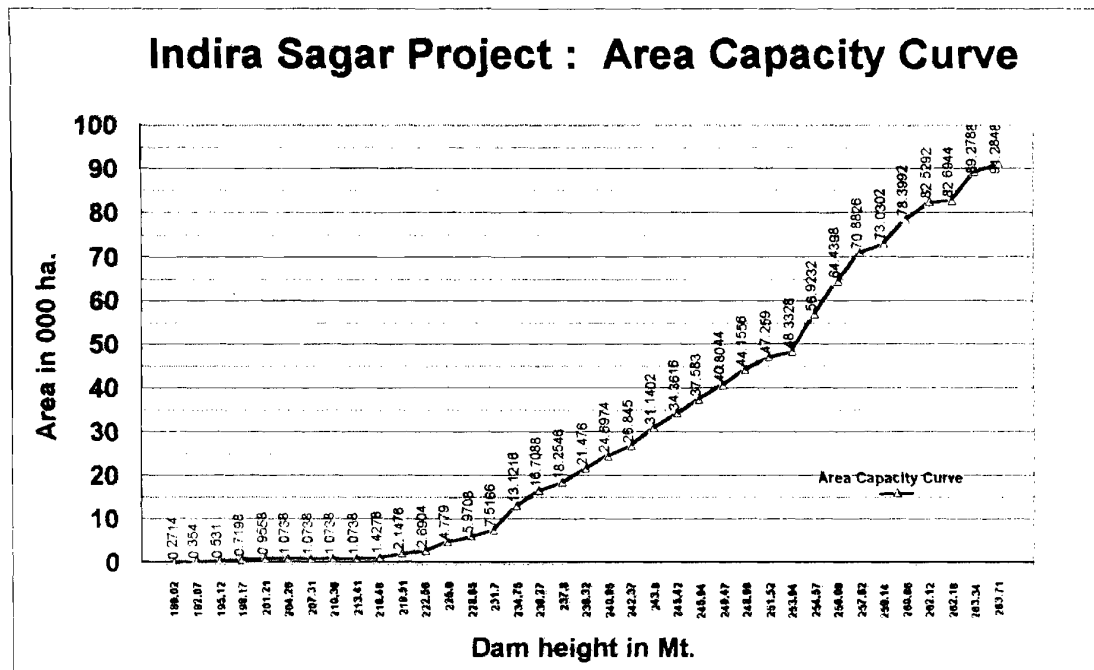
The canal system was proposed for completion in three phases as below :

Sl.No.	Phase	Description of canal reach	Proposed Irrigation (ha) (CCA)
1.	I	Main canal from Km 0 to Km 81.59	36,100
2.	II	Main canal to Km 206.28	82,900
3.	III	Main Canal to km 248.65, including canal from Khargone Lift Scheme	1,23,000

Note:- As per Revised Implementation Schedule of the Project-1992.*

SUBMERGENCE OF LAND

The break-up of 91000 ha areas proposed to be submerged by the ISP is as under



DOWNSTREAM ENVIRONMENT

Indira Sagar Project is a key project providing water storage which enables the downstream projects in the cascade, i.e., Omkareshwar, Maheshwar and Sardar Sarovar to cater the needs of irrigation and power generation as given in the following table :

Sl.No.	Name of Project	Gross Submergence (Lakh Ha.)	Proposed annual irrigation (Lakh Ha.)	Power Generation (MW)
1.	Indira Sagar	0.91348	1.69	1,000
2.	Omkareshwar	0.9393	2.83	520
3.	Maheshwar	0.04866	-	320
4.	Sardar Sarovar	0.34867	17.92	1,450
Total		1.40474	21.44	3,290

KEY ISSUES IN INDIRA SAGAR PROJECT

Ecological transformations following impoundment result in succession of fluviatile biocoenoses by lentic environment, the hydrography undergoes a shift by way of, fluctuations in water level, changes in physico-chemical regime and inundation, impacting areas upstream, downstream and in the irrigated command. Inundation results in involuntary resettlement of the people living in the submergence area, submergence of agricultural, forests and other resources like minerals, spawning grounds of fishes, resting/nesting places, buildings, roads etc. Fluctuation in water level brings in the issues of diseases, sedimentation, aesthetics of the area etc. Physico-chemical changes relates to quality of water, formation of hydro-sulphuric sludge, morphology of the river/estuary, salinity ingress etc. The key issues related to environmental control which have been discussed and mentioned in the order of clearance, are discussed in this report.

The parameters: The suggested environmental safeguard parameters are indicated below :

- ❖ *Phased Catchment Area Treatment*
- ❖ *Compensatory Afforestation*
- ❖ *Command Area Development*
- ❖ *Flora, Fauna, Wildlife and Carrying Capacity*
- ❖ *Seismicity*
- ❖ *Health Aspects*
- ❖ *Archaeological Survey, and Anthropological Studies*

The Action Plans and status of studies and implementation of Environmental Safeguard Measures upto quarter ending March, 2002 are summarised in this report. As 'Resettlement and Rehabilitation' is dealt with separately, current status of other suggested parameters is only presented hereunder.

1. PHASED CATCHMENT AREA TREATMENT

The MOEF clearance granted in 1987 contained two conditions pertaining to CAT, as follows:

- ❖ More detailed surveys for prioritisation of the sub-catchments in the ISP area should be undertaken;

- ❖ A phased CAT programme should be prepared and implemented ahead of reservoir filling. GOI issued a directive in July, 1992 that, the project would bear the costs of the treatment of all critically degraded sub-watersheds draining directly [Phase-I] into the reservoir. These watersheds were identified amongst those classified as either very high or high-priority categories by the All India Soil and Land Use Survey Organisation (AISLUSO). The project would also be responsible for the treatment of those areas of the catchment, which are directly damaged by the project activities.

In addition, plans are required to be prepared for the treatment of the balance of the critically degraded sub-watersheds but the cost of this will be met from other ongoing schemes and in a timeframe to be determined.

Studies

The Narmada River drains a total catchment area of 9.879 million ha. upto it's mouth at the Arabian sea. Out of this, about 6.164 million ha forms the catchment area of Indira Sagar Project. The freely draining area of Indira Sagar Project down stream of Bargi Dam is about 3.925 million ha. The prioritisation at watershed level using LANDSAT TM data of 1:2,50,000 scale was completed much before 1986.

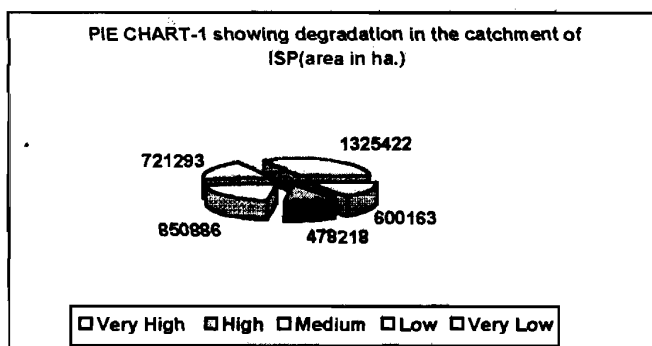
The master plan for treatment of the Indira Sagar catchment area was submitted by the state Govt. of M.P. during December 1986 about 7,920 km² was classified as critical catchment area to be treated. Establishment of priority in areas to be treated was followed by a detailed soil survey to determine what treatment measures would be most effective. This surveys was carried-out by the All India Soil and Land Use Survey Organisation of the Govt of India during 1989 to 1991. which was subsequently revised and updated during 1993.

Surveys and studies have been undertaken to aid the development of a management plan for CAT in the ISP catchment. They are: -

- Report of Inter-Departmental Committee on Soil Conservation and Afforestation, (the Dewan Committee Report), 1985.
- Report on Prioritisation of Sub-watersheds in sub-catchments of the Narmada Catchment, 1991 by AIS&LUSO, New Delhi. Revised subsequently in 1994.

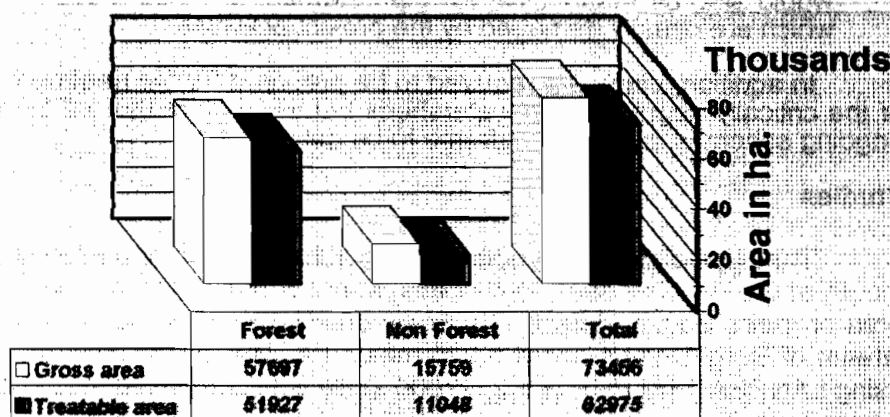
According to the above studies the freely draining area of Indira Sagar Project down stream of Bargi Dam is about 39,75,982 ha. Prioritisation survey of the watersheds was entrusted to the All India Soil & Land Use Survey Organisation, New Delhi. The Survey has been completed by AIS&LUSO, New Delhi and the survey reports have been received in the Narmada

Valley Development Authority (NVDA) Government of Madhya Pradesh. Findings of the AIS&LUSO indicated that about 28% of the catchment was yielding SYI of 1200 and above. As such these were considered as critically degraded. Results of the prioritisation are summarised in pie chart -1.



AIS&LUSO in their final report have identified 508 no. of critically degraded sub-watersheds (having Silt Yield Index of 1200 and above), covering an area of about 10,78,381 ha.

Catchment Area Treatment Planning



**Gross versus treatable area
in categories**

Phased Programme:

As per the guidelines of MOWR, directly draining watersheds of very high and high priority categories only, are to be treated *pari-passu* with the construction of the dam and at the project cost. On the basis of their proximity to the reservoir these watersheds have been planned for treatment in two phases namely Phase-I and Phase-II

Action Plan :

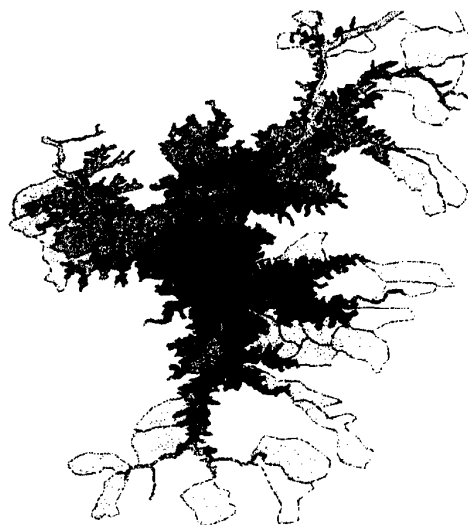
Macro-watershed plan for the ISP was submitted during 1993. This plan was subsequently revised and updated. The updated plan of work is under implementation. Various components of the Action Plan are depicted included the following:

1. Work responsibility
2. Survey work
3. Development Map
4. Micro-watershed Map
5. Treatment measures
6. Time table
7. Budget
8. Monitoring

According to the plan submitted by the NVDA, 30 sub-watersheds covering an area of 73,456 ha have been identified as directly draining sub-watersheds. Out of the gross area of 73,456 ha, directly draining sub-watersheds, 57,697 ha is non-forest and the remaining 15,769 ha is forestland. The net area available for treatment, however, is 62,975 ha of which 51,927 ha area is non-forest and the balance 11,048 ha is forestland. Graphic presentation of the same is given in Chart-1.

PHASE-I Programme

On the basis of the reports submitted by the AIS&LUSO, sub-watersheds belonging to the very high and high priority categories and directly draining into the reservoir have been identified for treatment. There are 30 such sub-watersheds. They cover an area of about 73,456 ha. Map showing the location of the identified sub-watersheds is depicted in Map-1.

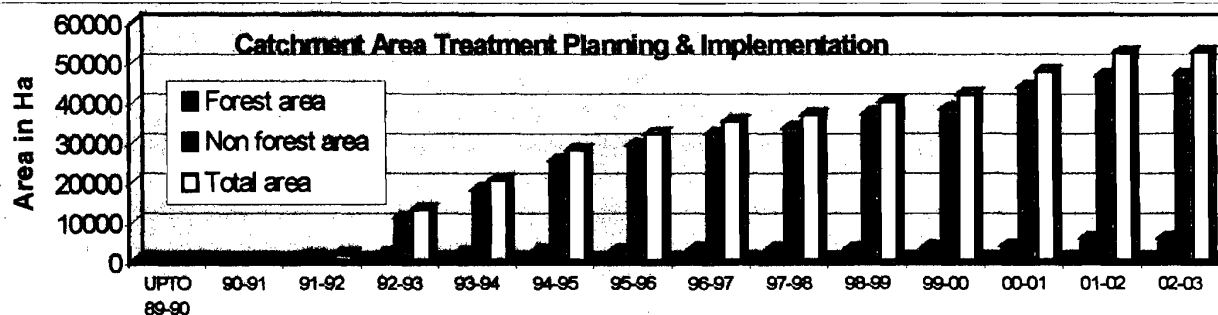


Map-1 Showing submergence area of Indira Sagar Project and location of critically degraded directly draining sub-watersheds.

IMPLEMENTATION:

NVDA have planned to treat the Phase-I area in about 10 years' time commencing 1991, at the cost of the project and pari-passu with the construction work on the project.

By the end of September 2002, the cumulative progress was 52751 ha. In addition an area of 1636 ha was treated up under pilot project earlier. It includes 2192 ha progress under forest sector which was covered in Datuni Pilot project. NVDA



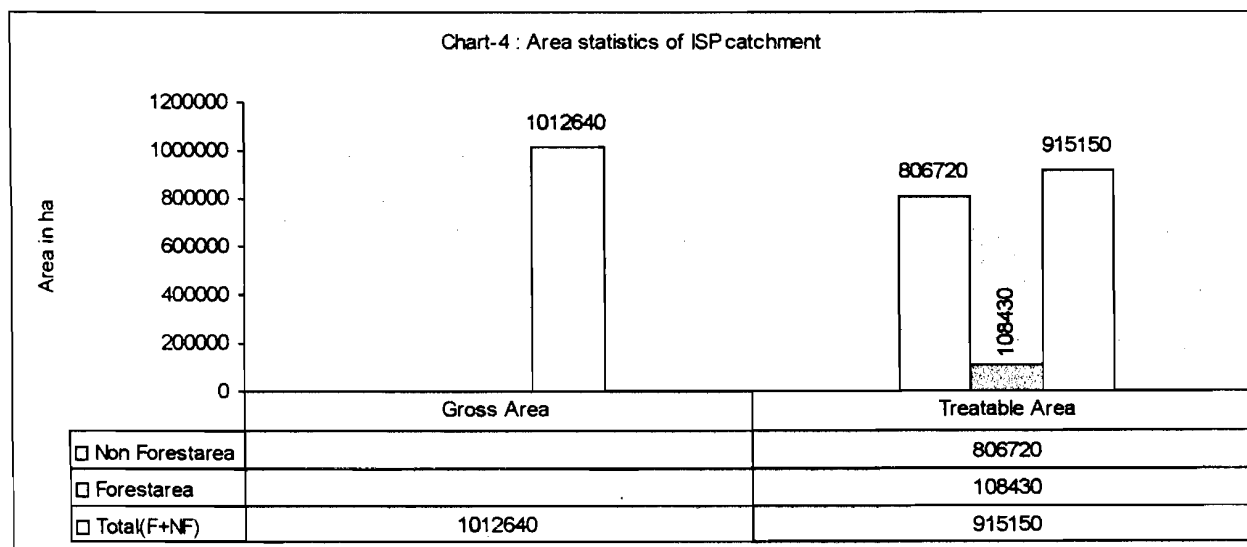
proposes to treat the balance areas during the next four years. The progress is shown in Charts 2 & 3.



II. FREELY DRAINING AREA (Excluding Directly Draining Sub-watersheds)

According to the plan submitted by the NVDA, 478 sub-watersheds, covering a gross area of 10,12,640 ha have been identified as freely draining (other than directly

draining) sub-watersheds. The net area available for treatment, however, is 9,15,150 ha of which 806720 ha area is non-forest and the balance 108430 ha is forestland. Above details are graphically presented in Chart-4.



ACTION PLAN :

NVDA have submitted macro-watershed plans covering the above area during 1993. NVDA have planned to treat the Phase-II area in about 30 years' time commencing 1994-95, as per the schedule of implementation given in Table-5 below. However, detailed micro-watershed schemes are required to be submitted to the funding agencies like NAEB, RVP etc. in accordance with the guidelines of these schemes. A few schemes have been submitted and got approved while the remaining schemes are under formulation.

IMPLEMENTATION :

The Project Authorities have submitted CAT Phase-II plans for NAEB/RVP funding for seeking funds. Fourteen schemes covering the area of 28,949 ha were approved by the Govt. of India in RVP Schemes. By the end of September 2002 the progress reported was 4,054 ha completed in 3 sub-watersheds and 11,328 ha partially completed in 11 sub-watersheds.

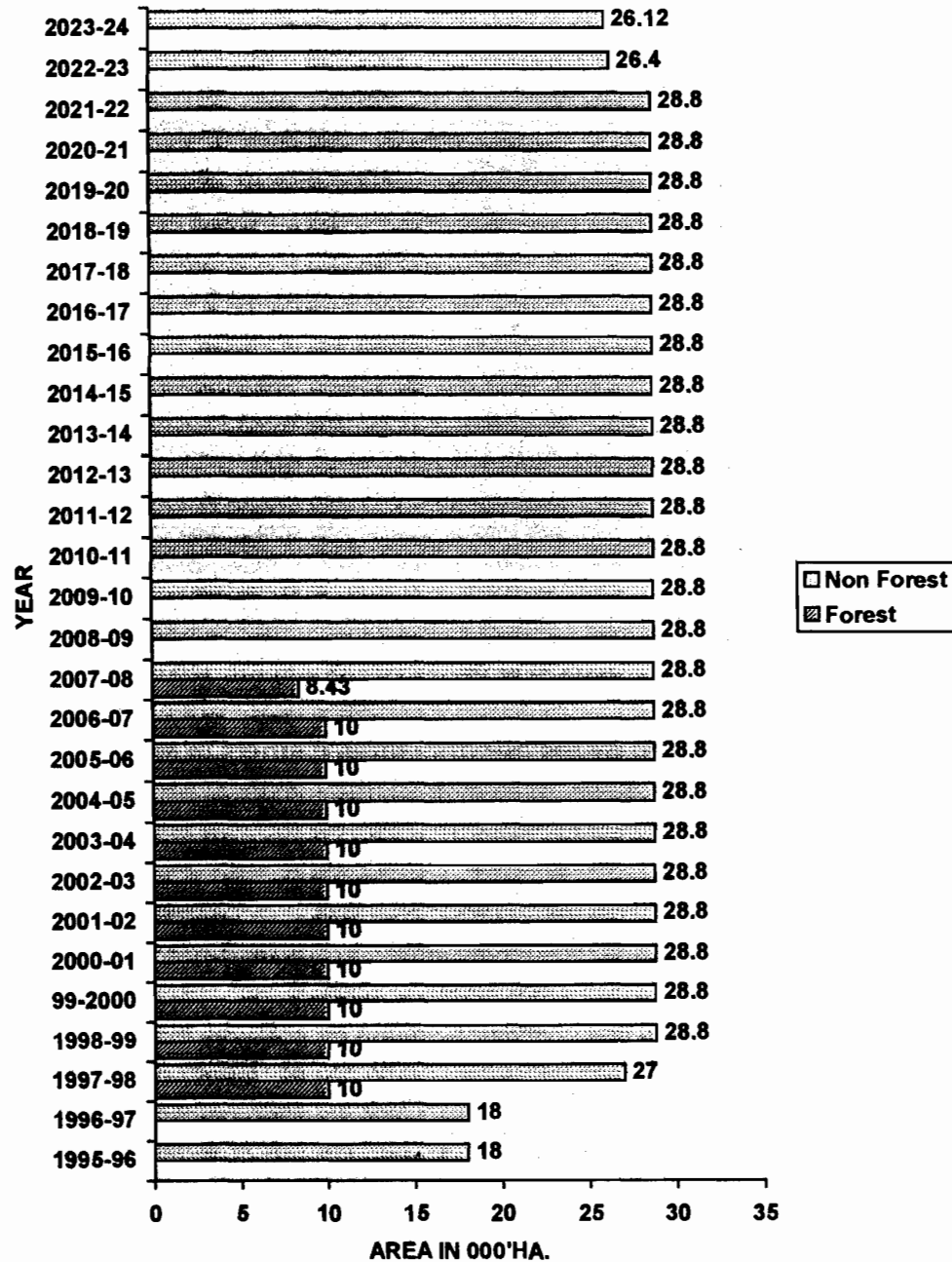
REQUIREMENT OF FUNDS :

The plan drawn up for treatment of Phase-II treatment works places requirement of total funds at Rs. 1038 crores. It is proposed by GOMP to treat the non-forest area at an estimated cost of Rs.602.57 crores and forest area Rs.435.12 crores.

Sub-watersheds sanctioned by Centrally Sponsored River Valley Projects :

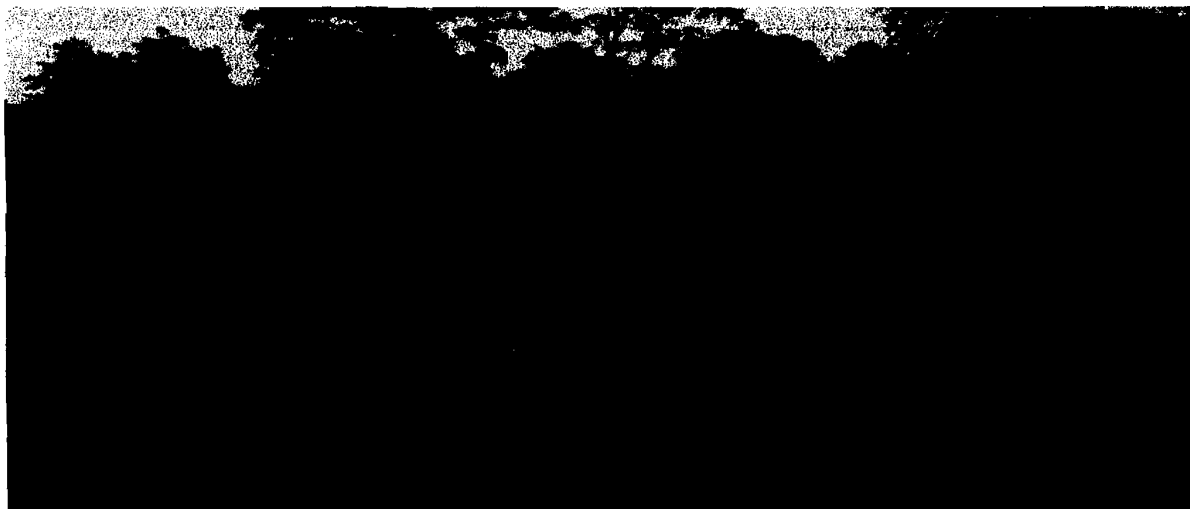
Total Sub-watershed (High & V. high priority)	Sub-watershed (High & V. high priority)	Target in Ha. Upto 2002 as per action plan	Progress in ha up to 30.09.2002		
			Forest Area	Non Forest Area	Total Area
9,15,150 (478)		2,28,200	10,991	5347	16338

Chart-5 : Schedule of treatment of CAT works, Phase-II



2. COMPENSATORY AFFORESTATION:

A total of 40,332 ha forestland would come under submergence and an additional 779.90 ha. of forestland has been diverted for the residential colony, powerhouse complex, main dam, saddle dam and approach roads.



Subsequently, another 308.40 ha. of forestland was permitted to be diverted for powerhouse. Thus a total of 41,420 ha of forestland has been permitted to be utilised for the construction of ISP. Area proposed to be utilised for the ISP covers three districts as shown in Table-1 below.

TABLE-1 : Showing area taken by the ISP from three districts in M.P.

District	Area in hectares diverted for ISP
Khandwa	33,383
Dewas	4,528
Hoshangabad	3,678
Total	41,589

MOEF clearance granted in 1987 contained several conditions pertaining to compensatory afforestation. The key conditions among others was that " Since the project involves violation of Forest (Conservation) Act, 1980, compensatory afforestation will be carried out over suitable degraded forest land double the diverted forest area in extent and in addition to the equivalent area in non-forest land. For this purpose, the area offered by the State Govt. vide their letter No.5/III/84-10-3, dated 14.10.1986 will be accepted and compensatory afforestation raised at the cost of the project in this area."

- State Forest Department re-conveyed the forestland for the purpose of ISP vide it's letter dated 28th November 1987 clarifying that-

"The plantations over the degraded forest, double in extent to the area which has been worked upon without the permission of the Forest Department, violating Forest Conservation Act thereby, shall be carried out, in addition to the usual plantations over non-forestland equal in extent to the area diverted."

ACTION PLAN :

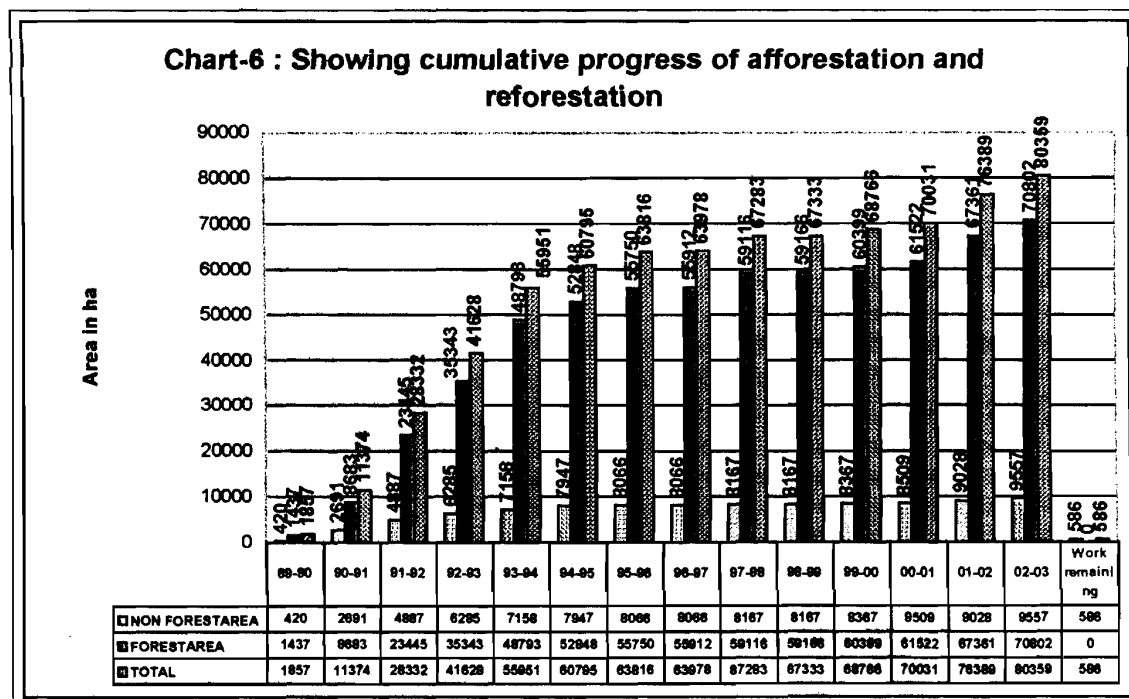
To compensate for this loss of forest the M.P. Forest Department had submitted an Action Plan for Compensatory Afforestation for the Indira Sagar Project in December, 1986. Area offered to this plan was accepted. The acceptance was acknowledged through the clearance order.

Accordingly, 10,143 ha of non-forest and 70,802 ha of degraded forestland has been identified for compensatory afforestation, in the districts of Khandwa, Hoshangabad, Dewas, Sehore, Dhar and Khargone as shown in Table-2.

TABLE-2 : Showing the district wise areas identified for compensatory plantation

District	Degraded Forest (In ha)	Area other than forest (In ha)
Khandwa	30,572	2,314
Hoshangabad	22,739	2,842
Dewas	17,491	802
Sehore	-	1,247
Dhar	-	1,001
Khargone	-	1,937
Total	70,802	10,143

The M.P. Forest Department has added additional areas to the prescribed afforestation hectare as a contingency to account for unforeseen circumstances. In selecting forestlands for the plantations, local requirements for grazing, firewood, and other nistar needs were kept in view. However, considering that with the dedication of vast areas to the proposed National Parks, some future adverse impacts on the local



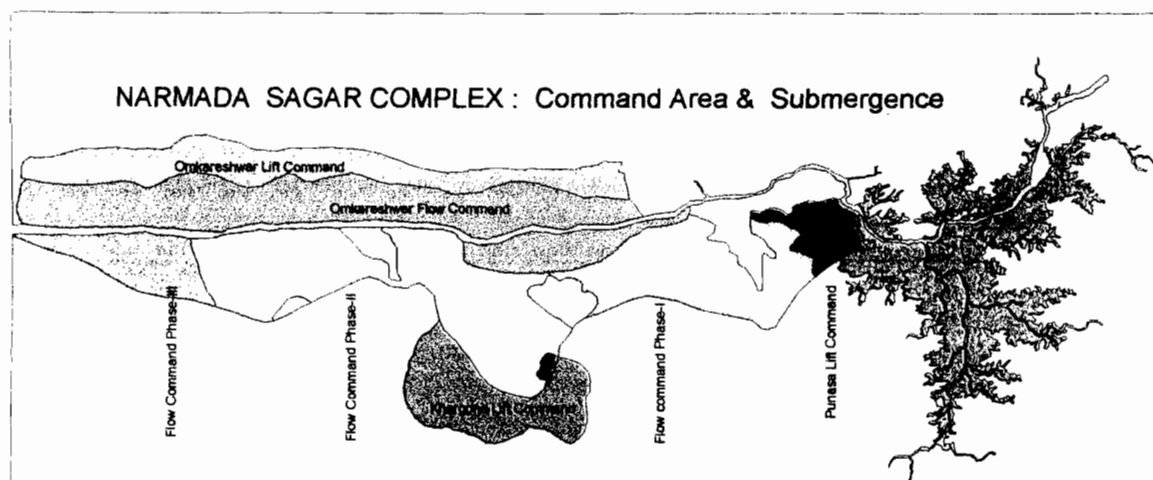
population's nistar needs may develop and that the wood from the submergence zone was expected to meet local fuel needs only for about 8 to 10 years, more emphasis was placed on fodder production in plantation areas in Khandwa and Dewas divisions. The plantations were to provide shelter and habitat to wildlife also.

IMPLEMENTATION :

NVDA started the plantation works in the degraded forests within the Narmada catchment on the areas identified in the plan. By the end of September 2002 the progress reported was 80359 ha as shown in Chart-6 above.

3. COMMAND AREA DEVELOPMENT

The Command area proposed to be irrigated by the NSP spreads on the left bank of the Narmada River. It comprises territory falling in the Khandwa tehsil of Khandwa District and six tehsils of Khargone District. The Satpura Ranges flank the command on the south. The northern boundary is formed by the Narmada River itself. The land of the command comprises Forest:10,055ha; Grasses and pastures:10,498ha; Cultivated land: 142,406ha; Culturable fallow : 8,116 ha; Barren:18,385 ha.



The command area has immense potential for development. The objectives of the command area development are :

- Optimum utilisation of created potential of irrigation.
- Introduction of multiple cropping patterns and increasing the levels of productivity and strengthening of agriculture research activities.
- Creation of adequate communication and storage facilities.
- Conservation management of integrated fisheries development.
- Intensification of dairy development.

The main components of the command area development program are

- On Farm Development,
- Conjunctive Use,
- Agro-Industries

- Regulated Market,
- Warehousing Facilities,
- Roads etc.

STUDIES AND FINDINGS

In 1975, at the request of the Narmada Water Dispute Tribunal (NWDT), the Gwalior Campus of J.N.K.V.V. University undertook a reconnaissance survey of the Narmada Sagar Command, using a 2-mile grid. Nearly 265 soil profiles were examined.

Reports on the quality of groundwater in the Indira Sagar Project area are limited, but the general assumption is that the quality is suitable for use in irrigation. Limited water quality testing was done in several blocks in the Indira Sagar Project area. These tests were apparently conducted in 1966 and 1967. In Barwaha block, five samples out of seven tested were of excellent quality.

During 1982-83, to appraise land irrigability, an area of about 2,80,000 ha falling within parts of Khandwa and Khargone districts was surveyed by the Department of Agriculture, M.P. Surveys were carried out on 1:50,000 – scale topo-sheets. Aerial photo-interpretation was carried out wherever possible. About 366 profiles and about 2787 auger bores were examined. The rate of profile examination was about 1 per 1000 ha. A total of 30 soil series were mapped. Areas falling under different classes of depth, erosion, slope, texture, and land irrigability subclasses were identified. This report indicated that typical vertisols are not extensive in the surveyed area.

A detailed reconnaissance soil survey of the Narmada Sagar Command Area was also carried out in January 1984 by the Directorate of Agriculture in co-ordination with the Govt. of India, National Bureau of Soil Survey and Land Use Planning Wing and the Agricultural University, Jabalpur in the command area of 2.10 lakh ha. The soils of the areas have been classified into 26 soil series taking into account the morphological features, topography, and physical and chemical characteristics. As per soil taxonomy (1970), altogether three orders, three suborders, three great groups, eight subgroups and ten families have been identified. Soils have been classified into various recognised classes in terms of their suitability for irrigation.

Table -3 : Showing land Irrigability classification

Sl. No.	Land Irrigability Class	Slope Percent	Depth of Soil (in cms.)	Percentage of gross command area
1.	2	0-3%	More than 90	29.5
2.	3	1-5%	22.5 to 90	21.5
3.	4	3-10%	7.5 to 45	25.7
4.	6	5-15%	0 to 22.5%	23.3

In order to study whether full irrigation would lead to water logging and salinity problems, state govt. of Madhya Pradesh commissioned special studies on subsurface drainage and groundwater behavior to the Indian Institute of Science at Bangalore. For study purposes, the entire Narmada Sagar complex Area was divided into 34 hydro-geological zones. The studies considered the following :

- Rainfall data from stations around the composite command.
- Runoff as measured in nearby gauging stations.
- Evaporation rate data.
- Climatological data.
- Groundwater-level data from all types of wells.
- Pump test data.
- Hydro-geological information on wells and aquifers.
- Soil and soil moisture data.
- Agricultural land use data, including information on crops and the seasonal nature and extent of surface water and groundwater irrigation.
- Proposed crop-water requirements.

Jawaharlal Nehru Krishi Vishwavidhyalaya, Jabalpur through their research centre are carrying out studies on impact of agro-chemicals run-off from fields on underground and surface water in command area with an objective of assessing the residues of toxic agricultural chemicals from fields in the ground water and surface water of command areas and ecological effects of the residues in irrigation water and their physiological effects on aquatic and terrestrial vegetation, crops, animal life and agro-ecosystem as a whole for devising measures to mitigate the same under the fallow and cropped yield conditions. Studies are commenced and are making progress.

SUGGESTED STRATEGIES

The Bangalore institute's study concluded that conjunctive use of surface water and groundwater on a significant scale would be required to avoid water logging and salinity problems in the Composite Command Area. Study data indicated that a water balance of 70% surface water and 30% groundwater would be suitable in most project areas to avoid waterlogged conditions.

Natural drainage conditions in the Narmada Sagar Complex Command Areas are quite favourable as Narmada Sagar area has a well-developed natural drainage system. The command complex lies on both flanks of the Narmada River, with a number of tributaries draining the area towards the Narmada River. The slope of the cultivable land generally ranges from 1 to 3% and it has good natural drainage. The groundwater aquifers are deeply incised, and major problems of surface drainage do not appear to exist. Surface drainage will, however, be required after irrigation is implemented through the provision of a proper network of field drains so that excess water will be removed from the cultivated fields.

Irrigation water from the Narmada River will be of good quality, and normal irrigation applications are considered sufficient to leach out the salts from saline/sodic soils. No additional leaching requirements will generally be necessary. Project planners do not expect any salinity problems if proper surface and subsurface drainage systems are installed.

ACTION PLAN :

The Government of Madhya Pradesh have submitted command area development plan, delineating the soil classifications and land irrigability in the Narmada Sagar

Command Area showing the first three phases of irrigation development by area, the land irrigability map of the Narmada Sagar Command Area showing lands of classes 2 through 6 by location in the first three phases of irrigation development during 1986.

The project on completion will provide annual irrigation to 1.69 lakh ha. Waterlogging occurs when the groundwater table rises too close to the ground surface and the soils are unable to drain properly. This concern has been carefully planned to avoid the problems. The conjunctive use of surface and groundwater resources to the extent of 30% is proposed.

The provision of drainage systems to prevent the accumulation of excessive water in the soils, and water management planning and monitoring to control the proportions of surface water and groundwater used in irrigation and the water levels in the groundwater aquifers are some of the measures being planned for prevention of any such eventuality.

In keeping with the study conclusions, planning for the Indira Sagar Project includes maintaining a water balance of 70% surface water and 30% groundwater use, lining of the canal distribution system from the Main Canal upto the eight ha. service area, and installing and maintaining surface and field drainage systems. Because of the deeply incised aquifers, plans for surface and field drains, and plans for conjunctive use of surface water and groundwater, the planned groundwater monitoring program would be sufficient to indicate the needed remedial measures. Essentially all of the groundwater development will be undertaken by the farmers, however the State Govt. plan to take appropriate action to encourage planned groundwater development on schedule and to ensure that the required 30% of the total irrigation demand was met from the groundwater. If groundwater development does not occur on schedule because of the lack of farmer initiative or because of problems with water quality or adverse aquifer conditions, State Govt. plan to step in and install appropriate drainage systems whenever wherever needed

IMPLEMENTATION

The Government of Madhya Pradesh has submitted command area development plan. The project on completion will provide annual irrigation to 1.69 lakh ha. The implementation of the plan would be taken up in three phases for completion in December-2007. The study on impact of Agro chemicals, runoff from fields on surface & ground water quality in the command area has been assigned to J.L. Agricultural University, Jabalpur. An MOU for this work was finalised. An allocation of Rs.24.5 lakhs was made. Studies have commenced and are making progress. The works of on farm development will be started 2 years in advance of the start of irrigation from canal system in a phased manner in the entire command area.

However the progress on the canal system is very slow. Earth work has been completed only in the first 20 kms of the main canal.

4. FLORA, FAUNA AND CARRYING CAPACITY

The guidelines of the MOEF require that while seeking environmental clearance for the hydropower projects, surveys should be conducted so that the status of the flora and fauna present can be assessed, listed (rare and endangered) species can be detected, if

present, and appropriate conservation measures devised. Important survey work undertaken for the purpose had included the following

- Preliminary Report on First Botanical Exploration and Plant Collection from Narmada Valley by the Botanical Survey of India in 1986.
- Report on the Survey of the Narmada Sagar Area by Zoological Survey of India, 1988.
- Narmada Basin Water Development Plan: Development of Fisheries, 1987, was prepared by the Narmada Planning Agency, GOMP.
- Rapid Reconnaissance Survey of Limnological Aspects Part I, II and III, 1987, were undertaken by the Bhopal, Vikram and Rani Durgavati, Universities for GOMP.
- Water quality data has been collected by the Central Pollution Control Board, Central Water Commission, the State Pollution Control Boards and the National Institute of Oceanography

On the basis of relevant details supplied by the various states, MOEF issued clearance in 1987. A condition of this clearance, as far as it related specifically to the Flora & Fauna, was that the Narmada Control Authority would ensure in-depth studies on flora and fauna needed for implementation of environmental safeguard measures.

Further in-depth studies with focus on the following prime concerns were taken up.

- Relocating and protecting wildlife through setting up and maintenance of the permanent protection areas.
- Detailed surveys of both flora and fauna to determine the number of individuals of the various species, their habitat types and other needs, their status in terms of being endangered, threatened or protected under Indian Legislation, and recommendations for minimising project impacts and maximising opportunities for protecting and enhancing plant and animal life.
- Studies to ascertain the capacity of the surrounding areas to accommodate additional wildlife

The objective of the suggested studies was to assess the environmental impacts as a result of the Narmada Sagar Complex, consisting of the three dams: the Narmada Sagar, Maheshwar and Omkareshwar, to ensure minimal adverse effects on wildlife as a result of the project development works. Studies were entrusted to Wildlife Institute of India and Friends of Nature Society. Institutes carried out exhaustive studies with a view to address the above concerns. Studies focused on the following

The reports submitted by the identified premier organisation during the period 1986 and 1997 included the following

- Sociological Survey of the Fishing Families of the Narmada River by CICFRI, 1991.
- Aquatic Fauna (Fish) Studies in Indira Sagar Submergence Area, prepared by the Friends of Nature Society in 1991 on behalf on the NVDA reported on the fish fauna of the Narmada.
- Pre-and Post-Impoundment Limnological Studies of Narmada Basin, by three universities coordinated by Barkatullah University for the NVDA. (1989-92) Study report was available in 1994.
- Studies on Fish Conservation in Narmada Sagar, Sardar Sarovar and its Downstream, is a desk review sponsored by the NCA and undertaken by CICFRI, 1993.

- Wetland and aquatic flora of Narmada Valley in Madhya Pradesh was also published in 1991 in Vol. 15 No.3 in J.Econ. Toxicology Bot.
- Studies on EIA of Flora & Fauna of NSP were entrusted to the Wildlife Institute of India, Dehradun in December, 1989 and were completed by March 1994.

Key concerns addressed on the terrestrial ecosystem were as follows:

- A wildlife inventory giving reliable estimates of the numbers of various species of wildlife in the project impact area.
- A catalogue of habitat types found in the project area.
- A status report on individual species indicating ones that are endangered, threatened, or protected under prevailing Indian wildlife Laws. The report on these special status species was also included the recommendations for actions to be taken to safeguard threatened species
- Recommendations for the creation of new protected areas for wildlife in the areas neighboring the submergence area.
- An assessment of the impact of the project gene pool reserves of wildlife in the project area.

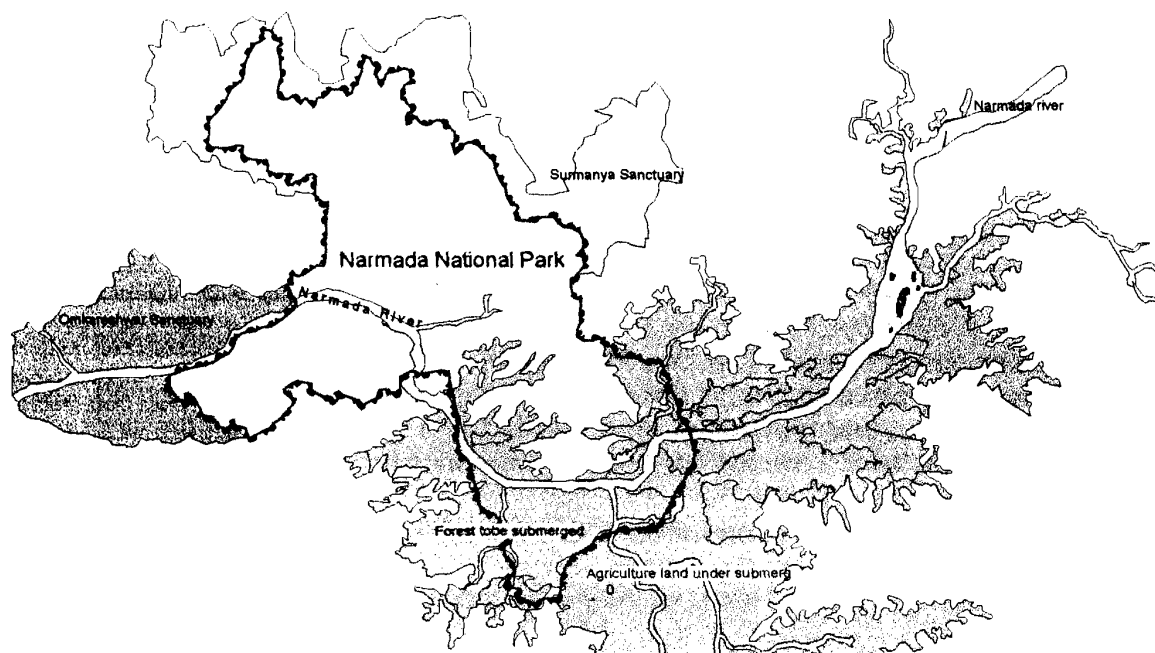
SUGGESTED STRATEGIES

Establishments of protected areas in many parts of the country in the last three decades has largely been and outcome of the Govt. concern for mitigation of the environmental degradation specially for preservation of species diversity and the genetic variation within them. Besides, maintaining productive capacities of Eco-system and safeguarding habitat critically for the local range of species. Three new protected areas were proposed to mitigate the losses. This includes Narmada National Park, Suryamanyasa Sanctuary and Omkareshwar Sanctuary.

Name of the Sanctuary/Park	Area in ha.
Narmada National Park	47522
Suryamanyasa Sanctuary	16370
Omkareshwar Sanctuary	11996
Total Area	75888

It is suggested that the severity of the impact resulting from direct and indirect losses could be minimised through restoration of some of the aquatic vertebrates and delineation of a substantial area of the contiguity forest which has similar conservation values that are being lost in submergence and to elevate its status to a protected area – a combination of a national park and sanctuary.

Key aquatic vertebrates species like **otter** is proposed to be restored and translocated. It was suggested to explore the possibility of capturing and translocation of impacted otters of Narmada Sagar into identified localities of the vacant niches in central Indian rivers. Besides, a species restoration plan for **aquatic reptile (turtle)** was also suggested within the submergence zone and also in other stretches of the river with rocky structure and sandy banks. The restoration program for **muggar crocodile** as being practices in other districts of M.P. was also suggested.



ACTION PLAN AND IMPLEMENTATION

Actions have been taken by NVDA to implement the recommendation of the WLI regarding declaration of National Park & protected areas. Matter is under consideration of the State Govt.

The studies of certain aspects of fisheries and reservoir sciences have been included in the Limnological studies being conducted by the three Universities of the State. Studies in the Upper Narmada, (Bargi Reservoir) by Rani Durgawati University, Jabalpur, studies in the Middle Narmada (Tawa, Barna and Kolar Reservoirs) by Barkatullah University, Bhopal, studies in the Lower Narmada by Vikram University, Ujjain. All the three Universities have completed the studies in their respective areas as per MOU and final report is available. Accordingly Action Plan has also been drawn up. Since the topography in the reservoir area consists of rolling hills, NVDA expected the higher peaks to remain above the water surface level and constitute islands in the reservoir. These islands would contain remnant flora and fauna that would remain isolated and would be subjected to changes in microclimate by virtue of being surrounded by a large body of water. NVDA scientists have expressed an interest in the possible effects these special circumstances could induce.

In addition to these small islands, two large islands will be formed to the north and south of the Narmada River just upstream of the Indira Sagar Dam. Present plans are to reserve the northern island of 17 km², for people and to link it to the mainland and the highways leading to Indore and Bhopal. The southern island of about 23 km², however, is earmarked for conversion into a wildlife sanctuary. This prospective island would be considered large enough to preserve existing flora and fauna.

5. SEISMICITY AND RIM STABILITY

The Narmada Sagar reservoir has a gross capacity of 12,200 million cubic meters, or about 9.9 million acre-feet, by far the largest-capacity reservoir planned in the Narmada River basin. Therefore the issues of seismicity, the potential for reservoir-induced seismicity (RIS) and the rim stability have been carefully studied and addressed.

Some of the staff of NVDA was trained by IMD for initial analysis of observed data and determining the magnitude of earthquake.

STUDIES

Investigations have considered the Narmada Sagar complex dam sites at Indira Sagar, Omkareshwar and Maheshwar together for the studies. Geological Survey of India, the Central Water and Power Research Station of Pune, the University of Roorkee, GOG, GOMP and World Bank Consultants Pinkerton, Markwell and others have been closely associated with the studies and the mitigation planning. Several reports on seismological factors affecting design of the dam, including the following are available

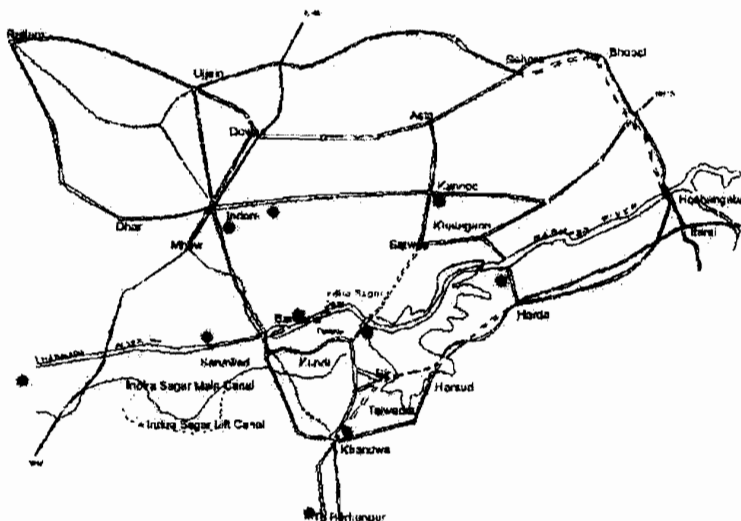
- Technical Memorandum 3.09, Evaluation of the Earthquake Parameters of the Indira Sagar Dam, by the Department of Earthquake Engineering, Roorkee University. Technical Memorandum 4.12,
 - Seismological Considerations for Indira Sagar Dam. Part-1: Evaluation of Earthquake Parameters for Design of Dam. Part-2: Assessment of Potential for Reservoir-Induced Seismicity in Narmada Basin.
 - Induced Seismicity and Other Geodynamic Processes Associated with Man-made lakes, Guha, S.K., Visiting Seismology Consultant, North Eastern Council, Shillong, India,
 - Sessional Report presented at IVth International Congress, International Association of Engineering Geology, New Delhi, India, 10-15 December 1982.
- Hazards Due to Reservoir-Induced Seismicity in India, Guha, S.K.

SUGGESTED STRATEGIES

Major conclusions related to the effects of RIS considerations on seismic design requirements and the needed plans for seismic monitoring. As for design, it was suggested that reservoir impoundment's by general agreement can trigger significant earthquakes only where tectonic deformations already exist in the geological structures. Thus it was concluded that filling the Narmada Sagar reservoir might cause an earthquake to occur sooner, but it would not affect the magnitude or intensity of ground motion associated with the earthquake. Consequently, RIS was assumed to have no influence on seismic design requirements for structures near to the reservoir.

Detailed studies got done from the University of Roorkee, by consultancy with Dr. Guha and expert opinion obtained from Dr. Ray W. Clough, were placed before the Dam Review Panel. The Indira Sagar Dam Review Panel considered all available reports and data and recommended that

- To monitor seismicity during the pre and post-impoundment phases. Network of about five stations each be developed in the Narmada Sagar, Omkareshwar, and Maheshwar areas.
- To record the ground motion intensity and response of the dams for any significant earthquake in the vicinity, installation of three strong motion seismographs at each dam site.
- To record any significant ground motion that occurs during construction, one strong motion instrument near each dam site.

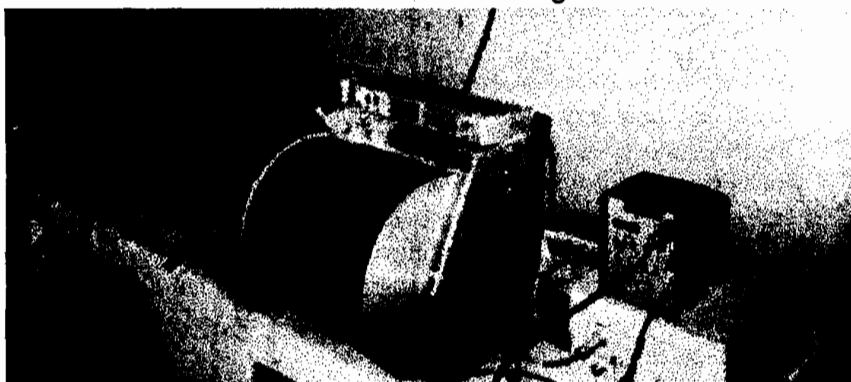


Based on the recommendations of the Dam Review Panel, detailed designs for the dam have been prepared by the Central Water Commission.

In order to study the seismic effects in the Narmada Sagar Complex, based on the recommendations of Erstwhile Dam Review Panel, Central Water and Power Research Station, (CWPRS) Pune and Indian Meteorological department (IMD). Zone a network of 10 seismological observatories with sophisticated instruments is being established. It is proposed to monitor pre and post impoundment seismicity also at these seismic stations to help in assessing the adequacy of seismic parameters adopted for designs. The location of these seismic observatories finalised on the recommendations of IMD are as follows :

Bagli	Barwani	Chhanera	Hirapur	Umrikheda
Kannod	Khandwa	Maheshwar	Narmada Nagar	Kothi

A set of five instruments viz. Micro Earthquake recording system, Wood Anderson Seismograph, Short period Seismometer, Long period Seismometer & Strong Motion Accelerograph (SMA)



At present, three experimental seismological stations have been established with the guidance of Central Water & Power Research Station, Pune, at

- Narmada Sagar,
- Omkareshwar and

➤ Maheshwar dam sites

The experimental station at Indira Sagar Dam site consists of a RV-320 Micro Earthquake Recorder, a Wood Anderson Seismograph and a Digital Recorder - 100 strong motion oscillograph. The results are analysed by the Central Water & Power Research Station, Pune & IMD. It was no significant event was reported during September 2002.

Out of the 11 Micro Earthquake (MEQ) recorders of 800 B model procured, 10 are installed at above locations. One spare unit is also installed at Pandhana near Khandwa to monitor local activity in and around Pandhana area.

The dam is, in effect, over-designed in the interests of public safety. As for the Indira Sagar Dam, Seismic design coefficients, though higher than needed, also meaning higher costs have been preferred.

RESERVOIR RIM STABILITY

The reservoir competency survey has been done by GSI and report is submitted. In the report, GSI suggested further studies for some patches of narrow water divide. However environment sub-group decided not to have further studies as experts were of the opinion that there was no water loss between Mandla & Rajghat.

MEQ recorders All the 11 MEQ recorders have been installed. MEQ recorders are now in working condition at 7 stations. Action is also taken by Project Authority to make functional the remaining MEQ recorders.

Anderson Seismometers Out of 6 nos. of Wood Anderson Seismometers supply for 4 was received and 2 sets have been installed already at Narmada Nagar, Khandwa during 1999. These however required recalibration by the IMD.

Seismic Instrument Complete instruments including digital data acquisition and analysis system was installed at 10 locations during 1998-99 which includes short term seismometer, long period seismometer, Strong Motion Accelerograph.

Presently only Narmada Nagar and Khandwa observatory station are fully functional.

6. HEALTH ASPECT:

The Indira Sagar Project would create a 913 km² reservoir, a main canal of 332 km. and 1,820 km of distributaries. Surveys have been conducted in the Indira Sagar impact areas to investigate existing levels of health and to gather information on specific diseases.



STUDIES AND FINDINGS :

Three specific diseases namely Malaria, Schistosomiasis, and Filaria were studied. Other diseases investigated were leishmaniasis and scabies and other water-washed diseases. The geographical reconnaissance study, to identify the potential breeding sites of malaria vector, is being explored.

Pre-impoundment and post-impoundment Limnological studies carried out by three Universities take care of water quality aspect. These studies have been completed and the final report is submitted.

Further regarding preventive aspects, Department of Preventive and Social Medicine, Gandhi Medical College, Bhopal carried out epidemiological studies.

J.L. University which carried out initial studies for the planning commission on the aspects related with the use of insecticides and pesticides in the command through their research station at Khandwa have been entrusted with studies on impacts of application of insecticides etc.

According to the above studies, key findings included the following :

- Malaria is increasing in Khandwa and Khargone Districts surrounding the Indira Sagar Dam site.
- Cholera and gastroenteritis are endemic in Indore, Dhar and Jhabua Districts for more than seven months each year.
- Other common diseases are typhoid and dengue fever, although they are not often found in the project area.
- Filariasis is endemic to at least eight districts of MP, including Chindwara, adjacent to the Narmada Sagar Site. The vector mosquito (mainly *Culex fatigans* responsible for this parasitic diseases proliferates in dirty water in ponded areas and artificial containers and also to a lesser extent in stagnant irrigation tributaries and lakes.
- Little or no autochthonous leishmaniasis exists at present in MP. This disease is not water related since it is spread by sand flies that do not need water to breed. However, according to NICD, Delhi, leishmaniasis flared up following the construction of the Rajasthan canal.
- Guinea worm disease (dracontiasis) affects 3,000 villages in MP. This disease is caused by a nematode worm and the vector for its transmission is Cyclops, the fresh water fleas.

SUGGESTED STRATEGIES :

Health problems related to these causes are expected to improve when the projects are implemented. The incidence of water-washed diseases should be reduced by the increased availability of water. The point has also been made that large water supply and irrigation projects often cause problems related to the expanded water environment. Plans have been prepared in both project areas to increase public health-related facilities, staffing, and services during project implementation. The incidence of water borne diseases in the Narmada Valley, as elsewhere in MP, is constantly being monitored by GOMP's Directorate of Health Services (DHS).

Means to control schistosomiasis include physical, chemical, and biological mitigation measures. Physical mitigation measures include draining area with standing water, clearing vegetation from water channels and banks, utilising flushing flows, and manipulating water levels. The primary chemical mitigation measure is the use of molluscicides. Biological mitigation measures would include the use of predator species that would eat the secondary host snails. Schistosomiasis is to be kept out of the project area through vigilant monitoring and the prompt use of eradication measures when needed

Malaria is another disease that requires monitoring and control actions in the project areas. It was found that most of the existing diseases in the project area were related to prevailing socio-economic levels, mainly hygiene. Since the Anopheline mosquito vector has the potential to proliferate in the reservoir, the large draw down strip, and the canals and drains, preventive measures are to be in place to keep the mosquitoes in check. Some experimental resistance of adult mosquitoes to commonly used biocides has been noted under laboratory conditions. Thus research to maintain effective biocides will have to be continued on long term basis. Land levelling and land filling operations as well as appropriate vegetation clearing are being integrated. Control measures will include larvae-eating fish in water bodies, mosquito-inhibiting plants, and clearing of vegetation and other actions to destroy breeding sites.

ACTION PLAN :

NVDA has submitted the revised plan costing Rs.278.95 lacs for the preventive and curative aspects of health. The plan includes establishment a 30 bed hospital at Punasa. Other facilities includes the following :

- Mobile unit
- PHC 3 nos., equipped with 5 beds each, equipments, vehicles, staff etc.
- 2 civil dispensaries with labs
- 24 sub-health centres with equipments etc.

Action Plan includes continued investigations of the Central and Western Zone of Narmada at selected sites for the identified parameters. In addition, plan proposes biological characteristic study, microphytes, phytoplankton, zooplanktons, micro invertebrates, biomass etc. The proposal includes among others continued limnological studies, ecological studies. A note on health aspects of NSP prepared by NVDA was examined in the Ministry of E&F and comments were sent for modifying the report. NVDA has submitted the revised plan costing Rs.748.73 lacs for the preventive and curative aspects of health. Regarding preventive aspects, a MOU has been signed with the Department of Preventive and Social Medicine, Gandhi Medical College, Bhopal. Six interim reports received. For studies on health aspect in project impact areas of SSP and NSP, work is proposed through a cell of monitoring and evaluation under the Directorate of Health Services, Bhopal. The approved plan is being implemented.

Pre-impoundment and post-impoundment Limnological studies carried out by three Universities will take care of water quality aspect. These studies have been completed and the final report is submitted. Action plan approved by NVDA is under scrutiny of NCA.

IMPLEMENTATION :

The above Action Plan is under implementation. For long term hydro-biological monitoring, one well equipped laboratory has been established at Barwani.

Progress on work on Health services being created in ISP.

Sl. No.	Rehabilitation sites	Provision	Status
1.	Bedhani	Ayurvedic Hospital	Work in progress
2.	Anjana Khurd	Ayurvedic Hospital	Work in progress
3.	Chainpur	Ayurvedic Hospital	Work in progress
4.	Saralya	Sub-Health Centre	Work completed
5.	Narmada Nagar	Medical Unit with 20 bedded Hospital for workforce of ISP	Functioning at Punasa Dam site.

7. ARCHAEOLOGICAL & ANTHROPOLOGICAL SURVEY:**Archaeological Aspects**

Investigations of the basin revealed that valley was rich in archaeological belongings:

- ♦ Paleolithic sites are to be found in Nemavar, Kannod, Punjapura, Chirapahad, Sitabau, Dhardi, Moretakka, Maheshwar, Kasrawad, Sahastradhara, Khalghat, Dharampuri, Kalibaodi, Manawar, Budada, Barwani, and Kukshi.
- ♦ Mesolithic sites are to be found all over the valley.
- ♦ Cholelithic sites are to be found in Chikalda, Khedi, Badada, Mohipura, Hathnawar, Piplada, Khalghat, Maheshwar, Nawada, Todi, Kapila Sangam, Veda Sangam and Mardana.
- ♦ Rock-cut caves and sculptures are to be found at Piploda, Dharampuri, Bijagadha, Bagha and Mandogarh.

None of the archaeological sites mentioned above, that have special significance, would fall within the area of submergence of the projects.

SURVEYS :

A survey of the 254 villages for identification of the archaeological monuments falling within the submergence area was carried out by the State Department of Archaeology and Museum, Bhopal.

Archaeological Survey of India has also completed the survey for 167 villages for centrally protected monuments for identification of the monuments of significance. Implementation of the Action Plan is already initiated.

ACTION PLAN :**State Protected Monuments :**

The State Department has submitted an Action Plan for relocation of monuments of archaeological significance earlier in 1993. According to this, the archaeological mound at village Khedinema is excavated.

Later on GOMP has revised its plan as Action Plan 1997. The plan was again revised in 2002 and in the revised action plan of 2002, Shiv Mandir, Khudiyamal previously proposed for relocation has not been included for relocation due to its deterioration. Similarly as decided by the Govt., maintenance of Singaji Samadhi has been handed over to NHDC. Whereas, Tomb of Abdul Hasan, Handia Distt. Harda being a new work, not included in the relocation plan. To delete above monuments from the list of relocation, Shiv Mandir, Sarswati Kund, Harsud has been included in the list. Therefore, in revised action plan 2002, 8 monuments have been selected for relocation of which Shiv Mandir, Dharikotla and Chatri Ghisor have already been relocated. The current status of monuments is as below.

- 254 villages surveyed for identification of Archaeological monuments coming under submergence.
- 8 Nos. of monuments have been identified which require relocation/ protection.
- 153 statues have already been collected and preserved at Museum at Dewas, Hoshangabad and Khandwa.
- Shiv Mandir Dharikotla has been relocated to Sarlaya R&R site.
- **Relocation / Protection**

Sl. No	Particulars				Status
	Name of mounment	Village / Tehsil	Distt.	RL in m	
1.	Shiv Mandir, Dharikotla	Harsud	Khandwa	229.500	Relocation completed.
2.	Shiv Mandir, Punghat	Harsud	Khandwa	240.315	Land allotment awaited.
3.	Shiv Mandir, Badkeshwar	Harsud	Khandwa	263.805	Pre-relocation work completed. Land allotment awaited.
4.	Shiv Mandir (Durga Mandir), Chandel	Khandwa	Khandwa	254.917	Land allotment awaited
5.	Chhatri Ghisor	Harsud	Khandwa	239.300	Relocation work completed.
6.	Shiv Mandir, Saraswati Kund,	Harsud	Khandwa	--	New proposal
7.	Ridheshwar Mandir, Handia	Harda	Hoshangabad	273.380	Estimate ready. Action is being taken for construction of retaining wall.
8.	Rock-cut statues	Deyat	Dewas	267.830	Estimates are under preparation.

▪ **Excavation**

Sl. No.	Particulars of archaeological mounds	Progress
1.	Mound at village Bijalpur Khurd, distt. Khandwa	Nil
2.	Mound at village Chhalpakala, distt. Khandwa	
3.	Mount at village Gajanpur, distt. Dewas	
4.	Mound at village Navalpura, distt. Khandwa	
5.	Mound at village Gannor, distt. Khandwa	

Centrally Protected Monuments :

Archaeological Survey of India have prepared a plan for protection of monuments coming under the submergence of Narmada Sagar Complex area. According to this plan, in the area of submergence of Indira Sagar Project, only lower bastion in north of the Joga Fort is likely to be affected by scour action of water.

IMPLEMENTATION :

Plan of Archaeological Survey of India

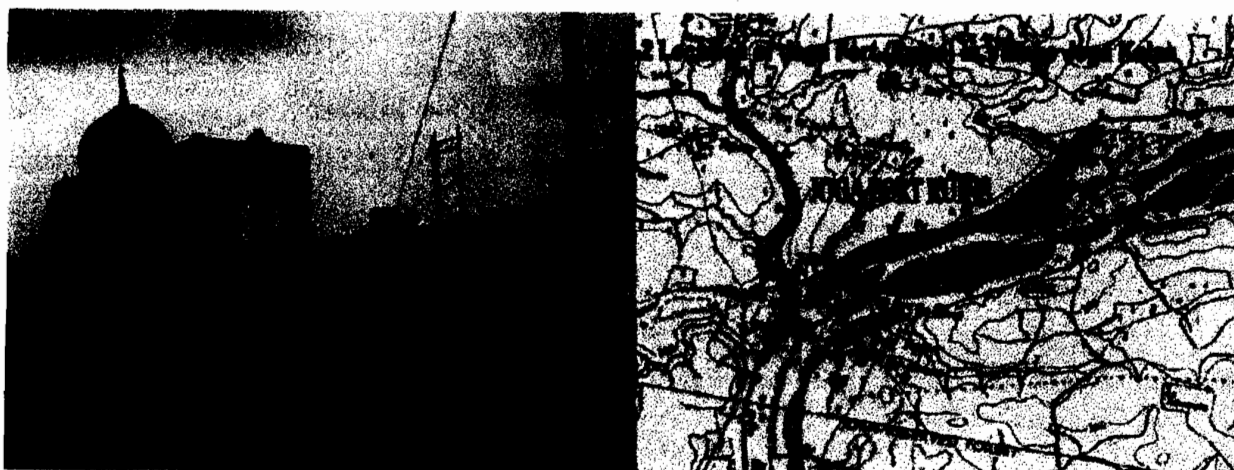
Environment Sub-group constituted a committee to look into the plans to protect the Joga Fort. The committee met twice and undertook field visits and observed as follows :

R.L. of plinth of Joga Fort	+ 274.80 M
R.L. of Top of Joga Fort	+ 284.75 M
R.L. of Main Gate of Joga Fort	+271.035 M
R.L. of Top of well	+ 261.39 M
F.R.L. of ISP	+ 262.10 M
Observed Highest Flood Level (54,000 cumecs)	+ 264.27 M
HFL corresponding to 1 in 100 year Flood (62,500 cumecs)	+ 265.52 M
HFL corresponding to 1 in 100 year Flood (83,366 cumecs)	+ 266.029M
BWL corresponding to 1 in 100 year Flood	+265.00 M
BWL corresponding to 1 in 100 year Flood	+ 266.637M
Water Level (20.7.98)	+ 252.00 M
River Bank	+ 259.14 M
River Bed	+ 248.00 M

From the above data, it was inferred that the, well situated in the midst of north bastion will be fully submerged at FRL + 262.10 M. However, this will remain submerged for 2-3 months during monsoon when reservoir might be at FRL.

As far as backwater effect is concerned, the temporary rise due to backwater will be about 0.60 M near well, above HFL. Archaeological Survey of India has prepared an estimate of Rs.1.50 crores for construction of a wall to protect the in-take well. The ASI is planning the work with the help of CPWD.

About 134 statues were collected from districts Hoshangabad, Dewas and Khandwa and are displayed in the museums there. Photo shown below is of the Shiv Mandir, Dharikotla , District Khandwa which has been completely relocated



Anthropological aspects:

The Narmada Valley can be divided into three physiographic units (1) Western Vindhyas (2) Narmada through West and South and (3) Western Satpuras. Some Indologists place the Narmada-Chambal civilisation of Malwa as a contemporary of Indus civilisation. Navada Toli is a site contemporary to Harappa where evidence of early farming villages were discovered. Findings of a hominoid skull from Hathnora indicated the possibilities of the existence of human bio-cultural remains within the basin.

SURVEYS/STUDIES :

A series of studies have been conducted for salvaging the Narmada Basin from anthropological point of view which includes Paleo-Anthropological, human ecological, ethnography and pre-historic aspects. Besides studies on contemporary culture and collection of ethnographic specimens were collected and leading anthropologists were associated.

Rashtriya Manav Sanghralaya has constituted a working group for the retrieval of bio-cultural material in Narmada Basin this includes studies on taphonomy and paleo ecology, excavation of upper paleo lithic sites, collection and documentation of material culture objects from tribal, artisan and folk culture.

- Survey of tribal art and handicraft entrusted to *M.P. Adivasi Kala Parishad* is completed and report is available. The report gathered details from the 24 submergence villages and identified 75 sculptors and eight groups of exhibitionists besides documentation of identified important sculptures. Cultural aspects of the tribes including marriages and their lifestyle were collected.
- The Bhil Track, a study of displaced tribal, sponsored by NVDA, of the 17 submergence villages of SSP compiled the information on their status, layout of their resettlements, construction of houses, social structure, division into clans, economic structure, in-depth, dependence on forests for living, inter-community relationship, leadership pattern, women's role, religion, superstitions and festivals.
- Besides Anthropological Survey of India has covered these studies under its own project called "People of India". The report is in 61 volumes out of which 7 volumes are under final editing.
- A Narmada salvage plan is also launched by Anthropological Survey of India.

ACTION PLAN :

Archaeological Survey of India is carrying out excavation at selected sites. Reports are available.

State Department has reviewed the Action Plan and has proposed 5 excavation sites as shown in table -4, in addition to the earlier proposal of collection of sculptures and excavation at Khedinama.

Table-4 Showing status of works at excavation sites

EXCAVATION SITES	STATUS
Bijalpur Khurd, Khandwa	Progress is nil
Chhalpa Kala, Khandwa	
Gajanpur, Dewas	
Nabalpura, Khandwa	
Gannaur, Khandwa	

Excavation works at Khedinama was completed earlier during 1993-94. Report is being published.

IMPLEMENTATION :

Excavation of the early historic mound in village Khedinama in Hoshangabad district is completed. Ancient tools and artifacts were found and report is available in NCA.

The entire area was scanned by the Anthropological Survey of India under Narmada Salvage Plan and some ancient tools have been found.

CLEARANCES ACCORDED TO SSP & ISP
CLEARANCE FROM ENVIRONMENTAL ANGLE TO SSP & ISP BY MOEF

GOVT. OF INDIA, MINISTRY OF ENVIRONMENT & FORESTS.
NEW DELHI

No. 3-87/80-IA

Dated 24 June, 1987

OFFICE MEMORANDUM

Subject : Approval of Narmada Sagar Project, Madhya Pradesh and Sardar Sarovar Project, Gujarat from environmental angle.

The Narmada Sagar Project, Madhya Pradesh and Sardar Sarovar Project, Gujarat have been referred to this Department for environmental clearance.

2. On the basis of examination of details of these projects by the Environmental Appraisal Committee for River Valley Projects and discussions with the Central and State authorities the following details were sought from the project authorities:

- (i) Rehabilitation Master Plan.
- (ii) Phased Catchment Area Treatment Scheme.
- (iii) Compensatory Afforestation Plan.
- (iv) Command Area Development.
- (v) Survey of Flora and Fauna.
- (vi) Carrying Capacity of surrounding area.
- (vii) Seismicity; and
- (viii) Health Aspects.

3. Field surveys are yet to be completed. The first set of Information has been made available and complete details have been assured to be furnished by 1989.

4. The NCA has been expanded and its terms of reference have been amplified to ensure that environmental safeguard measures are planned and implemented in depth and in its pace of implementation part passu with the progress of work on the project.

5. After taking into account all relevant facts the Narmada Sagar Project, Madhya Pradesh and the Sardar Sarovar Project, Gujarat are hereby accorded environmental clearance subject to the following conditions :

- i. The Narmada Control Authority (NCA) will ensure that environmental safeguard measures are planned and implemented pari passu with progress of work on projects.
- ii. The detailed surveys/studies assured will be carried out as per the schedule proposed and details made available to the Department for assessment.
- iii. The Catchment Area Treatment programme and the Rehabilitation plans be so drawn as to be completed ahead of reservoir filling.
- iv. The Department should be kept informed of progress on various works periodically.

6. Approval under Forest (Conservation) Act, 1980 for diversion of forest land will be obtained separately. No work should be initiated on forest area prior to this approval.

7. Approval from environmental and forestry angles for any other Irrigation, power or development projects in the Narmada Basin should be obtained separately.

Sd/-
(S. MAUDGAL)
 Director (IA)

The Secretary,
 Ministry of Water Resources,
 New Delhi.

FOREST CLEARANCE (8.9.87)

No. D-372/83-FC
GOVT. OF INDIA, MINISTRY OF ENVIRONMENT & FORESTS.
NEW DELHI

Dated 8TH September, 1987

To

1. The Secretary,
Agriculture Forest and
Cooperative Department,
Govt. of Gujarat,
Sachivalaya, Gandhinagar.
2. The Secretary,
Forest Deptt.,
Govt. of M.P.,
Bhopal.
3. The Secretary,
Revenue & Forest Department,
Govt. of Maharashtra,
Mantralaya, Bombay.

Sub: Diversion of 13385.45 ha (6488.54 ha in Maharashtra 4165.91 ha in Gujarat and 2731.00 ha in Madhya Pradesh) of Forest land in Dhule, Bharuch and Khargone district respectively for Sardar Sarovar Project.

Sir.

1. I am directed to refer to your letter Nos. (1) FLD-1282-78159-V-1 dated 17.2.83 (Gujarat) (2) 5/58/83/10/3 dated 31.8.84 (Madhya Pradesh) and (3) FLD. 1080/111531-11-F3 dated 8.9.83 (Maharashtra) on the above mentioned subject seeking prior approval of the Central Government under Section 2 of the Forest (Cons) Act. 1980 and to say that the proposal has been considered by the Advisory Committee constituted by the Central Government under Section 3 of the Forest (Cons) Act. 1980.

2. After careful consideration of the proposal, the Central Government hereby conveys its approval for diversion of 13385.45 ha of forest land for Sardar Sarovar Project as per details given below :

S.No.	State	Forest land to be diverted (ha)
1.	Gujarat	4165.91
2.	Madhya Pradesh	2731.00
3.	Maharashtra	6488.54

3. This approval is strictly subject to the following conditions :

- i) Legal status of the land will remain unchanged.
- ii) The full details of the non-forest lands for retaining compensatory afforestation with complete details viz. Khasara No, village etc. will be reported by the State Government before 30.9.87.
- iii) The non-forest areas available for rehabilitation of all the oustees will be reported by the State Governments or a proposal to the satisfaction of Govt. of India in this regard will be furnished by the State Governments before 30.11.87.
- iv) No work on the project in forest area will be commenced until and unless condition under (ii) & (iii) above are fulfilled.
- v) Since the project involves violation and also most of the non-forest areas for compensatory afforestation are away from the project area, the State Govts. will raised compensatory afforestation in double the degraded forest lands also in the project impact areas in addition to the afforestation on equivalent non-forest land. A scheme for this will be submitted by 30.11.87.

contd..../2

- vi) The State Governments will prepare by 30.11.87 a plan for the treatment of catchment areas failing which the Central Government will appoint a team for this purpose at the cost of the project for this purpose.
- vii) No Forest land will be utilised for the rehabilitation of oustees.
- viii) Tree felling will be permitted in submergence area only up to 4 M below FRL.
- ix) Tree planting will be done on either side of the canals, roads, forest area of the reservoir and in the wasteland/vacant land under the control of the Irrigation Department.
- x) Water will be supplied free of cost to the Forest Department for raising nursery and for irrigating forestry plantations in the command area.
- xi) In order that the construction labour & staff while working on the project in the forest area may not allow destruction to the forest area for meeting their fuel wood needed, the user agency will establish fuels depots and will provide suitable alternative domestic fuel such as fuel wood, coal, kerosene oil etc to them free of cost or at cost deducted from their salary and wages.

Yours faithfully,

Sd/

(R.S. Bisht)

Under Secretary to the Govt. of India.

No. 8-646-84-FC
Government of India
Ministry of Environment and Forest;
(Department of Environment, Forests and Wildlife),

Paryavaran Bhawan, CGO Complex,
Lodi Road, New Delhi - 110003.

Dated the 7th Oct. 1987.

To

The Secretary,
 Forest Department,
 Government of Madhya Pradesh,
 Bhopal.

Sub: Diversion of 41111.97 hectares of forest land in Khandwa, Dewas and Hoshangabad districts for the Narmada Sagar Multipurpose Project.

Sir,

I am directed to refer to your letter No.5/111/84/10/3 dated 15.10.1984 on the above mentioned subject seeking prior approval of Central Government under Section 2 of the Forest (Conservation), Act, 1980.

2. After careful consideration of the proposal, the Central Government hereby conveys its approval to diversion of 41,111.97 hectares of forest land in Khandwa, Dewas and Hoshangabad districts for the Narmada Sagar Multi-purpose Project as under :

Item No.	Purpose	Area (ha)
(1)	Submergence	40,332.00
(2)	Power House	50.00
(3)	Saddle Dam	37.26
(4)	Road	70.73
(5)	Colony, approach, road etc.	621.98 (already utilised before 1980)
Total :		41,111.97

3. The approval is subject to the following conditions :

- i) The State Government of Madhya Pradesh will intimate by 31st December, 1987, the complete details of equivalent non-forest land identified for compensatory plantation, preferably in project impact area.
- ii) The work of compensatory afforestation will be completed in five years time, depending upon the availability and selection of suitable area in the non forest /forest land, a detailed scheme will be prepared by the State Government showing year wise targets and expenditure, keeping in view the cost escalation on account of inflation. The project will release the amount for these annual plantation programme as per the scheme in the beginning of each financial year in the non voted fund to the Forest Department of the State Government. The State Government would ensure that these amounts would be in addition to the normal forestry budget.
- iii) Since the Project involves violation of Forest (conservation) Act, 1980, compensatory afforestation will be carried out over suitable degraded forest land double the diverted forest area in extent and in addition to the equivalent area in non-forest land. For this purpose, the area offered by the State Government vide their letter No. 5/III/84-10-3 dated 14.10.1986 will be accepted and compensatory afforestation raised at the cost of the project in this area.
- iv) The areas will be surveyed, demarcated and declared protected forests and placed under the control of the Forest Department for compensatory afforestation at the cost of the project. Areas not found suitable will be substituted by suitable area.

- v) The State Government will also intimate details of the non-forest land identified for rehabilitation of the oustees and draw up by 15th December 1987 a rehabilitation plan to the satisfaction of the Government of India.
- vi) No work on the project in forest area will commence unless conditions (i) & (v) above are fulfilled.
- vii) Under item (2) of paragraph 2 above only 50 hectares should be utilised for construction of the power house only. The proposed colony in the Power House area should be accommodated in the area of 621.98 hectares already utilised under item (5).
- viii) Sand quarry should be located in the submergence area. Therefore, the area of 72.50 hectares for sand quarries and 41.15 hectares for approach road for sand quarries is not being permitted for non-forest use.
- ix) For conservation and management of wildlife, a committee will be constituted by the State Government by 15th December, 1987 which will include a representative from the Government of India. The Committee will suggest the necessary steps to be taken and draw up a plan which will be implemented at the cost of the project.
- x) Forest clearance will be done only upto 4 M below FRL.
- xi) A plan for the treatment of the catchment area will be prepared by 15th December, 1987 and implemented at the cost of the project.
- xii) Tree planting will also be done on either side of canal road and foreshore of the reservoir and in the wasteland / vacant lands under the control of the Irrigation Department in the command area.
- xiii) Water should be supplied free of cost to the Forest Department for raising nursery and irrigated forest plantations in the command area.
- xiv) In order that the construction labour and staff while working on the project in the forest area may not cause destruction of forests for meeting their fuel wood needs, the Project Authorities will establish fuel wood depots, and will provide the fuel wood free of cost to the labourers.
- xv) Satisfactory fulfillment of the above conditions will be a deciding factor for the future proposals of the State Government for diversion of forest land under Forest (Conservation) Act, 1980

Yours faithfully,

Sd/-

(R.S. Bisht)

Under Secretary to the Government of India.

Copy to :

- 1) Chief Conservator of Forests, Govt. of Madhya Pradesh, Bhopal.
- 2) Sh. K.P. Nagaraju, Conservator of Forests (Central), Regional Office (Central Zone), Plot No.E-1/187, Arera Colony, Bhopal.
- 3) Guard File.
- 4) Ministry of Water Resources, Shram Shakti Bhawan, New Delhi.

(R.S. Bisht)

Under Secretary to the Govt. of India.

ANNEX - XXXVIII - (7)

नर्मदा घाटी विकास प्राधिकरण
नर्मदा भवन, भीषान

क्र०

/न्यायिका/पर्या/24/93/884/

भीषान, दि०

/ /2002

प्रति,

डॉ० श्रीमती । नलिनी शर्मा,

अधीक्षक

पर्यावरण एवं वन विभाग

पर्यावरण भवन, तीर्थीजी कॉम्प्लेक्स

नाथी रोड, नई दिल्ली ।

विषय:-

नर्मदा तानर एवं तरदार तरावर परियोजना के कारण त्वाकवपर
प्रभाव का अध्ययन बाबत ।

- - -

नर्मदा घाटी विकास प्राधिकरण द्वारा नाथी शिडीका कॉलेज, भीषान
पी० एच० एम० विभाग की विषयागत अध्ययन तैयार किया था । इसका अंतिम
प्रतिवेदन मुद्रांकन हेतु भेजा है । कृपया इसकी प्राप्ति तथा अभिमत है एक तत्पश्चात् में
अवगत कराने की व्यवस्था करें ताकि अध्ययनकर्ता तत्पश्चात् की अवगत देय राशि का
सुझाव दिया जा सके ।

तदुपरा:- उपरोक्तानुसार

१०६/-

उपाध्यक्ष

नर्मदा घाटी विकास प्राधिकरण, भीषान-3

सूचिका क्र०

423

/न्यायिका/पर्या/24/93/884/

दि० 11/6/2002

प्रतिनिधि:-

तदुपरा:- पर्यावरण एवं पुनर्वास, नर्मदा निपटण प्राधिकरण,
बी०पी०७७९, स्कीम ७४-सी, विषय नगर, तरदार की ओर
सुचनार्थ एवं आवश्यक कार्यवाही हेतु ।

तदुपरा:- उपरोक्तानुसार

उपाध्यक्ष


नर्मदा घाटी विकास प्राधिकरण, भीषान-3

-170

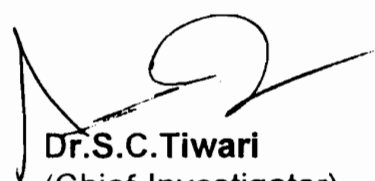
ACKNOWLEDGEMENT

We thankfully acknowledge the Narmada Valley Development Authority for rendering help at various stages during final report of study. We are thankful to **Dean Gandhi Medical College, Bhopal** for constant help in smooth conducting study.

We are thankful to the staff members of **preventive & social Medicine Department**, Interns posted in the Department, who participated in the survey work and completion of study.



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021

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SUMMARY

The final report is a compilation of all six phases of study. The cohort fixed in the earlier phases of the study for Pre and post impoundment areas were followed for epidemiological surveillance till the end of 6th phase of study.

DEMOGRAPHIC PROFILE

The age and sex composition of the population surveyed in all phases (six phases) is same except some minor changes in the percentages of population in last three phases i.e. 4th, 5th and 6th phases in different age groups. In both areas majority of families consisted of five to six members in all phases of study.

SOCIO-ECONOMIC STATUS

In both study areas majority of population belonged to Hindu religion. In both areas Nuclear family were constituting 69% of total families the overall literacy rate in pre and post impoundment area were more than 40%. Majority of males was engaged in farming and labour work in these areas. According to prasad's socio-economic classification maximum number of families in both areas were belonging to IV and V social class.

MORBIDITY PROFILE

In every phase of study overall morbidity rate within a fortnight and six months of survey was higher in post impoundment area as compared to pre impoundment area. In all phases of study disease specific rates were highest for vector born disease, respiratory infection and skin infection in post-impoundment area as compared to pre impoundment area. In both areas higher incidence of morbidity was observed at the extremes of ages i.e. in 0-4 years of children and above 60 years in all six phases. However in these extreme age groups the risk in age specific morbidity rate in pre-impoundment area over post impoundment area can not be termed as a significant finding.

Age and sex specific morbidity rates were also calculated for different groups of illnesses in pre-and post impoundment area. It was observed that there is variation in the morbidity rates of different age groups between males and females with a higher rate for males and females in post impoundment area as compared to pre-impoundment area for all six phases.

After examining the morbidity rates according to diseases and sex, slight difference was noticed in sex specific morbidity rates in both areas. This difference was visible for vector born and water borne and respiratory infection in post impoundment area. Incidence of Gastrointestinal diseases was slightly higher in males than females in post impoundment area all six phases.

Regarding overall prevalence of chronic diseases in all six phases was higher in post impoundment area except in 2nd phase of study. Prevalence of Tuberculosis, Cataract and Asthma in all phases were on higher side in post impoundment as compared to pre impoundment area but morbidity like chronic malaria, poliomyelitis in IV, V and VI phases have shown increased morbidity in post impoundment area. Obviously the prevalence of chronic diseases in elderly age groups i.e. above 61 + were always having highest morbidity rate as compared to other lower age groups. In all phases of study the nutritional status of children in the post impoundment area was better than pre impoundment area but morbidity in children in post impoundment area were always higher in post impoundment area as compared to pre impoundment area. Up to 2nd phase the immunization status in children below six years were slightly better than pre impoundment area but from 3rd to VIth phase immunization status in post impoundment area were slightly less than pre impoundment area.

The source of treatment like in rural area is similar in this study also where most of the families under study in pre and post impoundment area are being treated by private agencies.

Home deliveries are again common practice in the study area and these deliveries are conducted mostly by untrained dais.

2.1.1

The data on mortality did not show any variation between pre and post impoundment area therefore no further mortality statistics could be collected after IIIrd phase.

A significant finding in post impoundment area is detection of 3 cases found to be positive for microfilaria. A detailed investigation may yield more positive cases of microfilaria near Tawa Dam.

On comparing the current morbidity of all six phases with the morbidity profile of area prior to dam construction it was revealed that illness are almostly contributed by arthropod and water born diseases. Respiratory diseases also contribute to the illness that maybe attributed due to dampness in the environment.

The findings in the final report of six phases of study are applicable in Sardar Sarovar area also.

ANNEX - XXXVIII -(8)**S. S.P. : CATCHMENT AREA TREATMENT VIS A VIS IMPOUNDMENT AT LEVELS**

	S.No.	Subwatershed Code	Gross Area (Action plan)	Treatable Area as per MICRO-WATERSHED Planning	Vicinity Targets	Progress By NVDA by Dec 2002	Progress by Other agencies	Total works	Balance works	works completed
GUJARAT										
Sub-watershed	1-15		29157	29157	29157	29157	0	29157	0	100.00%
MAHARASHTRA										
Sub-watershed	16-32		24298	23294	23294	23294	0	23294	0	100.00%
MADHYA PRADESH										
Sub-watershed	33	Nb1j	362	595	595	595		595	0	
	34	Nb1k	1419	1845	1845	1795	50	1845	0	
	35	Nb1m	2580	2717	2717	2667	50	2717	0	
	36	Nb1n	3790	3234	3234	3234		3234	0	
	37	Nb1p	4405	4464	4464	4339	125	4464	0	
	38	Nb1q	2444	2910	2910	2910		2910	0	
	39	Nb1r	2626	3026	3026	2936	90	3026	0	
	40	Nb1s	2550	2560	2560	2292	268	2560	0	
	41	Nb2a	3870	2552	2552	1924	628	2552	0	
	42	Nb3a	3618	2075	2075	2035	40	2075	0	
	43	Nc1a	2939	2901	2901	2901		2901	0	
	44	Nc1b	1916	1814	1814	1664	150	1814	0	
	45	Na8b	3099	1875	1875	1875		1875	0	
	46	Na8b	1497	1490	1490	1490		1490	0	
	47	Na8c	2660	2415	2415	2415		2415	0	
	48	Na8d	827	825	825	825		825	0	
Upto 100m RL			40602	37298	37298	35897	1401	37298	0	100.00%
	49	Nb2c	5776	6100	6100	4604	975	5579	521	
	50	Nb2d	4128	3525	3525	758	465	1223	2302	
	51	Nb2b	2743	1881	1881	1173	250	1423	458	
	52	Nb3c	4479	4588	4588	3690		3690	898	
	53	Nb3f	3464	1910	1910	895	310	1205	705	
	54	Nb3j	4226	1667	1667	1030		1030	637	
	55	Nb3g	6497	5135	5135	4153		4153	982	
	56	Nb3b	2670	2086	2086	2086		2086	0	
	57	Nc1c	4083	3806	3806	3790	100	3890	0	
	58	Nc1f	5588	3032	3032	2972	90	3062	0	
	59	Nc1d	1838	1998	1998	1772		1772	226	
	60	Nd1b	3605	4486	4486	3764		3764	722	
	61	Nd1d	4599	3414	3414	3617		3617	0	
	62	Nc1g	3536	1648	1648	2125		2125	0	
	63	Nc2a	4161	3124	3124	2626		2626	498	
	64	Nc4a	2127	1944	1944	1339		1339	805	
	65	Nc6a	2080	603	603	6		6	597	
Between 100m & 110m RL			65600	50947	50947	40400	2190	42590	9181	82.04%
Upto 110m RL			106202	88245	88245	76297	3591	79888	9181	89.62%
	66	Nc6d	906	2432	2432	2128		2128	304	
	67	Nc6m	1923	1135	1135	1118		1118	17	
	68	Nd7d	1700	2213	2213	2213		2213	0	
	69	Nc7y	3683	2925	2925	2427		2427	498	
	70	Nf2a	1500	1488	1488	1488		1488	0	
	71	Ng1z	2885	3670	3670	3670		3670	0	
	72	Nf2j	3202	3683	3683	3683		3683	0	
	73	Ng5a	1082	938	938	938		938	0	
	74	Nf2k	2642	2631	2631	3263		3263	0	
Between 110 m & FRL			19623	21115	21115	20928	0	20928	819	
Upto FRL in M.P. only			125725	109360	109360	97225	3591	100816	9970	90.88%
Total			145825	109360	109360	97225	3591	153297	9970	

Village / Comptt No	Area in Ha up to FRL	Area up to 4m below the FRL	Area already submerged by raising the dam height to 90 m	Progress upto 1995- 96 vide letter dtd 6.6.2001fro m CF Dhule	Balance area left after raising the dam height to 90m	Maximum possible area in a village between 90m & 100m RL left for felling	Area Prposed for felling by GOM as between 90m & 100m RL	Balance area left after raising the dam height to 100m	Maximum possible area in a village between RL 100& 110m left for felling	Area in Ha proposed for felling by GOM between 100 & 110m RL
1	2	3	4	5	6	7	8	9	10	11
Details of AkkalKuan Talluk. mewasi forest division										
1 Manibeli	312	279.6	80.48	0.4	198.72	62.13	62.13	136.59	64.76	64.76
2 Dhankhedi	125.11	117.69	50.76	109.9	7.79	7.79	0	0	0	0
3 Chimalkhe	122.9	112.83	45.2	103	9.83	9.83	0	0	0	0
4 Sinduri	148.87	130.73	35.22	140.47	0	0	0	0	0	0
5 Gaman	54.81	48.19	27.44	54.4	0	0	0	0	0	0
6 Bamani	85.1	76.02	27.19		76.02	15.2	15.2	60.82	15.5	15.5
7 Danel	175.84	149.63	54.16	73.2	76.43	30.13	0	46.3	38.26	0
8 Mukhadi	186.39	175.68	56.76	161.05	14.63	14.63	0	0	0	0
9 Mandwa	11.02	7.68		11.02				0		0
10 Jangathi	17.96	12.96	3.17		12.96	2.07	2.07	10.89	2.36	2.36
11 Arathi	4.8				0			0		
12 Kukadipadar					0			0		
Total	1244.8	1111	380.38	653.44	396.38	141.78	79.4	254.6	120.88	82.62

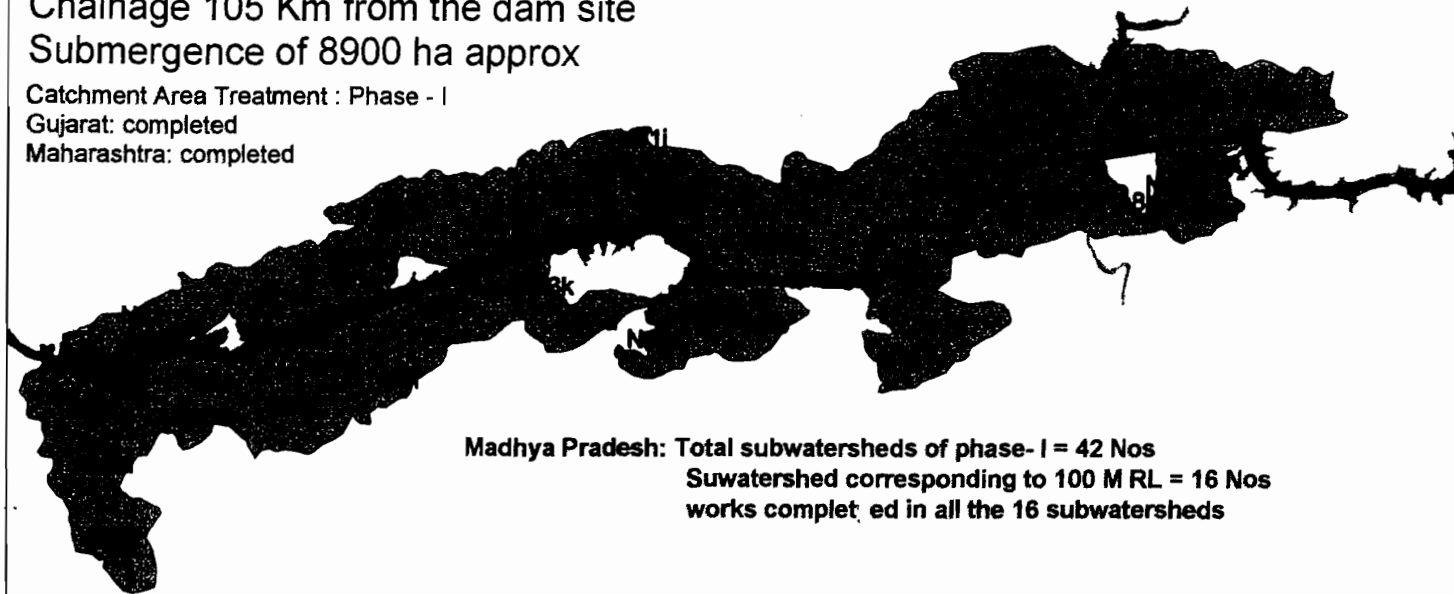
ANNEX – XXXVIII –(10)

Sardar Sarovar Project: Madhya Pradesh :Felling of trees from the forest area likely to be submerged at FRL									
	Village/Com ptt No	Area In Ha	No of tress above 20 Cm Girth, Estimate sof SFRI,1991	Area completed	No. of trees felled actual In 2001	No. of trees per ha. 1991	No. of trees per ha. 2001	As per NVDA Completi on %	
Details of Jhabua Forest Division									
1	725	23.2	207	23.2	0	9	0	100%	
2	727	24	335	24	0	14	0	100%	
3	728	6.4	366	6.4	0	57	0	100%	
4	729	7.6	575	7.6	0	76	0	100%	
5	730	6.8	586	6.8	0	86	0	100%	
6	731	13.6	1176	13.6	0	86	0	100%	
7	734	50.4	1102	50.4	0	22	0	100%	
8	735	11.6	660	11.6	0	57	0	100%	
9	747	32.8	1119	32.8	0	34	0	100%	
10	748	5.6	621	0		111		0%	
11	760	1.2	774	0		645		0%	
12	761	8	915	8	63	114	8	100%	
13	762	2	408	2	59	204	30	100%	
14	769	4.8	512	4.8	319	107	66	100%	
15	770	35	990	35	76	28	2	100%	
16	787	55.6	1915	0		34		0%	
17	788	120	5760	0		48		0%	
18	795	6.8	1738	6.8	360	256	53	100%	
19	798	0.8	122	0		153		0%	
20	799	52.4	5963	0		114		0%	
21	800	0.4	138	0		345		0%	
22	801	119	9052	119	825	76	7	100%	
23	802	91.8	2859	91.8	4028	31	44	100%	
24	803	205.2	6378	205.2	12907	31	63	100%	
25	804	7.6	924	7.6	556	122	73	100%	
26	805	81.6	4236	81.6	1600	52	20	100%	
27	849	20.8	372	20.8	0	18	0	100%	
	Total	995	49803	759	19916	108	18	76%	
Details of Dhar Forest Division									
28	593	57.46	774	57.46	0	13	0	100%	
29	594	30.351	258	30.351	0	9	0	100%	
30	595	9.712	162	9.712	0	17	0	100%	
31	598	29.137	76	29.137	0	3	0	100%	
32	602	51.8	59	51.8	0	1	0	100%	
33	603	51.85	67	51.85	0	1	0	100%	
34	617	32.375	39	32.375	0	1	0	100%	
35	618	45.325	551	45.325	0	12	0	100%	
36	619	16.185	366	16.185	0	23	0	100%	
37	620	38.85	495	38.85	0	13	0	100%	
38	622	71.225	31943	71.225	0	448	0	100%	
39	626	3.666	9695	3.666	0	2645	0	100%	
40	627	38.85	13577	38.85	0	349	0	100%	
41	628	61.506	10641	61.506	0	173	0	100%	
42	629	3.666	13720	3.666	0	3742	0	100%	
	Total	541.958	82423	541.958	0	497	0	100%	
Details of Barwani Forest Division									
43	Kotbandni	175	6789	175	2954.2	39	17	100%	
44	Bhadal	200	3635	200	2954.2	18	15	100%	
45	Bhamta (Semi	250	4207	250	2954.2	17	12	100%	
46	Tuwarkheda	259.649	4895	259.649	2954.2	19	11	100%	
47	Kuli	310.15	4125	310.15	2954.2	13	10	100%	
48	Total	1194.799	23651	1194.799	14771	21	13	100%	
Total for M.P.		2732	155877	2495.757	34687	57	14	91%	

178

Sardar Sarovar Project: Dam at 100M RL (proposed)
 Chainage 105 Km from the dam site
 Submergence of 8900 ha approx

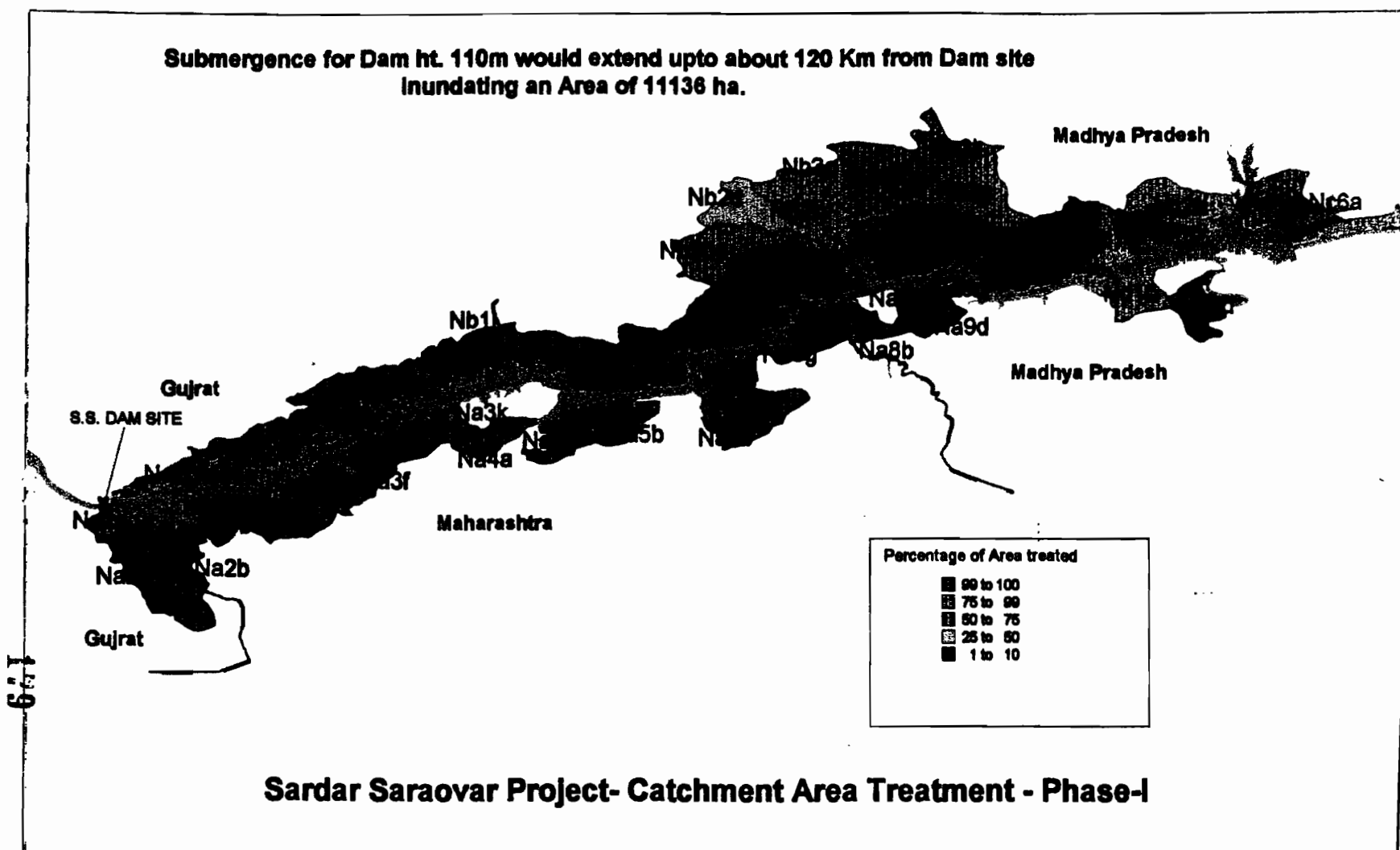
Catchment Area Treatment : Phase - I
 Gujarat: completed
 Maharashtra: completed

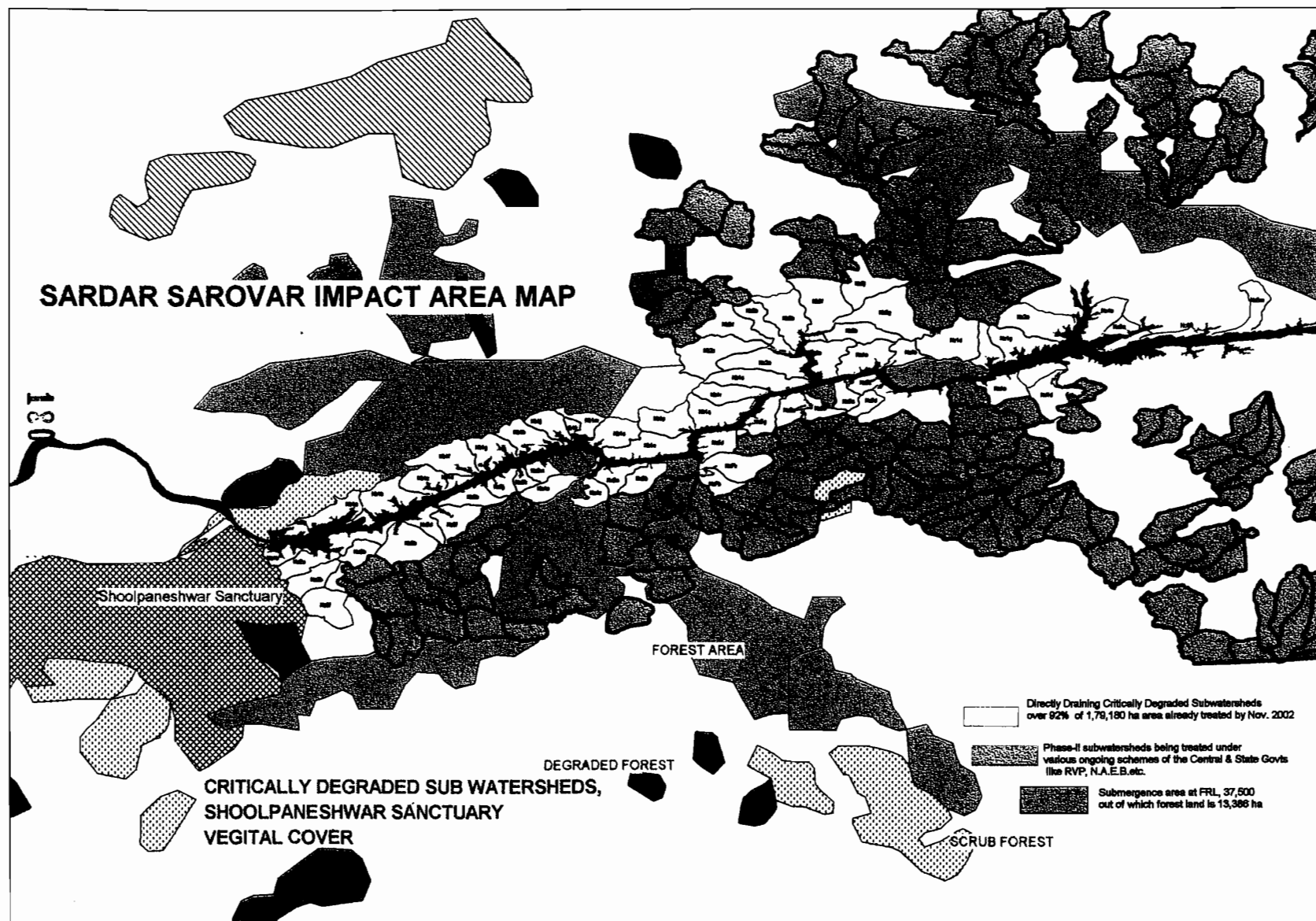


Madhya Pradesh: Total subwatersheds of phase-I = 42 Nos
 Suwatershed corresponding to 100 M RL = 16 Nos
 works complet ed in all the 16 subwatersheds

Subwatershed
Ns1a
Ns1b
Ns2a
Ns2f
Ns2g
Ns3a
Ns3b
Ns3c
Ns3d
Ns3f
Ns3h
Ns3j
Ns3k
Ns4a
Ns4c
Ns5a
Ns5b
Ns5d
Ns5g
Ns7b
Ns7k
Ns8a
Ns8b
Ns8c
Ns8d
Ns8e
Ns8f
Ns8g
Ns8h
Ns8i
Ns8j
Ns8k
Ns8l
Ns8m
Ns8n
Ns8p
Ns8q
Ns8r
Ns8s
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Ns8x
Ns8y
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Ns9c
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Ns10p
Ns10q
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ANNEX - XXXVIII-(11)





Sardar Sarovar Narmada Nigam Ltd.

ANNEX - XXXVIII -(14)

(A Wholly Owned Company of Govt. of Gujarat)



Block No. 12, 1st Floor, New Sachivalaya Complex,
Gandhinagar-382010. Gujarat, India.
Phone : 23530-37

Fax : 02712-23056.

SSNNL/Env/Status report/667
October 9, 2002

To,
Dr. Pawan Kumar
Director (Env)
Narmada Control Authority
Indore

Sub: Status report on Environment Management for quarter ending 30th June-
2002 for SSP

Ref: Your office letter no ENV-2(1)/ 2002/ 4410 dated 16.9.2002

Sir,

Enclosed, please find herewith a statement for necessary updation of the status on
environmental components for quarter ending 30th June- 2002 for SSP as sought from this
office, vide your letter under reference.

Thanking you,

Encl: As above

Yours sincerely

(R.V. Asari)
CCF, SSNNL
Gandhinagar

Plantation Activities (pg. 33 of status report – March 2002)**(a) Plantation along Canal Banks**

The total potential of canal bank plantations is estimated to be 15000 ha. The plantation programme was launched from the year 1990-91. Plantations on 2900 ha have already been established till monsoon of 2001.

B) Fisheries (Aquatic): (pg. 56 under “On-going fisheries activities in Sardar Sarovar” of status report – March 2002)

Till March 2002 State Fisheries Department and other fisheries development agencies have stocked 398.09 lacs fingerlings/ yearlings in the main reservoir as well as dykes as detailed below

Year	Fingerling (lacs)	Stocked in	
1990-91	2.05	Dyke 3 / 4	
1991-92	2.38		
1992-93	1.69		
Year (93-94) onwards	Fingerlings	Yearlings	Stocked in
Upto 1999-00	358.95	17.28	Reservoir & Dykes
2000-01	Nil	2.93	Reservoir
2001-02	10.55	Nil	Reservoir
	2.26	Nil	Dyke
TOTAL (90-91 to 01-02)	377.88	20.21	

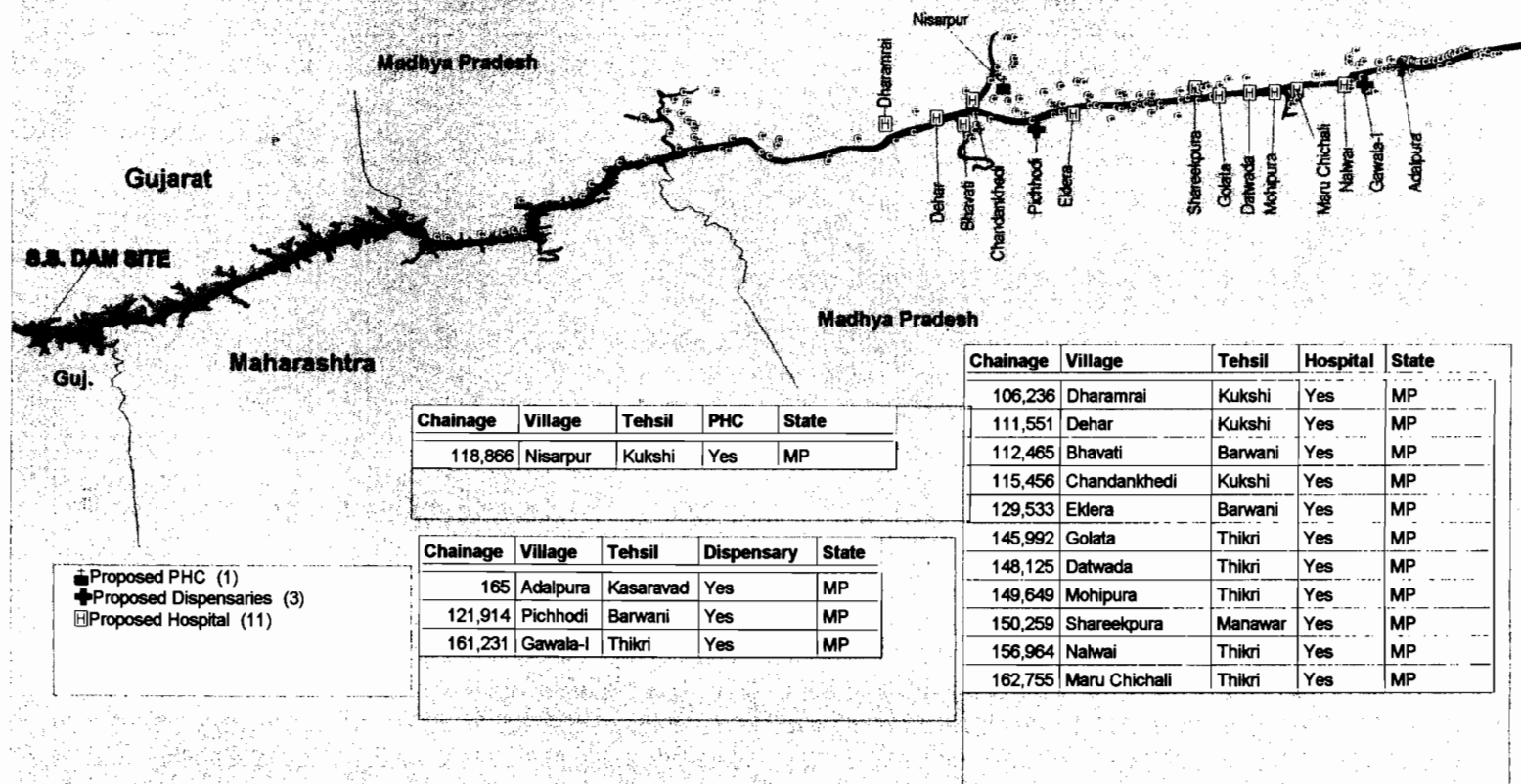
Villages where Mounds / Monuments are located

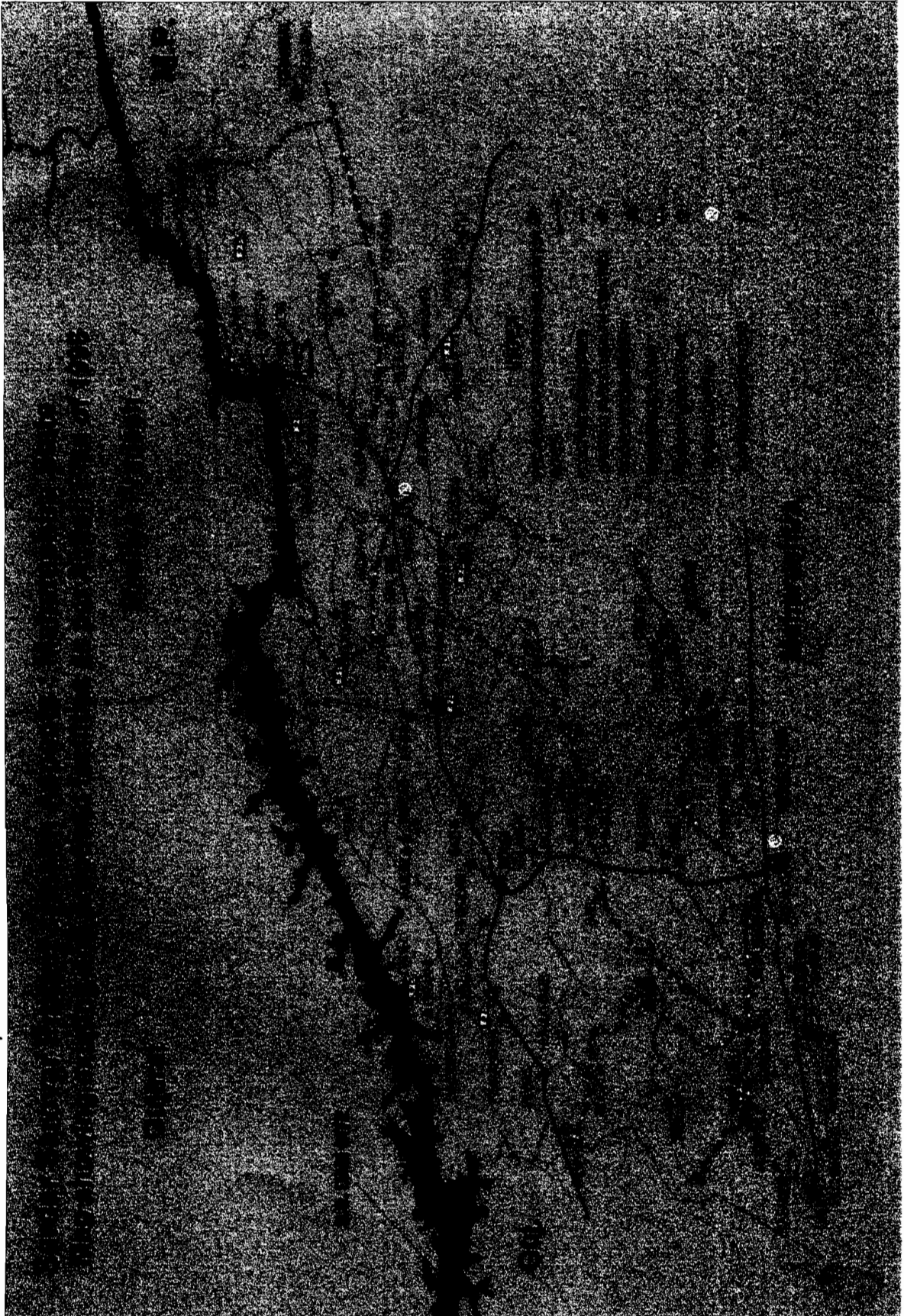
Madhya Pradesh

1. Bada Bards (1)
 2. Bards (1)
 3. Bhikha (1)
 4. Bodhwa (1)
 5. Brahminson (1)
 6. Deher (1)
 7. Dherampuri (1)
 8. Elkawa (1)
 9. Jangwa (1)
 10. Kalyapura (1)
 11. Kassarwad (1)
 12. Karna (1)
 13. Khatkhurda (1)
 14. Khatkhetha (1)
 15. Kheda (1)
 16. Khujwa (1)
 17. Khomni (1)
 18. Koheda (1)
 19. Maru Chhetri (1)
 20. Nandhadi (1)
 21. Nerdadi (1)
 22. Pipradigarhi (1)
 23. Rajson (1)
 24. Samda (1)
 25. Uswad (1)

SARDAR SAROVAR PROJECT : HEALTH ASPECTS

Affected villages : Thematic map showing location of proposed sites for health facilities in M.P.





ANNEX - XXXVIII -(17)**SSP :CANAL SYSTEM****GUJARAT PORTION****NMC PHASE - I : km 0 to km 144.50 (Upto Mahi River Crossing)**

All the works under phase-I including structures have been completed. Under this phase, it is envisaged to develop an irrigation potential of about 4.47 lakh ha. The main canal structures upto 144.50 km include the head regulator, cross regulators (including single purpose regulators and cross regulator combined with head regulator), road bridges, head regulator for branch turnouts, aqueducts, drainage siphons, super passages, canal crossings and railway bridges. Major structures are provided on rivers Deo, Karad, Meshri, Kun Mahi and Orsang etc.

The structures have been designed by SSNNL. The design of all these major structures of NMC upto Mahi crossings have been completed. Only specific changes are being made in the design of these structures necessitated by site conditions on the advice of the board of consultants (BOC) of SSNNL. The 1st Phase of NMC from chainage 0 to 144.50 km has been divided in two groups. The first group is between ch. km 0 to km 64 and 2nd group between km 64 to km 144.50. The group wise physical and financial progress achieved for NMC upto 30th September, 2002 is given below.

NMC PHASE - II: km 144.5 to km 458.318

The NMC Phase-II has been divided in to three reaches:

Phase-II (A): km 144.50 to km 263.165 (From Mahi River Crossing to offtake of Saurashtra Branch Canal [SBC]):

The entire work of the reach consists of ten packages and seven major structures. The works in all ten packages have been completed. Of the seven major structures, one structure (Mohar syphon) has not been completed which is targeted to be completed by Dec., 2002.

Phase-II (B): km 263.165 to km 357.196 (From SBC offtake to Khari II River):

The works in this reach upto km 357.196 have been divided in 8 packages and three major structures and awarded to different agencies. The work is in progress and scheduled to be completed by October, 2003.

Phase-II (C): km 357.196 to km 458.318 (From Khari -II River to Gujarat - Rajasthan Border):

The pre-qualification of bidders for the works of Earthwork, Lining & Structures for NMC reach km 357.196 to km 388.164 has been taken up

by SSNNL. The Pre-Qualification of the bidder for the works of remaining three canal syphons is under process. The work is planned to be completed by Dec./05.

For the reach from km 388.164 to km 458.318, Geo-tech investigation for design of structures has been started. These works are targeted to be started during the year 03-04 and completed by 2006.

RAJASTHAN PORTION

Rajasthan has been allocated 0.5 Maf (616 MCM) of Narmada water under the final award of NWDT. To utilize its share of the Narmada water, Govt. of Rajasthan have planned a 74 km long canal to irrigate 1.76 lakh ha of land in the drought prone districts of Jalore and Barmer. The canal system will cover Gross Command Area (GCA) of 3.00 lakh ha of which 2.51 lakh ha is Culturable Command Area (CCA).

- ◆ Besides providing irrigation benefits to 89 villages (74 in Jalore district & 15 in Barmer district), the project also envisages to provide drinking water to a population of about 10.88 lakh living in 770 villages around the irrigation canal. The canal is trapezoidal in section and will be lined by cement concrete paving machine. Maximum capacity of the canal at the head is 74.58 cumec while discharge requirement is 73.50 cumec. There are 9 major distributaries with a total length of 282.30 km. The total length of minors and sub-minors is 485.0 km and 636.0 km respectively. Additional project activities include construction of head regulators, bridges, cross drainage works, escapes, construction of syphon on Loni River and lining of main canal from km 7.88 to km 51.50 by paver machine has been started in 3/02 and in progress and 8 km lining is completed upto 9/02. Construction of Main Canal in the first 48.0 km reach has been taken up and the earthwork & lining are in progress. The entire canal works in Rajasthan are scheduled for completion by 2009-2010.
- ◆ Investment clearance was accorded by Planning commission vide their letter No.2 (307)/92-I & CAD, dated 23.01.1996 for Rs.467.53 crore at 1989-90 price level including Rs.280.14 crore share cost payable to Gujarat. The benefit cost ratio and internal rate of return of the project are 1.01 and 10.42% respectively.

ANNEX – XXXVIII –(18)***SUGGESTED SAFEGUARDS TO BE ADOPTED
WHILE RAISING THE HEIGHT OF THE DAM UP TO RL 110M
AND BEYOND.***

Certain safeguards, as outlined below, however, would be necessary to protect the environment during progressive filling of the reservoir

- Period of progressive filling is required to be kept at the minimum for which releases from the upstream reservoir has to be ensured at the appropriate time.
- While raising the blocks water level has to be lowered from its present level and while refilling, there would be time lag during 10 to 15 days depending upon the hydrology and timing of the flow. Arrangements, therefore, have to be made for providing adequate supplies of water for downstream users and *also to contain the salinity ingress up to the observed limits.*
- There would be pressure on the downstream areas due to draw down and due to sudden upsurge of the water which would flow down after a gap of 10 to 15 days. This might catch some people unaware and they might be washed down and, therefore, arrangements have to be made for providing adequate sign boards at appropriate places and all necessary arrangements to warn the people.
- Arrangements would also be required to protect fishing in the deep pools down stream of the reservoir during these 10 to 15 days to protect aquatic organisms taking shelter there.
- Control measures would be needed to contain mosquito breeding in small ditches that would be formed downstream of the reservoir during the period of filling.

Changes in the water quality downstream of the reservoir, during and after filling period would be desirable and needed mitigating measures would be required.

ENVIRONMENTAL COST OF SSP

RELATED TO UNIT-I DAM:

A) Expenditure by project authorities

i) Cost of Survey & Studies (In Rs. lacs)

	Estimate	Exp.	Estimate	Exp.	Estimate	Exp.	Estimate	Exp.	Total Estim.	Total Exp.
CAF	4.52	4.52	5.29	5.29	2.44	2.44			12.25	12.25
CAT	8.77	8.77	7	7	3.28	2.8			19.05	18.57
F&F	101.84	80.47	38	16	20.33	20.2	15.27	15.3	175.44	131.94
Health	2.5	2.5	10	2.5	29.63	27.84			42.13	32.84
Arch./Anth.	1.3	0.6	N.A.		59	36.33			60.3	36.93
Seismicity	5.05	5.07	N.A.		23	12.5	1.98	1.98	30.03	19.55
CAD	11.25	11.25					N.A.		11.25	11.25
							Total (i)		350.45	263.33

ii) Cost of Implementation (in Rs. la lacs)

	Estimate	Exp.	Estimate	Exp.	Estimate	Exp.	Estimate	Exp.	Total Estim.	Total Exp.
CAF	1809.10	1722.82	2116.00	1650.27	1800.00	907.90			5725.10	4280.99
CAT	3509.00	2776.67	2894.67	2218.27	8835.05	4002.76			15238.72	8997.70
F&F	75.31	64.42	117.00	2335.26	NA				192.31	2399.68
FISH			102.10						102.10	-
HEALTH	3800.00	192.28	546.60	9.26	1354.63	521.20			5701.23	722.74
ARCH/ANT	156.00	95.55			700.00	12.97			856.00	108.52
SEIS.	219.57	318.55							219.57	318.55
CAD	NA						NA			
							Total (ii)		28035.03	16828.18
Total (i & ii)									28385.48	17091.51

N.A. Not available

189

ANNEX - XXXVIII -(20)



नर्मदा नियंत्रण प्राधिकरण

NARMADA CONTROL AUTHORITY

No.Env-3(38)/2002/ 3531-3533

24 June, 2002

To

Shri Pradip Bhargava,
Vice Chairman,
Narmada Valley Development Authority
Narmada Bhawan, Tulsi Nagar
BHOPAL 463006

Sub: Follow-up action on the discussions of the 37th meeting of the Environment Sub-group.

Ref: Your letter No.NVDA/For/Tech/2002/797 dated 3.5.2002.

Sir,

We are in receipt of your letter under reference, seeking modifications in the Minutes of the 37th meeting of the Environment Sub-group. The views of the Govt., of Madhya Pradesh would be put up to the Environment Sub-group during its next meeting.

However, it is pertinent to bring out, through the note enclosed with this letter, the factual position regarding monitoring of Indira (Narmada) Sagar Project (ISP) by the Narmada Control Authority.

The provisions contained in the Narmada Water Scheme were linked to the commitments made by the Govt., of Madhya Pradesh to the Planning Commission, Ministry of Environment & Forests & higher authorities, therefore, to effect the changes in the legal and administrative requirements pertaining to Indira Sagar Project, the Govt., of Madhya Pradesh might have to take-up this issue with the concerned authorities of the Planning Commission, Ministry of Environment & Forests & Ministry of Water Resources, until, amendments are brought out in the Scheme and clearances issued by the Govt., of India are re-worded with the approval of the Competent Authority, it would be imperative for the NCA and its sub-groups to carry out monitoring of the Indira Sagar Project.

It is therefore requested that this issue may kindly be taken up with the concerned authorities.

Yours faithfully,

(INDRA RAJ)
MEMBER (E&R)

Encl: As above

Copy forwarded to:

1. The Secretary to the Govt., of India, Ministry of Water Resources and Chairman, Narmada Control Authority, Shram Shakti Bhawan, Rafi Marg, New Delhi for information please.
Copy of GOMP letter dated 3.5.2002 enclosed.

2. The Secretary to the Govt., of India, Ministry of Environment & Forests, Paryavaran Bhawan, Lodi Road, New Delhi for information please.

(INDRA RAJ)
MEMBER (E&R)

116-बी. जी., स्कीम नं. 74-सी, विजय नगर, इन्दौर - 452 010 (म.प्र.)
116-BG, Scheme No. 74-C, Vijay Nagar, Indore - 452 010 (M.P.)
Phone : Mem (E&R)-554333, SPL(Env)-571587, DIR(R)-558603, APRO-557691

Gram : NARCONTROL
Fax : 91-731-554333

130

ISSUED.
Smt. Patel
24/6/02

FACTUAL POSITION ON MONITORING OF INDIRA (NARMADA) SAGAR PROJECT BY THE NARMADA CONTROL AUTHORITY

To give effect to the provisions and directions contained in the NWDTA (1979) the Narmada Water Scheme was framed in 1980, by the Central Govt. in accordance with the amended section 6-a of Interstate Water Dispute Act of 1956.

13th April 1987.

The Hon'ble Prime Minister of India approved the clearances for the ISP & SSP from the environmental considerations on 13th April 1987, on the recommendations of the Ministry of Environment & Forests (MoEF) subject to the conditions amongst others the following:

- 1) It was agreed that a statutory authority will be established by legislation in Parliament which authority shall take all steps for the integrated development of the Narmada basin in all its facets.
- 2) Note was taken of the need to clear the projects specifically while simultaneously taking account of national concerns for the protection of the environment.
- 3) The terms of reference of the NCA will be amplified to ensure that environmental safeguard measures are planned and implemented in depth and in its pace of implementation *pari-passu* with the progress of work on the project.
- 4) The NCA will be reconstituted to include Secretary (WR), Secretary (E&F), Secretary (Welfare) and the four Chief Secretaries.

Commitments were received from amongst others, the Govt. of M.P. that NCA would be reconstituted to enable it to monitor the compliances of the conditions to be imposed by the Govt. of India for the Narmada Projects.

(Kind attention Annex-1)

3rd June 1987.

In pursuance to the above, to give effect to the discussions & decisions arrived at by the Union of India with the agreement of the party states the Narmada Water Scheme was amended on 3rd June 1987. According to the modified scheme the role of the authority was also modified as under.

1. The role of the Authority will mainly comprise of overall coordination and direction of the implementation of all the projects, including the engineering works, the environmental protection measures and the rehabilitation programme and to ensure the faithful compliance of the terms and conditions stipulated by the Central Government at the time of clearance of the aforesaid projects.

2(a) The Authority may constitute one or more sub-committees and assign to them such of its function and delegate such of its powers as it thinks fit".

(Kind attention Annex-2)

24th June 1987.

The order of clearance issued, by the Ministry of Environment & Forests on 24th June 1987 vide O.M.No.3-87/80-IA, to the ISP & SSP was subject to the conditions as were laid under Para 4 & 5(1) of this order. These conditions were as follows:

...."4. The NCA has been expanded and its terms of reference have been amplified to ensure that environmental safeguard measures are planned and implemented in depth and in its pace of implementation *pari passu* with the progress of work on the project.

5. After taking into account all relevant facts the Narmada Sagar Project, Madhya Pradesh and the Sardar Sarovar Project, Gujarat are hereby accorded environmental clearance subject to the following conditions:

- (i) The Narmada Control Authority (NCA) will ensure that environmental safeguard measures are planned and Implemented *pari passu* with progress of work on projects....."

(Kind attention Annex-3)

29th September 1987.

During 26th meeting of the NCA held on 29.9.87, it was decided to set up a group of nodal officers of participating states for deciding the terms of reference and composition of the Environment Sub-group of the NCA. The group met on 30.10.87 and finalised the composition and terms of reference. It was decided that the sub-group would be headed by Secretary, MOEF and have as members, one representative each from the four participating states, representative of ICAR, MOWR, Technical Experts in the field of forestry, wild-life, hydrology, flora, health, archaeology, anthropology, agriculture, and environment. The terms of reference to the sub-group were also finalised. This included amongst others the following:

"..... (i) To work out the environmental safeguard measures to be planned and implemented for the entire Narmada Basin so that environmental safeguard measures are executed and remain fully in consonance with the clearance accorded to the Narmada Sagar and Sardar Sarovar Projects..."

(Kind attention Annex-4)

The Sub-group ever since has been monitoring the compliance of the conditions contained in the clearances for the *pari - passu* implementation with the construction works on the Indira Sagar Project.

6th September 1989.

The Planning Commission considered the Indira Sagar Project (Narmada Sagar Project) in Madhya Pradesh acceptable for Investment subject to the conditions as here under

.... "The State shall comply with the conditions as laid down in the O.M.No.3-87/80-IA dated 24.6.1987 and letter No.8/646/84-FC dated 7.10.1987 both issued by the Ministry of Environment and Forest while according the environmental clearance and the approval for diversion of forest lands for this project respectively for this project and ensure completion of Rehabilitation and Resettlement Plan in scheduled time with close monitoring as per requirements of Department of Environment and Forest...."

(Kind attention Annex-5)

16th May 2000.

MOU signed between NHPC and the Govt. of Madhya Pradesh contained a clause-VI obligations of joint venture which read as under:

- (a) The joint venture would comply with the provisions of the Narmada Waters Disputes Tribunal (NWDT) Award and the directions of the Narmada Control Authority (NCA), its various sub-groups and the Review Committee of the Narmada Control Authority (RCNCA).
- (b) The joint venture would comply with the conditionality imposed by the Planning Commission / Ministry of Environment and Forest (MOEF) / Ministry of Social Justice and Empowerment in respect of the clearances issued to the projects by the various agencies of the GOI.

(Kind attention Annex-6)

Authority. ### The Authority may, with the previous approval of the Central Government, make regulations to regulate conditions of service of all such officers and employees in respect of residential accommodation, house rent allowance, travelling allowance, daily allowance, conveyance allowance and medical reimbursement. ### The scales of pay and other service conditions shall be as applicable to Central Government employees.

Persons employed in the services of the four States may be appointed or employed by the Authority in such proportions as the Authority may deem fit. The Authority shall arrange with the State Governments to spare the services of the persons employed in State Government for whole time employment with the Authority, or for the performance of any work or services for the Authority. The Authority may also make direct recruitment of any personnel or obtain the same from the Centre or other source as considered appropriate.

8. Administrative and Field organisation costs.

1. ~ All expenses of the Authority (including the salary and expenses of the independent Members) shall be borne by the State Governments of Madhya Pradesh, Gujarat, Maharashtra and Rajasthan in equal shares. The expenses pertaining to a Member representing a State shall be borne by the State concerned. The expenses pertaining to the Members representing the Central Government shall be borne by the Government. The cost of maintaining, operating and controlling the gauging and other hydrological stations in each State and the telecommunication system for communicating the data shall be borne by the State concerned ~
2. The costs of construction of the storages, Power installations, diversion works, headworks and canal networks shall be borne wholly by the State Government in whose territory the work is located except for works whose cost has been ordered by the Tribunal to be shared between two or more party States. Where the capital cost is thus shared, the operation and maintenance cost shall also be shared in the same proportion.

9. Powers, Functions and Duties of the Authority.

1. ~ The role of the Authority will mainly comprise of overall coordination and direction of the implementation of all the projects including the engineering works ~~the environmental protection measures and the rehabilitation programme and to ensure the faithful compliance of the terms and conditions stipulated by the Central Government at the time of clearance of the aforesaid projects.~~
2. The Authority shall be charged with the power and shall be under a duty to do any or all things necessary, sufficient and expedient for the implementation of the order of the Tribunal with respect to :

Inserted vide notification No. 856 (E) dt. 22.11.82 (Ref.: para 7)

- Modified as per notification No. S.O. 467 (E) dated 4.5.88 [Ref. para 8]

-- Modified as per notification No. S.O. 554 (E) dated 3.6.87 [Ref. para 9 sub para (1) and sub para (2) (a)]

- i. the storage, apportionment, regulation and control of the Narmada Waters.
 - ii. sharing of power benefits from Sardar Sarovar Project.
 - iii. regulated releases by Madhya Pradesh.
 - iv. acquisition by the concerned States for Sardar Sarovar Project of lands and properties likely to be submerged under Sardar Sarovar.
 - v. compensation and rehabilitation and settlement of oustees; and
 - vi. sharing of costs.
- 2.(a) ~~The Authority may constitute one or more sub-committees and assign to them such of its function and delegate such of its powers as it thinks fit.~~
3. In particular and without prejudice to the generality of the foregoing functions, the Authority shall perform inter-alia, the following functions :-
- i. Madhya Pradesh or Gujarat as the case may be shall submit to the Authority, the Sardar Sarovar Project Report, the Narmada Sagar Project Report, the Omkareshwar Project Report and the Maheshwar Project Report. The Authority shall point out to the States concerned, the Central Water Commission, the Central Electricity Authority and Planning Commission any features of these projects which may conflict with the implementation of the orders of the Tribunal. Any subsequent changes in the salient features or substantial increase in cost, in respect of dams, power houses and canal headworks shall be reported to the Authority for taking appropriate action in the matter.
 - ii. The Authority shall decide the phasing and shall coordinate construction programmes of the Narmada Sagar Project and Sardar Sarovar Unit-II Canals with a view to obtaining expeditiously optimum benefits during and after the completion of the construction of the project having due regard to the availability of funds.
 - iii. The Authority shall obtain from the concerned States periodical progress reports both as to works and expenditure, such reports and shall on receipt of such report review the progress of construction of different units of the projects and @ whenever necessary advise the State concerned on the steps to be taken to expedite the work, except in respect of Unit-I Dam and appurtenant works and Unit-III Power Complex of Sardar Sarovar Project. The States shall submit completion reports to the Authority in respect of projects referred to in sub-paragraph (3) (i).
 - iv. The Authority shall issue appropriate directions whenever necessary for timely and full compliance by the concerned States within the orders of the Tribunal in the

-- Modified as per notification No. S.O. 554 (E) dated 3.6.87 [Ref. para 9 sub para (1) and sub para (2) (a)]

@ Corrected vide Corrigendum No. 872 (E) dt. 28.10.90 [Ref. : sub para (iii) & sub para (v)]



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पर्यावरण उपदल
ENVIRONMENT SUB-GROUP

अड़तीसवीं बैठक की कार्यवृत्त
Minutes of the 38th Meeting

10 मार्च, 2003 को
पर्यावरण भवन, नई दिल्ली में हुई
Held at Paryavaran Bhawan, New Delhi on 10th March, 2003

नर्मदा नियंत्रण प्राधिकरण
NARMADA CONTROL AUTHORITY

इन्दौर
अप्रैल, 2003

Indore
April, 2003

**MINUTES OF THE 38th MEETING OF ENVIRONMENT SUB-GROUP
OF THE NCA HELD ON 10th March, 2003 AT PARYAVARAN
BHAWAN, CGO COMPLEX, NEW DELHI**

I N D E X

Item No.	Contents	Page No.
	Introduction	1
XXXVIII - 1(175)	CONFIRMATION OF MINUTES OF THE 37th MEETING	2
XXXVIII- 2 (176):	INDIRA SAGAR PROJECT : REVIEW OF THE STATUS OF ENVIRONMENT SAFEGUARD MEASURES	3
XXXVIII-3 (177)	SARDAR SAROVAR PROJECT: REVIEW OF THE STATUS OF ENVIRONMENT SAFEGUARD MEASURES	12
	A. Action taken report on the recommendations of the Sub-group, permitting, raising of the dam height to 100m RL:	12
	A. Review of the progress of works on the suggested parameters in relation to the proposed filling of the reservoir up to RL 110m by June 2003 and beyond	15
XXXVIII - 4 (178)	REVIEW OF THE ACTION TAKEN ON THE DECISION OF THE PREVIOUS MEETINGS.	19
XXXVIII- 5 (179)	Any other item – MONITORING OF ISP	20

ANNEXURE

XXXVIII-MIN-1	List of participants	21
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**MINUTES OF THE 38th MEETING OF ENVIRONMENT SUB-GROUP OF THE NCA
HELD ON 10th March, 2003 AT PARYAVARAN BHAWAN,
CGO COMPLEX, NEW DELHI**

The 38th meeting of Environment Sub-group (ESG) of the Narmada Control Authority (NCA) was held at Paryavaran Bhawan, CGO Complex, New Delhi, under the Chairmanship of Shri K.C. Misra, Secretary, Ministry of Environment & Forests (MoEF), Govt. of India. A list of participants is enclosed at **Annex-XXXVIII-Min-(1)**.

The Chairman welcomed the Members and Invitees to the discussions. The Chairman while inviting attention of the Members to the conditions stipulated by the MoEF for according Forest & Environment clearances to the Projects and to the terms of reference of the ESG, stated that the judgement of the Hon'ble Supreme Court of 2000 on Sardar Sarovar Project, has endowed more responsibilities on the Sub-group for ensuring timely implementation of the Environment Safeguard Measures (ESM) and desired that the participants should discuss the items of the Agenda keeping the above in view. He requested Member Secretary of the Sub-group to take up discussions on the Agenda papers item wise.

Item No. XXXVIII-1(175) : CONFIRMATION OF MINUTES OF THE 37th MEETING

The Issues brought-out by NVDA vide letter No.NVDA/For/Tech/2002/797 dated 03.05.2002 and letter No.56/PS/NVDD/MP/M(E&R)/638 dated 09.04.2002 were considered by the subgroup and after detailed discussions, no changes in the minutes were considered necessary.

Views expressed by Prof. Ramaseshan vide letter dated 28.3.2002 being mainly suggestive in nature were noted.

Minutes of 37th Meeting of Environment Sub-Group (ESG) of NCA as circulated to all Members and Invitees vide NCA Office letter No.Env-3(37)/2002/1267-1301 dated 13th March, 2002 were taken as confirmed.

Since it was not possible to record each and every statement made by the participants during the discussions, the Chairman opined that deliberations which lead to some decision may be recorded. The Chairman, however, on the request of the Member from GoMP, agreed for discussions on the issue of desirability of monitoring Indira Sagar Project (ISP) by the ESG of NCA as a separate item. The discussions on the subject are placed under "**Any Other Item**" Agenda No.XXXVIII-5(179).

Item No. XXXVIII-2(176): INDIRA SAGAR PROJECT : REVIEW OF THE STATUS OF ENVIRONMENT SAFEGUARD MEASURES.

Member (E&R), NCA informed the Sub-group of the following schedule of construction of Indira Sagar Project and the likely submergence as furnished by the NHDC:

Month / year	Level	Area in ha.	% in relation to FRL
Oct. 2002	215	1250	1.37
June, 2003	238	18300	20
June, 2004	254.13	56923	62.55
May, 2005	MRL	91,000	100

Prof. S. Ramaseshan, referring to the Annex-4 of the Agenda papers, expressed doubts about the correctness of the river bed level and the back water curve. He desired to verify the data related to river bed level and if required recalculation of the backwater level. Prof. Ramaseshan also expressed the view that medium monsoon flood be considered for delineating submergence area for all the parameters except archaeological aspects for which a different view may be taken.

The Vice Chairman, NVDA informed that NVDA have in-house expertise for verification of the data and re-calculation, if required. He further pointed out that NHDC, which is a major player in the ISP, also possessed this capability. He assured that GoMP would carry out whatever was necessary and would report back to the Sub-group in time. The Chairman desired that Central Water Commission may also be requested to have a re-look at the matter.

(A) Catchment Area Treatment

The progress presented was noted by the Sub-group. Dr. Shekhar Singh was of the opinion that all critically degraded sub-watersheds within the entire freely draining catchment areas were required to be treated pari-passu with the construction schedule of the Dam as per the clearance order. It was clarified that the issue has already been discussed and decided by the Sub-

group earlier and accordingly treatment of Phase-I area was being carried out and monitored. It was observed that more than 85% of the CAT works were already completed.

(B) Compensatory Afforestation

The Sub-group noted the progress. To a query from the Chairman, the Director (Env.), NCA, mentioned that the extent of area covered under plantation though could not be verified by the NCA officers, its quality was checked randomly and it was found that though plantations raised were not comparable to the natural forests but considering anthropogenic pressure and harsh environment, the progress could be considered satisfactory. It was further explained that the survival rate varied between 50% at the poor sites and 80-85% at better sites and that more than 99% of the targets have already been achieved.

It was suggested by the Chairman that in order to enrich the plantations further, aerial seeding / broadcast sowing might also be taken up where ever found possible/ feasible.

In response to a question by the Chairman, Vice Chairman, NVDA informed that the process of transferring the plantation area to the regular territorial division was making progress and that non forest areas were being notified as forest land while effecting such transfers.

(C) Survey of Flora & Fauna and Carrying Capacity

Member (E&R), NCA brought out that more than 15,000 ha., of the forest have already been clear felled in the submergence area of the ISP. Flora and fauna in the area have already been impacted as felling operations are in full swing. However, actions for mitigation as suggested by the Wildlife Institute of India and Friends of Nature Society were not implemented by GOMP.

The Vice Chairman, NVDA informed that the Committee constituted by the Madhya Pradesh, during 1990, on the recommendations of the MoEF, has examined the recommendations of the study groups and suggested certain

changes. The proposal was under consideration of the State Govt. It was informed that Principal Chief Conservator of Forest, Madhya Pradesh, has suggested to exclude certain areas from the proposed National Park and wildlife sanctuaries for the purpose of laying roads and development of other infrastructural facilities.

Representative of The Wildlife Institute of India informed that complete details of the area to be utilised for various purposes along with forests compartment numbers, population, etc., were already given in their report. The Vice Chairman, NVDA informed that the proposal is under consideration of the Cabinet Committee and unless it is approved it would not be possible to give complete details of the extent and area included in the notification of National Park and Wildlife Sanctuaries.

The Chairman after detailed discussions on the subject observed that the forest clearance was given under Forest (Conservation) Act of 1980 and violation of the same was a serious offence. It was, therefore, desirable to adhere to a time schedule commensurate with pari-passu implementation of all the conditions stipulated by MoEF including wildlife protection measures as per condition No (IX) of the order.

The Vice Chairman, NVDA indicated that it would be possible for GoMP to issue preliminary notification for declaration of National Park and Wildlife Sanctuaries as per provisions of Wildlife (Protection) Act of 1972, within a period of 5-6 months. The Chairman concluded the discussions by saying that MoEF would take a view on the issue of the infringement of the conditionalities separately.

(D) **Archaeology**

It was informed by the Vice Chairman, NVDA that all steps needed for implementation of the planned action pari-passu with the construction works were being taken up by the NVDA. The Commissioner, Department of Archaeology and Museum, GoMP, gave details of the monuments and mounds under protection / re-location and / or under excavation. She stated that works were on schedule. However, it was pointed out by her that the issue related to protection of Joga Fort, a centrally protected monument, was required to be resolved.

Director (Env.) NCA informed that North bastion of the Joga Fort enclosing intake well shall be impacted by the scour action of the of the backwater corresponding to FRL of the ISP. A Committee of experts formed by the NCA on the advise of the Environment Sub-group visited the monument and suggested that since the monument in question was designed to withstand the flow of Narmada it would suffice if the outer wall of the intake well was shortcreted to protect it from the abrasive action of the water which might impact it though for a very short duration. Archaeological Survey of India disagreed by stating that since the monument in question was a centrally protected monument, any action which might deface the monument may not be desirable and in the alternative, it was suggested by the ASI, to construct a bund around the well. An estimate of Rs.1.67 crores was submitted by the ASI to the NVDA for the purpose. It was agreed that the ASI would carry out the work. GoMP agreed to provide the funds as and when needed by the ASI. However, with the passage of time, ASI expressed its inability to carry out the works and suggested that NVDA should take up the work under the supervision of the ASI. The issue was hanging in air since then.

Subsequent to the discussions on the subject, the Chairman, proposed to convene a meeting shortly to discuss and resolve the issue with the ASI. GoMP was also invited to join the discussions.

(E) **Anthropology**

Dr. J.K. Sarkar, In-charge-Director, Anthropological Survey of India (An.S.I) informed that An.S.I carried out a detailed survey of the areas and certain tools and artifacts were found. These have been displayed in the Museum and detailed findings have been covered under the publication brought out by the An.S.I., entitled "Land and the People". He presented a copy of the book to the Chairman during the meeting for his perusal.

The Vice Chairman, NVDA stated that a comprehensive data bank on Anthropological aspect was established in the Museum at Bhopal for exhibiting Anthropological Aspects.

(F) **Seismicity**

Prof. R.K. Katti mentioned that though number of seismological observatories have been made they are not being manned by adequately qualified and trained staff leading to delay and timely analysis of the data. He stressed on the need to post adequately qualified and trained staff at each site. The Vice Chairman, SSNNL stated that there was shortage of the technically qualified staff and efforts to engage Indian Meteorological Department and / or University of Roorkee for the SSP were not successful because of the shortage of the qualified staff. These Institutions were requested for taking up the work of data analysis. This might be true for ISP also. It was further explained by him that the data was being recorded and reviewed by the dam safety panel and all that was necessary was being done as per the directions received from Dam Safety Review Panel on this aspect in case of SSP. Prof. Katti was of the opinion that this issue may be left to the Experts on the subject who are represented on the Dam Safety Review Panel. Referring to the concern expressed on non working of the Seismic Monitoring Stations, the Vice Chairman, NVDA informed that network of the monitoring stations was for the entire Narmada Sagar Complex area including Omkareshwar and Maheshwar Projects and that in addition one more monitoring station was

made functional at Khandwa on the request of the District Collector. As such, the monitoring station at Narmada Sagar should suffice. However, procurement of equipment for all other stations was under advance stage. Since buildings were already constructed, it was expected that the other Stations would also become functional soon.

The Sub-group noted the progress and also appreciated the points brought out by Prof. Katti. The Chairman, however, stressed on the necessity for constant recording and analysis of seismic data.

(G) Health

Dr. Shekhar Singh stated that the data generated by the Gandhi Medical College presented an alarming situation and threat and more stress was required on implementing preventive measures. Dr. Kawathekad, NVDA Consultant stated that the GoMP was alive to the situation. Even though water borne diseases were under control, yet preventive measures were being taken for malaria and filaria together. He further stated that though, the Project areas might have only Annual Parasitic Index (API) below-2, still these areas would be covered up by insecticide spray as per the plan. He requested Director, Malaria Research Centre, (MRC) for suggestions on promoting engineering design parameters for residential complex to prevent proliferation of the diseases vector.

Dr. Kawathekad, referring to the concerns expressed by the Committee of Experts on Health which visited the areas, stated that the final consolidated report of the Gandhi Medical College was already received and the recommendations were being taken up for implementation. Control of water borne diseases, surveillance and monitoring of the diseases trend and reinforcement of the existing medical facilities were being taken up in a phased manner. He further informed that water quality assessment by Central Pollution Control Board would be supplemented through collection of data and

analyses of the samples in the field by Mobile Field Stations proposed in the plan under implementation.

Director (Env.), NCA mentioned that the Committee of the Health Expert who visited the Sardar Sarovar areas found certain gaps in the diseases surveillance programme. It was observed that the data kept at the Field Station Hospital / Dispensary were not in the proper format as was required. It was also opined by him that the surveillance of the diseases by the Ayurvedic Doctors may not fit well in the Allopathically designed surveillance system of the National Institute of Communicable Diseases (NICD). It was further informed by him that during the last meeting, GoMP was of the view that it would be appropriate to discuss these issues in the presence of an Expert from the Department of Indian System of medicine and homeopathy. Accordingly a representative of the Indian System of Medicine was especially requested to attend this meeting. The Vice Chairman, NVDA stated that on the issue of the diseases surveillance, expert advice from the NICD, Malaria Research Centre (MRC), etc. was being solicited. Addl. Director, NICD expressed that diseases surveillance would point out any possibility of outbreak of the monitored diseases and stressed that NICD would extend all possible help in this regard to the State Govt., if approached.

(H) Command Area Development

Member (E&R) NCA emphasized the need for timely completion of an holistic and integrated command area development plan for ISP. The Vice Chairman, NVDA stated that the ToR for the Command Area was finalized though agencies were not fixed up. Dr. Ramaseshan desired that all studies related to ground water drainage etc., should be made available to him. The Vice Chairman, NVDA stated that CAD was an integrated exercise where all aspects have to be considered and integrated. He assured for early completion of CAD plan for ISP by NVDA. He stated that MoWR will also be

approached for technical and financial assistance for implementation of CAD work programme .

The Chairman concluded by saying that works to formulate integrated command area development plan were required to be speeded up. As per the existing policy CAD has to be an integral part of the project and, therefore, all steps should be taken for ensuring timely preparation and implementation of the CAD plan and that works on this aspect were required to be speeded up.

Project Costs

The Member (E&R), NCA requested GoMP to provide expenditure statement against the cost estimates of Environmental Safeguard Measures provided by them earlier for perusal of the Sub-group. This was agreed to by the NVDA. Expenditure statement as on 31st January, 2003, received from the NVDA subsequent to the meeting is as below:

ENVIRONMENTS SAFEGUARD MEASURES	ESTIMATES (Rs. In Crores)	EXPENDITURE (Rs. In Crores)
Compensatory Afforestation	196.37	39.66
CAT works (Forest + Non-Forest) + restoration of land in construction area.	235.27	39.66
Control of aquatic weeds in submergence area to provide improved habitat for aquatic life (Fisheries)	2.59*	Not available (N.A.)
Establishment of fuel depots etc. to meet fuel requirement of labour force to prevent indiscriminate felling of trees	2.00*	N.A.
Relocation of monuments of archaeological significance	1.70	0.25
Public health measures to control spread of water bound diseases	3.38*	0.78

Removal of stumps and roots before filling the reservoir for the purpose of pisciculture.	2.60*	Nil
Setting up of a National Park & two wild life sanctuaries as per MoEF directions for Conservation of Flora & Fauna.	28.62	Nil
Fisheries conservation and development	10.57	Nil
Seismicity & Rim Stability	N.A.	7.22

*Figures provided by NHDC to be verified by the NVDA.

At the end of the discussions the Vice Chairman, NVDA reiterated that the monitoring of the ISP by NCA was not desirable and requested the Chairman to consider the stand of the GoMP in this regard. The Chairman, however, stated that the views of the GoMP were already discussed at length and stressed that the Environment Sub-group would continue to monitor the ISP, as already decided.

**Item No. XXXVIII-3 (177): SARDAR SAROVAR PROJECT: REVIEW OF THE
STATUS OF ENVIRONMENT SAFEGUARD
MEASURES**

**A. Action taken report on the recommendations of the Sub-group,
permitting, raising of the dam height to 100m RL:**

The Sub-group noted the progress presented in the Agenda on the action taken report. Member (E&R), NCA, requested the State Govts to present an up-dated picture on the issues brought out in the Agenda papers for discussions concerning their States.

Govt., of Gujarat (GoG)

Compensatory Afforestation

The Managing Director, SSNNL, informed that almost all the areas brought under plantations have been transferred to territorial divisions of the Forest Department and non forest areas have been declared as protected forests.

Command Area Development (CAD)

GoG submitted a copy of the Command Area Development (CAD) Plan to the MoEF and to the NCA. Members desired that copies be made available to them for their perusal and suggestions. The Vice Chairman, SSNNL requested the Members to suggest further improvements and stated that since planning and development of the Command Area was a long drawn process, the observations of the Members would be given due consideration during implementation of the Plan. It was decided that the copy of the plan shall be circulated to all the Members for their comments before the next meeting of the Environment Subgroup.

Seismicity and Rim Stability

Regarding analysis of the data generated at a seismological stations it was informed that there was a shortage of the technical qualified manpower for day-to-day analysis and that help of the institutions like IMD and University of Roorkee was

being sought. He, however, stated that these Institutions, due to shortage of staff, have also not shown interest in taking up analysis of the data. He further pointed out that the objective of the seismological monitoring was to ascertain Reservoir Induced Seismicity (RIS) and that the data generated was of academic interest for ascertaining seismological activities and can also be used by those who needed this in future. He, however, pointed out that the data was being collected and was being presented to the Dam Safety Review Panel for their consideration and recommendations from time to time.

Health

It was brought out by the Managing Director, SSNNL, that diseases surveillance system was in place and as per the observations of the Expert Committee on Health, medical facilities in the Project area could be compared with even the developed countries. Dr. Gandhi, Health Consultant, SSNNL brought out that Malaria was under control for the last several years but considering the cyclic upsurge of the vector, adequate measures were taken for keeping the diseases under control. He further pointed out that planning and implementation of the health delivery system in Gujarat relied heavily on preventive aspects of the diseases control.

Govt., of Maharashtra (GoM)

Regarding plantations in non-forest areas, representatives of GoM also informed that all new plantation areas have already been declared as protected forest.

In response to a question on status of felling on the submergence area commensurate with 100m RL, Addl. Chief Engineer, Irrigation Department, informed that funds were received from the GoM but the work was yet to commence.

Govt., of Madhya Pradesh (GoMP)**Compensatory Afforestation**

It was informed by the Vice Chairman, NVDA that about 85% of the plantation areas have been transferred to territorial divisions for further protection and management. Further work was making progress. He informed that works undertaken for various environmental activities were being maintained by the NVDA till such time these are transferred to the regular territorial division.

Flora, Fauna and Carrying Capacity

Regarding felling of the trees from the forest areas corresponding to 100m RL, it was informed that except for some 60 trees all areas have been felled as suggested by the Environment Sub-group.

Maintenance of the Plantation & Catchment Area Treatment (CAT)

The Vice Chairman, NVDA pointed out that the CAT works have been completed in all the identified sub-watersheds as suggested by the ESG during its 37th meeting. It was pointed out that the treatment of the Catchment within the forest area was being carried out by the Forestry Division whereas treatment of the agricultural areas was being carried out by the trained and qualified staff of the Department of Agriculture.

Health

Regarding implementation of the recommendations of the Committee on health aspect, it was pointed out that issues brought out by Dr. Kwathekad while discussing health aspect of ISP applied equally to the SSP also and considering that the submergence was yet to commence in M.P. in a big way, there was time to take appropriate action in the matter.

Archeological Aspects

It was pointed out by the Vice Chairman, NVDA that works were progressing as scheduled except for some monuments for which the ASI agreed to take up the works initially but withdrew subsequently.

The Chairman suggested that these issues could also be discussed in the meeting to be convened by the MoEF to discuss the issues related to Joga Fort concerning ISP.

A. Review of the progress of works on the suggested parameters in relation to the proposed filling of the reservoir up to RL 110m by June 2003 and beyond

Govt., of Gujarat (GoG)

The Vice Chairman, SSNNL pointed out that the GoG have already completed all the works related to CAT and Compensatory Afforestation and the results of the CAT works were also analyzed with the help of satellite imageries and reported to the subgroup. It was further pointed out by him that Flora and Fauna aspects have been attended to as required and that felling of the trees from the submergence zone was completed. In addition, the Archaeological monuments were re-located completely, as planned. The CAD Plan was already submitted and requested the Chairman to consider the request of the GoG for allowing to raise the dam to 110m as per the schedule approved by the NCA.

Member (E&R), NCA brought to the notice of the sub-group that a request from the Govt. of Gujarat towards sharing of the expenditure & responsibilities related to conservation of lake environment was received and that it was being presented for consideration of the High Level Expert Group (HLEG) on Fisheries Conservation & Development formed by the NCA on the advice of the Environment Sub-group. A meeting of this HLEG was proposed and outcome on the deliberations on the subject shall be reported to the Sub-group in due course.

Govt., of Madhya Pradesh (GoMP)

The Vice Chairman, NVDA pointed out that whereas, all works related to Compensatory Afforestation have already been completed, and as per the vicinity targets delineated by the NCA, about 5,000 ha., of the Catchment would require treatment corresponding to raising of the dam height to 110m RL. This would also be treated in time. The implementation of the Action Plan on Flora & Fauna and Carrying Capacity aspects were making progress. He clarified that regarding felling of the trees in submergence zone and re-location of the monuments in the submergence area commensurate with impoundments at 100 MRL, almost all works have been completed and that preparation of the M.P. for considering the request of GoG for raising the dam height of 110m may be considered as adequate.

Govt., of Maharashtra (GoM)

In the absence of concerned Officers from GoM for presenting the status on health, Sub-group could not review the same. However, it was brought out by the Addl. Chief Engineer, Irrigation Department, GoM, that though felling was yet to be started in 79 ha forest area coming under the submergence of 100M, all works related to Compensatory Afforestation and CAT have been completed. Steps were being taken for implementation of Plan related to Flora & Fauna and Carrying Capacity aspects also.

Govt., of Rajasthan (GoR)

Representative of GoR stated that the recommendations on the development of the Command Area made by the WAPCOS were being examined and the Action Plan was under formulation. It was, however, pointed out that water would reach Rajasthan only after the main canal was completed by the GoG and the dam height was raised to its full level.

The Vice Chairman, SSNNL requested the Chairman that in view of the substantial progress made in all the areas by all the three States, especially with

regard to pari-passu requirement commensurate with 110m RL, the Sub-group might consider request of GoG for allowing it to raise the dam height up to 110m RL, favorably.

Prof. Ramaseshan, referring to his observations communicated earlier, stated that it was required to be ascertained for sure whether raising the dam height up to 100/110m and construction of humps of 3m height above this height would increase the effective submergence or not. The Managing Director, SSNNL explained that the detailed studies on this aspect were carried out by the CWPRS and detailed reports were available. He requested Prof. Ramaseshan to spare some of his time and visit the CWPRS for detailed discussions on this aspect with the team for any clarification needed by him. He further stated that all expenditure made in connection with his visit to CWPRS would be borne by the SSNNL.

Prof. R.K. Katti was of the view that considering the substantial compliance on various issues disused by the ESG, GoG may be permitted to raise the dam height to 110m RL including humps, if any. He further stated that all steps should be taken for analyzing the data on seismicity especially in view of the phenomenon of amplification as was evidenced during the Bhuj Earthquake wherein although the center of the earthquake was at Bhuj yet Ahmedabad experienced higher than expected impacts and, therefore, regular monitoring of seismological activity was necessary.

Dr. Shekhar Singh, desired to know the outcome of the recommendations of the Multi-disciplinary Committee formed by the MoEF for appraisal of survey, studies and implementation of the action plan and stated that until Sub-group was provided with inputs of this Committee and the Sub-group was convinced that all that was required, was completed, Sub-group might not be in a position to consider the request of the GoG. He was of the view that request of the GoG may not be acceded to at this time. He further pointed out that he would need some time after receipt of the CAD Plan to firm up his views. He also stated that the works on felling of trees were required to be expedited especially in Maharashtra. In addition, CAT in

Madhya Pradesh and Health issues both in Madhya Pradesh and Maharashtra were beset with short comings and, therefore, it would not be desirable to consider the request.

Director (IA), MoEF pointed out that some works on Catchment Area Treatment in Madhya Pradesh, felling of trees in the submergence area in Maharashtra, implementation of the plan on Flora, Fauna and Carrying Capacity aspects both in Madhya Pradesh and Maharashtra, re-location of the monuments in Madhya Pradesh besides implementation of the recommendations made by the Committee of Health Experts in Madhya Pradesh and Maharashtra were still outstanding and suggested that request of the GoG could be considered after fulfillment of the above requirements.

The Vice Chairman, SSNNL requested the Chairman that considering substantial progress in almost all the areas request of the GoG for granting permission be considered.

The Chairman pointed out that the implementation of the R&R plan also formed a part of the conditional clearance and considering that the permission for raising the dam height beyond even 95m RL was still under consideration of the R&R Sub-group of the NCA, no useful purpose would be served by the permission of the Environment Sub-group at this juncture.

After some discussions and considering the observations of the Members, it was agreed that States would speed up the implementation of the required action to be commensurate with the requirement for granting permission to raise the dam height to 110m by ESG and that the Sub-group would consider the request during its subsequent meetings. It was also agreed that meetings of the Sub-group could be convened more frequently.

**Item No. XXXVIII - 4 (178) : REVIEW OF THE ACTION TAKEN ON THE DECISION
OF THE PREVIOUS MEETINGS.**

The discussions on the Agenda item was deferred due to shortage of time.

Item No. XXXVIII-5(179) : Any other item – MONITORING OF ISP

The Vice Chairman, NVDA brought to the notice of the Chairman the discussions of the 8th meeting of RCNCA held on 10.1.2001 wherein it was brought out by the Hon'ble Minister for Environment & Forests, Govt., of India, that an alternative mechanism would be evolved for monitoring of R&R aspects of the ISP. In view of the above and that, the ISP was an Intra-state project, he requested that environmental aspects of the ISP need not to be monitored by the Environment Sub-group or any other body of the NCA.

The points brought out by the GoMP were discussed in detail. Ministry of Environment & Forests while according clearance from the environmental angles to both ISP and SSP had entrusted the responsibilities for monitoring of ISP to the NCA. The decision to monitor the ISP was, therefore, taken at the highest level by the Govt. This was also reflected in the Narmada Water Scheme which was amended specifically for this purpose. The ESG has been monitoring this ever since the clearance was granted in 1987. Considering the above, it was decided that the ISP would continue to be monitored by the Environment Sub-group of the NCA as before.

Regarding an alternative mechanism for monitoring of the R&R aspects of the ISP to be evolved by the MoEF, the issue was discussed in detail and it was considered desirable to study the legal opinion which was to be obtained by the MoWR as per the decision taken during NCA meetings. To enable MoEF to evolve the monitoring mechanism for R&R aspects of the ISP, the Ministry of Water Resources was requested to convey the factual position on this aspect to the MoEF. Commissioner (PR), MoWR informed that MoWR holds the view that R&R as well as environmental monitoring of ISP should be done by the NCA as stipulated in various clearances given to the project and statutory requirement of the Narmada Water Scheme.

The meeting ended with a vote of thanks to the Chairman.

ANNEXURE

ANNEX-XXXVIII-Min-I

LIST OF PARTICIPANTS OF THE 38th MEETING OF ENVIRONMENT SUB-GROUP OF NCA HELD ON 10th March 2003 AT PARYAVARAN BHAWAN, NEW DELHI.

GOVERNMENT OF INDIA

S/Shri/Smt.

Ministry of Environment & Forests

1. K.C. Misra, Secretary, Govt. of India, New Delhi
2. V. Rajagopalan, Joint Secretary, New Delhi
3. Dr. Nalini Bhat, Director, New Delhi
4. R.P. Agarwala, IGF, New Delhi

Narmada Control Authority

1. R. Jeyaseelan, Executive Member, Indore
2. A.C.Gupta, Designated Executive Member
3. Suresh Chand, Member (E&R), Indore
4. Dr. Pawan Kumar, Director (Environment), Indore

Ministry of Water Resources

1. R.K.Sharma, Commissioner (PR), New Delhi

Sardar Sarovar Construction Advisory Committee

1. Indra Raj, Secretary, Vadodara

Botanical Survey of India

1. Dr. K.K. Khanna, Dy. Director, Allahabad

Indian Council of Medical Research

1. Dr. Sarala. K. Subbarao, Director, Malaria Research Institute, New Delhi

National Institute of Communicable Diseases

1. Dr. S.K. Satpathy, Addl. Director, New Delhi

Ministry of Health & Family Welfare

1. Dr. S.K. Sharma, Advisor (Ayurveda), Dept. of ISM&H, New Delhi.

Wild Life Institute of India

1. Dr. Asha Rajvanshi, Senior Reader, Dehradun.

Anthropological Survey of India

1. Dr. J.K. Sarkar, Director-in-Charge, Kolkata

EXPERT MEMBERS

1. Dr. S. Ramaseshan, Prof. (Retd.) I.I.T., Kanpur
2. Dr. Sekhar Singh, Director, Samya – Centre for Equity Studies, New Delhi.
3. Dr. R.K. Katti, Prof. Emeritus, IIT, Mumbai and Director & Consultant, UNEECs, Mumbai

GOVERNMENT OF GUJARAT

1. V.B. Buch, Vice Chairman, SSNNL, Gandhinagar
2. K.C. Kapoor, Managing Director, SSNNL, Gandhinagar.
3. N.B. Desai, Director (Civil), SSNNL, Gandhinagar.
4. S.J. Desai, Executive Director SSNNL, Gandhinagar
5. R.V. Asari, CCF, SSNNL, Gandhinagar
6. Ashwin Parmar, Specialist Environment, SSNNL, Gandhinagar
7. Dr. J.C. Gandhi, Consultant (Health), SSNNL, Gandhinagar
8. K.R. Narayanan, Consultant (Fisheries), SSNNL, Gandhinagar

GOVERNMENT OF MADHYA PRADESH

1. Pradeep Bhargava, Principal Secretary, NVDA, Bhopal
2. A.K. Dubey, Member (E&F), NVDA, Bhopal
3. Mrs. I.M. Chahal, Commissioner, Archaeology & Museum, Bhopal
4. R.K. Behre, SMS, NVDA, Bhopal.
5. Dr. P.W. Kavathekar, Health Advisor, N.V.D.A
6. V.B. Bhatt, Dy. Manager (Env.), NHDC, Bhopal.

GOVERNMENT OF MAHARASHTRA

1. S.Y. Kulkarni, Addl. Chief Engineer, Koyana Project, Irrigation Department, Mumbai.
2. Dr. V.B. Waghmode, Dy. Director (Fisheries), Mumbai.

GOVERNMENT OF RAJASTHAN

1. N.R. Mehta, S.E., Irrigation Dept., Narmada Project Circle, Jalore.