

NARMADA CONTROL AUTHORITY

Environment Sub Group

Agenda and Minutes of Meetings

PART III

*21st to 27th Meeting of the Environment Sub-
Group (ESG)*

1993 to 1996

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नर्मदा नियंत्रण प्राधिकरण NARMADA CONTROL AUTHORITY

पर्यावरण उपदल
Environment Sub-Group

इक्कीसवीं बैठक की कार्यसूची Agenda for Twenty First Meeting

स्थान : पर्यावरण भवन, नई दिल्ली
Venue : Paryavaran Bhawan
New Delhi

दिनांक 7 दिसम्बर, 1993, 10 बजे
Date : 7 Dec., 1993, 10A.M.

इन्दौर
दिसम्बर, 1993

INDORE
December, 1993

AGENDA FOR 21ST MEETING OF THE ENVIRONMENT SUB-GROUP
NCA TO BE HELD ON 7TH DECEMBER, 1993 AT PARYAVARAN
BHAWAN, CSO COMPLEX, NEW DELHI

I N D E X

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A N N E X U R E S

- XXI-1 Minutes of the 5th meeting on fisheries development and conservation in SSP & NSP held on 10.11.93
- XXI-2 Minutes of the meeting on action plan and implementation of Public Health of SSP & NSP held on 30.11.93.
- XXI-3 Copies of letter received from Dr. Sekhar Singh & NBA.

ITEM NO. XX-1(108): CONFIRMATION OF MINUTES OF THE 20TH MEETING

Minutes of the 20th meeting of Environment Sub-Group of Narmada Control Authority were circulated to all members and invitees separately vide letter No.Env 34(21)/93/4558-97 dated 26.11.93. Minutes are put up for confirmation

**ITEM NO.XXI-2(109): REVIEW OF ACTIONS TAKEN ON THE DECISIONS
OF THE PREVIOUS MEETING**

While reviewing the environmental impacts of closing of construction sluices it was noted by the sub-group that the information supplied by Govt. of Gujarat and details of fishermen rehabilitation, catchment area treatment is not adequate to arrive at a final decision. However considering the minimum time required for completing preparatory work for closing of construction sluices by mid December '93 SSNNL was allowed to proceed with the preparatory work subject to the condition that actual closure may take place after a decision is taken in the 21st meeting.

It was also agreed to hold 21st meeting on 7th December, 1993 to review the above aspect. Project authorities were directed to furnish all relevant data needed by the Sub-group to enable it to arrive at a decision in the matter during 21st meeting. The Govt. of Madhya Pradesh was also to confirm about adequate releases from Bargi. The environment impact of closing of the construction sluices such as those relating to downstream water supplies, conservation of fish fauna and public health were proposed for a review during the meeting.

The present status of each aspect is presented below for a review by the members.

XXI-2(109) (1): CONSERVATION OF FISH-FAUNA

During the 16th meeting of the environment subgroup, Chairman directed that a clear picture on conservation aspect may be presented to the subgroup. CICFRI were assigned the task by NCA. The institute carried out a desk review study and submitted its report in Sept. 1993. This report suggested a number of action points for the project authorities to be taken before and after the impoundment. The suggested action plan was scrutinised in NCA and states were requested to expedite the action suggested by NCA.

A number of actions have been taken up by the concerned State & Govt. aimed at initiating negative impacts of fish & fisheries. Executive member NCA discussed the issue with State Govts and exports in a meeting held on 10th Nov. 1993. Minutes of meeting are placed at Annex. XXI- I.

During the 20th meeting the issue of conserving fish-fauna downstream SSP was discussed and SSNNL was requested to supply information on availability of deep pools downstream for the purpose of declaring these either as sanctuaries or closed area during after closing of construction sluices.

NVDA/SSNNL/and Govt. of Maharashtra may like to present the current status of implementation of the recommendations made by the NCA earlier for review by the Members.

ITEM NO.XXI-2(109)2 : STUDIES/SURVEY ACTION PLAN AND IMPLEMENTATION ASPECT OF PUBLIC HEALTH.

Covenants of agreement, entered into by GOI, GOG, GOMP, & GOM with the world bank contained specific provisions for preparation and implementation of action plan on health aspects. Clearance granted by MOE & F in 1987 also included health aspects as important parameter for monitoring. State Govts. submitted their health plans in various stages of completion. The progress is being reviewed by the subgroup from time to time.

During the course of review subgroup had directed state Governments to develop data base on health statistics of pre and post impoundments regime and to take all necessary actions to safeguard the public health around periphery of the reservoir and also at the relocation sites from increased risk due to Sardar Sarovar Project. It was also directed that only the incremental expenditure needs to be debited to the projects. For monitoring the level of use of insecticide, pesticides in the command & organic loading of the reservoir, need for regular monitoring of the water quality of the reservoir, estuary and command was also stressed. Vector Control measures proposed by the project authorities which advocated drawing of the vector larvae due to fluctuation in the water level was also called for, for a review by the experts. Integrated vector control was stressed.

To provide fresh impetus to the effective implementation of the action plans related with public health issues Ex. Memb. NCA had discussed the issue with experts in a meeting held on 30.11.93. A copy of the Minutes of meeting is placed at Annex-XXI-2.

In accordance with the decision taken during 19th meeting of the subgroup. Copies of the health plan and monitoring report of Gandhi Medical College Bhopal were made available to the DG ICMR for his observations.

The State Govts. of Maharashtra, SSNNL/NPG of GOG and NVDA of GOMP are requested to present information regarding the current states of implementation of the health aspects for a review by the members.

**ITEM XX1-2(109)3 : ENVIRONMENTAL IMPACTS OF CLOSING OF
CONSTRUCTION SELUICES: REPORT OF
THE EXPERT GROUP CONSTITUTED BY
SSNNL XX-5(108)**

During a review of the report submitted by SSNNL some details were called for by the subgroup, these related to the maintaining of d/s water supplies in the 1st 5 Km reach and thereafter upto the required limit. Information was also called for regarding the availability of deep pools d/s of SSP & assessment of possible impact on grown culture, drinking water requirements of the d/s habitations etc.

Copies of the letter received from Dr. Shekhe Singh & NBA people are placed at Annex XXI -3. Project authorities were directed to send replies to the points raised by them. NPG/SSNNL may like to present the complete scenario on the above aspects for a review by the subgroup.

Any other item

Date & Venue of next meeting.

ANNEXURES

ANNEX - XXI -(1).

MINUTES OF THE FIFTH MEETING ON FISHERIES
DEVELOPMENT AND CONSERVATION IN SARDAR SAROVAR AND
NARMADA SABAR PROJECT HELD ON 10.11.93 AT NEW DELHI.

Shri S.A. Char, Executive Member, NCA welcomed all those present in the meeting. Discussion on various agenda items was taken up thereafter. List of participants is enclosed at Annexure-I.

Item No.V(1): Confirmation of the Minutes of the 4th meeting held on 22.9.93 at New Delhi.

Comments on the minutes of the 4th meeting received from Commissioner of Fisheries, Govt. of Gujarat are placed at Annex-II.

Minutes were confirmed with the following modifications as alteration/ additions to the Minutes of 4th meeting.

Agenda Item No.IV(1),Page No.2 Para-II. (Line 13 to 15 was replaced by the following)

The period of Prawn seed collection is from September to January. December is the peak period.

Page No.2 Para-III. (Following was added to the para)

The information on deep pools have been sought from Sardar Sarovar Narmada Nigam Ltd. On getting the same survey could be conducted.

Page No.2, Para-IV (Following was added to the para)

Hilsa migration has been widely studied in all river system by CICFRI and other research workers. Fresh study, therefore, is not required. But only co-relation of flood flows, phase of moon and catch is necessary. This can be addressed to by CICFRI.

Page No.3, Para-III (Following was inserted on line 3rd)

The closed season in reservoir fishing observed in Gujarat is from 16th August to 15th September.

Page No.3, Para-IV (Following was added to the para)

The fisheries component under reservoir, village pond development programme, water logged area, Estuarine area are aimed to give benefit to the displaced persons on account of submergence and promotion of research as well to the traditional fishermen of the concerned areas.

Item No.V(2) Implementation of the recommendations made on the basis of Desk Review study completed by CICFRI

Shri N.V.V. Char, Secretary, SSCAC opened the discussion and desired to know the progress regarding the implementation of the recommendations based on desk review conveyed by the NCA earlier.

Shri B. Roy wanted to know whether the recommendation will be implemented by State Governments or by the proposed Inter-State Fisheries Development Board. Dr.A.K. Malhotra, Member (E&R), NCA expressed that these recommendations are supposed to be implemented by the State Government concerned.

Shri A.M. Farooqui, Director, Fisheries, GOM stated that as most of the recommendations are for taking up further studies GOMP is exploring the possibility for entrusting these to the universities engaged by NVDA earlier. He also informed that, CICFRI has shifted its one of the research centres from Bangalore to Hoshangabad and they may also be requested to take up these studies.

Shri B. Roy suggested that ICAR has already done considerable work on Fisheries development and conservation concerning Narmada river, therefore it will be appropriate if Deputy Director General (Fisheries) is approached in this matter. He further informed that as desired during the earlier meetings Commissioner, Fisheries, Department of Agriculture & Cooperation, Govt. of India had already communicated the need for taking up studies on artificial propagation of the fishes identified by CICFRI to ICAR. He pointed to the occurrence of a particular fish sp. Rita pavementata which constitutes 10% of the total fish catches in Narmada. According to him this fish is found exclusively in Narmada and Krishna rivers only. He desired that CICFRI may be addressed on the vulnerability of the fish sp. also.

Dr. A.K. Malhotra, Member (E&R) requested GOMP officials to frame the TOR for the proposed studies at the earliest under intimation to the NCA.

Shri Man Singh, Secretary (Fisheries) expressed that his department is basically concerned with productivity of fishes and would do everything to enhance the same. Dr. Pawan Kumar, Specialist (Env) informed that the conservation of fish fauna is covered under environmental clearance granted to the project by MOE&F in 1987 and that plans are required for mitigating the negative impacts due to construction of the project. The approach to conservation should be holistic. It is with this consideration that issues were identified for conserving the aquatic fauna of which fish is an important indicator. It was also in this context that norms are required to be developed for rational

management of aquatic eco system keeping in view not only the carp varieties but other flora and fauna also. The issues like initial tropic burst that is expected with progressive filling of the reservoir, eutrophication, algal bloom, clearing the forest from the submergence area are also to be addressed to. Specialist (Env.) further pointed out that these point have been discussed in the sub-group meetings earlier and as sufficient information on these issue was not available to the Sub-group it was agreed to entrust these studies to CICFRI. Now that CICFRI has submitted its report which also outlines the actions needed before impoundment and after impoundment, there is an urgent need for quick response from the State Governments.

Shri N.V.V. Char, Secretary, SSCAC pointed out that people engaged in fishing downstream would not be affected by closing of sluices immediately since the impact downstream would be felt after Stage-I yet there is a need to work out the plan for rehabilitation of fishermen families upstream. Member (E&R), NCA stated that efforts are required for developing the actions outlined in the reports produced by CICFRI, GOPA & M/s Wallingford Institute, London.

GOG officials also showed a list of deep pools available in the NWDT files and informed that they are working out further details for presentation to the Sub-group. Shri N.V.V. Char, Secretary, SSCAC informed that M/s. Wallingford Institute are to continue further studies on downstream reach under OTA technical assistance.

After some discussion it was agreed that GOG would take up the issues with the concerned authorities soon.

Item No.VI-(3) Revision of the plans prepared by State Governments of Madhya Pradesh, Maharashtra and Gujarat.

Shri B.K. Verma, Member (E&F) informed that final reports on liminological aspect is expected shortly from Barkatullah University. The plans prepared in 1984 will be taken up for revision soon.

Shri S.A. Char, Executive Member, NCA stated that we need to take note of our experience from other reservoirs also. Specialist (Env), NCA pointed out that as per the reports available GOG has already allotted 16 ha area for developing the fish seed farm and hatcheries. However action plan on the lines suggested in the GOPA reports are yet awaited. GOG officials informed that further studies are progressing for developing action plans on fisheries in the Estuary and command area where Scientist from M.S. University & CICFRI are also engaged.

Item No. VI(4) Formation of Sardar Sarovar Inter- State Fisheries Development Board

Shri B.K. Verma, Member (E&F) informed that based on decision taken by the Madhya Pradesh cabinet in June, 1992 a proposal was sent to the Secretary, Fisheries, Govt. of Gujarat and Secretary, Fisheries, Govt. of Maharashtra in which it is proposed to form a 5 member board with President & Member Secretary from Madhya Pradesh besides one Member from each state of Madhya Pradesh, Maharashtra and Gujarat. Response to this proposal is awaited.

Shri Man Singh, Secretary, Fisheries, Govt. of Gujarat stated that the proposal sent by GOMP does not include the representative of NCA which in his opinion is not conducive to the Inter-State issues.

Dr. A.K. Malhotra, Member (E&R) pointed out that NWDT Award has restricted the fishing rights of each state to the water spread areas within their territorial jurisdiction and has left it open to NCA and State Governments to workout a strategy for management of fishing in the reservoir. Besides, in view of the guidelines from MOE&F for conserving the fish fauna the responsibility for overseeing the survey, studies and implementation of the action plans was entrusted to NCA.

Specialist (Env.) pointed out that as conservation of fish fauna aims at best utilisation of the resource with holistic approach, it is desirable that a decision regarding the establishment of Inter-State Board is taken soon.

Shri S.A. Char, Executive Member, NCA, suggested that the communication received from GOMP by GOM and GOG should be addressed to on it's merit urgently.

In response to a question from Executive Member, NCA, Shri B.K. Verma stated that in case GOG & GOM disagree with the proposal sent by GOMP any departure from the stand taken by Madhya Pradesh would require approval of the government.

After some discussion it was agreed that GOG would expedite action regarding this.

**Item No.IV(5):Studies on fish & fisheries entrusted to
Friends of Nature Society, Bhopal by NVDA.**

Shri B.K. Verma informed that Friends of Nature Society had submitted its draft report but it was devoid of action plan. A meeting has been called to discuss these issues and upon receipt of the action plan from Friends of Nature Society further recommendation would be taken up for implementation.

Item No.IV(6):Studies on Liminological aspects of BSP & NSP entrusted to three Universities by NVDA.

Shri B.K. Verma stated that the report from Barkatullah University is expected shortly.

ANNEX- XXI-III(a)

**INDIAN INSTITUTE OF PUBLIC ADMINISTRATION
Indraprastha Estate
New Delhi 110002**

2 November, 1993

Dear Shri Rajamani,

I enclose a note on the proposal to close the Sardar Sarovar Sluice Gates in December, 1993, to be discussed at the 20th meeting of the Narmada Control Authority Sub-group on environment (scheduled for 3.11.93). This note is based on the agenda papers for the said meeting and on the Report of the Expert Group on Environmental Impact on Closure of Construction Sluices .. of the Narmada Planning Group.

I would be grateful if the points I have raised in the enclosed note be discussed at the forthcoming sub-group meeting.

With regards,

Yours Sincerely,


Shekhar Singh

Shri R.Rajamani
Secretary
Ministry of Environment and Forests, &
Chairman, NCA Sub-group on Environment
Government of India
New Delhi 110 003

Encl: aa

NOTE ON THE PROPOSED CLOSURE OF SLUICE GATES OF SARDAR SAROVAR DAM

Despite the decision of the sub-group to not allow the closure of the sluice gates before March, 1994, and even then after taking approval of the sub-group, there is now a proposal before the sub-group to close the gates in December, 1993. Given below are some of the main reasons why this should not be accepted.

1. PENDING ACTION

1.1 Relocation and rehabilitation work in six villages in Gujarat has been stayed by the Gujarat High Court, of which Vadgam and Gader will be permanently submerged if gates are allowed to be closed in December, 1993. This would be in violation of the High Court order.

1.2 Even if stay is lifted today, the R&R conditions prescribed in the tribunal, especially clauses IV(2)(iv), IV(6)(ii) and V(3)(iii).

1.3 Similar violation will occur in relation to Manibeli in Maharashtra, which would also be permanently submerged.

1.4 The NPG report mentions (p12) that "The impounding of water would, however, result in the submergence of important road linkages below EL 53 m.... Further, they (GOM) have been advised to construct a road at higher elevation ..." Unless we know the status of this, we cannot decide about the closing of the sluices.

1.5 There is another road (not mentioned in the NPG report), connecting the dam site to Vadgam and beyond to other villages which would also be submerged and needs to be replaced. The status of this road also has to be determined.

1.6 Nowhere is there a mention if the people have been consulted or even informed about the issue. From the report of Ms Tripti Soni on the downstream impacts of Sardar Sarovar Project, titled "The Voiceless Tragedy" and presented to the Committee currently reviewing the project, it seems the people in the downstream area have not been taken into confidence about the closure of the construction sluices. Nor is it evident from the NPG report whether the people likely to be affected by the closing of the sluices have been informed about the consequences. This concern also is not mentioned in the list of specific areas (p 6) the Expert Group identified for closer scrutiny, as listed in the NPG report.

1.7 It is particularly important to discuss this with the downstream fisherfolk, who would be significantly affected by the closure of the sluice gates, and to evolve in consultation with them mitigatory and compensatory strategies.

1.8 It is also critical to discuss the implications with the many downstream villages whose sources of water will be affected and who would be affected with salt water ingress. Preventive and mitigative strategies would have to be evolved in consultation with them.

1.9 This last point is especially important as the impact on drinking water supply, downstream of the dam, would be significant despite statements to the contrary in the NPG report. The NPG report mentions (p 13) that "currently 147 MLD are being drawn from various water supply schemes through intake wells or by divert pumping." However, as per CICFRI report on sociological survey of downstream villages, people in 28.7% of the villages on the banks of the Narmada depend on the river directly for their daily supply of domestic water.

15.9% villages depend on wells, 24.2% on tubewells and 23.7% villages depend on water-supply schemes. All of them would be affected when water flow downstream of SSP gets reduced drastically. They have not been mentioned in the break up of users mentioned in the NPG report.

1.10 No users are mentioned from Baroda District, though there are many villages on the banks of the river in Baroda District. These villages would also be dependent on the river water. It is, therefore, important to determine how much water is being used in the downstream area, who is using it, and for what. An assessment needs to be made as to how much water will be actually available for these people.

1.11 A similar analysis will have to be done for the areas and populations dependent on Karjan Reservoir, if water is to be made available from there.

1.12 It is also not clear whether the losses due to seepage and evaporation have been taken into consideration while working out the water availability scenario downstream after the closing of the sluices, especially considering the fact that in that season there is ordinarily no flow in Karjan River below the dam.

1.13 Regarding the increased risk from water pollution due to reduced water flow, the NPG report says (p 17) "... during the period of the flow reduction, the Gujarat Pollution Control Board may persuade the concerned industries to adopt stringent controls so that the quality of effluents is kept within permissible limits. It showed not be difficult to obtain necessary support and cooperation from the concerned industries for such a limited period." This seems to be an unworkable solution for, if all that was needed was persuasion the SPCB could have already ensured that effluents were within "permissible limits". Usually what is required is investment and the installation of pollution control devices. Besides, without knowing the details of the pollutants, the current levels of pollution, and the response of the industry to this "persuasion", no decisions can be made.

2. NON-AVAILABILITY OF STUDIES

2.1 It is recorded in the minutes of the 19th meeting of NCA-ESG (p 5-7) that "Sub-Group also discussed implications of the closure of sluices beyond December '93 and felt that the studies which have been done for mitigating the downstream impacts need to be scrutinised, mitigation measures proposed and their need to be checked and recommended measures should be implemented in time and in any case the Sub-Group cannot arrive at a firm recommendation or suggestion just now.

"Chairman referring to the discussions of the 18th meeting of the ESG stated that the Sub-Group had recommended shifting of the dates for closing of the sluices to March. '94,...

"He (Chairman) suggested that the Sub-Group cannot decide on closing of the sluices unless data on the following aspects is available:

- (i) Provision of downstream water supply
- (ii) Salt intrusion with and without dam; and
- (iii) Areas which are likely to be submerged at the level pool submergence (pondage)."

It seems obvious that much of this information is still not available and, at least as far as the ESG members go, they have not had access to the reports that might be available (some of which are listed below) since the 18th meeting. Therefore, it is still not possible to recommend the closing of sluices.

REHABILITATION

2.2 Rehabilitation plan for fisherfolk families: Annexure VI of the Agenda notes says: "GOG officials also agreed to examine the need for developing an action plan for rehabilitation of all those fisherman likely to be affected by reduced flow downstream of the SSP." The need for such a plan was felt even in CICFRI's study of 1991. In the 18th meeting of the NCA-ESG, it was suggested by the Chairman that, "the fisherman families, living downstream may be resettled in the command area in the growth centre." Despite this, even till today the GOG has only agreed "to examine the need for developing action plan ..". There is still no action plan, leave alone action. But the NPG report does not even mention what is to be done about the fisherfolk and boat-operators families whose livelihoods would be immediately affected. CICFRI report of 1991 mentioned the figure of over 5000 families so affected. We need to look into this aspect seriously while taking a decision on the sluices.

ECOLOGICAL IMPACTS

2.3 Salt water ingress: While it is claimed that 67 cumecs of water will be released, this is less than a third of the normal flow at this time of the year. What is not clear is the level of flow at the Narmada River mouth with and without the closing of the sluice gates and the implication on salt water ingress. The general statement in the report that saline intrusion zone is 72 kms has no basis provided. Besides, this might be the situation currently, but would change when the water flow is significantly reduced and the saline water is drawn into the aquifers due to the action of pumps in the region. Also, the impact of this saline ingress has not been assessed. Experience elsewhere (eg. Vaiga River in Ramanathapuram District in Tamil Nadu) shows that once salt water enters aquifers it would take many many years and huge expenditure to clean up the aquifer, if it can ever be cleaned.

2.4 The NPG report mentions (p 14) that "Dr. S.N. Singh, Head of Vadodara Unit at CICFRI examined the likely impacts and had prepared a note on various aspects discussing the fishery potential, ecology of the Narmada riverine systems, the biological study at the river and a broad assessment at macro-benth. He found that with a large reduction in the flow at water in the river, the following repercussions may be expected:

- i) Charges in habitat in terms at hydrographic and hydro dynamic regimes;
- ii) Tidal ingress and salinity tongue invasion;
- iii) Hydrobiological aberrations;
- iv) Pollutational severity and
- v) Effect on mangroves ecosystem."

The only response to this in the NPG report is: "However, since a flow of over 67 cumecs is to be maintained downstream of the confluence of Kanjan river with the Narmada and since the reduction of flow will be for a short duration of about 6 to 15 days only, the adverse impact on fisheries, in general, is expected to be limited" (p 15). However, considering the first stretch of the river (40 kms) would

be with much smaller flows, and considering the assumption made in the response is not scientific, such a response would not suffice. Therefore, the ESG members need to look at the note prepared by Dr. S.N.Singh.

2.5 In 19th meeting of NCA-ESG (28 July) it was stated (p 13) that, "Regarding report on Environmental Impact of downstream of SSP Govt. of Gujarat informed that the final report is awaited from HR Wallingford Institute, London." This was despite the fact that an earlier report prepared by NCA "SSP:Environmental Overview and Prioritised Action Plan, dated June '93" says on p74: "There have been a number of studies carried out on the downstream environment. These have been assessed and synthesized in the Wallingford report." Obviously the report was available in June, 1993 and should, therefore, have been circulated to the members of the ESG. An examination of this report is necessary before any decision about the closing of sluices can be taken.

2.6 Similarly, the report at the CWPRS is referred to several times, but this report has also not been circulated to the members of the sub-group. Neither has the NPG-GOG report on comprehensive downstream impacts.

2.7 Impact on the first stretch : While it is clear that not more than 12.5 cumecs (which is also gradually built up) will be available for upto 40 kms, the impact of this low flow in this region is not analysed, and the whole exercise assumes a flow of 67 cumecs. What would be the impact of this low flow on the ecosystem and drinking water availability for the first 40 kms is not assessed. Whether this would permanently damage the aquifers is also not clear.

2.8 Period of water flow suspension : While in the 18th meeting of the NCA-ESG it was said that the water would be stopped for a period at 22 days, in this document it is variously mentioned as 6, 10 and 15 days (p 20). This vagueness makes it difficult for anyone to come to a conclusion about the likely impact and necessary mitigative measure. It is necessary to show what is the amount of storage capacity till 53 mt. and the present flow rate in Narmada, leading to estimation of the number of days for which the flow rate in the downstream will stop.

FISHERIES

2.9 While there is some assessment of the impact on commercial fish species, there is no assessment of the impact of aquatic fauna and flora of the river, especially in the stretch between the dam and Karjan River mouth. Even the solutions suggested for commercial species are impractical and without any scientific basis. For example, what would be the impact of fish concentration in pools on the availability of food or on water oxygenation? Has the report of Mr. K.G.S.Nair on the impact of the closing of sluice gates on the fish been received (as requested in meeting on 22.9.93 and reported on p 61 of agenda) ? If it has, what are the findings? If not, how can we take a decision in its absence.

2.10 How can prawn seeds be available and collected in the same quantities in a shorter period? What would be their viability if collected prematurely, or late? In case it is maintained that the viability would not be affected then scientific evidence for this must be produced. It must also be explained why people do not ordinarily collect these in two months, as is being proposed, rather than the three months that is the practice. This is especially important as the giant fresh water prawn is stated to be very important to the economy of the region (p 60 of agenda).

2.11 The "Desk Review Study on fish conservation in Narmada Sagar and Sardar Sarovar and its downstream" was entrusted to CICFRI in Feb'92, to be completed in 3 months. (Ref: Minutes of the 14th meeting of NCA-ESG). In both 18th and 19th meeting of NCA-ESG, it was stated that the report is under printing. After twenty months, the Agenda notes of 20th meeting (Annex - VI) do state that the said report is now available, but this crucial report, which would help the NCA-ESG members to arrive at their own assessment, has not yet been circulated to the members. Annex VI does discuss the report, but does not mention the recommendations of the report.

3. GENERAL ISSUES

3.1 The closing of the sluice gates mark an important step in the dam construction schedule. The ESG must, therefore, assess whether the pari passu condition has been fulfilled before it approves the time schedule for closing the sluices. If the project authorities unilaterally create conditions where the construction work advances beyond the level justified by the pari passu clause then this cannot be used as a basis to get approval for further construction work.

3.2 It seems that the progress of rehabilitation work in Maharashtra is way behind schedule and that the identification of land and of the estimated 1700 families who would be affected by June, 1994 has not yet been completed. As the tribunal lays down that various tasks related to rehabilitation must be completed atleast one year in advance of the submergence, according to the proposed construction schedule this is no longer possible.

3.3 The proposed allocation of water releases of the Narmada river seem to have been drawn up without any reference to the ecological requirements of the down stream riverine system. Surely this should be settled before the closing of sluice gates is agreed upon.

ss\narmada\nca\sluice

ANNEX-XXI-III(5)

नर्मदा बचाओ आंदोलन

C/o. परिवर्तन, निंबाकर चेंबर, दांडिया बाजार
वडीदा-३९० ००१. गुजरात.

फोन : 558963, फेक्स : C/o. ४५११६३

१२, गांधी मार्ग, बडवानी-४५१५५१ म. प्र.

**NARMADA BACHAO ANDOLAN**

- ♦ C/o. "Parivartan" Nimbalkar Chambers, Dandia Bazar, BARODA-390 001. Gujarat. Phone : 55 8963 Fax C/o. 451963
- ♦ 62, M. Gandhi Marg, Badwani-451 551 M. Pr.

URGENT.

1st November, 1993

To
The Chairman,
Environment Sub-Group
Narmada Control Authority,
And Secretary Ministry of Environment & Forests,
Paryavaran Bhawan,
New Delhi - 110 003

Subject : Closure of the Sluices of SSP

Respected Sir,

We have come to know that one of the issues before the 20th meeting of the Environment Sub-Group of Narmada Control Authority to be held on 3rd November 1993 is the issue of the closure of construction sluices at the SSP dam. We feel strongly about this and have the following points to make :

1. As you know the Review Group on Sardar Sarovar is in the process of consultation on all aspects at SSP, and before that your ministry has also made its presentation. To take a step that would lead to the FIRST permanent submergence in these circumstances would be clearly in violation of the spirit of this process.

2. You must be aware of what happened in the last monsoon when houses, lands and forests of Vadgam (Gujarat), Manibeli (Mah) & many other villagers got submerged. Even in Vadgam (Guj), where people had been fighting for rehabilitation, houses of at least 45 families got submerged, without rehabilitation, in violation of all stipulations of NWDT, rehabilitation policies as also the orders of the court.

3. What is likely to happen in the monsoon of '94, if the dam wall construction is pushed ahead as today, is a repetition of the the tragedy multiplied several times over. As per the Government of Maharashtra itself, at least 1700 families will be affected in Maharashtra alone in '94 Monsoon. They don't have the detailed submergence schedule or the exact number of people likely to be affected in '94 or even the total number of affected

in Maharashtra. Nor do they have land for rehabilitation of all these people, as an application is pending before your Ministry for denotification of 1500 ha forest land in Maharashtra & 1800 ha. of forest land in Gujarat.

Government of Maharashtra is saying that " It needs to be pointed out here that state Government is not in a position to confirm the number of families which would be affected in the 1994 monsoon as the joint measurements were not possible in the submergence zone due to NBA activities". This confession on the part at GOM speaks volumes for the state of rehabilitation process. The qualification attached to the confession is irrelevant as NBA started opposition to the SSP in 1988, whereas NWDT award came in 1978, which stipulated that the survey and master plan should be ready in two years from then on. Secondly, GOM did approach NBA for cooperation for joint measurement in Aug-Sept '93, but even if the people had agreed then, the consequent displacement would have been in violation of NWDT award as mentioned below. As it is, people said that they and the Government should wait for the Review process going on now, and then only should the decision be taken.

So without a complete rehabilitation master Plan, without basic information about likely affected population, without a reliable construction schedule, without availability of land for rehabilitation, a step of closure of sluices is being contemplated.

Even if all this were clarified today, to take a step that will lead to submergence of certain area in June '94 from where people are not rehabilitated today (Nov '93), just seven months before the likely submergence, would be in clear violation of NWDT award which stipulates :

Clause XI sub-clause IV(2) (iv) : Gujarat shall acquire and make available a year in advance of submerge before each successive stage, irrigable lands and house sites for rehabilitation of the oustees from M.P. and Maharashtra.

Clause XI sub-clause IV(6)(ii) : In no event shall any areas of MP and Mah. be submerged under the SSP unless all payment of compensation, expenses and costs....is made for acquisition of land and properties and arrangements are made for the rehabilitation of the oustees...and intimated to the oustees.

Clause XI sub-clause V(3)(iii) : Gujarat shall at each successive stage of submergence intimate to MP and Maharashtra the area coming under submergence at least 18 months in advance.

This clause should be read with the following extract from the GOM GR No. SSP- 3192/WB/CR-196/R-5 dated 21st Dec '92 :

"The district administration's intimation to the affected persons/ families coming within submergence due in any year shall be given immediately after Government of Gujarat notifies to the State Government, areas coming under submergence in any

yet, 18 months in advance at the date of inundation as required by the NWDT Award." Thus today when even the number of project affected persons of SSP is not known, these stipulations are bound to be violated.

4. You are also aware that major studies like the Flora & Fauna and the Carrying Capacity of the upstream submergence/catchment area are even today incomplete. Moreover, the Catchment Area Treatment program especially in Maharashtra is lagging behind. The Minutes of the meetings of the NCA-ESG are full of references to this, which also violate the *pari passu* clause, and the conditional clearance given by your Ministry. Closure of the construction sluices will create conditions rendering the completion of this impossible.

5. As far as the downstream impact of the dam is concerned less said the better. Every authority & party of the project has been guilty of neglecting this issue. Your Ministry, while giving sanction to SSP, did not mention this impact at all. Till date no comprehensive study of the downstream impact of the SSP has been done. Whether it is the question of fisherfolk, boatmen, or the people who depend on Narmada for their daily supply of water, no impact assessment is done. The question of preparing or implementing an action plan does not exist. Worse is, these people have not even been informed about the fact that the dam is being built and their life line is going to be cut off. We know this as we are in touch with these people and we keep getting letters from these people. Now you are considering a decision of closure of construction sluices which is bound to cut-off the water for several weeks and leave over 10,000 families of fisherfolk & boatmen without their only source of daily livelihood, and lakhs of people without domestic water supply. That these people will fight it out is beyond doubt, but the question is, will you be party to this decision?

6. That no comprehensive study on following aspects of downstream ecology & impact of SSP on them is done should be a matter of concern before taking a decision leading to irreversibility of SSP : aquatic eco-system, including parameters indicating the quality and quantity of water and its seasonal changes, biological species, processes and resource linkages. With & without dam, systematic documentation of flow regimes and geomorphology and resource use from drinking water and fisheries, physical, biological & socio-economic changes, cumulative impacts of the other developments on the Narmada further upstream, in particular the Narmada Sagar Project, and the expansion of industrial activity in the downstream river basin in Gujarat itself. We have reasons to believe that none of these studies have been done with the necessary depth and comprehensiveness. In such a situation, considering the closure of sluices, which by itself will have serious implication, is anything but development.

7. You would know that NWDTA did not allocate any water for releases downstream of Sardar Sarovar Project, as Government of Gujarat could not substantiate its case for it. But in its Further Orders, NWDT has said that Gujarat can do it out its own share. Today when total utilisable quantity in Narmada at 75%

dependability is distributed among the party states and when Gujarat has planned to use its entire share for other uses, there is no water left for downstream area. Unless allocation of adequate quantity of water is done to protect downstream users and comprehensive rehabilitation plan is prepared with full participation of the people, closure of construction sluices cannot be considered.

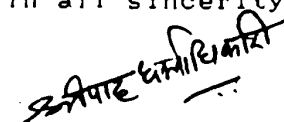
8. We have not been provided the copies of the studies we asked for from the Ministry of Water Resources, including studies of environmental aspects, but we have seen some of the reports, like the CICFRI report on Sociological survey of fishing villages, or the NPG report titled "Report of the Expert Group on Environment Impact of Closure of Construction Sluices provided in the Sardar Sarovar Dam". These have lead to the patch up solutions like releases of Karjan waters "to mitigate" effects of closure of construction sluices, without looking into the likely social and ecological impacts of SSP. We think it would not only be unwise, but disastrous both socially and ecologically to rely on such patch up solutions and go ahead with closure at sluices.

9. Assumptions and assurances, however well intentioned, are a poor substitute for in-depth studies and assessments. The magnitude of the projects, and its impacts, justify a rigorous multi-disciplinary impact assessment. It seems incongruous to proceed with a multi-crore rupee river development scheme without thoroughly addressing the downstream consequences especially in an area of major urban, industrial, and agricultural expansion. To plan and implement one of the world's largest irrigation project without such basic knowledge can only bring unqualified disaster. Until a multi-disciplinary impact assessment is done, the project cannot go ahead.

We hope your will circulate this letter among all the members at the NCA and NCA-ESG. There are only some of the points we wish to raise at this juncture. We can put up more detailed presentation if you feel it necessary.

Thanking You, in anticipation,

In all sincerity,



(SHRIPAD DHARAMADHIKARY)

Camp New Delhi

Phone (New Delhi) : Upto Nov. 3, 1993 : c/o 642 6783

Fax (New Delhi) : Upto Nov. 3, 1993 : c/o 642 6914

AT BARODA : ph : 55 8963 Fax : c/o 451 963

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नर्मदा नियंत्रण प्राधिकरण NARMADA CONTROL AUTHORITY

पर्यावरण उपदल
Environmental Sub-Group

इक्कीसवीं बैठक का कार्यवृत्त
Minutes of the Twenty First Meeting

7 दिसम्बर, 1993 को
पर्यावरण भवन, नई दिल्ली में हुई

Held at Paryavaran Bhawan New Delhi
On 7th Dec., 1993,

इन्दौर
दिसम्बर, 1993
INDORE
December, 1993

**MINUTES OF 21ST MEETING OF THE ENVIRONMENT SUB-GROUP NCA
HELD ON 7TH DECEMBER 1993 AT PARYAVARAN BHAWAN,
CBO COMPLEX, NEW DELHI**

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**MINUTES OF THE 21ST MEETING OF ENVIRONMENT SUB-GROUP HELD
ON 7TH DECEMBER, 1993 AT PARYAVARAN BHAWAN, NEW DELHI**

Shri R.Rajamani, Secretary to the Govt. of India, Min. of Environment & Forests and Chairman of the Environment Sub-Group of NCA welcomed the Members and Invitees to the 21st meeting of Environment Sub-Group. The list of the participants is enclosed at Annex.XXI.Min.1.

Discussions on the various agenda items was taken up thereafter.

Item No.XXI-1(109): CONFIRMATION OF THE MINUTES OF THE 20TH MEETING.

Minutes of the 20th meeting of Environment Sub-Group of the Narmada Control Authority were circulated to all Members and Invitees separately vide letter No.Env-34(21)/93/4558-07 dated 26.11.1993.

The Minutes were confirmed with the following amendments;

- 1) Item No.XX-2(105) point No.1, after 1st para the following was added:

The clear picture on pari-passu aspect of the Narmada Sagar Project in relation to Environment Safeguard Measures will be presented to the Sub-Group in future meetings.

- 2) Under point 2 of the same agenda, in fourth line the sentence starting from "He further started that..... is reworded as follows:

He further stated that the cost of treating the directly draining catchment area should be charged to the project as a whole and not to Unit-I only.

- 3) On page-14 under heading "Anthropology", the following was added:

"No specific issue on Anthropology was discussed:". After the caption "Anthropology" a caption,"Rim Stability" was added.

Item No.XXI-2(110): ~~REVIEWED~~ THE ACTIONS TAKEN ON THE DECISIONS OF THE PREVIOUS MEETING.

Before the discussion, Dr.Maudgal, Advisor (I), MOEF made a presentation about the present position regarding the Pari-Passu implementation of environmental safeguards envisaged in the clearance order issued by the Ministry in 1987 to the Narmada Sagar and Sardar Sarovar Projects. In his presentation he referred to the Command Area Development plans in Gujarat (beyond Mahi river crossing) and in Rajasthan. He pointed out that the plans on the above aspects are not yet ready. He also presented the information available with MOEF on progress of implementation of Catchment Area Treatment works in the State of Gujarat, Maharashtra and Madhya Pradesh and pointed out that action plans for treating the balance of the critically degraded area in the free draining catchment are still awaited. He emphasised that these are also required to be treated Pari-Passu with the construction schedule. He also pointed out that discussion on sharing of the cost of catchment treatment is still going on in the NCA and a decision is yet to be arrived at. He also presented a picture of the progress regarding implementation plan related to Flora Fauna and Carrying Capacity studies in the state of Gujarat, Maharashtra and Madhya Pradesh. In Maharashtra the final report of the Pune University study is still awaited. Based on their recommendation action plans will be made. In Madhya Pradesh also action plans are yet to be made and their implementation will take place later on. Based on the presentation he concluded that pari-passu condition is not being met in many areas, closure of sluices has to be examined in the light of compliance status of pari-passu clause and the fact that Environment Sub-Group cannot waive them. Chairman of the Sub-Group thanked Dr.Maudgal for the presentation made by him on behalf of MOEF and pointed out that the responsibilities of the MOEF and Environment Sub-Group are distinct and that there should not be any confusion about the role of the two. The environment conditionalities are laid down by Ministry of Environment & Forests and Environment Sub-Group look into manner in which these are fulfilled.

1) CONSERVATION OF FISH-FAUNA

Dr.Shekhar Singh referred to para-4 of the page-21 of the Agenda where it was stated that the fisheries downstream would not be affected by closing the sluices immediately since the impact on downstream would be felt after Stage-I. In this connection he also referred to the report of HR Wallingford Institute, London in which it had been pointed

that the silt deficient water flowing from the SSP may have negative impact on breeding of hilsa downstream. Prof. Katti however pointed out that silt is carried by river mostly during the floods and that, therefore, there would not be any problem of silt deficiency downstream by closing of the construction sluices. Prof. Ramaseshan expressed the opinion that in India the silt carried by the river mostly gets deposited all along the bottom and sides of the reservoir. Shri S.A.Char, Executive Member, NCA also pointed out that during the non monsoon period mostly clear water flows in the Narmada and the silt if any is carried only during monsoon.

Shri D.Rajagopalan, Secretary (R), GOG stated that the timings for the closure of construction sluices during December has been selected so as to minimise the possible negative impacts downstream. He pointed out that the period is expected to last only for 8 days if the sluices are closed as proposed. In response to a question from Chairman, Prof. Ramaseshan stated that according to hydrological data available as on date, the period required for the water level to rise upto the crest level may be of the order of 10 days which at worst may extend to 12 days. He further stated that the project authorities have made arrangements for providing the needed quantity of water in the downstream reach from Karijon reservoir. He also pointed out that the downstream impact would always be there during closure of the sluices whether we close the sluices now or five years later.

Shri Man Singh, Secretary (F), GOG agreed that there would be some negative impact on fishes downstream of the SSP. However, if the closure is done in December the impact will be minimum. He explained that the collection of prawn seed is not through organised sector but collection is done by a small number of people as part time work. Fisheries Department, earlier, was also favouring such collection but now it is no longer needed because of self-sufficiency attained by the fisheries Department. Chairman wanted to know about fisheries aspect in general specially with reference to Mahaseer. Secretary (F), GOG stated that GOG has approved plan for development of fisheries in the reservoir, estuary and the command area.

Chairman requested GOM to ensure proper conservation of the fisheries and protection/training/rehabilitation of the fishermen families engaged in fishing. Shri Bahadur, Secretary (Fisheries), GOM agreed to ensure coordination among the appropriate department for this purpose. Shri Sirohi, Secretary, GOMP stated that their experience of the reservoir in MP has established that the Mahaseer fish get acclimatised to the reservoir conditions. The fisheries

department already has a proposal for artificial breeding and a fish seed farm has been set up by the NVDA. He, however, agreed that as the carp varieties tend to multiply faster in the reservoir as a result the percentage catch of the Mahaseer has declined. He further stated that the plans prepared by NVDA in 1984 are being revised and updated.

Chairman desired to know whether the provisions to take care the extra work needed for conservation of fish fauna was also made in the plan. He further pointed out that in order to ensure proper conservation an ecologist was also required to be associated. He expressed concern that if adequate steps were not taken to safeguard the aquatic fauna important to the food web/food chain, the long term sustainability of the commercial fishes itself will be endangered. He emphasised that the conservation approach pursued by the MOEF is to ensure long term sustainability. He emphasised that the plans should include infrastructure and commitments of the project authorities for ensuring the same.

Shri M.A Farooqi, Director, NVDA stated that because of the low fecundity and low growth rate Mahaseer fish catch is declining. He referred to Rita pavemententa which is present exclusively in the river Narmada but has been left out by CICFRI from their studies. He elaborated the need for setting up proper infrastructural facilities.

Chairman directed that all the aspects should be incorporated in the plans to be prepared by the NVDA.

2. CATCHMENT AREA TREATMENT

Chairman invited Govt. of Maharashtra to report the progress of Catchment Area Treatment. Shri M.S.Parasinis, CCF, GDM and nodal officer for Catchment Area Treatment and Compensatory Afforestation works related to SSP informed that 960 ha area has been treated in the vicinity of the areas likely to be submerged due to closing of the construction sluices and it would be possible for GDM to complete the treatment of entire critically degraded directly draining sub-watersheds by next four rainy seasons. He could not give information about the treatment of non-forest areas even within the directly draining sub-watersheds. He informed that Agriculture Department has been approached at which regional level for preparing detailed plans for treatment of the agricultural areas. Chairman wanted to have the specific information about the status of implementation in the non-forest and forest areas in the directly draining critically degraded sub-watersheds which are in the vicinity of the proposed impoundment to be

created by the closure of the sluices. Chairman wanted to know about the sources of funds for CAT works in the entire freely draining areas. Officials of GOM could not provide any information regarding this. At this point Shri M.B.Chobe, Secretary (Public Health), GOM pointed out that the States are facing financial constraints and are finding it very difficult to spare funds for treating the degraded areas in the entire freely draining areas. He also raised the issue of cost sharing for CAT works. Chairman pointed out that the decision of the MOEF is that all the areas whether directly or freely draining are required to be treated *Pari-Passu* with construction and it is the responsibility of the project authorities/state governments to find the sources of funds. Chairman also pointed out that the catchment area treatment ahead of the reservoir filling was one of the important conditions imposed by the MOEF while granting clearance. Shri B.S.Baswan, Vice-Chairman, NVDA informed that for this reason in Madhya Pradesh preliminary exercise has been done by the NVDA for locating the sources of funds for treating the freely draining critically degraded catchment areas. He requested MOEF for helping them on this matter. Chairman, however pointed out that the issue of approaching various contract agencies for securing funds for treating the freely draining areas through MOEF or other sources has already been discussed earlier and he said that State Governments should go ahead with the proposals and MOEF can help them to at the margin to pursue the matter but finding funds for the works should be the responsibility of the State Governments. Chairman stated that he was very much concerned about mobilisation of the required manpower and resources and for the plans for treating the freely draining critically degraded sub-watersheds. On review it was found that for treating the entire freely draining critically degraded areas final plans were not yet available. Shri N.V.V.Char, Secretary, SSCAC pointed out that the matter of treating the catchment area by the project authorities was discussed by the Committee of Secretaries and it was decided that the cost of treating only the directly draining critically degraded sub-watersheds will be charged to the project and that the funds for treating the remaining critically degraded sub-watersheds will have to be found by the State Governments from other sources. Dr.Maudgal supplemented this to point out that MOEF has clearly laid down that the entire freely draining areas need to be treated *Pari-Passu* with the project works. Chairman expressed unhappiness over the lack of co-ordination among various departments involved in Maharashtra and desired that a nodal department needs to be designated to co-ordinate all activities related to the SSP. He further desired that there is a need to take some decision regarding this in Maharashtra urgently.

STUDIES/SURVEY ACTION PLAN AND IMPLEMENTATION ASPECT OF PUBLIC HEALTH.

The Chairman requested Dr. (Ms) R.Arora, Assistant Director General, ICMR to give their opinion about various health plans of State Governments. She stated that the plans prepared by the State Governments deal mainly with providing the infrastructural facilities and that there is not enough emphasis on research aspects of disease control. She referred to the report of the Gandhi Medical College for the areas in Madhya Pradesh and stated that there is no information regarding the detailed methodology of the data collection adopted by them to the sampling technique should also be mentioned to enable a correct assessment of the results indicated. She however stated that the data for the monsoon period which is the peak period for the spread of vector borne disease has been left out from the data collection. Dr.Arora stated that the plans of the State Governments are mainly based on the health statistics available with the State health services. However, constant monitoring is required for further building of the data base during pre and post impoundment period.

Shri M.B.Chobe, Secretary(Public Health), GOM stated that based on the report of the TISS, (Tata Institute of Social Services) setting up of certain facilities in the periphery of the reservoir as well as at the relocation sites have been decided and the plan has been prepared which has been approved by the cabinet. But he pointed out that in the absence of the source of funds the plan is awaiting implementation. Dr.A.K.Malhotra, Member (E&R), NCA pointed out that GOM can follow same rule as is being followed by the GOG and GOM for providing the incremental health facilities. It was pointed out that the Sub-Group has already decided that the cost of additional facilities to be created is chargeable to the project and the issue of sharing this is to be decided by the NCA. Secretary, Health, GOM agreed to pursue the implementation of the plan implementation urgently.

Shri B.K.Verma, Member (E&F), NVDA stated that regarding the water quality, the matter is being addressed to by the State Pollution Control Board. Shri B.K.Baswan agreed to send a copy of the comprehensive health plan prepared by the NVDA in 1990 to the MOEF soon.

Chairman invited Dr.V.P.Sharma, Director, MRC of ICMR for his views on vector control measures. Dr.V.P.Sharma made a brief presentation of the vector borne disease resulting from various components of a water resources project. He also highlighted various steps which, if taken in time, can go a long way in reducing the risk of water

borne diseases. The mitigation measures should form a part of the dam design process and if this is not done, spray of various insecticides later on would not help much. He quoted his experience from Upper Krishna Irrigation Project in Karnataka where data for 7 years had shown that the spray of insecticides has resulted in an increase of Annual Parasite Incidence (API). He presented statistics of the API of pre construction period of SSP for the period 1979 to 1985 where the average API was 10.9. He also presented the data of the API during the construction phase 1986 to 1991 where API has registered an increase to 58.40. He narrated the problems faced in controlling the malaria and stated that the technology for preventing the diseases and for keeping it below the critical threshold level is available. In response to a question from Dr. Shekhar Singh, he stated that the incidence of malaria generally extends upto 3 Km of the stagnant water bodies which are breeding ground of mosquitoes. Secretary (R), GOG pointed out that in case of Sardar Sarovar reservoir which is bound by steep mountain ranges all around the need for applying the preventive measures even in the 3 Km area may not arise. Dr. Shekhar Singh further stated that the reservoir operations are to be synchronised with the life cycle of the vector to control the same. In case of the Narmada basin where a chain of reservoirs are to be built a careful operation of the reservoir may help in containing the diseases. In response to a question from Dr. Shekhar Singh regarding the vector becoming immune to the various insecticides, Dr. Sharma emphasised that by spray of insecticides alone, malaria cannot be contained as the vector resistance is a world wide phenomenon. He suggested for taking up of various preventive steps together with the spray of insecticides. Prof. Ramaseshan stated that Dr. V.P. Sharma should be associated with the formulation and implementation of health plans in all the states. Chairman agreed with the views expressed by Prof. Ramaseshan and suggested that the services of Dr. Sharma may be utilised during revision of the health plans.

Chairman on behalf of Sub-Group thanked Director, MRC for his presentation. He also thanked Dr. (Ms) Arora for having spared the time for the benefit of the project authorities.

4) ENVIRONMENTAL IMPACTS OF CLOSING OF CONSTRUCTION SLUICES: REPORT OF THE EXPERT GROUP CONSTITUTED BY SSNNL XX-5(108).

Chairman recalled the discussion of the 20th meeting of the Environment Sub-Group held at Indore and stated that the detailed information on the following major issues is required to be presented:

- i) Discussion on closing of construction sluices is to be linked with the Pari-Passu clause on implementation of Environment Safeguard measures.
- ii) R&R has to be completed in all respects in the area to be affected by closing of the sluices, not only for those whose houses are getting submerged but also for all others whose lands only may be getting affected.
- iii) Confirmation in writing of releases from the Bargi reservoir is needed from NVDA.
- iv) The steps proposed to be taken by SSNNL to augment the water supply below the Sardar Sarovar Dam in the initial 5 Km reach and further downstream.
- v) Provision of deep pools for protection of fishes.

Chairman stated that the review done by the Sub-Group on progress of Catchment Area treatment in Maharashtra, specially in the non forest lands, shows infringement of the Pari-Passu clause. Shri N.V.V.Char, Secretary, SSCAC pointed out that there is no non-forest land in the directly draining sub-watersheds for the areas under reference. Chairman pointed out that even if this were so, treatment of non- forest land for the freely draining areas is also covered by the Pari-Passu clause. Shri S.A.Char, Executive Member, NCA wanted to know whether this practice is being followed for all other projects in the country?

Dr.Maudgal stated that rehabilitation is required to be completed not only at the level of the pondage but upto the level of backwater affect. Shri Johny Joseph, Secretary (R), GOM stated that rehabilitation of all the people getting affected due to submergence upto crest level of 59 mtr.has been completed but; for the people to be affected by the backwater floods, GOM will ensure only temporary rehabilitation on the pattern as was done during the monsoon of 1993 i.e by providing temporary sheds at higher elevation. Chairman stated that if the flood is created by the project and people are made to shift every year then there is an urgent need to rehabilitate them permanently and without that pari-passu condition may be violated. Secretary (R), GOM pointed out that the temporary sheds are provided only to those villagers who, on account of certain reasons, could not be shifted permanently.

Shri S.A.Char, EM, NCA stated that in all other areas affected by floods people are rehabilitated in the same manner as is being ensured by the SSP authorities.

Shri Johnny Joseph, Secretary (R), however stated that in case dam height is being increased to the level of construction programme approved for 1994 then he will have to go back and see the corresponding rehabilitation schedule and, therefore, he is not in a position to make any commitment in this regard immediately.

Referring to the releases from the Bargi reservoir, Chairman stated that as discussed during the last meeting a written commitment from NVDA to release maximum quantity of water needed during closure of sluices was required to be furnished to NCA. The same has, however, not been received yet.

Shri B.J.Parmar submitted a copy of the letter written by MPSEB confirming the operation of both the units of the Bargi reservoir for power generation throughout the month of December, 1993.

Shri B.S.Baswan, Vice-Chairman, NVDA endorsed the letter of the MPEB presented to the Sub-Group and stated that he would do so in writing also within a week's time.

Regarding provision of water supplies downstream Shri G.L.Java, Chief Engineer, Dam Design stated that 10 pumps have been installed for pumping water downstream of the dam. These pumps have the capacity to supply 200 cusecs (3 cumecs) of water. Another 10 pumps have been kept as standby and, if needed, all the 20 pumps can also be commissioned at a time. Shri B.J Parmar, (ED), GOG stated that altogether 60 cumecs of water will be released to the downstream to mitigate the negative impacts and additional quantities from the Karjan dam can also be released if the need arises. In response to a query from Chairman, Secretary (R&R), GOG stated that there are no industries in the first 40 Km of downstream reach from the dam site.

Shri G.L.Java referred to the report submitted by GOG in which on page 36 the detailed information on availability of deep pools downstream of SSP has been given.

In response to a query from Chairman, Prof. Ramaseshan stated that the provision made by GOG for supplying the water downstream of the SSP, as stated can generate a flow

of 1 ft. to 1.5 ft. for a cross section of 100 ft. wide river. Chairman desired to know whether this much quantity will be sufficient to flush out the disease vector from the pools which are present downstream, to prevent the manifestation of negative impact. Dr. V.P. Sharma replied in the affirmative.

Chairman referred to the plea of the GOG that closing of the construction sluices is desirable from the safety point of view and invited Prof. Ramaseshan to present his views on the same. Prof. Ramaseshan stated that danger to the toe of the dam as well as cavitation damage to the construction sluices exist due to high velocity flow. He stated that the damage will be more if there is no water downstream to cushion the effect of a column of water falling from height of 60 mtr or more. However, if 20 mtrs. water is present on the downstream side to cushion the effect of high velocity water falling from this height then the impact will be comparatively low.

He expressed serious concern about the cavitation damage but stated that the extent of the the damage caused cannot be predicted. Prof. Katti categorically stated that damage to the dam due to cavitation may be enormous as it may develop cracks which may lead to its failure. He pointed out that there have been such instances of dam failures due to similar reasons in the past. Shri S.A. Char, EM, NCA stated the great risk has been taken last year and the project authorities were lucky that nothing serious happened but if the same risk was taken again then suspected failure of the dam may lead to the wastage of about Rs. 500 crores of public money already spent on construction.

Chairman stated that the issue of closing of the construction sluices came up before the Sub-Group on the request of the SSP authorities and as a result a committee examined the issue. This committee suggested that on consideration of the dam safety, construction sluices may be allowed to be closed and that the best period for closure would be December, 1993. However, it was noted that the formulation and implementation of Environmental Safeguard Measures, which should have been implemented *Pari-Passu* with the construction schedule, in a number of important areas is not satisfactory. Safety of the dam is, on the other hand, also important.

Chairman summed up the discussion as follows:-

- Based on the assurance given by Madhya Pradesh for release of water from the Bargi during the period of closure and the provision of supplying water downstream through pumping made by SSNNL and considering the opinion of the fisheries experts and the departments of the concerned State Government that no major negative impact is likely on fish fauna during the closure and that no industries are located in the downstream reach in the first 40 Km and
- also considering a categorical statement from Secretary, (R&R), GOM that no injury to human habitation is expected if permanent pondage is upto 59 mtr. only and that all rehabilitation measures upto permanent submergence of 59 mtr. level in respect of both land and houses in the affected village has been completed but also taking into account need for rehabilitation in stretches upto 79 mtr level where near-permanent pondage may be created and where too R&R must be satisfactorily completed,
- also considering that the Pari-Passu conditions with regard to the R&R, Compensatory Afforestation, Archaeology, Anthropology are prima-facie satisfied. The implementation of catchment area treatment plans and flora-fauna studies which are yet awaited and resulting action plans remain to be evolved and implemented are not in conformity with pari-passu clause. Considering the report of the Pune University for the areas getting submerged which pointed out no major wild life is present there and noting that the final report of the university for the entire area is expected by March, 1994 and that the implementation of the resulting recommendations would be done thereafter.
- On the Catchment Area Treatment, GOG has taken up the treatment works for entire freely draining areas. Plans from GOM have also been received only for directly draining critically degraded sub-watersheds. However, further observing that the actions to identify funds for treatment of the remaining critically degraded areas are yet to be taken up.

Considering the fact that the Environment Sub-Group is not in a position to waive the conditions imposed by the MOEF requiring progress on construction with Pari-Passu implementation of the environmental safeguard measures.

The Sub-Group suggests to the NCA and MOWR that on the basis of commitments from the project authorities on the aspects related to catchment area treatment and implementation of action plan related to flora fauna studies and further, subject to no rising of the dam beyond what is done till today either on flanks or on height of the blocks a final decision may be taken on closure of sluices after getting the question of waiver or temporary suspension of pari-passu condition cleared by both Ministries of Welfare and Environment and Forests on the commitment the actions to fulfill the conditions will be taken in full before the monsoons in June, 1994.

In response to a query from Dr. Shekhar Singh, Chairman however stated that the recommendation made by the Sub-Group may not mean waiving the conditions imposed by MOEF but for temporary suspension keeping in view the safety of the dam structure.

However, Chairman wanted categorical statement from Secretary (R&R), GOM for the completion of the entire rehabilitation not only at the pool submergence but also considering the back water effect which may stretch upto 79 mtr. Prof. Ramaseshan drew the attention of the Chairman towards the fact that even without closing the sluices GOM should complete rehabilitation upto the level of 79 mtr as during 1993 monsoon at the level 61 mtr. of construction the back water effect was felt upto 79 mtr.

Chairman at this stage indicated that Sub-Group has not taken any final decision regarding permitting the closure of the construction sluices. However Sub-Group has made recommendations with certain conditions as summarised above and it is upto Ministry of Water Resources / Ministry of Environment & Forests / Ministry of Welfare etc. to take a final decision.

The meeting ended with a vote of thanks to the Chair.

ANNEXURES

ANNEX-XXI.MIN.1

**LIST OF PARTICIPANTS ATTENDED ON THE 21ST ENVIRONMENT
SUB-GROUP MEETING HELD ON 7.12.93 AT NEW DELHI.**

S.No. Name & Designation

GOVERNMENT OF INDIA

1. Shri Rajamani, Secretary, Min. of Env. & Forests, N.Delhi
2. Shri S.A. Char, Executive Member, NCA, Indore.
3. Dr. S. Maudgal, Advisor, MOE&F, New Delhi.
4. Shri N. Suryanarayanan, Commissioner (PP), MOWR, New Delhi.
5. Shri N.V.V. Char, Secretary, SSCAC, Vadodara.
6. Dr. A.K. Malhotra, Member (E&R), NCA, Indore.
7. Shri M.S. Menon, Member (Civil), NCA, Indore.
8. Shri B.B. Sinha, Secretary, NCA, Indore.
9. Dr. (Mrs) Nalini Bhatt, Joint Director, MOE&F, New Delhi.
10. Dr. Pawan Kumar, Specialist (Env), NCA, Indore.
11. Dr. Afroz Ahmad, Impact Assessment Officer, NCA, Indore.
12. Dr. S.C. Verma, Dy. Director, MOE&F, New Delhi.

GOVERNMENT OF MADHYA PRADESH

1. Shri B.S. Baswan, Vice Chairman, NVDA, Bhopal.
2. Shri R.S. Sirohi, Secretary (Fisheries), GOMP, Bhopal.
3. Shri B.K. Verma, Member (E&F), NVDA, Bhopal.
4. Shri A.M. Faruqui, Director, Fisheries, GOMP.
5. Mrs. I.M. Chahal, Commissioner, Arch/Mus., GOMP, Bhopal.
6. Dr. E.M. Agnon, IDHG, Govt. of Madhya Pradesh.

GOVERNMENT OF GUJARAT

1. Shri N. Ramaswamy, Secretary (Narmada), GOG, G. Nagar.
2. Shri D. Rajagopalan, Secretary (R&R), Govt. of Gujarat.
3. Shri Man Singh, Secretary (Fisheries), Govt. of Gujarat

S.No.	Name & Designation
4.	Dr. Mahesh Pathak, Executive Member, NPG, Gujarat.
5.	Shri M.B. Mehta, CCF, SSP, Govt. of Gujarat.
6.	Shri B.J. Parmar, Executive Director, SSNNL, GOG.
7.	Shri G.L. Java, CE (Designs), Govt. of Gujarat.
8.	Shri V.C. Trivedi, Dy. Commissioner, SSPA, GOG.
9.	Shri B.E. Salania, Member Secretary, Gujarat Pollution Control Board, Gandhinagar.
10.	Dr. N.K. Pali, Joint Director, Govt. of Gujarat.

GOVERNMENT OF MAHARASHTRA

1. Shri Johnny Joseph, Secretary (R&R), Govt. of Maharashtra
2. Shri B.N. Bahadur, Secretary (Forests), Govt. of Maharashtra
3. Shri M.B. Chobe, Secretary (Public Health), Govt. of Maharashtra.
4. Shri M.S. Parasnis, CCF, Govt. of Maharashtra.
5. Shri N.M. Dange, CE, Dev. Deptt, Nasik, Govt. of Maharashtra
6. Shri Chand Goel, Director, Env., Govt. of Maharashtra.
7. Shri R.H. Joshi, Director, Fisheries, GOM.

GOVERNMENT OF RAJASTHAN

1. Shri S.P. Mathur, Addl. Secretary, Deptt. of Env., Govt. of Rajasthan.

EXPERTS

1. Prof. R.K. Katti, Director, UNEECs, Bombay.
2. Prof. S. Ramaseshan, IIT, Kanpur.
3. Dr. (Ms) P. Arundhate, AO, Archaeological Survey of India.
4. Shri Sekhar Singh, IIPA, New Delhi.
5. Dr. V.P. Sharma, Director, Malaria Research Institute.
6. Dr. (Ms) R. Arora, Asstt. Director General, ICMR.

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नर्मदा नियंत्रण प्राधिकरण
NARMADA CONTROL AUTHORITY

पर्यावरण उपदल
Environment Sub-Group

बाईसवीं बैठक की कार्यसूची
Agenda for Twenty Second Meeting

स्थान : पर्यावरण भवन, नई दिल्ली
Venue : Paryavaran Bhawan
New Delhi

दिनांक : 3 मई, 1994, 10 बजे
Date : 3 May, 1994, 10A.M.

इन्दौर
अप्रैल, 1994

INDORE
April, 1994

**AGENDA FOR 22ND MEETING OF THE ENVIRONMENT SUB-GROUP
NCA TO BE HELD ON 3RD MAY, 1994 AT PARYAVARAN
BHAWAN, CSO COMPLEX, NEW DELHI.**

I N D E X

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Item No.XXII-1(111): CONFIRMATION OF MINUTES OF THE 21ST MEETING.

Minutes of the 21st meeting of Environment Sub-group of Narmada Control Authority were circulated to all members and invitees vide letter No.Env-34(21)/93/4979-5011 dated 17.12.1993. Since no comments have been received, therefore, the minutes as circulated are approved & confirmed.

Item No.XXII-2(112): REVIEW OF ACTION TAKEN ON THE DECISIONS OF THE PREVIOUS MEETINGS.

1. **Submission of Catchment Area Treatment (CAT) plans for freely draining critically degraded sub-watersheds (Item No.XX-2(105)(2)).**

GOMP submitted plan for the critically degraded (high & very high priority categories) sub-watersheds, other than directly draining into the reservoir. The plan was reviewed by NCA & certain discrepancies were noticed specially in area proposed by NVDA with area worked out by AISLUSO. Further details have been called from NVDA, which are yet awaited. However, the CAT plan for GOM is still awaited.

Chairman had suggested that GOG should install sophisticated equipment for measuring silt load during the pre & post phases of the CAT. The GOG may report about the present status of the silt measurement experiments during pre & post CAT period.

2. **Cost Estimate for preparation of Action plan and implementation of Environment safeguard measures (Item No. XX-2(105)(3)).**

NCA had prepared a table during 19th Environment Sub-group meeting to bring out a clear picture of the cost estimates for various survey/studies/ action plans alongwith their implementation. The Chairman during 20th meeting had also desired that respective state Govts. should provide detailed information on cost estimates for various actions as per the table. The information on cost estimate as per the table has not been received so far from the state govts. The concerned state govts. are requested to furnish the updated figures to the sub-group.

3. **Environmental Impact of Closure of Construction sluices.**

The construction sluices were closed by Govt. of Gujarat keeping in view the safety of dam on February 23rd, 1994 in pursuance of authorisation issued by the Secretary, Ministry of Water Resources, Govt. of India vide letter No.5/39/93/PP dated February 22, 1994. To ascertain the Environmental impacts of the closure of sluices on downstream & upstream environment, Member (E&R), NCA & Specialist (Env.), NCA visited the dam site on 2nd to 4th March, 1994. A report of their visit is placed at Annexure-XXII-(I).

The respective state Govts. may inform about the impacts of the closure of sluices on upstream & downstream environment & mitigative measures planned by them to manage the negative impacts if any.

They may also specifically report on the pari-passu implementation status of the environmental safeguard and rehabilitation, with and without backwater effect during Monsoon, 1994 if (a) only two blocks of SSP Dam are raised upto 80.3 meter height; (b) height of the dam is raised to 80.3 meter uniformly as proposed and reported by the State authorities.

Item No. XXII-3(113): PRESENT STATUS OF STUDIES SURVEY AND ENVIRONMENTAL ACTION PLANS.

The status of studies, surveys & action plans are presented below in brief for review by the sub-group:

Phased Catchment Area Treatment:

Narmada Sagar Project

Government of Madhya Pradesh

An area of 16374 ha. has been treated by the end of December, 1993 against total planned area of 62,974 ha. for directly draining sub-watershed of high & very high priority categories. In the year 1993-94 there was a target of 13434 ha. for treatment against which 4935 ha. was treated by December '93. Narmada Valley Development Authority (NVDA) report achievement for the planned target of the year 1993-94. Plans for the treatment of freely draining area have been received from NVDA. As per the plan, an area of 9,15,150 ha. in 478 watersheds is proposed for treatment by the year 2007-08. NVDA to please inform about the status of work progress in treating forest & non forest.

Sardar Sarovar Project

Govt. of Madhya Pradesh

GOMP has planned to treat 1,25,725 ha. area as per the latest report supplied by NVDA. As per the latest information received from NVDA, 10550 ha. of non forest area & 700 ha. forest area have been treated by September '93. GOMP are requested to furnish detailed information regarding progress achieved so far.

Government of Gujarat

GOG has taken up the entire catchment area upstream of the SSP in Gujarat for treatment. Progress of treatment as furnished by SSNNL till last meeting is available. No further progress has been reported so far. However, GOG has reported that the non forest treated area is 1495 ha in place of 1534 ha as reported earlier. GOG are requested to furnish and present upto date progress of CAT.

Govt. of Maharashtra

As per latest plan for catchment area treatment submitted by GOM 20,000 ha. of forest area is proposed for treatment in addition to 4360 ha. of non forest area. As per latest information, GOM has treated 960 ha. forest

area during the year 1993-94. However details for the treatment of non forest area are still awaited. GOM are requested to provide detailed upto date progress of CAT.

ii) Compensatory Afforestation

Narmada Sagar Project

Government of Madhya Pradesh:

According to latest information given by NVDA, Compensatory Afforestation in 41596 ha. area which comprises 5947 ha of degraded forest & 35649 ha of non forest area have been completed upto 1993 monsoon.

Sardar Sarovar Project

Government of Madhya Pradesh

Out of a total of 6550 ha. of degraded forest 5947 ha area has been planted till monsoon 1993 & the entire work is planned to be completed by monsoon 1994. There is no progress in non forest area during 1992 & 1993 monsoon because of non availability of land. Latest position of availability of area for afforestation shall be reported by NVDA.

Government of Gujarat

Against a total target of 13950 ha., work has been completed by SSNNL in 11586 ha. by the end of 1993 monsoon. Balance is scheduled for completion in the coming monsoon.

Government of Maharashtra

The entire area comprising of 12980 ha. degraded forest has been afforested by monsoon 1993 and 7222 ha of non forest land has also been afforested against a total target of 9190 ha. GOM has provided location maps of the areas being brought under plantation for some districts & the details are still awaited for the balance area.

iii) COMMAND AREA DEVELOPMENT

Narmada Sagar Project

Status of preparation of comprehensive environmental impact assessment report on command area development with integrated development plan for NSP is awaited from GOMP. The MOU regarding studies on effect of pesticides, insecticides in the command area to be entrusted to J.L.N Agricultural University is under consideration in

NVDA. GOMP are requested to furnish details regarding finalisation of MOU for carrying out this study.

Sardar Sarovar Project

Government of Gujarat

Various studies related to EIA were scheduled to be completed during 1993 as reported by Government of Gujarat earlier. GOG are requested to furnish comprehensive EIA report to NCA.

Government of Rajasthan

The EIA studies of Command area in Rajasthan portion has been entrusted to WAPCOS. The GOR are requested to furnish latest status of the studies.

iv) SURVEY OF FLORA, FAUNA & CARRYING CAPACITY STUDIES

Narmada Sagar Project

Government of Madhya Pradesh:

Status of action taken on recommendations contained in the report of Friends of Nature Society, Bhopal shall be reported by NVDA. The Wildlife Institute of India, Dehradun has completed a comprehensive study on this aspect, however the final report is still awaited. GOMP are requested to provide latest position regarding this study & furnish final report to NCA.

Sardar Sarovar Project

Government of Madhya Pradesh

The final report of State Forest Research Institute for the Impact assessment studies in M.P. has not been received so far. However, interim reports are being received regularly. GOMP may inform regarding the status of final report and action taken/proposal on the recommendations contained in the interim report.

Government of Gujarat

Detailed action plan based on the recommendations contained in the report of M.S. University, Vadodara is still awaited from GOG.

Government of Maharashtra

Interim report on status of Flora & Fauna in and around Sardar Sarovar Project in Maharashtra prepared by School of Environmental Sciences, Poona has been received by NCA. The report was scrutinized in NCA and

some suggestions were made for its improvements. The suggestions were communicated to GOM for its incorporation in the final report.

v) **ARCHAEOLOGICAL & ANTHROPOLOGICAL SURVEY**

ARCHAEOLOGY

Narmada Sagar Project

Government of Madhya Pradesh

Action plan for the Centrally protected monuments to be affected by Omkareshwar & Maheshwar projects have been received from NVDA. Detailed action plan for the relocation/protection of Central as well as state protected monuments is still awaited from GOMP. Who will report the status in the meeting.

Sardar Sarovar Project

Government of Madhya Pradesh

Action plan prepared by State department of Archaeology & Museum, M.P. was received by NCA and the same is under scrutiny. NCA analysis will be presented in the meeting.

Government of Gujarat

Plan finalized by GOG for re-construction of Hamfeshwar temple is awaited. The latest status shall be reported by GOG.

Government of Maharashtra

No works are required to be done in Maharashtra in this respect.

ANTHROPOLOGY

Government of Madhya Pradesh

Anthropological Survey of India in 1992, had undertaken Narmada Salvage Plan. The information collected by the ASI was requested for possible use in R&R plans and this is awaited.

vi) **SEISMICITY AND RIM STABILITY OF RESERVOIR**

Narmada Sagar Project

Government of Madhya Pradesh

GOMP is to report about the progress regarding

procurement of seismometers from IMD needed for obtaining pre impoundment data.

Sardar Sarovar Project

The report on rim stability analysis was finalised by GSI. Some studies have been entrusted to CW&FRS, Pune and an amount of Rs.12.5 lakhs had been placed at their disposal. CW&FRS are engaged in conducting study of water losses in River Narmada. Report of Pre monsoon study was received however the report of the post monsoon field study done in February, 1994 is awaited.

vi) HEALTH ASPECT

Government of Madhya Pradesh

Narmada Sagar Project & Sardar Sarovar Project

The 2nd Interim report of the Surveillance & control studies being done by Gandhi Medical College, Bhopal is still awaited from GOMP. The GOMP are requested to provide information regarding implementation of the recommendations contained in 1st Interim report alongwith a copy of the 2nd Interim report.

Sardar Sarovar Project

Government of Gujarat

The copy of the updated health plan is awaited from GOG.

Government of Maharashtra

The GOM was requested to provide detailed Health profile of the villages coming under submergence and villages situated within 10 km radius of the reservoir. The detail information is still awaited. Moreover it was suggested to commission a Surveillance & monitoring studies for keeping a watch over the future health profile of the concerned area during & after filling of the reservoir. Action taken in this respect shall be reported to Sub-group by GOM.

viii) FISHERIES DEVELOPMENT OF SSP AND NSP RESERVOIRS

To review and speed up the work on development of fish and fisheries in the reservoir, a meeting was convened on 24.3.94 by the Executive Member, NCA & the minutes of the meeting are enclosed at Annex-II.

NVDA was to report about the submission of final report on Limnological aspect by Barkatullah University, Bhopal. In addition, NVDA was also requested to report on the actions proposed to be taken on acceptable recommendations contained in the report of Friends of Nature Society, Bhopal.

The GOG, GOM and GOMP were requested to update and revise their plan on fish and fisheries sector. Progress on this aspect may be reported by the respective state Govts. to the sub-group.

ANY OTHER ITEM

DATE & VENUE OF NEXT MEETING

ANNEXURES

ANNEX-XXII-(I).**ENVIRONMENTAL IMPACT OF CLOSING OF CONSTRUCTION SLUICES
A NOTE ON FIELD VISIT TO THE AREAS IN GUJARAT-DURING
2ND TO 4TH MARCH, 1994.**

- II Closing of construction sluices & consequent environmental impacts were discussed by Environment Sub-group of the Narmada Control Authority during its 20th to 21st meetings held on 3rd November & 7th December, 1994 at Indore & New Delhi respectively.

During the discussion of the sub-group, Govt. of Gujarat submitted detailed proposals for mitigating the possible negative impacts of closing the sluices. Based on the plans submitted & review of the implementation aspect of Environmental safeguard measures, sub-group ruled that except for Catchment Area Treatment works and some anxiety about flora & fauna in Maharashtra pari-passu condition with respect to other parameter appears prima-facie satisfied.

During 21st meeting of the sub-group recognising that closing of the construction sluice is the imperative need of dam safety aspect, certain recommendations were made. Chain of events that followed & subsequent authorization from Secretary, Ministry of Water Resources, sluices of SSP were closed on 23rd February, 1994.

To ascertain the spot situation arising out of closing of construction sluices, Member (E&R) accompanied by Specialist (Env.) visited the areas of it's influence; Upstream as well as downstream of SSP, on 3rd March, 1994. Apart from telephonic conversation with Scientist of CICFRI at Baroda, discussion with concerned officers of the SSNNL & State Fisheries Department were held. Villages downstream of SSP were visited and villagers were also interviewed. The list of officers interacted with during this visit is given in Annex-I.

Assessment of the situation due to closing of sluices can be summarised as follows:

III **OBJECTIVES:**

In the mitigation plan submitted by the Govt. of Maharashtra in October, 1993 it was stated that exact hydrological conditions will be known by the end of October, 1993. In the subsequent plan submitted by Govt. of Gujarat to Environmental Sub-group in the meeting held on 7th December, 1993, it was proposed that 3 cumecs of water will be pumped from the storage to the downstream to meet the minimum basic requirement of the first 5 km. reach downstream of the SSP.

It was further proposed that small tributaries and rivulets joining the downstream reach are expected to provide further impetus. Substantial quantities of water were also promised from Karjan reservoir at the confluence of Karjan canals with nallahs draining into the Narmada. These additional quantities of water were expected to keep under control, the salinity ingress, pollution hazards and also keep alive bio-diversity besides sustaining second migration of Hilsa fish and Prawn culture.

- IIII] 1) It was observed that there was a leakage of the order of 18 cumes of water from the construction sluices (Plate-1) which could not be completely plugged due to some Technical reasons. This quantity of water was more than required to mitigate any projected adverse impact.

However, project authority had made elaborate arrangements for providing 3 cumes of water, as promised in the plan, through pumping from storage. A series of pumps were in operation, continuously, from the day closing operation began. On 3rd March, 1994 all the pumps were pumping very well (Plate-2). Additional pumps were kept as standby. A visit to the net work of canals & Karjan dam showed that water was released from dam as promised in the plan (Plate-3). There was a recharge from the catchment downstream of SSP through small springs as well (Plate-4).

Therefore in all there was more than 20 cumes of discharge available in the immediate downstream of the SSP (Plate-5). This quantity of water was more than required to off-set projected negative impacts on downstream reach.

- 2) A visit to the downstream villages and conversation with the villagers revealed that no problem of drinking water was being experienced.
- 3) Downstream reach was inspected for the provision of deep pools and related fish conservation aspect (Plate-6). It was observed that the deep pools were larger than their size due to continuous flow received from the main river and its tributaries. There was enough room for fish to take shelter.
- 4) As per the discussions held with the officials of state Fisheries department it was clear that the collection of prawn seed was through an unorganised sector, and all available data indicated that the seed collection had been greater this year as compared to the last year. It was further stated that due to reduced flow, in this season, prawn catches are bigger in size & beneficial to the people.

- 5) A study on the pollution and carbon assimilation is being conducted under a project of Central Inland Capture Fisheries Research Institute by its local research centre located at Vadodara. This institute had collected data before closing of the sluice gates on 21st February and the will be done again during second week of March. The data collected is being procured through the Director of the Institute.

To discuss all related aspects a meeting has been convened under the Chairmanship of the Executive Member, NCA on 24th March, 1994 at New Delhi..

- 6) During inspection of the deep pools silt deposits were observed along the bank of the river (Plate-7) and according to the discussions held with the people it is gathered that the silt deposition took place in the first week of November. Even though deposition of the silt is not linked with the closing of construction sluices, yet deposition of the silt is of concern from fisheries point of view.

Officials of the state Fisheries Department were requested to provide detailed information on these aspects.

- 7) On the upstream site, the water level on second March was about 50 meters i.e. 3 meters short of the river sluice gates (Plate-8). According to the information received later, the flow through the sluices started from 7th March onwards and the normal flow conditions were restored.
- 8) During the discussions with Conservator of Forest, SSP, Mr. Negi on the question of clear felling on the submergence area. It was gathered that the entire felling work has been completed before June, 1993 and that even all coppice crop up to 4 meters below the FRL was removed.
- 9) The new Shoolpaneshwar temple is at an advance stage of construction and a beautiful complex is coming up to house the deity which is presently resting at transit shed nearby .

IV) CONCLUSION:

It may thus be seen that all necessary arrangements as promised by Govt. of Gujarat for supplying minimum quantity of water downstream of SSP were made.

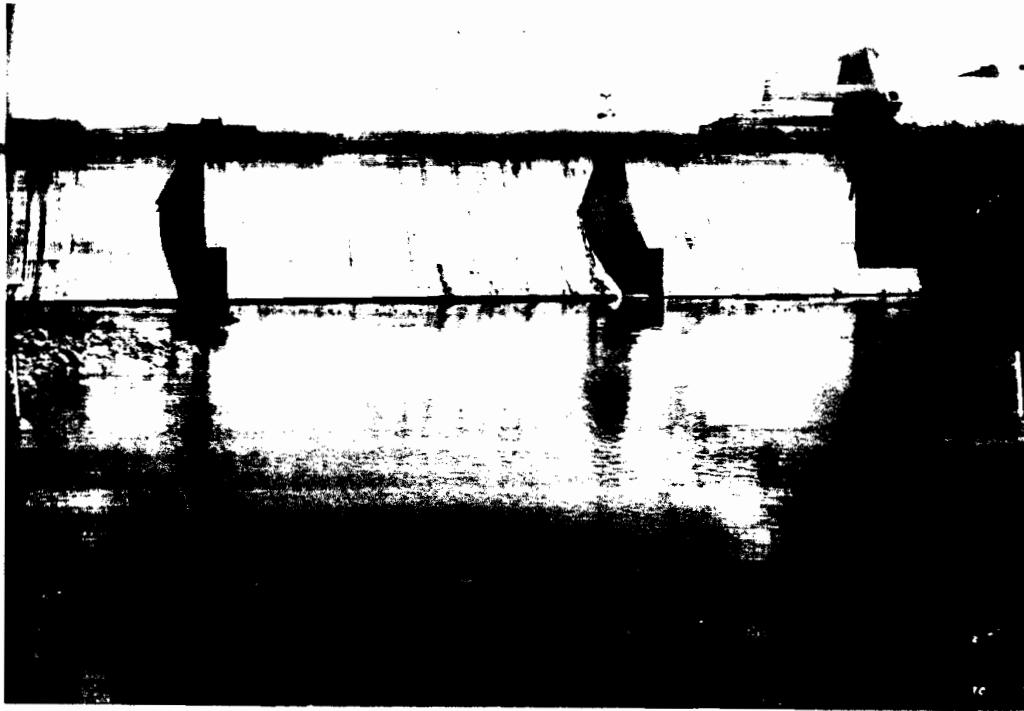
No adverse effect on fish and prawn was discernible, as enough quantity of water was available in the Narmada, salinity ingress is not expected.

However, it was suggested that notices are required to be served to the people using the Narmada river downstream as well as upstream to prevent any loss of life and property (in upstream due to submergence and downstream due to sudden stopping of the flow and surges through the river sluices 15 days later). It was further suggested that the areas of influence may be declared as prohibitive zone at least for the limited purpose to safeguard the life property. It would have been desirable to keep continuous monitoring of the water quality downstream and to regulate the discharge of the toxic wastes from the industries situated on the downstream river banks. Yet in view of the additional release of water available through leakage from the construction sluices, no significant negative impact were observed / anticipated

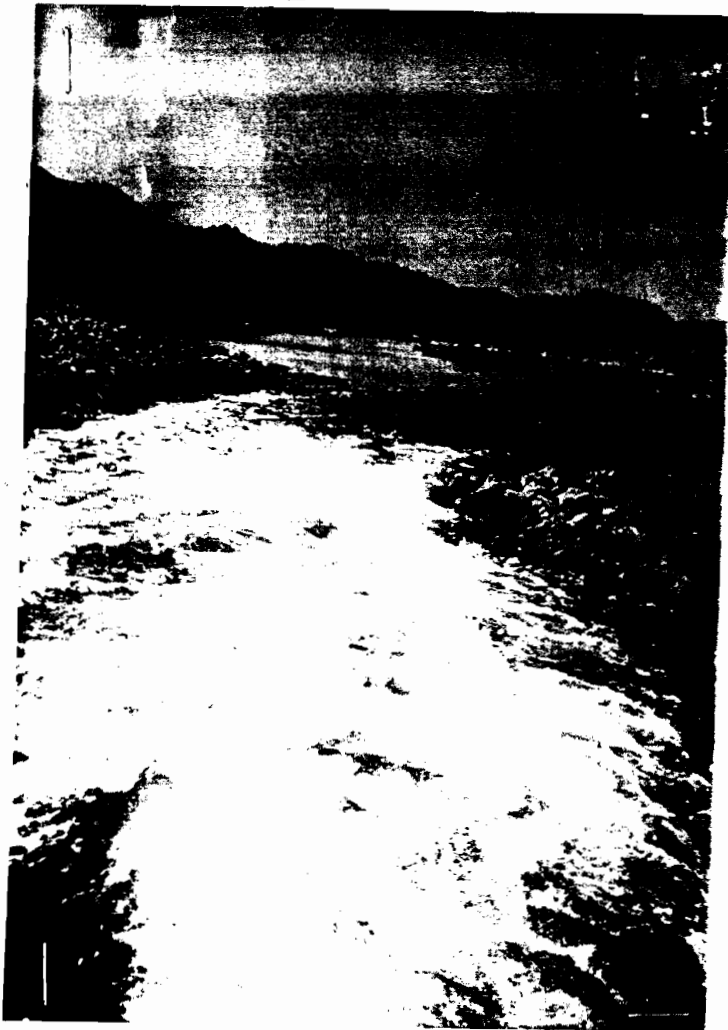
ANNEX - 1**LIST OF OFFICERS INTERACTED WITH DURING VISIT**

1. Shri G.J. Java, Chief Engineer, SSNNL, Vadodara.
2. Shri N. Ramaswamy, Secretary, Narmada Development Department, Gandhinagar.
3. Shri R.S. Negi, Conservator of Forests, Vadodara.
4. Shri S.K. Chaturvedi, DFO, Kevadia.
5. Shri M.W. Menon, Commissioner (Fisheries), GOG, Gandhinagar.
6. Shri K.G.S. Nair, Dy. Commissioner (Fisheries), GOG.
7. Dr. S.N. Singh, Sr. Scientist, CICFRI, Vadodara.
8. Shri Jhu Jhar Singh, Director (Civil), NCA, Vadodara.
9. Executive Engineer, Karzon Dam.
10. R&E Team from NVDA at Kevadia Colony.

PLATE - 1



Leakage from Construction Sluices.



Flowing waters
from construction
sluices.

FLATE

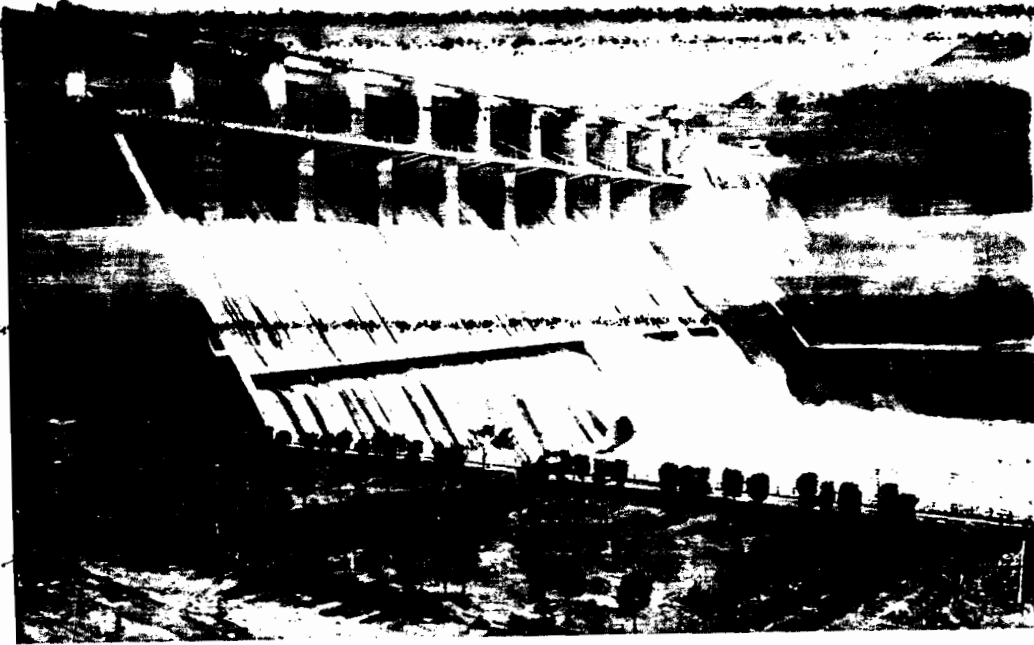


Pumps in operation



3000000 water
being pumped.

PLATE - 3



Release from Karjan reservoir.

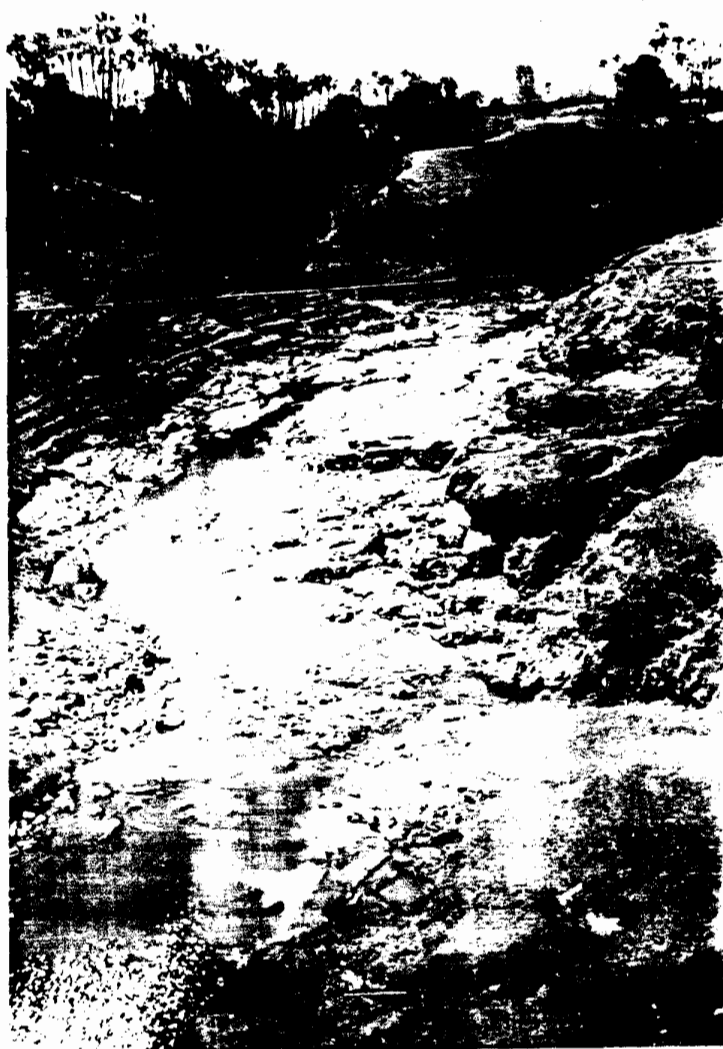


Karjan Canal discharging into Nallah.

PLATE - 1



Main tributary (Natural springs)



Tributaries
flowing into
down stream
reach

PLATE - 5



Enough quantity of water in the down-stream.



Water in the river downstream during closing of construction sluices on 3rd March, 1994.

PLATE - 6



Deep Pool.



Deep
Pool.

171-7

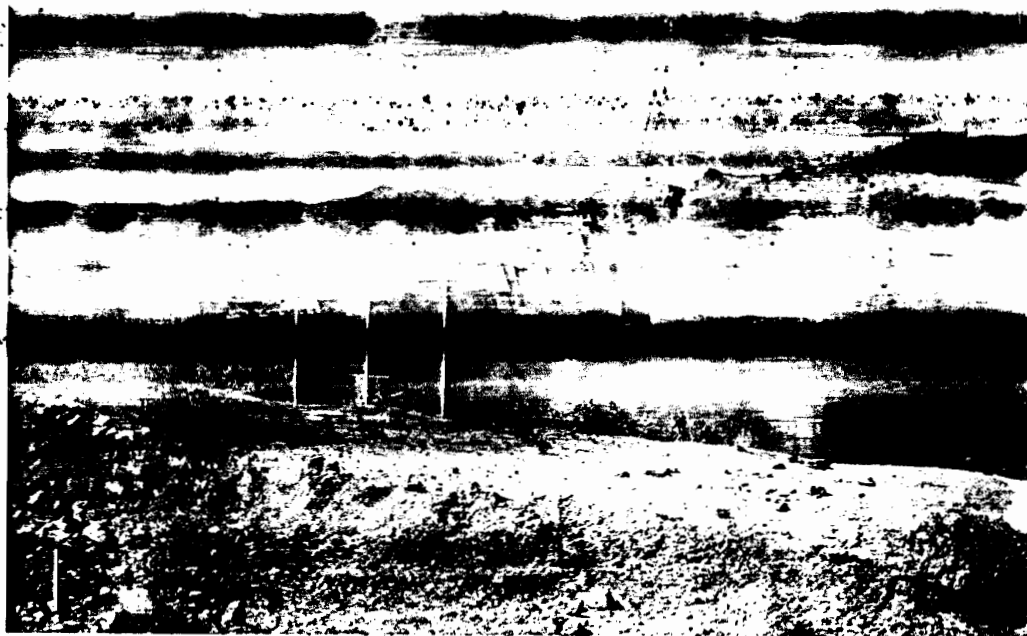


Silt deposits.



Silt deposits

- 8



Rising of water level on upstream due to closure
of sluices. (49 meter on 3rd March, 1994.)



Reservoir Impoundment

ANNEX-XXII-(II).

MINUTES OF 6TH MEETING ON FISHERIES DEVELOPMENT &
CONSERVATION IN SARDAR SAROVAR PROJECT & NARMADA SAGAR
PROJECT HELD ON 24TH MARCH, 1994 AT NEW DELHI.

Dr. A.K. Malhotra, Member (E&R), NCA on behalf of Chairman welcomed all those who participated in the discussions. Discussion on agenda items was taken up thereafter. Shri S.A. Char, Executive Member, NCA joined the discussion a little later. List of participants is enclosed at Annex-I.

Agenda Item No.VI-(1) : **Confirmation of the Minutes of the 5th Meeting held on 10.11.93 at New Delhi.**

The Minutes was confirmed with the following modifications:

1. Under Item No. V(2) para 3. Following sentence was added at

the end of para 3. "Dr. B. Roy (Fisheries) Govt. of

Madhya Pradesh, (GOMP) suggested that the Limnological data

recorded need to be stored in Computer Software. Study on

Trophic burst, Trophic depression and Trophic stabilization

shall also be included in the Limnological studies".

2. Under item No. V(2) the following sentence was added at the

end of para 4. "Shri B. Roy, DAC Ministry of Agriculture,

(MOA) suggested that Dr. P.S. Dehadrai, DDG (Fisheries), MOA

may also be invited. He further suggested that a committee

should be constituted to advice on the course of action on

the total aspects of the development and conservation of Fish

& Fisheries".

Agenda Item No.VI-(2) : **Implementation of the recommendations made on the basis of Desk review study completed by CICFRI.**

Shri A.M. Faruqui, Director (Fisheries), GOMP suggested

that on the recommendations of desk review study by Central

Inland Capture Fisheries Research Institute (CICFRI), the

Limnological studies may be entrusted to CICFRI (Reservoir

Dept) and a session may be convened for this purpose

separately. He further stated that so far as N.Chitale is

concerned, it should also be included in the list of

endangered species and the biology and breeding aspects of the species indicated in the desk review may be taken up and work entrusted to CIFE, Bombay who have a fish seed farm at Powerkheda, district, Hoshangabad.

Study of water quality and probable eutropication should be continued for another 5 years. For endangered species separate fish seed farm should be developed to take care of the conservation aspect of flora and fauna of SSP.

Detailed comments submitted by Director (Fisheries), NVDA on the points of action outlined in the CICFRI report, are enclosed at Annex-II.

Agenda Item No.VI-(3) : Identification of the agency for laying down guidelines for conservation of fisheries in the SSP.

Director (Fisheries), GOMP informed that a fish hatchery of 15 ha. for raising fish Fingerling by 94-95 has been proposed. He further suggested that if there is a possibility of delay in the development of fish seed farm alternative arrangements through purchase are suggested. He further suggested that a technical committee comprising of Commissioner (Fisheries), Director, CIFE, Director, CICFRI, Director of Fisheries (M.P) and senior technical officers of Govt. of Gujarat & Government of Maharashtra may be constituted.

Shri B.K.Verma, Member (E&F), Narmada Valley Development Authority (NVDA), expressed the opinion the constitution of committee/Board can only be agreed if approved by his Government. Shri B. Roy, suggested the formation of a high

level technical Committee which may consist of 3 Secretaries (Fisheries) of the state of Madhya Pradesh, Maharashtra &

Gujarat. Dr. P.S. Dehadrai, DDG (Fisheries), of ICAR, and

Member (E&R), of NCA. This committee may function under the chairmanship of Additional Secretary (Fisheries), Ministry of

Aquaculture. He expressed the opinion that this committee may make recommendation for immediate requirements pending formation of interstate board/apex cooperative. He further suggested that Terms of Reference to be drawn for this committee may also include monitoring of implementation aspect.

In response to a question from Shri B.Roy, Dr Pawan Kumar, Specialist (Env), NCA stated that all technical details if required can be supplied to this committee for laying down the guidelines.

Dr. A.K. Malhotra, Member (E&R), NCA, suggested that conservation of Fish Fauna is one of the requirement laid down by Ministry of Environment & Forest (MOE&F). Environment Sub-Group of NCA, which is chaired by Secretary, MOE&F, and monitors the progress of planning & implementation aspects. Therefore monitoring aspect can be left to this sub-group. However, in response to suggestions from Members, Executive Member, NCA agreed to take appropriate action to include Additional Secretary (Fisheries), MOA as invitee to the Environment Sub-Group of NCA.

Shri J.P.Dange, Commissioner (Fisheries), (GOM) agreed to

~~the proposal of Shri B.Roy, DAC, MDA, however Shri B.K.~~

Verma, Member (E&F), NVDA, stated that on the issue of formation of committee and its Terms of Reference, he has to consult his Government before committing anything.

Agenda Item No.VI-(4) : Identification of the executing agency for implementing the guidelines in view of the impoundment created in SSP by closing of construction sluices.

Director (Fisheries), GOMF stated that regarding stocking of fish seed, it is proposed to develop hatchery in the area. Regarding conservation, the member states should take care of the conservation aspect jointly, and the staff of NVDA (GOMF) should take care of the conservation aspect. Since the river has its own fish fauna, the fishermen families which are likely to be effected due to submergence and SC/ST persons and others who are interested to take to this profession should be given the right of fishing in the whole submergence area.

Shri B.Roy, DAC, MDA, suggested that the concerned state Government may be asked to take up appropriate measures for conservation of fish fauna in proportion to the area of submergence in each state.

In response to a question from Shri J.P.Dange, Commissioner (Fisheries), GOM, on meeting the funds requirement, Dr. A.N. Malhotra, Member (E&R), NDA stated that initially the funds can be obtained from state budget subject to final

decision in letter. These may be shared in the same manner as the cost of other environmental mitigation measures.

Shri. B. K. Verma, Member (E&F), NVDA, stated that the Central Government can possibly fund 50% of the total requirement but there has to be a forest scheme for the purpose.

It was agreed that concerned state fisheries department shall be the executing agency for implementing the guidelines. Appropriate infrastructural network shall be reported to the NCA.

Agenda Item No.VI-(5) : Formation of Sardar Sarovar inter state fisheries development board.

Shri B.K. Verma, Member (E&F), NVDA, stated that regarding formation of a board, response from GOG & GOM is yet awaited. Shri Dange, Commissioner (F), GOM, agreed to convey the views of Government of Maharashtra shortly.

Agenda Item No.VI-(6) : Revision of the plan prepared by state govts. of M.P., Maharashtra & Gujarat.

Shri Dange, Commissioner (Fisheries), GOM, stated that the GOM had prepared a detailed plan for development of fisheries and had submitted the same to the World Bank and NCA. It was expecting the funds from either of these organizations. However in view of clarifications given by Member (E&F), NCA, this Action Plan has to be taken up for revision and the demand for the funds will be put up against the state budget.

Shri B.K. Verma, Member (E&F), NVDA, submitted a copy of the summary of the Final Report on Limnological Aspects prepared by Barkatullah University, Bhopal. He further informed that the action plan is being revised taking into consideration the recommendations of all available reports.

Dr Pawan Kumar, Specialist (Env.) NCA, pointed out that as per the directives given by the Environment Sub-Group of NCA eco-ithycologist is to be associated for developing these plans.

Meeting ended with a vote of thanks to the chair.

ANNEX - I

LIST OF PARTICIPANTS ATTENDED THE 6TH MEETING OF FISHERIES
CONSERVATION & DEVELOPMENT OF SSP & NSP HELD ON 24.03.94
AT 11.00 A.M. IN NEW DELHI.

S.No.	Name & Designation	Address
1.	Shri S.A. Char, Executive Member, NCA, Indore.	
2.	Dr. A.K. Malhotra, Member (E&R), NCA, Indore.	
3.	Shri B.K. Verma, Member (E&F), NVDA, Bhopal.	
4.	Shri J.P. Dange, Commissioner (F), GOM., Bombay.	
5.	Shri B. Roy, DAC, Ministry of Agriculture, New Delhi.	
6.	Shri B.B. Sinha, Secretary, NCA, Indore.	
7.	Shri A.M. Faruqui, Director (F), GOMP, Bhopal.	
8.	Dr. Pawan Kumar, Specialist (Env.), NCA, Indore.	

14 (A) Action Plan for pre-impoundment Stage:

- 1) The work can be entrusted to CICFRI (Reservoir Unit).
- 2) This can also be incorporated in the above programme by the Narmada Valley Development Authority.
- 3) Immediate action is necessary to remove forest before impoundment. The action may be taken by NVDA.
- 4) The action is already proposed in (B)
- 5) It will cover in limnological studies and if there is any pollution, the matter may be referred to M.P. Pollution Control Board.

14(B) Action Plan for post-impoundment:

In the action plan of post-impoundment stage, the points referred in the CICFRI desk-review; the pointwise reply is as under :-

- i. The reservoir fisheries development plan is being prepared keeping in view most of the points indicated in the reports. So far as public awareness regarding judicious use of Agriculture inputs and pesticides is concerned it is in the pervue of Agriculture Department and they have to take care, for which you may please refer it to the Agriculture Department.
- ii. So far as the constitution of the Inter State Fisheries Development Board is concerned the matter has already been referred to GOM and GOG. Their replies are awaited.

Regarding measures to be taken in, pointwise reply is as under :-

- a| Multi species stocking is being planned.
- b| Stocking norms will have to be decided as per potential of the resources.
- c| Regarding exploitation of fish at M.S.Y., it will be taken care of at the time of fishing.
- d| It will be taken care of at the time of exploitation.
- e| Close season is already in vogue as per M.P. Fisheries Act, 1948.

- 2 -

f| . Regarding use of P. ... it is prohibited as per M.P. Fisheries Act, 1948

g| Pollution Control Board is required to take action in the matter, who have been delegated the powers.

iii. Hydro-biological monitoring should continue by CIGRI reservoir division/fisheries staff provided in NVDA.

iv. The provision of intensive stocking will have to be done for which one ten hectare water area ^(18 ha land) fish seed farm with hatchery is necessary for which the suitable land has been surveyed and the finalisation of the land have to be done shortly.

v. Regarding weeds, it will be covered under Hydro-biological studies programme.

vi. The action should be taken by GOG.

6- The steps have been taken up to Survey the deep pools in Narmada river. So far as the close season is concerned the State Govt. has already declared a close season wef 16th June, to 15 August, every year. Regarding sanctuaries, the State Govt. has already declared sanctuaries in Narmada River at different places, the copy is enclosed

12. Regarding threatened fauna, one ten hectare water area fish seed farm has to be developed. Where seed production of threatened species shall be undertaken.

NARMADA CONTROL AUTHORITY

Environment Sub Group

22nd meeting

3rd May 1994

Minutes

**MINUTES OF 22ND MEETING OF THE ENVIRONMENT SUB-GROUP NCA
HELD ON 3RD MAY, 1994 AT PARYAVARAN BHAWAN, NEW DELHI.**

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MINUTES OF THE 22ND MEETING OF ENVIRONMENT SUB-GROUP
HELD ON 3RD MAY, 1994 AT PARYAVARAN BHAWAN, NEW DELHI.

Shri R. Rajamani, Secretary to the Govt. of India, Ministry of Environment & Forests and Chairman of the Environment Sub-Group of NCA welcomed the Members and Invitees to the 22nd meeting of Environment Sub-Group. The list of participants is enclosed at Annex-XXII.Min.1.

Discussions on the various agenda items was taken up thereafter.

Item No.XXII-1(111): CONFIRMATION OF THE MINUTES OF THE 21ST MEETING.

Minutes of the 21st meeting of the Environment Sub-Group of Narmada Control Authority were circulated to all members and invitees seperately vide letter No. Env. 34(21)/93/4979-5011 dated 7.12.93.

The minutes were confirmed as circulated.

Item No.XXII-2(112): REVIEW OF ACTIONS TAKEN ON THE DECISION OF THE PREVIOUS MEETINGS.

1. Submission of Catchment Area Treatment plans for freely draining critically degraded sub-watersheds (Item No.XX-2(105)(2)).

Shri B.K. Verma, Member (E&F), GOMP submitted a copy of the report on prioritization for catchment of Narmada Sagar Project done by AIS&LUSO. He informed that change in the figures of Catchment area has been necessitated due to the revision of the earlier reports by AIS&LUSO. He further stated that the detailed maps are under preparation, and the same shall be made available soon.

In response to a question from Chairman, Shri Ranjit Singh, Chairman, NVDA stated that state's resources are already under stress and it would not be possible to arrange funds for Catchment Area Treatment works from the state's resources alone. He suggested that Central Government should also provide requisite funds to Madhya Pradesh for the same. Chairman Environment Sub-group however stated that the issue of securing funds has already been discussed by the Sub-group earlier and the directives issued then may be followed. Shri Naresh Narad, Vice Chairman, NVDA informed that a proposal for Rs.22 crores has already been submitted to department of Rural Development, Govt. of India. Chairman desired that a set of correspondence made by GOMP on this issue may be given to him for his perusal and follow up at his level.

On the issue of time frame for treating the area, it was pointed out by Dr. A.K. Malhotra, Member (E&R), NCA, that it has been proposed in the MP plan to complete the treatment works by 2024 A.D. Chairman, NVDA however stressed again that it would not be possible to treat the huge catchment spread over 9,15,000 ha.(for NSP) earlier than scheduled, even if all manpower & resources of the state government are mobilised. Chairman agreed to look into the issue and stated that a final view in this regard has to be taken by the Ministry of Environment & Forests.

Shri D. Rajgopalan, Secretary (R&R), Govt. of Gujarat made a reference to the suggestion of the committee of Secretaries & pointed out that only those critically degraded sub-watersheds, which are directly draining into the reservoir are to be treated at the project cost. Whereas, for the balance critically degraded subwatersheds he pointed that according to the above decision the issue was to be decided by the Planning Commission in consultation with Ministry of

Environment & Forests & Ministry of Agriculture. He also referred to the report of the committee of Environment Sub-group submitted in July, 1993 and proceedings of the 15th meeting of the Environment Sub-group, to state that treatment of freely draining sub-watershed is to be kept outside the conditionalities of pari-passu. To explain his point further he stated that the CAT works in directly draining areas, in all the three states put together have been completed in more than 55% area as against the submergence of the land which is likely to be only 15% of the total by the monsoon of 1994. He emphasized that the extent of CAT work completed is enough to justify raising the height of the dam to 81 M.

Chairman however disagreed with this analysis & stated that the stand of Ministry of Environment & Forests (MOE&F) regarding this has been made very clear on more than one occasion. He stated that the completion of works on entire critically degraded subwatersheds within the freely draining areas are also to be completed. He also stated that the view expressed by Shri Rajagopalan to treat only the directly draining sub-watersheds for satisfying the pari-passu clause was conceived and advocated by the project authorities and not by the Ministry of Environment & Forests. He further made it clear that it is the responsibility of the project authorities to locate the source of funding for this programme. Dr. Maudgal, Advisor, MOE&F requested NVDA to send copies of the plan of freely draining catchment area of SSP & NSP to the MOE&F. In response to a question from Chairman, Environment Sub-Group Shri Ranjitsinh stated that subject to the availability of funds NVDA will continue to ensure the implementation of CAT plan beyond 2002 till 2024 as scheduled.

Chairman summed up the situation by saying 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 MOE&F. He directed that all the directly draining critically degraded sub-watersheds in the vicinity of the impoundment should be positively treated up by the monsoon of 1994.

Shri Mago, Secretary (Env.) Govt of Maharashtra, submitted copies of the plan for treating the entire critically degraded sub-watersheds both forest & non forest areas, however, detailed map are yet awaited.

Shri K.R.Ladwa, CCF (SSP), Govt. of Gujarat referring to the measurement of silt during pre & post catchment treatment works stated that this work has been entrusted to the Regional Centre of Central Soil & Water

Conservation & Research Institute, (CSWCRI) Silaqui, Dehradun located at District Vasad, Gujarat. The measurement are to be done by automatic recorders stationed at 6 selected sites. Work order regarding this for 8.7 lakhs has been issued in March, 1994.

Chairman suggested that Govt. of Madhya Pradesh may also associate the same institute for the areas in Madhya Pradesh. Chairman agreed to the suggestion of Dr. Maudgal, Senior Advisor, MOE&F that CSWCRI may be requested to attend the next meeting & make a presentation on the works being done by them in SSP areas.

2. Cost Estimate for preparation of Action plan and implementation of Environment safeguard measures (Item No. XX-2(105)(3).

A table regarding this has been circulated to be various states with a request to fill their portion. It was observed that complete information is not yet available. Chairman requested state Govts. to submit the desired information and fill the blanks before the next meeting of the sub-group. He further stated that even if some cost, are not available, realistic estimates are to be apportioned for filling in the proforma. The compilation of the cost estimates is enclosed at Annex.XXII.Min-2

3. Environmental Impact of Closure of Construction sluices.

Chairman recalled the decision of the 21st meeting of Environment Sub-Group of NCA, wherein it was agreed that closing of construction sluices would be done after getting a waiver for the pari-passu condition from MOE&F.

Shri D. Rajgopalan, Secretary (R&R), GOG stated that the construction sluices were closed by Govt. of Gujarat on the authorisation issued by Ministry of Water Resources, taking note from the meeting chaired by Hon'ble Prime Minister, with the Chief Ministers of the four party states.

Chairman clarified that it was agreed to allow the closure of sluices only after satisfying conditions related to the Environment & R&R. He expressed that in this connection, satisfaction of the SSCAC is not enough either for this sub-group or for the Ministry of Environment & Forests. He informed the sub-group that now after this point has been made clear and the process of ratification has been initiated a final view has to be taken by the ministry of Environment & Forests.

A copy of the letter written by Dr. Shekhar Singh, Member of the Sub-group was read out to the members in his absence. Copy of the letters is enclosed at Annex.XXII. Min-3. Chairman desired that the sub-group may examine the points raised by him.

Shri Rajgopalan, stated that Govt. of Gujarat will send detailed observation on the points raised by Dr. Shekhar Singh. Prof. R.K. Katti expressed that he had already written a letter to the Chairman on the technical issue of closing of construction sluices & requested that this should also be considered for annexing alongwith Dr. Singh's letter. A copy of the letters written by Prof. Katti is enclosed at Annex-XXII.Min-4.

Shri G.L. Jawa, Chief Engineer (Dam Design), Govt. of Gujarat made a brief presentation on the technical issues involved in closing of construction sluices. The sub-group discussed these issue & agreed that even purely on safety consideration the sluices gates can not be re-opened. On the issue of violations of the pari-passu condition as contained in the letters of Dr. Shekhar Singh, it was pointed out that process of ratification has been set in motion and MOE&F is constituting a committee of officials for verification of the facts for this purpose.

On the issue of limiting the height of the individual blocks at the levels as they existed in December, 1993, Chairman recalled the decision of 21st meeting of Environment Sub-group where it was recorded that .."subject to no raising of the dam beyond what is done till today either on flanks or on height of the blocks. A final decision may be taken on closure of sluices-----".

On the issue of construction schedule as reported by project authorities, Sub-group observed that the SSCAC is going ahead with the construction programme in disregard to the recommendations of the sub-group & noted that the sub-group will become infructuous if this continues further. It was recommended by the sub-group that this fact should be brought to the notice of MOE&F & MOWR.

Shri N.V.V. Char, Secretary, SSCAC referred to the letter written by Secretary, MOWR to the Secretary, MOE&F about 15 days back in which status of Environmental Safeguard Measures & R&R works was considered progressing satisfactory to justify the construction work even upto 110 mt level. Shri D. Rajagopalan, sought to clarify the issue and stated that it was noted in the meeting chaired by the Prime Minister where Minister for Environment and forests,

representatives of Govt. of Maharashtra and Govt. of Madhya Pradesh were also present that work on SSP should proceed.

Chairman however stated that the issue is that the height of the blocks has been raised without satisfying the Sub-group/ MOE&F neither on the pari-passu clause nor about completion of all the works in the areas to be permanently submerged. He desired that the sub-group should consider the status of implementation of Environmental Safeguard Measures & Rehabilitation, aspects, with & without back water effects during monsoon 1994, if (a) only two blocks of SSP Dam are kept at 69 meter height; (b) height of the dam is raised to 80.3 meter uniformly as proposed by the State authorities.

Status of implementation of the Environmental safeguard measures as broughtout before the sub-group enclosed at Annex-XXII.Min-5, was noted by the members. Progress of individual environmental safeguard measures was reviewed under Agenda item No.XXII-3(113). Chairman stated that on the issue of Rehabilitation, this sub-group will be guided by the recommendations of the R&R Sub-group.

Item No.XXII-3(113): PRESENT STATUS OF STUDIES SURVEYS AND ENVIRONMENTAL ACTION PLANS

The Sub-group reviewed the progress of studies, surveys and the actions plans as follows:

i) **Phased Catchment Area Treatment:**

Narmada Sagar Project

Government of Madhya Pradesh

As per the action plan an area of 915150 ha is proposed for treatment by the year 2023-24. Shri Ranjit Singh, Chairman, NVDA stated that efforts are being made to locate the sources of funds from National Watershed Development Board, National Waste land Development Board, Employment Assurance Scheme, Jawahar Rozgar Yojana. NVDA also requested that the Central Government should provide requisite funds to Madhya Pradesh for catchment area treatment works. The fund requirement is estimated to be of the order of Rs.645 crores.

Copies of the report of AISLUSD on prioritisation of the Narmada Sagar catchment alongwith index map has been submitted to the NCA. However a copy of maps forming part of the report and the demarcation of sub watersheds boundary on Survey of India map of 1:50000 scale as requested by NCA are still awaited.

Regarding treatment of directly draining 62975 ha critically degraded subwatersheds, NVDA reported completion of works on 24075 ha against a target of 25075 ha. There is a shortfall of 1000 ha as per the programme presented to the Sub-group earlier.

Sardar Sarovar Project

Freely Draining

NVDA had submitted a plan to treat 318118 ha of critically degraded freely draining sub watersheds (forest and non forest areas) at an estimated cost of Rs.239 crores. The works are proposed to commence from 1997-98 and are likely to be completed by 2011-12. Funds for the treatment of these areas are yet to be located.

Directly Draining

NVDA propose to treat 125725 ha of critically degraded directly draining sub-watersheds within forest and non forest areas. They reported that an area of 14060 ha against a target of 25800 ha has been treated up till the end of March, 1994 leaving a shortfall of 11740 ha. Chairman directed GOMP to expedite the work.

Government of Maharashtra

Freely Draining (Forest and Non Forest)

Shri Mago, Secretary (Environment), GOM submitted copies of the plans for catchment area treatment works (Non forest and forest both) within the freely draining critically degraded subwatersheds covering a net area of 80881 ha. According to these plans 36950 ha area constituting 46% of the area (agriculture land) is proposed to be treated by Agriculture Department in 6 years period commencing from 94-95 at an estimated cost of Rs. 9.56 crores. Balance available area 40650 ha (being forest land) is to be treated by Forest Department in 8 years time commencing from 93-94 at an estimated cost of Rs. 60.62 crores.

Directly Draining (Agricultural)

He also submitted a copy of the plan prepared by Department of Soil Conservation and Watershed Management, Pune for treatment works in directly as well as freely draining (non forest) areas. According to this plan out of 31400 ha of the gross area of directly draining subwatersheds 28226 is net area above submergence. Out of this 2925 ha area of subwatersheds is agriculture land. The entire area is planned for treatment within a period of 3 years.

Agriculture area of 1543 ha in extent from 9 subwatersheds lying in the vicinity of the area likely to be affected by the pondage at EL 69 M was taken up for treatment during 93-94. Treatment is proposed to be completed by 94-95 at an estimated cost of Rs.48.75 lakhs.

The balance area from remaining 8 subwatersheds covering an area of to 1382 ha is proposed to be taken up for treatment during 94-95 and is scheduled for completion by 95-96 at an estimated cost of Rs.44.52 lakhs.

Directly draining Forest Land

21380 ha forest land falling in the category of directly draining area is proposed for treatment in 5 years commencing from 92-93. An area of 960 ha has been treated up during 92-93. In addition advance work has been completed (Soil conservation work, trenching etc) over an area of 6826 ha and the plantation will be done in 1994 monsoon. It is further proposed to take up additional 6000 ha area for complete treatment works each year till all works are completed.

Government of Gujarat

GOG reported that out of 27204 ha total area, 21311 ha area has been treated up by the end of March, 1993-94. Besides this out of a total of 3025 ha area Gujarat Land Development Corporation has completed the treatment works on 1740 ha of non forest land.

ii) Compensatory Afforestation

Narmada Sagar Project

Government of Madhya Pradesh

Shri B.K. Verma, Member (E&F), NVDA reported that against a target of 80945 ha a total of 55910 ha area has been planted up by the end of 93-94.

Sardar Sarovar Project

Government of Madhya Pradesh

Shri B.K. Verma, Member (E&F) reported that against 8740 ha area to be planted works have been completed in an area of 7036 ha.

Government of Gujarat

Shri Ladwa, CCF(SSP), GOG reported that against a target of 4650 ha GOG had completed plantations in an area of 3807 ha. This area is situated in Rann of Kutchch. In addition, GOG had also completed plantations in degraded forests on 7784 ha area against the final target of 9300 ha. Besides these plantations, an additional area of 770 ha has also been planted up in the dam vicinity.

Government of Maharashtra

Shri M.S. Parasnis informed the Sub-Group that lieu of land going in submergence and also that released for rehabilitation. GOM have to raise plantation over an area of 1846 ha during 1994-95 to complete all works.

Giving further details Shri Kelkar, Nodal Officer, GOM reported that with plantation on 22 ha land during 1994 rains the entire works on plantations in degraded forests shall be completed. He further reported that afforestation works on 3431 ha against a target of 6488 ha non forest land have been completed by 1993 rains. Besides PYO operations for taking up the planting work on 2911 ha area during 1994 rains have also been completed. He pointed out that with plantation on 145 ha during 1995 rains all works on non forest land shall be completed. He further reported that afforestation works on 2500 ha shall be completed by the rains of 1994 against a target of 2700. The balance area of 200 ha is proposed to be treated by 1995 rains.

iii) COMMAND AREA DEVELOPMENT

Narmada Sagar Project

Shri B.K. Verma, Member (E&F) informed that a comprehensive EIA for the command area of Narmada Sagar Project has been entrusted to Agricultural Finance Corporation, Bhopal, the organisation is expected to submit its report in about 3 months time. The report would include the issues like soil, human settlement, area planning, infrastructures, human health related to integrated development of the command area.

He further stated that a copy of the MOU of the work being entrusted to JLM Agriculture University, Jabalpur, shall be furnished to the NCA shortly.

Sardar Sarovar Project

Government of Gujarat

In reply to a question from Chairman, Shri D.Rajagopalan, Secretary (R&R), GOG stated that the time limit for the experts multi disciplinary group for the development of wildlife sanctuary in little Rann of Kutchch has been extended upto December, 1994. The group will take care of all the issues and provide their expert opinion to the Sub-group. The study has been entrusted to GEER Foundation of Gujarat recently. It is proposed to convene the next meeting of the expert group shortly. Dr.A.K. Malhotra, Member (E&R) pointed out that NCA is not represented in the study group(s) and is therefore ignorant of the deliberations or activity of the expert committees. Shri Rajagopalan agreed to include Member (E&R) as member of the Expert committees constituted to study the environment related issues of the command area.

On the issue of irrigated agro forestry in SSP command NPG agreed to consult Dr. Abrol. It was also informed that draft final report of the study entrusted to Wamana consultant, Hyderabad has been received by NPG. GOG was requested to submit a copy of this report to NCA for scrutiny. A copy of the other study reports completed in last two years are still awaited. Chairman desired that a copy of the proposal be made available to MOE&F also.

Government of Rajasthan

Shri S.P. Mathur, Additional Secretary (Environment), GOR submitted a copy of the first progress report of environmental studies carried out by the Centre for Environment, WAPCOS for Narmada Canal project in Rajasthan. The report contained the work done by WAPCOS during January, 1994 to April, 1994, copy of the report is enclosed at Annexure-XXII-Min-6 for consideration of the members and will be discussed during the next meeting of the Sub-Group. Chairman referred to the earlier directives of the sub-group for including additional studies on command area in Rajasthan portion, and desired that the comments of NCA on TOR which includes the recommendations of the Sub-Group should be included by WAPCOS & GOR while carrying further studies.

iv) SURVEY OF FLORA, FAUNA & CARRYING CAPACITY STUDIES

Narmada Sagar Project

Government of Madhya Pradesh

Shri B.K. Verma, Member (E&F) informed that the final report of the Wildlife Institute of India shall be available to the NVDA by 15th May, 1994. In response to a question from Chairman he stated that the WLI has given its recommendation for establishment of one National park and two wildlife sanctuaries in the project impact area of Narmada Sagar and Omkareshwar projects. Shri Ranjit Singh, Chairman, NVDA informed the Sub-group that according to the recommendations of the report produced by Friends of Nature Society, Bhopal and the interim report of WLI, and on the basis of further discussions formal proposals for creation of one national park of 480 sq. km and two sanctuaries of 154 and 125 sq.km have been sent to the state government for consideration.

The copy of the final report of Friends of Nature Society, Bhopal has also been supplied to the NCA. Shri B.K. Verma, Member (E&F) agreed to send one copy each of all the reports to MOE&F also.

② will be available later on

Sardar Sarovar Project

Government of Madhya Pradesh

Shri B.K. Verma, Member (E&F) informed that final report of the State Forest Research Institute, Jabalpur is likely to be submitted to the NVDA by 15th May, 1994 and the same shall be sent to the NCA after its receipt.

Government of Gujarat

Shri M.B. Mehta, Advisor, SSNNL informed that M.S. University had submitted its final report during April, 1993 the report has been sent to the Forest Department for perusal. Narmada Planning Group shall be arranging an expert deliberations for preparing the required action plan very soon. Dr. Pawan Kumar, Specialist (Env), NCA pointed out that the draft report of the university was available during July, 1992 and was discussed already in the seminar arranged by M.S. University during November, 1992. But because GOG have already developed the shoolpaneshwar sanctuary and cleared the entire forest area in submergence zone, besides taking up massive afforestation works in the entire catchment there may be very little scope for further work within the Narmada Basin. However, the report may be examined for any additionalities and actions expedited. It was reported by the GOG officials that all works as scheduled on Shoolpaneshwar sanctuary development have been completed by the end of March, 1994.

Government of Maharashtra

Shri Mago, Secretary (Environment) informed that School of Environment Science, Pune University had submitted a draft report and the comments received from NCA have been communicated to the study team. He further stated that the study team is examining the comments for making appropriate changes. In response to a question from the Chairman on need for improving presentation of the report Secretary (Env), GOM agreed to arrange a discussion with the officials of NCA and GOM with the scientists of the Pune, University to meet the requirement.

v) **ARCHAEOLOGICAL & ANTHROPOLOGICAL SURVEY****ARCHAEOLOGY****Narmada Sagar Project****Government of Madhya Pradesh**

Shri B.K. verma, Member (E&F), NVDA informed that the state department of Archaeology and Museum in collaboration with Archaeological Survey of India, had completed a survey of all the villages coming under submergence of all the 6 projects including Mann and Jobat. A copy of the action plan with an outlay of Rs.568 lakhs was enclosed with the minutes of the 20th meeting for consideration by the members. This plan includes an estimate of Rs.87 lakhs for relocation of two important centrally protected monuments viz. Chaubis Awtar temple and tomb of BajiRao Peshwa, these two structures are centrally protected monuments and are likely to be affected by the submergence of Omkareshwar and Maheshwar projects respectively. He further informed that the GOMP had already requested Superintendent Archaeologist, Archaeological Survey of India, Bhopal to immediately start the work as per the action plan. Joint inspection of the monuments to be affected by NSF is still awaited.

Government of Gujarat

It was informed that new construction site for Hamfeshwar temple has already been identified and steps have been taken to expedite the construction work. A new road to this temple site is under construction. Tenders have been floated for finalisation of the contract. However a firm action plan for relocation of the Hamfeshwar temple is yet awaited from Gujarat. Chairman directed to expedite this.

Government of Maharashtra

No work concerning archaeology is required to be done in Maharashtra.

ANTHROPOLOGY**Government of Madhya Pradesh**

Shri B.K. Verma, Member (E&F) informed that ethnographic study of tribal families of 17 villages coming under submergence has been done. The action plan prepared for rehabilitation of the oustees of SSP includes specific plans for the settlement of tribal families in accordance with the recommendations of the

study team. On the basis of the recommendation actions have already been initiated to get such scheduled tribe communities included in the 5th schedule of the constitution as they are included as scheduled tribe in Gujarat state. In addition the views as expressed in the report prepared by Anthropological Survey of India are being used for R&R of tribal families.

vi) **SEISMICITY AND RIM STABILITY OF RESERVOIR**

Narmada Sagar Project

Government of Madhya Pradesh

The Sub-Group was informed that on the advise of the Dam Review Panel, CW&PRS, Pune, I.M.D etc the NVDA had decided to establish a network of 10 seismic stations along the periphery of NSP complex to record and collect pre and post impoundment seismic data. Orders for supply of 6 nos photographic recorders and 12 nos wood Anderson Seismographs have already been placed. Tenders for Micro-Earthquake Recorders have been finalised by the NVDA. The balance imported instruments are proposed to be procured and installed as an add-on procurement under existing contracts of SSP.

Meanwhile, CW&PRS, Pune have agreed to undertake seismic studies of Narmada Sagar, Omkareshwar and Maheshwar projects by installing (a) Analogue Micro Earthquake Recorders and (b) one strong motion accelerograph for a period of two years. One Micro Earthquake recorder has already been installed by them at Narmada Nagar on 16.12.93. Action for approval of balance instruments is under process.

Sardar Sarovar Project

GSI had completed the survey and submitted its final report on rim stability analysis for the areas in Maharashtra and Madhya Pradesh recently. The survey for the rim stability analysis in Gujarat was completed much earlier by Jaipur branch of the GSI. In order to confirm the findings of the GSI, NVDA had entrusted some more time bound studies to CW&PRS, Pune at an estimated cost of Rs.12.55 lakhs. The CW&PRS has submitted an interim report. Final report is yet awaited.

vi) HEALTH ASPECT

Government of Madhya Pradesh

Narmada Sagar Project & Sardar Sarovar Project

Third interim report of the Gandhi Medical College on surveillance and control studies is likely to be available by the end of May, 1974. Certain observations were made by ICMR. Replies received from Gandhi Medical College have been sent to ICMR for a review.

Sardar Sarovar Project

Government of Gujarat

It was informed that draft final report of the environmental impact assessment studies in Narmada command area entrusted to SCHMS is almost finalised and the same will be submitted to the NCA and MOE&F at the earliest. Based on the suggestions and comments on the draft final report the action plan will be formulated. It was further informed that Dr.V.P. Sharma, Director, MRC, Delhi is being approached for control of malaria in the SSP areas. However response from Dr.Sharma is awaited.

Government of Maharashtra

Government of Maharashtra submitted a copy of the health plan prepared by Health Department, however on the question of getting the funds from NCA, Dr.A.K. Malhotra, Member (E&R) informed that expenditure incurred for providing incremental health facilities is chargeable to the project and is to be shared in the manner as in the case of other environmental mitigation measures. A copy of the plan is enclosed and placed at Annexure-XXII-Min-7 for approval of the Sub-Group. GOM was requested to take up other studies on surveillance and monitoring of the future health profile during and after filling of the reservoir. GOM Health Department requested ICMR to provide the guidelines. ICMR however indicated that the State Health authorities are to frame the terms of reference and proforma for taking up such studies. The proforma once prepared may be submitted to ICMR for any modification or suggestion. GOM was requested to expedite the action.

viii) FISHERIES DEVELOPMENT OF SSP AND NSP RESERVOIRS

To speed up the work on conservation and development of the fish resources in the reservoir a meeting was convened by the Executive Member, NCA, the minutes were enclosed with the agenda papers. Dr.A.K. Malhotra, Member (E&R) read out the recommendations made

on formation of a technical committee to lay down the guidelines on the above aspects. He however pointed out that NVDA had some reservations about the composition and the terms of reference of this proposed committee, he requested that formation of the committee may be approved by the Sub-Group. Shri Ranjit Singh, Chairman, NVDA stated that unless and until NCA takes the lead bring the party states together at one platform to look after the conservation and lay down the guidelines, it will be very difficult to implement the actions in time. He pointed out that the issue is hanging in air since long, he suggested that NCA should form a group of experts to lay down the action plan for development of fisheries and for rehabilitation of fishermen also. Chairman suggested that in the above committee expert like Dr.P.V. Dehadrai, DIG (Fish), ICAR and some other reputed Eco Itheologist(s) may also be included.

Government of Gujarat

It was informed that GOG had entrusted hydro biological monitoring of the estuary to CICFRI, Vadodara unit and pollution hazards are to be monitored by their state pollution control board. Suitable sites for infrastructure such as hatchery and rearing pond for hilsa and Macrobrachium have been tentatively identified. It was further informed that supplementary proposals for coastal-aquaculture, water logged areas etc have been incorporated in the plan. However, for regulation of mesh sizes of the gears, observations of closed season, ban on negative fishing, dynamite operation and limited discharge of pollutants could be implemented through an executive order. GOG agreed to send a copy of the approved plan for fisheries development to the NCA within a months time.

Government of Madhya Pradesh

Shri B.K. Verma, Member (E&F) stated that the final report on liminological aspect by Barkattulah University, Bhopal is expected by 15th May, 1994. He further informed that earlier the study team had given the data and analysis but no action was recommended. They have been asked by NVDA to provide recommendations and the mitigation plan.

Government of Maharashtra

Shri Mago, Secretary (Env) informed that the revised up dated fisheries development plan shall be sent to NCA within a months time.

The meeting ended with a vote of thanks to the Chair.

ANNEXURES

ANNEX-XXII.MIN.1

**LIST OF PARTICIPANTS ATTENDED IN THE 22ND ENVIRONMENT
SUB-GROUP MEETING HELD ON 3RD MAY, 1994 AT NEW DELHI.**

GOVERNMENT OF INDIA

Ministry of Environment & Forests

Shri R. Rajamani, Secretary, Ministry of Environment & Forests, New Delhi. - Chairman
Dr. S. Maudgal, Advisor, MOE&F, New Delhi.
Dr. K.A. Kushalapa, CCF, Govt. of India, MOE&F, Bhopal.
Shri Jiwrajika, DIG (FC), MOE&F, New Delhi.
Dr. (Mrs.) Nalini Bhatt, Joint Director, MOE&F, New Delhi.
Dr. S.C. Verma, Deputy Director, MOE&F, New Delhi.

Ministry of Water Resources

Shri N. Suryanarayanan, Commissioner (PP), MOWR, New Delhi.

Narmada Control Authority

Dr. A.K. Malhotra, Member (E&R), NCA, Indore.
Shri M.S. Menon, Member (Civil), NCA, Indore.
Dr. Pawan Kumar, Specialist (Env.), NCA, Indore.
Dr. Afroz Ahmad, IAO & Director (R), NCA, Indore.
Shri N.S. Bawahir, Deputy Director, (Env.), NCA, Indore.

Sardar Sarovar Construction Advisory Committee

Shri N.V.V. Char, Secretary, SSCAC, Vadodara.

ICMR, New Delhi

Dr. (Mrs.) Rashmi Arora, Asstt. Director General (ICMR), New Delhi

ICAR

GOVERNMENT OF MADHYA PRADESH

Shri Ranjitsinh, Chairman, NVDA, Bhopal.
Shri Naresh Narad, Secretary, NVDD, Bhopal.
Shri B.K. Verma, Member (E&F), NVDA, Bhopal.
Smt. I.M. Chahal, Commissioner, Archaeology & Museum, Govt. of M.P., Bhopal.

GOVERNMENT OF GUJARAT

Shri D. Rajagopalan, Secretary (Reh.) Govt. of Gujarat.
Shri L. Mansingh, Secretary, Agri. & Fisheries, GOG.
Shri H.A. Vaishnav, PCCF, Govt. of Gujarat.
Shri M.B. Mehta, Advisor (Env.), SSPA, Vadodara.
Shri G.L. Java, Chief Engineer, Design (D&PH), GOG.
Shri K.R. Ladwa, CCF (SSP), Govt. of Gujarat.

GOVERNMENT OF MAHARASHTRA

Shri Johny Joseph, Secretary (R&R), GOM, Bombay.
Shri A.K. Mago, Secretary (Environment), GOM, Bombay.
Shri M.S. Parasnis, CCF (C), Govt. of Maharashtra.
Dr. N.H. Mishra, Jt. Director, Health, GOM, Bombay.
Shri G.S. Nawathe, Chief Engineer & Jt. Secretary,
Irrigation Department, GOM, Bombay.
Shri M.B. Mankare, C.F., Govt. of Maharashtra, Dhule.
Shri S.P. Kelkar, Nodal Officer, GOM, Bombay.
Shri Ashwani Kumar, Deputy Secretary (R&R), GOM, Bombay.
Shri Suresh Gairola, Deputy Secretary, Forest Dept. GOM.

GOVERNMENT OF RAJASTHAN

Shri S.P. Mathur, Addl. Secretary (Env.), GOR., Jaipur.

NON OFFICIAL MEMBERS

Prof. R.K. Katti, Director, UNEECs, Bombay.

ANNEX-XXII.MIN-2A

ENVIRONMENTAL COST OF SSPRELATED TO UNIT I & II DAM & POWER HOUSE :A) Expenditure by project authorities:i) Cost of Survey & Studies (in lacs.)

S.No.	Component	<u>Estimate/Actual Expenditure</u>				Total
		GOG	GOM	GOMP	NCA	
1.	Compensatory Afforestation	<u>4.52</u> 4.52	<u>5.29</u> 5.29	<u>2.4375</u> 2.4375	-	<u>12.2475</u> 12.2475
2.	Catchment Area Treatment.	<u>8.77</u> 8.77	<u>7.00</u> 7.00	<u>3.28</u> 2.80	-	<u>19.05</u> 18.57
3.	Flora & Fauna	<u>52.2</u> 38.3	<u>38</u> 16	<u>20.334</u> 15.64	<u>15.27</u> 15.27	<u>127.804</u> 85.21
4.	Health	<u>2.5</u> 2.5	NA	<u>30.00</u> 23.5	-	<u>32.5</u> 26.0
5.	Archaeology/Anthropology.	<u>1.3</u> 0.40	NA	<u>59</u> 36.33	-	<u>60.3</u> 36.73
6.	Seismicity & Rim Stability.	-	NA	<u>23.00</u> 12.50	<u>1.98</u> 1.98	<u>24.98</u> 14.53
						<u>276.8815</u> 193.2875

ii) Cost of Implementation (in lacs)

1.	Compensatory Afforestation.	<u>1809.10</u> 1298.48	<u>2116</u> 1650.27	<u>1800.000</u> 886.38	<u>5725.1</u> 3635.13
2.	Catchment Area Treatment.	<u>3509</u> 1826.48	<u>2801.4</u> 30.47	<u>8835.05</u> 954.69	<u>15145.45</u> 2811.64
3.	Flora & Fauna including Shoolpaneshwar	<u>75.31</u> 64.42	NA	<u>NA</u> NIL	<u>75.31</u> 64.42
4.	Health (Incremental expenditure) for 10 yrs.	<u>3800.0</u> 101	<u>210.15</u> -	<u>1354.63</u> 514.78	<u>5364.78</u> 615.78
5.	Archaeology/Anthropology.	<u>156.00</u> 29	NA	<u>700</u> NIL	<u>856</u> 29
6.	Seismicity & Rim Stability.	<u>129</u> 271	-	<u>NA</u> NIL	<u>129</u> 271

Total: 27295.64
7426.97

* In addition several State/Central agencies have also incurred expenditure on various Environmental studies & implementation aspects. Full details are not yet available.

NA : Not available.

ANNEX-XXII.MIN-2B.ENVIRONMENTAL COST OF SSP

	<u>Estimate/Expenditure</u>	<u>(%)</u>
1) Survey studies and plans	276.8815/193.2815	(69.8)
2) Implementation		
i) Catchment Area Treatment	5725.1/3635.13	(63.5)
ii) Compensatory Afforestation	15145.45/2811.64	(18.56)
iii) Flora, Fauna & Carrying Capacity	75.31/64.42	(85.84)
iv) Health	5364.78/615.78	(11.48)
v) Archaeology & Anthropology	856/29	(3.38)
vi) Seismicity & Rim stability	129/71	(55.04)
Total Env. Safeguard Measures:	27295.64/7426.97	(27.21)

SARDAR SAROVAR PROJECT : COST ESTIMATES AND EXPENDITURE (RS./HA)

	<u>Govt. of Gujarat</u>		<u>Govt. of Maharashtra</u>		<u>Govt. of Madhya Pradesh</u>	
	<u>Estimate</u>	<u>Expenditure</u>	<u>Estimate</u>	<u>Expenditure</u>	<u>Estimate</u>	<u>Expenditure</u>
1. <u>CAT</u>						
<u>Forest</u>						
Area	12012	7883	14007	4856	6355	6790
<u>Non-Forest</u>						
Area	7967	8391	3190	*1	7500	6790
2. <u>CAF</u>						
<u>Forest</u>						
Area	10129	9211	11090	7039	20595	9755
<u>Non Forest</u>						
Area	17527	13895	-	7523*2	20595	9755

*1. Incomplete work/expenditure is Rs.14.0 lacs so far during 1993-94.

*2. Compensatory afforestation in lieu of R&R works cost is Rs. 11232/ha.

ANNEX-XXII-MIN-3.

INDIAN INSTITUTE OF PUBLIC ADMINISTRATION
INDRAPRASTHA ESTATE, NEW DELHI 110002

2 May, 1994

Dear Shri Rajamani,

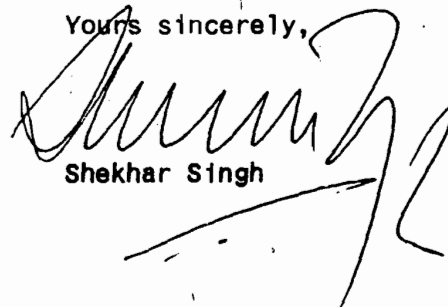
I regret my inability to attend the NCA subgroup meeting on 3 May, 1994, as I would not be in Delhi. However, based on the minutes and agenda notes circulated, I would like to make the following points for discussion at the meeting:

1. The closing of the sluice gates in contravention of the decision of the sub-group at its last meeting is clearly violative of the conditions of clearance and of *pari passu*. Therefore, the sub-group has no alternative but to request the Ministry of Environment and Forests, Government of India, to revoke the clearance to the project and reconsider the matter only after the sub-group is satisfied that the *pari passu* condition has been fulfilled. I hope the sub-group will take this decision.
2. The sluice gates should be immediately reopened and this should be a pre-condition to the project being allowed to apply for fresh environmental clearance.
3. The decision of the sub-group was that there should be no increase in dam height. I understand this decision has already been disregarded and now there is a proposal for further increase in the dam height. This should not, under any condition, be accepted till *pari passu* has been achieved. The sub-group should also recommend revocation of environmental clearance on the basis that their recommendation about not increasing the dam height was ignored.

I would be grateful if you could consider these points in the forthcoming meeting.

With regards,

Yours sincerely,


Shekhar Singh

Shri R. Rajamani
Chairman
NCA Sub-Group on Environment
Ministry of Environment and Forests
Government of India
New Delhi

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TO.

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10/12/93

Shri R. Rajamani
Secretary to Govt. of India Ministry of
Environment & Forests, 4th Floor,
Paryavaran Bhawan,
C.G.O. Complex,
New Delhi - 1100 03

(Chairman, Environment Subgroup of G.O.I.)

Sub:- Item xxi-2 (109) 3 : Environmental Impacts of closing of
Construction Sluices Report of the expert Group Constitutes by
SSNNL XX-5 (108)

Dear Sir,

(A) When the above item was tabled for discussion, one of the members drew my attention to the legal aspect of the item and scope of the item. However, I submitted to the august body that during the past 40 years I have been involved in teaching, research and assisting government of India and State Governments etc, to solve problems relating to river valley projects and stability and safety of dams, and thus it is my duty to draw the attention of the Chairman and this august body to the grave danger the stability of the dam would be subjected to if immediate action is not taken to close construction sluices. Due to cavitation and high magnitude of dynamic forces caused by flow of water under heads not permissible, the body of the dam and the foundation may show distress and result into permanent weakness in the dam. This may call for strengthening, the dam by injecting thousands of tonnes of epoxy and thus incurring thousands of crores of expenditure. Even after this we will be exposing all towns and villages down stream to grave danger caused by likely disaster.

In view of this I requested this august body to first close the sluices and save the dam and then under take accelerated measures to tackle the marginally remaining catchment treatment problems in the part falling under Maharashtra. This I understand can be achieved by allocating some funds. In our anxiety to turn Nelsoni's eye to dam safely the committee will be doing great disservice to the very purpose for which the exercise of environmental protection is taken. If the dam is safe our effort to impose strict environmental discipline would be considered

Cont...

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laudable. It may be noted that the discharge capacity of construction sluices is ten thousand cusec as against estimated flood discharge of 24.5 lakh cusecs. Already the level of submergence during 1993 is far higher than the level of submergence that will be caused due to closure of construction sluices as another set of sluices are provided at R.L.53.

In the year 1974 at the instance of then secretary DST I had an opportunity to conceive centers of excellence to be located at 5, IITS. At IIT, Bombay we proposed environment related centers, (i) Center of studies in resources engineering using satellite technology and GIS and (ii) center for environmental engineering and sciences.

Thus during the past two decades I have been playing my humble role in the area of championing the cause of environmental protection both on the ground and in the air as much as any body else. I believe in scientific approach to solving environmental problems in an integrated way, developing scientific equilibrium between human habitat, natural resources, natural and man made hazards and environment.

(B) After the chairman summed up the discussion as he conceived it, we had no opportunity to clarify some points. He questioned the very competence of the subcommittee to consider the problem relating, attention to be paid to grave dangers the stability of the dam is subjected to as it falls under the preview of another body. In this context I may kindly be permitted to present my views. Construction sluices are normal features in almost all dams in the whole world. Taking into consideration ease and requirement of construction and stability and safety of the dam, the designing authorities and construction authorities are authorised to construct construction sluices and close them when the dam is raised to desired level. These two authorities who are entrusted with the safety of the dam in coordination with other authorities plan closure period for the construction sluices. This is a normal practice.

It appears that when the construction sluices were designed and executed, environmental component was not incorporated in the design of these construction slices. If this component would have been incorporated, I am sure the designer would have provided proper gates, liners for the sluices and also proper concrete etc. to take care of high velocities.

If gates would have been provided and sluices would have been designed for high velocity and high head of water flows both the project authorities and the subcommittee on environment would have been spared from tackling this problem embracing both environmental front and dam safety front.

Cont..

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Continuation Sheet No.....

Because of the past inadequacies in dealing with the design of construction sluices by not incorporating environmental component, it has become necessary to authorise the design and construction engineers to close the sluices immediately and thus ensure safety of the dam.

(C) The discussion at the subcommittee revealed the mismatch between the direction given by MOEF and execution under taken by various State Governments. There is a weakness in the coordination system as set up. One can understand the agony to which the subcommittee is subjected to. However, as the country is making a herculian effort to impose environmental discipline in the society which is a new parameter, it is necessary to bear with, for some time lacking in perfect implementation. Causes may be many. In the interest of achieving the major aim of constructing a safe and sound dam which will save the down stream human habitat from grave disaster, the committee may alert the appropriate authorities to under take closure of construction Suices immediately.

This letter may kindly be circulated to all concerned.

With kind personal regards,

Yours Sincerely,

R.K. Katti

(R.K.Katti)

(Members Environmental subground NCA)

From:-

Dr. R.K.Katti
B.E. (Hons), M.S. (HWYS) USA
Ph.D. (Soil Engg.) USA, F.I.E., F.I.G.S
F.Ma Sc.
Prof. Civil Engg. & Head Center of Studies in
Resources Engg., I.I.T.B. (Retd.)
Director & Consultant UNNEECS

MMEL-IXIL-RDM-5

**STATUS OF PLANNING AND IMPLEMENTATION OF ENVIRONMENTAL SAFEGUARD MEASURES,
EXECUTIVE SUMMARY AS ON MARCH, 1994.**

ITEM	PONDAGE LEVEL		FLOOD LEVEL (1 in 100 year flood)		FINAL TASK
	69 mt	80.3 mt	100 mt		
	(Figures in brackets indicates percentage)				
<hr/>					
A) <u>SUBMERGENCE</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>		
I) <u>TOTAL LAND</u>	3575 ha. (9.6%)	5160 ha. (13.9%)	8900 ha. (24%)		37000 ha.
<hr/>					
II) <u>FOREST LAND</u>					
a) <u>Govt of Gujarat</u>	4376 ha.	4376 ha	4376 ha		4376 *1
b) <u>Govt. of Maharashtra</u>	50 ha. (1.8%)	350 ha. (12.6%)	2300 ha. (82.8%)		2776 *2
c) <u>Govt of Madhya Pradesh</u>	NIL	NIL	1900 ha. (36%)		2732
<hr/>					
<u>SUGGESTED ESM.</u>					
B) <u>DAF</u>	<u>Desired</u>	<u>Achieved</u>	<u>Desired</u>	<u>Achieved</u>	<u>Desired</u> <u>Achieved</u>
a) <u>Govt. of Gujarat</u>	13950	11586	13950	11586	13950 11586
b) <u>Govt. of Maharashtra</u>	150	21819	1050	21819	6900 21819
c) <u>Govt. of Madhya Pradesh</u>	NIL	7036	NIL	7036	5700 7036
<u>TOTAL</u>	14100	40441	15000	40441	26550 40441
<hr/>					
C) <u>CAT (DD)</u>					
a) <u>Govt. of Gujarat</u>	13164	23051	30230	23051 ()	30230 23051
b) <u>Govt. of Maharashtra</u>	5798* (16.55)	960 ()	14629* (6.56)	960 (30.45)	27784* 960
c) <u>Govt. of Madhya Pradesh</u>	NIL	14060	NIL	14060	27462 14060
<u>TOTAL</u>	18962	38071	44859	38071	85476 38071

D) WILD LIFE PRESERVATION
(upto F.R.L.)

Total Forest Area (ha).	Status 3/94	Desired	
		Pondage 69m.	Flood 80.3m 100m

a) GUJARAT	4523	Survey Complete)	
b) MAHARASHTRA	3252	Survey Complete)	All Completed
c) MADHYA PRADESH	2732	Survey Complete)	

**I) Protection to endangered Sp.
of Flora & Fauna.**

a) Gujarat	Completed	"Completed"	
b) Maharashtra	Action Plan awaited	Not needed	Action Plan awaited
c) Madhya Pradesh	Action Plan awaited	Not applicable	Action Plan awaited

II) Forest clear felling
(Upto 4 mt below FR. with
migratory corridors.)

a) Gujarat	4376	3773.6	4376	4376
b) Maharashtra	2776	28 ha felled as on June, 1993.	49	1700
c) Madhya Pradesh	2732	Felling plan ready	NIL	1900

III) Fisheries Conservation

a) Gujarat	Revised Action plan awaited	) - Measures for utilising Trophic burst needed.) - Decision on Joint Management for implementation of
b) Maharashtra	-do-	) measures awaited.
c) Madhya Pradesh	-do-	) - Long term hydro-biological studies to be entrusted.) - Report from Barkatullah University for M.P. awaited.

E) HEALTH ASPECTS

a) Gujarat	1. Project site.	) Hospital functioning	) Continuous monitoring needed.
	2. Peripheral villages	) Staff Strengthened)
	3. Command Area	) Revised Action Plan awaited	-Not relevant
b) Maharashtra	1. Relocation site	-One hospital at Somawal functioning)	
	2. Periphery of reservoir-Revised plan received, financial	) -Continuous monitoring needed	
		approval awaited.)
c) Madhya Pradesh	1. Hospital at Nisarpur	-Action awaited)
	& strengthening of staff.	)	Not relevant
	2. Monitoring studies	-Studies progressing)
	3. Water quality studies	-To be entrusted)

F) RIM STABILITY ANALYSIS

- | | | |
|-------------------|--|--------------------|
| a) Gujarat | - Studies completed | - No action needed |
| b) Maharashtra | - Studies completed | - No action needed |
| c) Madhya Pradesh | - Studies completion, further studies in progress. | - Not relevant |

G) ARCHAEOLOGY

- | | | |
|-------------------|--|---|
| a) Gujarat | - Survey completed |) |
| | - Shoolpaneshwar temple shifted |) Completed - Hampheshwar awaited - Action Plan awaited |
| | - Hampheshwar temple shifting plan awaited |) Action Plan awaited. |
| b) Maharashtra | - Survey completed | - No action needed |
| c) Madhya Pradesh | - Survey completed, Action Plan ready. | - Not relevant. |

-
- *1 Breakup of the area undergoing submergence at RL 69 or 80.3 meter is not available. Total forest land coming under submergence is 4523 ha. out of this an area of 147 ha between FRL & 4 mt below FRL.
- *2 Total forest land in is 6488 ha. out of this 1060 ha. is encroached, 2175 ha is riverbed & Nallah beside 476 ha in between FRL & 4 mt below FRL.
- *3 Out of this area 1096 ha area is agricultural land. Besides 1561 ha area is encroached. Therefore net forest area is 3141 ha.
- *4 Out of this area 1893 ha is agricultural land. Besides 2487 ha. area is encroached. Therefore net forest area is 3802 ha.
- *5 Out of the 2933 ha is the agricultural area. Besides 3382 ha. area is encroached. Therefore net forest area is 8314 ha.
- *6 Out of the 4359 ha is the agricultural area. Besides 5734 ha area is encroached. Therefore net forest area is 17691 ha.

ANNEX-XXII.MIN-7MAHARASHTRA STATESARDAR SAROVAR PROJECT - HEALTH PLAN

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 a combined effort of Gujarat, Madhya Pradesh, Maharashtra and Rajasthan States. Because of the backwater of the dam 33 villages of Arkalkuwa & Akrani Tahsil 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 sites near Walheri Village in Taloda Tahsil of Dhule District, Maharashtra. It would be necessary to provide adequate health cover to these oustee families being resettled in Taloda. The submergence water would affect an area admeasuring 10 km X 40 km. This submergence would indirectly affect about 80 villages in this belt. Although it would not be necessary to relocate these villages, proper health cover would be necessary as the ponded water may cause several water borne diseases like Malaria, Filariasis, Diarrhoea etc.

2. Existing Infrastructure -

Accordingly to the norms adopted by the State Government, one primary health centre is admissible for 30,000 population in non-tribal area while the norm for tribal area is 20,000 population. Similarly for population of 5,000 in non-tribal and population of 3,000 in the tribal area, one subcentre is admissible. One Community Health Centre is established for every 5 Primary Health Centres. Based on these norms, 2 rural hospitals, 8 primary health centres and 55 subcentres

- 2 -

have already been sanctioned for Akkalkuwa and Akrani Tahsils in Dhule. But as most parts of these two Tahsils are hilly & inaccessible the existing infrastructure is not sufficient to render the health care services to all the people hence the State Government has adopted a special health programme for these talukas and has sanctioned an additional 8 primary health centres. It has also been decided that till the establishment of these new 8 primary health centres, 10 mobile health units has been sanctioned for this area. These mobile units have been put into service about two years ago. In addition to this 5 primary health units have been sanctioned under the plan of difficult villages scheme.

Through these institutions patients are examined and the treatment will be given to them as a outdoor patient department. So also indoor facilities are also provided to the needy patients for the treatment. Diet facility to the patients and their one relative who accompanies the admitted patients is under the consideration of Government.

A) Details of existing infrastructure

Sr. No.	Tahsil	CHC	PHC	PHU	MHU	SC	Floating Dispensary
1.	Akrani	1	7	2	6	22	✓
2.	Akkalkuwa	1	9	3	4	33	-

..... 3

- 3 -

B. Infrastructure available in 40 km X 10 km belt adjoining to the submergence area

Sr. No.	Taluka	PHC	PHU	Mobile Dispensary	Subcentres
1.	Akrani	-	-	-	-
2.	Akkalkuwa	-	1	-	1

C. Infrastructure available in Submergence area which is to be shifted

Sr. No.	Taluka	PHC	PHU	Mobile Dispensary	Subcentres
1.	Akrani	2	-	-	3
2.	Akkalkuwa	1	-	-	2

3. A. Proposed Infrastructure -

Of the new 8 primary health centres (refer para 2) sanctioned for these talukas, one of the primary health centres was to be located at Bammi village. As this village would undergo submergence, it has been decided to shift this primary health centre to Walheri, Tahsil Taloda, District Dhule in order to take care of the rehabilitated project affected persons who would be concentrated around this village. It is proposed to establish the outstees in three resettlement sites of Walheri village to accommodate the displaced persons during the year 1993-94 & 1994-95. It has been decided to sanction one subcentre for each of these villages attached to this primary health centre. Thus in a radius of about 5 kms. one primary health centre and 3 subcentres will be established, with none of the units being more than 2 kms from each other.

-- 4 --

b. While the health measures are being strengthened at the resettlement sites, it has been decided to establish 8 Sub-Centres and provide one Floating dispensary for the villages falling in the 10km belt of the submergence area.

c. In addition to primary health centre, Bamni from Tahsil Akkalkuwa, 2 more Primary Health Centres from Tahsil Akrani are also getting submerged and needs to be relocated at village Son (BK) and Rajbardi in Tahsil Akrani.

d. 5 Sub-Centres are also going under submergence, they also need to be relocated in 10km area near the submergence.

Akkalkuwa - i. Manibeli - Kewadi
 ii. Bamni - Palaskhobra
 Dhadgaon - iii. Roshmal (KH) - Akwani
 iv. Bilgaon - Nimkhedi
 v. Sadri - Bhabari

e. Creation of 11 posts of MW (M) at newly proposed Sub-Centres to carry out Malaria Surveillances and surveillance of other diseases such as Diarrhoea, Dysentery, Dengu, Fever, Measles etc.

The statement of newly proposed and existing infrastructure -

Sr.No.	Tahsil	CHC	PHC	PHU	MHU	SC	Floating Disp.	MPW
1.	Akrani	Exist 1	7	2	6	22	--	--
		Prop. -	-	-	-	4	1	4
2.	Akkalkuwa	Exist 1	9	3	4	33	--	--
		Prop. -	-	-	-	4	-	4
3.	Taloda	Exist 1	3	1	1	20	-	-
		Prop. -	1*	-	-	3	-	3

(* Out of 9 Primary Health Centres in Akkalkuwa Tahsil, 1 Primary Health Centre of village Bamni which is being submerged is being shifted to village Walheri Tahsil Taloda at rehabilitation site)

-- 5 --

CREATION OF POST OF LABORATORY TECHNICIAN

Since the problem of Malaria & Filaria is expected in future due to the effect of water pondage, more fever cases & malaria cases would require Laboratory Technician at every Primary Health Centre in both Akrani and Alkalkuwa Tahsil for blood examination. This would require creation of 16 posts of Laboratory Technicians.

In addition to strengthening of existing infrastructure and creation of new infrastructure, the problem of malaria incidence would be controlled in real sense by taking preventive minor engineering measures such as prevention of seepage, levelling of ditches and ponds near the dam and back water. Similarly, chemical treatment of stagnant water with abate would be necessary. This activity can be covered by Irrigation Department. Approx. Rs. 1 Lakhs.

The existing and additional staff will carry out number of health activities in addition to their original duties.

Through the health institutions the staff working, they would carry out number of Health activities such as -

a. The health staff working in the field do the active surveillance by doing house to house visits. Health Education and other health activities are also carried out by them during their home visits.

b. Anti-malarial activities (other than active and passive surveillance), such as insecticide spranging, putting larvicides in water collections and developing larviforous fish in the ponds. (Gumbusia & Guppifish)

-- 6 --

c. The health staff including medical officers co-ordinate the ICDS activities carried out by the Anganwadi workers. They also examine the children between 0-6 age group, ANC mothers and give them treatment. Immunization of mothers and children is also carried out by them. They also provide regenal services to Rural M and District Hospital.

d. The health institution provide ambulance services for shifting the patients from primary health centre to rural hospitals and district hospitals.

The staff structure in the Floating Dispensary and Sub-Centre is enclosed as an Annexure.

The financial requirement for establishment of new health institutions, staff created and measures to be adopted for prevention of communicable diseases is enclosed as an Annexure -

The funds may be provided by the Narmada Control Authority i.e. Narmada Project or may be borne by Government of Maharashtra as will be decided.

These measures when adopted would take sufficient care of the health needs of both the areas i.e the resettlement site and the submergence area. This would be substantial improvement over the existing health arrangement in the submergence area and nearby area. It needs to be mentioned that except for the proposed Primary Health Centre at Banni, there is no proper medical arrangement in the 33 villages undergoing submergence. People are required to walk for several kms before they come across any dispensary or medical establishment. The large number of medical units proposed to be opened would serve multi purpose needs. Whild they would take care of water borne diseases and sicknesses prevaillent in the area, they

--- 7 ---

would also impart in the people consciousness about population control. The ill effects of traditional practices and help remove superstitious beliefs. They would also provide major relief for mother and child care.

STAFFING POSITION OF FLOATING DISPENSARY

1. Medical Officer Cl. 2	1
2. Compounder	1
3. Auxilliary Nurse Midwife (ANM)	1
4. Driver	1
5. Peon	1
6. Watchman	1
7. Mechanic	1

 7

STAFFING POSITION OF SUB-CENTRES

1. Auxilliary Nurse Midwife	1
2. Part Time Attendant	1

 2

MULTIPURPOSE WORKER

1

AT THE HEADQUARTER OF SUB-CENTRE**LABORATORY TECHNICIAN**

1

AT THE HEADQUARTER OF PRIMARY HEALTH CENTRES

TOTAL COST REQUIRED

ANNEXURE

Rs. in Lakhs

a. Floating Dispensary 19.50

b. Sub-Centres 42.46

c. Laboratory Technicians 7.20

d. Anti Malarial
Activities 1.00

Total Cost 70.16

ANNEXURE - AFLOATING DISPENSARY :I) RECURRING

(Rs. in Lakhs)

a) Salary	- 2.85
b) Medicines	- 0.50
c) Contingency	- 0.10
d) POL	- 0.25

- 3.50
-----II) NON - RECURRING

a) Ship Purchase	- 2.50
b) Material & Supplies	- 1.50

- 4.00
-----III) Resident¹ for Staff-----
-12.00

-12.00

Total Cost

19.50

ANNEXURE - B

<u>SUB-CENTRE</u>	<u>UNIT COST</u> (Rs. in Lakhs)	<u>11 UNITS COST</u>
I) <u>RECURRING</u>		
a) Salary	- 0.70	7.70
b) Medicines	- 0.06	0.66
c) Rent	- 0.01	0.11
d) Contingency	- 0.06	0.66
	-----	-----
	- 0.83	9.13
	-----	-----
II) <u>NON - RECURRING</u>		
a) Material & Supplies	- 0.03	0.35
	-----	-----
	- 0.03	0.35
	-----	-----
III) <u>CAPITAL</u>		
a) Main Building	- 3.00	33.00
	-----	-----
	- 3.00	33.00
	-----	-----
	-----	-----
Total Cost	- 5.86	42.46
	-----	-----

ANNEXURE 'C'LABORATORY TECHNICIANS : (Rs. in Lakhs)

<u>1) RECURRING</u>	<u>ONE POST</u>	<u>SIXTEEN POST</u>
a) Salary	0.45	7.20
	-----	-----
TOTAL COST	0.45	7.20
	-----	-----

ANNEXURE 'D'Anti Malarial Activities. (Rs. in Lakhs)

	1.00

Total Cost	1.00

This activity can be covered by Irrigation Department.

Submerged in the dam.

Sr.No.	Name of the village	Taluka	Families to be rehabilitated.	Population 1991 census
1.	2.	3.	4.	5.

AKKALKUWA TALUKA

1.	Manibeli	Akkalkuwa	238	523
2.	Dhankhedi	-do-	55	229
3.	Chimalkhedi	-do-	117	527
4.	Sinduri	-do-	163	937
5.	Gaman	-do-	52	1529
6.	Bamani	-do-	79	883
7.	Danel	-do-	189	1333
8.	Mukhedi	-do-	77	467
9.	Mandva	-do-	11	495
<u>9</u>			<u>979</u>	<u>6921</u>

DHADGAON TALUKA

10.	Paula	Dhadgaon	45	436
11.	Pimpalchowk	-do-	71	214
12.	Shelgda	-do-	19	319
13.	Atti	-do-	44	428
14.	Keli	-do-	28	155
15.	Thuvani	-do-	28	221
16.	Bharad	-do-	164	389
17.	Shikka	-do-	160	347
18.	Roshmal (KH)	-do-	24	607
19.	Domkhedi	-do-	102	238
20.	Nimgavan	-do-	106	402
21.	Shelda	-do-	38	341
22.	Junana	-do-	68	63
23.	Khardi Khut	-do-	2	239
24.	Mal	-do-	—	367
25.	Bilgaon	-do-	25	737
26.	Sawaryadigar	-do-	38	792
27.	Bhusha	-do-	249	616
28.	Sadri	-do-	71	315
29.	Varvali	-do-	46	159
30.	Udadaya	-do-	33	569
31.	Bhadal	-do-	82	756
32.	Surung	-do-	37	141
33.	Chinchkhedi	-do-	5	220
<u>24</u>			<u>1485</u>	<u>9071</u>

* Belt of 10 Km. nearby Sardar Sarovar Project
is shown as below:-

Sr. No.	Name of Village.	No. of Wadis.	Popu-lation	Distance from sanction ed Sub-Centre Km.	Distance from sanctioned P.H.C.
1.	Jengathi	--	563	6 Manibethi	65 Kathi
2.	Kevdi	2	286	13 - do -	58 -do-
3.	Kukadipadar	2	211	7 Vadphal	52 Malgi
4.	Pandharamati	2	588	5 - do -	45 - do-
5.	Chapdi	2	273	5 - do -	57 - do-
6.	Arethi	--	91	9 - do -	61 - do-
7.	Janbhipani	2	105	5 - do -	42 - do-
8.	Vadphali	8	588	--	40 -do-
9.	Kanjala	5	266	7 Bhagadari	17 Kathi
10.	Sambar	-	99	9 - do -	19 -do-
11.	Velkhedi	-	65	7 - do -	26 - do-
12.	Palaskhobra	-	138	11 - do -	37 -do-
13.	Debramal	-	189	13 - do -	40 -do-
14.	Makadkund	3	352	10 Katri	35- Chulvad
15.	Vahvani	1	294	9 - do -	28 -do-
16.	Borsisa	--	9	10 Roshmal (Kh)	25 Dh. D. D. D.
17.	Goradi	--	145	7 - do-	25 -do-
18.	Kumbhari	1	179	5 - do-	28 -do-
19.	Akavani	3	245	5 Son (BK)	15 - do-
20.	Jalola	--	58	5 - do -	12 - do-
21.	Kuktar	2	244	7 - do -	17 -do-
22.	Nimkhedi	3	305	15 Roshmal (KH)	24 -do-
23.	Timsamal	--	350	11 - do-	27 -do-
24.	Bhadri	2	275	20 Khadki	30 Toramal
25.	Khaparmal	--	354	15 -do-	25 -do-
26.	Kundya	3	310	11 -do-	21 -do-
27.	Chikhali	1	257	--Chikhali	25 -do-
28.	Bori	--	133	5- do-	26 -do-
Total		42	7012		

NARMADA CONTROL AUTHORITY

Environment Sub Group

23rd meeting

29th November 1994

Agenda

**AGENDA FOR 23RD MEETING OF THE ENVIRONMENT SUB-GROUP NCA TO
BE HELD ON 29TH NOVEMBER, 1994, AT PARYAVARAN BHAVAN, NEW DELHI.**

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A N N E X U R E

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Item No. XXIII-1(116): CONFIRMATION OF MINUTES OF THE 22ND MEETING.

Minutes of the 22nd meeting of Environment Sub-Group of Narmada Control Authority were circulated to all Members and invitees vide letter No.Env-34(22)/94/2266-2293 dated 24/27 June, 1994.

Govt. of Madhya Pradesh vide their letter No.NVDA/ENV-FCR/TECH/94/1692 dated 5.9.94 placed at Annex XXIII-1 desired that last sentence of 2nd para on page-3 may be reworded as follows:

Vice Chairman (NVDA) stated that proposals for various works amounting to approximately Rs.22 crores have been submitted to the collectors for allotment of funds from Jawahar Rojgar Yojna and Employment Guarantee Assurance Scheme sponsored by the department of Rural Development, GOI.

The minutes are put up for confirmation.

Letter to be passed by B.S.
Initial plus signed

Item No. XX111-2(117): REVIEW OF ACTION TAKEN ON THE DECISIONS OF THE PREVIOUS MEETINGS.

1. Submission of Catchment Area Treatment (CAT) plans for freely draining critically degraded sub-watersheds (Item No. XX11-2(112) (1)).

Govt. of Madhya Pradesh (GOMP) have submitted plans for treatment of entire freely draining critically degraded subwatersheds excluding directly draining sub-watersheds. However the treatment maps for balance of the critically degraded subwatersheds for both Narmada Sagar and Sardar Sarovar are yet awaited.

Govt. of Maharashtra have also submitted copy of the plans for treatment of the entire freely draining critically degraded subwatersheds excluding directly draining sub-watersheds.

Govt. of Gujarat is going ahead with the treatment of entire catchment within the state of Gujarat. The treatment works are nearing completion.

During the earlier meetings of the Sub-group State authorities had been advised to approach various State and Central agencies incharge for funding the watershed development programmes for mobilising funds for treatment of freely draining areas. However, Govt. of Madhya Pradesh have approached local governmental authorities for locating the funds for treatment of the balance of the critically degraded areas. Govt. of Maharashtra approached the central authorities for inclusion of Narmada catchment under River valley projects scheme. Planning Commission has already approved the catchments of Sardar Sarovar for inclusion under the centrally sponsored schemes of soil conservation under the River valley projects. State Governments have been advised by the Ministry of Agriculture that water shed project reports as per the guidelines of RVP schemes be prepared in order to enable that Ministry to include these projects in RVP scheme. Action taken by the State Governments may be reported.

During the earlier meetings, Chairman suggested that GOMP may associate the Central Soil and Water Conservation and Research Institute, Dehradun for measuring the silt load during pre and post treatment phases of the catchment area treatment works.

It was also agreed that Central Soil Water Conservation Research Institute (CSWCRI) may be requested to make presentation on the works being done by them in SSP areas of Gujarat State. Progress on this aspect may be reported.

SSP

meets shall be
3/1st Jan

Chairman, Environment Sub-Group during the 22nd meeting while summing up the discussions on proposed scheduling of CAT works in balance of the critically degraded subwatersheds had directed that all the works which adversely affect the environment, steps for their mitigation have to proceed on pari passu basis. Survey and other works could be done on a different scheduling for which a view has to be taken by the MOE&F. The present schedules as proposed by the State Governments subject to the availability of the funds are presented in Annex-XXIII-11.

2. Cost Estimates for preparation of Action plan and implementation of Environment safeguard measures (Item No. XXII-2(112) (2)).

During the earlier meetings of the Environment Sub-Group it was desired that the detailed cost (estimates and expenditures) on studies and implementation of mitigation measures for suggested environmental safeguards should be presented. The information available in the office of the NCA is presented in the Annex-XXIII-111 for information and consideration of the members.

3. Environmental Impact of Closure of Construction Sluices.

During the last meeting of Environment Sub-Group members were informed that process of ratification regarding closure of sluices has been set in motion and MOE&F is constituting a committee of officials for verification of the facts for this purpose.

Status of implementation of the environment safeguard measures is put up under separate agenda item for review by the members. A brief note on current status of construction including height of the dam in various blocks, impoundment created & the proposed construction schedule up to June, 1995 shall be circulated during the meeting.

Durvaran
M. A. L. V.
Vijay
S. P. member
C. P. member
D. S. member
get opportunity

41, 27
760000 FA
13 MFA

Apr 5500 in as pl
For 11000/- 3
Ref. Jan. meeting
MS to give

m/s DB PA 34400 - 960 - 6400
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1995-96

Item No. XXIII-3(118): **PRESENT STATUS OF STUDIES SURVEYS AND ENVIRONMENTAL ACTION PLANS.**

A copy of the status report for the quarter ending September, 1994 is enclosed and placed at Annex-XXIII-11.

Bar charts showing the progress of individual parameters as on 31.8.94 are enclosed at Annex-XXIII-IV. The present status of studies surveys and action plans is presented below in brief for a review by the Sub-Group.

1) **Phased Catchment Area Treatment**

Narmada Sagar Project

Govt. of Madhya Pradesh

An area of 24075 ha has been treated up by the end of March, 1994. NVDA to report the survival rate of plantation & the ext-ent of progress during the 1994-95. A copy of map for the areas under treatment is yet awaited.

Sardar Sarovar Project

A copy of the map showing the subwatersheds where treatment works are under progress is placed Annex-XIII-V.

Govt. of Madhya Pradesh

Govt. of Madhya Pradesh has planned to treat 125725 ha area, out of which an area of 20874 ha was treated up by 30th September, 1994. Further progress if any may be reported. A brief note on the field visit undertaken by Specialist Environment shall be circulated during the meeting.

Govt. of Gujarat

Govt. of Gujarat has taken up the entire catchment area upstream of the Sardar Sarovar Project in Gujarat for treatment. A copy of the map for areas under treatment is enclosed at Annex-XIII-VI.

By the end of September, 1994 an area of 28898 ha was treated up.

Govt. of Maharashtra

As per the plan submitted by Govt. of Maharashtra non forest area of 4360 ha is proposed to be treated by the end of 94-95. By the end of June, 1994, 1573 ha was to be treated up. However in 2 subwatersheds where the works could not be undertaken due to resistance from the villagers will now be taken up during November, 1994. The work on remaining non forest areas is proposed to be completed by the end of March, 1995.

In addition GOM have planned to treat 20,000 ha of forest areas. By the end of March, 1994 treatment in an area of 960 ha was completed. During 1994-95 additional area of 13014 ha was tackled. Besides, 6500 ha. area is also treated up with PPO works. A brief note on the field visit undertaken by Specialist Environment shall be circulated during the meeting.

GOM may like to submit the completion report on CAT works tackled so far.

11/12 Compensatory Afforestation

Narmada Sagar ProjectGovernment of Madhya Pradesh

Compensatory afforestation over an area of 55900 ha was reported to have been completed by the end of March, 1994. Further progress may be reported by NVDA.

Sardar Sarovar Project

A map showing compensatory afforestation sites in three states is enclosed at Annex-XIII-VII.

Govt. of Madhya Pradesh

Govt. of Madhya Pradesh have completed plantation works over an area of 8160 ha against the final target of 8740 ha by the end of August, 1994.

Govt. of Gujarat

Govt. of Gujarat have completed plantation works in the entire planned area of 13950 (including non forest and degraded forest areas) by the end of September, 1994.

Dr. Akem
Submitted for
MSD along with evoluta team
for submission to Govt. of Madhya Pradesh
an analysis is invited
Pl. send DHA (FC) to him a look.

Govt. of Maharashtra

by 2004
end of 1994

Out of total target of 19460 ha planned for treatment in lieu of the area undergoing submergence, an area of 16380 ha was planted up by the end of August, 1994. However detailed location map of some of the districts where compensatory afforestation works are progressing is yet awaited.

iii) COMMAND AREA DEVELOPMENT**Narmada Sagar Project**

NO yet
Designing in
1984
SAR
Subsidiary

Status of preparation of comprehensive environmental impact assessment report on command area development with integrated development plan for NSP is being entrusted to Agricultural Finance Corporation, Bhopal.

The MOU regarding studies on effect of pesticides, insecticides in the command area being entrusted to J.L.N. Agricultural University, Jabalpur is placed Annex-XXIII-VIII. Sub-Group may like to offer comments if any.

Sardar Sarovar Project**Govt. of Gujarat**

20-8-94

Regarding deliberations of the Experts Multi Disciplinary Group during the last meeting, it was pointed out that as NCA is not represented in the study groups they are ignorant of the deliberations or activity of the expert committee and it was agreed that Member (E&R) shall be included as a Member of the Expert Committee(s) constituted to study the environmental related issues of the command area. Govt. of Gujarat may like to report the progress.

The draft final report of the study entrusted to WAMNA consultants, Hyderabad received by NPG was to be submitted to NCA. Copies of the other reports completed in the last two years were also required to be submitted to NCA and MOE&F.

On the issue of irrigated Agro forestry in SSP it was agreed by NPG to consult Dr. Abrol. Further developments may be reported.

Govt. of Rajasthan

Report on the studies conducted by WAPCOS on environmental impact assessment has been submitted. NCA have offered their comments on this draft report. A meeting has been arranged between WAPCOS officers, NCA and the State Government official to discuss various issues before finalisation of report. The outcome of the meeting shall be reported during the meeting.

iv) SURVEY OF FLORA, FAUNA & CARRYING CAPACITY STUDIES**Narmada Sagar Project****Govt. of Madhya Pradesh**

Flora & Fauna studies for Narmada Sagar Project areas have been carried out by the two agencies viz, Friends of Nature Society, Bhopal and Wildlife Institute of India, Dehradun. Both of these agencies have submitted their final reports. Plans based on the recommendations of these study reports are required. NVDA may like to report further progress.

Sardar Sarovar Project**Govt. of Madhya Pradesh**

Final report of the Impact Assessment studies in the area undergoing submergence in Madhya Pradesh completed by State Forest Research Institute, Jabalpur was made available to MOE&F and NCA. NVDA may like to submit the action plans.

Govt. of Gujarat

Govt. of Gujarat may like to inform further progress on implementation aspect recommended in the report of M.S. University, Vadodara submitted in July, 1992.

Govt. of Maharashtra

The interim report of studies on flora and fauna in and around the SSP in the areas in Maharashtra State was prepared by School of Environmental Science, Pune. Some suggestions were made by NCA for improving the report. During the last meeting it was directed that discussions between officials of NCA and GOM with the Scientists of Pune University may be arranged to meet the requirements. Outcome of the discussions shall be reported during the meeting.

v) **ARCHAEOLOGICAL & ANTHROPOLOGICAL SURVEY**

ARCHAEOLOGY

Narmada Sagar Project

Govt. of Madhya Pradesh

During the last meeting Sub-Group was informed that State Department of Archaeology and Museum and Archaeological Survey of India, Govt. of India have completed survey of the villages coming under submergence.

The action plan for relocation of the monuments affected by Omkareshwar project and Maheshwar projects was prepared by Archaeological Survey of India for which an amount of Rs.87 lakhs was approved by NVDA. Allotment of requisite land at new relocation site is under consideration of the State Revenue Department. During the earlier meetings it was stated that north bastion of Joga Fort, Hoshangabad may be adversely affected due to scouring action of the water. Joint inspection for this monuments was to be undertaken to determine the best method for protecting the monuments. NVDA may like to report the progress in this regard.

Sardar Sarovar Project

Govt. of Madhya Pradesh

NVDA may like to indicate the progress on implementation of the action plan prepared by Department of Archaeology and Museum, Madhya Pradesh for protection/relocation and excavation works.

Govt. of Gujarat

Govt. of Gujarat may like to report the progress on further works undertaken by it for development of Shoolpaneshwar temple. Progress is also required to be reported on developments related to protection of Hamfeshwar temple.

Govt. of Maharashtra

No works are required to be done in Maharashtra in this respect.

ANTHROPOLOGY**Sardar Sarovar & Narmada Sagar Projects****Govt. of Madhya Pradesh**

It was reported during the last meeting that on the basis of recommendations contained in the report entitled ethnographic study of the tribal families, actions have been initiated to get certain tribal communities included in the 5th schedule of the constitution as has been done in Gujarat State and that the view expressed in the report prepared by Anthropological Survey of India are being used for R&R of tribal families. Progress may be reported.

vi) SEISMICITY AND RIM STABILITY OF RESERVOIR**Narmada Sagar Project****Govt. of Madhya Pradesh**

The Sub-Group was informed that on the advise of the Dam Review Panel, CW&PRS, Pune, I.M.D. etc the NVDA had decided to establish a network of 10 seismic stations along the periphery of NSP complex to record and collect pre and post impoundment seismic data. Orders for supply of 6 Nos photographic recorders and 12 Nos wood Anderson Seismographs have already been placed. Tenders for Micro-Earthquake Recorders have been finalised by the NVDA. For procurement of the balance imported seismic instruments proposal was to be sent by NVDA to the State Government for approval. Further progress may be reported by NVDA.

Meanwhile, CW&PRS, Pune have agreed to undertake seismic studies of Narmada Sagar, Omkareshwar and Maheshwar projects by installing (a) Analogue Micro Earthquake Recorders and (b) one strong motion acclerograph for a period of two years. One Micro Earthquake recorder has already been installed by them at Narmada Sagar on 16.12.93. Orders for supply of balance 11 Nos of instruments was also placed. Further progress may be reported by NVDA.

Sardar Sarovar Project

GSI had completed the survey and submitted its final report on rim stability analysis for the areas in Maharashtra and Madhya Pradesh in 1993. The survey for the rim stability analysis in Gujarat was completed much earlier by Jaipur branch of the GSI. In order to confirm the findings of the GSI, NVDA had entrusted some more time bound studies to CW&PRS, Pune at an estimated cost of Rs.12.55 lakhs. The CW&PRS had submitted an interim report. Final report is yet awaited.

vi) HEALTH ASPECT

Government of Madhya Pradesh

Narmada Sagar Project & Sardar Sarovar Project

Third interim report of the Gandhi Medical College on surveillance and control studies submitted by NVDA is placed at Annex-XXIII-IX. A copy of this report was also sent to DG, ICMR for his observations. Suggestions from DG, ICMR are awaited.

Sardar Sarovar Project

Government of Gujarat

It was informed that draft final report of the environmental impact assessment studies in Narmada command area entrusted to SCHMS have almost been finalised and the same will be submitted to the NCA and MOE&F at the earliest. Based on the suggestions and comments on the draft final report the action plan will be formulated. It was further informed that Director, MRC, Delhi is being consulted for the control of malaria in the SSP areas. Further progress may be reported.

Govt. of Maharashtra

Govt. of Maharashtra had submitted a copy of the health plan prepared by the Health Department earlier. Based on the discussions during the 22nd meeting of the Environment Sub-Group suggestions were incorporated and a revised plan was submitted by GOM. The plan is enclosed at Annex-XXIII-VIII for consideration of the members.

GOM was requested to carry out surveillance and monitoring studies of the impact area of the pondage. Terms of reference for these studies were to be drawn by the State Health Department keeping in view the views of ICMR and for taking up the studies subsequently. Progress may be reported by GOM.

viii) FISHERIES DEVELOPMENT OF SSP AND NSP RESERVOIRS

To speed up the work on conservation and development of the fish resources in the reservoir, Sub-group recommended the formation of a group of experts. The proposal for formation of a high level expert group is under consideration of the NCA and further progress in this regard shall be reported during the meeting.

*Shri
he will
Conclude after*

Govt. of Gujarat

During the 22nd meeting of the Environment Sub-Group members were informed that GOG had entrusted hydro biological monitoring of the estuary to CICFRI, Vadodara unit and pollution hazards are to be monitored by their state pollution control board. Suitable sites for infrastructure such as hatchery and rearing pond for hilsa and Macrobrachium sp. have been tentatively identified. It was further informed that supplementary proposals for coastal-aquaculture, water-logged areas etc have been incorporated in the plan. However GOG further informed that regarding regulation of mesh sizes of the gears, observations of closed season, ban on negative fishing, dynamite operation and limited discharge of pollutants these could be implemented through an executive order. Progress regarding this to be reported. GOG was to send a copy of the approved plan for fisheries development to the NCA this is still awaited.

is being
proposed
in the
plan
for
hatchery
and
rearing
pond

Govt. of Madhya Pradesh

Final report on liminological aspect by Barkattullah University, Bhopal is submitted by NVDA.

NVDA may like to report and submit the action plan.

Govt. of Maharashtra

The plan incorporating the aquaculture through development of irrigation tanks at the new relocation sites and training aspect of the fishermen families settled on the periphery of the proposed reservoir submitted by GOM is enclosed at Annex-XXIII-XI.

Item No. XXIII-4(119) ANY OTHER ITEM

DATE & VENUE OF NEXT MEETING:

ANNEXURE-XVIII-I

**NARMADA VALLEY DEVELOPMENT AUTHORITY
NARMADA NAGAR, TULSI NAGAR, BHOPAL, (M.P.)**

NO.NVDA/ENV-FOR/TECH/94/1692

Bhopal, Dated 5.9.94

To

**Shri A.K. Malhotra
Member (Env. & Rehabilitation)
Narmada Control Authority
27 Press Complex, A.B. Road
Indore - 452008.**

**Sub: Follow up action of the 22nd meeting of the
Environment Sub-Group of NCA held on 3.5.94 at
New Delhi.**

Ref: Your letter No.ENV-34(22)/94/1389 dated 27.6.94.

**Kindly refer your above described letter. As desired, the
progress and present status about the action on 14 points is
being sent enclosed herewith.**

Enclosure: As above.

Sd/-

**[B.K. VERMA]
MEMBER (ENVT. & FORESTS)
NVDA, BHOPAL - (M.P.)**

**STATUS REPORT REGARDING FOLLOW UP ACTIONS TO BE TAKEN
BY THE GOVT. OF MADHYA PRADESH**

Point-wise position is as under:-

1. One master set of detailed maps (Scale 1:50,000) of areas for freely draining subwatersheds (belonging to high & very high priority categories) for catchment area treatment of NSP is presently available in NVDA. Copies of these maps are presently under preparation in NVDA for subsequent submission to the NCA/MOEF. As there are some 93 toposheets to be worked upon, this work will take about a month's time.
2. As regards furnishing of copies of correspondence made by GOMP with the Department of Rural Development (GOI) the correct position is clarified as under. The statement made by the Vice Chairman, NVDA in the 22nd meeting of the Environment Sub-Group [w.r.t. Agenda Item No.XXII-2(112)] has not been correctly reproduced in the minutes of the meeting. In fact, the Vice Chairman, NVDA stated that proposals for various works amounting to approximately Rs.22 Crores have been submitted to the Collector for allotment of funds from Jawahar Rojgar Yojna and Employment Assurance Scheme sponsored by the department of Rural Development, GOI.

It would, thus, be clear that the NVDA has not directly approached the GOI, Deptt. of Rural Development for allotment of funds. As such the question of making correspondence with the GOI, Rural Development department does not arise.

The contents of the minutes may also kindly corrected accordingly.

ANNEX-XXIII-II.

STATUS REPORT
SARDAR SAROVAR PROJECT (SSP) ENVIRONMENTAL ASPECTS
SEPTEMBER - 1994

The action plans and status of studies and implementation of Environmental Safeguard Measures upto quarter ending September, 1994 is as indicated below:

Environmental Safeguard Studies/Measures

- 1) Phased Catchment Area Treatment,
- 2) Compensatory Afforestation,
- 3) Command Area Development,
- 4) Flora, Fauna & Carrying Capacity,
- 5) Seismicity,
- 6) Health Aspects,
- 7) Archaeological & Anthropological, Studies,
- 8) Fisheries,
- 9) Rim Stability Analysis.

1. 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.

GOI issued a Directive in June 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 and Land Use Survey (AISLUS). 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 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 SSP catchment.

- 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.

1- **DIRECTLY DRAINING SUB-WATERSHEDS:**

Table 1.1 **The total catchment area of SSP below NSP is 2442440 ha.**

	GOMP	GOG	GOM	Total for the Basin
Total Catchment	2248600	30230	163610	2442440 ha
Very High & High	546702**	30230	116355	688410
Directly draining Very High & High	121330***	29537	28226*	175565
Areas directly damaged by project activities.	-	500	-	500
Planned to treat	125725	30230	22768	178723

* The total area of directly draining sub-watersheds, as per AIS&LUSO figures is 31400 ha.

** However according to AIS&LUSO, Total area under high & very high priority categoring below NSP in M.P. is 541825 ha.

*** According to the data available in NCA office the total area of directly draining subwatersheds in M.P. is 1,14,606 ha.

Table 1.2 **Summary of Status of CAT Planning**

	GOG	GOM	GOMP
Preliminary Surveys)		
Prioritisation of sub-watersheds	:		
Development of Management Options	:	"Complete for all item in all States."	
Annual Action Plan	:		
Effective monitoring	:		
Phased Programme)		

Table 1.3 Principal Elements of Action Plans for CAT

Elements of Action Plans	GOG	GOM	GOMP
Survey work	} "Complete" for all item : & all States.		
Preparation of detailed map			
Micro-watershed development map	Complete	Partly done & partly under pre- paration.	Partly done & partly under pre- paration.
Assignment of responsibility for conducting the work	} : :		
Timetable		"Yes" for all item for	
Budget	} : :	all States	
Menu of treatment			
Proposals for monitoring	} : :		

Table 1.4 Implementation of CAT

	Gujarat		Maharashtra		Madhya Pradesh	
	<u>Area to be treated in ha.</u> (Area in brackets indicate actual progress)					
	Forest	Non- Forest	Forest	Non- Forest	Forest	Non- Forest
<u>Monsoon year</u>						
1990-91	<u>4528</u> (4528)	<u>898</u> (898)	-	-	-	-
1991-92	<u>4770</u> (4770)	<u>230</u> (230)	-	-	-	-
1992-93	<u>6013</u> (6013)	<u>336</u> 336	-	-	-	<u>8800</u> (8800)
1993-94	<u>6000</u> (6000)	<u>225</u> (276)	<u>960</u> (960)	-	<u>966</u> (966)	<u>6246</u> (6246)
1994-95	<u>5893</u> 1225	<u>668</u> 69	<u>6347</u> 6420	<u>2768</u> 1093	<u>17000</u> 4268	<u>20000</u> 594
1995-96	-	617	6347	-	18000	20000
1996-97	-	-	6346	-	15964	18749
TOTAL:	<u>27204</u> 22536***	<u>3025</u> 1809***	<u>20000</u> (7380)**	<u>2768</u> (1093)	<u>51930</u> * (5234)	<u>73795</u> 16640

- * Out of 51930 ha. area, an area of 13930 ha is fully stocked where minor soil engineering works will only be carried out w.e.f. 1994-95 @ 4000 in (1994-95), 5000 (95-96) & Balance in 96-97.
- ** In addition 6500 ha. area was tackled by PPO works during 1994-95.
- *** Total progress of CAT works is reported to be 28,890 ha.

	<u>Gujarat</u>	<u>Maharashtra</u>	<u>Madhya Pradesh</u>
Implementation	Complete work scheduled to finish 1995-96	work recently commenced scheduled to finish 1997.	Completed work scheduled to finish 1997.

11. FREELY DRAINING SUBWATERSHEDS: (Excluding directly draining Subwatersheds).

Table 1.5 Summary of Status of CAT Planning:

	<u>GOMP</u>	<u>GOM</u>	<u>GOG</u>
Preliminary Survey	Yes	Yes	
Prioritization of Sub-watersheds	Yes	Yes	Already Under implementation.
Development of Management options monitoring	Yes	Yes	
Phased programme	Yes	Yes	

Table 1.6 Principal Elements of Action Plan for CAT:

	<u>GOMP</u>	<u>GOM</u>	<u>GOG</u>
Survey work	Yes	Yes	
Preparation of development map	Yes	Yes	Already under
Micro watershed map	Awaited	awaited	imple-
Work responsibility	Yes	Yes	menta-
Menu of treatment	Yes	Yes	tion.

Time Table	Yes	Yes
Proposal for monitoring	Yes	Yes
Budget	Yes	Yes
Availability of funds	Not yet *	Not yet *

* But agreed by Planning Commission for inclusion in River Valley Project" Scheme.

A. Govt. of Madhya Pradesh:

Table 1.7 Total Area of freely draining critically degraded sub-watersheds below NSP is 54,6702 ha.

	Phase I Area (Directly draining)	Phase-II (Balance Area)	Total Area
SSP	121330	356484	477814
Jobat	-	-	28211
Man	-	-	12720
Maheshwar	-	-	13209
Omkareshwar	-	-	14748
			546702 *

* According to AISLUSO, this area is 541825 ha. The plan submitted by NVDA is under scrutiny in NCA.

Table 1.8

PHASE - II (356484 ha.)			
<u>Forest Area</u>		<u>Non Forest Area</u>	
Gross Area	Net Working Area	Gross Area	Net working Area
1,11,479	78,368	2,66,388	2,39,750

Table 1.9 Schedule of Implementation (Madhya Pradesh):(318118 ha)

Year	Forest Area	Non Forest Area
	Phy. (ha.)	Phy. in ha
1997-98	8000	15750
1998-99	8000	16000
1999-2000	8000	16000
2000-01	8000	16000
2001-02	8000	16000
2002-03	8000	16000
2003-04	8000	16000

2004-05	8000	16000
2005-06	8000	16000
2006-07	6368	16000
2007-08	-	16000
2008-09	-	16000
2009-10	-	16000
2010-11	-	16000
2011-12	-	16000
	-----	-----
	78,368	2,39,750

B. Govt. of Maharashtra:

PHASE-II

Table 1.10 Schedule of Implementation of freely draining Sub-watersheds.

<u>Year</u>	<u>Forest Area</u> <u>Phy. in ha.</u>	<u>Non Forest Area</u> <u>Phy. in ha.</u>
1994-95	5600	3145.66
1995-96	5600	4186.97
1996-97	5600	4511.86
1997-98	5600	5044.1
1998-99	5600	4993.48
1999-2000	5600	5453.93
2000-2021	6400	-
	-----	-----
	40,000	27,336

II. COMPENSATORY AFFORESTATION

Approval for the diversion of forest land 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 conduct of CAF. Principal amongst these are the following stipulations.

- For every hectare of forest land 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. This represents a two fold increase of the usual requirement.
- For the 4,200 hectares of forest land 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

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

- Sardar Sarovar (Narmada) Project Development Plan, Volume-II prepared by the Narmada Planning Group (NPG) in 1983.
- Studies on Ecology 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-Environmental and Wildlife Management Studies on the Sardar Sarovar Submergence Area in Gujarat 1992 by MSU.
- Impact Assessment of Madhya Pradesh Land to be Submerged Under Sardar Sarovar Project and Adjoining Ecosystems by State Forest Research Institute, Jabalpur (1989-92).
- Status of Flora and Fauna in and Around Sardar Sarovar Project, Maharashtra is a preliminary report of an ongoing study by the University of Pune which began in 1992 and is due to run for two years.

The Action Plans

In compliance with the conditions set by the MOE&F, each state has prepared an action plan for the CAF of areas within its 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 Kutch, 1986.
- Project for Afforestation in Sardar Sarovar Project Impact Areas due to Diversion of Forest Lands 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 multi-purpose river-valley project (1989).

These plans were submitted in varying stages of completeness but each has now been revised and updated to take account of the comments of the MOEF and the NCA. Action plans of 3 State Govts. contained following components:

1. Identification of areas for CAF;
2. Description of selected areas,
3. Justification of Selection of Areas,
4. Identification of responsible agency,
5. Description of staffing requirements,
6. Description of material requirements,
7. Estimate of costs,
8. Identification of tree species,
9. Description of preparatory work needed,
10. Description of planting techniques,
11. Provision for aftercare,
12. Yearly planting target,
13. Yearly budget,
14. Provision made for monitoring implementation

These action plans spell out a programme of tree planting in the three states on both non-forest and degraded forest areas as shown in Table 2.1 & 2.2.

Table 2.1 Areas for Compensatory Afforestation

	Area of Forest diverted for SSP	Area of Degraded forest to be Replanted	Area of Non-Forest Land to be Afforested	Total area for CAF
GOG	4,523	9,300	4,650	13,950
GOM (a) Submer.	6,488*	12,980	6,488	19,468
(b) R&R *	4,200	-	4,200	4,200
GOMP	2,732	6,550	2,190	8,740
TOTAL :	17,943	28,830	17,528	46,358

- | | | | |
|-----|---|--|---------------------|
| 3. | Pre-Feasibility level Drainage study of Narmada Mahi Doab of SSP Command. | Core Consultants Ltd. Ahmedabad. | 1982 |
| 4. | Some Aspects of Role of Panchyats and Institutional Arrangements for canal irrigation in Two Talukas of Ahmedabad District. | Institute of Cultural and Urban Anthropology, Ahmedabad. | 1982 |
| 5. | A study of settlement Pattern (6 Talukhas in the Narmada Command Area of Mahesana District of Gujarat). | Department of Geography, Gujarat University, Ahmedabad. | 1982 |
| 6. | Regionalisation of Narmada Command. | Operations Research Group, Vadodara. | 1982 |
| 7. | Marginal cost study of two Typical Distributerries and Two Typical Branches. | Dr. C.R. Shah, Vadodara. | 1983 |
| 8. | Socio-Economic Bench Mark survey of 62 Talukas (Sub-districts) of Narmada Command Area. | Fourteen Different Agencies Including Universities, Research Institutions etc. | Between 1982 & 1983 |
| 9. | Population Projection and Migration study for Narmada Command Area. | Operations Research Group, Vadodara. | 1983 |
| 10. | Study on Water Demand for Non-Agricultural use from Narmada Project. | Gujarat Water Supply and Sewerage Board, Gandhinagar. | 1983 |
| 11. | Consumer Expenditure, Assets and Indebtedness of Rural Households of the Command Areas of Sardar Sarovar (Narmada) Project, 1982. | Directorate of Economics & Statistics, Gandhinagar. | 1983 |
| 12. | Wasteland Development Project for command Area of Narmada Canal (Region 11 and 12). | Gujarat State Rural Development Corporation Ltd., Gandhinagar. | 1984 |
| 13. | Mathematical Modelling of Ground Water System Narmada Mahi Doab. | Operations Research Group, Vadodara. | 1985 |

- | | | |
|--|---|------|
| 14. Additional work on Mathematical Modelling of Ground Water System-Single Layer Model Narmada Mahi Doab. | Operations Research Group, Vadodara. | 1985 |
| 15. Rate 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 |
| 16. Computer aided Planning of conveyance and delivery Network. | Indian Institute of Management, Ahmedabad. | 1986 |
| 17. Land Use and Cropping Pattern Survey and Mapping of Narmada Command Area Zone 4A & 4B. | Department of Geography, M.S. University, Vadodara. | 1986 |
| 18. Survey and Investigation work of Ground Water Resources in Narmada-Mahi Doab. | Gujarat Water Resources Development Corporation Ltd. Gandhi-Nagar. | 1987 |
| 19. Cropping Pattern and Water Demand Study in Narmada Command Area. | Operations Research Group, Vadodara. | 1987 |
| 20. Inter-Regional Water allocation and Determination of Branch Canal capacity. | Operations Research Group, Vadodara. | 1989 |
| 21. Extended study on Inter Regional Water Allocation and determination of Branch Canal Capacity. | Operations Research Group, Vadodara. | 1989 |
| 22. Growth of Agro-Processing Industries in Phase-I of the Sardar Sarovar Project. | Gujarat Industrial & Technical Consultancy Organisation Ltd. Ahmedabad. | 1990 |
| 23. Consultancy work for Control, Telemetry and Communication Net Work on Narmada Canal System for SSP. | Gujarat Communication & Electronics Ltd., Vadodara. | 1991 |
| 24. Techno-Economic Study for utilising Village Tanks as Borrow Area for Construction of Canal Net Work. | Operations Research Group, Vadodara. | 1992 |

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|---------------------------|---|---|----------|
| 25. | Area Development Strategies for selected Regions Adjacent to Narmada Main Canal (Vadodara, Surendra-nagar & Banas Khatha Dist.) | Operations Research Group, Vadodara. | 1992 |
| 26. | Studies in Water Rates Policy in 3 parts. | | |
| | i) Pricing of a public Utility Survey of Literature | Department of Economics, South Gujarat University, Surat. | 1992 |
| | ii) Financial working of Irrigation Projects - A case of four projects in Gujarat. | Department of Economics, Sardar Patel University, Vallabh Vidyanagar. | 1992 |
| | iii) Some policy issue for Canal Water Rates in Gujarat. | Department of Economics, Sardar Patel University, Vallabh Vidyanagar. | 1992 |
| 27. | Mathematical Modelling of Ground Water System for SSP Command between Rivers Shedi and Sabarmati. | Consultancy Engineering Services, New Delhi. | 1993 |
| 28. | Mathematical Modelling of Ground Water System for SSP Command between Rivers Sabarmati and Banas. | Operation Research Group, Vadodara. | 1993 |
| 29. | Mathematical Modelling of Groundwater System for SSP Command beyond Banas upto Rajasthan Border. | Dalal Consultants, Ahmedabad. | 1993 |
| 30. | Prefeasibility level Drainage study for SSP Command beyond Mahi. | Consultancy Engineering Service, New Delhi. | 1993 |
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11. ON GOING STUDIES: | | | |
| 1. | Monitoring and Evaluation of Resettlement & Rehabilitation Programme. | Centre for Social Studies, Surat. | 1985 |
| 2. | Development of Allabet Island in the Estuary of River Narmada. | Multi Disciplinary Expert Group. | Sept.'92 |

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| 3. Agricultural Research Studies. | Gujarat Agricultural University, | 1987 |
| 4. Survey and Investigation Work of Ground Water Resources beyond River Mahi in SSP Command. | Gujarat Water Resources Development Corporation Ltd., Gandhinagar. | 1989 |
| 5. Action Research on People's Participation in Water Management in SSP. | Gandhi Labour Institute, Ahmedabad. | 1991 |
| 6. Development of Nal Sarovar Bird Sanctuary. | Multi Disciplinary Expert Group. | Sept. 1992 |
| 7. Development of Black Buck National Park at Velavadar. | Multi Disciplinary Expert Group. | |
| 8. Development of Wild Ass Sanctuary in Little Rann of Kachchh. | Multi Disciplinary Expert Group. | Sept. 1992 |
| 9. Study on preparation of a detailed Integrated Command Area Development Plan for SSP. | M/s Wamana Consultants Pvt. Ltd., Hyderabad. | Dec. 1992 |
| 10. Environmental Impact Assessment Studies on Inland and Marine Fisheries relevant to the Command Area of Sardar Sarovar (Narmada) Project. | M.S. University, Vadodara. | Dec. 1992 |
| 11. 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. | Commissionerate of Health, Medical Services & Medical Education, Govt. of Gujarat, Gandhinagar. | Dec. 1992 |
| 12. Study of Flora and Fauna of the Command Area of Sardar Sarovar (Narmada) Project : Lying between the Narmada & Sabarmati Rivers. (Environmental Impact Assessment Studies). | Sardar Patel University, Valalabh Vidyanagar. | Feb. 1993 |

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| 13. Study on Flora and Fauna of the Command Area of Sardar Sarovar (Narmada) Project Lying in Saurashtra and Kachchh Area (Environmental Impact Assessment Studies). | Saurashtra University, Rajkot. | March, 93 |
| 14. Study on Flora and Fauna of the Command Area of Sardar Sarovar (Narmada) Project: Lying between Sabarmati River and Rajasthan Border (Environmental Impact Assessment Studies). | Gujarat University, Ahmedabad. | March, 1993 |
| 15. Integrated Review Study of Soils for the Command Area of Sardar Sarovar (Narmada) Project. | Shri K.R. Agrawal, Consultant, New Delhi. | March, 1993 |
| 16. Ecological study of Wild Ass Sanctuary and surrounding area using remote sensing technology for Environmental Impact Assessment. | Guj. Ecological Education & Research Foundation (GEER Foundation), Gandhinagar. | Dec., 93 |
| 17. Environmental Impact Assessment of Nal Sarovar Bird, Sanctuary. | GEER Foundation | Dec., 93 |
| 18. Environmental Impact Assessment of Velavadar National Park located in the command area of SSP. | GEER Foundation | Dec. 93 |
| 19. Environmental Impact Assessment (EIA) studies on Aliabet Island. | Chief Engineer, (CAD SSP) Expert Multidisciplinary Group. | Dec. 93 |
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(B) Government of Rajasthan

The Government of Rajasthan had submitted a report on Environmental & Ecological aspects and remedial measures for Narmada Canal Project. Copy of the report was submitted to Ministry of Environment and Forests. Govt. of Rajasthan have assigned studies on EIA of Command area in Rajasthan portion to WAPCOS & the TOR finalised and WAPCOS have since started the work & interim reports submitted.

IV. FLORA, FAUNA, WILDLIFE 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.

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 Narmada Control Authority would ensure in-depth studies on flora & fauna needed for implementation of Environmental Safeguard measures.

Studies/Surveys :

Important survey work has 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). Interim 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 is completed & report is 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 Universities of Bhopal, Vikram and Rani Durgavati 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.
- 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)
- 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.

The Action Plans

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 which will avoid the possibility of animals being trapped in the submergence area;
- plans for improvement works in the wildlife sanctuaries of Gujarat;

Fisheries Component:

Three state Govts. 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 NSP, 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 were 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 hydrobiological 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.
- **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.

Subsequently, the state governments 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.

Table 4.1 Summary of Status of Environmental Planning:

A) Wildlife

	Gujarat	Maharashtra	Madhya Pradesh
Preliminary Surveys	Complete	Complete	Complete
In-Depth Studies	Complete	Completed	Complete
Development of Management Options	Complete for Shoolpaneshwar	Some work completed but awaiting deliberations of the expert group.	Some work completed but awaiting results of study and deliberations of the expert group

Action Plan

Migratory corridors	Not needed	Completed	Complete
Sanctuary development	Complete for Shoolpaneshwar development.	Plans for establishment of wildlife sanctuaries await study results and expert group	Plans for establishment of wildlife sanctuaries await study result and expert group
Wildlife conservation	Massive afforestation in entire catchment of SSP	It depends on deliberations of expert group	Await final outcome of study
Implementation	Shoolpaneshwar development almost complete, CAT work (increasing carrying capacity)nearing completion	Awaiting outcome of the study. CAF nearly completion, CAT work recently accelerated	Arrangements complete, awaiting final outcome of study

Progress in Shoolpaneshwar Sanctuary Development

	Target	Achieved to	% Complete
Fencing	100km	107	100
Firelines	60km	60	100
Barricades	2km	1.3 km	65
Check Dams	14	14	100
Construction of Quarters	21	21	100
Construction of Rest House	1	1	100
Improvement of Communications	50 km	50.5 km	100

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.
- Velvadar Black Buch Nation Park.

Summary of Status of Environmental Planning:

B) Fisheries

	GOG	GOM	GOMP
Preliminary surveys	}		
Detailed surveys/ studies of fish fauna			
Action plans			
Monitoring and evaluation cell			
Plan for training of fishermen	Yes	Yes	Yes

Implementation

1. Plan for clear felling	Completed	Yes to synchronise with submer- gence	Yes to synchronise with submer- gence
2. Development of fish farms	Under imple- mentation	Yes, awaits submergence	Yes, awaits submergence
3. Establishment of IFDB for future R&D management	Agreed	Agreed	Yet to agree

Progress of Implementation

CICFRI have already established one hatchery in Gujarat for augmenting the numbers of the Hilsa fish in the reservoir. This currently produce around 250,00 spawn per year. CICFRI have also been commissioned to monitor the whole of the estuary and their study has been extended to examine pollution and to undertake modelling studies in the downstream environment.

A draft plan for the creation of an Interstate Fisheries Development Board (IFDB) has been prepared by the NCA and agreed, in principle, by the governments of Gujarat and Maharashtra. However GOMP has disagreed & suggest an alternative proposal. Reaction from GOG & GOM are awaited. The organisation is expected to be set up and fully functioning prior to reservoir filling.

GOG has already provided 16 hectares of land to the project for the development of fish farms. In addition, the State Fisheries Department is exploring the development of riverine fisheries and the development of the reservoir for commercial and game fisheries.

Execution of felling as per felling plans prepared will await the commencement of impounding.

V. 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 I&II.
- 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.
- GSI. 1993. Sardar Sarovar Project Seismicity and Sardar Sarovar Dam.

Progress of 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 river bed.

The Government of Gujarat has identified 9 locations for the installation of seismic monitoring stations, 4 each on either side of the Sardar Sarovar reservoir in Madhya Pradesh and Maharashtra and 1 at Kevadia in Gujarat. By mid 1992, 7 stations had been installed. A further 2 stations are being commissioned. Selection of the initial sites was carried out by the SSNNL.

The progress of implementation is illustrated in Table below:

Implementation of Actions

Action	Status
Dam design modifications	Complete
Installation of monitoring stations	8 stations installed by June, 1994, 2 more awaited
GSI (Nagpur Division) rim stability studies	Completed
Tracer Studies by CWPRS	Ongoing

VI. HEALTH ASPECTS

Studies

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 was 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 produced a report on the health profile of 33 project-affected villages in Dhule District, Maharashtra.
- **Health Statistic 1982-84, GOMP.** This study, published by GOMP in 1985.
- **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 by, amongst others, by the Malaria Research Centre (MRC) and Dr. Kalra.**

Status of Implementation of Actions for Public Health

Action	Gujarat	Maharashtra	Madhya Pradesh
Baseline studies	Complete	Complete	Complete
Preparation of state action plan	Submitted and modified in 1986; Urban Malaria Scheme proposed	Original submitted in 1987, revised in 1991 and 1992 & 1993	Original submitted in 1986, revised in 1988 and final plan submitted in 1991
Survey of existing facilities	Complete	Complete	Sufficient facilities
Establishment of new facilities	Hospital at Kevadia for workers; laboratory and mobile unit complete, drug dispensaries	Somawal village hospital; health centres and health units sanctioned.	Hospital, mobile unit and civil dispensaries for labour; detailed scheme for resettled population
Vector control measures in place	NMEP; SSNNL workshop on malaria control; laboratory established; entomological studies underway	NMEP; adoption malaria control guidelines of irrigation Department	NMEP; state malaria control organisations strengthened
Appointment of specialist staff	Complete	Awaits financial approval by State Govts.	Needs identified

Disease Monitoring and responsibility	Entrusted to SCHMS Action Plan of 1986 will be revised. Preliminary EIA report Submitted by SCHMS. Final plan awaited.	Entrusted to regular health department	Evaluation cell established monitoring by Gandhi Medical College, Bhopal. 3rd Six monthly report submitted.
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VII. ARCHAEOLOGICAL SURVEY AND ANTHROPOLOGICAL STUDIES/ ARCHAEOLOGICAL SURVEY

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:

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 of Department of Archaeology. A survey was carried out by the Department of Archaeology of cultural sites in 24 villages of Akkrani Taluk and nine village from Akkalkuwa Taluk, Dhule District.
- Madhya Pradesh : Survey of State Department of Archaeology and Museum (1992).
- Anthropological Survey of India: Narmada Salvage Plan.
- Anthropological Survey of India: People's of India.
- Parishad, A.K. Survey of Material Cultural in the Narmada Valley.
- Rashtriya Manav Sanghralaya : Narmada Salvage Plan.

Cultural Heritage in SSP Area

	Gujarat	Madhya Pradesh	Maharashtra
Relocation of Temples	8(2)*	37 (7)	-
Excavation site(s)	-	5	

* Figures in brackets indicate number of sites designated for relocation.

Summary of Current Situation and Progress

	GOG	GOMP	GOM*
Survey of Villages in Submergence Zone.	1		
Identification of Cultural Sites	1	"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 present location.

ANTHROPOLOGICAL STUDIES

Government of Madhya Pradesh has informed that in view of the studies being carried out in connection with Narmada Sagar Project, no separate anthropological studies are required and that the Director General, Anthropological Survey of India has also expressed the same view. M.P. State Adivasi Kala Parishad has submitted its report on Tribal arts & culture. Besides Anthropological Survey of India has informed that Narmada Basin is already covered extensively under the project "people's of India". Besides Rashtriya Manav Sanghralaya has conducted needed studies in the past as follows. Further studies are covered under R&R plan of the state Governments.

- a study of the palaeo-ecology of quaternary fossils in the central Narmada Valley;
- excavation of upper palaeolithic site of Mehtakhaeda and further exploration of Nimar;
- collection of tribal artifacts in Madhya Pradesh.

Institutional responsibility for these actions was specified in the action plan whereby the first two elements were completed by Deccan College, Puna and the third by Adivasi Kala Parishad, for the Rashtriya Manav Sanghralaya, Bhopal.

STATUS REPORT
NARMADA SAGAR PROJECT (NSP) ENVIRONMENTAL ASPECTS.
SEPTEMBER, 1994

1) Phased Catchment Area Treatment:

The freely draining area of Narmada Sagar Project down stream of Bargi Dam is about 39,25,422 ha. 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. Prioritisation survey of the watersheds was entrusted earlier to SGSIT&S, Indore. Later on, as per GOI's instructions the prioritisation survey was entrusted to the All India Soil & Land Use Survey Organisation, New Delhi. The Survey has been completed by AISLUSO, New Delhi and the Survey reports have been received in the NVDA.

On the basis of the reports submitted by the AIS&LUSO, 30 sub-watersheds belonging to the very high and high priority categories and directly draining into the reservoir have been identified for treatment. These 30 sub-watersheds cover an area of about 73,000 ha.

1. DIRECTLY DRAINING SUB-WATERSHED OF HIGH & VERY HIGH PRIORITY CATEGORIES:

Critically degraded Sub-watersheds below Bargi dam (Figure in ha).

	FOREST		NON FOREST		TOTAL	
	Gross	Net	Gross	Net	Gross	Net
Critically degraded sub-watersheds.	15304	11048	57697	53563*	73001	64611

* Out of 53563 ha. area, an area of 1636 ha. was treated up under pilot project earlier and 51927 ha is planned for treatment.

Programme and Progress of Works:

	<u>Upto 92-93</u>	<u>93-94</u>	<u>94-95</u>	<u>95-96</u>	<u>96-97</u>
	Cumulative Progress		Target/Progress		
				Target	
Non-Forest area/ ha. (51,927 ha)	11439	<u>13636</u> 12636	12000	11500	3352
Forest area/ (11,048 ha)	-	-	3700	3700	3648
Total Area: (62,975 ha)	11439	<u>13636</u> 12636	15700	15200	7000

11. FREELY DRAINING AREA: (EXCLUDING DIRECT DRAINING SUB-WATERSHEDS)

Number of watersheds	- 478
Gross Area	- 10,12,650 ha.
Net Area	- 9,15,150 ha.

Schedule of Implementation:

Year	Forest (in ha.)		Non Forest (in ha.)	
	Gross Area	Net Area	Gross Area	Net Area
1995-96				18000
1996-97				18000
1997-98		10000		27000
1998-99		10000		28800
1999-2000		10000		28800
2000-2001		10000		28800
2001-2002		10000		28800
2002-2003		10000		28800
2003-2004		10000		28800
2004-2005		10000		28800
2005-2006		10000		28800
2006-2007		10000		28800
2007-2008		8430		28800
2008-2009				28800
2009-2010				28800
2010-2011				28800
2011-2012				28800
2012-2013				28800
2013-2014				28800
2014-2015				
2015-2016				28800
2016-2017				28800
2017-2018				28800
2018-2019				28800
2019-2020				28800
2020-2021				28800
2021-2022				28800
2022-2023				26400
2023-2024				26120
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	1,24,732	1,08,430	8,96,361	8,06,720
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2) Compensatory Afforestation :

A total of 40332 ha forest land would come under submergence and an additional 779.9 ha of forest land has been diverted for the residential colony, power house complex, dam, saddle dam and approach roads. Subsequently, another 308.4 ha of forest land was

permitted to be diverted for power house. Thus a total of 41,420 ha of forest land has been permitted to be utilised for the construction of ISP. To compensate for this loss of forest, 10,143 ha of non-forest and 70,802 ha of degraded forest land has been identified for compensatory afforestation.

Programme of Compensatory Afforestation:

	Commulative Progress till 91-92	92-93 Target/ Progress	93-94 Target/ Progress	94-95	95-96
Degraded Forest area (70,802 ha)	23048	<u>12528</u> 11919	<u>12400</u> 12987	12400	10035
Non-Forest area (10,143 ha)	5239	<u>1534</u> 1390	<u>1500</u> 1327	1500	514
(80,945) (say 81,000 ha)	28287	<u>14062</u> 13309	<u>13900</u> 14314	13900	11549

3) Command Area Development :

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 6/2007. Monthly observation of water levels started in November, 1991 for subsequent supply of this data to the consultants, already shortlisted, are likely to be continued for 2 seasons to draw inference for preparation of master plan for drainage. NVDA has addressed J.L. Agricultural University for studies on effect of pesticides, insecticides in the command area. The study proposal received from the University has been scrutinized in NVDA by a team of experts in light of suggestions/observations received from WALMI, Bhopal, WALMI Aurangabad, M.P. State Pollution Control Board, Bhopal, and MAPCOST Bhopal. Accordingly, the University has now modified its study proposal. The work on preparation of command area development plan is being entrusted to Agriculture Corporation, Bhopal.

4) Flora, Fauna, Wildlife and Carrying Capacity :

Studies on these aspects were entrusted to the Wildlife Institute of India, Dehradun in December, 1989 and were scheduled to be completed by March, 1993. The studies have been completed. The final study report is submitted.

Besides this, the Friends of Nature's Society, Bhopal, was entrusted with the preparation of Wildlife Retrieval and Conservation Plan. They have submitted the final report.

5) Seismicity and Rim Stability

The reservoir competency survey has been done by GSI and report is submitted. In the report, GSI has suggested further studies for some patches of narrow water divide. As such they were requested to carry out the study in the required area. GSI is further reviewing the need to survey the area identified earlier.

Establishment of seismic observatories in the Narmada Sagar Complex area is under correspondence with IMD and CWC. The specification have been finalised and procurement of imported instruments as suggested by IMD is under finalisation with CWC. Meanwhile action for procurement of indigenous wood Anderson Seismometers from IMD has already been taken so as to obtain pre-impoundment data.

6) Health Aspect:

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. Three six monthly report 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.

7) Fisheries Development:

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

8) Archaeological and Anthropological Survey:

A survey of the 254 villages is required for identification of the archaeological monuments falling within the submergence area. The State Department of Archaeology and Museum, Bhopal was entrusted with the survey of 87 villages which has been

completed. Archaeological Survey of India has also completed the survey for 167 villages assigned for identification of the monuments of significance.

Action plan is available. Action will be taken to preserve material of archaeological importance in consultation with experts.

As only lower bastion in north of the Joga Fort is likely to be affected by Scour action of water and the Siddeshwar temple is well above the FRL of 860 ft., these two structures are not considered as affected by the project. The state Department of Archaeology & Museum has already submitted an action plan for relocation & monuments of Archaeological significance. This plan is being implemented.

Anthropological Studies:

Efforts are being made for retrieval of bio-cultural material from the Narmada Basin. A lot of information is gathered from the field which generates immense data of Socio-Anthropological significance.

Rashtriya Manav Sanghralaya has constituted a working group for the retrieval of bio-cultural material in Narmada Basin. Survey of tribal art and handicraft entrusted to M.P. Adivasi Kala Parishad is completed and report is available. Besides Anthropological Survey of India has covered these studies under its own project called "people of India". The report is in 61 volume out of which 7 volume are under final editing. A Narmada Salvage plan is also launched by Anthropological Survey of India recently and the entire area is scanned and some ancient tools have been found.

ANNEX-XXIII-(III)

ENVIRONMENTAL COST OF SSP**RELATED TO UNIT I & II DAM & POWER HOUSE :****A) Expenditure by project authorities:****1) Cost of Survey & Studies (in lacs.)**

S.No.	Component	<u>Estimate/Actual Expenditure</u>				Total
		GOG	GOM	GOMP	NCA	
1.	Compensatory Afforestation	<u>4.52</u> 4.52	<u>5.29</u> 5.29	<u>2.4375</u> 2.4375	-	<u>12.2475</u> 12.2475
2.	Catchment Area Treatment.	<u>8.77</u> 8.77	<u>7.00</u> 7.00	<u>3.28</u> 2.80	-	<u>19.05</u> 18.57
3.	Flora & Fauna	<u>52.2</u> 38.3	<u>38</u> 16	<u>20.334</u> 16.586	<u>15.27</u> 15.27	<u>127.804</u> 86.156
4.	Health	<u>2.5</u> 2.5	NA	<u>29.627</u> 24.162	-	<u>32.127</u> 26.662
5.	Archaeology/Anthropology.	<u>1.3</u> 0.40	NA	<u>59</u> 36.33	-	<u>60.3</u> 36.73
6.	Seismicity & Rim Stability.	-	NA	<u>23.00</u> 12.50	<u>1.98</u> 1.98	<u>24.98</u> 14.53
						<u>276.5085</u> 195.8955

ii) Cost of Implementation (in lacs)

1.	Compensatory Afforestation.	<u>1809.10</u> 1298.48	<u>2116</u> 1650.27	<u>1800.000</u> 749.140	<u>5725.1</u> 3497.89
2.	Catchment Area Treatment.	<u>3509</u> 1826.48	<u>2894.67</u> 409.61	<u>8835.05</u> 1047.63	<u>15238.72</u> 3283.73
3.	Flora & Fauna including Shoolpaneshwar	<u>75.31</u> 64.42	NA	<u>NA</u> NIL	<u>75.31</u> 64.42
4.	Health (incremental expenditure) for 10 yrs.	<u>3800.0</u> 101	<u>93.16</u> -	<u>1354.63</u> 515.225	<u>5247.79</u> 616.225
5.	Archaeology/Anthropology.	<u>156.00</u> 29		<u>700</u> NIL	<u>856</u> 29
6.	Seismicity & Rim Stability.	<u>129</u> 271	-		<u>129</u> 271

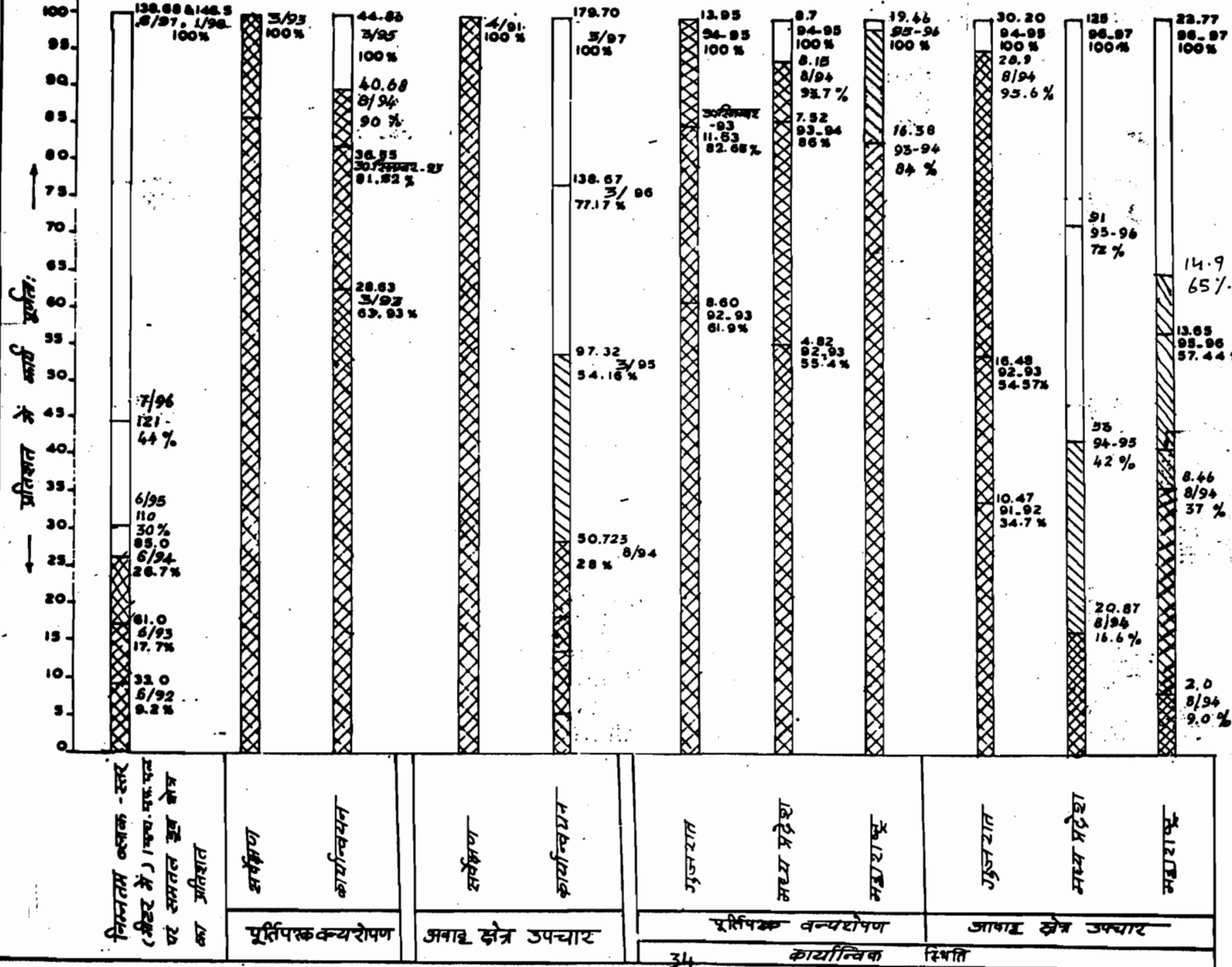
Total: 27196.61 = 28.30%
7697.845

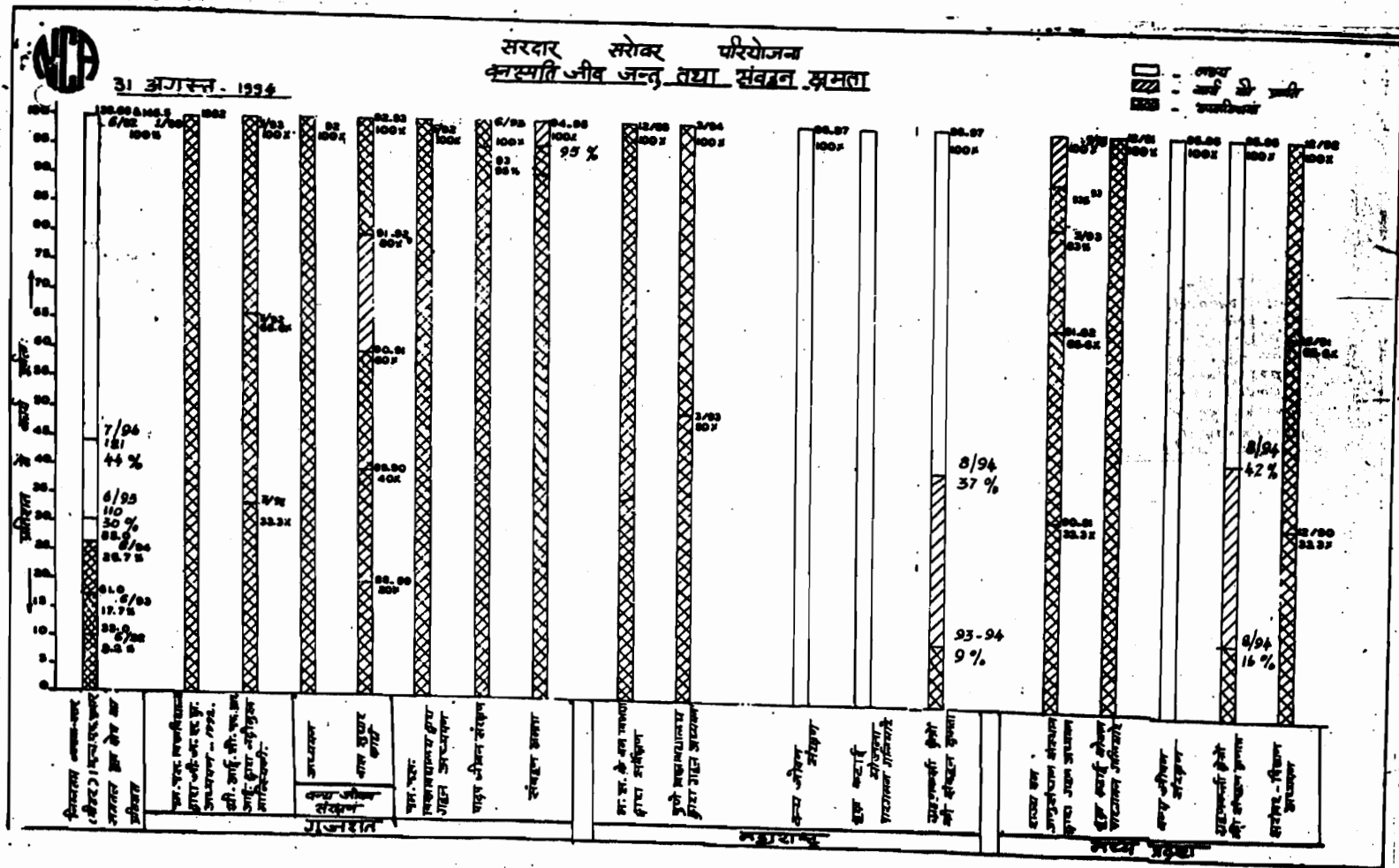
* In addition several State/Central agencies have also incurred expenditure on various Environmental studies & Implementation aspects. Full details are not yet available.

NA : Not available.




ANNEX-XXIII.IV

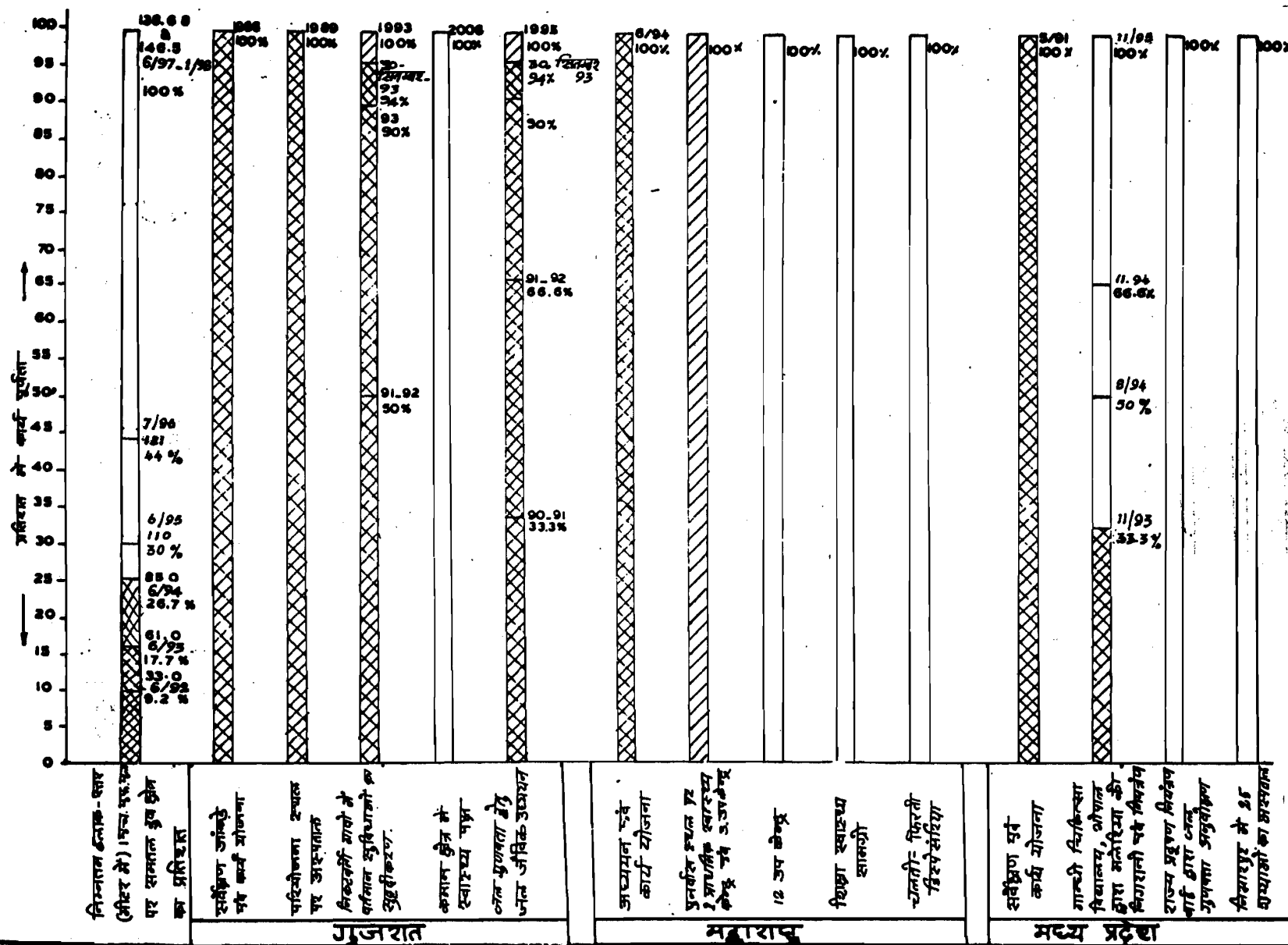
☐ १. लक्ष्य
☒ २. कार्य की प्रगति
☒ ३. उपलब्धियां

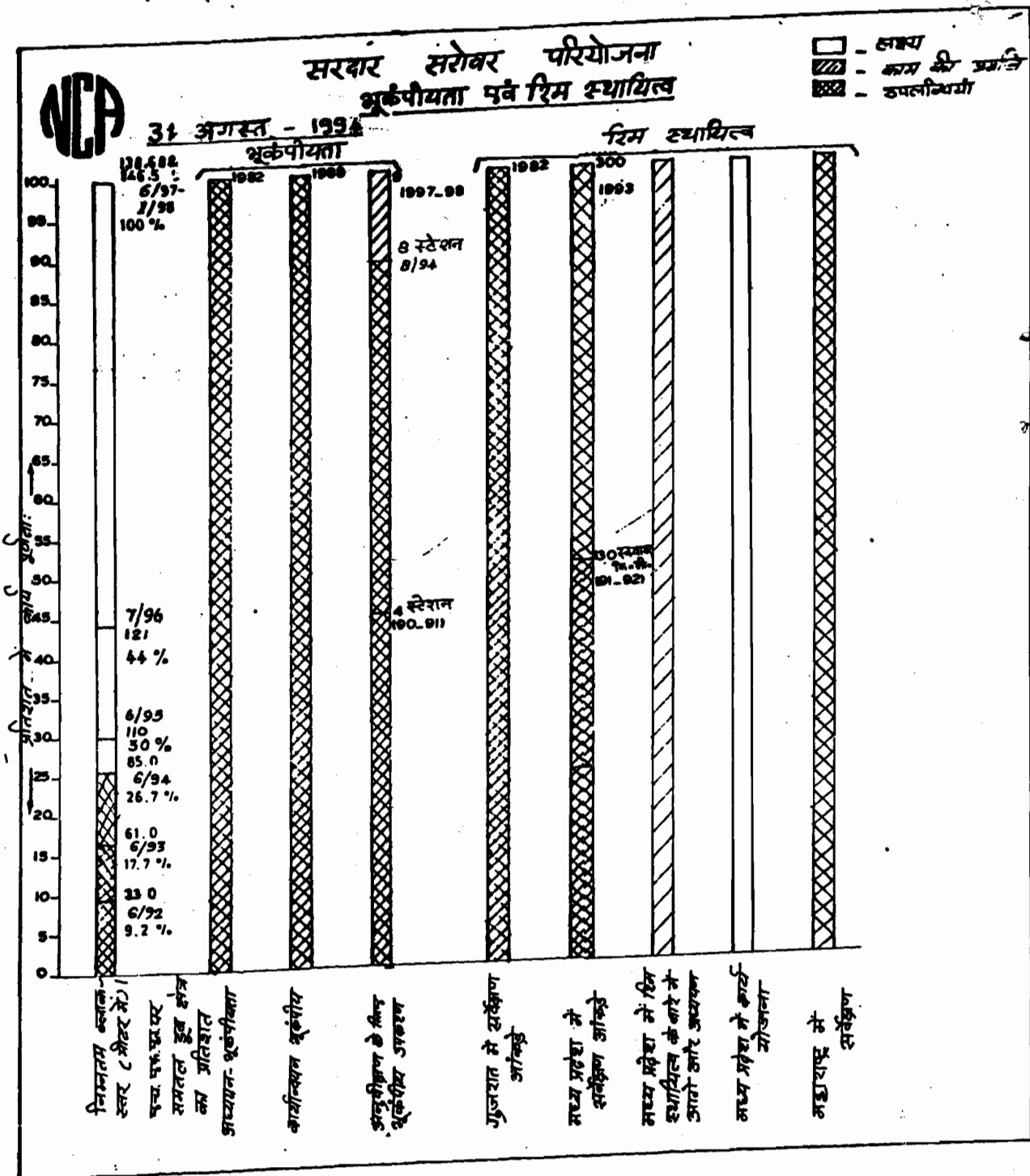




सरदार सरोवर परियोजना
स्वास्थ्य

 - मुख्य :
 - काम की प्रगति
 - उपलब्धियाँ



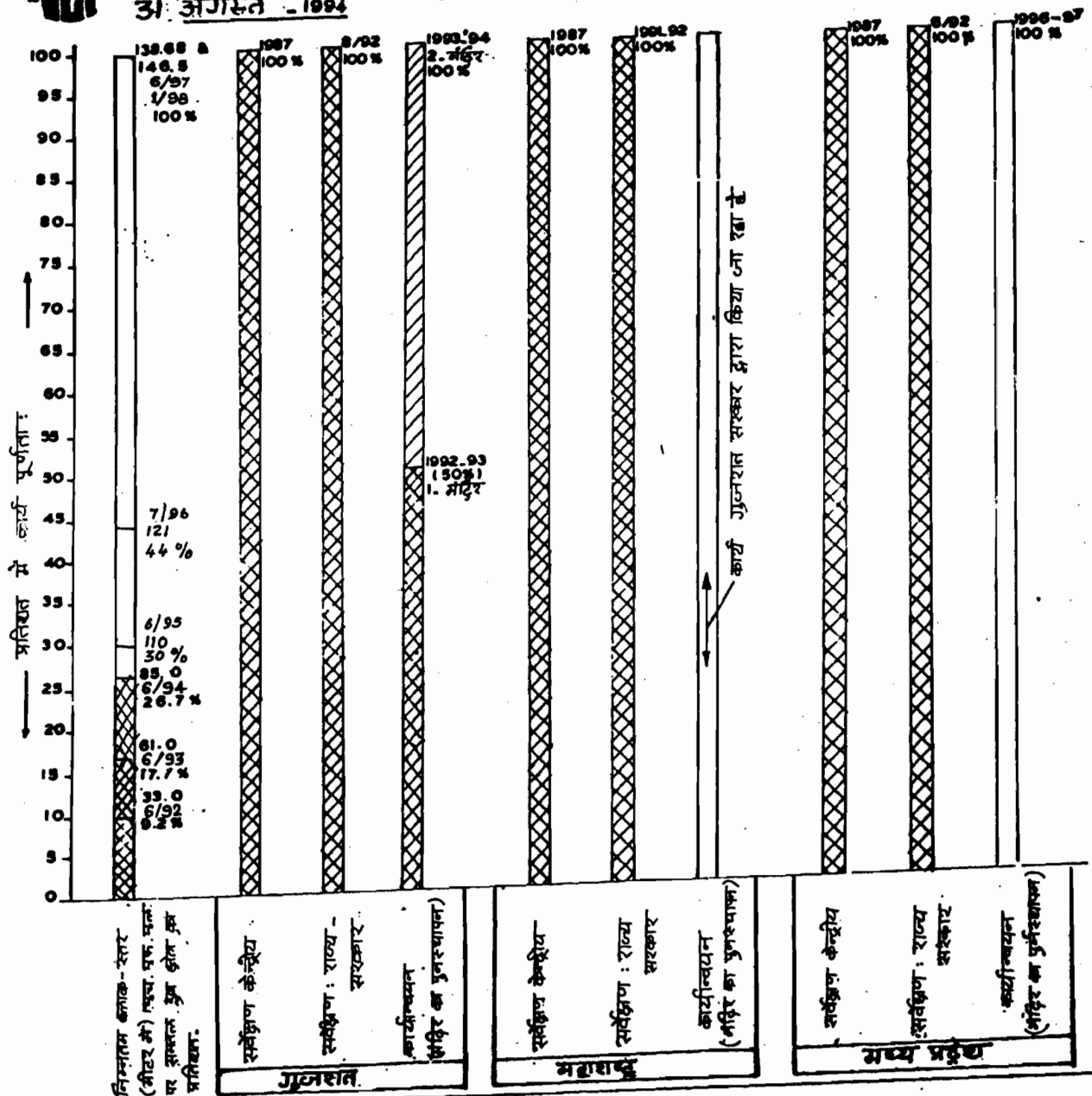




अ. अगस्त - 1994

सरदार सरोवर परियोजना पुरातात्विकी

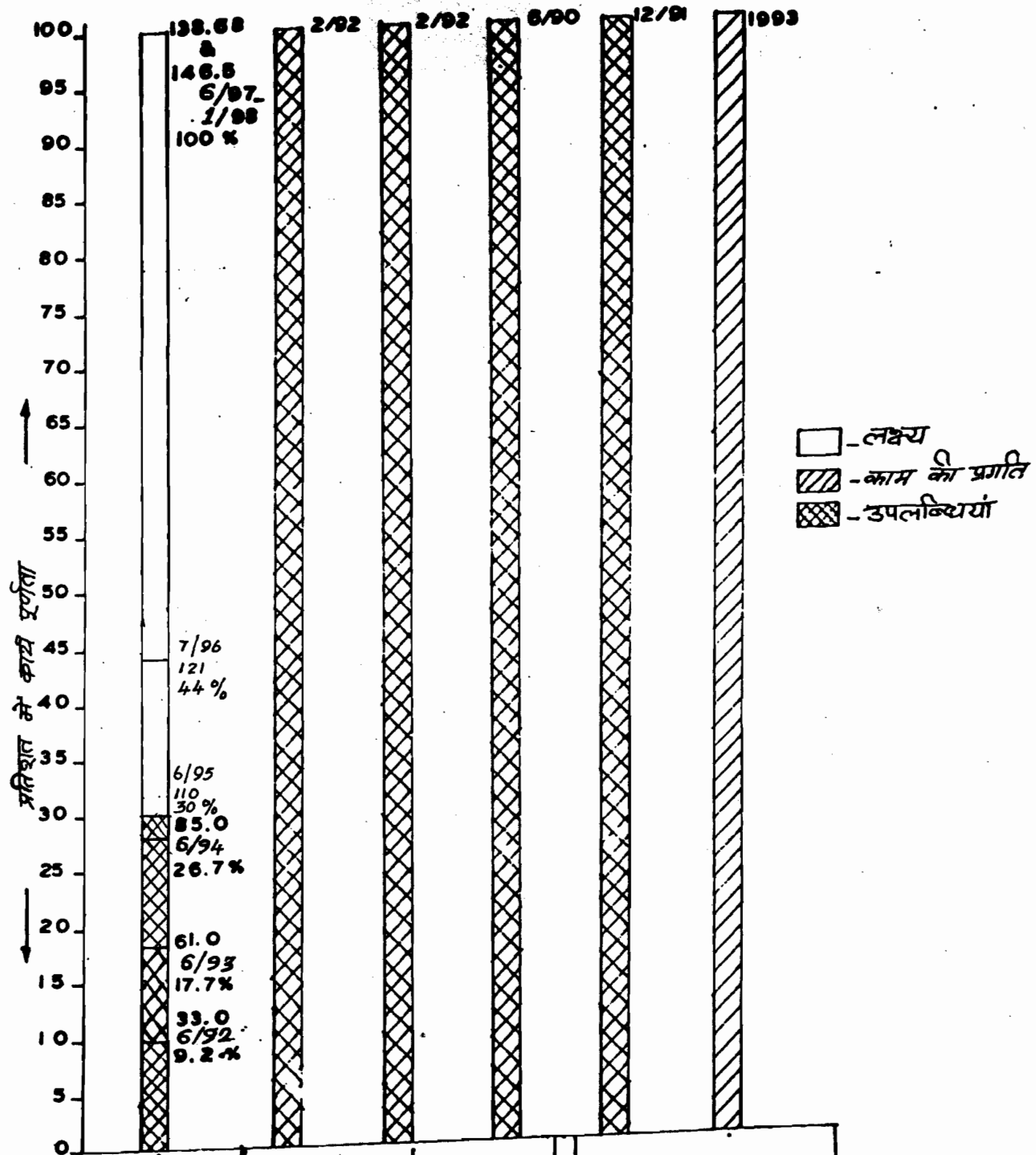
□ - लक्ष्य
▨ - काम की प्रगति
▩ - उपलब्धियाँ





सरदार सरोवर परियोजना मानवविज्ञान पक्ष

31 अगस्त - 1994



निम्नतम ब्लाक-स्तर
(मीटर में) पंच. पू. पू. पर
समतल इन क्षेत्र
का प्रतिशत

टैफोनोमी पंच
पुरातत्व
ऊपरी पुरातत्वीय
स्थलों की खुदाई
आदिवासी कला
एवं संस्कृति
राष्ट्रीय मानव संग्रहालय
भोपाल

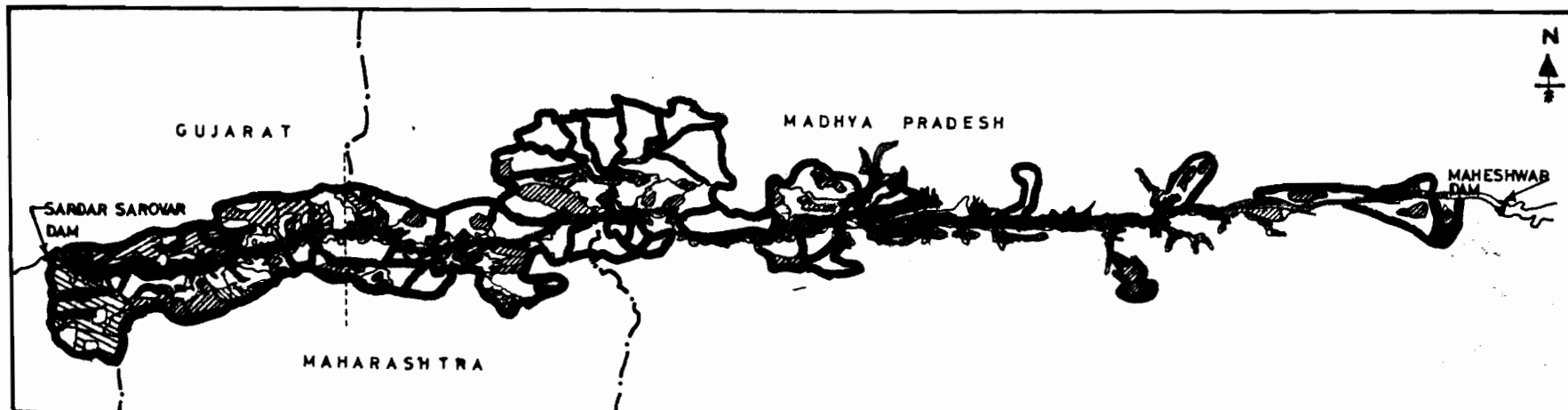
भारत के लोग
पुरातत्वीय
अध्ययन
भारतीय मानवविज्ञान
सर्वेक्षण

Annex-XXIII-V

STATUS 30-06-94



PRIORITY AREAS FOR CATCHMENT AREA TREATMENT

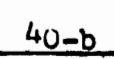


LEGEND

- SUB WATER SHED BOUNDARY
- WORK TACKLED BY 1994 RAINS
- STATE BOUNDARY
- 1994 81 EL 45100 M. Ch. 5280 ha. Area under submergence.

NOT TO SCALE

ANNEX-XXIII-VII.



ANNEXURE-3ANNEX- XXIII-VIII

MEMORANDUM OF UNDERSTANDING BETWEEN NARMADA VALLEY DEVELOPMENT AUTHORITY OF BHOPAL AND JAWAHARLAL NEHRU KRISHI VISHWA VIDYALAYA, JABALPUR FOR CONDUCTING STUDIES ON "IMPACT OF AGROCHEMICALS RUNOFF FROM FIELDS ON SURFACE AND GROUND WATER QUALITY IN THE COMMAND AREAS OF NARMADA SAGAR COMPLEX IN MADHYA PRADESH".

This memorandum of understanding has been arrived at, by and between the Narmada Valley Development Authority, Bhopal on one hand and Jawaharlal Nehru Krishi Vishwa Vidyalaya Jabalpur on the other hand for conducting studies on "Impact of agrochemicals runoff from fields on surface and ground water quality in the command areas of Narmada Sagar Complex in Madhya Pradesh".

BACKGROUND :

A large number of insecticides, fungicides & herbicides are being used for the protection of cultivated field crops in the agriculture. The use of agrochemicals including chemical fertilizers in some cash crops like cotton, chillies, sugarcane, vegetables etc. is high. The surface runoff, erosion and leaching to ground water from treated agricultural fields are the major sources of agrochemicals pollution in the aquatic environment.

Most of the organochlorine insecticides have been phased out of use in the developed nations, while they are increasingly used in the developing countries like India. These compounds are known for their toxicity, lipophilicity and persistence in the environment. Due to their high solubility in fact, they are likely to get accumulated and magnified by various organisms. This can lead to the transfer of these toxic chemicals to human beings through food chain, thus causing a major environmental concern.

Organophosphate and carbamate, although less persistent, are more soluble in water and their presence even in trace quantities in natural water may generate public concern since it is known that such compounds induce phosphorylation/carbamoylation of acetyl-cholinesterase enzyme in the body of the organisms. Higher levels of nitrate nitrogen in ground water is detrimental to the mankind.

The presence of high level of toxic residues in the body of non-target organisms adversely affect their normal functioning causing reduced reproduction and mortality. Irrigations with contaminated water can pollute vast area under agriculture and crop grown on these fields. In addition it could be hazardous for people living on river banks and utilize this contaminated river water for bathing, drinking

In some areas of Nimar Valley Zone where cash crops like cotton, chillies, Sugarcane, Bananas, papaya and vegetables are grown, the farmers generally avail all possible inputs to obtain maximum profitable production and thus in many cases the levels of fertilizer applications or spraying/soil treatments through pesticides may be higher than that of recommendation. Therefore, the actual consumption of pesticides per unit area is the highest in the Nimar Valley of Madhya Pradesh. Creation of irrigation potential through forthcoming Narmada Sagar Complex Projects may further enhance the area under cash crops and the per capita consumption of pesticides and/or fertilizers. Therefore, this study was planned to monitor the present level of contamination of surface and ground water under different situations in Nimar Valley Zone and also in some other areas of Narmada basin where the use of agrochemicals is moderate and low.

OBJECTIVES AND SCOPE :

For the study the area of Khandwa and Khargone districts has been selected as the representative for higher levels of agrochemical inputs. The area of Hoshangabad/Narsingpur district for moderate use and North side of Lakhnadone taluka of Seoni district for low inputs. The details for the selection of field sites are elaborated in the project proposal. The project will cover the following objectives :

- (1) To monitor the nature and levels of residues of toxic agrochemicals runoff from fields in the ground water and surface water in the command areas of the Narmada Sagar Complex on regular intervals at a selected site to correlate water pollution with non-point load of agrochemicals.
- (2) To monitor pesticides residues in green/fresh vegetables.
- (3) To conduct basic studies under natural and controlled ecosystem with selected pesticides to workout possible routes in aquatic system and other related materials of interest.
- (4) To determine the rate of dissipation of the agrochemical and significant degradation products under fallow and cropped field conditions.
- (5) To develop a mathematical model to predict non-point agrochemicals load in ground water and river water based on selected parameters.
- (6) To find out suitable measures for reducing the ill effect of the toxic agrochemical residues, if any, and thus to predict their safe consumption in the study area.

LOCATION OF THE PROJECT :

The Khandwa Campus of Jawaharlal Nehru Krishi Vishwa Vidyalaya would be the headquarters of the Principal Investigator and also for laboratory/experimental work.

The main focus to conduct studies on agrochemicals impact/pollution would be the command areas of Narmada Sagar Complex in Khandwa/Khargone district. Considering the nature of soil types and its depth consideration, the study sites would be concentrated within the ten proposed cropping sequences. However, only the dominant cropping sequences limited to seven in number would be studied in each location. Due consideration has to be given to include farming conditions ranging from higher inputs of agrochemicals to moderate and low use.

The irrigated areas in Khandwa/Khargone districts are the representative for higher use of agrochemicals, while the area of Narsinghpur/Hoshangabad districts is representative for the moderate use and the north side of the Lakhnadone taluka of Seoni district (Bargi Command) is for low input of agrochemicals.

DURATION OF STUDIES :

The studies shall be conducted over a period of three years from the date of the release of the first instalment of funds (Rs. 17.5 lakhs for equipments and Rs 3.25 + 0.25 lakh for six months staff salary and contingency) to the Comptroller, JNKVV, Jabalpur.

ASSESSING/COMPLETION OF DATE AND SUBMISSION OF REPORT :

The Senior Scientist (Soils) , JNKVV, with his headquarters at Khandwa Campus, will act as Principal Investigator and shall be responsible for submission of compiled physical and financial progress reports (25 copies) within a month of expiry of first year and subsequently one copy after each six months period till the completion of project to the NVDA. The final report (25 copies) will be submitted within six months after completion of the project, to the NVDA, Bhopal.

ACCOUNTING :

Jawaharlal Nehru Krishi Vishwa Vidyalaya will render annually the componentwise statement of expenditure and utilisation certificate duly audited by the Comptroller (J.N.K.V.V., Jabalpur) for the installments released in the preceding year.

FUNDS REQUIRED FOR THE STUDY :

The total funds payable for study would be the actual expenditure limited to "Rs. 39.35 lakhs". The details of the expenditure are as follows :

Head of expenditure	Rupees in lakhs			
	1st year	2nd year	3rd year	Totals
A. Salary of staff	3.25	3.30	3.35	9.90
B. Contingency	3.75	3.85	3.35	10.95
C. Equipments	17.50	0.00	1.00	18.50
Total	24.50	7.15	7.70	39.35

Funds will be paid to the Comptroller, JNKVV Jabalpur who will be passing on funds to the Principal Investigator. The first installment of Rs. 21.00 lakh (including full amount for equipments for the first year and six months additional staff salary and contingency funds) will be released immediately. Rest of the amount will be paid in six monthly installments as an advance including the last six monthly installment, but these installments shall be released only when audited statement of expenditure and utilisation certificate as desired under the head "Accounting" is furnished for the sums advances in preceding year. The last installment (not less than 10% of the total cost) shall be released only after the submission of final report and its approval by the N.V.D. A.

OBLIGATIONS OF THE JNKVV, JABALPUR :

1. The studies would be conducted as per the details enumerated in the proposal and as far as possible within the stipulated time.
2. Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur would present to NVDA. 25 copies of final reports
3. As the consultancy has been agreed on a no profit no loss basis and for the specific project mutually agreed to be conducted and unless mutually agreed upon by JNKVV and NVDA, no portion of the amount thus released would be utilized on any other purpose not included in the approved proposal or not authorised by the Narmada Valley Development Authority, Bhopal.
4. One Jeep in running condition would be provided by C.E. (Lower Narmada Zone (NVDA) to the Principal Investigator JNKVV at Khandwa Campus for the study period to collect field information/data and samples of the project area and shall remain the property of NVDA. The running cost & minor repairs shall be met

: 7 :

by JNKVV from the amount released to them from time to time . Major repairs, replacements, however, will be carried out by NVDA. In case of non availability of vehicle during any span of study period, the principle investigation would use University vehicle, the minor repairs and P.O.I. for which could be meet out of the contingencies provided for the study.

5. The equipments purchased for the study out of the sum advanced by the NVDA shall be the property of NVDA. These equipments will be returned to the NVDA after completion of study.
6. The cost of repair of the equipments (costing more than Rs. 1.00 lakh) purchased for the study, shall be borne by the JNKVV. These equipments will not be used for any other purpose without the prior permission of NVDA.
7. Minor maintenance and repair of equipments would be done from the funds available in the equipment head or the recurring contingency funds available. However, the service contacts, if necessary for an efficient working of the Equipment/Project have to be borne by NVDA.
8. The staff that may be posted for the project work by the JNKVV shall be subject to the administrative control and service conduct rules of JNKVV.
9. The JNKVV staff working in the project would be at liberty to make use of NVDA's computer at Narmada Bhawan with prior permission of competent authority.
10. The JNKVV have the liberty to use the data/results and any other scientific information generated through this study for scientific purpose and academic advancement only after the completion of the studies and subject to the approval of NVDA in this regard.

: 8 :

11. The project proposal under the heading 'Object and Scope' shall be as per the project proposal as contained in P-96 to 111 of the 35 meeting of NWDA, a copy of which is Annexed .
12. Joint Committee of Vishwa Vidyalaya and NWDA officials would monitor the progress of study, quarterly.
13. In case any dispute arises in execution of the studies and submission of final report as per MOU, the decision of the Vice-Chairman of NWDA shall be final and binding.

Dr. D.L.Kauraw	Dr. D.F.Nema	J.P. Patel
Principal Investigator	Director Research	Director Agril.
Sr. Scientist(Soils)	Services, JNKVV	NWDA, Bhopal
	Jabalpur	

THIRD SIX MONTHLY REPORT

(1st November to 30th April 1994)

**STUDY ON HEALTH ASPECTS IN PROJECT IMPACT
AREA OF NARMADA SAGAR THROUGH
EPIDEMIOLOGICAL SURVEILLANCE**

**DEPARTMENT OF PREVENTIVE AND SOCIAL MEDICINE
GANDHI MEDICAL COLLEGE BHOPAL**

PROJECT TEAM

Investigators:

- | | |
|--------------------|--|
| 1. Dr. S.C. Tiwari | Professor & Head
Department of PSM |
| 2. Dr. D.K. Pal | Reader in Department of PSM |
| 3. Dr. G.P. Naik | Lecturer in Statistics and
Demography Department of PSM |

Research Team:

- | | |
|--------------------------|---|
| 1. Dr. S.K. Patne | Assistant Research officer
in the Project |
| 2. Sh. Rajesh Sharma | Assistant Statistical officer
in the project |
| 3. Ku. Purnima Chaurasia | Medico Social Worker
in the Project |
| 4. Sh. Dinesh Kumar Gaur | Lab. Technician in the project |

---x---

ACKNOWLEDGMENT

We thankfully acknowledge the Narmada Valley Development Authority for rendering help at various stages during third phase of study. We are thankful to the Dean Gandhi Medical College Bhopal for constant help in smooth conducting of study.

We are thankful to the staff of PSM Department, Post graduate students and Interns posted in the Department, ; who participated in survey work during third phase of study.

G.P. Naik
Dr. G.P. Naik
Lecturer in Stat.
and demography
Department of PSM
Gandhi Medical College

D.K. Pal
Dr. D.K. Pal
Reader
Department of PSM
Gandhi Medical
College Bhopal

S.C. Tiwari
Dr. S.C. Tiwari
Professor & Head
Department of PSM
Gandhi Medical
College Bhopal

SUMMARY

Family formation pattern in pre and post impoundment project area are according to norms of rural set up of states. No significant change has been observed in pre and post impoundment area in respect of age and sex composition of population, Birth and Death rates, male to female ratio, character of literacy rate, and socio-economic class is also nearly same. According to occupation, the farmers are more (35%) in pre impoundment area as compared to 23% in post impoundment area. In post impoundment area unskilled labours are more (15%) in comparison to 7.6% in pre impoundment area.

Overall morbidity rate within a fortnight of survey is more in post impoundment area ie. 11.90% than in pre impoundment area ie. 7.20%. This increase is mostly contributed by increase in vector born diseases water born gastrointestinal infections and respiratory infectious diseases. Same finding holds good for the period of six months before survey ie. morbidity rate was 9.24% in post impoundment area as compared to 5.63% in pre impoundment area. Morbidity rate according to sex does not show any significant change in both area except for certain category of diseases for fortnight and six monthly survey. Nutritionally normal children were 29 % in post impoundment area in comparison to 23% in pre impoundment area but unexpectedly overall morbidity rate in children below 6 years is higher in post impoundment area

ie. 23% as compared to pre impoundment area 15%. Immunization status in pre impoundment area appears to be slightly better than post impoundment area.

In post impoundment area percentage of ailing population taking treatment from private sources and allopathy is also from private source of treatment. Utilization of Health Institution Services for conducting deliveries are poor but deliveries conducted by untrained dais is positive commonest practice among surveyed population.

INTRODUCTION :-

The present study entitled "Study on health aspects in project impact area of Narmada sagar Dam through epidemiological surveillance system" was started in July 1992 with following objectives:-

- (1) To study morbidity and mortality pattern in Narmada project area.
- (2) To compare it with health situations in a similar area for which project was completed earlier.
- (3) To elucidate any change in health situation in due course of time.
- (4) To suggest health promotion and disease prevention measures for the project area.

The area of irrigated land in the world is increasing at over one million hectares per annum. The creation of a lake and an irrigation system establishes a radically new ecological regime and with it a new pattern of infectious diseases. Surtees (1970) identified six ecological consequences of irrigation which affect mosquito population -

- (i) Simplification of habitat.
- (ii) Increased surface water.
- (iii) Higher water table.
- (iv) Changes in water flow.

- (v) Climate changes towards weather and cooler conditions.
- (vi) Human population changes.

Mosquitoes are vector of Malaria, Filaria and a number of arboviral infections. Therefore incidence of these vector born infections is likely to increase in these areas. Sautasla Sorumani and chaulalong 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 of infection increased with the length of time for which irrigation had been installed.

The survey for 3 rd phase was carried out with the help of medical interns as it was done in the second phase. In the 3 rd phase survey work was done in four months period ie. from November 1993 to February 1994. A total of 19 villages in pre impoundment area and 21 village in post impoundment area were covered during survey of 2000 families.

Due to financial constraints the survey work for 3 rd phase could not be started at scheduled time. After the survey work analysis of data collected on schedules was done manually in the Department of Preventive and social Medicine. This was another major factor responsible for delay in finally submission of third phase report.

Findings of third phase of the study are described below .

DEMOGRAPHIC PROFILE

The age and sex composition of the population surveyed in the third phase is almost same as that observed in second phase except some minor changes in the percentage of population in the different age groups. These minor changes hardly make any difference in outcome of final findings of report. Again the age composition observed in 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 like second phase of study. Average family size in pre and post impoundment area was 5.66 and 5.49 respectively. The birth rate in pre impoundment area was 40.26 per thousand population and 42.77 per thousand in post impoundment area. Death rate was 7.5 and 8.6 per thousand population in pre and post impoundment area respectively. Population surveyed was similar in both areas and which is also in conformation with national figures of age structure of rural Indian population.

SOCIO ECONOMIC FEATURES

(a) Religion

In both the study areas majority of population belong to Hindu religion ie. 94.5 % in pre impoundment area and 99.4 % in post impoundment area. Remaining population belongs to Muslim religion.

(b) Type of family.

In both the areas percentage of nuclear families (69 %) was similar so obviously the percentage of joint families was also same (31 %).

(c) Literacy status.

The over all literacy rate in pre and post impoundment area is nearly similar ie. 39.38 % and 39.88 % respectively. Majority of the literate population is educated up to primary school level in both areas. Female literacy in both areas is almost half of the male literacy.

(d) Occupation.

Majority of males in both the areas were engaged in farming and agriculture labour ie. 61.64 % and 49.75 % in pre and post impoundment area respectively. Unskilled labours were 7.63 and 15.20 percent in these areas. In post impoundment area the percentage of house wives was more (21 %) than in pre impoundment area (16.92 %). The percentage of unemployed was 5.84 and 7.80 in pre and post impoundment area.

(e) Income.

Like second phase of study the modified Prasad's socio economic classification was followed to differentiate various income groups in the study area. Maximum number of families in both areas were in socio economic class iv and v. Proportion of families in socio economic class I II was slightly higher (2.41

%) in post impoundment area. In both areas the income group iv has a minor difference of 2.44% but in the socio economic group-v there is substantial fall of nearly 9 % in the post impoundment area. This difference in the percentage can not be attributed to a particular cause but it gives rise to non sampling error caused by interviewer as well as respondents also.

Incidence of morbidity within a fortnight of survey.

In third phase of study also , it was observed that incidence of morbidity was higher in post impoundment area (11.9 %) as compared to pre-impoundment area (7.2%). These findings were consistent with the earlier findings. In both the areas higher incidence of morbidity was observed at the extremes of ages ie. in 0-4 year children and above 60 years age. Vector borne infections viz. Dengue fever, Malaria etc. Gastrointestinal infections and Respiratory infection 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 might be because of seasonal variation.

(b). Prevalence of morbidity in last six months was also studied. Morbidity rate in post-impoundment area (9.24 %) was obviously higher than in pre-impoundment area (5.63 %). The age specific morbidity rate in children 0-14 years age group of post-impoundment area was almost double (24.34%) than pre-impoundment area (11.71 %) 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 71 years and above of pre-impoundment area where age specific morbidity rate was higher (14.58 %) than post-impoundment area (10.20%).

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 total population amongst 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 marked among both sex and in both area. The difference was visible for the disease vector born and water born gastroenteritis in pre-impoundment area and any difference between male and female for the diseases vector born was observed in post impoundment area. Rest of difference in diseases morbidity among sex in both areas can be regarded as apparent but not significant.

TABLE No. 1(A)

DISTRIBUTION OF FAMILIES ACCORDING TO RELIGION.

RELIGION	PRE IMPOUNDMENT							
	NUMBERS OF FAMILIES				POPULATION			
	PUNASA	MANDL	TOTAL	%	PUNASA	MANDL	TOTAL	
Hindu	484	461	945	94.5	2839	2541	5380	
Muslim	16	39	55	5.5	79	203	282	
Christian	-	-	-	-	-	-	-	
Sikh	-	-	-	-	-	-	-	
Others	-	-	-	-	-	-	-	
Total	500	500	1000	100.00	2918	2744	5662	

TABLE No. 1(B)

DISTRIBUTION OF FAMILIES ACCORDING TO RELIGION.

RELIGION	POST IMPOUNDMENT							
	NUMBERS OF FAMILIES				POPULATION			
	TAWA	BERGI	TOTAL	%	TAWA	BERGI	TOTAL	
Hindu	499	495	994	99.4	2987	2476	5463	
Muslim	1	4	5	0.5	9	16	25	
Christian	-	-	-	-	-	-	-	
Sikh	-	1	1	0.1	1	6	6	
Others	-	-	-	-	-	-	-	
TOTAL	500	500	1000	100.00	2996	2498	5494	

Hindus are in majority in both pre and post impoundment areas. In pre-impoundment area Hindus are 94.51 % of total sample population where as in post-impoundment area majority of the

population (99 %) is Hindu. In the pre and post impoundment areas muslim constitute a very low percentage of total population ie. 5.5 % in pre impoundment area and 0.6 % in post impoundment area under study.

TABLE 2(A)

DISTRIBUTION ACCORDING TO TYPE OF FAMILY.
PRE IMPOUNDMENT AREA

TYPE OF FAMILIES	NUMBER OF FAMILIES AND POPULATION								
	PUNASA			HANDLESHWAR			TOTAL		
	NO.	POPU.	%	NO.	POPU.	%	NO.	POPU.	%
Nuclear	344	1662	68.8	346	1623	69.2	690	3285	69.0
Joint	156	1256	31.2	154	1121	30.8	310	2377	31.0
Total	500	2918	100.0	500	2744	100.0	1000	5662	100.0

TABLE 2(B)

DISTRIBUTION ACCORDING TO TYPE OF FAMILY.
POST IMPOUNDMENT AREA

TYPE OF FAMILIES	NUMBER OF FAMILIES AND POPULATION								
	TAWA			BERGI			TOTAL		
	NO.	POPU.	%	NO.	POPU.	%	NO.	POPU.	%
Nuclear	320	1656	64.0	370	1626	74.0	690	3282	69.0
Joint	180	1340	36.0	130	872	26.0	310	2212	31.0
Total	500	2996	100.0	500	2498	100.0	1000	5494	100.0

Nuclear families were more in number in both areas. In both pre and post impoundment areas they constituted 29.5 % of total families. Indicative of increasing trend for nuclear families, though living in same house. It is also expected that in the post-impoundment area more nuclear families will increase because of heavy migration from joint families.

TABLE No 3(A)
DISTRIBUTION ACCORDING TO FAMILY SIZE.
PRE IMPOUNDMENT AREA

FAMILY SIZE	PUNASA			HANDLESHWAR			TOTAL		
	NO.	POPU.	%	NO.	POPU.	%	NO.	POPU.	%
up to 4	146	484	29.2	168	560	33.6	314	1044	31.4
5-6	198	1077	39.6	203	1105	40.6	401	2182	40.1
7-8	103	764	20.6	88	657	17.6	191	1421	19.1
9-10	25	237	5.0	27	252	5.4	52	489	5.2
above 10	28	356	5.6	14	170	2.8	42	526	4.2
Total	500	2918	100.0	500	2744	100.0	1000	5662	100.0

TABLE 3(B)

DISTRIBUTION ACCORDING TO FAMILY SIZE
POST IMPOUNDMENT AREA

FAMILY SIZE	TAWA			BERGI			TOTAL		
	NO.	POPU.	‡	NO.	POPU.	‡	NO.	POPU.	‡
up to 4	142	467	28.4	214	679	42.8	356	1146	35.6
5-6	170	940	34.0	183	984	36.6	353	1924	35.3
7-8	115	849	23.0	70	515	14.0	185	1364	18.5
9-10	51	478	10.2	29	271	5.8	80	749	8.0
above 10	22	262	4.4	4	45	0.8	26	311	2.6
Total	500	2996	100.0	500	2498	100.0	1000	5494	100.0

Average family size was 5.66 and 5.49 in pre and post impoundment area respectively. As such there is no major difference in the family size between pre and post impoundment area.

TABLE No 4(A)
DISTRIBUTION ACCORDING TO AGE AND SEX
PRE IMPOUNDMENT AREA

AGE GROUP	SEX					
	MALE	%	FEMALE	%	TOTAL	%
0 - 1	120	3.96	94	3.56	214	3.77
1 - 4	270	8.92	256	9.73	526	9.27
5 - 14	918	30.34	722	27.37	1640	28.96
15 - 44	1303	43.07	1178	44.67	2481	43.81
45 - 60	295	9.75	304	11.52	599	10.57
61 - 70	92	3.04	62	2.35	154	2.71
71 above	27	0.89	21	0.79	48	0.84
TOTAL	3025	99.97	2637	99.97	5662	99.93
sex ratio 870:1000						

TABLE No 4(B)
DISTRIBUTION ACCORDING TO AGE AND SEX
POST IMPOUNDMENT AREA

AGE GROUPS	SEX					
	MALE	%	FEMALE	%	TOTAL	%
0 - 1	96	3.31	121	4.65	217	3.94
1 - 4	267	9.22	283	10.88	550	10.01
5 - 14	803	27.75	691	26.56	1494	27.19
15 - 44	1311	45.31	1155	44.40	2466	44.88
45 - 60	323	11.16	271	10.41	594	10.81
61 - 70	74	2.55	50	1.92	124	2.25
71 above	19	0.65	30	1.15	49	0.89
TOTAL	2893	99.95	2601	99.97	5494	99.97
sex ratio 899:1000						

Age and sex composition of studied population:

Proportion of infants was 3.77 and 3.94 percent in pre and post impoundment area respectively, the infants population is mainly dependent upon the crude birth rate prevailing in the area at the time of survey. In this phase of study, the crude birth rate is slightly higher than the last phase (second phase). Age structure of remaining population in pre and post impoundment area is same as observed in the second phase of study. The sex ratio in post impoundment area is higher (899 females per 1000 males) than pre impoundment area (870 females per 1000 males).

TABLE No 5(A)

DISTRIBUTION ACCORDING TO LITERACY STATUS PRE IMPOUNDMENT AREA

LITERACY STATUS	MALE	%	FEMALE	%	TOTAL	%
Illiterate	1126	45.82	1656	77.67	2782	60.62
Just literate	94	3.82	29	1.36	123	2.68
Primary	813	33.08	329	15.43	1142	24.88
Middle	288	11.72	98	4.59	386	8.41
Higher Secondary	105	4.27	17	0.79	122	2.65
Graduate	29	1.18	3	0.14	32	0.69
post Graduate	2	0.08	-	-	2	0.04
Others	-	-	-	-	-	-
Total	2457	99.97	2132	99.98	4589	99.97
Not applicable	568	-	505	-	1073	-
TOTAL POPULATION	3025		2637		5662	

TABLE No 5(B)
DISTRIBUTION ACCORDING TO LITERACY STATUS
POST IMPOUNDMENT AREA

LITERACY STATUS	MALE	%	FEMALE	%	TOTAL	%
Illiterate	1133	47.88	1539	74.06	2672	60.12
Just literate	68	2.87	43	2.06	111	2.49
Primary	682	28.82	357	17.17	1039	23.37
Middle	328	13.86	108	5.19	436	9.81
Higher Secondary	132	5.57	24	1.15	156	3.51
Graduate	18	0.76	5	0.24	23	0.51
post Graduate	4	0.16	1	0.04	5	0.11
Others	1	0.04	1	0.04	2	0.04
Total	2366	99.97	2078	99.96	4444	99.96
Not applicable	527		523		1050	
TOTAL POPULATION	2893		2601		5494	

As we know that every parameter of health is directly or indirectly related with literacy status of population. More the education status of population lower the morbidity status of population, since literate is more conscious than illiterate man. In the present phase of study an attempt has been made to know the literacy status of population in pre and post impoundment area so that literacy can be held as one of the major factor for higher morbidity pattern in the study population. Currently the literacy status in pre and post impoundment area is 39.38 and 39.88 respectively. The morbidity pattern in relation to the literacy will be observed in the next tables.

DISTRIBUTION ACCORDING TO LITERACY

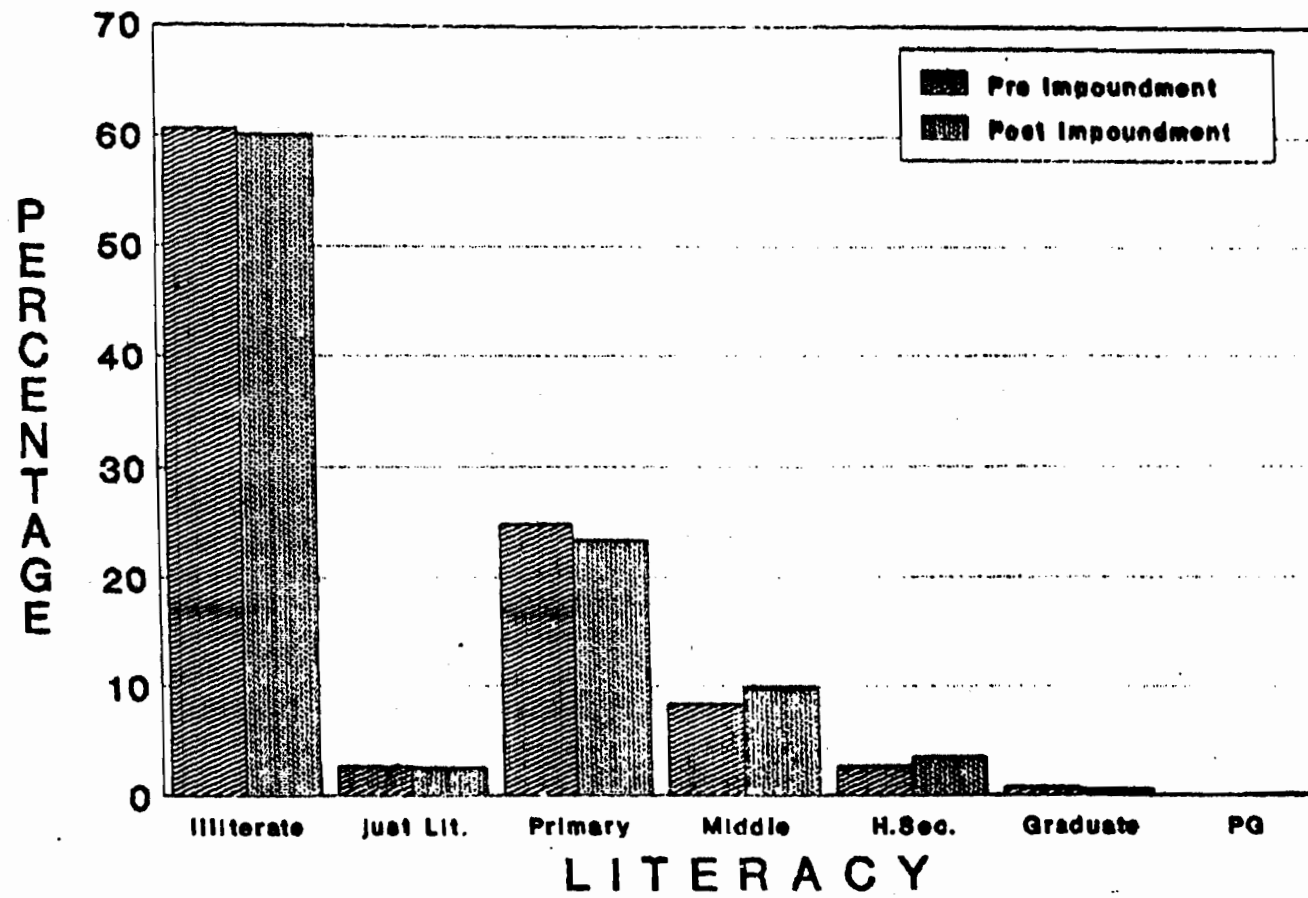


TABLE No 6(A)

DISTRIBUTION ACCORDING to OCCUPATION

OCCUPATION	PRE IMPOUNDMENT					
	MALE	%	FEMALE	%	TOTAL	%
Farmer	925	43.00	527	27.97	1452	35.98
Agriculture labour	401	18.64	234	12.42	635	15.75
Skilled worker	36	1.67	14	0.74	50	1.23
Unskilled worker	213	9.90	95	5.04	308	7.63
Vendors	3	0.13	4	0.21	7	0.17
Service class	46	2.13	1	0.05	47	1.17
Shopkeeper	10	0.46	1	0.05	11	0.27
House Wife	-	-	683	36.25	683	16.91
Professional	1	0.04	-	-	1	0.02
Student	413	19.32	192	10.19	605	14.99
Unemployed	103	4.78	133	7.05	236	5.84
Total	2151	100.00	1884		4035	
Not applicable	874		753		1627	
POPULATION TOTAL	3025		2637		5662	

TABLE No 6(B)

DISTRIBUTION ACCORDING to OCCUPATION

OCCUPATION	POST IMPOUNDMENT					
	MALE	%	FEMALE	%	TOTAL	%
Farmer	711	33.53	217	11.96	928	23.59
Agriculture labour	344	16.22	145	7.99	489	12.43
Skilled worker	55	2.59	8	0.44	63	1.60
Unskilled worker	389	18.34	209	11.52	598	15.20
Wenders	10	0.42	-	-	10	0.25
Service class	36	1.69	8	0.44	44	1.11
Shopkeeper	34	1.60	-	-	34	0.86
House Wife	-	-	826	45.55	826	21.00
Professional	-	-	-	-	-	-
Student	408	19.24	226	12.46	634	16.11
Unemployed	133	6.27	174	9.59	307	7.80
Total	2120		1813		3933	99.95
Not applicable	773		788		1561	
POPULATION TOTAL	2893		2601		5494	

Several studies has revealed that morbidity is also effected by the type of occupation he/she belongs. In the present study the area selected for assessing the morbidity pattern in pre and post impoundment area is mostly having a rural set up. And the main occupation of the families are Farming, therefore in the present phase of study nearly 36% of the total population in pre-impoundment area is having farmer as main occupation. Remaining part of population is associated with agriculture labour (16%) and unemployed category of population like housewife, student and unemployed itself also contribute major part of population (38%) in the post impoundment area. In the post impoundment area population involved in agriculture is 15% less than pre impoundment area. The reason for such difference may be due to submerging of agriculture land in the water at the time of dam construction resulting a reduction in agriculture population. There seems to be more unemployed category of population (45%) in post impoundment area as compared to pre impoundment area (38%) perhaps more time is required to rehabilitate the population residing in post impoundment area through employment.

TABLE No 7

DISTRIBUTION ACCORDING TO SOCIO ECONOMIC CLASS
(According to Prasad's modified classification)

INCOME GROUPS	SOCIO-ECONOMIC CLASS	PRE IMPOUNDMENT			POST IMPOUNDMENT		
		FAMI LIES	POPULATION	%	FAMI LIES	POPULATION	%
975 above	i	1	4	0.87	13	65	1.15
974 - 475	ii	17	76	1.28	31	148	2.61
474 - 225	iii	126	536	9.76	157	814	14.38
224 - 100	iv	459	2476	45.10	494	2692	47.54
below 100	v	397	2406	43.79	305	1943	34.32
TOTAL		1000	5494	100.00	1000	5662	100.00

Majority of families in both the areas belonged to social class IV of modified Prasad's classification, Followed by social class V and III. Proportion of families belonging to Socio-economic class I and II was slightly higher (2.41%) in post impoundment area. The observation of third phase study according to SEC almost resembles with that of second phase. But there is slight variation in class IV, socio-economic group but marked difference 9.47% less in SEC IV was observed in post impoundment as compare to pre impoundment area.

TABLE No.8(A)

INCIDENCE OF MORBIDITY WITHIN FORTNIGHT OF SURVEY IN
PRE IMPOUNDMENT AREA

AGE GROUP IN YEARS	DISEASE						
	I	II	III	IV	V	VI	VII
0-1	3	5	12	3	-	-	-
1-4	20	11	39	1	1	-	-
5-14	43	14	67	13	5	1	1
15-44	48	10	15	11	2	2	10
45-60	11	3	11	4	1	1	-
61-70	6	3	-	1	-	-	-
71 Above	-	1	1	-	-	-	-
TOTAL	131	47	145	33	9	4	11
Disease specific Morbidity rate	32.26	11.57	35.71	8.12	2.21	0.98	2.69

TABLE 8(A) (Continued)

AGE GROUP IN YEARS	DISEASE						AGE SPECIFIC MORBIDITY RATE
	VIII	IX	X	OTHERS	TOTAL	POPUL ATION	
0-1	-	-	-	-	23	214	10.74
1-4	-	-	-	5	77	526	14.63
5-14	-	1	1	2	148	1640	9.02
15-44	-	-	-	10	108	2481	4.35
45-60	-	-	2	4	37	599	6.34
61-70	-	-	1	-	11	154	7.14
71 Above	-	1	-	1	4	48	8.33
TOTAL	-	2	4	22	408	5662	
Disease specific morbidity rate	-	0.49	0.98	5.41			7.20

Overall incidence of morbidity in pre impoundment area was 7.20 , slightly higher than the second phase. Highest age specific incidence of morbidity was observed in the age group 0-4 years ie. 25.37% and in extreme age group above 61 years, it was 15.39% . Disease morbidity rate were higher for Respiratory infections (35.71%) vector borne disease (32.26%) and water born gastroenteritis diseases (11.57%).

TABLE No. 8(B)

INCIDENCE OF MORBIDITY WITHIN FORTNIGHT OF SURVEY IN
POST IMPOUNDMENT AREA

AGE GROUP IN YEARS	DISEASE						
	I	II	III	IV	V	VI	VII
0-1	6	15	24	1	4	-	-
1-4	27	16	42	5	1	-	-
5-14	116	13	51	5	3	-	-
15-44	162	9	34	4	5	4	5
45-60	38	4	8	-	1	-	3
61-70	7	-	3	1	-	1	-
71 Above	4	-	-	-	-	-	-
TOTAL	360	57	162	16	14	5	8
Disease specific Morbidity rate	55.04	8.71	24.77	2.44	2.14	0.76	1.22

TABLE 8(B) (Continued)

AGE GROUP IN YEARS	DISEASE						AGE SPECIFIC MORBIDITY RATE
	VIII	IX	X	OTHERS	TOTAL	POPUL ACTION	
0-1	-	-	-	1	51	217	23.50
1-4	-	1	-	-	92	550	16.72
5-14	-	1	-	2	191	1494	12.78
15-44	-	2	-	11	236	2466	9.57
45-60	-	-	3	9	66	594	11.11
61-70	-	-	-	2	14	124	11.29
71 Above	-	-	-	-	4	49	13.79
TOTAL	-	4	3	25	654	5494	11.90
Disease	-	0.61	0.45	3.82			
specific morbidity rate							

In the post impoundment area overall incidence of morbidity was 11.90%. This is higher than that observed in second phase of the study. As usual higher age specific morbidity rates were 23.50% in 0-1 years age 16.72% in 1-4 years age and 13.79% in 71 years and above age groups. Disease specific morbidity rate was highest for vector born infections (55.04%) followed by water borne G.I.T. infections (24.7%) and respiratory infections (8.71%)

INCIDENCE OF MORBIDITY IN A FORTNIGHT OF SURVEY IN PRE AND POST IMPOUNDMENT AREAS

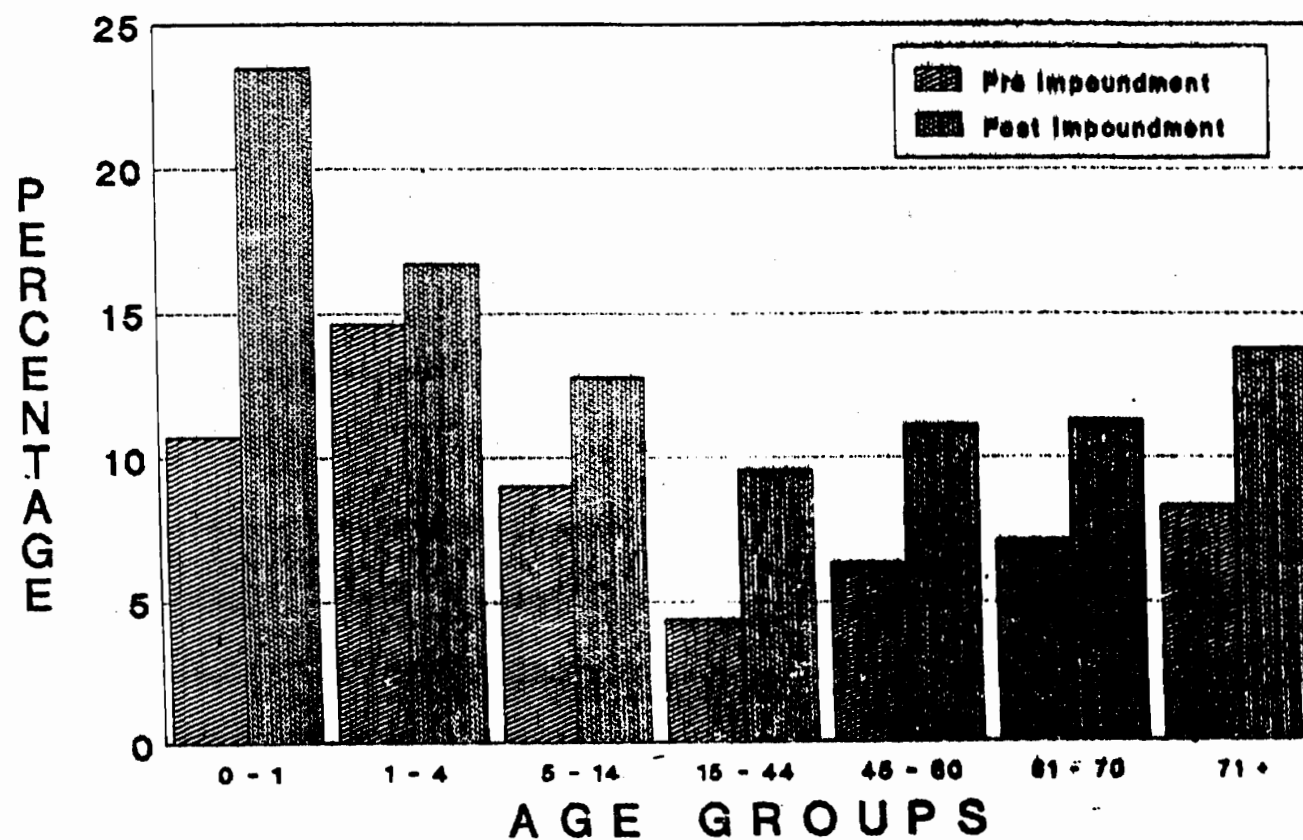


TABLE No. 9(A)
PREVALENCE OF MORBIDITY IN LAST SIX MONTH OF
SURVEY IN PRE IMPOUNDMENT AREA

AGE GROUP IN YEARS	DISEASE							
	I	II	III	IV	V	VI	VII	VIII
0-1	1	3	4	-	-	-	-	-
1-4	7	1	3	3	-	-	-	-
5-14	43	10	4	3	-	-	-	-
15-44	44	21	20	4	1	4	39	-
45-60	14	5	7	3	1	1	4	-
61-70	6	-	4	1	-	1	1	-
71 Above	-	1	1	-	-	1	-	-
TOTAL	115	41	43	14	2	7	44	-
Disease specific morbidity rate	36.05	12.85	13.47	4.38	0.62	2.19	13.79	-

TABLE 9A (continued)

AGE GROUP IN YEARS	DISEASE					
	IX	X	XI	TOTAL	POPUL- ATION	AGE SPECIFIC MORBIDITY RATE
0-1	1	-	1	10	214	4.67
1-4	2	-	1	17	526	3.02
5-14	1	1	4	66	1640	4.02
15-44	-	3	13	169	2481	6.00
45-60	1	6	12	54	599	9.01
61-70	1	-	2	16	154	10.38
71 Above	-	1	3	7	46	14.58
TOTAL	6	11	36	319	5662	5.63
Disease specific morbidity rate	1.88	3.44	11.28	-	-	-

The above table shows prevalence of morbidity in pre impoundment area in last six month according to age. Age specific morbidity rate is almost equal upto the age of 44 years and slightly higher more in the age group 45-60 years (9.01%) and 61-70 years (10.38%) and definitely highest in age above 71 years and above (14.28%). Over all prevalence of morbidity was 5.63% .

TABLE No. 9B

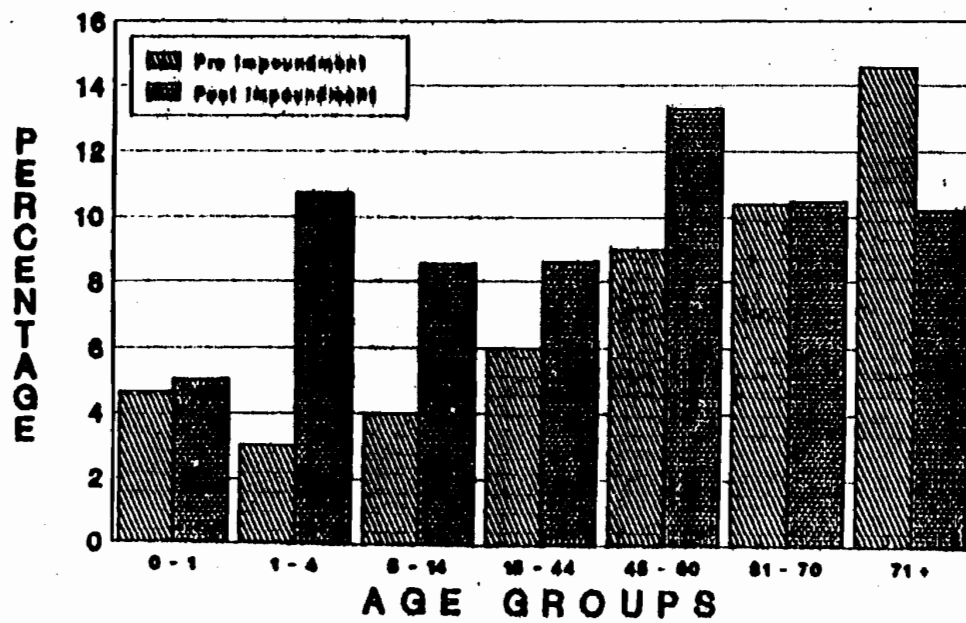
PREVALENCE OF MORBIDITY IN LAST SIX MONTH OF
SURVEY IN POST IMPOUNDMENT AREA

AGE GROUP IN YEARS	DISEASE							
	I	II	III	IV	V	VI	VII	VIII
0-1	1	2	5	1	-	-	-	-
1-4	25	10	11	7	-	-	-	-
5-14	84	6	16	6	-	-	-	-
15-44	149	10	9	4	1	3	6	1
45-60	46	2	11	-	2	2	-	-
61-70	8	1	-	1	-	-	-	-
71 Above	4	-	1	-	-	-	-	-
TOTAL	317	31	53	19	3	5	6	1
Morbidity rate	62.15	6.07	10.39	3.72	0.58	1.37	1.17	0.19

TABLE 9B (Continued)

AGE GROUP IN YEARS	DISEASE					
	IX	X	XI	TOTAL	POPUL- ATION	AGE SPECIFIC MORBIDITY RATE
0-1	-	-	2	11	217	5.06
1-4	5	-	1	59	550	10.72
5-14	1	-	15	128	1494	8.56
15-44	-	2	28	213	2466	8.63
45-60	-	3	13	79	594	13.29
61-70	-	1	2	13	124	10.48
71 Above	-	-	-	5	49	10.20
TOTAL	6	6	61	508	5494	9.24
Morbidity rate	1.17	1.17	11.96	-	-	-

PREVALENCE OF MORBIDITY IN LAST 6 MONTHS IN PRE AND POST IMPOUNDMENT AREAS



The above table shows age wise distribution of morbidity in last six month in post impoundment area. Age specific morbidity rate was lowest in 5-14 years and 15-44 years age group i.e. 8.56% and 8.66% respectively. Higher age specific morbidity rate were observed in 0-1 year (9.06%) 1-4 years (10.72%) 45-60 years (13.29%) 61-70 years (10.48%) and 71 years and above (10.20%). Overall prevalence of morbidity in last six months was 9.24%.

TABLE No. 10(A)

AGE AND SEX SPECIFIC MORBIDITY WITHIN FORTNIGHT OF SURVEY
PRE IMPOUNDMENT AREA

AGE GROUP IN YEARS	I		II		III		IV		V	
	M	F	M	F	M	F	M	F	M	F
0-1	3	-	1	4	5	7	2	1	-	-
1-4	13	7	4	7	26	13	1	-	1	-
5-14	23	20	10	4	45	22	7	6	3	2
15-44	34	14	7	8	6	9	5	6	2	-
45-60	5	6	1	2	6	5	1	3	1	-
61-70	4	2	1	1	-	-	1	-	-	-
71 Above	-	-	11	-	1	-	-	-	-	-
TOTAL	82	49	26	21	39	56	17	16	7	2
M.R.	2.71	1.85	1.85	0.79	2.77	2.12	0.53	0.60	0.21	0.07

TABLE No.10(A) (Continued)

AGE GROUP IN YEARS	VI		VII		VIII		IX		X		XI	
	M	F	M	F	M	F	M	F	M	F	M	F
0-1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	-	-	-	-	-	-	-	-	-	-	2	3
5-14	1	-	-	1	-	-	1	-	1	-	1	1
15-44	1	1	-	10	-	-	-	-	-	-	7	3
45-60	-	1	-	-	-	-	-	-	-	2	1	3
61-70	-	-	-	-	-	-	-	-	1	-	-	1
71 Above	-	-	-	-	-	-	-	1	-	-	-	-
TOTAL	2	2	-	11	-	-	1	1	2	2	11	11
M.R.	0.06	0.07	-	0.41	-	-	0.03	0.03	0.06	0.07	0.34	0.41

TABLE 10(A) (Continued)

AGE GROUP IN YEARS	TOTAL					
	MALE			FEMALE		
	CASES	POPULATION	%	CASES	POPULATION	%
0-1	11	120	9.16	12	94	12.76
1-4	34	270	12.59	30	256	11.71
5-14	74	918	8.06	56	722	7.75
15-44	60	1303	4.60	46	1178	3.90
45-60	19	295	6.44	22	304	7.23
61-70	3	92	3.26	3	62	4.83
71 Above	1	27	3.70	2	21	9.52
TOTAL	202	3025	6.67	171	2637	6.48

The overall sex specific morbidity rate for male (6.67%) and female (6.48%) was almost similar. But there was marked difference in sex specific morbidity in males and females for vector borne infections (2.71% and 1.85%) and gastrointestinal infections (1.85% and 0.79%). The disease group VII comprises of disease of female genital tract therefore it includes female morbidity only.

TABLE NO. 10(B)

AGE AND SEX SPECIFIC MORBIDITY WITHIN FORTNIGHT OF SURVEY
POST IMPOUNDMENT AREA

AGE GROUP IN YEARS	I		II		III		IV		V	
	M	F	M	F	M	F	M	F	M	F
0-1	3	3	7	8	14	10	-	1	2	2
1-4	11	16	8	8	18	24	2	3	-	1
5-14	77	39	7	6	21	30	4	1	1	2
15-44	85	77	5	4	22	12	1	3	3	?
45-60	22	16	3	1	5	3	-	-	1	-
61-70	5	2	-	-	3	-	1	-	-	-
71 Above	1	3	-	-	-	-	-	-	-	-
TOTAL	204	156	30	27	83	79	8	8	7	7
M.R.	7.05	5.99	1.03	1.03	2.86	3.03	0.29	0.30	0.24	0.26
TOTAL Cases	360		57		162		16		14	

TABLE 10(B) (Continued)

AGE GROUP IN YEARS	VI		VII		VIII		IX		X		XI	
	M	F	M	F	M	F	M	F	M	F	M	F
0-1	-	-	-	-	-	-	-	-	-	-	1	-
1-4	-	-	-	-	-	-	-	1	-	-	-	-
5-14	-	-	-	-	-	-	-	1	-	-	-	2
15-44	1	3	-	5	-	-	2	-	-	-	5	6
45-60	-	-	1	2	-	-	-	-	2	1	3	6
61-70	1	-	-	-	-	-	-	-	-	-	1	1
71 Above	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	2	3	1	7	-	-	2	2	2	1	10	15
M.F.	0.06	0.11	0.03	0.26	-	-	0.06	0.07	0.06	0.03	0.34	0.57
TOTAL Cases	5		8		-		4		3		25	

TABLE 10(B) (Continued)

AGE GROUP IN YEARS	TOTAL					
	MALE			FEMALE		
	CASES	POPULATION	%	CASES	POPULATION	%
0-1	27	96	28.12	24	121	19.83
1-4	39	267	14.60	53	283	18.72
5-14	110	803	13.69	81	691	11.72
15-44	124	1311	39.87	112	1155	9.69
45-60	37	323	11.45	29	271	10.70
61-70	11	74	14.86	3	50	0.06
71 Above	1	19	5.26	3	30	10.00
TOTAL	349	2893	12.06	305	2601	11.72

The above table shows that sex specific morbidity for males (12.06%) was slightly higher than the females (11.72%). Morbidity rate for vector born infections was higher in males (7.05%) as compared to females (5.99%). Gastrointestinal infections were slightly higher in females (3.03%) as compared to males (2.86%).

TABLE NO. 11(A)

AGE AND SEX SPECIFIC MORBIDITY IN LAST SIX MONTHS OF SURVEY
PRE IMPOUNDMENT AREA

AGE GROUP IN YEARS	I		II		III		IV		V	
	M	F	M	F	M	F	M	F	M	F
0-1	-	1	1	2	3	1	-	-	-	-
1-4	3	4	1	-	-	3	2	1	-	-
5-14	23	20	6	4	4	-	1	2	-	-
15-44	25	19	11	10	7	13	4	-	-	1
45-60	8	6	2	3	4	3	1	2	-	1
61-70	3	3	-	-	3	1	1	-	-	-
71 Above	-	-	-	1	1	-	-	-	-	-
TOTAL	62	53	21	20	22	21	9	5	-	2
M.R.	2.04	2.00	0.69	0.75	0.72	0.79	0.29	0.18	-	0.07
G. TOTAL	115		41		43		14		2	

TABLE 11(A) (Continued)

AGE GROUP IN YEARS	VI		VII		VIII		IX		X		XI	
	M	F	M	F	M	F	M	F	M	F	M	F
0-1	-	-	-	-	-	-	1	-	-	-	1	-
1-4	-	-	-	-	-	-	-	2	-	-	1	-
5-14	-	-	-	-	-	-	1	-	1	-	3	1
15-44	1	3	-	39	-	-	-	-	-	3	5	8
45-60	-	1	-	4	-	-	-	1	1	5	8	4
61-70	-	1	-	1	-	-	1	-	-	-	2	-
71 Above	1	-	-	-	-	-	-	-	1	-	2	1
TOTAL	2	5	-	44	-	-	3	3	3	8	22	14
M.R.	0.66	0.18	-	1.66	-	-	0.09	0.11	0.09	0.30	0.72	0.53
G TOTAL	7		44		-		6		11		36	

TABLE 11(A) (Continued)

AGE GROUP IN YEARS	TOTAL					
	MALE			FEMALE		
	CASES	POPULATION	%	CASES	POPULATION	%
0-1	6	120	5	4	94	6.25
1-4	7	270	2.59	10	256	3.90
5-14	39	918	4.24	27	722	3.73
15-44	53	1303	4.06	96	1178	8.14
45-60	24	295	8.13	30	304	9.86
61-70	10	92	10.86	6	62	9.67
71 Above	5	27	18.51	2	21	9.52
TOTAL	144	3025	4.76	175	2637	6.63

The overall sex specific morbidity for males (4.76%) and females (6.63%) were observed, the higher sex morbidity among females than males is in pre impoundment area. It can be easily understood with the fact that the females have higher morbidity due to genital tract infection in reproductive age group, which can become a common cause of morbidity among females at a point of time. On examination of disease specific morbidity between males and females there was hardly any difference in any category of disease. Though the difference between males and females for disease morbidity pattern for last six months is apparent but it is not statistically significant.

TABLE NO. 11(B)

AGE AND SEX SPECIFIC MORBIDITY IN LAST SIX MONTHS OF SURVEY
POST IMPOUNDMENT AREA

AGE GROUP IN YEARS	I		II		III		IV		V	
	M	F	M	F	M	F	M	F	M	F
0-1	1	-	-	2	2	3	-	1	-	-
1-4	14	11	4	6	4	7	3	4	-	-
5-14	47	37	4	2	10	6	2	4	-	-
15-44	74	75	9	1	8	1	2	2	-	1
45-60	28	18	1	1	9	2	-	-	1	1
61-70	4	4	1	-	-	-	1	-	-	-
71 Above	1	3	-	-	1	-	-	-	-	-
TOTAL	169	148	19	12	34	19	8	11	1	2
M.R.	5.84	5.69	0.65	0.46	1.17	0.73	0.27	0.42	0.03	0.07
G. TOTAL	317		31		53		19		3	

TABLE 11(B) (Continued)

AGE GROUP IN YEARS	VI		VII		VIII		IX		X		XI	
	H	P	H	P	H	P	H	P	H	P	H	P
0-1	-	-	-	-	-	-	-	-	-	-	-	2
1-4	-	-	-	-	-	-	1	4	-	-	-	1
5-14	-	-	-	-	-	-	1	-	-	-	8	7
15-44	-	3	-	6	-	1	-	-	-	2	17	11
45-60	2	-	-	-	-	-	-	-	1	2	5	8
61-70	-	-	-	-	-	-	-	-	1	-	1	1
71 Above	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	2	3	-	6	-	1	2	4	2	4	31	30
M.R.	0.06	0.11	-	0.23	-	0.03	0.06	0.15	0.06	0.15	1.07	1.15
G.TOTAL	5		6		1		6		6		61	

TABLE 11(B) (Continued)

AGE GROUP IN YEARS	TOTAL					
	MALE			FEMALE		
	CASES	POPULATION	%	CASES	POPULATION	%
0-1	3	96	12.24	8	121	6.61
1-4	26	267	9.73	33	283	11.66
5-14	72	803	8.96	56	691	8.10
15-44	110	1311	35.36	103	1155	8.91
45-60	47	323	14.55	32	271	11.80
61-70	8	74	10.81	5	50	10
71 Above	2	19	10.52	3	30	10
TOTAL	268	2893	9.26	240	2601	9.22

The overall sex specific morbidity rate for male (9.26%) and for female (9.22%) were worked out in post impoundment area for last six months which is more or less equal, but when comparing with the pre impoundment area in males it is two times and for female females it is one and half times more. This may be due to environmental impact of water collection on the population residing near the dam site. This higher incidence of morbidity in post impoundment area is mostly contributed by the incidence of vector born diseases in both sex ie. 5.84% in male and 5.69% in females. In rest of the diseases specific morbidity pattern has hardly created any unusual incidence of disease.

TABLE No.12
DISTRIBUTION OF CHRONIC ILLNESS
PRE IMPOUNDMENT

	AGE GROUPS					TOTAL	%
	5-14	15-44	45-60	61-70	71 +		
POPULATION	1640	2481	599	154	48	4922	
T.B.	2	13	6	5	4	30	0.48
Cataract & Blindness	2	4	17	8	6	37	0.75
Asthma	1	3	6	8	4	22	0.44
Cancer	-	-	-	-	-	-	-
Leprosy	-	-	1	2	-	3	0.06
Chronic Malaria	-	-	-	1	-	1	0.02
Epilepsy	1	-	-	-	-	1	0.02
Poliomyelitis	3	-	-	-	-	3	0.06
other	15	45	20	13	6	99	2.01
TOTAL	24	65	50	37	20	196	3.98
Percentage	1.46	2.61	8.34	24.02	41.66	3.98	

TABLE No.12(B)

DISTRIBUTION OF CHRONIC ILLNESS
POST IMPOUNDMENT

	AGE GROUP					TOTAL	%
	5-14	15-44	45-60	61-70	71 +		
POPULATION	1494	2466	594	124	49	4727	
T.B.	-	19	18	4	-	41	0.86
Cataract & Blindness	1	7	26	17	11	62	1.31
Asthma	1	3	8	5	3	20	0.42
Cancer	-	-	-	-	-	-	-
Leprosy	-	-	-	-	-	-	-
Chronic Malaria	-	3	-	1	-	4	0.08
Epilepsy	-	-	-	1	-	1	0.02
Polio-myelitis	5	3	1	-	-	9	0.19
other	11	53	36	11	2	113	2.39
TOTAL	18	88	89	39	16	250	5.28
Percentage	1.20	3.56	14.98	31.45	32.65	5.28	

The above table shows that prevalence of chronic

diseases was higher in post impoundment area (5.28%) as compared to the pre impoundment area (3.98%). In both the areas frequency of chronic disease increased with advancing age. Cataract and blindness Tuberculosis and Asthma were commonest chronic diseases in both areas.

TABLE No.13

NUTRITIONAL STATUS OF CHILDREN (0-6 YEARS) AND MORBIDITY

NUTRITIONAL STATUS	PRE IMPOUNDMENT				POST IMPOUNDMENT			
	CHILD REN	%	MORBI DITY	%	CHILD REN	%	MORBI DITY	%
Normal	202	22.62	27	13.36	282	28.89	30	24.82
Malnutrition (I & II)	543	60.80	87	16.02	567	58.09	150	26.45
Malnutrition (III & IV)	148	16.57	34	22.97	127	13.00	18	14.17
Not available	180	16.77	15	8.33	74	7.04	8	10.81
TOTAL	1073		163		1050		246	

Out of 1073 children in 0-6 years age group in pre impoundment area only 893 could be assessed for nutritional status, similarly in post impoundment area 976 children were examined out of 1050. Nutritional status of children in post impoundment area was better (29 %) than pre impoundment area (23%). The over all morbidity status in post impoundment area was slightly higher than pre impoundment area.

NUTRITIONAL STATUS OF CHILDREN (0-6) YEARS AND MORBIDITY

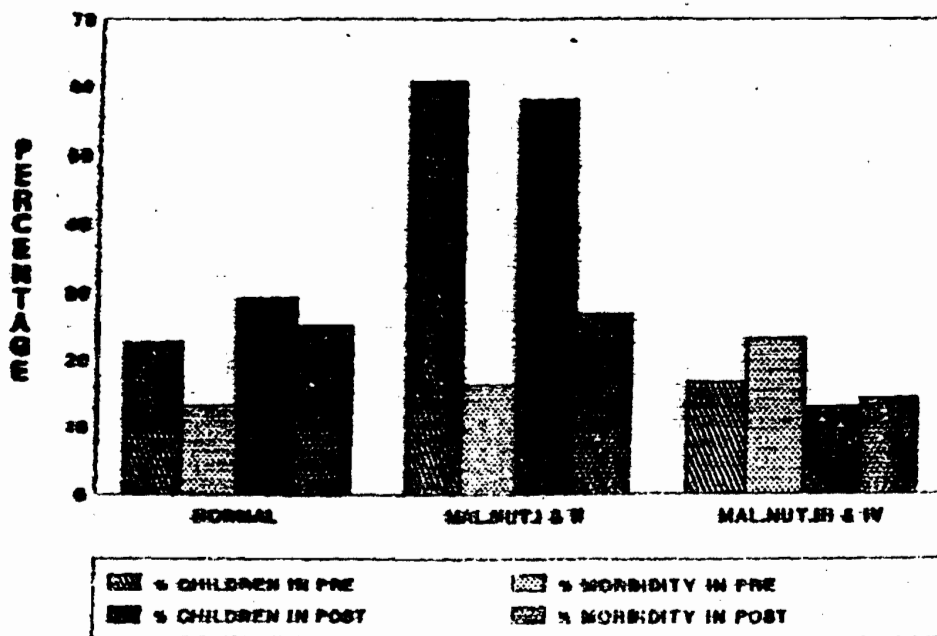


TABLE No.14

DISTRIBUTION OF CHILDREN (0-6 YEARS)

ACCORDING TO IMMUNISATION STATUS

IMMUNISATION STATUS	PRE IMPOUNDMENT		POST IMPOUNDMENT	
	CHILDREN	%	CHILDREN	%
Fully Immunised	322	30.00	296	27.99
Partially Immunised	281	26.18	358	34.09
Unimmunised	335	31.22	332	31.61
Not available	135	12.58	66	6.28
TOTAL	1073		1050	

The above table shows that percentage of fully immunised children was slightly higher in pre impoundment area (30%) as compared to post impoundment area (27.9%). Partially immunised children were 26.18% and 34.09% and unimmunised children were 31.2 and 31.6% in pre and post impoundment area respectively.

TABLE No 15

DISTRIBUTION ACCORDING TO SOURCE OF TREATMENT
FOR LAST SIX MONTHS

SOURCE OF TREATMENT	PRE IMPOUNDMENT		POST IMPOUNDMENT	
	CASE	%	CASE	%
Government	177	47.83	241	33.54
Private	181	48.91	515	66.19
Others	12	3.24	2	0.25
TOTAL	370		778	

In the pre impoundment area 48.9% population availed treatment from private practitioner as compared to 66.2% population in post impoundment area for last six months period. In pre impoundment area the percentage of population availed treatment from Government institution (48%) was more than post impoundment area (34%).

TABLE No 16

DISTRIBUTION ACCORDING TO TYPE TREATMENT RECEIVED

TYPE OF TREATMENT	PRE IMPOUNDMENT		POST IMPOUNDMENT	
	DISEASED	%	DISEASED	%
Allopathy	352	48.41	766	65.92
Homeopathy	13	1.78	6	0.51
Aurvedic	1	0.13	6	0.51
Unani	1	-	-	-
Others	4	0.55	-	-
Not taken Treatment	357	49.10	384	33.04
TOTAL	727		1162	

TABLE No 18
DISTRIBUTION ACCORDING TO PERSON CONDUCTING DELIVERIES

PLACE	PRE IMPOUNDMENT DELIVERIES		POST IMPOUNDMENT DELIVERIES	
	NUMBER	%	NUMBER	%
Trained Dai	73	32.30	48	17.82
Untrained Dai	138	60.52	163	69.36
ANN	13	5.75	9	3.82
Doctor	1	0.44	5	2.12
Relative	2	0.88	14	5.95
Others	1	0.44	4	1.70
TOTAL	228		235	

It was observed that in both the areas majority of deliveries are being conducted by untrained dais (60% and 69%) followed by those conducted by trained dais (32% and 17%). In post impoundment area the number of deliveries conducted by doctors and relatives are definitely higher (2% and 6%) than pre impoundment area (0.44% and 0.88%).

It was observed that 48% of diseased population in pre impoundment area used Allopathic system of medicine as compared to 66% in post impoundment area. Interestingly the percentage of no treatment taken in pre impoundment area is more (49%) than post impoundment area (33%).

TABLE No 17

DISTRIBUTION ACCORDING TO PLACE OF DELIVERY

PLACE	PRE IMPOUNDMENT DELIVERIES		POST IMPOUNDMENT DELIVERIES	
	NUMBER	%	NUMBER	%
Home	188	82.45	225	95.74
PHC	33	14.60	7	2.97
District	6	2.65	3	1.27
Other	1	0.44	-	-
TOTAL	228		235	

The above table shows the distribution according to place of delivery. Since the survey belongs to rural population therefore the maximum percentage of delivery taking place will be at home only in both pre and post impoundment area ie. 82% and 96% .

TABLE No. 20
LABORATORY INVESTIGATION FOR MALARIA PARASITE

AGE GROUPS	BLOOD SLIDE COLLECTED FROM							
	Pre IMPOUNDMENT				Post IMPOUNDMENT			
	MALE	FE- MALE	TOTAL	POSI- TIVE	MALE	FE- MALE	TOTAL	POSI- TIVE
0-1	-	-	-	-	-	3	3	-
1-4	2	2	4	1	9	10	19	-
5-14	19	14	33	1	46	38	84	2
15-44	26	21	47	-	67	52	119	7
45-60	4	6	10	-	19	9	28	-
61-70	2	4	6	-	9	2	11	-
71 +	1	-	1	1	-	-	-	-
TOTAL	54	47	101	3	150	114	264	9

Out of the 101 blood slides collected from fever cases in pre impoundment area only three were found for malaria parasite (Slide positivity rate 2.97%) but in post impoundment area slide positivity rate was much higher (3.4%).

TABLE No 19
LABORATORY INVESTIGATION FOR MICROFILARIA

AGE GROUP	BLOOD SLIDE COLLECTED FROM							
	PRE IMPOUNDMENT				POST IMPOUNDMENT			
	MALE	FE- MALE	TOTAL	POSI- TIVE	MALE	FE- MALE	TOTAL	POSI- TIVE
0-1	-	-	-	-	-	-	-	-
1-4	4	2	6	-	4	3	7	-
5-14	65	19	84	-	78	31	109	-
15-44	91	35	126	-	130	84	214	-
45-60	18	3	21	-	26	9	35	-
61-70	6	1	7	-	7	1	8	-
71 +	6	-	6	-	2	-	2	-
TOTAL	190	60	250	-	247	128	375	-

The above table shows that out of 250 and 375 night blood smears taken in pre and post impoundment area respectively, none was found positive for microfilaria.

TABLE No 21
AGE AND SEX DISTRIBUTION OF DEATHS

AGE GROUPS	PRE IMPOUNDMENT					POST IMPOUNDMENT				
	MALE	FE MALE	TOTAL	POPUL ATION	%	MALE	FE MALE	TOTAL	POPUL ATION	%
0-1	6	8	14	228	6.14	12	6	18	235	7.65
1-4	-	7	7	533	1.31	-	-	-	550	-
5-14	4	3	7	1647	0.42	1	2	3	1497	0.20
15-44	2	4	6	2487	0.24	3	9	12	2478	0.48
45-60	3	-	3	602	0.49	3	1	4	596	0.66
61-70	3	-	3	157	1.91	4	-	4	128	3.12
71 +	1	2	3	51	5.88	3	4	7	56	12.50
TOTAL	19	24	43	5705	0.75	26	22	48	5542	0.86

The above table shows age and sex distribution of deaths in the two study areas. Crude death rate was slightly higher in post impoundment area (8.6 / 1000 pop.) than in pre impoundment area (7.5 / 1000 pop.). In both the areas higher age specific death-rates were recorded in 0-4 years and 60 years and above age groups.

Recommendations

At the end of the third phase of the study recommendation already made in the earlier two phases still hold good viz.

- (1) Protection of health of workers engaged in construction work by appropriate immuno prophylaxis and chemoprophylaxis and making health services available at camp site.
- (2) For effective vector control in the area integrated vector control measures should be adopted simultaneously a detailed entomological study should also be undertaken
- (3) Primary health care services should be effectively strengthened in post impoundment area so that health care services are available to them near their habitat.
- (4) To improve the physical quality of life in Narmada valley area, measures for improving literacy status particularly female literacy should be undertaken. This will increase utilisation of available health services and improve nutritional status of children.
- (5) Epidemiological units should be established in post impoundment area as per the norms of N.I.C.D. . These units will keep watch on morbidity pattern in the area they will forecast morbidity trends in the area and identify possible risk factors. Thus helping in prevention and control of diseases in post impoundment area.

ANNEXURE 1

NAMES OF VILLAGES SURVEYED DURING THIRD PHASE OF THE STUDYBARGI DAM (JABALPUR)Submergence areaCommand area

1. Gullapath
2. Nagardha
3. Bijlora
4. Papari kala
5. Toonia
6. Biza

1. Sunwara
2. Badhiya kheda
3. Ghughri
4. Bichuwa
5. Sewni tola

TAUA DAMSubmergence areaCommand area

1. Piperyakala
2. Dhoori
3. Junkar
4. Kotminal
5. Chicha

1. Gugri
2. Gajpur
3. Nander
4. Sundwada
5. Kadai kala

PUNASA DAM

Submergence area

1. Richimafi
2. Khogani
3. Bedhani
4. Kitta
5. Banasa

Command area

1. Dhamangaon
2. Hand. Khola Rayyat
3. Hand. Khola mafi
4. Chitravadi
5. Rudhgaon

HANDESHWAR DAM

Submergence area

1. Tailyan
2. Sulgaon
3. Gogaon
4. Teli batyan
5. Jallod

Command area

1. Batyan bujarg
2. Pathrad
3. Lepe
4. Baigaon

ANNEXURE 2

GROUPING OF DISEASES

I. VECTOR BORN DISEASES

1. Malaria
2. Dengue Fever

II. WATER BORN GASTROENTERITIS

1. Typhoid Fever
2. Amoebiasis
3. Gastroenteritis
4. Viral hepatitis
5. worm infestations

III. RESPIRATORY INFECTIONS

1. Diphtheria
2. Whooping cough
3. Measles
4. Pneumonia
5. Bronchitis, Asthma, Emphysema
6. A. R. I.

IV. SKIN INFECTIONS

1. Leprosy
2. Diseases of skin & Subcutaneous Tissue

V. EYE INFECTIONS

1. Trachoma
2. Conjunctivitis

VI. DISEASES OF GENITOURINARY

1. Nephritis, Nephrotic Syndrom and Nephrosis
2. Hyer-plasia of prostate
3. Hydrocoelo
4. U. T. I.

VII. DISEASES OF FEMALE GENITAL TRACT

1. Menstrual disorder
2. Spontaneous abortion
3. Legally induced abortion
4. Toxemia of pregnancy
5. Obstructed Labour

VIII. SEXUALLY TRANSMITTED DISEASES

1. Syphilis
2. Gonococcal infections

IX. EAR, NOSE & THROAT INFECTIONS

1. Otitis media
2. Acute rhenumatic fever

X. DISEASES OF MUSCULOSKELETAL

1. Rheumatoid arthritis
2. Birth Trauma
3. Fracture of upper limb
4. Fracture of lower limb

XI. OTHERS

MAHARASHTRA STATE
SARDAR SAROVAR PROJECT - HEALTH PLAN

1. 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 Tahsil 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 three different sites at i. Amli, ii. Dekati, iii. Valheri in Akkalkuwa and Taloda Tahsil of Dhule district, Maharashtra. It would be necessary to provide adequate health coverage to these oustee families being resettled at rehabilitation sites. The submergence water would affect an area measuring 10 X 40 km directly and would also 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, Filariæ, Dengu, influenza etc.

2. Existing infrastructure at dam site and nearby area which is being affected by water collection

Accordingly to the norms adopted by the State Government, one Primary Health Centre is admissible for 30,000 population in non-tribal area while the norm for tribal area is 20,000 population. Similarly for population of 5,000 in non-tribal and population of 3,000 in tribal area, one Subcentre is admissible. Also one Community Health Centre is established for every 5 Primary Health Centres as a first level referral centre. However, the norms prescribed as above, are relaxed to some extent in most difficult areas and Special Action Plan districts. Based on these norms, two Rural Hospitals, eight Primary Health Centres and fifty five Subcentres have already been sanctioned for Akkalkuwa & Akrani Tahsils in Dhule. But as most of the area of these two Tahsils is

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hilly and inaccessible, the existing infrastructure is not sufficient to render the health care services fully. Hence the State Government has adopted a Special Health Programme for these talukas and has sanctioned additional eight Primary Health Centres under Special Action Plan. It has also been decided that till the establishment of these new eight Primary Health Centres, ten Mobile Health Units has been sanctioned for this area. These Mobile Units have been put into service about two years ago. In addition to this, five Primary Health Units have been sanctioned under the plan of most difficult villages scheme. (Plan for 1472 villages in the State).

These institutions provide outdoor health facilities and treatment to the patients. So also indoor facilities are also provided to the needy patients for the treatment at Primary Health Centres. Diet facility to the patients and their one relative who accompanies the admitted patients has been recently approved by the Government at Primary Health Centres and Rural Hospitals.

Details of existing infrastructure in affected Talukas

Sr. No.	Tahsil	CHC	PHC	PHU	MHU	SC	Floating Dispensary
1.	Akrani	1	7	2	6	22	-
2.	Akkalkuwa	1	9	3	4	33	-

Out of the above mentioned infrastructure five Primary Health Centres, four Primary Health Units, five Mobile Health Units (Temporary) and five Subcentres are functioning in the area of Dam site.

3. Proposed Infrastructure

A. Health Infrastructure proposed at Rehabilitation Site

The oustees from 33 villages are being rehabilitated at three different sites viz. Amlī, Dekati, Valheri (Somawal).

The total population at three rehabilitation sites will be about 15,000 and will require a separate health plan for providing Health Services. Accordingly separate plan has been prepared and submitted to Narmada Control Authority. The plan is as under -

For 15,000 population, one Primary Health Centre and three Subcentres are required for effective health coverage. Accordingly, one Primary Health Centre which was sanctioned for village Bamni, which would be submerged has been already shifted to Valheri and it is now functioning. In addition to this, three Subcentres are required. At every Subcentre one ANM and one male Multipurpose Worker is required. The establishment of three Subcentres would require the budget of Rs.11.58 lakhs.

B. Plan for Intensive Health Care in 10 X 40 km belt and near by area of 80 Villages

i. Floating Dispensary

As the villages near the water collection area are not approachable by road but are approachable through the boat. Hence floating dispensary is proposed which can cater the Health Services to these villages. This would require provision of Rs.19.50 lakhs. The details regarding the scheme has been submitted in the plan proposed earlier.

ii Creation of posts of Laboratory Technicians

Due to the pondage effect of water, there would be alarming increase in diseases transferring population of different vectors, which may lead to diseases like Malaria, Filaria, Dengu etc. For effective implementation of control

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of vector borne diseases like Malaria, Filaria and Dengu, it would be necessary to have effective surveillance of these diseases. They would require to collect blood samples from fever cases for confirmation of positive cases and for radical treatment and also to give presumptive treatment. The vector borne diseases will not be limited to this area only but the spread is expected throughout both the talukas so these technicians would be necessary at all (16 PHCs) the Primary Health Centres. With this view, 16 posts of Laboratory Technicians are proposed in the plan which would require an expenditure of Rs.7.20 lakh.

iii. Antimalarial Activity

For effective vector control and control of Malaria and Filaria, it is proposed to provide insecticides. For insecticide spraying activities Rs.1.00 lakh is proposed.

iv. Establishment of Subcentres

Out of 11 Subcentres which are already proposed in the plan which is submitted, eight Subcentres will be located in this area for which at every Subcentre one Multipurpose Worker (Male) and one Multipurpose Worker (Female) alongwith Part Time Attendant would be working. The total expenditure would be Rs.30.88 lakh.

v. Establishment of Mobile Public Health Laboratory

Drinking water monitoring would be critical issue for this area. At present the collection of water samples and examination of water samples are dealt by different agencies. To co.ordinate both the activities, it would be effective if this agency is created for the collection of large number of water samples from different places and examination of water samples immediately in the field only. The similar agency will also conduct corrective measures such as disinfection of water sources, with the help of Gram Panchayat. With this

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-5-

view one Mobile Public Health Laboratory has been proposed with following staff with amenities.

- | | | |
|------------------------------|---|---|
| 1. Bacteriological Assistant | - | 1 |
| 2. Chemical Assistant | - | 1 |
| 3. Class IV | - | 1 |
| 4. Driver | - | 1 |
| 5. Vehicle | | |
| 6. Material and Supplies | | |

For establishment of one Mobile Public Health Laboratory budget of Rs.20.00 lakh is required.

C. A study proposed in the area of submergence to study the disease pattern

In one of the meetings with Narmada Control Authority at Delhi, it was suggested to carry out disease pattern study on the basis of study carried by Madhya Pradesh and to be continued for four to five years. Accordingly Assistant Director of Health Services, Bombay visited Bhopal and studied the methodology of survey. Public Health Department has decided to process the study under the supervision of some Voluntary Organization working at present in Dhule district. However, this will require additional budget of Rs.3.00 lakh. The proposal is being submitted to Narmada Control Authority in due course.

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SUMMARY OF THE PLAN

<u>Sr. No.</u>	<u>Name of the Scheme</u>	<u>Funds Required (Rs. in Lakh)</u>
1.	Health infrastructure at Rehabilitation site i.e. 3 Subcentres	11.58
2.	Plan for Intensive Health Care area near the Dam	
a.	Floating Dispensary	19.50
b.	16 posts of Laboratory Technicians	7.20
c.	Antimalarial Activity	1.00
d.	Establishment of 8 Subcentres	30.88
e.	Establishment of Mobile Public Health Laboratory	20.00
3.	Study proposed to study the disease pattern near the Dam site area	3.00
Total		93.16



J.P. Dange,
COMMISSIONER

Tel : 201 8043

ANNEX - XXIII-XI.

D.O.No. 011401/103/94

Office of the

Commissioner of Fisheries,
Government of Maharashtra,
Taraporewala Aquarium,
Bombay 400 002,

Date : 23.9.1994

**Sub : Fisheries Development in
Sardar Sarovar Project.**

Dear

Sardar Sarovar Project is an interstate project having a total waterspread area of 37030 ha. Out of which, 7323 ha (19.91%) comes in Maharashtra and remaining 8825 ha (23.83%) in Gujarat, 20882 ha (56.23%) in Madhya Pradesh State. The 33 villages, (9 villages from Akkalkuwa Taluka and 24 villages from Akrani taluka) having 2464 families are falling under submerged area of the project; out of which, 2209 families' resettlement is going on at Taloda Tahsil, Dist. Dhule.

At present, 110 families have been shifted and resettled at Somaval Gaathan in Taloda Tahsil. The members of these families were interviewed in person by this department, accordingly, no one was found to be engaged in fishing previously. Moreover, no one is willing to take up fisheries as an occupation in future.

With a view to studying the environmental impact on fisheries under this project, this Department approached the Central Inland Capture Fisheries Research Institute (ICAR), Barrackpore (West Bengal) to conduct studies on ecology and hydrobiological aspects of project. The institute has asked for the location map of river which has been sent on 29-8-1994.

Taking into consideration all the above factors, and need to take immediate steps for development of fisheries in this project, a proposal of Rs. 1.02 Crores has been submitted to Government vide letter No. 011401/10394 dated 16-5-1994 (copy enclosed). This proposal may please be approved and funds may be allotted for fisheries

(23)

- 2 -

programme under Sardar Sarovar Project immediately, because this fisheries programme will be incremental, i.e. in addition to the normal programme of this department.

Yours

sd/-

(J.P. Dange)

Shri Ashok Sinha,
Secretary (ADF),
Agriculture & ADF Department,
Mantralaya Annexe,
BOMBAY 400 032.

Copy f.w.cs. to

1. Shri A.K. Mago, Secretary, Environment Department, Mantralaya, Bombay 400 032.
2. Dr. A.K. Malhotra, Member (E&R), Narmada Control Authority, 27, Press Complex, 2nd Floor, A.B. Road, Indore-452 008 (M.P.) for approval.
3. Shri Johnny Joseph, Secretary (R&R), Mantralaya, Bombay-32 for releasing the funds.
4. Shri V.P. Shimpi, Secretary, Irrigation Department, Mantralaya, Bombay-32, for releasing the funds.



(J.P. Dange)
Commissioner of Fisheries,
Maharashtra State, Bombay.

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FISHERIES DEVELOPMENT PLAN UNDER
SARDAR SAROVAR PROJECT.

Sardar Sarovar Project is an inter-state multipurpose project of Gujarat, Madhya Pradesh and Maharashtra. This project is on Narmada river, the largest west-flowing river of India. The river forms the border of Dhule District of Maharashtra for a stretch of 73 kms. Total submergence of land under this project would be 37.030 ha., out of which 7323 ha (19.78%) of land from Maharashtra will be submerged under this project. The submergence area will cause displacement of the tribal inhabitants in 33 villages from Maharashtra 979 families in a villages from Akkalkuwa taluka and 1485 families in 24 villages from Akrani Taluka, totalling 2464 families in 33 villages falling under proposed submerged area of the project are to be displaced. It is learnt that 255 families will be shifted to Gujarat State and 2209 families will be settled in Maharashtra at Taloda Tahsil of Dhule district.

Since the entire submergence area of the project, which was hitherto being utilised for various productive purposes, e.g. forestry, would become unproductive. Yet, this so called unproductive land area, can very well be utilised for fisheries development. Fisheries development in this reservoir assumes great importance, since it is not only going to produce fish, but is also

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going to bring about a major change in the vocation, profession and life of the population surrounding the reservoir.

The Fisheries Development Programme for Maharashtra under S.S.P. will be of 2 fold :-

- (1) Fisheries Development in S.S.P.
- (2) Providing employment to the resettled persons in Taloda area by way of promoting aquaculture.

(1) Fisheries Development in S.S.P.

The average waterspread area of the reservoir in Maharashtra is approximately 6000 ha. Since the water spread is located in three states, the stocking of fish seed will have to be done collectively by 3 states under the auspices of the Narmada Control Board. The reservoir (6000 ha waterspread area in Maharashtra will require 18 lakhs fingerlings of size 100 mm length @ 300 fingerlings/ha would be required for first 3 years and later on the stocking rate will be reduced to 50%. The cost of 18 lakhs fingerlings will be about Rs. 9.00 lakh @ Rs. 500/- 1000 Nos. fingerlings).

2. The Mukti Fish Seed Farm is the nearest centre for procurement of fingerlings. But this centre can not fulfill the total requirement of the reservoir due to shortage of rearing space. It is therefore, necessary to construct about 4 ha. fish seed farm with a circular hatchery at a suitable site. It is estimated that about Rs. 30 lakhs will be required for this purpose.

- 3 -

3. About 300 fishermen, most of them tribals, who will be rehabilitated along the bank of reservoir will get the employment by way of fishing in the reservoir. It is proposed to organise about 5 primary fisheries coop. societies (about 60 members of tribal fishermen) who will undertake the responsibility of exploitation of fish from the reservoir. Following fisheries requisites will be provided to the tribal fishermen through their primary fisheries coop. societies.

Fishing net :-

Net unit of 3 kg per tribal fishermen will be provided. Total quantity of nets required for 300 persons would be 900 kg. Total cost will be about Rs. 2.70 lakhs say Rs. 3.00 lakh @ Rs. 300 per kg. This nets will be provided on 100% subsidy for 1st year and from 2nd year onward net will be provided on 50% subsidy. The expenditure for first year would be Rs. 3 lakhs for subsequent years Rs. 1.50 lakhs.

Fishing boats :-

In addition to fishing net, 60 fishing boats will be provided on 100% subsidy to each of the group consisting of 5 fishermen each to conduct the fishing in the reservoir. The cost of which will be about Rs. 6.00 lakh (Rs. 10,000 per boat).

A boat fitted with outboard engine would also be required for collecting the fish catch along the stretch of 73 kms. shore line and quickly transporting them to the landing centre. Two motorised boats are required which will be incharge of the society. This

- 4 -

will be supplied on 100% subsidy, the cost evolved Rs. 1.00 lakh @ Rs. 0.50 lakh each boat.

In order to market the catch in vicinity or to take it to the approach road, it is proposed to provide 60 bicycles, 60 insulated ice boxes of 50 kg. capacity each to a groups consisting of 5 fishermen each on 100% subsidy. The cost of this component will be Rs. 1,80 lakhs @ Rs. 3000 each bicycle and insulated boxes).

The fish marketing will be done in the vicinity of the reservoir by the fishermen through their primary co-op. society. The long distance transport will be undertaken by Dhule district Fisheries B Federation, who will be given a 3 ton capacity truck and 50 insulated boxes of 50 kg on 100% subsidy costing Rs. 4.00 lakhs.

Training :

The adivasis and tribals are not basically fishermen, they will be attracted towards this avocation, since they will have very few avocation open for them for their livelihood. It is therefore, proposed to conduct one month's short training course for 15 candidates per batch. Accordingly 5 batches of 75 tribals will be conducted. The training is proposed to be conducted at fish seed farm, Mukti, Dist. Dhule. The trainee will be given Rs. 400 stipend and Rs. 200/- for field tour, thus total Rs. 600/- per trainee. To conduct this training programme,

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class room and dormitory will have to be constructed at Mukti fish farm, Dhule and staff will be appointed to impart the training under this programme. This will be required Rs. 4.30 lakhs.

Staff :

The technical and supporting staff will be required for taking up the above activities. It is proposed that about Rs. 2 lakh per year will be required.

The exact requirement of staff for above programme will be worked out after the project is completed.

The total cost of all above components will be as follows -

	Rs. in lakhs
1. Stocking of fingerlings	36.00
2. Construction of fish seed farms.	30.00
3. Supply of fishery requisites.	
(i) Nylon net	9.00
(ii) Boat - 60 nos.	6.00
(iii) Mechanised boats - 2 nos.	1.00
4. Transport and preservation -	
(i) Bicycle and insulated boxes - 60 nos. each for a group of 5 fishermen	1.80
(ii) Mini truck (3 ton capacity) and 50 insulated boxes to Dist. Fisheries Federation, Dhule.	4.00

Training

1. Stipend and field study tour	1.80
2. Construction of class room, staff	2.50

Staff

10.00

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Total Rs. 102.10 lakhs

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Financial gain to
tribal fishermen

It is presumed that each fishermen will harvest about 1.5 tonnes of fish annually. By sale of 1.5 tonnes of fish @ Rs. 15000/ton for the fishermen will get gross income of Rs. 22,500 per year.

Source of fund - The funds of Rs. 102.10 lakhs will have to made available from the State budget under the district level plan - (Tribal sub-plan) during 1994-95 onward. Necessary provision will be made after the approval from Govt. in this respect.

Fisheries Development Programme
for the resettled persons in
Taloda area.

It is learnt that 2209 families will be settled in Maharashtra at Taloda Tehsil of Dhule Dist. Resettlement of 2209 families is proposed to be carried out in 5 Gaonthans at Taloda. At present, 110 families have been shifted and resettled at Somaval Gaonhan in Taloda.

The rehabilitation of oustees is in progress. The Fisheries Development Programme will be chalked out after resettlement of oustees.

The persons rehabilitated in Taloda area will be provided employment by way of fish culture in 30 irrigation tanks being constructed

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in the area. The total waterspread area of these tanks is 1000 ha and will need 50 lakh fingerlings @ 5000 nos/ha for stocking. These tanks are expected to yield about 500 tonnes fish per annum and hence expected to provide employment to 500 families. In addition addition, about 50 ponds of 1 ha. each will be constructed at suitable sites and will be allotted to these beneficiaries for semi intensive fish culture. This will require 2.50 lakhs of fingerlings per annum and is expected to give the production of 50 tonnes of fish per annum.

120

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नर्मदा नियंत्रण प्राधिकरण
NARMADA CONTROL AUTHORITY

पर्यावरण उपदल
Environmental Sub-Group

तेईसवीं बैठक का कार्यवृत्त
Minutes of the Twenty Third Meeting

29 नवम्बर, 1994 को
पर्यावरण भवन नई दिल्ली में हुई

Held at
Paryavaran Bhawan
New Delhi
On 29th November, 1994

इन्दौर
जनवरी, 1995

INDORE
January 1995

MINUTES OF 23RD MEETING OF THE ENVIRONMENT SUB-GROUP NCA
HELD ON 29TH NOVEMBER, 1994. AT PARYAVARAN BHAWAN, NEW DELHI.

I N D E X

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A N N E X U R E

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MINUTES OF 23RD MEETING OF THE ENVIRONMENT SUB-GROUP
HELD ON 29TH NOVEMBER, 1994 AT PARYAVARAN BHAWAN, NEW DELHI.

Shri N.R. Krishnan, Secretary to the Govt. of India, Ministry of Environment & Forests and Chairman of the Environment Sub-group of NCA welcomed the Members and Invitees to the 23rd meeting of Environment Sub-group. The list of participants is enclosed at Annex-XXIII.Min.I.

Discussion on the various agenda items was taken up thereafter.

Item No. XXIII-1(116): **CONFIRMATION OF THE MINUTES OF THE 22ND MEETING.**

Minutes of the 22nd meeting of the Environment Sub-group of Narmada Control Authority were circulated to all members and invitees separately vide letter No.Env-34(22)/94/2266-2293, dated 24.7.94.

The correction suggested by NVDA as indicated in the agenda papers was accepted.

In accordance with the suggestions given during the 22nd meeting of the Environment Sub-group, Govt. of Gujarat sought to place a copy of the reply pertaining to the letter of Dr. Shekhar Singh as part of the 22nd meeting's minutes. However, after discussion, it was decided that Govt. of Gujarat should directly reply to Dr. Shekhar Singh and no correction in the minutes on this account was necessary.

Minutes were then confirmed with the modifications as indicated above.

Item No.XXIII-2(117): REVIEW OF ACTIONS TAKEN ON THE DECISIONS OF THE PREVIOUS MEETINGS.

1. Submission of Catchment Area Treatment (CAT) plans for freely draining critically degraded subwatersheds [Item No.XXII-2(112) (1)].

While discussing the availability of funds for CAT works, it was reported that due to lack of funds there might be delay/difficulty in achieving the targets in Madhya Pradesh. Chairman, however, suggested that some funds can be obtained from National Afforestation and Ecodevelopment Board and the scheme as per guidelines for wasteland development may be sent to this Board. It was suggested that both GOMP and GOM may send these schemes urgently. A copy of the guidelines for preparing the scheme was made available during the meeting. These are placed at Annex-XIII.Min-2.

Representatives of State Govts. of Madhya Pradesh and Maharashtra informed that the plans for treatment of balance of the freely draining, critically degraded subwatersheds are under revision and the same shall be submitted soon.

On the issue of making a presentation by Central Soil Water Conservation Research Institute of CAT works being done by them in SSP areas of Gujarat, Govt. of Gujarat informed that the same would be done during the next meeting.

2. Cost Estimates for preparation of Action Plan and implementation of Environment safeguard measures [Item No.XXII-2(112) (2)].

The state Govts. were requested to complete the table annexed with the agenda, as early as possible. It was also agreed that the cost estimates for command area development shall

be made available by Govt. of Gujarat for consideration of the sub-group by next meeting.

3. Environmental Impact of Closure of Construction Sluices.

On the issue of ratification of the closure of construction sluices, Dr. Nalini Bhatt, MOEF informed that the committee constituted under the Chairmanship of Dr. S.Maudgal could not visit the areas due to various reasons. After the discussion, it was agreed that the committee should visit the areas within the next one month's time and submit their report.

On the issue of making an assessment of the compliance of environmental conditions pari-passu with the construction works, after discussions, it was agreed that the bottlenecks in smooth and speedy implementation of the environmental safeguard measures should be removed. Chairman desired that a detailed presentation if possible on maps regarding the pari-passu implementation of various safeguard measures should be made by the State Govts. during the next meeting.

Item No.XXIII-2(118): **PRESENT STATUS OF STUDIES SURVEYS AND ENVIRONMENTAL ACTION PLANS.**

The Sub-group reviewed the progress of studies, surveys and the actions plans as follows:

1) **Phased Catchment Area Treatment:**

Narmada Sagar Project

Govt. of Madhya Pradesh

Govt. of Madhya Pradesh informed that upto October, 1994 against a final target of 62975 ha. an area of 25867 ha. had been treated up. Sub-group was informed that the maps were still under preparation. It would be possible to submit these maps by the end of January, 1995.

Sardar Sarovar Project

Govt. of Madhya Pradesh informed that by the end of October, 1994 against a target of 125725 ha. area, an area of 20864 ha. had been treated up.

Govt. of Maharashtra

Shri Johny Joseph, Secretary (R&R), Govt. of Maharashtra informed that by the end of October, 1994 in addition to completion of treatment of 1093 ha. of non-forest areas, forest area to the extent of 7380 ha. had also been treated. Besides, pre planting operation have been completed over an area of 6500 ha.

Govt. of Gujarat

Govt. of Gujarat reported that as against the target of 30200 ha. of catchment area an area of 28915 ha. had been treated up by the end of October, 1994.

ii) Compensatory Afforestation

Narmada Sagar Project

Govt. of Madhya Pradesh

Sub-group was informed that an area of 60633 ha. had been treated up against a total target of 80945 ha.

Govt. of Madhya Pradesh

Sardar Sarovar Project

Shri B.K.Verma, Member (E&F) informed that against 8740 ha. area to be planted, works have been completed over an area of 8165 ha. by the end of October, 1994. Chairman suggested that DIG (FC), MOEF should visit the areas for inspection of CAF works going on in Madhya Pradesh.

Govt. of Gujarat

Govt. of Gujarat reported that the compensatory afforestation works have already been completed in the State of Gujarat in both the forest as well as non-forest areas.

Govt. of Maharashtra

Sub-group was informed that against the target of 23666 ha. planting work, on an area of about 21700 ha. was completed by the end of October, 1994.

It was further informed that the plantation area maps would be made available to MOEF and NCA within a month's time.

iii) Command Area Development

Narmada Sagar Project

Sub-group approved the Memorandum Of Understanding (MOU) for the studies proposed to be entrusted to Jawaharlal Nehru University as annexed with the agenda papers. It was suggested

that the Agriculture Finance Corporation, an agency likely to be entrusted with the tasks of preparing integrated development plan for NSP, should be asked to integrate drainage aspects in the plan.

Sardar Sarovar Project

Govt. of Gujarat

Govt. of Gujarat informed that the Chairman of the multi-disciplinary group has been requested to grant suitable date for convening a meeting of expert multi-disciplinary group for considering the suggestions of the Sub-group, regarding inclusion of Member (E&R), NCA as member of the expert committee.

Sub-group was further informed that so far about 30 studies have been completed and all other studies which were under progress would be completed by the end of December, 1994.

Regarding the scope of irrigated agro-forestry in SSP command, Govt. of Gujarat informed that Dr. Abrol has agreed to visit Gujarat in near future and that further action would be taken as per his advice.

Govt. of Rajasthan

Member (E&R), NCA informed that a meeting was convened on 28.11.94 at New Delhi for discussing the draft report on Environmental Impact Assessment (EIA) of command area in Rajasthan prepared by Water And Power Consultancy Services India Ltd. (WAPCOS). The WAPCOS has agreed to incorporate the corrections/ suggestions as made by NCA officials and also those which emerged out of the meeting before finalising the report.

iv) Survey of flora, fauna & carrying capacity studies

Narmada Sagar Project

Govt. of Madhya Pradesh

Sub-group was informed that the study report had suggested the creation of special protection areas and that actions have already been initiated for notification of one such area. It was suggested that the main findings of the study report may be circulated to the members in this as well as other cases for their consideration.

Sardar Sarovar Project

Govt. of Madhya Pradesh

Sub-group was informed that based on the final report of State Forest Research Institute, action plan is under preparation and that it would be possible to push up all the needed works within 4 - 5 months' time.

Govt. of Gujarat

Govt. of Gujarat informed that an expert deliberation on the findings of M.S. University report is to be arranged shortly for preparing the required action plan and that it will be possible to arrange a discussion in a workshop scheduled to be held during December, 1994.

Govt. of Maharashtra

Sub-group was informed that the discussion between Scientists of Department of Environmental Sciences, Pune University and officials of NCA and Govt. of Maharashtra are yet to be arranged. It was suggested that the discussions should be arranged as early as possible and reports should be finalised.

v) Archaeological & Anthropological Survey

ARCHAEOLOGY

Narmada Sagar Project

Govt. of Madhya Pradesh

Sub-group was informed that the State Deptt. of Archaeology and Museum have completed the survey for State protected monuments. Besides, Archaeology Survey of India (ASI), Govt. of India have completed survey of the villages for centrally protected monuments. It was further informed that joint inspection of the Joga Fort had been done. Though this monument is not coming under submergence, however, scouring effect of the water on this monument is being assessed.

Sardar Sarovar Project

Govt. of Madhya Pradesh

Sub-group was informed that the implementation of action plan has already been started. Documentation of the materials of archaeological significance has been takenup and an amount of Rs.20 lacs has been paid to Film Vikas Nigam for this purpose.

Govt. of Gujarat

Sub-group was informed that relocation of one temple namely Shoolpaneshwar has been completed and the idol has also been installed. The work related to Hamfeshwar temple was under progress and would be completed before the submergence.

Govt. of Maharashtra

No works were required to be done in Maharashtra in this regard.

ANTHROPOLOGY

Govt. of Madhya Pradesh

Sub-group was informed that the recommendations of the studies on the tribal families contained in the report 'Bhil Track' were being made use of in R&R of tribal families and that Anthropological Survey of India had been requested by NVDA to provide copies of their studies and publications. It was further informed by Govt. of Madhya Pradesh that the State Tribal Scheduled Caste Welfare Department of Madhya Pradesh had agreed and communicated their recommendations for amendments in the constitution that SC/ST families being resettled in Gujarat should enjoy the same benefits, privileges and rights what they were enjoying in Madhya Pradesh.

vi) Seismicity and Rim Stability of Reservoir

Narmada Sagar Project

Govt. of Madhya Pradesh

The Sub-group was informed that one micro-earthquake recorder had already been installed and the remaining 11 nos. would be installed by March, 1995.

Sardar Sarovar Project

Sub-group was informed that the final report of CWPRS was awaited. It was agreed that the copies of the interim report received by NVDA should be sent to NCA and other States.

vi) Health Aspect

Narmada Sagar Project & Sardar Sarovar Project

For adopting an integrated approach on health aspects, Dr. Rashmi Arora of ICMR suggested that officials from Central Health Services may be consulted. After detailed discussions, it was

agreed that State Govts. of Madhya Pradesh, Maharashtra and Gujarat should make a presentation on the health facilities proposed for SSP in their respective areas. It was also agreed that as far as practiceable for controlling the vectors an integrated approach was to be adopted involving both Biological as well as chemical measures. It was felt that some experts from Malaria Research Institute, Delhi and Scientists of Vector Control Research Institute at Bangalore, if considered necessary may be approached for this purpose. In this connection, it was felt that the suggestions made by ICMR for undertaking various studies for collecting various base line data should be implemented. GOM official informed that sufficient baseline data was available through a number of studies carried out during the last one decade. Sub-group then approved the establishing of infrastructural facilities as proposed in the plan prepared by the State Govts. and directed the State Govts. to go ahead with the establishment of these facilities.

As regard to the studies on surveillance and control in Maharashtra, it was suggested that Govt. of Maharashtra may consult the Specialist suggested by ICMR and that the State Govts. should make a presentation about the existing and projected health facilities in the Sardar Sarovar Project areas during the next meeting.

Govt. of Gujarat

Govt. of Gujarat informed that the action plan on health aspect shall be prepared by Govt. of Gujarat after receiving the report from SCHMS who were in touch with Malaria Research Centre, Delhi on malaria related diseases in SSP area.

Govt. of Madhya Pradesh informed that as no submergence was envisaged currently in Madhya Pradesh it was proposed to take up incremental health facilities by next year.

vii) Fisheries Development of SSP and NSP Reservoirs

Sub-group was informed that the proposal for formation of a high level expert group for laying down the guidelines on conservation aspects of SSP has been approved by NCA pending the formation of interstate fisheries development board. Member (E&R) of NVDA sought to include more representatives from the Madhya Pradesh side in the expert group. Member (E&R), NCA however, clarified that this Sub-group was not related with the interstate fisheries development board as the matter was pending before the NCA. This expert group is a purely scientific body constituted with the aim to lay down technical guidelines aimed at conservation and development point of view.

Govt. of Maharashtra

Govt. of Maharashtra requested the sub-group to approve the terms of reference for the studies proposed to be entrusted to CICFRI. After detailed discussions, it was suggested that the Govt. of Maharashtra might go ahead with the studies proposed to be entrusted to CICFRI with the rider that terms of reference of the studies were also required to be reviewed by the expert group constituted for the purpose. A meeting of this group was proposed to be convened shortly. It was further suggested that the plan of fisheries development as it related to the rehabilitation of the tribals, it might not be proper to charge it to the project as a component of environmental mitigation measure. It

was further agreed that whether or not this plan can be charged to rehabilitation need to be examined separately.

Govt. of Gujarat

Govt. of Gujarat informed that the fisheries plans was under the scrutiny of Department of Port and Fisheries, Govt. of Gujarat.

Govt. of Madhya Pradesh

Sub-group was informed that the action plan based on comprehensive water development plan prepared in 1984, as well as, on the recommendations of the basic review report of the CICFRI, Barrakpore was likely to be ready by the end of December, 1994.

Meeting ended with a vote of thanks to the chair.

ANNEXURES

ANNEX-XXIII.MIN.-1.

**LIST OF PARTICIPANTS ATTENDED THE 23RD MEETING OF
ENVIRONMENT SUB-GROUP OF NCA HELD ON 29.11.94 AT 1030 A.M.
AT PARYAVARAN BHAWAN, CGO COMPLEX, NEW DELHI.**

GOVERNMENT OF INDIA:

Ministry of Environment & Forests

1. Shri N.R. Krishnan, Secretary, Ministry of Env. & Forests, New Delhi. - CHAIRMAN
2. Shri N. Bagchi, Advisor, MOEF, New Delhi.
3. Dr. K.A. Kushalappa, CCF, Govt. of India, MOE&F, Bhopal.
4. Shri D. Misra, DIG. (FC), MOEF, New Delhi.
5. Dr. N. Bhat, Addl. Director, MOE&F, New Delhi.
6. Dr. S.C. Verma, Deputy Director, MOEF, New Delhi.

Ministry of Water Resources

1. Shri N. Suryanarayanan, Commissioner (PP), MOWR, New Delhi.

Narmada Control Authority

1. Shri S.A. Char, Executive Member, Indore.
2. Dr. A.K. Malhotra, Member (E&R), Indore.
3. Dr. Pawan Kumar, Specialist (Env.), Indore.
4. Dr. Afroz Ahmad, IAO & Director (R), Indore.

Sardar Sarovar Construction Advisory Committee

1. Shri N.V.V. Char, Secretary, SSCAC, Vadodara.

ICMR, New Delhi

1. Dr. (Mrs.) Rashmi Arora, Asstt. Director General, ICMR, New Delhi.

ICAR, New Delhi

1. Dr. R.N. Prasad, Asstt. Director General, ICAR, New Delhi.

ASI, New Delhi

1. Dr. B.L. Nagarch, Director, Archaeological Survey of India, New Delhi.

GOVERNMENT OF MADHYA PRADESH

1. Shri B.K. Verma, Member (E&F), NVDA, Bhopal
2. Mrs. D. Gurgava, Registering Officer, State Department of Archaeology & Museum, GOMP.

GOVERNMENT OF GUJARAT

1. Shri A. Prasad, Add. Chief Secretary (R&R), GOG.
2. Shri V.C. Trivedi, Specialist (Env.), SSNNL, GOG.

GOVERNMENT OF MAHARASHTRA

1. Shri T. Balaraman, Principal Secretary (Fisheries), GOM.
2. Shri Johny Joseph, Secretary (R&R), GOM, Bombay.
3. Shri J.Y. Patil, Director Soil Con. & Watershed Management, M.S. Pune, Maharashtra.
4. Dr. N.S. Wanere, Addl. Director (Health), GOM., Bombay.
5. Shri M.K. Jiwrajka, O.S.D., Govt. of Maharashtra.
6. Shri Ashwani Kumar, Dy. Secretary (R&R), GOM.

GOVERNMENT OF RAJASTHAN

1. Shri S.P. Mathur, Addl. Secretary, Environment Deptt., GOR, Jaipur,
2. Shri C.S. Ramasamy, Dy.C.F, Env.Department. GOR.

NON OFFICIAL MEMBERS

1. Dr. R.K. Katti, Director, UNECS, Bombay.
2. Dr. Shekhar Singh, Faculty Member, IIPA, New Delhi.

NATIONAL WASTELANDS DEVELOPMENT BOARDCentral/Centrally Sponsored Scheme for
Integrated Wastelands Development Projects

1. INTRODUCTION :

1.1 Land degradation has created a serious ecological and socio-economic crisis in the country. It has been estimated that about half the total land area of the country is suffering from some form of degradation. Such lands are referred to as 'wastelands'. The first attempt to tackle such degraded lands on a national scale was made in 1985 with the establishment of National Wastelands Development Board. However, during the Seventh Plan period, the strategy adopted for wastelands development has tended to be somewhat unidimensional, with emphasis on tree planting activities only.

1.2 A review of the work done so far has revealed certain limitations. To build on the experience gained during the Seventh Plan period and to remove the deficiencies that have been identified, the National Wastelands Development Board has restructured its programme and initiated it from 1989-90.

1.3 The main thrust of the restructured programme is, on one side, to develop integrated land use planning capability, and on the other, to take up specific activities aimed at conservation of ecologically fragile watersheds, regeneration of degraded forest areas, technology extension for reclamation and development of special problem lands, fuelwood and fodder production, etc. All this is to be attempted with people's participation and by involving the small/marginal farmers and the landless people. The Integrated Wastelands Development Projects Scheme provides the necessary framework for these purposes and specially on checking land degradation, restoration of ecological balance, production of biomass and using wastelands on a sustainable manner.

2. DESCRIPTION OF THE SCHEME :

2.1 The scheme envisages implementation of the Wastelands Development Programme by adopting an integrated approach to land management and wastelands development based on the village/watershed level plans prepared after taking into account land capability, site conditions and local needs. so as to promote optimum land use both for fulfillment of ecological and socio-economic needs. Under the scheme, project prepared should include and integrate different activities like afforestation, natural regeneration supplemented by management intervention wherever necessary on the degraded forests, conservation of selected ecologically fragile watersheds, extension of suitable technologies for special problem lands, rehabilitation of shifting cultivation areas through protection, afforestation, pasture development, soil and moisture conservation measures, etc. This would also necessitate integration of the funding resources, implementing agencies and various activities required to develop the different categories of wastelands in the project area. The implementation of the scheme shall be on the basis of micro-plans prepared in consultation with the local people. so that their needs are met and local people's participation

ensured at all stages of development and management through a properly devised mechanism of usufructs sharing and benefit distribution. The project so prepared should clearly spell out these aspects to ensure its proper implementation.

3. OBJECTIVES OF THE SCHEME :

3.1 The scheme aims at fulfillment of the following immediate and long-term objectives.

a) The immediate objectives are :-

- i) Augmenting the availability of wood and non-wood forest products, specially fuelwood and fodder.
- ii) Employment generation to the most needy sections of society, particularly those belonging to Scheduled Castes/ Scheduled Tribes and landless rural labourers.
- iii) Demonstration of micro-planning methodology for preparation of village level action plans and implementation of wastelands development programme.
- iv) Extension and dissemination of proven technologies in various categories of problem lands.
- v) Ensuring people's participation at all stages in the Wastelands Development Programme through various mechanisms intended to ensure equitable distribution of intermediate and final forest products.

b) The long-term objectives are :

- i) Checking land degradation.
- ii) Fulfillment of the broader objectives of sustainability, equity and environmental conservation for the general good of the people.

4. NATURE OF THE SCHEME :

4.1 This will be both Centrally Sponsored and Central Sector Scheme in as much as it would be open to implementation by agencies within the State Governments or outside. There would be two methods of providing Central assistance: The State Governments would be assisted on 100% grant basis through the Centrally Sponsored component of the Scheme for working principally on degraded forest lands and other degraded government lands, Autonomous Bodies, Corporations, Voluntary Agencies, Cooperative Societies and other registered institutions would be assisted with 100% grants under the Central sector component of the Scheme for working principally on community lands and private wastelands. As the programme would be based on area specific interactive planning, any particular project may well involve different categories of wastelands. However, scope is sought to be provided to adopt different techniques and mechanisms to implement the programme in the project area, depending upon the ownership of the land and the model adopted in each case. The projects taken up on degraded public lands, including degraded forest lands, will be focused on the

principal goals of the Wastelands Development Programme, i.e. checking land degradation, restoring ecological balance, increasing production of fuelwood and fodder in the rural areas, and, in any case, these projects will not sub-serve any commercial interest or purpose.

5. ELEMENTS OF THE SCHEME :

5.1 The scheme, which aims at integrating various activities with a view to preparing a plan of development keeping in view the local conditions at the micro-level, covers the following main elements :-

- i) Preparation of integrated wastelands development plan at the micro-level on watershed basis in the districts for which detailed wastelands maps have been prepared and on the basis of available thematic information in the other districts.
- ii) Conservation of selected ecologically fragile watersheds of the upper catchments and areas subject to shifting cultivation, through protection, afforestation, pasture land development including alpine pastures, soil and moisture conservation measures, etc. Catchments in the Himalayas will receive special attention.
- iii) Extension of technologies for special problem lands like saline/alkaline soils, ravines, arid and desert areas, mined areas, marshy and water-logged areas, the Aravallis, the Western Ghats, the Eastern Ghats, the Himalayas, shifting cultivation areas, etc.
- iv) Regeneration of degraded forest areas principally through natural regeneration and supplemented by afforestation, where necessary. Focus will be on raising diverse and indigenous species as well as on providing fuelwood, fodder, small timber, fruit and other minor forest produce, for the benefit of communities.
- v) Improvement of pasture conditions in the alpine pastures and grazing conditions along migration routes and in the lower ranges for winter graziers. Survey of factual position regarding migratory grazing, the condition of graziers, intensity of grazing, availability of alpine pastures, etc. shall be carried out in order to draw a plan for taking up ameliorative programme for tackling the problems of migratory graziers.

6. PROJECTS ACTIVITIES :

6.1 The major activities to be undertaken should include the following :-

- i) In-situ soil and moisture conservation measures like contour furrows, staggered trenches, mulching, box trenches, bench terracing, bunding, and vegetative

barriers, etc.

- ii) Soil and moisture conservation by adopting small scale engineering structures and vegetative measures like gully plugging, check dams, retaining and breast walls, toe walls, spurs and torrent control measures, small water harvesting structures etc.
- iii) Planting and sowing of multi-purpose trees, shrubs, grasses, and legumes, as well as fodder production and pasture land development including seed and seedling production.
- iv) Cultural operations like cutting back to encourage coppicing/pollarding, climber cutting, weed removal, etc to encourage natural regeneration.
- v) Promotion of agro-forestry and horticulture, sericulture, scientific animal husbandry etc., as appropriate.
- vi) Wood substitution and fuelwood conservation measures etc.
- vii) Measures needed to disseminate technology.

6.2 While projecting the requirements of funds for different activities including those listed above, it should be kept in view that requisite integration of funding resources is done as mentioned in para 2.1.

7. IMPLEMENTING AGENCIES :

7.1 Implementation of the Projects under this scheme could be taken up by the State Forest Department, Rural Development or any other connected department having expertise in the field of Wastelands Development. Autonomous bodies like Forests/Land Development Corporations, Research Institutes/Universities could also submit projects under the Scheme and implement them directly. Competent Voluntary Agencies and other registered institutions of the local people could also take up direct implementation of the project under the Scheme.

8. PROJECT APPROVAL

8.1 In the Government of India, the National Wastelands Development Board would sanction projects under the scheme in accordance with procedure laid down for the purpose.

9. IMPLEMENTATION MODALITIES

9.1 Projects under the scheme should be in accordance with the basic approach of the scheme as stated in para 2.1 above. In case of project prepared by autonomous bodies or voluntary agencies, such a plan will be prepared by them, but approved by the multi-disciplinary team if one exists in the district, or the DRDA in other cases.

9.2 Where the State Government is taking up project preparation and implementation, it is expected that, at the

district level, an appropriate mechanism would be created in the form of a multi-disciplinary team (including voluntary agencies where feasible) coordinated by the representative of the Department preparing the project. While the line department will assume administrative responsibility for the project and would be accountable for its execution and proper rendition of accounts under the Scheme, it is expected that the district-level multi-disciplinary team would be constituted into a Management Committee for the project and similar projects in the district, and would be headed by the Collector, The District Development Officer, Chief Executive Officer, Zila Parishad, or any other such Officer, that the State Government designates as the overall head of Development Administration in the District.

9.3 Projects prepared and submitted by Autonomous Bodies or Voluntary Agencies would be implemented by them but in consultation with the same District Level Management Committee mentioned in the preceding paragraph which is responsible for monitoring other such projects under the Scheme.

10. AREA AND LOCATIONS TO BE COVERED UNDER THE SCHEME :

10.1 Under the National Wastelands Identification Project, detailed wastelands maps showing the location, extent, and different categories of wastelands with reference to village and forest boundaries have been prepared in respect of 146 districts in 19 States of the country. In certain districts where the State Government or other project proposing agencies have adequate information on the availability of wastelands which could be taken up under the scheme, proposals from outside these 146 districts would also be considered. This is necessary also because there could be areas having certain special problems for historical reasons, where the size and degree of the problem justifies immediate action even though wasteland maps may not have been prepared in respect of such problem areas. The Scheme would, therefore, encompass all the States in the country with primacy being given to the 19 States and 146 districts for which wastelands maps have been prepared.

11. ACTIVITIES UNDER DIFFERENT ELEMENTS OF THE SCHEME :

11.1 Decentralised Planning : Under the decentralised planning component of the Scheme, in districts to be selected by the State Governments, multi-disciplinary teams under the Collector or the District Development Officer, or the Chief Executive Officer of Zila Parishad, etc. will be formed. The multi-disciplinary team will prepare integrated plans in collaboration with local scientific/technical institution and, after approval in NWDB, these plans would be implemented under the overall supervision of these teams which would constitute the District Level Management Committee for the purpose. The plans will specify the implementing agencies and will take into account funding likely to be available under various programmes for the purpose, including funds available under this Scheme.

11.2 Conservation of Selected Ecologically Fragile Watersheds : Under the component relating to conservation of selected ecologically fragile watersheds in the Himalayan catchments, the State Government concerned would prepare specific projects for assistance under the Scheme. Similarly,

non-government organisations can also submit proposals under this component to be implemented with the active involvement of the local people which could be given assistance under the Scheme.

11.3 Technology Extension for Problem Lands : Initially pilot projects would be taken up in selected States for reclamation of the under-mentioned categories of problem lands/areas :

- Saline/Alkaline
- Arid/Sandy/Coastal/Marshy water-logged.
- Mine Spoils
- Ravines
- Western/Eastern Ghats
- Aravallies
- Shifting cultivation

Projects under this component will be in collaboration with the scientific/technical institutions having necessary expertise in the field. The attempt should be to develop inexpensive but cost effective technologies for wastelands reclamation and to refine and extend these technologies through replication, on both public and private problem lands. Wherever suitable technology models have already been successfully demonstrated, the same could be replicated in similar problem lands / areas.

11.4 Regeneration of Degraded Forest Areas : Under the component relating to regeneration of degraded forest areas, projects would be prepared by the States Forest Department for natural regeneration or planting of diverse and indigenous species on degraded forest lands to meet the subsistence requirements of the local population living in and around these forest areas. As far as possible, preference should be given to natural regeneration along with the efforts needed to ensure protection and reduction of biotic pressure. In some of these areas, soil and moisture conservation, sowing of seeds of shrubs, grasses and legumes etc. may also be desirable so as to develop proper ground cover. In areas where natural regeneration is not feasible, management intervention through sowing of grasses, legumes, shrubs and trees, and where absolutely necessary, planting operations may be taken up so as to establish multi-tier vegetation of permanent nature.

11.5 Problem of Nomadic Graziers : The migratory shepherds and nomadic graziers in Himachal Pradesh, J&K and U.P. move to high alpine pastures during summer months and come to lower pastures during the winter months. Their migratory routes provide subsistence to their live-stock. By and large these groups suffer from poverty, illiteracy etc. There is absence of effective steps to improve the pastures, particularly along the migratory routes and in the alpine zones. The availability and condition of resources in the terminal pastures and along the migratory routes, as well as the pattern of live-stock holdings and species mix etc. have not been studied in depth so far. The scheme, therefore, aims at survey for evaluating the resource endowment of terminal pastures and

along migratory routes. This will be done through consultancy. Representative groups would be selected after preliminary investigations and their conditions, present requirements and need for pasture development on their routes, etc. would be studied in depth. Based on the findings of the study, specific measures for fertilising and seeding of alpine pastures and improvement of pasture lands along migratory routes should be undertaken and grazing regulated according to the carrying capacity of these pasture lands as far as possible.

In all operations, the cooperation of the local community needs to be clearly spelt out. Social fencing, with the community taking the responsibility for protection, in return for the exercise of rights and concessions etc., should form part of the project and the protection costs should reflect this accordingly.

12. UTILISATION OF USUFRUCTS :

- 12.1 The beneficiaries should be entitled to a share of usufructs to the extent and subject to the conditions prescribed by the State Government in this behalf. The Voluntary Agency/NGO should not be entitled to usufructory benefits. In providing the usufruct sharing. The Ministry of Environment & Forests circular No. 6-21/89-F.P. dt. 1st June, 1990 should be kept in view. A copy of the circular is attached as Annexure - I.
- 12.2 Access to forest land and usufructory benefits should be available only to those beneficiaries who get organised into a village institution, specifically for forest regeneration and protection. This could be the Panchayat or the Cooperative of the village, with no restriction on membership. It could also be a Village Forest Committee. In no case should any access or tree pattas be given to individuals.
- 12.3 The beneficiaries should be given usufructs like grasses, lops and tops of branches, and minor forest produce. If they successfully protect the forest, they may be given a portion of the proceeds from the sale of trees when they mature. (The Government of West Bengal has issued orders to give 25% of the sale proceeds to the Village Forest Protection Committees. Similar norms may be adopted by other States).
- 12.4 The benefit of people's participation should go to the village communities and not to commercial or other interests which may try to derive benefit in their names. The selection of beneficiaries should, therefore, be done from only those families which are willing to participate through their personal efforts.
- 12.5 The implementing agencies should in no case use the forest produce for any commercial purpose.

13. COST NORMS :

- 13.1 Most of the expenditure under the projects to be covered under different elements as mentioned in the preceding paras would be of a recurring nature. Such expenditure will

mainly be on staff, planting material. expenditure for involving scientific/technical institutions in preparing integrated plans and for technology extension on problem lands. The broad details under each category of elements are given below :

- i) Under the decentralised planning component, assistance to the State Government would be provided for framing the district level plans at the rate of about Rs. 1,00,000 lakh per 10,000 ha. of project area.
- ii) For conservation of the selected ecologically fragile upper catchments as in the Himalayas the expenditure is expected to be in the range of Rs. 7,500-10,000 per hectare of area to be treated by protection, afforestation, pasture and land development, soil and moisture conservation, etc.
- iii) For technology extension on problem lands, the financial assistance from the Central Government under the Scheme could be about Rs. 12,000 per hectare of the area to be covered.
- iv) For the regeneration of degraded forest areas, Central assistance would be provided to those projects which give primacy to natural regeneration. The expenditure will be restricted to about Rs. 8,000 per hectare in case of planting and Rs. 3000-4000 per hectare in case of natural regeneration.

14. OUTLAY DISTRIBUTION :

14.1 The distribution of outlays for different components may conform to the following pattern :-

- | | |
|---|---------|
| - Works | - 80% @ |
| - Staff/Establishment, contingencies, Equipment, Vehicles, Small field structures etc | - 20% |

@ Expenditure on engineering methods of soil & moisture conservation should not exceed 20% of the work component. Cost-effective, vegetative methods of soil & water conservation should be preferred to engineering methods.

14.2 As indicated in the preceding paragraphs, Central assistance under the scheme will be provided fully under all the components to the State Governments and Autonomous Bodies/Corporations/Voluntary Agencies for the projects which they may submit to the NWDB. No loan component is involved in the scheme.

14.3 Staffing : Details of the staff to be appointed by the States/Union Territories for implementation of the scheme will be worked out by them according to project requirements as per the prevailing norms in each State/U.T.

14.4 Construction Works : No major construction works are

permissible under the scheme. However, small field structures could be constructed in inaccessible and difficult areas.

14.5 Stores, Equipment and Vehicles : The State/UT Government will use the existing stores/equipment and new purchases on this account will be admissible to the extent of 3% of the total project cost under the scheme.

15. SCHEDULE OF PROGRAMME AND OUTLAYS :

15.1 An outlay of Rs. 230 crores for VIII Plan, Rs. 23.84 crores and Rs. 45 crores for the years 1990-91 and 1991-92 respectively have been approved by the Planning Commission under the Integrated Wastelands Development Projects Scheme. The year-wise details of physical and financial targets under the scheme are given in the table below :-

Year	Financial Outlay (Rs. in lakhs)			Physical Targets (area in lakh ha.)
	CS	CSS	Total	
1990-91	264	2100	2384	0.42
1991-92	700	3800	4500	0.62
1992-93	800	4200	5000	0.68
1993-94	1000	4500	5500	0.75
1994-95	1016	4600	5616	0.78
	3800	19,200	23,000	3.25

* Actual Release is Rs. 2554.00 Lakhs.

15.2 The benefits likely to accrue by implementing the Scheme are given as under :-

1) An area of 3.25 lakh ha. shall be covered during the VIII Plan period in incurring an expenditure of Rs. 230 crores. About 64 million mandays shall be generated over a period of 5 years. Considering that approximately 70% of the outlays provided for works components shall be utilised as wages, the majority of beneficiaries will be in the category of Scheduled Castes / Scheduled Tribes and landless labourers living in the rural areas.

2) An area of 1.02 lakh ha. shall be treated in the Himalaya Region, Aravallis, Western Ghats, etc. with a view to protect ecologically fragile areas from getting further deteriorated.

3) 2.23 lakh ha. of degraded forest area shall be improved by natural regeneration and management intervention.

4) 100 projects shall be taken up for Technology Extension to demonstrate the proven technologies on the problem lands of the country.

5) Interactive micro-planning methodology is likely to be demonstrated and taken up systematically for preparing village level action plans for implementation of wastelands development programme in future. Such exercise are being initiated in a large number of districts in the country.

6) The plantation created during the VIII Plan period under this scheme will produce about 3.25 million tonnes of fuelwood on a conservative estimate of 10 tonnes per ha. in the average rotation of 10 years. In addition, grass and green leaf fodder shall become available from the very first year of implementation of the project. Grass and green leaf fodder production will gradually increase and become available continuously as long as the area is properly protected and managed

7) The project implementation will lead to fulfilment of the broader objectives of sustainability, equity and environmental conservation for the general good of the people of the project area.

Annexure - I

GOVERNMENT RESOLUTION REGARDING INVOLVEMENT OF COMMUNITIES
AND VOLUNTARY AGENCIES IN REGENERATION OF DEGRADED FOREST LANDS

No. 6-21/89-F.P.
Government of India
Ministry of Environment and Forests
Department of Environment, Forests and Wildlife
Paryavaran Bhavan, CGO Complex, B Block
Lodi Road, New Delhi
1 June 1990

To

The Forest Secretaries (All States/UTs)

Subject : Involvement of village communities and voluntary agencies for regeneration of degraded forest lands

Sir,

The National Forest Policy 1988 envisages people's involvement in the development and protection of forests. The requirements of fuelwood, fodder and small timber such as house-building material of the tribals and other villagers living in and near the forests, are to be treated as first charge on forest produce. The policy document envisages it as one of the essentials of forest management that the forest communities should be motivated to identify themselves with the development and protection of forests from which they derive benefits.

In a D.O. letter No. 1/1/88-TMA dated 13 January 1989 to the Chief Secretary of your State, the need for working out the modalities for giving to the village communities, living close to the forest land, usufructory benefits to ensure their participation in the afforestation programme, was emphasized by Shri K.P. Geethakrishnan, the then Secretary (Environment and Forests).

Committed voluntary agencies and NGOs, with proven track record, may prove particularly well suited for motivating and organising village communities for protection, afforestation and development of degraded forest land, especially in the vicinity of habitations. The State Forest Department/Social Forestry Organisations ought to take full advantage of their expertise and experience in this respect for building up meaningful people's participation in protection and development of degraded forest lands. The voluntary agencies/NGOs may be associated as interface between State Forest Departments and the local village communities for revival, restoration and development of degraded forests in the manner suggested below :

- (i) The programme should be implemented under an arrangement between the Voluntary Agency/NGO, the village community (beneficiaries) and the State Forest Department.

- (ii) No ownership or lease rights over the forest land should be given to the beneficiaries or to the Voluntary Agency/NGO. Nor should the forest land be assigned in contravention of the provisions contained in the Forest (Conservation) Act, 1980.
- (iii) The beneficiaries should be entitled to a share in usufructs to the extent and subject to the conditions prescribed by the State Government in this behalf. The Voluntary Agency/NGO should not be entitled to usufructory benefits.
- (iv) Access to forest land and usufructory benefits should be only to the beneficiaries who get organised into a village institution, specifically for forest regeneration and protection. This could be the Panchayat or the Cooperative of the village, with no restriction on membership. It could also be a Village Forest Committee. In no case should any access or tree patta be given to individuals.
- (v) The beneficiaries should be given usufructs like grasses, lops and tops of branches, and minor forest produce. If they successfully protect the forests, they may be given a portion of the proceeds from the sale of trees when they mature. (The Government of West Bengal has issued orders to give 25% of the sale proceeds to the Village Forest Protection Committees. Similar norms may be adopted by other States).
- (vi) Areas to be selected for the programme should be free from the claims (including existing rights, privileges, concessions) of any person who is not a beneficiary under the scheme. Alternatively, for a given site the selection of beneficiaries should be done in such a way that any one who has a claim to any forest produce from the selected site is not left out without being given full opportunity of joining.
- (vii) The selected site should be worked in accordance with a Working Scheme, duly approved by the State Government. Such scheme may remain in operation for a period of 10 years and revised/renewed after that. The Working Scheme should be prepared in consultation with the beneficiaries. Apart from protection of the site, the said Scheme may prescribe requisite operations, e.g. inducement to natural regeneration of existing root stock, seeding, gap filling, and wherever necessary, intensive planting, soil-moisture conservation measures etc. The Working Scheme should also prescribe other operations e.g. fire-protection, maintenance of boundaries, weeding, tending, cleaning, thinning etc.
- (viii) For raising nurseries, preparing land for planting and protecting the trees after planting, the beneficiaries should be paid by the Forest Department from the funds under the social forestry programme. However, the

village community may obtain funds from other Government agencies and sources for undertaking these activities.

- (ix) It should be ensured that there is no grazing at all in the forest land protected by the village community. Permission to cut and carry grass free of cost should be given so that stall feeding is promoted.
- (x) No agriculture should be permitted on the forest land.
- (xi) Along with trees for fuel, fodder and timber, the village community may be permitted to plant such fruit trees as would fit in with the overall scheme of afforestation, such as aonla, imli, mango, mahuaa etc. as well as shrubs, legumes and grasses which would meet local needs, help soil and water conservation, and enrich the degraded soils/land. Even indigenous medicinal plants may be grown according to the requirement and preference of beneficiaries.
- (xii) Cutting of trees should not be permitted before they are ripe for harvesting. The forest department also should not cut the trees on the forest land being protected by the village communities except in the manner prescribed in the Working Scheme. In case of emergency needs, the village communities should be taken into confidence.
- (xiii) The benefit of people's participation should go to the village communities and not to commercial or other interests which may try to derive benefit in their names. The selection of beneficiaries should, therefore, be done from only those families which are willing to participate through their personal efforts.
- (xiv) The Forest Department should closely supervise the work. If the beneficiaries and/or the Voluntary Agency/NGO fail or neglect to protect the area from grazing, encroachment or do not perform the operations prescribed in the Working Scheme in a satisfactory manner, the usufructory benefits should be withdrawn without paying compensation to anyone for any work that might have been done prior to it. Suitable provisions in the Memorandum of Understanding (MOU) for this purpose should be incorporated.

Yours faithfully,

Mahesh Prasad
Secretary to the Govt. of India

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नर्मदा नियंत्रण प्राधिकरण
NARMADA CONTROL AUTHORITY

पर्यावरण उपदल
Environment Sub-Group

चौबीसवीं बैठक की कार्यसूची
Agenda for Twenty Fourth Meeting

स्थान : पर्यावरण भवन, नई दिल्ली
Venue : Paryavaran Bhawan
New Delhi

तारीख 10 मार्च, 1995 3 बजे,
Date : 10 th March, 1995, 3.00 P.M.

इन्दौर
फरवरी, 1995
INDORE
February, 1995

AGENDA FOR 24TH MEETING OF THE ENVIRONMENT SUB-GROUP NCA
TO BE HELD ON 10TH MARCH, 1995, AT PARYAVARAN BHAWAN, NEW DELHI.

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Item No. XXIV-1(119): CONFIRMATION OF MINUTES OF THE 23RD
MEETING.

Minutes of the 23rd meeting of Environment Sub-Group of Narmada Control Authority were circulated to all Members and invitees vide letter No.Env-34(24)/95/394-420 dated 16th February, 1995.

No comments have been received so far.

The minutes are put up for confirmation.

Item No. XXIV-2(120): REVIEW OF ACTION TAKEN ON THE DECISIONS OF THE PREVIOUS MEETINGS.

1. Submission of Catchment Area Treatment (CAT) plans for freely draining critically degraded sub-watersheds (Item No. XXI-2(112) (1)).

I Govt. of Madhya Pradesh (GOMP) and Maharashtra were directed to recast their plan keeping in view the guidelines for the schemes of Ecodevelopment Board & River Valley projects, progress in this regard may please be reported. Treatment maps for balance of the critically degraded subwatersheds for both Narmada Sagar and Sardar Sarovar are yet awaited.

Govt. of Gujarat is going ahead with the treatment of entire catchment within the state of Gujarat. The treatment works are nearing completion.

During the 23rd meeting it was agreed by GOG that a presentation by Central Soil Water Conservation Research Institute (CSWCRI) on the works being done by them in SSP areas of Gujarat State shall be arranged during the 24th meeting. Progress on this aspect may be reported. by Govt

GOMP was also directed to associate the Central Soil and Water Conservation and Research Institute, Dehradun (CSWCRI) for measuring the silt load during pre and post treatment phases of the catchment area treatment works in M.P. areas. GOMP had reported that Vadodara centre of CSWCRI was being approached. Further progress may be reported.

2. Cost Estimates for preparation of Action plan and implementation of Environment safeguard measures (Item No. XXI-2(112) (2)).

II During the earlier meetings of the Environment Sub-Group it was desired that the detailed cost (estimates and expenditures) on studies and implementation of mitigation measures for suggested environmental safeguards should be presented. The information available in the office of the NCA is presented in Annex-XXIV-I for information and consideration of the members.

Govt. of Gujarat agreed for revising cost estimates of Command Area Development works and for presenting the same during 24th meeting. Progress may be reported.

3. Environmental Impact of Closure of Construction Sluices.

III During the last meeting of Environment Sub-Group members were informed that the process of ratification of the closure of sluices has been set in motion and MOE&F had constituting a committee of officials for undertaking field visit for this purpose. This committee was to visit the areas for submission of report within a month's time. Progress may be reported by MOE&F.

As directed during the last meeting State Govts may like to present a clear picture to bring out status of implementation of environmental safeguard measures in relation to construction works of SSP & NSP with the help of slides & maps.

Present position of construction of Sardar Sarovar Dam : As approved in the 55th meeting of SSCAC, the Spillway Blocks 30 to 43 have been raised up to 80.3 meters. The position of the constructed profile including the Spillway Blocks as of now is indicated in the plan enclosed at Annex-XXIV-1.b.

Item No. XXIV-3(121): PRESENT STATUS OF STUDIES SURVEYS AND ENVIRONMENTAL ACTION PLANS.

IV A copy of the status report for the quarter ending December, 1994 is enclosed and placed at Annex-XXIV-II.

The present status of studies surveys and action plans in brief is presented below for a review by the Sub-Group.

1) PHASED CATCHMENT AREA TREATMENT

Narmada Sagar Project

Govt. of Madhya Pradesh

An area of 28987 ha had been treated up by the end of January, 1995. NVDA was to report the survival rate of plantation & the extent of progress during the year 1994-95. A copy of map for the areas under treatment is still awaited.

Sardar Sarovar Project

A copy of the map showing the subwatersheds where treatment works are under progress is placed at Annex-XXIV-III.

Govt. of Madhya Pradesh

Govt. of Madhya Pradesh had planned to treat 125725 ha area, out of which an area of 21356 ha has been treated up by 31st January, 1995. Further progress, if any, may be reported.

Govt. of Gujarat

Govt. of Gujarat had taken up the entire catchment area upstream of the Sardar Sarovar Project in Gujarat for treatment.

By the end of January, 1995 an area of 28914 ha has been treated up.

Govt. of Maharashtra

As per the plan submitted by Govt. of Maharashtra non forest area of 4360 ha was proposed to be treated by the end of 94-95. Out of this till the end of October, 1994, works over 1573 ha area were completed. The progress of work on the remaining non forest area may be reported.

In addition GOM had planned to treat 20,000 ha of forest areas. By the end of October, 1994 works in an area of 960 ha had been completed. During 1994-95 an additional area of 13014 ha was tackled. Besides, PPO works were completed over an area of 6500 ha.

GOM may like to submit the completion report of CAT works finished so far.

11) COMPENSATORY AFFORESTATION

Narmada Sagar Project

Government of Madhya Pradesh

Compensatory afforestation over an area of 60633 ha was reported to have been completed by the end of December, 1994. Further progress may be reported by NVDA.

Sardar Sarovar Project

A location map showing compensatory afforestation sites in three states is enclosed at Annex-XXIV-IV. However states should submit a detailed map urgently.

Govt. of Madhya Pradesh

Govt. of Madhya Pradesh by the end of January, 1995, had completed plantation works over an area of 8165 ha against the final target of 8740 ha.

Govt. of Gujarat

Govt. of Gujarat had completed plantation works in the entire planned area of 13950 (including non forest and degraded forest areas) by the end of September, 1994.

Govt. of Maharashtra

Out of total target of 19460 ha planned for treatment in lieu of the areas undergoing submergence, an area of 16380 ha had been planted up by the end of August, 1994. However detailed location map of some of the districts where compensatory afforestation works are progressing is yet awaited.

iii) COMMAND AREA DEVELOPMENT

Narmada Sagar Project

Status of preparation of comprehensive environmental impact assessment report on command area development with integrated development plan including drainage aspect for NSF was to be entrusted to Agricultural Finance Corporation, Bhopal. Progress may be reported.

Regarding studies on effect of pesticides insecticides in the command area being conducted by J.L.N. Agricultural University, Jabalpur, further progress may be reported by NVDA.

Sardar Sarovar Project

Govt. of Gujarat

Following the concern expressed by Chairman, Environment Sub-group during its 15th meeting held on 25th February, 1992, SSNNL constituted High Level Steering Committee (HLSC) for SSP in Gujarat alongwith 4 Expert Multi Disciplinary Groups for the sanctuaries in the command. The HLSC included senior officers of SSNNL/State Govt./ MOEF, GOI and experts. Terms of References for the Expert Multi Disciplinary Groups & for other studies were circulated during the 16th meeting. Considering that the sub-group was ignorant of the deliberations of these committees, inclusion of Member (E&R) of NCA in the committees was recommended.

GOG may like to report regarding latest deliberations of the Experts Multi Disciplinary Group and inclusion of Member (E&R) in the committee.

Copies of the other reports completed in the last two years were also required to be submitted to NCA and MOE&F.

On the issue of irrigated Agro forestry in SSP it was agreed by NPG to consult Dr. Abrol. Developments in the regard are to be reported by NPG.

Govt. of Rajasthan

Draft report on the studies conducted by WAPCOS on environmental impact assessment was submitted. NCA officer had offered comments on this draft report. To discuss various issues before finalisation of report, a meeting has been arranged between officers of WAPCOS, NCA and the State Government at Jodhpur. The outcome shall be reported during the meeting.

iv) SURVEY OF FLORA, FAUNA & CARRYING CAPACITY STUDIESNarmada Sagar Project

Govt. of Madhya Pradesh

Flora & Fauna studies for Narmada Sagar Project areas have been carried out by two agencies viz., Friends of Nature Society, Bhopal and Wildlife Institute of India, Dehradun. Both of these agencies have submitted their final reports. NVDA was to circulate main findings of the report to the members.

Various action plans, based on the recommendations of these study reports were required to be made. Besides NVDA may like to report on the various steps taken for the creation of special protection areas.

Sardar Sarovar Project**Govt. of Madhya Pradesh**

Final report of the Impact Assessment studies in the areas undergoing submergence in Madhya Pradesh completed by State Forest Research Institute, Jabalpur has been made available to MOEF and NCA. Comments given by NCA office are enclosed at Annex-XXIV-V. NVDA has to submit action plan soon. Further progress in this regard may be reported.

Govt. of Gujarat

Govt. of Gujarat may like to inform about further progress on the implementation aspect of various recommendations made in the report of M.S. University, Vadodara submitted in July, 1992.

Govt. of Maharashtra

The interim report of studies on flora and fauna in and around the SSP in the areas in Maharashtra State was prepared by School of Environmental Science, Pune. Some suggestions were made by NCA officers for improving the report. Discussions between Member (E&R), NCA with the Scientists of Pune University in the presence of Secretary (Env.), GOM were held on 7th & 8th February, 1995. Based on the rediscussions University Scientists are expected to finalise the report soon. A copy of the summary of progress of the studies completed by School of Environmental Science, Pune is enclosed at Annex-XXIV-VI. GOM have to ensure that the final report meets the requirements as outlined in the TOR.

v) ARCHAEOLOGICAL & ANTHROPOLOGICAL SURVEY**ARCHAEOLOGY:****Narmada Sagar Project****Govt. of Madhya Pradesh**

During the last meeting, sub-group was informed that the State Department of Archaeology and Museum and the Archaeological Survey of India, have completed survey of the villages coming under submergence.

The action plan for relocation of the monuments affected by Omkareshwar and Maheshwar Projects was prepared by Archaeological Survey of India for which an amount of Rs.87 lakhs was approved by NVDA. Allotment of requisite land at new relocation site was under consideration of the State Revenue Department. During the earlier meetings it was stated that north bastion of Joga Fort, Hoshangabad may be adversely affected due to scouring action of the water. Joint inspection for this monument was to be undertaken to assess the impact of impoundment on the monuments. NVDA may like to report the progress in this regard.

Sardar Sarovar Project

Govt. of Madhya Pradesh

NVDA may like to indicate progress of implementation of the action plan prepared by the Department of Archaeology and Museum, Madhya Pradesh for protection/relocation and excavation works.

Govt. of Gujarat

Govt. of Gujarat may like to report the progress regarding further works undertaken by it for development of Shoolpaneshwar temple. Progress is also required to be reported on developments related to protection of Hamfeshwar temple. Action plan for relocation of Hamfeshwar temple is yet awaited.

Govt. of Maharashtra

No works are required to be done in Maharashtra in this regard.

ANTHROPOLOGY:

Sardar Sarovar & Narmada Sagar Projects

Govt. of Madhya Pradesh

NVDA was to initiate action on to need to get amendment of the constitution regarding the inclusion of SC & ST being resettled in Gujarat in the list. Action taken may be reported.

Besides NVDA was to report on procurement of the publication related to Tribal of Narmada from ASI, progress be reported.

vi) SEISMICITY AND RIM STABILITY OF RESERVOIR

Narmada Sagar Project

Govt. of Madhya Pradesh

The Sub-group was informed that on the advise of the Dam Review Panel, CW&PRS, Pune, I.M.D. etc the NVDA had decided to establish a network of 10 seismic stations along the periphery of NSP complex to record and collect pre and post impoundment seismic data. Orders for supply of 6 Nos photographic recorders and 12 Nos wood Anderson Seismographs had already been placed.

Meanwhile, CW&PRS, Pune have agreed to undertake seismic studies of Narmada Sagar, Omkareshwar and Maheshwar projects by installing (a) Analogue Micro Earthquake Recorders and (b) one strong motion acclerograph for a period of two years. One Micro Earthquake recorder had already been installed by them at Narmada Sagar on 16.12.93. Order for supply of balance 11 nos. of instruments was also placed. Further progress may be reported by NVDA.

Sardar Sarovar Project

GSI had completed the survey and submitted its final report on rim stability analysis for the areas in Maharashtra and Madhya Pradesh in 1993. The survey for the rim stability analysis in Gujarat was completed much earlier by Jaipur branch of the GSI. In order to confirm the findings of the GSI, NVDA had entrusted some more time bound studies to CW&PRS, Pune at an estimated cost of Rs.12.55 lakhs. The CW&PRS had submitted an interim report. This report is yet awaited in NCA.

vi) HEALTH ASPECT

Narmada Sagar Project & Sardar Sarovar Project

Government of Madhya Pradesh

Action taken by GOMP for providing the facilities as proposed in the health plan may be reported.

Sardar Sarovar Project

Govt. of Gujarat

GOG may like to submit its revised health plan.

Govt. of Maharashtra

GOM may like to report progress on creation of infrastructure and other facilities as proposed in the plan. GOM may also to report on the surveillance & control studies in Maharashtra, in consultation with the experts suggested by ICMR.

During the last meeting representatives of all the three states Govts. were directed for adopting integrated approach of vector control & were requested for making a presentation on the health facilities proposed for SSP areas.

viii) FISHERIES DEVELOPMENT OF SSP AND NSP RESERVOIRS

To speed up the work on conservation and development of the fish resources in the reservoir, sub-group recommended the formation of a group of experts. The proposal for formation of a high level expert group was approved by NCA with inclusion of one more expert member to be nominated by GOMP. A meeting of this expert group is to be conveyed shortly.

Govt. of Gujarat

GOG submitted a copy of the Environmental Protection plan - Fisheries sector, to NCA, during Jan'95. This plan was examined and certain suggestions were made by NCA officers. A copy of the plan alongwith suggestions offered are placed below at Annex-XXIV-VII.

to be kept
A copy of the EIA report on Inland & Marine Fisheries relevant to command area of SSP was made available. This report was examined in NCA & certain suggestions were given. A copy of the suggestions given is placed at Annex-XXIV-VIII.

Govt. of Madhya Pradesh

Final report
Final report on liminological aspect by Barkatullah University, Bhopal was submitted by NVDA. Comments offered by NCA office are annexed at Annex-XXIV-IX. NVDA was to revise the action plan prepared earlier during 1984. Progress may be reported.

Govt. of Maharashtra

The plan submitted by GOM as it related to R&R of Taloda works was to be scrutinised in the light of R&R requirement of the PAP's. GOM may like to report further development.

Regarding ecological studies proposed to be entrusted to CICFRI by GOM it was agreed during the 23rd meeting that the need for undertaking such studies was to be scrutinised by the expert group on fisheries const-ituted by NCA before actually entrusting the work. Chairman of the expert group has been approached by NCA to convene the 1st meeting of the expert group.

Item No. XXIV-4(122): ANY OTHER ITEM:

DATE & VENUE OF THE NEXT MEETING

ANNEXURES

ANNEX-XXIV-1-a.

ENVIRONMENTAL COST OF SSP**RELATED TO UNIT I & II DAM & POWER HOUSE 1****A) Expenditure by project authorities:****i) Cost of Survey & Studies (in lacs.)**

S.No.	Component	<u>Estimate/Actual Expenditure</u>				Total
		GOG	GOM	GOMP	NCA	
1.	Compensatory Afforestation	<u>4.52</u> 4.52	<u>5.29</u> 5.29	<u>2.4375</u> 2.4375	-	<u>12.2475</u> 12.2475
2.	Catchment Area Treatment.	<u>8.77</u> 8.77	<u>7.00</u> 7.00	<u>3.28</u> 2.80	-	<u>19.05</u> 18.57
3.	Flora & Fauna	<u>52.2</u> 38.3	<u>38</u> 16	<u>20.334</u> 16.586	<u>15.27</u> 15.27	<u>127.804</u> 86.156
4.	Health	<u>2.5</u> 2.5	NA	<u>29.627</u> 24.162	-	<u>32.127</u> 26.662
5.	Archaeology/Anthropology.	<u>1.3</u> 0.40	NA	<u>59</u> 36.33	-	<u>60.3</u> 36.73
6.	Seismicity & Rim Stability.	-	NA	<u>23.00</u> 12.50	<u>1.98</u> 1.98	<u>24.98</u> 14.53
						<u>276.5085</u> 195.8955

ii) Cost of Implementation (in lacs)

1.	Compensatory Afforestation.	<u>1809.10</u> 1298.48	<u>2116</u> 1650.27	<u>1800.000</u> 749.140	<u>5725.1</u> 3497.89
2.	Catchment Area Treatment.	<u>3509</u> 1826.48	<u>2894.67</u> 409.61	<u>8835.05</u> 1047.63	<u>15238.72</u> 3283.73
3.	Flora & Fauna including Shoolpaneshwar	<u>75.31</u> 64.42	NA	<u>NA</u> NIL	<u>75.31</u> 64.42
4.	Health (incremental expenditure) for 10 yrs.	<u>3800.0</u> 101	<u>93.16</u> -	<u>1354.63</u> 515.225	<u>5247.79</u> 616.225
5.	Archaeology/Anthropology.	<u>156.00</u> 29		<u>700</u> NIL	<u>856</u> 29
6.	Seismicity & Rim Stability.	<u>129</u> 271	-		<u>129</u> 271

Total:

27196.61 = 28.30%
7697.845

* In addition several State/Central agencies have also incurred expenditure on various Environmental studies & implementation aspects. Full details are not yet available.

NA : Not available.

1.a



STATUS REPORT
SARDAR SAROVAR PROJECT (SSP) ENVIRONMENTAL ASPECTS
DECEMBER - 1994

The action plans and status of studies and implementation of Environmental Safeguard Measures upto quarter ending December, 1994 is as indicated below:

Environmental Safeguard Studies/Measures

- 1) Phased Catchment Area Treatment.
- 2) Compensatory Afforestation.
- 3) Command Area Development.
- 4) Flora, Fauna & Carrying Capacity.
- 5) Seismicity.
- 6) Health Aspects.
- 7) Archaeological & Anthropological, Studies.
- 8) Fisheries.
- 9) Rim Stability Analysis.

1. 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.

GOI issued a Directive in June 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 and Land Use Survey (AISLUS). 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 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 SSP catchment.

- 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.

1- DIRECTLY DRAINING SUB-WATERSHEDS:

Table 1.1 The total catchment area of SSP below NSP is 2442440 ha.

	GOMP	GOG	GQM	Total for the Basin
Total Catchment	2248600	30230	163610	2442440 ha
Very High & High	546702**	30230	116355	688410
Directly draining Very High & High	121330***	29537	28226*	175565
Areas directly damaged by project activities.	-	500	-	500
Planned to treat	125725	30230	22768	178723

* The total area of directly draining sub-watersheds, as per AIS&LUSO figures is 31400 ha.

** However according to AIS&LUSO, Total area under high & very high priority categoring below NSP in M.P. is 541825 ha.

*** According to the data available in NCA office the total area of directly draining subwatersheds in M.P. is 1,14,606 ha.

Table 1.2 Summary of Status of CAT Planning

	GOG	GQM	GOMP
Preliminary Surveys	1		
Prioritisation of sub-watersheds	1		
Development of Management Options	1	"Complete for all item in all States."	
Annual Action Plan	1		
Effective monitoring	1		
Phased Programme	1		

Table 1.3 Principal Elements of Action Plans for CAT

Elements of Action Plans	GOG	GOM	GOMP
Survey work	} "Complete" for all item : & all States.		
Preparation of detailed map			
Micro-watershed development map	Complete	Complete	Complete
Assignment of responsibility for conducting the work	} : : "Yes" for all item for : all States		
Timetable			
Budget			
Menu of treatment			
Proposals for monitoring			

Table 1.4 Implementation of CAT

	Gujarat	Maharashtra	Madhya Pradesh			
	Area to be treated in ha. (Area in brackets indicate actual progress)					
	Forest	Non-Forest	Forest	Non-Forest	Forest	Non-Forest
<u>Monsoon year</u>						
1990-91	<u>4528</u> (4528)	<u>898</u> (898)	-	-	-	-
1991-92	<u>4770</u> (4770)	<u>230</u> (230)	-	-	-	-
1992-93	<u>6013</u> (6013)	<u>336</u> 336	-	-	-	<u>8800</u> (8800)
1993-94	<u>6000</u> (6000)	<u>225</u> (276)	<u>960</u> (960)	-	<u>966</u> (966)	<u>6246</u> (6246)
1994-95	<u>5893</u> 5730	<u>668</u> 116	<u>6347</u> 6420 6570	<u>2768</u> 1093 ¹⁹⁸⁰	<u>17000</u> 4268 4772	<u>20000</u> 594
1995-96	-	668	<u>6347</u> 6650 14127 ¹⁹⁸⁰	-	18000	20000
1996-97	-	-	6346	-	15964	18749
TOTAL:	<u>27204</u> <u>27049</u>	<u>3025</u> 1856	<u>20000</u> (7380)**	<u>2768</u> (1093)	<u>51930</u> * (5234)	<u>73795</u> 16640

- * Out of 51930 ha. area, an area of 13930 ha is fully stocked where minor soil engineering works will only be carried out w.e.f. 1994-95 @ 4000 in (1994-95), 5000 (95-96) & Balance in 96-97.
- ** In addition 6500 ha. area was tackled by PPO works during 1994-95.

	<u>Gujarat</u>	<u>Maharashtra</u>	<u>Madhya Pradesh</u>
Implementation	Complete work scheduled to finish 1995-96	work recently commenced scheduled to finish 1997.	Completed work scheduled to finish 1997.

11. FREELY DRAINING SUBWATERSHEDS: (Excluding directly draining Subwatersheds).

Table 1.5 Summary of Status of CAT Planning:

	<u>GOMP</u>	<u>GOM</u>	<u>GOG</u>
Preliminary Survey	Yes	Yes	
Prioritization of Sub-watersheds	Yes	Yes	Already Under implementation.
Development of Management options monitoring	Yes	Yes	
Phased programme	Yes	Yes	

Table 1.6 Principal Elements of Action Plan for CAT:

	<u>GOMP</u>	<u>GOM</u>	<u>GOG</u>
Survey work	Yes	Yes	
Preparation of development map	Yes	Yes	Already under implementation.
Micro watershed map	Awaited	awaited	
Work responsibility	Yes	Yes	
Menu of treatment	Yes	Yes	
Time Table	Yes	Yes	

Proposal for monitoring	Yes	Yes
Budget	Yes	Yes
Availability of funds	*	*

* Agreed by Planning Commission for inclusion in River Valley Project" Scheme and funds are also promised by MOE&F from National Waste Land Development Board.

A. Govt. of Madhya Pradesh:

Table 1.7 Total Area of freely draining critically degraded sub-watersheds below NSP is 54,6702 ha.

	Phase I Area (Directly draining)	Phase-II (Balance Area)	Total Area
SSP	121330	356484	477814
Jobat	-	-	28211
Man	-	-	12720
Maheshwar	-	-	13209
Omkareshwar	-	-	14748
			546702 *

* According to AISLUSO, this area is 541825 ha. The plan submitted by NVDA is under scrutiny in NCA.

Table 1.8

PHASE - II (356484 ha.)			
<u>Forest Area</u>		<u>Non Forest Area</u>	
Gross Area	Net Working Area	Gross Area	Net working Area
1,11,479	78,368	2,66,388	2,39,750

Table 1.9 Shedule of Implementation (Madhya Pradesh):(318118 ha)

Year	Forest Area	Non Forest Area
	Phy. (ha.)	Phy.in ha
1997-98	8000	15750
1998-99	8000	16000
1999-2000	8000	16000
2000-01	8000	16000
2001-02	8000	16000
2002-03	8000	16000
2003-04	8000	16000

2004-05	8000	16000
2005-06	8000	16000
2006-07	6368	16000
2007-08	-	16000
2008-09	-	16000
2009-10	-	16000
2010-11	-	16000
2011-12	-	16000
	-----	-----
	78,368	2,39,750

B. Govt. of Maharashtra:

PHASE-II

Table 1.10 Schedule of Implementation of freely draining Sub-watersheds.

Year	<u>Forest Area</u> Phy. in ha.	<u>Non Forest Area</u> Phy. in ha.
1994-95	5600	3145.66
1995-96	5600	4186.97
1996-97	5600	4511.86
1997-98	5600	5044.1
1998-99	5600	4993.48
1999-2000	5600	5453.93
2000-2021	6400	-
	-----	-----
	40,000	27,336

11. COMPENSATORY AFFORESTATION

Approval for the diversion of forest land 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 conduct of CAF. Principal amongst these are the following stipulations.

- For every hectare of forest land 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. This represents a two fold increase of the usual requirement.
- For the 4,200 hectares of forest land 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

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

- Sardar Sarovar (Narmada) Project Development Plan, Volume-II prepared by the Narmada Planning Group (NPG) in 1983.
- Studies on Ecology 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-Environmental and Wildlife Management Studies on the Sardar Sarovar Submergence Area in Gujarat 1992 by MSU.
- Impact Assessment of Madhya Pradesh Land to be Submerged Under Sardar Sarovar Project and Adjoining Ecosystems by State Forest Research Institute, Jabalpur (1989-92).
- Status of Flora and Fauna in and Around Sardar Sarovar Project, Maharashtra is a preliminary report of an ongoing study by the University of Pune which began in 1992 and is due to run for two years.

The Action Plans

In compliance with the conditions set by the MOE&F, each state has prepared an action plan for the CAF of areas within its 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 Kutch, 1986.
- Project for Afforestation in Sardar Sarovar Project Impact Areas due to Diversion of Forest Lands 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 multi-purpose river-valley project (1989).

These plans were submitted in varying stages of completeness but each has now been revised and updated to take account of the comments of the MOEF and the NCA. Action plans of 3 State Govts. contained following components:

1. Identification of areas for CAF;
2. Description of selected areas,
3. Justification of Selection of Areas,
4. Identification of responsible agency,
5. Description of staffing requirements,
6. Description of material requirements,
7. Estimate of costs,
8. Identification of tree species,
9. Description of preparatory work needed,
10. Description of planting techniques,
11. Provision for aftercare,
12. Yearly planting target,
13. Yearly budget,
14. Provision made for monitoring implementation

These action plans spell out a programme of tree planting in the three states on both non-forest and degraded forest areas as shown in Table 2.1 & 2.2.

Table 2.1 Areas for Compensatory Afforestation

	Area of Forest diverted for SSP	Area of De- graded for- est to be Replanted	Area of Non- Forest Land to be Affo- rested	Total area for CAF
GDG	4,523	9,300	4,650	13,950
GOM (a) Submer.	6,488*	12,980	6,488	19,468
(b) R&R *	4,200	-	4,200	4,200
GOMP	2,732	6,550	2,190	8,740
TOTAL :	17,943	28,830	17,528	46,358

* This includes 2700 ha released in 1990 & 1500 in 1993 for R&R works in Maharashtra for which only equal non forest area is being raised as stipulated.

Table 2.2a Schedules for Implementation of CAF (Against Submergence).

	Gujarat		Maharashtra		Madhya Pradesh	
	Area to be Afforested in ha (Area in brackets indicates actual progress)					
	Degraded Forest	Non-Forest	Degraded Forest	Non-Forest	Degraded Forest	Non-Forest
Monsoon year						
1990		<u>2,150</u> (2150)			<u>132</u> (132)	<u>716</u> (716)
1991	2,834 (2,834)	350 (350)	8,383 (8383)		1580 (1200)	400 (373)
1992	2,450 (2450)	847 (847)	4,552 (4552)	2,276 (2276)	1580 (2400)	400 (-)
1993	<u>2,500</u> (2,500)	<u>455</u> (455)	<u>45</u> (20)	<u>1,156</u> (1,156)	<u>1580</u> (2215)	<u>400</u> (-)
1994	<u>1,516</u> 1,516	<u>848</u> 848	-	2,911	600*	1100*
1995	-	-		0,145	-	-
Total:	9,300	4,650	12,980	6,488	6550	2190
Achievement in ha.	(9300)	(4650)	(12955)	(3431)	**	**

* Net target considering progress of the previous years.

** Total Progress achieved is 8165 ha. against a target of 8740.

Table 2.2b Schedule for Implementation of CAF in lieu of Forest Land released for R&R works.

State	Year	Land released Area in ha.	Target & Progress		
			1993-94	94-95	95-96
Maharashtra	1990	2700	<u>2192.37</u> (2192)	<u>307</u> (-)	<u>201</u> (-)
	1993	1500	-	-	1500
	TOTAL	4200	2192	307	1701
Achievement			2192		

Plantation along Canal Banks:

The total potential of canal bank plantations is estimated to be 18000 ha. A project report prepared for this purpose by forest Deptt. is under scrutiny of SSNNL. The plantation programme is likely to be launched effectively from the year 1995. However to give a start to the work of canal bank plantations, plantations on 215 ha have already been established till rains of 1994.

Additional Plantation Activities

(a) Dam Vicinity Plantation (235 ha)

An area of 240 ha. in the vicinity of the dam has also been planted. This work was completed in 1992.

(b) Revine Land Afforestation (200 ha.)

On the left bank of the river Sabarmati an area of 200 ha. in two villages i.e. Ratanpur (150 ha.) and Pirojpur (80 ha.) is also planned to for plantation. An area of 200 ha. is till 1994 rains.

(c) Project area plantations: (255 ha)

An area of 300 ha. has been planted in the project area as per the target and the work completed in the rain of 1992.

III. COMMAND AREA DEVELOPMENT: (Including Drainage Studies)

(A) Government of Gujarat:

Government of Gujarat have undertaken several studies related to the Command area development. Some of which have been completed and the remaining are in progress. Their position is as follows:

Sl. No.	Name of Study	Name of Agency	Year of Completion

1.	Completed Studies:		
1.	Pre-Feasibility study for Low Level Canal.	Jyoti Consultants Ltd. Vadodara.	1981
2.	Mathematical Modelling of Ground Water for system single layer model-Narmada Mahi-Doab.	Operation Research Group. Vadodara.	1982

- | | | | |
|-----|---|--|---------------------|
| 3. | Pre-Feasibility level Drainage study of Narmada Mahi Doab of SSP Command. | Core Consultants Ltd. Ahmedabad. | 1982 |
| 4. | Some Aspects of Role of Panchyats and Institutional Arrangements for canal irrigation in Two Talukas of Ahmedabad District. | Institute of Cultural and Urban Anthropology, Ahmedabad. | 1982 |
| 5. | A study of settlement Pattern (6 Talukhas in the Narmada Command Area of Mahesana District of Gujarat). | Department of Geography, Gujarat University, Ahmedabad. | 1982 |
| 6. | Regionalisation of Narmada Command. | Operations Research Group, Vadodara. | 1982 |
| 7. | Marginal cost study of two Typical Distributerries and Two Typical Branches. | Dr. C.R.Shah, Vadodara. | 1983 |
| 8. | Socio-Economic Bench Mark survey of 62 Talukas (Sub-districts) of Narmada Command Area. | Fourteen Different Agencies Including Universities, Research Institutions etc. | Between 1982 & 1983 |
| 9. | Population Projection and Migration study for Narmada Command Area. | Operations Research Group, Vadodara. | 1983 |
| 10. | Study on Water Demand for Non-Agricultural use from Narmada Project. | Gujarat Water Supply and Sewerage Board, Gandhinagar. | 1983 |
| 11. | Consumer Expenditure, Assets and Indebtedness of Rural Households of the Command Areas of Sardar Sarovar (Narmada) Project, 1982. | Directorate of Economics & Statistics, Gandhinagar. | 1983 |
| 12. | Wasteland Development Project for command Area of Narmada Canal (Region 11 and 12). | Gujarat State Rural Development Corporation Ltd., Gandhinagar. | 1984 |
| 13. | Mathematical Modelling of Ground Water System Narmada Mahi Doab. | Operations Research Group, Vadodara. | 1985 |

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| 14. Additional work on Mathematical Modelling of Ground Water System-Single Layer Model Narmada Mahi Doab. | Operations Research Group, Vadodara. | 1985 |
| 15. Rate 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 |
| 16. Computer aided Planning of conveyance and delivery Network. | Indian Institute of Management, Ahmedabad. | 1986 |
| 17. Land Use and Cropping Pattern Survey and Mapping of Narmada Command Area Zone 4A & 4B. | Department of Geography, M.S.University, Vadodara. | 1986 |
| 18. Survey and Investigation work of Ground Water Resources in Narmada-Mahi Doab. | Gujarat Water Resources Development Corporation Ltd. Gandhinagar. | 1987 |
| 19. Cropping Pattern and Water Demand Study in Narmada Command Area. | Operations Research Group, Vadodara. | 1987 |
| 20. Inter-Regional Water allocation and Determination of Branch Canal capacity. | Operations Research Group, Vadodara. | 1989 |
| 21. Extended study on Inter Regional Water Allocation and determination of Branch Canal Capacity. | Operations Research Group, Vadodara. | 1989 |
| 22. Growth of Agro-Processing Industries in Phase-I of the Sardar Sarovar Project. | Gujarat Industrial & Technical Consultancy Organisation Ltd. Ahmedabad. | 1990 |
| 23. Consultancy work for Control, Telemetry and Communication Net Work on Narmada Canal System for SSP. | Gujarat Communication & Electronics Ltd., Vadodara. | 1991 |
| 24. Techno-Economic Study for utilising Village Tanks as Borrow Area for Construction of Canal Net Work. | Operations Research Group, Vadodara. | 1992 |

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|----------------------------------|--|---|-----------|
| 25. | Area Development Strategies for selected Regions Adjacent to Narmada Main Canal (Vadodara, Surendranagar & Banas Khatha Dist.) | Operations Research Group, Vadodara. | 1992 |
| 26. | Studies in Water Rates Policy in 3 parts. | | |
| | i) Pricing of a public Utility Survey of Literature | Department of Economics, South Gujarat University, Surat. | 1992 |
| | ii) Financial working of Irrigation Projects - A case of four projects in Gujarat. | Department of Economics, Sardar Patel University, Vallabh Vidyanagar. | 1992 |
| | iii) Some policy issue for Canal Water Rates in Gujarat. | Department of Economics, Sardar Patel University, Vallabh Vidyanagar. | 1992 |
| 27. | Mathematical Modelling of Ground Water System for SSP Command between Rivers Shedhi and Sabarmati. | Consultancy Engineering Services, New Delhi. | 1993 |
| 28. | Mathematical Modelling of Ground Water System for SSP Command between Rivers Sabarmati and Banas. | Operation Research Group, Vadodara. | 1993 |
| 29. | Mathematical Modelling of Groundwater System for SSP Command beyond Banas upto Rajasthan Border. | Dalal Consultants, Ahmedabad. | 1993 |
| 30. | Prefeasibility level Drainage study for SSP Command beyond Mahi. | Consultancy Engineering Service, New Delhi. | 1993 |
|
11. ON GOING STUDIES: | | | |
| 1. | Monitoring and Evaluation of Resettlement & Rehabilitation Programme. | Centre for Social Studies, Surat. | 1985 |
| 2. | Development of Allabet Island in the Estuary of River Narmada. | Multi Disciplinary Expert Group. | Sept. '92 |

3. Agricultural Research Studies. Gujarat Agricultural University, 1987
4. Survey and Investigation Work of Ground Water Resources beyond River Mahi in SSP Command. Gujarat Water Resources Development Corporation Ltd., Gandhinagar. 1989
5. Action Research on People's Participation in Water Management in SSP. Gandhi Labour Institute, Ahmedabad. 1991
6. Development of Nal Sarovar Bird Sanctuary. Multi Disciplinary Expert Group. Sept.1992
7. Development of Black Buck National Park at Velavadar. Multi Disciplinary Expert Group.
8. Development of Wild Ass Sanctuary in Little Rann of Kachchh. Multi Disciplinary Expert Group. Sept.1992
9. Study on preparation of a detailed Integrated Command Area Development Plan for SSP. M/s Wamana Consultants Pvt.Ltd., Hyderabad. Dec.1992
10. Environmental Impact Assessment Studies on Inland and Marine Fisheries relevant to the Command Area of Sardar Sarovar (Narmada) Project. M.S. University, Vadodara. Dec.1992
11. 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. Commissionerate of Health, Medical Services & Medical Education, Govt. of Gujarat, Gandhinagar. Dec.1992
12. Study of Flora and Fauna of the Command Area of Sardar Sarovar (Narmada) Project : Lying between the Narmada & Sabarmati Rivers. (Environmental Impact Assessment Studies). Sardar Patel University, Valalabh Vidyannagar. Feb.1993

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|---|---|-------------|
| 13. Study on Flora and Fauna of the Command Area of Sardar Sarovar (Narmada) Project Lying in Saurashtra and Kachchh Area (Environmental Impact Assessment Studies). | Saurashtra University, Rajkot. | March, 93 |
| 14. Study on Flora and Fauna of the Command Area of Sardar Sarovar (Narmada) Project: Lying between Sabarmati River and Rajasthan Border (Environmental Impact Assessment Studies). | Gujarat University, Ahmedabad. | March, 1993 |
| 15. Ecological study of Wild Ass Sanctuary and surrounding area using remote sensing technology for Environmental Impact Assessment. | Guj. Ecological Education & Research Foundation (GEER Foundation), Gandhinagar. | Dec., 93 |
| 16. Environmental Impact Assessment of Nal Sarovar Bird Sanctuary. | GEER Foundation | Dec., 93 |
| 17. Environmental Impact Assessment of Velavadar National Park located in the command area of SSP. | GEER Foundation | Dec., 93 |
| 18. Environmental Impact Assessment (EIA) studies on Aliabet Island. | Chief Engineer, (CAD SSP) Expert Multidisciplinary Group. | Dec., 93 |
| 19. Review of ground water drainage study. | H.R. Wallingford | Jan., 94 |
| 20. Agro Pollution aspect of Command Area. | -do- | Jan., 94 |
| 21. EIA on downstream of Sardar Sarovar Dam upto Gulf of Cambay. | -do- | Jan., 94 |

(B) Government of Rajasthan

The Government of Rajasthan had submitted a report on Environmental & Ecological aspects and remedial measures for Narmada Canal Project. Copy of the report was submitted to Ministry of Environment and Forests. Govt. of Rajasthan have assigned studies on EIA of Command area in Rajasthan portion to WAPCOS & the TOR finalised and WAPCOS have since started the work & interim reports submitted.

IV. FLORA, FAUNA, WILDLIFE 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.

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 Narmada Control Authority would ensure in-depth studies on flora & fauna needed for implementation of Environmental Safeguard measures.

Studies/Surveys :

Important survey work has 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, GDM, 1988.
- Status of Flora and Fauna in and Around Sardar Sarovar Project, Maharashtra is studied by the University of Pune (1992-94). Interim 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 is completed & report is 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 Universities of Bhopal, Vikram and Rani Durgavati 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.
- 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 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.

The Action Plans

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 which will avoid the possibility of animals being trapped in the submergence area;
- plans for improvement works in the wildlife sanctuaries of Gujarat;

Fisheries Component:

Three state Govts. 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 NSP, 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 were 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 hydrobiological 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.
- 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 proposed by GOM through CICFRI.

Subsequently, the state governments 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. This plan is presently under scrutiny of NCA. 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.

Table 4.1 Summary of Status of Environmental Planning:

A) Wildlife

	Gujarat	Maharashtra	Madhya Pradesh
Preliminary Surveys	Complete	Complete	Complete
In-Depth Studies	Complete	Completed	Complete

Development of Management Options	Complete for Shoolpaneshwar	Some work completed but awaiting deliberations of the expert group.	Some work completed but awaiting results of study and deliberations of the expert group
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Action Plan

Migratory corridors	Not needed	Completed	Complete
Sanctuary development	Complete for Shoolpaneshwar development.	Plans for establishment of wildlife sanctuaries await study results and expert group	Plans for establishment of wildlife sanctuaries await study result and expert group
Wildlife conservation	Massive afforestation in entire catchment of SSP	It depends on deliberations of expert group	Await final outcome of study.
Implementation	Shoolpaneshwar development almost complete. CAT work (increasing carrying capacity) nearing completion	Awaiting outcome of the study. CAF nearly completion, CAT work recently accelerated	Arrangements complete, awaiting final outcome of study

Progress in Shoolpaneshwar Sanctuary Development

	Target	Achieved to	% Complete
Fencing	100km	107	100
Firelines	60km	281 km	100
Barricades	2km	2.8 km	100
Check Dams	14	14	100
Construction of Quarters	21	21	100
Construction of Rest House	1	1	100
Improvement of communications	50 km	70.5 km	100

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.
- Velvadar Black Buch Nation Park.

Summary of Status of Environmental Planning:

B) Fisheries

		GOG	GOM	GOMP
<hr/>				
Preliminary surveys work plan		Yes	Yes	Yes
Updating of Detailed surveys/ studies of fish fauna		Yes	-	Yes
Updated Action plans		Yes	Yes	Underformu- lation
Implementation				
1. Plan for clear felling	Completed	Yes to synchronise with submer- gence	Yes to synchronise with submer- gence	
2. Development of fish farms	Under imple- mentation	Yes, awaits submergence	Yes, awaits submergence	
3. Establishment of IFDB for future R&D management	Agreed	Agreed	Yet to agree	
4. Expert group to lay down guide- lines for conser- vation & Development	} : : }	Yes agreed by the states.		

Progress of Implementation

CICFRI have already established one hatchery in Gujarat for augmenting the numbers of the Hilsa fish in the reservoir. This currently produce around 250,00 spawn per year. CICFRI have also been commissioned to monitor the whole of the estuary and their study has been extended to examine pollution and to undertake modelling studies in the downstream environment.

A draft plan for the creation of an Interstate Fisheries Development Board (IFDB) has been prepared by the NCA and agreed, in principle, by the governments of Gujarat and Maharashtra. However GOMP has disagreed & suggest an alternative proposal. Reaction from GOG & GOM are awaited. The organisation is expected to be set up and fully functioning prior to reservoir filling. 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 followup action.

GOG has already provided 16 hectares of land to the project for the development of fish farms. In addition, the State Fisheries Department is exploring the development of riverine fisheries and the development of the reservoir for commercial and game fisheries.

Execution of felling as per felling plans prepared will await the commencement of impounding.

V. 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 I&II.
- 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.

- G.O.1993. Sardar Sarovar Project Seismicity and Sardar Sarovar Dam.

Progress of 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 river bed.

The Government of Gujarat has identified 9 locations for the installation of seismic monitoring stations. 4 each on either side of the Sardar Sarovar reservoir in Madhya Pradesh and Maharashtra and 1 at Kevadia in Gujarat. By Dec. 1994, 8 stations had been installed. Construction of building for the 9th station in progress.

The progress of implementation is illustrated in Table below:

Implementation of Actions

Action	Status
Dam design modifications	Complete
Installation of monitoring stations	8 stations installed by June, 1994. 2 more awaited
GSI (Nagpur Division) rim stability studies	Completed
Tracer Studies by CWPRS	Ongoing

VI. HEALTH ASPECTS

Studies

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 was 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 produced a report on the health profile of 33 project-affected villages in Dhule District, Maharashtra.*
- *Health Statistic 1982-84, GOMP. This study, published by GOMP in 1985 & updated is 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 by, amongst others, by the Malaria Research Centre (MRC) and Dr. Kalra.*

Status of Implementation of Actions for Public Health

Action	Gujarat	Maharashtra	Madhya Pradesh
Baseline studies	Complete	Complete	Complete
Preparation of state action plan	Submitted and modified in 1986; Urban Malaria Scheme proposed	Original submitted in 1987, revised in 1991 and 1992 & 1993	Original submitted in 1986, revised in 1988 and final plan submitted in 1991
Survey of existing facilities	Complete	Complete	Sufficient facilities
Establishment of new facilities	Hospital at Kevadia for workers; laboratory and mobile unit complete, drug dispensaries	Somawal village hospital; health centres and health units sanctioned.	Hospital, mobile unit and civil dispensaries for labour; detailed scheme for resettled population
Vector control measures in place	NMEP; SSNNL workshop on malaria control; laboratory established; entomological studies underway	NMEP; adoption malaria control guidelines of irrigation Department	NMEP; state malaria control organisations strengthened

Appointment of specialist staff	Complete	Awaits financial approval by State Govts.	Needs identified
Disease Monitoring and responsibility	Entrusted to SCHMS Action Plan of 1986 will be revised. Preliminary EIA report Submitted by SCHMS. Final plan awaited.	Entrusted to regular health department	Evaluation cell established monitoring by Gandhi Medical College, Bhopal. 3rd Six monthly report submitted.

VII. ARCHAEOLOGICAL SURVEY AND ANTHROPOLOGICAL STUDIES/ ARCHAEOLOGICAL SURVEY

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:

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 of Department of Archaeology. A survey was carried out by the Department of Archaeology of cultural sites in 24 villages of Akkrani Taluk and nine village from Akkalkuwa Taluk, Dhule District.
- Madhya Pradesh : Survey of State Department of Archaeology and Museum (1992).
- Anthropological Survey of India: Narmada Salvage Plan.
- Anthropological Survey of India: People's of India.
- Parishad, A.K. Survey of Material Cultural in the Narmada Valley.
- Rashtriya Manav Sanghralaya : Narmada Salvage Plan.

Cultural Heritage in SSP Area

	Gujarat	Madhya Pradesh	Maharashtra
Relocation of Temples	8(2)*	37 (7)	-
Excavation site(s)	-	5	

* Figures in brackets indicate number of sites designated for relocation.

Summary of Current Situation and Progress

	GOG	GOMP	GOM*
Survey of Villages in Submergence Zone.	}		
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 present location.

ANTHROPOLOGICAL STUDIES

Government of Madhya Pradesh has informed that in view of the studies being carried out in connection with Narmada Sagar Project, no separate anthropological studies are required and that the Director General, Anthropological Survey of India has also expressed the same view. M.P. State Adivasi Kala Parishad has submitted its report on Tribal arts & culture. Besides Anthropological Survey of India has informed that Narmada Basin is already covered extensively under the project "people's of India". Besides Rashtriya Manav Sanghralaya has conducted needed studies in the past as follows. Further studies are covered under R&R plan of the state Governments.

- a study of the palaeo-ecology of quaternary fossils in the central Narmada Valley;
- excavation of upper palaeolithic site of Mehtakhaeda and further exploration of Nimar;
- collection of tribal artifacts in Madhya Pradesh.

Institutional responsibility for these actions was specified in the action plan whereby the first two elements were completed by Deccan College, Puna and the third by Adivasi Kala Parishad, for the Rashtriya Manav Sanghralaya, Bhopal.

STATUS REPORT
NARMADA SAGAR PROJECT (NSP) ENVIRONMENTAL ASPECTS,
DECEMBER, 1994

1) Phased Catchment Area Treatment:

The freely draining area of Narmada Sagar Project down stream of Bargi Dam is about 39,25,422 ha. 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. Prioritisation survey of the watersheds was entrusted earlier to SGSIT&S, Indore. Later on, as per GOI's instructions the prioritisation survey was entrusted to the All India Soil & Land Use Survey Organisation, New Delhi. The Survey has been completed by AISLUSO, New Delhi and the Survey reports have been received in the NVDA.

On the basis of the reports submitted by the AIS&LUSO, 30 sub-watersheds belonging to the very high and high priority categories and directly draining into the reservoir have been identified for treatment. These 30 sub-watersheds cover an area of about 73,456 ha.

1. DIRECTLY DRAINING SUB-WATERSHED OF HIGH & VERY HIGH PRIORITY CATEGORIES:

Critically degraded Sub-watersheds below Bargi dam (Figure in ha).

	FOREST		NON FOREST		TOTAL	
	Gross	Net	Gross	Net	Gross	Net
Critically degraded sub-watersheds.	15759	11048	57697	51927 *	73456	62975

* In addition an area of 1636 ha. was treated up under pilot project earlier.

Programme and Progress of Works:

	<u>Upto 92-93</u>	<u>93-94</u>	<u>94-95</u>	<u>95-96</u>	<u>96-97</u>
	Cumulative Progress		Target/Progress	Target	
Non-Forest area/ ha. (51,927 ha)	11439	<u>13636</u> 10261	<u>15375</u> 4664	11500	3352
Forest area/ (11,048 ha)	-	-	<u>3700</u> 2623	3700	3648
Total Area: (62,975 ha)	11439	<u>13636</u> 10261	<u>15700</u> 7287	15200	7000

11. FREELY DRAINING AREA: (EXCLUDING DIRECT DRAINING SUB-WATERSHEDS)

Number of watersheds	- 478
Gross Area	- 10,12,650 ha.
Net Area	- 9,15,150 ha.

Schedule of Implementation:

Year	Forest (in ha.)		Non Forest (in ha.)	
	Gross Area	Net Area	Gross Area	Net Area
1995-96				18000
1996-97				18000
1997-98		10000		27000
1998-99		10000		28800
1999-2000		10000		28800
2000-2001		10000		28800
2001-2002		10000		28800
2002-2003		10000		28800
2003-2004		10000		28800
2004-2005		10000		28800
2005-2006		10000		28800
2006-2007		10000		28800
2007-2008		8430		28800
2008-2009				28800
2009-2010				28800
2010-2011				28800
2011-2012				28800
2012-2013				28800
2013-2014				28800
2014-2015				
2015-2016				28800
2016-2017				28800
2017-2018				28800
2018-2019				28800
2019-2020				28800
2020-2021				28800
2021-2022				28800
2022-2023				26400
2023-2024				26120
<hr/>				
	1,24,732	1,08,430	8,96,361	8,06,720
<hr/>				

2) Compensatory Afforestation :

A total of 40332 ha forest land would come under submergence and an additional 779.9 ha of forest land has been diverted for the residential colony, power house complex, dam, saddle dam and approach roads. Subsequently, another 308.4 ha of forest land was

permitted to be diverted for power house. Thus a total of 41,420 ha of forest land has been permitted to be utilised for the construction of ISP. To compensate for this loss of forest, 10,143 ha of non-forest and 70,802 ha of degraded forest land has been identified for compensatory afforestation.

Programme of Compensatory Afforestation:

	Commulative Progress till 91-92	92-93 Target/ Progress	93-94 Target/ Progress	94-95	95-96
Degraded Forest area (70,802 ha)	23048	<u>12528</u> 11919	<u>12400</u> *	<u>12400</u> 4056	10035
Non-Forest area (10,143 ha)	5239	<u>1534</u> 1390	<u>1500</u> *	<u>1500</u> 667	514
(80,945) (say 81,000 ha)	28287	<u>14062</u> 13309	<u>13900</u> 14314	<u>13900</u> 4723	11549

3) Command Area Development :

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 6/2007. Monthly observation of water levels started in November, 1991 for subsequent supply of this data to the consultants, already shortlisted, are likely to be continued for 2 seasons to draw inference for preparation of master plan for drainage. 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 area for this work was finalised.

4) Flora, Fauna, Wildlife and Carrying Capacity :

Studies on these aspects were entrusted to the Wildlife Institute of India, Dehradun in December, 1989 and were scheduled to be completed by March, 1993. The studies have been completed. The final study report is submitted to MOE&F & NCA.

Besides this, the Friends of Nature's Society, Bhopal, was entrusted with the preparation of Wildlife Retrieval and Conservation Plan. They have submitted the final report. Action plan is under formulation.

Actions have been taken up by NVDA to implement the recommendation of the WLI regarding construction of National Park & protected areas.

5) Seismicity and Rim Stability

The reservoir competency survey has been done by GSI and report is submitted. In the report, GSI has suggested further studies for some patches of narrow water divide. As such they were requested to carry out the study in the required area. GSI is further reviewing the need to survey the area identified earlier.

Establishment of 10 nos. of seismic observatories in the Narmada Sagar Complex area is taken up. NVDA 12 nos. of wood Anderson Seismometers and six nos. of photographik recorders are being procured from IMD. Procurement of Micro Earthquake recorders is also in progress. In the mean time on the initiatives taken by NVDA, CWPRS has already installed the instrument to records. Preimpounding date and for undertaking seismic studies at NSP, Omkareshwar & Maheshwar projects through Analogic micro earthquake recorder & strong motion accillograph as an interim measure.

6) Health Aspect:

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. Three six monthly report 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 is under formulation.

7) Fisheries Development:

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, 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. 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.

8) Archaeological and Anthropological Survey:

A survey of the 254 villages is required for identification of the archaeological monuments falling within the submergence area. The State Department of Archaeology and Museum, Bhopal was entrusted with the survey of 87 villages which has been completed. Archaeological Survey of India has also completed the survey for 167 villages assigned for identification of the monuments of significance.

Action plan is available. Action will be taken to preserve material of archaeological importance in consultation with experts.

As only lower bastion in north of the Jaga Fort is likely to be affected by Scour action of water and the Siddeshwar temple is well above the FRL of 860 ft., these two structures are not considered as affected by the project. The state Department of Archaeology & Museum has already submitted an action plan for relocation & monuments of Archaeological significance. This plan is being implemented.

Anthropological Studies:

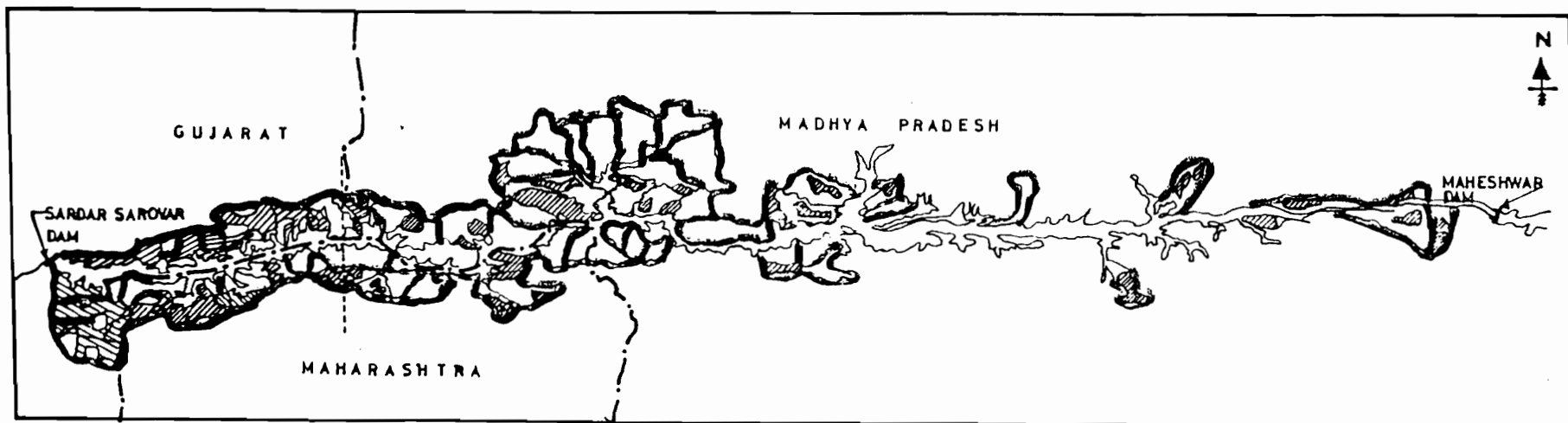
Efforts are being made for retrieval of bio-cultural material from the Narmada Basin. A lot of information is gathered from the field which generates immense data of Socio-Anthropological significance.

Rashtriya Manav Sanghralaya has constituted a working group for the retrieval of bio-cultural material in Narmada Basin. Survey of tribal art and handicraft entrusted to M.P. Adivasi Kala Parishad is completed and report is available. Besides Anthropological Survey of India has covered these studies under its own project called "people of India". The report is in 61 volume out of which 7 volume are under final editing. A Narmada Salvage plan is also launched by Anthropological Survey of India recently and the entire area is scanned and some ancient tools have been found.



ANNEX-XXIV-III.

PRIORITY AREAS FOR CATCHMENT AREA TREATMENT

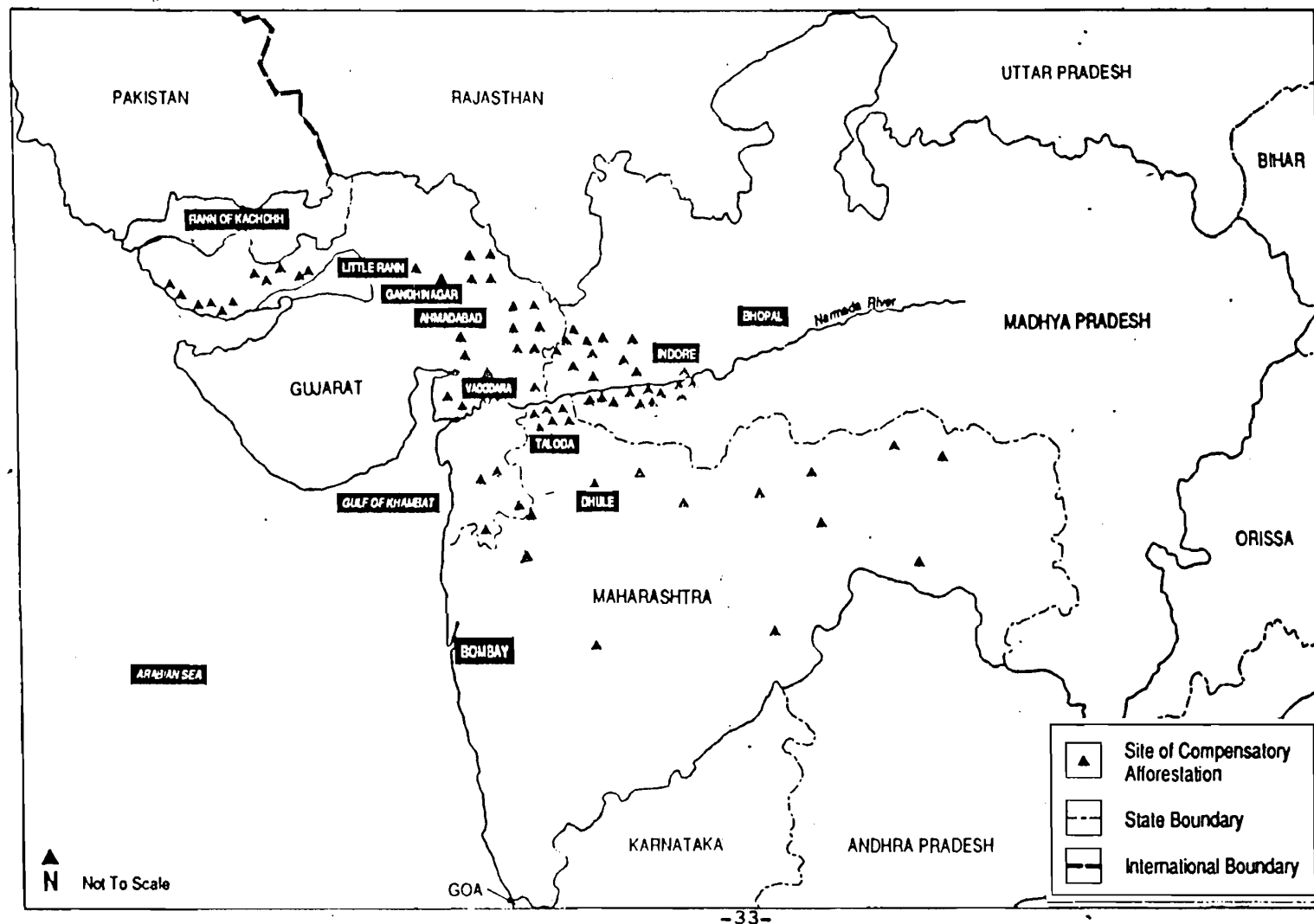


LEGEND

- SUB WATER SHED BOUNDARY
- WORK TACKLED BY 1994 RAINS
- STATE BOUNDARY
- 1994 81 EL 45100 M. Ch. 5280 ha. Area under submergence.

NOT TO SCALE

Compensatory Afforestation in Gujarat, Maharashtra, Madhya Pradesh



ANNEX-XXIV-V.

**ASSESSMENT OF THE REPORT ENTITLED "IMPACT ASSESSMENT OF
MADHYA PRADESH LANDS TO BE SUBMERGED UNDER SARDAR SAROVAR PROJECT
AND ADJOINING ECOSYSTEM: FLORA, FAUNA AND OTHER BIOTIC COMPONENTS"
SUBMITTED TO NVDA BY STATE FOREST RESEARCH INSTITUTE, JABALPUR**

IMPORTANT RECOMMENDATIONS OF THE STUDY GROUP:

1. The forest in the submergence zone (excluding the one's that will actually to be submerged) under the forest in the impact zone should be constituted into one unit for special development with following objectives:
 - a) Ecologica and environmental security;
 - b) To meet the regional requirements of the local population;
 - c) Providing employment opportunities to the local population.

Forests undergoing submergence and standing in the impact area are seriously understocked. But these forest under proper regime of protection and management can yield 25 times than the present yield.

The study team recommended that the forest in the submergence in the impact zone should be brought under intensive forest management, Barwani Division should also be brought under working plan and measures like protection from fire control, grazing, awareness, people's participation and developmental legislation may be adapted.

Social forestry should also be organised outside the conventional forests. The study team recommended that every inch of available land should be taken up for planting. The study team recommended introduction of quick growing exotics for meeting the requirements of the people in a shorter available time.

It further recommended that Canal banks and roads of either side should be brought under concentrated plantations and low yielding areas should be converted into high yielding areas.

2. No corridors are needed to act as an escape route for the wild animals, impounding would be beneficial to the inhabitant of impact area for plants, animals and humans.
3. No endemic plant or animal species could be found in the submergence area.

4. The area was quite scarce in wild life due to extremely degraded condition of the forests yet in order to protect the existing wildlife and give them a fair chance for further multiplication, two sanctuaries viz. Mothwad (34659 sq.km) in Jhabua district and one is Bokrata (3559 sq.km) in Khargone district were proposed.
5. About 60 islands varying from 1 to 75 ha. in size to be formed at FRL should be left undisturbed for study of the process of natural succession and to provide refuge to bird life in the area.
6. There was a wide gap between demand and supply of fuel and fodder. Therefore special measures are needed to bridge this gap. Forests of impacts zone may be brought under intensive management. Planting of Bamboo is recommended under farm and Agro forestry.
7. It is recommended that the catchment protection works should include both engineering and biological measures for development of indigenous eco system and local bio diversity. Timber, fodder and fuel wood requirements of the local population is to be quantified for planning future yield.

ANNEX.XXIV.VI.

SUMMARY OF REPORT ON
"STATUS OF FLORA AND FAUNA IN AND AROUND
SARDAR SAROVAR PROJECT - MAHARASHTRA".

FUNDED BY

DEPARTMENT OF ENVIRONMENT, GOVERNMENT OF MAHARASHTRA

UNDERTAKEN BY

SCHOOL OF ENVIRONMENTAL SCIENCES,
UNIVERSITY OF POONA,
PUNE - 411 007.

Along the Maharashtra border, the Narmada river flows through a deep gorge covering about 70km wide tract which is hilly, highly dissected and covered with forest and shows areas of shifting cultivation. The area has foundation of basalts that are intruded by forest cover.

The study was conducted along the Maharashtra border for the 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 area 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 quadrates of different sizes, line and belt transect methods.

c) Soil analysis was carried out for the samples collected from submergence and catchment area.

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 10cm) reddish-brown soil cover. The soil profiles are ill developed and poorly defined. The organic content of these soils is very low in the uppermost horizon because of poor vegetation cover. The clay content of these soil is very low and they have very poor fertility. On the other hand, very 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 chemical characteristics of representative soils from the area under study are presented in Table No. 1.

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 (Table 2) 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 the submergence zone the canopy cover was found to be from 0.1 to 0.2. The submergence villages such as Manibeli, Chimankhedl, Dhankhedl, Bhusha, Bilgaon bear poor vegetation cover.

The above ground biomass studies of herbaceous flora show values of 0.812 tons/hectare to 2.712 tons dry wt/hectare (Table 3). Ethnobotanical survey was carried out to identify plants of local importance. Over 100 plant species with medicinal value were listed from the area.

Table 3.

Locality	Dry Wt. Tones/Hectare
Khadki	2.04
Son (Kh)	1.511
Sakali Umar	0.812
Kakarda	0.918
Gunal Chopda	1.213
Bilgaon	2.712
Devgoi ghat	2.248
Rohyabari	1.625

Survey of flora and fauna was carried out in the submergence and catchment areas using quadrat and line transect method. In all 510 plant species have been recorded with four species of Bryophytes and four of Pteridophytes from this area. The floristic composition in the submergence and catchment area as well as in the Tapi river basin is same. The dominant plant

species listed below were on the basis of % of canopy cover and % occurrence in most quadrat studied.

<u>Tectona grandis</u> ,	-----Sag.
<u>Madhuca indica</u> ,	-----Moha.
<u>Lannea coremandolica</u> ,	-----Shimti.
<u>Mitragyna parvifolia</u> ,	-----Kadam.
<u>Besnoellia serrata</u> ,	-----Salai.
<u>Eutea monosperma</u> ,	-----Palas.
<u>Anogeissus latifolia</u> ,	-----Dhavda.
<u>Acacia catechu</u> ,	-----Khair.
<u>Acacia concinna</u> ,	-----Shikakai.
<u>Bridelia retusa</u> ,	-----Asna.
<u>Parasus flabellifer</u> ,	-----Tad.
<u>Dalbergia latifolia</u> ,	-----Rosewood.
<u>Derris indica</u> ,	-----Karanj.
<u>Embliza officinalis</u> ,	-----Avala.
<u>Ficus racemosa</u> ,	-----Umber.
<u>Hardwickia binata</u> ,	-----Anjan.
<u>Halarrhena antidysenterica</u> ,	-----Pandhara-kuda.
<u>Terminalia arjuna</u> ,	-----Kahu.
<u>Wrightia tinctoria</u> ,	-----Kala-kuda.
<u>Mallotus philippensis</u> ,	-----Kunku/Shendri.
<u>Merinda cartifolia</u> ,	-----Bartondi.
<u>Zizyphus xylopyra</u> ,	-----Chot-bor.

The area shows some of the economically important species on the basis of ethnobotanical survey as well as the use of plants by local people for food, fodder, fiber, shelter and wild

fruit trees. Some of these plants were used by local inhabitants for their economic purposes/getting cash by selling them in nearby markets.

Acacia concinna,

A. catechu,

Agave americana,

Buchanania lanzan,

Baracassia flabellifer,

Carvia callosa,

Cymbopogon martini,

Dendrocalamus strictus,

Diospyros melanoxylon,

Emblia officinalis,

Emelina arborea,

Hardwickia binata,

Madhuca indica,

Mangifera indica,

Mitragyna parvifolia,

Perris indica,

Tectona grandis, etc.

The recorded number of species belongs to 356 genera and 106 families (Table 4) which were represented by predominance of herbaceous flora. The percentage of annual to perennial plants was 48.8% and 51.2% respectively.

Table 4.

No. of Species	No. of Genera	No. of Families
510	356	106

Among the 510 plant species 396 were growing wild, 98 were cultivated (including crop plants, ornamental plants and forestry plantations) and 16 are naturalised (Table 5). The number of different life forms such as trees, shrubs, herbs, climbers etc is listed in Table 6.

Table 5.

Wild	Cultivated	Naturalised
396	98	16

Table 6

Life form	Number
Trees	125
Shrubs	91
Herbs	207
Climbers	41
Grasses	35
Palms	04
Creepers	04
Orchids	03
Total	510

Among the locally cultivated crops most of crop varieties are wild in their origin. Such wild crop varieties can be preserved as gene pool. The tribals do protect particular plant species which are not only medically and economically important but may also ethic or religious. Such plants could be conserve as gene pool. Some wild/traditional vegetables are :

Bhendi,
Mohari,
Tag,
Gawar,
Ambadi,

Pyas/kanda,
Gram,
Kakri,
Gajar,
Ghosale

Lasan,
Colocasia,
Kala-Bhopla,
Kulith/Hulga, Karala,

Bhuimung,
Dhania,
Kashiphal,

Crops :

Rice,
Mung,Varai,
Jondhala, etc.

Bajara,

Udid,

Trees :

Charoli,
Sitaphal,
Guava,Mango,
Avala,
Chinch,Papai, Mahua,
Jambhul, Shevga,
Beheda, etc.

could be conserve as wild gene pool.

The studies of aquatic habitats were carried out along different rivers in the catchment area. It shows moderate growth of phytoplankton and zooplankton as well as epiphytic and benthic organisms, indicating seasonal flow of water and oligotrophic status of water bodies.

Studies so far carried out in the area indicate very poor faunal composition. Among the fauna, birds were common. In all about 20 species of birds were identified. Among the mammals, species like Civet, Hare, Small Cats and a possible presence of Leopard. This observation is based on droppings and pugmarks. Few reptiles such as Garden lizards and marsh Crocodiles were also observed (Table 7).

Table 7.

Locality	Aves	Mammals	Reptiles
Rajbardi	29	01	--
Bhusha	70	04	04
Rochmal	58	02	02
Bijari	64	04	04
Wadphali	58	01	02
Dhadgaon	--	--	01

The mammals listed below were recorded on the basis of enquiries and at some places on pug marks.

Pteropus giganteus [Indian flying fox]
Vulpes bengalensis [Indian Fox]
Canis aureus [Jackal]
Hyacna hyaena [Striped Hyena]
Paradoxurus hermaphroditus [Palm Civet]
Lepus nigricollis [Black Naped Hare]
Felis Chaus [Jungle Cat]
Panthera tigris [Tiger]
Panthera pardus fusca [Leopard]

The insect fauna is relatively rich in comparison with other life, so far as 92 species of insects were identified (Table 8).

Table 8.

Feeding Habits	Percentage
Phytophagous	40.2%
Predators	19.6%
Omnivores	6.5%
Pollen/Nectar feeder	27.2%
Sanquivores	4.3%
Detrivores	2.2%

Observations also indicate that the grasslands support more insects such as Grasshoppers than other insects. These have been classified into pollinators, agricultural pest and vectors.

In general, it is concluded that the poor soil cover has supported sparse vegetation and consequently very poor wildlife. The records further show that there are no rare and endangered plants species in the submergence areas, so far detected (As per BSI Red Data Book). There are some locally occuring plants which are rare and needs to be conserved. These are :

<u>Alangium salviifolium,</u>	<u>Amorphophallus campanulatus,</u>
<u>Arisaema murrayi,</u>	<u>Asparagus racemosus,</u>
<u>Rutea superba,</u>	<u>Casuarina rubescens,</u>
<u>Clematis smilacifolia,</u>	<u>Clerodendron serratum,</u>
<u>Cochlospermum religiosum,</u>	<u>Dillenia pentagyna,</u>
<u>Dioscorea pentaphylla,</u>	<u>Dioscorea bulbifera,</u>
<u>Gloriosa superba,</u>	<u>Jasminum pubescens,</u>
<u>Oroxylum indicum,</u>	<u>Radermachera xylocarpa,</u>
<u>Tamarix dioica,</u>	<u>Wrightia tomentosa.</u>

CARRYING CAPACITY (SEEDS) :

To know the amount of seed present in the soil an experiment was carried out in the laboratory using different soil samples from the study area. The experiment showed soil as a potential seed bank for many plant species. The following table indicate the same.

This experiment was carried out in view to recommend the soil samples to be used as seed bank to raise the vegetation of local plants. There are many seeds remain viable in the soil and are difficult to germinate in the nurseries. Such practice of lifting the top layer of soil from the submergence area which is

Table 9.

LOCALITY	SURFACE AREA TAKEN FOR GERMINATION	TOTAL NO. OF SEED GERMINATED	TYPES OF SEEDLING
Gaman	..	23	3
Sinduri	..	04	1
Bamani	..	07	2
Pimpalkhunta & Surgas	..	31	1
Kathi & Mojara	..	03	2
Bori	..	01	1
Bori (on slope)	..	19	4
Nalvanbari	..	07	3
Umarpada	..	12	4
Roshmal	..	06	2
Bhucha	..	01	1

likely to be the permanent loss of not only plant species but the soil microbes as well could help to raise the natural vegetation.

Surveys on animal species was carried out using enquiries and it shows poor presence of wild animal species (Table 7). However, to have detail survey of wild animal species one requires a fairly long span of time to investigate the exact status of fauna. The period of the investigation was too short for such studies. Corridors for safe migration of wildlife from submergence areas were identified on the basis of :

1. Forest distribution map based on aerial photographs, satellite imageries and topographic maps for different years.
2. Relief and drainage characteristics. Areas of high relief and relatively dense settlement have been avoided.
3. The suggested corridors are above the submergence zone.
4. The suggested corridors are connecting areas with fairly good (> 0.3) vegetation cover.

In addition to this, surveys for estimating the ground water potential were also carried out and maps were prepared to isolate

areas of high ground water potential and good soil cover for afforestation programmes to be undertaken in the future, by concern authorities.

The study area was classified into two deferent physiographic units for the purpose of catchment area treatment plan. This classification is based on geological structure, relief, slopes, soil and groundwater condition existing as well as vegetation cover.

1. The Dhadgaon Molagi depression and
2. The hilly area around depression.

Geo-parameter	Physiographic units	
	Dhadgaon - Mulgi Depression	Hilly terrain around Depression
Relief	Moderate to gentle	High to very high
Slopes	Gentle to undulating	Rugged and steep
	$< 10^{\circ}$	$10^{\circ} - 30^{\circ}$
Structure	Structural depression	Parallel ridges
Soil	40-60 cm thickness moderately fertile	< 10 cm thick poor fertility.
Groundwater Potential	Moderate	Poor
Vegetation cover/ Potential	Dominantly agriculture with isolated patches of vegetation ($< 0.1 - 0.2$)	Deciduous forest, inter-mixed with shifting cultivation vegetation ($0.1 - 0.4$)
Environmental Degradation	Severe to high deforestation, intense high soil erosion and gullyying	High density (> 0.6) along rivers and inaccessible areas. Moderate to high degradation, unstable slopes.

From the above table it is clear that for all practical purposes the Dhadgaon-Mulgi depression can be considered as one geo hydrologic unit for implementation of watershed development and management programmes. The severity of damage by soil erosion on slopes leading to floods and sedimentation is likely to be enhanced in the Sardar Sarovar Project. Hence, execution of soil, and water conservation measures on agricultural land, forest land and also on river valley floors of Dhadgaon-Mulgi depression are essential.

In order to implement the programme of catchment area treatment the first priority needs to be given to the hilly area around the Dhadgaon Mulgi depression. This area is divisible into seven different micro watersheds given below :

Devghanga watershed, Samba watershed, Khat watershed, Udai watershed, Major stream watershed (including villages mandva and Nalvanbar), Kuhumbada watershed and Jharkhal watershed.

In the hilly areas top priority should be given to stabilisation of hill slopes. This can be achieved by adopting combination of suitable techniques such as afforestation, contour bunding, terracing, check dams and conservation of grassy vegetation that grows spontaneously during monsoons.

It can be a futile exercise to concentrate on one or other methods for conservation of soil on this difficult terrain. Hence, it is necessary to go in for a combination of one or more methods as locally feasible. Small storages of run off water, should be aimed at. There is abundance of vegetative growth during rains on these slopes. The growth appears concentrated in

and along the crevices and other features on slopes, by the microhabitats. Suggestion is made to identify plant species with spreading (of both shoot and root mass) habit and encourage rapid growth. Some plant species considered suitable for this purpose are listed below :

List of plants suggested for plantation in catchment area (*). These species were identified on their habit and habitat, local importance, etc. Most of them are grass species which could help to check soil erosion.

<u>Agave americana</u> , *	<u>Agave sisalana</u> , *
<u>Andropogon</u> spp., *	<u>Apluda aristata</u> , *
<u>Borhavia diffusa</u> , *	<u>Chloris barbata</u> , *
<u>Commelina benghalensis</u> , *	<u>Cynodon dactylon</u> , *
<u>Digitaria pedicellaris</u> , *	<u>Evolvulus alsinoides</u> , *
<u>Heteropogon contortus</u> , *	<u>Justicia diffusa</u> , *
<u>Lepidagathis cristata</u> , *	<u>Mollugo oppositifolia</u> , *
<u>Oldenlandia corymbosa</u> , *	<u>Panicum</u> spp., *
<u>Paspalum</u> spp., *	<u>Spermacoce stricta</u> , *
<u>Sporobolus</u> spp., *	<u>Themeda ciliata</u> , *
<u>Tribulus terrestris</u> , *	<u>Tridax procumbens</u> , *
<u>Zornia diphylla</u> , *	

The grassy and weedy growth, forming pioneer stages of secondary succession on disturbed habitats, help consolidate the substratum and pave the way for further regeneration. Where the soil is too thin or slope too steep, care needs to be taken to arrest succession which may lead to growth of heavier and deep-rooted plants introducing instability

In addition to the above grasses and herbs following plant species should be used for catchment area development and also for compensatory forest development. But while selecting the plant species for afforestation in programme local peoples choice should be taken in to consideration.

<i>Angelica latifolia</i> , Wall.	(M. Dhavda)
<i>Acacia catechu</i> , Willd.	(M. Khair)
<i>Acacia farnesiana</i> , Willd.	(M. Dev-babul)
<i>Acacia concinna</i> , DC.	(M. Sikakai)
<i>Agave americana</i> , L.	(M. Latia-Guial)
<i>Acacia leucophloea</i> , Willd.	(M. Hivar)
<i>Agla marmelos</i> , Corre.	(M. Bel)
<i>Albizia lebeck</i> ,	(M. Shirish)
<i>Anona squamosa</i> ,	(M. Sitaphal)
<i>Asadirachta indica</i> ,	(M. Neem)
<i>Bambusa arundinacea</i> ,	(M. Bamboo)
<i>Balanites roxburghii</i> ,	(M. Hinganbet)
<i>Bridelia retusa</i> , Spr.	(M. Asna)
<i>Rutea monosperma</i> , (Lamk) Taubert.	(M. Palas)
<i>Boswellia serrata</i> , Roxb.	(M. Salai)
<i>Buchanania lanzan</i> , Spreng.	(M. Charoli)
<i>Borassus flabellifer</i> , L.	(M. Tad)
<i>Salmolia malabarica</i> ,	(M. Kate-saveri)
<i>Cassia fistula</i> , L.	(M. Bahava)
<i>Cochlospermum gossypium</i> , Linn.	(M. Pila Katesawar)
<i>Diospyros melanoxylon</i> , Roxb.	(M. Temru)
<i>Dalbergia sissoo</i> , Roxb.	(M. Sisvi)
<i>Dalbergia latifolia</i> ,	(M. Rosewood)
<i>Dendrocalamus strictus</i> ,	(M. Bamboo)
<i>Elaeodendron glaucum</i> ,	(M. Bhutkes)
<i>Syzygium cumini</i> ,	(M. Jambhul)
<i>Embllica officinalis</i> , Gaert.	(M. Avla)
<i>Erythrina indica</i> ,	(M. Pangara)
<i>Ficus glomerata</i> , Roxb.	(M. Umber)
<i>Ficus religiosa</i> ,	(M. Pimpal)
<i>Ficus retusa</i> ,	(M. ----)
<i>Elacourtia latifolia</i> ,	(M. ----)
<i>Gmelina arborea</i> , Roxb.	(M. Shivan)
<i>Grewia asiatica</i> ,	(M. ----)
<i>Grewia tiliaefolia</i> ,	(M. ----)
<i>Hardwickia binata</i> , Roxb.	(M. Anjan)
<i>Holarrhena antidysenterica</i> , Wall.	(M. Pandhara-kuda)
<i>Hymenodictyon excelsum</i> ,	(M. Madom)
<i>Kigelia pinnata</i> , DC.	(M. ----)
<i>Lagerstroemia parviflora</i> ,	(M. Bondara)
<i>Lagerstroemia lanceolata</i> ,	(M. Lahan-bondara)
<i>Lannea coromandelica</i> , Merr.	(M. Shimti)
<i>Mallotus philippinensis</i> ,	(M. Kunku)
<i>Mitrasyna parviflora</i> , Korth.	(M. Kadam)
<i>Morinda citrifolia</i> , L.	(M. Bartondi)

<i>Mangifera indica</i> , L.	(M. Amba)
<i>Madhuca indica</i> , Cmel.	(M. Moha)
<i>Moringa pterygosperma</i> , Gaert.	(M. Shevga)
<i>Melia composita</i> , Willd.	(M. Kadu-khajur)
<i>Olea dioica</i> , Roxb.	(M. Parjamb)
<i>Oraxylon indicum</i> ,	(M. -----)
<i>Pongamia pinnata</i> , (Linn) Pierre.	(M. Karanj)
<i>Phoenix sylvestris</i> , Roxb.	(M. Shindi)
<i>Pithecolobium dulce</i> , Benth.	(M. Vilayti-chinch)
<i>Radarmachera xylocarpa</i> ,	(M. -----)
<i>Santalum album</i> , L.	(M. Chandan)
<i>Tectona grandis</i> , L.	(M. Sag)
<i>Terminalia bellerica</i> , Roxb.	(M. Beheda)
<i>Terminalia arjuna</i> , W. & A.	(M. Arjun-sadada)
<i>Tamarindus indica</i> , L.	(M. Chinch)
<i>Vauquaria spinosa</i> ,	(M. -----)
<i>Vitex negunda</i> , L.	(M. Nirgudi)
<i>Wrightia tinctoria</i> , Br.	(M. Kala kuda)
<i>Woodfordia floribunda</i> ,	(M. Dhayti)
<i>Zizyphus trinervia</i> , Roxb.	(M. ----)
<i>Zizyphus xylocarpa</i> ,	(M. Ghot bor)

An attempt has been made to classify the area for afforestation programme, on the basis of N,P,K contents and water potential

In general three groups were formed from the area in and around the Dhadgaon Mulgi depression such as,

- 1 High ground water potential area along with moderate N,P,K content, which includes villages such as Dhadgaon, Son Khurd, Dhanaje Budruk, Amla, Khardi, Achpa, Kodbapada and Khutwada.
- 2 High and medium ground water potential area along with moderate N,P,K contents. This area includes villages such as Vadphali, Pandharimati, Surgas, Mokas, Mulgi, Bijalgaon and Ambula.
- 3 Medium to poor ground water potential area along with medium N,P,K content. This area includes villages such as Telkhadi, Jugni, Kathi, Pimpalkhunta and Nigadi.

In order to have survival rate of plants for afforestation

programme the first area will likely to give better results since it has higher carrying capacity. However it is necessary to implement afforestation programme in the area with medium to low water as well as N,P,K potential, since this area is likely to become prone to erosion in due course of time.

So, it is suggested that along with hilly areas, the areas with second and third category as well as remaining area in Dhadgaon Mulgi depression needs to be taken up on priority so as to reduce the erosion and eventually reduce the increasing pattern of formation of barren areas.

TEAM OF RESEARCHER :

DR V R GUNALE, PROJECT DIRECTOR

PROF V S KALE, PRINCIPAL INVESTIGATORS,

DR N J PAWAR,

DR D N PATIL,

DR A S GADGIL,

DR D R SHIRKE

PROF. S.B. CHAPHEKAR, CONSULTANT.

Date : 7th Feb. 1995

Table No. 0.2 : Physico-chemical data for soils of SSP area, Maharashtra, India

S. No	Location	Colour	pH	E.C. umhos	S.M. %	O.M. %	O.C. %	CaCO3 %	N %	P Kg/ha	K Kg/ha	Exchangeable		
												Ca	Mg	K (meq/100g)
A7	22 Roshmal Kh-1	Pale olive	7.38	105	0.84	0.86	0.50	11.00	0.044	9.58	113.2	84	22	0.23
	23 Roshmal Kh-2	Gray	7.25	34	1.36	1.11	0.65	11.50	0.056	21.90	123.2	28	22	0.21
	24 Roshmal Kh-3	Dark olive gray	6.77	53	1.77	1.27	0.74	13.00	0.064	22.34	103.0	24	26	0.15
	25 Roshmal Kh-4	Very dark gray	6.59	104	1.47	1.20	0.70	11.00	0.060	25.98	100.8	33	23	0.17
	26 Roshmal Kh-5	Dark gray	7.27	40	1.51	0.87	0.51	13.00	0.044	68.76	91.8	30	29	0.14
	27 Roshmal Kh-6	Olive gray	6.74	43	1.32	1.50	0.87	10.00	0.075	32.52	123.2	28	27	0.21
	28 Roshmal Kh-7	Dark gray	6.85	26	1.55	1.18	0.69	11.00	0.059	4.93	72.8	33	32	0.21
	29 Roshmal Kh-8	Weak red	6.32	282	2.49	2.42	1.41	11.50	0.122	14.36	50.4	23	21	0.06
	30 Roshmal kh-9	Dark reddish gray	7.31	65	1.80	0.06	0.62	14.00	0.053	7.97	143.4	31	25	0.27
A10	37 Khuntamodi-1	Dark gray	6.76	22	2.00	1.07	0.62	15.50	0.054	33.15	173.6	33	20	0.16
	38 Khuntamodi-2	Olive yellow	6.98	31	1.54	0.54	0.31	15.00	0.027	6.90	42.5	16	18	0.06
	39 Khuntamodi-3	Gray brown	6.71	43	1.21	0.77	0.45	16.00	0.039	19.44	173.6	24	18	0.24
	40 Khuntamodi-4	Light gray	6.82	91	1.17	1.03	0.60	14.50	0.052	15.41	67.2	28	14	0.10
	41 Khuntamodi-5	Dark gray	6.78	56	1.14	1.23	0.72	10.00	0.062	2.69	229.6	26	24	0.35

Table 2.0. showing % forest canopy in the area investigated:

Locality/ site	Area Investigated M ²	Area under canopy M ²	Total canopy %	Canopy cover on 0.1 to 1.0 scale	Zone
Manibeli-A	10'000	0855	08.55	< 0.1	I
Manibeli-B	10'000	1900	19.00	0.2	I
Chimankhedi	10'000	1538	15.38	0.2	I
Dhankhadi	10'000	1824	18.24	0.2	I
Junana	10'000	1800	18.00	0.2	I
Bhusa	10'000	0078	07.83	< 0.1	I
Domkhedi	10'000	0809	08.09	< 0.1	I
Bilgaon	10'000	0735	07.35	< 0.1	I
Khardi	10'000	1722	17.22	0.2	I
Vadphali	10'000	4355	43.55	0.4	II
Pimpalkhunta	10'000	6133	61.33	0.6	II
Surgas	10'000	4355	43.55	0.4	II
Chikhali	10'000	2588	25.88	0.3	II
Roshmal	10'000	0650	06.50	< 0.1	II
Mal	10'000	0681	06.81	< 0.1	II
Sandvi Bk.	10'000	2066	20.66	0.2	III
Nigadi	10'000	1055	10.55	0.1	III
Khamla	10'000	3200	32.00	0.3	III
Devgoi Ghat	10'000	4800	48.00	0.5	III
Sitakhai Pt.	10'000	4400	44.00	0.4	III
Toranmal	10'000	0911	09.11	< 0.1	III
Amdari Pt.	10'000	0911	09.11	< 0.1	III
Khadki Pt.	10'000	2711	27.11	0.3	III
Toranmal Rd.	10'000	2688	26.88	0.3	III

I - Submergence zone, II - Catchment area zone, III - Influence zone.

ANNEX-XXIV.VII.

Sub: Comments on Sardar Sarovar Project : Work plan for Environmental Protection - Fisheries Sector, GOG.

Vol-1

Page No. 7: This page is missing.

Page No. 14, 2nd line: Appropriate figure may be filledup in the blank.

On page - 20, Para-1: last line appropriate figure may be filled up in the blank space.

Para-2: The objectives and goals of SSP may be modified to include conservation aspects within the meaning of Environment clearance given to the projects by MOEF in 1987.

Annexure-9 & Table-2, Point-1 & page 15:

Various Annexures may be referred to in the text. Analysis suggests that although production per ha. from Kadana reservoir is 22 kg. per ha, it is 114 kg per ha from Ukai reservoir. Based on the suggestions are needed for achieving optimum production from SSP.

Vol-2

Page-3: blank space in the top line may be filled up.

Page-14: The average productive area of the reservoir is given as 23000 ha. This is the average productive area of the entire SSP spread to the state of Madhya Pradesh & Maharashtra also. No. of fishermen & families proposed to be given employment are indicated as 2,200. If these are for Gujarat only the entire SSP may be clarified.

Annex-11: It seems probable that the requirement of the plan has been worked out based on the entire water spread. Necessary clarifications whether the plan projects the figures limited to Gujarat or for the entire SSP may be given.

Vol-3

On page 2, 4th para: Impact on estuary may be worked out within the scenerio projected in NWDTA. As such phase-1 to III may be recognised for predicting impacts at least for Narmada estuary.

On page-3 para-1, 4th line: "will not" may be replaced by may attract less nos. because the causal factors which induces Hilsa to migrate during February is not known.

Para-2: CWPRS studies which indicate downstream degradation & salinity ingress may be integrated.

4th para-7th line: A reference to endangered species may be avoided as Hilsa is well distributed & is not listed endangered as such.

Vol-4

Recommendations contained in the report prepared by M.S. University may need to be integrated. We suggest that a model scheme for Pisciculture may be given alongwith the cost estimates for mitigating effect of Environment on fish culture. The effects of fish culture on the environment may also be outlined with suggestion for compensatory measures.

NO.FDX-1190-3164-T

GOVERNMENT OF GUJARAT
PORTS & FISHERIES DEPARTMENT
Block No. 8, 2nd Floor
Sachivalaya, Gandhinagar.

Dated : 1st December, 1994.

TO:

✓ The Executive Member
Narmada Control Authority
Vishal Tower
Indira Complex, Navalakha
INDORE-452001

SUB : SARDAR SAROVAR PROJECT - WORK PLAN FOR
ENVIRONMENTAL PROTECTION - FISHERIES SECTOR

Sir,

With reference to the subject mentioned above,
I am directed to state that the Commissionerate of
Fisheries had prepared 4 volumes of work plan for
environmental protection in Sardar Sarovar Project.
These volumes are now updated, and a complete set of
the project is enclosed herewith for necessary action.
You are also requested to consider this project and make
necessary financial provision for the same.

Thanking you,

Yours faithfully,

Encl: Vol. I to IV.

m. s. Bhavsar

(M.S. BHAVSAR)
Under Secretary

SARFAR SARFAR PROJECT

WORK PLAN FOR

ENVIRONMENTAL PROTECTION

FISHERIES SECTOR

VOLUME - 1

NATIONAL BUREAU OF ENVIRONMENT STUDIES

SARDAR SAROVAR PROJECT
WORK PLAN FOR ENVIRONMENTAL PROTECTION
FISHERIES SECTOR
VOLUME I
GENERAL BACKGROUND & ENVIRONMENT STUDIES

1. INTRODUCTION

The population of Gujarat according to the 1991 population census, is 41.30 million and its area 1,96,000 sq. k.m. The density of population of this State is 211 per sq.k.m. The State has 19 revenue districts, 184 talukas, 18,569 inhabited villages and 264 towns. The working population of the State is 14.1 million, and marginal workers 2.52 million and the unemployed was 24.69 million (1991). 86 percent of workers depend on agricultural activities for their livelihood. Of the workers dependent on the agricultural activities, 33 percent are cultivators and 23 percent agricultural labourers.

The total reporting area of the State is 18.8 million ha., of which 9.9 million ha. are cultivated, 10.5 percent of the land is under use and 5.6 percent is of non agricultural use. Majority of the cultivated land depend upon rain fall. The annual rain fall ranges from less than 300 m.m. in the north west to over 2,000 m.m in the extreme south west. However most parts of the State receive a rain fall between 500 to 900 m.m. The rain fall is characterised by large variations of time.

Tapti, Narmada and Mahi are the major rivers contributing to the surface water resources, while the rivers in the north Gujarat and Saurashtra run off. The ultimate potential for surface water is estimated (as per the 6th five year plan) at 21 MAF. The cropping intensity is estimated to be around 108 to 109 for the last one decade. This is comparatively lesser than other States (such as Uttar Pradesh, Haryana, Punjab, etc). Low level of irrigation is said to be the reason for such a low cropping intensity in Gujarat.

Paddy, wheat, jowar, bajara and tur are the major food crops, while cotton groundnut and tobacco are the major cash crop. 84 percent of the total cropped area is occupied by the above mentioned crop. The crop pattern has more or less remained unchanged since 1960-61. While planning for the agricultural development of Gujarat, milk production animal husbandry, fish culture, etc need to be considered as associated activities. In spite of the constraints of water resources the farmer of Gujarat have been utilising available resources in an optional way for augmenting their income.

In spite of the low resources basis of the agrarian economy, the Gujarat farmer has shown immense capability of responding to marketing stimuli to maximise the returns from his meagre water and available land resources. Besides animal husbandry and milk production the farmers since have taken up fish culture in village ponds in an extensive way in South and Central Gujarat.

1.3. Sardar Sarovar Project

The proposed Narmada Project will provide a massive programme of land development in the State. The command area development strategy, which includes short term crops, will result in dramatic changes in the rural economy. The irrigation density also will increase considerably. Besides the food and cash crop the project will also provide economic opportunities for developing animal husbandry, forestry and fisheries in great a way.

Among the rivers of the Peninsular India, Narmada earns its importance by having a vast catchment area of 98,796 sq.km. which is spread over three States, namely Madhya Pradesh, Maharashtra and Gujarat. The river after originating from Amarkantak hills at an elevation of 1,057 m above MSL in Bilaspur District of Madhya Pradesh, flows through the state of Gujarat in its last lap of 140 kms before discharging in the Gulf of Cambay. A major dam, one in a series of 20 such dams, is being constructed over the river in Narmada, 11 kms upstream of the village of Navagam in Nanded taluka of Amreli District in Gujarat, as a hydel and irrigation project.

The total command area of the proposed reservoir is 34,867 ha. The dam is 1606 m. high and 1210 m. long with a spillway of discharge capacity of 87 cumecs. The main spillway will have 13 gates and auxiliary spillway will have 7 gates. The live storage capacity of the reservoir created upstream of the dam will have 4.27 Tmcft. The main canal with a capacity of 40,000 cumecs at the outlet will be the largest lined irrigation canal in the world.

Certain important geomorphic and hydrodynamic features of the proposed reservoir are given in the Annexure-1.

It is estimated that the building of the proposed reservoir would result in the submergence of 12 village consisting of 2,250 families and a population of 10,593 (1981 census). Certain parameters of socio-economic aspects of such villages, as per the survey conducted by the State Fisheries Department are given Annexure-2. Similarly, the ethnic group and different categories of population are listed and shown in Annexures 3 and 4.

1.3. Impoundment Impact on Fisheries

The effects of dams on rivers are well-known. The river practically dries up in the lower stretches or its flow is restricted only to certain periods. However, a large body of water will be raised in the upstream, changing the environment from fluvial to lacustrine, once the dam is built.

The major impacts of the project on the river system shall be:

a. A new environ (a large sheet of deep water body) shall come into existence and the river will undergo comprehensive morpho-ecological changes.

b. Since the river culminates in the Gulf of Cambay, a stretch of 143.07 km below, the dam is expected to experience repercussion due to limited discharge and affect the migration of anadromous fishes.

c. Due to change in fluvial pattern and restricted water drainage, oceanic intrusion towards the river is expected to take place in the absence of compromising factors. This will cause increase in the salinity regime and other conditions deleterious to the system. The biotic communities spectrum in the lower deltaic region. Migratory route of the Hilsa and Scampi shall be affected and this would result in poor/negligible output from these prime estuarine fisheries.

d. Human interference in the form of industrial, agricultural and domestic discharge shall inflict its own toll and would adversely affect the biological cycle. This is because the lower estuarine stretch is surrounded by large number of industries pouring effluents into this region of Barak.

e. The fishing craft and gear presently used may become obsolete and thus invite need for modifications to suit the new environment.

1.4. Compensation Measures.

The newly created industrial environment provides great potential and scope for fisheries development. The economic loss of fisheries of the down stream can well be compensated by proper management of fisheries in the reservoir to be formed. However, in the case of a river like Barak, where the anadromous fish like Hilsa and Giant Fresh Water Prawn (Scampi) form a substantial

other, it may be difficult to sustain these fisheries, as they are not likely to adjust to the lacustrine environment very easily. A few species of the Hilsa multiplying in the Ukai Reservoir in the adjacent forest (tributary) is a welcome sign, which could be adopted to develop a good fishery of the Hilsa in the proposed reservoir too. The existing biota in the river, including fish, is likely to be affected and a new biotic environment would emerge in the lacustrine system. The scientific intervention from the initial stages itself can make these environmental changes yield economic advantages and also, create employment potential to avert the social, displaced rural problem. The work plan, therefore, suggests economic and environmental compensation and nullify the harmful effects of the project as a whole.

It also envisages to provide employment to the families in the upper reaches and the deep stream of the river. The modern technique of reservoir fisheries development can establish a remunerative fishery in the proposed reservoir to employ several hundred displaced persons. The endangered species like the Hilsa and scampi will be introduced and multiplied artificially in the reservoir and also cultivated in ponds constructed in the water-logged areas and in the command area. This will help retaining these species within the aquasystem of the State and provide scope for employment to the affected families. The fishermen to be inducted to the new activities will be trained suitably and will be provided with fishing implements and marketing infrastructure on a co-operative basis.

iii. Habitat improvement, which encompasses norms taking into consideration population intensity (mortality, natality and supplementary stocking, if any) and potential fish yield based on tropho-dynamic model (Whingran, 1989).

To document the above referred studies, a data profile in time and space comprising all the components is a must. At present, when the impoundment does not exist, pre-impoundment phase studies mentioned at (i) and (ii) may be undertaken which shall be followed by (iii) after the impoundment sets in. The following components need to be studied for having in depth insight into the present trophic (pre-impoundment) status as well as trophic level to be attained subsequent to impoundment (post-impoundment).

Abstract components

a. bathymetric, morphological, climatological and meteorological features include:

- i. General bathymetry of the reservoir including mean depth.
- ii. Morphological features like index of silt development (ISD), volume development (DV), mean depth and maximum depth ratio (Z/Z_m) and development of the littoral area.
- iii. Climatological and Meteorological variables like rain, rainfall, maximum/minimum air temperature, wind velocity, solar radiation, inflow/outflow, flushing rate and reservoir level.

H. Physico-chemical regime of water and soil comprises:

Physical Factors.

Water

- i. Transparency
- ii. Colour of water
- iii. Water temperature, columnwise too (thermal stratification and heat budget).

Soil

- i. Texture

Chemical Factors.

Water

- i. Dissolved Oxygen (DO_2)
- ii. Carbon-di-Oxide (CO_2)
- iii. Total alkalinity
- iv. pH
- v. Calcium and Magnesium
- vi. Total dissolved solids (TDS)
- vii. Specific conductivity
- viii. Dissolved Organic matter
- ix. Chloride and Fluoride
- x. Edaphic factors nutrients-phosphates, silicate and nitrates.
- xi. Redox Potential

Soil

- i. Organic carbon
- ii. C/N Ratio
- iii. Available Phosphates
- iv. pH

vii. Dissolved organic carbon in

viii. Specific conductivity.

Biotic component

a) Qualitative and quantitative assessment of plankton in time and space, its seasonal patterns and diversity.

b) Qualitative and quantitative evaluation of the benthic population in time and space, its dynamics and diversity index.

c) Periphytic community in time and space, its structure and diversity.

d) Hydrophytic vegetation.

e) Microbial density contributing towards biodegradation.

f) Biology of the commercially fishes include - Food and feeding habits, length-weight relationship and condition factor, age and growth.

g) Juvenal prospecting studies so as to assess the present level of natural recruitment and post-impoundment impact.

The cost estimates of the hydro-biological studies have been offered in Annexure- 5 and the manpower requirement and the cost thereof are indicated in Annexure-6. ek

For monitoring the entire workplan for fisheries including the reservoir, estuary and Command Area, it would be necessary to have a separate cell headed by a Deputy Director of Fisheries at the State's Commissionerate of Fisheries. The cost of staff and contingencies for this cell is given in Annexure-6. 61

II. INLAND FISHERIES

Although Gujarat is a major maritime State and has been engaged in marine fisheries ever since pre independence days, the development of inland fisheries is recent and commenced only after the new State was formed in 1960. Though fish culture was not hitherto known in this region, it is established rather well in the rural areas of the State through the intensive fish culture programme and Fish Farmers Development Agencies (FFDA) of the State. The inland fish production which was practically nil (barring a few kilograms per year captured for subsistence by the inhabitants of the river banks and lake/strip banks) has since increased to about 20,000 tonnes in 1969-70 and has reached a level of 51,154 tonnes in 1979-80.

The recorded average is one of the widest varieties in the country and is known to have about 15,450 tonnes of fish per annum valued at Rs. 15.00 million. The fish production from the Marakanda reservoir for the last few years is given in Annexure-7.

the Central Commission on the Fish and Fisheries of the River
has sent Central Commission to the fishing, when the former Central Commission
has sent Central Commission to the Institute (CIPRI), Dehradun, carrying out
diverse investigations between 1955 and 1956. However, most of
these studies have been confined to the river stretch within State of
Haryana. Seven species of fishes belonging to 17 families
were found during these investigations. The commercial catch
comprised 11 species and the most important among them were
and *Channa argus*, *Hemibarbus*, *Labeo*, *Labeo* and *Labeo*.

Mulga Hill the siluriformes, especially a major species fisheries in the estuarine zone of the river. The annual average landings obtained from the estuarine area is about 12,000 tonnes during 1991 to 1993. Similarly Giant Fresh Water Prawn (*Macrobrachium rosenbergii*) also contributes to a rather good fisheries here, through both capture and culture operations, with an average annual production of about 300 tonnes.

2.2. Presently, there are about 12 completed irrigation projects in the State. The reservoir created by these projects provide a total reservoir area of about 1,10,000 ha. about 52 small medium and large projects are in different stages of completion and would provide an additional water spread area of 1,46,000 ha.

The State Fisheries Department has already taken up the reservoir development in the State through stocking, management and regional exploitation through co-operation and co-ordinate agencies. At the earlier Sardar Sarovar Project is in its initial stage, scientific investigation and the formulation of the development strategy would be possible in the beginning itself.

The national average of fish catch from the reservoir varies between 10 to 15 tonnes/ha. The reservoir in Gujarat however, have given a much higher rate of production. The average production of 10 of reservoir, between 1984-87 to 1991-92 was 341 tonnes/ha. It would be 41 tonnes/ha/annum. Similarly, the annual average production of Dhar, Dantwada and Kedana would be 39,118 and 21 tonnes/ha/annum respectively.

The first work plan for environmental effects for the fisheries sector was prepared as early as February, 1986. This work plan was, however, restricted to reservoir management. It did not take into account the effects of the post-impoundment on the Estuarine Fisheries. Subsequently, the work plan was further modified taking into consideration various aspects such as reservoir, estuarine, floodplain and development.

All these previous work plans have been examined and studied and after deliberations and discussions with different agencies involved, the final work plan has now been worked out. The main areas of coverage under this work plan would include the main reservoir, floodplain, and the estuary environmental developments. After considering the probable impact of the dam construction and developmental, socio-economic, technical and financial aspects.

2.1. Resources.

Several types of resources are available for sustaining the inland fisheries. The resources available are in the form of village ponds, reservoirs, floodplains, ponds, waterlogged lands, reservoirs, irrigation canals, rivers and estuaries. The total resources available at the present level of utilisation and fish production in the inland fisheries are 81.

Against a total catch potential of 151,907 tonnes of fish, the State Government has been producing 1,100 tonnes of fish. The inland fish production of the State for the last few years is given in the following table.

1

?

70

rearing fish seed in hapas (cages) made of synthetic fibre. Recovery level in such cage culture has been observed to be anything between 20 to 70%. Therefore, the State Department of Fisheries is presently improving and intensifying the cage culture for fish seed rearing, taking advantages of the available water sheds like lakes, ponds, minor irrigation tanks, etc.

Reservoir Production.

As indicated in the previous paragraph the reservoirs in India yield an average of 12 tons of fish per hectare per annum. The fish production from the reservoirs of Gujarat is, however, variable and sometimes to be higher. The fish production of a few reservoirs in the State is given in Table 2.1.

No.	Name of the Reservoir	Approximate surface area (ha)	Average annual production during 1971-1972	Production per ha (kg)
1	<u> </u>	30,000	3,364	114
2	<u> </u>	11,000	1,294	118
3	<u> </u>	1,100	181	39
4	<u> </u>	8,111	115	22

About 20% of the areas of small and medium reservoirs are being utilized in the Reservoir Fisheries Development Projects sponsored by the National Cooperative Development Corporation (NCDC) through the District Council (EDC) in the State.

2. Field of Vision

·72

first time in the year 1976 and it was subsequently revised in 1982. However, the leasing system was further revised and a still new leasing policy was adopted in December, 1990, which was subsequently revised in 1992. The salient features of this revised leasing policy (1992) is given in Annexure 12.

2.8. Fishermen and Fishermen Community

The fishermen engaged in inland fisheries are generally Machhis, Kahars (Bhois), Dubla, Kholos, Alupak, Nayak, Beels and other adivasi communities. Waghris, Thakedas and Harijans also are engaged in this pursuit in the many areas. Besides the above communities, several fish eating communities who are primarily agriculturist or agricultural labourers also do fishing in leisure time. Part-time fishermen, who are primarily agriculturist also take up fishing as a subsidiary occupation. Apart from these many are engaged in other activities like fish marketing, net making, net repairing etc.

2.9. Fishing Implements

Except in the estuary and large reservoirs fishing tackle used are simple and many a time without use of boats. The characteristics of fishing boats used in inland waters are given in Annexure - 13 and the particulars of the important traditional fishing gears used in inland fisheries are given in Annexure-14.

2.10. Fisheries Institutions

Fisheries development of the State is carried out through the State Fisheries Department. The primary, federal and Apex Cooperatives concerned with fisheries also are involved in the Inland Fisheries Sector. In addition, the State owned Gujarat Fisheries Development Corporation also plays significant role in this area. State Department of Fisheries is under the Secretariate Department of Agriculture, Cooperation and Rural Development. Majority of the developmental programmes are implemented through the State Department of Fisheries. Besides regional and district level offices of the Fisheries Department, there are special officers for special projects like fish farms, servicing centres, training centres, etc. The Fish Farmers Development Agencies established in 17 districts are providing technical and infrastructure facilities for fish culture development.

The other main organisations connected with the State fisheries development are:

- * Gujarat Fisheries Central Cooperative Association Ltd (GFCCA).
- * Gujarat Fisheries Development Corporation (GFDC)
- * Primary fisheries cooperative societies
- * The district level cooperative federations functioning in the districts of Kheda, Panchmahals and Valsad.

2.11. Marketing, Demand and Prices

Fresh water fish especially carps have a ready market in most of the cities and towns of the State. However, as fish fetches higher prices in metropolitan cities than the local markets, a portion of inland fish production of the State is transported and sold in Calcutta, Delhi and other cities. The role of middleman and fish merchants is less significant in inland sector than in marine fisheries. But in the large reservoirs fish merchants do operate in a significant way. It is rationally estimated that out of the present production of about 51,000 tonnes, about 9000 tones are exported outside the State, while the remainder is consumed within the State in fresh condition. The average retail prices of Major Carps (1992-93) is Rs.26.20 per kg. The retail and wholesale prices of inland fish varieties in the State during 1992-93 is given in the Annexure-15. Of late, large-sized Carps have also established great clientele in the overseas markets, especially in the Gulf countries, and many exporters are entering this field. These developments may push up the average price realization for the Indian Major Carps in the ensuing years.

2.12. State Development Plans

The Inland Fisheries Sector development received popular attention during the And Five Year Plan onwards. The main emphasis of the planning has been increasing the fish seed production, exploitation of Fisheries Resources, intensive fish culture and Fish Farmer Development Agencies and augmenting the fish

production. The 8th Five Year Plan has been drawn up by the State Department of Fisheries for the development of Inland Fisheries at an estimated cost of Rs. _____ million.

III. PRINCIPAL OBJECTIVES OF FISHERIES MANAGEMENT

The objective of any Fisheries Development Programme is to produce maximum quantity of quality fish in minimum time and investment, organize its harvest and effective marketing in order to yield a maximum level of socio-economic advantages. The present programme for fisheries development, under Sardar Sarovar Project, also aims at the above goal. The major components of the fisheries management programmes in the reservoir, command area and the estuaries are discussed hereunder.

3.2. Reservoir Fisheries Development

Principles of reservoir fisheries development envisages judicious stocking of economic varieties of fish at proper ratio, its conservation and discriminate exploitation, so as to obtain a maximum sustainable yield for a long period. This coupled with an efficient marketing system will ensure proper distribution of fish and maximum returns to the fishermen. The judicious selection of fish species for stocking the reservoir, to suit the environmental conditions thereof is also very important. The species selected should be able to utilise the biomass within the water body and convert the same into edible flesh.

3.3. Fish Culture in Ponds

The fish culture is akin to agriculture. Here also medium of production, namely the water body, is required to be prepared well with fertilisers before the fish seed is stocked. The stocked fish-seed is provided with supplementary feed and when they attain table size, they are harvested to ensure maximum production. Different varieties of fish are cultivated together for the full utilization of the biological production of the water body. To increase production, supplementary feeding and control disease are important.

3.4. Reclamation of Water-logged Areas.

The water logged areas unsuitable for agriculture have been reclaimed for such farms in the States of Karnataka, Orissa and Andhra Pradesh. Such areas have been converted into fish ponds where various varieties of fish are cultivated. The reclamation involves mostly bunding and very little excavation. The use of bulldozers and soil pumps can make the pond construction work much easier.

Taking into account a very vast area of about 150,000 ha. of waterlogged lands, the State Department of Fisheries drew up a waterlogged area development programme for conversion of such areas into fish culture ponds during 1992.

3.5. Hatchery Management

The seed of cultivable fishes is the main requirement in any fishery development. Breeding of most of the cultivated fish and prawns is difficult. This necessitates special hatcheries for breeding them and nursing them to stockable sizes. Under the proposed Work Plan, hatcheries of Major Carp, Hilsa and Giant Fresh Water Prawn will be required. The Carps can be bred successfully in the Chinese type Circular hatchery. Small nurseries, and rearing ponds, etc. are also required to rear the seed. The seed can be reared in cages and pens specially prepared for them.

The spawning of *Hilsa* has been perfected in India by stripping method. Freshly dead fish can also be used to produce fertilised eggs and hatching in rearing ponds. However, rearing of the hatchlings to stockable size is very difficult and the technology is yet to be perfected.

The breeding of fresh water prawn is also perfected in India and can be adopted in Gujarat. A few commercial hatcheries have since been established in south India, which are reported to be running satisfactorily.

The above issues of fishery management are discussed in detail in the following volumes of this document.

3.6. SUMMARY OF COST ESTIMATES

The summary of cost estimates for hydrobiological studies and Monitoring Cell are given below.

Sr. No.	Item	Estimated Cost (Rs.000)	
		Annual	5 year period
1.	Hydrobiological studies.	342	5165
2.	Monitoring Cell in the Fisheries Commissionerate of India, State		
	- Staff	303	1515
	- For agency	390	357
	Total	1035	7037

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11/1/79

WORK PLAN FOR FISHERIES

1. GENERAL BACKGROUND & ENVIRONMENT STUDIES

CHAPTER - 1

IMPORTANT MORPHOMETRIC & HYDRODYNAMIC FEATURES OF THE
SARDAR SAROVAR RESERVOIR

1	River bed level at dam pier site (RL)	101.60 M
2	Full reservoir level (H _{FL}) (RL)	133.10 M
3	Normal water level (RL)	140.21 M
4	Maximum free board (ft)	10.50 M
5	Free board provided at W.D.	10.50 M
6	Gross storage capacity	1.95 M m ³
7	Live storage capacity	1.50 M m ³
8	Dead storage capacity	0.45 M m ³
9	Usable storage capacity	1.05 M m ³
10	Gate opening at the reservoir	16.70 m
11	Average width of the reservoir	1.70 m

LOTUS/01/01
13-11-2009

WORK PLAN FOR FISHERIES I. GENERAL BACKGROUND & ENVIRONMENT STUDIES

ANNEXURE - 2

A. COMMON DETAILS OF THE POPULATION		
1	VILLAGE NAME SUBVILLAGE	
	Total	19
	Surveyed	14
2	POPULATION OF SUBMERGED VILLAGES	
	Total	10093
	Surveyed	12651
3	POPULATION OF DISTRICT	
	Total	2250
	Surveyed	2125
4	POPULATION OF SURVEYED	
	Surveyed	6388
	Surveyed	6263
5	POPULATION OF POPULATION SURVEYED	
	Population of 18 years	5483
	Population of 18 years	6665
6	POPULATION OF SURVEYED POPULATION	
	Population	2962
	Population	7657
B. EDUCATIONAL ATTACHMENTS OF A OF THE		
POPULATION		
1	POPULATION OF THE POPULATION AND	
	POPULATION OF THE	
	POPULATION OF THE	2050
	POPULATION OF THE	1183
2	POPULATION OF THE POPULATION	
	POPULATION OF THE	2929
	POPULATION OF THE	53
3	POPULATION OF THE POPULATION	
	POPULATION OF THE	3652
	POPULATION OF THE	8952
4	POPULATION OF THE POPULATION	
	POPULATION OF THE	1153
	POPULATION OF THE	967
5	POPULATION OF THE POPULATION	
	POPULATION OF THE	376
	POPULATION OF THE	290
	POPULATION OF THE	704
	POPULATION OF THE	767

[illegible]

PAGE 473 3

POPULATION ADJUSTED TO 1970 CENSUS VALUES OF ALABAMA STATE

TABLE 4	DOMESTIC UNIT FAMILIES	HOUSEHOLD FAMILIES	TOTAL FAMILIES	PERCENT APPLIED
Unemployed	1,100	115	1,215	100
Retired	10	11	21	100
Other Persons	180	100	280	100
Total	1,290	226	1,516	100

FORM 100-100 (10-1-74)
 100-100-100 (10-1-74) 100-100-100 (10-1-74)

100-100-100

100-100-100 (10-1-74) 100-100-100 (10-1-74)

DESCRIPTION	100-100-100 (10-1-74)	100-100-100 (10-1-74)	100-100-100 (10-1-74)	TOTAL
-------------	-----------------------	-----------------------	-----------------------	-------

100-100-100

100-100-100	100-100-100 (10-1-74)	100-100-100 (10-1-74)	100-100-100 (10-1-74)	100-100-100 (10-1-74)
100-100-100	100-100-100 (10-1-74)	100-100-100 (10-1-74)	100-100-100 (10-1-74)	100-100-100 (10-1-74)
100-100-100	100-100-100 (10-1-74)	100-100-100 (10-1-74)	100-100-100 (10-1-74)	100-100-100 (10-1-74)
100-100-100	100-100-100 (10-1-74)	100-100-100 (10-1-74)	100-100-100 (10-1-74)	100-100-100 (10-1-74)
100-100-100	100-100-100 (10-1-74)	100-100-100 (10-1-74)	100-100-100 (10-1-74)	100-100-100 (10-1-74)

100-100-100	100-100-100 (10-1-74)	100-100-100 (10-1-74)	100-100-100 (10-1-74)	100-100-100 (10-1-74)
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100-100-100	100-100-100 (10-1-74)	100-100-100 (10-1-74)	100-100-100 (10-1-74)	100-100-100 (10-1-74)
-------------	-----------------------	-----------------------	-----------------------	-----------------------

100-100-100	100-100-100 (10-1-74)	100-100-100 (10-1-74)	100-100-100 (10-1-74)	100-100-100 (10-1-74)
-------------	-----------------------	-----------------------	-----------------------	-----------------------

Percentage of 100-100-100: 92.11% ✓
 Percentage of others: 02.89% ✓

100-100-100 (10-1-74)
 100-100-100 (10-1-74)

NATIONAL PLAN FOR FISHERIES
I. GENERAL BACKGROUND & ENVIRONMENT STUDIES

ANNEXURE - 5

COST ESTIMATES FOR HYDROBIOLOGICAL STUDIES

SR.NO.	ITEM	ESTIMATED COST (RS:THOUSANDS)	
		FOR ONE YEAR	FOR FIVE YEARS
1	Office, Staff, Office	72	360
2	Staff Salary & Allowance	500	2400
3	Acqp. Books and Equipments	2	10
4	Honorary wages for Expert, Consultant	—	240
5	State Training in Hydrobiology	—	20
6	Contingency	10	50
	TOTAL	584	3120

UNPUBLISHED
REVISION 04/04

1. GENERAL BACKGROUND / HYDROBIOLOGICAL STUDIES
NATIONALLY REPRESENTATIVE HYDROBIOLOGICAL STUDIES
ADDITIONAL - 2

SR NO	DESIGNATION OF POSTS	NUMBER OF POSTS	ANNUAL EXPENDITURE ON SALARY & WAGES (Rs. THOUSANDS)	COST FOR 5 YEARS
1	Deputy Director, General Admin. (General) (11)	1	20	100
2	Deputy Director, General Admin. (Electrical) (10)	1	100	500
3	Deputy Director, General Admin. (Medical) (10)	1	100	500
4	Deputy Director, General Admin. (Civil) (10)	1	50	250
5	Deputy Director, General Admin. (General) (10)	1	50	250
6	Deputy Director, General Admin. (General) (10)	1	20	100
7	Deputy Director, General Admin. (General) (10)	1	10	500
	Sub-total		180	2000
8	Deputy Director, General Admin. (General) (10)	1	10	500
	TOTAL POSTS OF DEPT		190	2500

LIFE: 1975
1976-1977

WORK PLAN FOR FISHERIES 1. GENERAL BACKGROUND & ENVIRONMENT STUDIES

ANNEXURE - 7

REQUIREMENT OF STAFF & COST ESTIMATES OF THE
MONITORING CELL IN THE COMMISSIONERATE OF
FISHERIES, GUJARAT STATE (RS. THOUSANDS)

I. STAFF EXPENDITURE

SR NO	NAME OF THE POST	NUMBER OF PERSONS	ANNUAL COST (RECURRING) ALL AGED 100	COST ESTIMATE FOR 5 YRS
1	Div. Director of Fisheries	1	4000	4000
2	Super. of District	1	3000	3000
3	Asst. Commr.	1	2000	2000
4	Deputy	1	1000	1000
5	Peon	1	100	100
	Total		7000	7000
6	Head Clerk	1	1000	1000
	TOTAL			8000

II. OTHER STAFF

SR NO	NAME OF THE POST	NUMBER OF PERSONS	COST (RECURRING) ALL AGED 100	COST ESTIMATE FOR 5 YRS
1	Office Assistant	1	75	75
2	Peon	1	100	100
3	Peon	1	100	100
4	Office Assistant	1	125	125
	TOTAL		300	300
	GRAND TOTAL			8300

LOTUS:0107
R01:13.001

1984 FISH CATCH REPORT
 TONGAREVA AND LAKESIDE FISH CATCH REPORT

APPENDIX 1

ANNUAL FISH CATCH REPORT FOR 1984 ESTIMATES

YEAR	ANNUAL ESTIMATE FISH CATCH (kg)	PERCENTAGE IN TOTAL TONGAREVA FISH YIELD
1983-84	9,470	44.84
1984-85	10,111	44.87
1985-86	10,304	43.97
1986-87	11,139	44.10
1987-88	10,447	46.68
1988-89	11,107	40.29
1989-90	12,111	41.07
1990-91	12,111	37.11
1991-92	11,111	36.71
1992-93	11,111	30.71

LOWE & SONS
 PRINTING

1. *Staphylococcus aureus* (ATCC 12228) was grown in tryptic soy broth (TSB) (Difco) supplemented with 0.5% yeast extract (Difco) and 0.5% glucose (Difco) at 37°C. Cells were harvested at mid-log phase (OD₆₀₀ = 0.5) and washed with phosphate buffered saline (PBS) (pH 7.4) containing 100 μg/ml penicillin, 100 μg/ml streptomycin, and 100 μg/ml nystatin. Cells were then washed with PBS containing 100 μg/ml penicillin and 100 μg/ml streptomycin. Cells were then washed with PBS containing 100 μg/ml penicillin and 100 μg/ml streptomycin. Cells were then washed with PBS containing 100 μg/ml penicillin and 100 μg/ml streptomycin.

Figure 1. The effect of the concentration of the *Agrobacterium* suspension on the transformation efficiency of *Agrobacterium* strains. The *Agrobacterium* strains were grown in the YEA medium for 24 h at 28°C. The cell concentration of the strains was adjusted to 10⁸ cells/ml. The cell suspension was mixed with the plant tissue and the transformation efficiency was determined. The results were expressed as the mean ± SD of three independent experiments. The asterisk indicates a significant difference (*P* < 0.05) between the strains.

[illegible]

22. 2020

ANNUAL PLAN FOR FIDUCIARIES
FEDERAL BUREAU OF INVESTIGATION

ADDITIONAL 1951

ANNUAL PLAN FOR FIDUCIARIES

YEAR	INCOME FROM FIDUCIARY ASSETS	INCOME FROM FIDUCIARY ASSETS	PERCENTAGE OF INCOME FROM FIDUCIARY ASSETS
1951-52	100.00	100.00	100.00
1952-53	100.00	100.00	100.00
1953-54	100.00	100.00	100.00
1954-55	100.00	100.00	100.00
1955-56	100.00	100.00	100.00
1956-57	100.00	100.00	100.00
1957-58	100.00	100.00	100.00
1958-59	100.00	100.00	100.00
1959-60	100.00	100.00	100.00
1960-61	100.00	100.00	100.00
1961-62	100.00	100.00	100.00
1962-63	100.00	100.00	100.00
1963-64	100.00	100.00	100.00
1964-65	100.00	100.00	100.00
1965-66	100.00	100.00	100.00
1966-67	100.00	100.00	100.00
1967-68	100.00	100.00	100.00
1968-69	100.00	100.00	100.00
1969-70	100.00	100.00	100.00
1970-71	100.00	100.00	100.00
1971-72	100.00	100.00	100.00
1972-73	100.00	100.00	100.00
1973-74	100.00	100.00	100.00
1974-75	100.00	100.00	100.00
1975-76	100.00	100.00	100.00
1976-77	100.00	100.00	100.00
1977-78	100.00	100.00	100.00
1978-79	100.00	100.00	100.00
1979-80	100.00	100.00	100.00
1980-81	100.00	100.00	100.00
1981-82	100.00	100.00	100.00
1982-83	100.00	100.00	100.00
1983-84	100.00	100.00	100.00
1984-85	100.00	100.00	100.00
1985-86	100.00	100.00	100.00
1986-87	100.00	100.00	100.00
1987-88	100.00	100.00	100.00
1988-89	100.00	100.00	100.00
1989-90	100.00	100.00	100.00
1990-91	100.00	100.00	100.00
1991-92	100.00	100.00	100.00
1992-93	100.00	100.00	100.00
1993-94	100.00	100.00	100.00
1994-95	100.00	100.00	100.00
1995-96	100.00	100.00	100.00
1996-97	100.00	100.00	100.00
1997-98	100.00	100.00	100.00
1998-99	100.00	100.00	100.00
1999-00	100.00	100.00	100.00
2000-01	100.00	100.00	100.00
2001-02	100.00	100.00	100.00
2002-03	100.00	100.00	100.00
2003-04	100.00	100.00	100.00
2004-05	100.00	100.00	100.00
2005-06	100.00	100.00	100.00
2006-07	100.00	100.00	100.00
2007-08	100.00	100.00	100.00
2008-09	100.00	100.00	100.00
2009-10	100.00	100.00	100.00
2010-11	100.00	100.00	100.00
2011-12	100.00	100.00	100.00
2012-13	100.00	100.00	100.00
2013-14	100.00	100.00	100.00
2014-15	100.00	100.00	100.00
2015-16	100.00	100.00	100.00
2016-17	100.00	100.00	100.00
2017-18	100.00	100.00	100.00
2018-19	100.00	100.00	100.00
2019-20	100.00	100.00	100.00
2020-21	100.00	100.00	100.00
2021-22	100.00	100.00	100.00
2022-23	100.00	100.00	100.00
2023-24	100.00	100.00	100.00
2024-25	100.00	100.00	100.00
2025-26	100.00	100.00	100.00
2026-27	100.00	100.00	100.00
2027-28	100.00	100.00	100.00
2028-29	100.00	100.00	100.00
2029-30	100.00	100.00	100.00
2030-31	100.00	100.00	100.00
2031-32	100.00	100.00	100.00
2032-33	100.00	100.00	100.00
2033-34	100.00	100.00	100.00
2034-35	100.00	100.00	100.00
2035-36	100.00	100.00	100.00
2036-37	100.00	100.00	100.00
2037-38	100.00	100.00	100.00
2038-39	100.00	100.00	100.00
2039-40	100.00	100.00	100.00
2040-41	100.00	100.00	100.00
2041-42	100.00	100.00	100.00
2042-43	100.00	100.00	100.00
2043-44	100.00	100.00	100.00
2044-45	100.00	100.00	100.00
2045-46	100.00	100.00	100.00
2046-47	100.00	100.00	100.00
2047-48	100.00	100.00	100.00
2048-49	100.00	100.00	100.00
2049-50	100.00	100.00	100.00
2050-51	100.00	100.00	100.00
2051-52	100.00	100.00	100.00
2052-53	100.00	100.00	100.00
2053-54	100.00	100.00	100.00
2054-55	100.00	100.00	100.00
2055-56	100.00	100.00	100.00
2056-57	100.00	100.00	100.00
2057-58	100.00	100.00	100.00
2058-59	100.00	100.00	100.00
2059-60	100.00	100.00	100.00
2060-61	100.00	100.00	100.00
2061-62	100.00	100.00	100.00
2062-63	100.00	100.00	100.00
2063-64	100.00	100.00	100.00
2064-65	100.00	100.00	100.00
2065-66	100.00	100.00	100.00
2066-67	100.00	100.00	100.00
2067-68	100.00	100.00	100.00
2068-69	100.00	100.00	100.00
2069-70	100.00	100.00	100.00
2070-71	100.00	100.00	100.00
2071-72	100.00	100.00	100.00
2072-73	100.00	100.00	100.00
2073-74	100.00	100.00	100.00
2074-75	100.00	100.00	100.00
2075-76	100.00	100.00	100.00
2076-77	100.00	100.00	100.00
2077-78	100.00	100.00	100.00
2078-79	100.00	100.00	100.00
2079-80	100.00	100.00	100.00
2080-81	100.00	100.00	100.00
2081-82	100.00	100.00	100.00
2082-83	100.00	100.00	100.00
2083-84	100.00	100.00	100.00
2084-85	100.00	100.00	100.00
2085-86	100.00	100.00	100.00
2086-87	100.00	100.00	100.00
2087-88	100.00	100.00	100.00
2088-89	100.00	100.00	100.00
2089-90	100.00	100.00	100.00
2090-91	100.00	100.00	100.00
2091-92	100.00	100.00	100.00
2092-93	100.00	100.00	100.00
2093-94	100.00	100.00	100.00
2094-95	100.00	100.00	100.00
2095-96	100.00	100.00	100.00
2096-97	100.00	100.00	100.00
2097-98	100.00	100.00	100.00
2098-99	100.00	100.00	100.00
2099-00	100.00	100.00	100.00
2100-01	100.00	100.00	100.00

Balance marine?

WATER PLAN FOR FISHERIES
I. GENERAL BACKGROUND & ENVIRONMENT STUDIES

A. INEXHAUSTIBLE - 1.

INLAND FISH PRODUCTION IN OREGON STATE

YEARS	INLAND FISH PRODUCTION (LBS.)	TOTAL FISH PRODUCTION (LBS.)	PERCENTAGE OF PRODUCTION (%)
1910-19	1,111,111	14,111,111	7.8
1920-29	1,111,111	14,111,111	7.8
1930-39	1,111,111	14,111,111	7.8
1940-49	1,111,111	14,111,111	7.8
1950-59	1,111,111	14,111,111	7.8
1960-69	1,111,111	14,111,111	7.8
1970-79	1,111,111	14,111,111	7.8
1980-89	1,111,111	14,111,111	7.8
1990-99	1,111,111	14,111,111	7.8
2000-09	1,111,111	14,111,111	7.8

A. Estimated Production

1910-1919

1920-1929

Duplicate

WORK PLAN FOR FISHERIES
1. GENERAL BACKGROUND & ENVIRONMENT STUDIES

ANNEXURE - 11

FISH SEED PRODUCTION IN GUJARAT STATE

YEAR	LOCAL FISH SEED PRODU- CTION [LAKH SPANND]	FRY EQUIV- VALENT [LAKH NUMBERS]	FINGERLINGS EQUIVALENT [LAKH FINGERLINGS]
1980-81	147	44.10	13.27
1981-82	402	120.60	36.18
1982-83	495	121.50	36.25
1983-84	468	143.40	42.11
1984-85	460	158.60	41.50
1985-86	756	206.80	68.04
1986-87	890	261.00	79.11
1987-88	789	256.70	77.41
1988-89	1842	552.60	168.11
1989-90	2150	657.00	197.11
1990-91	4008	1192.52	362.5
1991-92	3196	1637.41	541.11
1992-93	5643	1741.47	432.21
1993-94	7461	2272.52	456.96 [Anticipated]

LOTUS:CHE/11

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WORK PLAN FOR FISHERIES
1. GENERAL BACKGROUND & ENVIRONMENT STUDIES

ANNEXURE - 12

SALIENT FEATURES OF THE RESERVOIR LEASING POLICY (1992)

I. CLASSIFICATION OF WATER SHEETS

- Village ponds upto 20 hectares
- Small irrigation tanks and checkdams upto 1200 hectares
- Medium irrigation reservoirs 1200 to 5000 hectares
- Large reservoirs above 5000 hectares
- Rivers, gorges and lakes

II. DEVELOPMENT PATTERN

Water Sheets

Pattern of Leasing

- | | |
|---|--|
| 1. Village Ponds upto 20 ha. | To be leased out by the village panchayats concerned, as per a separate policy |
| 2. All water-sheets above 20 ha such as village tanks, reservoirs, checkdams, pickup wells etc. | Fishing rights to be given on lease on competitive price |
| 3. Rivers, gorges and estuaries | Licensing |

III. LEASE AND LICENCE

- | | |
|---|---|
| 1. Rivers, gorges & lakes | Not under fish culture
to be licenced by the District Fisheries officer @ Rs.100/year w/ boat and Rs.50/year without boat from 1st July to 30th June |
| 2. All Water-sheets upto 20 ha other than those of Saurashtra, Kutch, Mehsana and Sabarkantha | Can be reserved for FFAs |
| A. All water-sheets upto 200 ha FRL of the Districts of Saurashtra Kutch and North Gujarat | Can be reserved for the FFAs |
| B. Water-sheets upto 2000 ha FRL of Tribal areas | Reserved for Tribal Co-operative societies

if no beneficiary is coming forward as above, they can be short-tendered for 2 years |

IV. ANNUAL UPSET PRICE

A. The upset price shall be fixed on 50% of the FRL area for the water sheets falling in the districts of Saurashtra, Kutch, Banaskantha and Mehsana

B. Upset price shall be fixed on 75% of the FRL of the water sheets falling in the districts of Vadodara, Ahmedabad, Gandhinagar Panchmahals and Sabarkantha districts

C. Upset price shall be fixed on 100% of the FRL for the water sheets falling in the districts of Kheda Bhavnagar, Surat, Valsad & Dangs

Upset price

Upto 25 ha	Rs. 350 per hectare/year
From 26 to 100 ha.	Rs. 300 per hectare/year
From 101 to 200 ha.	Rs. 250 per hectare/year
From 201 to 500 ha.	Rs. 200 per hectare/year
From 501 to 1200 ha.	Rs. 150 per hectare/year
From 1201 hectares onwards	Rs. 100 per hectare/year

V. COST OF FISH SEED

The lessee has to bear the cost of seed stocked in the watershed leased out to him.

VI. SANCTIONING AUTHORITY

<u>Water sheets</u>	<u>Designation of sanctioning authority</u>
Upto 100 hectares	District Fisheries Officer
From 101 to 500 hectares	Regional Fisheries Officers
From 501 to 2500 hectares	Commissioner of Fisheries
From 2501 hectares onwards	Administrative Department in Government of Gujarat

VII. LEASE PERIOD

Ten years, each year commencing from 1st July up to 30th June. However, the lease period covered under specific schemes shall have the lease period as per the rules of the schemes.

VIII. GENERAL CONDITIONS

The lessee cannot sublease/transfer the lease without the prior sanction of the Commissioner of Fisheries

Fish seed stock is required to be done as per the ratio fixed by the Commissioner of Fisheries

The local Fisheries Co-operatives, who were operating in the water sheets before 1.7.1990, shall have a price preference upto 20%. The co-operative societies organized after 1.7.1990 will have a price preference upto 10%.

WORK PLAN FOR FISHERIES
1. GENERAL BACKGROUND AND ENVIRONMENT IMPACT

ANNEXURE - 13

CHARACTERISTICS OF THE INLAND FISHING BOATS

SR NO	TYPE OF BOAT	LOA (m)	Tonnage	CONSTRUCTION PATTERN
1	Wooden Flat Bottom boat (small)	3.75 to 4.55	0.5 to 1.0	Made of Mango wood. Plank built transom stern. Open. Carvel type
2	Wooden Flat bottom boat	3.75 to 4.55	1.5 to 4.0	Teak plank built. Rinker type transom stern. Fore & aft decked.
3	Tin Plank bottom boat	3.75 to 4.55	-	Transom stern. With wooden frame and GI sheet body
4	Teak plank built Boat	3.75 to 4.55	1.5 to 4.0	Teak plank built. Carvel type

LOTUS: ONE 13
F08:15.04.03

WATER PLANT FISHERIES
GENERAL MANAGEMENT AND ENVIRONMENT STUDIES

ANNEXURE - 14

TABLE 14.1: LISTING OF GEAR USED IN INLAND
FISHERIES OF CHHATTISGARH

SR NO	NAME OF THE FISHING GEAR	SPECIFICATIONS OF A UNIT OF GEAR	MATERIAL USED	AREA OF OPERATION
1	Small Net	Length: 2-400 M Depth: 10-20 mesh Mesh: 7.5 - 10 cm	Nylon/ Monofilament	Rivers, Reservoirs, Estuaries
2	Small Net	Length: 2.5 - 12 m Depth: 100 - 200 mesh Mesh: 10-15 cm	Nylon	For Hilsa
3	Small Net	Length: 10 - 20 m Depth: 10 - 100 mesh Mesh: 3-6 cm	Nylon/ Monofilament	Estuaries/ Rivers/ Ponds
4	Small Net	Length: 2.5 - 25 M Depth: 10 - 15 mesh Mesh: 10-15 cm	Cotton/ Nylon	Rivers/Tanks Gorges/Reservoirs
5	Small Net	Length: 1.5 - 15 M Depth: 10 - 15 cm	Monofilament	Estuaries
6	Small Net	Length: 3 - 6 M Depth: 10 - 15 cm	Cotton/ Nylon	Estuaries/ Rivers/Tanks Reservoirs

LOTUS: 0001
URN: 15.04.9

WORK PLAN FOR FISHERIES
 (LATERAL BACKGROUND & ENVIRONMENT STUDIES)

EXHIBIT - 15

AVERAGE RETAIL PRICES OF THE
 COMMON FISH IN GUJARAT

(1972-1993)

FISH VARIETY	RETAIL PRICE (RUPEES/KILOGRAM)
Catla	29.38
Rohu	27.04
Mrigal	27.30
Calbasu	27.15
Minor Carp	20.18
Grey Mullet	18.10
Shrimp (medium)	55.99
Shrimp (small)	32.86

LCRUS: DMC 15
 FRN: 15.04.1991

ENVIRONMENTAL PROTECT

WORK PLAN FOR

ENVIRONMENTAL PROTECTION

ENVIRONMENTAL PROTECT

ENVIRONMENTAL PROTECT

ENVIRONMENTAL PROTECT

ENVIRONMENTAL PROTECT

SARDAR SAROVAR PROJECT

WORK PLAN FOR ENVIRONMENTAL PROTECTION

FISHERIES SECTOR

VOLUME II

FISHERIES DEVELOPMENT IN THE MAIN RESERVOIR

1. INTRODUCTION

It is already mentioned in the earlier volume that a newly created man made lake can provide great potential for development of fisheries. With the proper management of the proposed reservoir the economic loss that may be sustained by the loss of commercial fisheries in the down stream can be compensated to a great extent. It is also very important when scientific management is initiated and how best the fish population in the water body is manipulated by proper stocking and exploitation management.

In a reservoir three distinct trophic phases are observed. The first phase, known as the "Trophic Burst", is characterised by increased fertility of water by washed off nutrients from the catchment area and the submergence of the new soil and the decomposition of large quantity of organic matters. This increases food reserve and this combined with a thin population of fish results in intensive growth of the ichthyomass. This phase lasts for about 5 to 10 year after the first impoundment. In the second phase, the "Trophic Depression", the decomposition of the organic matter and lesser wash off from the catchment area, etc. are observed and the growth of ichthyomass and other biomass is

inhibited. This phase lasts for 10 to 30 years. In the third phase, the hydro-biological conditions stabilize and increased fertility and food reserves are observed. These conditions slowly reach a peak and a stabilised eco system is formed. The level of fertility depends on the general climatic conditions, soil characteristics, etc., of the area, where the reservoir is situated. The best time to initiate the development of fisheries in the reservoir is during the first "Trophic burst". Sufficient number of seed of quality fishes are required to be introduced during this period. They will multiply fast and will establish rich fishery. If adequate stocking of quality fish seed is not done during the first phase, some trash/uneconomic minor fish varieties will start multiplying quickly and will occupy all the reaches of the eco system. It would be very difficult for the economically important fish varieties to grow and establish subsequently.

1.2. Background

Reservoir Fisheries Development in Gujarat has been initiated as early as in the late sixties. The reservoirs like Ukai, Kadana, Dharoi, Panam etc. are being stocked and developmental activities taken up by the Government of Gujarat during the last two decades. The fish production in these reservoirs is also higher when than compared to the general average production in the country as a whole. While the average production from the reservoirs in India is 8 to 12 kg./ha/annum, the production from the major reservoirs of Gujarat vary from 22 to 114 kg./ha/annum. Besides the major reservoirs, 55 small and medium reservoirs, with a total

waterspread area is hectares, are being developed in a special project financed by the National Co-operative Development Corporation (NCDC). A reservoir fisheries development project sponsored by European Economic Community (EEC) has also been initiated.

The State has developed an effective technology for developing large and medium reservoir. The organisational skill for the exploitation of reservoir and post harvest technology of handling and marketing based on the cooperative footing, is also well developed in the State.

II. SARDAR SAROVAR

The 134.68 m high and 1210 m. long dam at Navagam will be the largest gravity dam in the world, in terms of volume concrete involved while it ranks so far as spillway discharge capacity (87,000 cumecs) is concerned. Live storage capacity of the reservoir will be 4.73 MAF. The total catchment area of the reservoir will be about 93,796 sq.km. The important morphometric and hydro-dynamic features of Sardar Sarovar is given in Annexure- The total waterspread area of the proposed reservoir is 34,357 ha. Such a large reservoir provides opportunities to develop remunerative fishery and will give employment to several hundreds displaced rural families.

2.2. Social Impact

It is estimated that 19 villages consisting of 2250 families and the population of 10,573 (1981 census) are affected by the submergence. As per a recent survey conducted by the State

Fisheries Department (the details of which has already been given in the Volume I), it has been revealed that out of the 2125 families surveyed 704 families have shown willingness to accept fisheries as a vocation. While 298 families have already undertaken fisheries activities in the adjoining areas as a subsidiary occupation, training and incentives to these displaced families will enable them to establish themselves as regular fishermen in newly created reservoir.

III DEVELOPMENT STRATEGY

Strategy for the development of fisheries in the reservoir will be judicious stocking of selected varieties of Carps at the optional numbers and sizes. For the first three years, advanced fingerlings of the Major Carps will be purchased and stocked in the reservoir. It is proposed to establish a fish-farm, with sufficient bearing space near the dam site itself for raising required stockable fish seed in adequate numbers.

The displaced persons will be given training in reservoir capture fisheries. They will be grouped to form primary cooperative societies on the periphery of the reservoir. The trained persons and/or their co-operative will be provided with boats, nets, landing facilities, storage facilities, etc so as to enable them to capture and market fish produced in the reservoir. The primary societies will be brought under a Apex Cooperative or a Board in which the three States viz. Gujarat, Madhya Pradesh and Maharashtra will be having control.

3.2. The Reservoir Fisheries Development will have the following components:

1. Construction of rearing ponds near the dam site. ✓
2. Purchase of advanced fingerlings of Major Carps for stocking the reservoir in the initial three years of impoundments. ✓
3. Building up fisheries infrastructure, such as ice plant and cold storage facilities, transportation vehicles, carrier vessels, landing centre and the capture implements like the boats and gear. ✓
4. Training and extension services. ✓
5. Establishment of primary cooperative societies and assistance for formulation of Apex Cooperative Board. ✓
6. Enforcement unit for enforcement of fishing regulations. ✓

IV. PROJECT CONCEPT

The main objectives of proposed project would be to develop a rich fishery in the barrier Sarnovar by introducing the quick growing Major Carps at the right time in the right quantity and right size. The fisheries resources will be exploited by the primary cooperative societies formed mainly from the displaced families. The fishermen will be trained reservoir capture fishing and will also be engaged in fish culture so as to get maximum quantity of fish for their livelihood. Hatchery will be established to produce large quantity of fish seed of desired varieties using modern technology of. The hatchlings will be reared in rearing ponds at the dam site.

An apex Board/agency will be formulated in which all the three participated States will have a control. It is proposed that the entire development of the reservoir will be done through this board constituted.

V. PROJECT DETAILS

The details of various components of the Reservoir Fisheries Development Project and their cost are summarised below. The project costs are estimated basing on the price level of 1993.

5.2. Hatchery & Rearing Ponds

The average waterspread area of the proposed reservoir can be worked out as 24.131 ha. The total requirement of advanced fingerlings will, therefore, be about 58 lakhs @ 250 fingerlings per hectare. The Department of Fisheries has successfully perfected the Chinese Circular Hatchery technology and has been successfully producing more than its requirement in terms of Major Carps spawn. The Southern Gujarat is very much conducive for hatchery operations and hence the spawn-need of the reservoir can very well be produced in the hatcheries operating in the South-Gujarat districts. The spawn could be transported to the rearing ponds in the vicinity of the reservoir and could be grown to advanced fingerling stage. Hence, there is no need to go for a hatchery for this project.

In addition to the stocking of Major Carps, fingerlings of Sport Fish, like the Mahaseer/rohi will also be stocked and the breeding of this species also could be taken up in the hatcheries of South Gujarat.

The cost estimates of the rearing ponds/nurseries, as given in Annexure-III, will be about Rs.11.03 million. The estimated cost

of the staff and operations for the rearing centre would be Rs.1.142 million per annum and Rs.5.725 million for a period of five years, as detailed in Annexure-IV.

The physical and financial phasing of the project are detailed below:

Year	Physical coverage	Financial Requirement (Rs. Million)			
		Capital	Staff	Operation	Total
1984-85	Rearing & operation	03.00	0.795	0.150	0.945
1985-86	-do-	08.03	0.795	0.400	1.195
1986-87	-do-	00.00	0.795	0.400	1.195
1987-88	-do-	00.00	0.795	0.400	1.195
1988-89	-do-	00.00	0.795	0.400	1.195
Total		11.03	1.975	1.750	5.758

5.3. Initial Stocking of Advanced Fingerlings

It is very essential that desirable fish seed is stocked in the reservoir in the initial trophic phase (trophic burst), so as to give an advantage to the economic fish varieties to establish themselves in the reservoir. The operation of the rearing unit will take sometime to come into full operational level and hence it is proposed that during the first two years of inauguration, 5.6 million advanced fingerlings of 70-90 mm size will be purchased every year and stocked in the reservoir. The total anticipated cost of these fingerlings (including a transport cost @ 15%) would be Rs.3.90 million, as detailed below.

Year	Cost of 5.8 million fingerlings. (Rs.million)	15% Transport cost (Rs.million)	Total (Rs.million)
I	2.90	0.435	3.335
II	2.90	0.435	3.335
Total	5.80	0.870	6.670

5.4. Building up Fishery Infrastructure

For proper harvesting and marketing of the catch, it is proposed to provide various fishing infrastructure like fishing boats, gear, assembly sheds, transport vehicles, carrier boats, ice and cold storages, weighing scales, packing sheds, etc. Most of the fishermen to be engaged will be those displaced from the area. Government is envisaged to provide 720 fishing units, each comprising of a boat and a pair of fishing gear. The fishermen will be organised under primary co-operatives. It is proposed to organise 120 primary co-operatives with a total membership of 2200 fishermen. The societies will be located at various points on the periphery of the reservoir. The finance for the implementation of the infrastructure will be channelled through the proposed District/State level Apex Co-operative of the Gujarat. The apex organisation will take care of the implement supplies and arrange the marketing of the catch. It is proposed to have 12 assembly centres to be managed each by a co-operative society. Each centre would receive the fish catch from about 20 boats and it is also proposed to have assembly centres at a convenient place to be managed by the central Organisation. For

quick and effective transport of fish, three carrier boats and three transport vehicles are to be provided to the Central Organisation. Each assembly centre will be provided with insulated storages, weighing scales etc. The cost estimates of these infrastructure is given in Annexure 5.

These facilities are to be provided over a period of 5 years after the impoundment or the year of first stocking.

5.5. Training & Extension Services

Before providing the infrastructure for fishing, it would be necessary to train the fishermen in the modern fishing methods. It is contemplated to impart training of three months duration to 1500 persons during a period of five years. The training will be of practical nature for deployment of boats and nets, net fabrication, net mending, fish handling, preservation, storage, packing transport and marketing. They will also be given preliminary knowledge about the principles of cooperative organisation, accounting banking and advantage of savings.

For imparting training, the existing facilities available with the State Department of Fisheries will be partly used, while it will be necessary to have a training-cum-extension centre exclusively for the Project. The cost estimates for the training and extension centre is Rs:8.72 million, as shown in Annexure 6.

The phasing of the physical and financial coverage are detailed in the following table.

Year	Physical Coverage	Financial Requirement (thousand Rs.)		
		Capital	Operational	Total
1994-95	Civil Works	700	000	700 ✓
1995-96	Equipment & others	1550	1294	2844 ✓
1996-97	-	000	1294	1294 ✓
1997-98	-	000	1294	1294 ✓
1998-99	-	000	1294	1294 ✓
1999-2000	-	000	1294	1294 ✓
Total		2250	6470	8720

5.6. Assistance to Apex Organization & Primary Societies

For the effective implementation of the various components of the reservoir development plan, it is proposed to have an Inter State Reservoir Development Board, which will have the overall control of the reservoir fisheries management. The apex co-operative organization of the respective State will function, as per the regulation laid down by the said board. Since the Board is to be formulated, with contributions from all the three participating States and with the approval of the Government of India, the cost estimates of the establishment and running of the Board is not given here.

However, for the establishment and management of the various programmes of work under this plan, it is proposed to provide financial assistance to the Gujarat Fisheries Central Cooperative Association Ltd. to the tune of Rs.1.705 million as detailed below:

A. Staff.

Name of posts	Numbers	Annual expenditure (Rs.000)	Total expenditure for 5 years (Rs.000)
Senior Manager	1	51	255
Manager	2	90	450
Total	-	141	705

B. Share capital - -- 1000

C. Grand Total (A+B) - -- 1705

It is also proposed to give managerial assistance @ Rs.500/month/cooperative for 5 years and also contribute to the share capital of the cooperative @ 20,000/society.

The details of expenditure will be as shown below:

Item	Amount required for 5 years (Rs.000)
1. Managerial assistance to 10 Cooperative @ 500/month for 5 years	300
2. Share capital to 10 cooperatives @ Rs.20,000/society	200
Total	500

Thus the total financial requirement under this programme would be Rs.2.205 million.

5.7. Management and Enforcement

It has been indicated earlier that an Inter State Board will have overall control of the reservoir fisheries development. However, for the implementation of the state level activities of different programmes under various workplans, it is necessary to have management staff with the State Department of Fisheries of Gujarat.

The Sardar Sarovar Project work plans will be looked after by a unit headed by a Deputy Director of Fisheries, assisted by an Assistant Director of Fisheries, Superintendent of Fisheries and administrative staff. In the same way, for the enforcement of fishing regulation a separate enforcement unit is proposed. The staff for this enforcement unit will be drawn on deputation from the State Police Department. It is necessary to provide vehicles and speed boats to the enforcement staff.

The total cost of this programme is estimated at Rs.8.14 million, as worked out in Annexure 7.

The Enforcement staff will be working directly under the Inter State Board so as to enforce the regulations based on a common policy.

VI. SUMMARY & COST ESTIMATES

The total cost estimates for the work plan for the Reservoir fisheries development is Rs.55.131 million. Out of this, Rs.11.443 million will be capital expenditure on infrastructure, Rs.27.005 million will be the operational cost and Rs.16.683 million will be incentive in the form of loan and subsidy. The details thereof are summarised below;

Programme	Capital	Operational	Grant (loan/subsidy)	Total
1. Nursery and Rearing ponds	05.193	5.725	00.00	14.918
2. Initial stocking of advanced fingerlings	00.00	6.670	00.00	06.670
3. Expanding the existing structure	00.00	0.000	14.478	14.478
4. Training and Extension services	02.250	6.470	00.000	08.720
5. Assistance to Apex Organisation & Primary Co-operatives	00.000	0.00	02.205	02.205
6. Hatchery & Fertilisation	00.000	8.140	00.000	08.140
Total	11.443	27.005	16.683	55.131

(All figures in Million Rs)

VII. PROJECT BENEFITS

*This is for an
the 3 states put
together
What is the area in sqm?*

The average productive area of the proposed reservoir is estimated at 21,200 ha. From the experience gained from the development of reservoirs like Bhait and Dharoi, it is envisaged that a production level of the Brachydanio can be achieved in the Sardar Sarovar at full development. Thus the annual production will be 2320 tonnes valued at Rs. 4.40 million @ Rs. 1.90 kg at the tank site.

The fishing activities in the reservoir would give permanent employment to 100 families. The indirect employment on account of construction work, boat building, gear fabrication, fish handling and marketing will be several thousand mandays annually.

The presence of Brachydanio in cages and culture of fish in pens along the reservoir margin is expected to provide permanent employment to 1000 rural families.

The other several benefits generated by the Project will be the availability of additional fish in the terminal markets as well as in the neighbouring areas of the reservoir, contributing to the nutritional standards of the population.

The programme-wise employment opportunities created through the implementation of the Reservoir Project is summarised below.

Sr. No.	Programme	Direct Employment (No. of families)	Indirect Employment (Thousand Mandays)
1.	Nursery & Rearing Ponds	20	442.400
2.	Initial stocking	--	3.480
3.	Building up of fishery infrastructure:		
	a) Fishing	2200	--
	b) Fish handling	--	9.280
	c) Fish marketing	--	23.200
	d) Net making and mending	--	22.500
	e) Boat building	--	1.500
	f) Construction of assembly sheds	--	1.050
	g) Ice and cold storage	10	11.200
7.	Training and Extension Services.	10	--
8.	Assistance to Cooperative Apex Organization and primary Societies.	15	--
9.	Management and Enforcement.	21	--
TOTAL		2276	514.61

NSA:RMD_2

KPN:25.03.94

WORK PLAN FOR FISHERIES

II. FISHERIES DEVELOPMENT IN MAIN RESERVOIR

ANNEXURE - 1

IMPORTANT MORPHOMETRIC & HYDRODYNAMIC FEATURES OF THE
KARNATAKA SAFARU RESERVOIR

1	Minimum level of the dam site (m)	18.30 M
2	Full supply level (FSL) (m)	138.68 M
3	Normal water level (NWL) (m)	140.21 M
4	Maximum water level (m)	110.04 M
5	Area of impoundment (sq. km)	34867.00
6	Gross storage capacity	0.95 M ha
7	Live storage capacity	0.57 M ha
8	Dead storage capacity	0.37 M ha
9	Length of the reservoir	214.00 Km
10	Maximum width of the reservoir	16.10 Km
11	Average width of the reservoir	1.77 Km

LOTUS:TW01
KRN:15.04.74

WATER PLAN FOR FISHERIES
 1. FISHING DEVELOPMENT IN THE LAKE RESERVOIR

ANNEXURE - 2

WATER REQUIRED FOR FISHERIES,
 1974-75 TO 1978-79

SR NO	DESCRIPTION	UNIT
1	Average water per acre of 10 Rozar area	25,131 cu
2	Standard size of advanced fingerling	90 gm
3	Requirement of fingerling @ 250/ha	58.14 cu
4	Standard fingerling @ 100 gm required to produce 50 lakh advanced fingerling @ 250 gm each of 1 ha	58,145 cu
5	Requirement of water to produce 50 lakh advanced fingerling @ 250 gm each of 1 ha	108,46 cu
6	Area required to produce 10 lakh advanced fingerling	276.16 ha
7	Area required to stock 175.16 lakh @ 100 gm each of 1 ha	62.19 ha
8	Area required to stock 1,000 lakh @ 250 gm each of 1 ha	27.60 ha
9	Area required to stock 100 lakh standard fingerling @ stocking rate of 2 lakh per hectare	44.25 ha

LCR: 1974
 LRR: 1974

*Requirement of water
 would be to
 manage the fish
 reservoir*

WORK PLAN FOR FISHERIES

II. FISHERIES DEVELOPMENT IN THE MAIN RESERVOIR

ANNEXURE - C

COST ESTIMATES FOR 44.25 HA. LEASING SPACE FOR THE
PRODUCTION OF MAJOR CAPP & MARSEER (CR. THOI SAHDS)

LEASING SPACES 44.25 HA. LEASINGCIVIL WORKS

Site preparation	142.50
Earthworks	4425.00
Bank protection	750.00
Water supply	1125.00
Fencing & gates	582.50
Watchman's hut	100.00
Engineering	100.00
Administrative building	150.00
Staff Quarters	400.00
Sub total	9353.00

EQUIPMENT

Jeep	260.00
Open truck	320.00
Water pumps	100.00
Fingerling nets	70.00
Hoses	20.00
Transport containers	50.00
Sub total	890.00

BASE COST ESTIMATES

Civil works	9353.00
Equipment	890.00
Physical contingencies 10% of the civil works	1933.00
Total with contingencies	11981.00

LOTUS: TMOJ
KRN; 16.04.94

UNITED STATES DEPARTMENT OF AGRICULTURE

DEPARTMENT OF AGRICULTURE, OFFICE OF THE SECRETARY

WASHINGTON, D. C.

RECEIVED: MAY 17 1964

UNITED STATES DEPARTMENT OF AGRICULTURE		DATE RECEIVED	OFFICE OF THE SECRETARY
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WORLD PLAN FOR FISHERIES
II. FISHERY DEVELOPMENT IN THE HAIN RESERVOIR
ANNEXURE - C

COST ELEMENTS FOR INVESTMENT IN FISH FARMING: THOUSANDS

SERIAL	ITEMS	LOAN	SUBSIDY	TOTAL
I	FISHING IMPLEMENTS			
	1. Cost of 720 boats @ Rs. 2000/-	2160	2160	4320
	2. Cost of 15.0 tonnes of nylon net @ Rs. 1000 per tonne	1500	1500	3000
	Sub-total	3660	3660	7320
	3. Cost of 15.0 tonnes of nylon net @ Rs. 1000 per tonne	1500	1500	3000
	4. Cost of 15.0 tonnes of nylon net @ Rs. 1000 per tonne	1500	1500	3000
	5. Cost of 15.0 tonnes of nylon net @ Rs. 1000 per tonne	1500	1500	3000
	6. Cost of 15.0 tonnes of nylon net @ Rs. 1000 per tonne	1500	1500	3000
	7. Cost of 15.0 tonnes of nylon net @ Rs. 1000 per tonne	1500	1500	3000
	8. Cost of 15.0 tonnes of nylon net @ Rs. 1000 per tonne	1500	1500	3000
	9. Cost of 15.0 tonnes of nylon net @ Rs. 1000 per tonne	1500	1500	3000
	10. Cost of 15.0 tonnes of nylon net @ Rs. 1000 per tonne	1500	1500	3000
	Sub-total	15000	15000	30000
	Total	21600	21600	43200

LOANABLE
FUND

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PLANT INDUSTRY
WASHINGTON, D. C.

PLANT INDUSTRY REPORT NO. 1000

PLANT INDUSTRY REPORT NO. 1000

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January 1, 1920

REPORT OF THE COMMISSIONER OF LABOR AND INDUSTRY

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SARDAR SAROVAR PROJECT
WORK PLAN FOR
ENVIRONMENTAL PROTECTION
FISHERIES SECTOR
VOLUME - III
FISHERIES DEVELOPMENT IN ESTUARINE AREAS

SARDAR SAROVAR PROJECT
 WORK PLAN FOR ENVIRONMENTAL PROTECTION
 FISHERIES SECTOR
 VOLUME III
 FISHERY DEVELOPMENT IN ESTUARINE AREAS

INTRODUCTION

The Narmada estuary is the most productive among the estuaries in the West Coast of India. The total extent of estuaries in Gujarat is estimated at 21,230 Ha, of which Narmada estuary alone contributes to 14,250 Ha (67.12%). Compared to the other estuaries, Narmada is the most potential one in so far as the fishery resources are concerned. The mouth of the estuary is 21 Km. wide and the tidal effect is experienced upto Zangor, 32 Km. upstream. The annual fish catch from the estuarine regime since 1985-86 is given below.

Year	Catch (Tonnes)
1985 - 86	12,292
1986 - 87	11,829
1987 - 88	12,564
1988 - 89	11,148
1989 - 90	13,954
1990 - 91	17,126
1991 - 92	14,655

It can be seen that the average annual fish yield of the Narmada estuary from the above is 13855 tonnes, which can be valued at Rs.277 million at an average rate of Rs.20,000/ton. The most important commercial fishery is supported by the Hilsa (*Tenulosa elisha*) and the Giant Freshwater Prawn (*Macrobrachium rosenbergii*). The average annual landing of the Hilsa from the river Narmada is about of 12000 M tonnes and fishery of Giant Fresh water Prawn also contributes an economic resource (average landings of 1991 to 1993). Jew fish, Thread Fin, Bombay Duck, Grey Mullet, Megalops, Anchovy, Shrimp, etc. are the other varieties of fish available here. The down stream of the proposed dam

has also the fishery of the Indian Carps, such as Catla, Rohu, Mrigal, Galda, Bata, Reba etc. Cat Fishes like *Wallago sp.*, *Mystus sp.*, *Channa sp.*, *Rita sp.*, etc. are also caught in the fisher region. The river stretch also provides fish and Freshwater Prawn seed in abundance. The Major Carp spawn is available in the river stretch between Poicha and Zanon. The seeds of Mahseer (*Tor tor*) also are available in areas from Karjan confluence to Zanon. The seeds of Giant Freshwater Prawn is available in the tidal affected area between Zanon and Sulla Tirth.

It is estimated that 3200 fisher-families are exclusively dependant on the estuarine fisheries of Narmada. However, the active fishermen engaged in the estuarine fisheries are 1175.

The important fishing gear used in the estuarine fisheries are Conical Bag Nets (Cholve), Drift Gill nets, Drag Nets and Cast Nets. The fishing-boats are by and large flat bottom plank built double enders.

2. Improvement Impact in the Estuary

As per the reports of the Narmada Planning Group, the annual inflow of water in the river, which ranges from 18 to 45 MAF, will be reduced to spills during the monsoon season. The spills, which will go down unused depending on the power generation capacities, range from 1.36 to 3.69 MAF. The possible utilization of the spillwater also is being considered by the Narmada Planning Group. Out of the downstream river water a part (0.95 MAF) is planned to be pumped into low level canal with an FSL of 150 Ft and the remaining pumped into higher located main canal (FSL 300 Ft). Thus, practically, very little water is available in the downstream of the dam, during most of the period at the completion of the Sardar Sarovar Project (source "PLANNING FOR PROSPERITY" by Sardar Sarovar Nigam Ltd., Chapter 7 and 12).

The projected reduced water flow in the river stretch below the dam

Very dangerous
may not

has been given in detail in Volume I of this document. The commercial fishery of the Hilsa and the Fresh Water Giant Prawn will be affected adversely. The reduced discharge of water during the monsoon into the sea will not attract the anadromous Hilsa into the river stretch. The same will be the case with the Giant Fresh Water Prawn, whose breeding grounds will be destroyed due to exposure.

needs changes

The salinity ingress will change the entire ecology of the river stretch replacing the present organisms with new ones, based more on marine environment.

OK ✓

The estuarine area development programmes should, therefore, compensate the loss of fishery resources and the economic advantages, that existed before the impoundment to the possible extent.

3. Development Concept and Strategy

may not be true

The development strategy for the estuarine sector would be to propagate the endangered commercially important Hilsa and Scampi through specially established hatcheries and provide them with new environment for growth and multiplication. To compensate the loss of estuarine environment, it is proposed to construct aquaculture ponds in the riverine mudflats and coastal marshes, so as to cultivate the endangered species on a commercial basis. For the breeding and propagation of Hilsa and Scampi, it is proposed to establish two separate hatcheries.

Using the tail end water (which is normally drained into the sea), it is proposed to have coastal aquaculture ponds where shrimp and euryhaline fish could be cultivated. In the command area, 2000 ha low-lying and waterlogged areas will be developed into aquaculture ponds, where Major carp, Hilsa and scampi will be cultivated under poly culture system.

The infrastructure for handling and marketing will be provided at the appropriate localities. The changed environment in the river mouth will necessitate a provision for changed designs of capture equipment (like the boats and nets), as the present ones might become obsolete. It is also proposed to provide small trawler boats at subsidised rates to fishermen so as to enable them to go into shallow coastal sea to conduct fishing.

The important components for the Estuarine area development are briefed hereunder.

1. Establishment of a Hilsa Hatchery of 5 Ha. near the river mouth.
2. Establishment of a Macrobrachium hatchery, with provisions for Artemia culture, so as to produce 10 millions of PL.15 annually.
3. Construction of 500 Ha. polyculture ponds in the adjoining waterlogged areas, with a provision of incentives for polyculture operations.
4. Construction of 1000 Ha. of brackish water aquaculture ponds for semi intensive prawn culture.
5. Mangrove reforestation in 110 Ha. area in intertidal zones around the free river mouth.
6. Implementation of fishery management plan and introduction new fishing crafts and gear alongwith formation and strengthening of co-operatives, training and extension services.

4. Project Details

The details of the various components under the estuarine fisheries sector development programme and the cost thereof are given below. The project costs are based on the pricing of 1993.

4.2. Hilsa Hatchery

The decreased discharge of water in the river mouth, will reduce the migratory range of the Hilsa. They may be confined to the river mouth only, at a much reduced magnitude and hence it is proposed to establish a Hilsa hatchery near the river mouth itself. Bhadbut on the north bank of the estuary could be an ideal location. It is proposed to establish a 10 ha. hatchery which will include some area for demonstration ponds for the Hilsa culture.

The cost estimates for the programme is worked out below.

Sr No	Item of expenditure	Cost estimate (million Rs.)		
		Capital	Operational	Total
1.	Civil works	3.543	--	3.543
2.	Purchase of equipment	0.255	--	0.255
3.	Management cost for 5 years	--	2.335	2.335
4.	Contingent Expenditure	--	1.500	1.500
Total		4.398	3.835	8.233

The details of each category of expenditure is given in Annexure-1.

The phasing of financial and physical coverage is given below..1s1

Years	Physical Coverage	Financial requirement (million Rs.)		
		Capital	Operational	Total
1994-95	Hatchery construction to start	1.100	--	1.100
1995-96	Hatchery to be completed and equipment	3.298	0.250	3.548
1996-97	Staff and contingencies	--	1.272	0.771
1997-98	-do-	--	0.771	0.771
1998-99	-do-	--	0.771	0.771
1999-2000	-do-	--	0.771	0.771
Total		4.398	3.835	8.233

4.3. Macrobrachium Hatchery

The Giant Fresh Water Prawn usually breeds in the freshwater environment, the larvae require brackish water condition for further development. This make the breeding and nursing of this species in fresh water very difficult. The present natural production of Macrobrachium will be affected due to less fresh water flowing in the downstream as well as due to salinity ingress into the river system. Hence it will be required to breed Macrobrachium in an artificial environment in a hatchery. The proposed hatchery will be of 10 Ha. water spread area with provision for Artemia Culture and provision of high quality feed. It is also proposed to obtain the services of a foreign expert on long term basis (48 Man months) and also short term consultancy (6 Man months). The hatchery will produce 10 million post larvae of P 10 stage.

The cost estimates of this programme as given in Annexure-2. works out to be Rs.9.733 million.

The phasing of the financial and physical coverage under this programme are detailed below.

Year	Physical coverage	Financial requirement (Rs.Million)		
		Capital	Operational	Total
1994-95	Civil works to start and Foreign Expertise.	1.100	0.075	1.175
1995-96	Civil works to be completed and Foreign Expertise	2.000	0.075	2.075
1996-97	Foreign Expertise, Equipment and Contingencies.	1.298	2.000	3.298
1997-98	Foreign Expertise, Staff and contingencies.	--	1.062	1.062
1998-99	Foreign Expertise, staff and contingencies.	--	1.062	1.062
99-2000	Foreign Expertise, Contingency and staff.	--	1.061	1.062
Total		4.398	5.335	9.733

4.4. Construction and Operation of Polyculture Ponds

It is proposed to finance for 2000 Ha. of fish ponds to be constructed in and around the estuarine area, where polyculture of Freshwater Prawn, Hilsa and compatible species of Carps will be cultivated. The ponds will be constructed at a capital cost of Rs.80,000/Ha. These ponds will be of 0.5 Ha. in area and two pond will be allotted to a rural family. Out of the 2000 beneficiaries 1000 will be trained so that the trained farmers can train other farmers in turn. It is proposed to give grant in aid to the apex co-operative body for marketing infrastructure, like transport vehicle, project office, assembly shed, etc. Incentive subsidy of 50% for purchase of inputs limited to Rs.10000/ha is proposed to be given to the farmers for One Cycle of operation. The cost estimates of this programme is detailed below.

	<u>Rs.in Million</u>
1. Construction of 2000 Ha of polyculture ponds @ Rs.80,000/Ha.	165.00
2. Operational Incentive @ 10000/ha for one cycle of operation	20.00
3. Training of 1000 prospective farmers @ Rs,2200/farmer.	02.20
4. Marketing Infrastructure to the Apex Body, such as Transport vehicle, Project Office, Assembly Centre etc.	02.00
Total	<u>184.20</u>

These ponds are envisaged to produce 2.5 tonnes/ha/annum resulting in an additional fish production 5000 tonnes annually valued at—Rs.100 million @ Rs.20,000/ton.

The phasing of the programme will be as shown below.

Year	Physical coverage		Financial Requirement		
	Item	Quantity	Capital	Operational	Total
1994-95	Pond Construction	50 Ha.	4.000	--	4.000
1995-96	Pond Construction	500 Ha.	40.000	--	40.000
1996-97	Pond Construction	500 Ha.	40.000	--	40.000
	Training	550men	--	1.100	1.100
	Operational Incentives	550 Ha.	--	5.500	5.500
1997-98	Pond Culture	500 ha.	40.000	--	40.000
	Marketing Infrastructure	--	2.000	--	2.000
	Training	500men	--	5.500	5.500
	Operational Incentives	500 Ha.	--	5.500	5.500
1998-99	Training	450 men	36.000	--	36.000
	Operational Incentive	500 ha.	--	5.000	5.000
99-2000	Operational Incentive	450 ha	--	4.500	4.500
Total			162.000	22.200	184.200

4.5. Brackish Water Aquaculture Ponds

It is proposed to develop 1000 ha. of coastal ponds to be distributed among 1000 rural families. It is proposed to get technical assistance from abroad. It is proposed to use these ponds for semi intensive culture of white and tiger prawns. It is expected that by this time the prawn hatchery for Tiger Prawn (Penaeus monodon) and White Prawn (Penaeus indicus), under private and the State's and regular developmental plans, would be ready and the seeds of these quick growing species will also be available in sufficient quantities for cultivation in the coastal ponds.

It is proposed to give operational incentive subsidy of 50% of the cost of inputs to the farmers for one cycle of operation limited to Rs.20000/ha. They will also be trained for short term periods at the

appropriate training centres. Usually the coastal areas are without proper approach roads and hence, it is proposed to provide approach roads to the sites.

The cost estimates for the programme is given below:

1. Cost of construction of 1000 ha of brackish water ponds @ 200,000/ha. including pumps and water ways	Rs. 200.000 million
2. Cost of approach roads and water courses approx. 300 kms. @ Rs.3.00 Lacs/kms	Rs. 90.000 million
3. Operational subsidy cost including seed supply @ Rs.20000/ha for 1000 ha.	Rs. 20.000 million
4. Training of 1000 people @ 2200/person.	Rs. 2.200 million
5. External technical consultancy @ 4 man months.	Rs. 5.000 million.
Total	Rs.317.200 million

The yearwise phasing of the programme is detailed below.

Year	Physical Coverage	Financial Requirement (Million Rs.)		
		Capital	Operational	Total
1995-96	a) 100 ha. ponds	20.000	--	20.000
	b) Technical consultancy (roads)	10.000	1.250	1.250
				18.000
1996-97	a) 250 ha. pond	50.000	--	50.000
	b) Roads	18.000	--	18.000
	c) Technical consultancy	--	1.250	1.250
	d) Input cost for 100 ha,	--	2.000	2.000
	e) Training for 250 people	--	0.550	0.550
1997-98	a) 300 ha pond	60.000	--	60.000
	b) Roads and	18.000	--	18.000
	c) Technical consultancy	--	1.250	1.250
	d) Input cost for 250 ha	--	5.000	5.000
	e) Training for 250 people	--	0.550	0.550

1978-99	a) 350 ha. pond	70.000	---	70.000
	b) Roads	10.000	---	10.000
	c) Technical consultancy	---	1.250	1.250
	d) Input cost for 300 ha.	---	6.000	6.000
	e) Training of 250 people	---	0.550	0.550
99-2000	a) Roads and water	10.000	---	10.000
	b) Input cost for 350 ha.	---	7.000	7.000
	c) Training of 250 persons	---	0.550	0.550
Total		270.000	27.200	317.200

4.6. Environmental Enhancement

In this programme, it is also proposed to carry out reforestation with mangrove vegetation in Aliyabet and in the intertidal zone around the rivermouth. An area of about 110 ha. will be brought under reforestation. The help of the Forest Department of Gujarat State will be sought for this purpose. The cost estimates for the programme is given below.

1. Cost of Reforestation during first 4 years (50 ha) @ Rs.30,000/Ha.	Rs.1.500 million
2. Reforestation during next 3 years (60 ha.) @ 30000/-	Rs.1.800 million
Total	Rs.3.300 million

4.7. Fisheries Management Plan

The changes in the environment of the estuary, higher salinity, changes in the fish population etc. will make the presently used fishing crafts and gear obsolete. It will, therefore, be necessary to introduce mechanised fishing crafts and gear suiting the changed environment and also going to the sea for fishing in shallow waters. It is estimated that about Rs.300000 will be required as aid component as loan and subsidy for one such unit (taking into account, the cost of gears also. It is proposed to assist 100 boats during the project

period. It is also proposed to undertake formation of cooperative societies and provide training to its members and involve non-government organisations in the developmental activities by providing them with financial assistance. A lump sum amount of Rs.6.0 million is provided for this purpose.

Further, it will be necessary to provide, assembly centres with auxiliary structures in the areas of pond culture, prawn culture, brackish water aquaculture etc. It is proposed to provide such eleven assembly centres in the entire estuarine sector at a cost of Rs.300,000 per assembly centre.

The cost estimates for the programme is summarised below.

	(Rs.million)
1. Aid component for new gear and boat (Loan 50% subsidy 50%)	30.000
2. Training and Extension Services, Aid to Co-operative and non- government organization.	6.000
3. Building up of 11 assembly centres with auxiliary structures.	0.900
Total	36.900

The yearwise phasing of this programme has not been worked out, as the implementation thereof will depend upon the completion of other programme in this project.

4.8. Summary of Cost Estimate

The total cost estimates of the work plan for the development of the Estuary sector can be summarised as below.

Sr No	Name of the programme	Cost estimate (million Rs.)		
		Capital	Operational	Total
1.	Hilsa Hatchery	4.398	3.835	8.233
2.	Macrobrachium Hatchery.	4.398	5.335	9.733
3.	Polyculture Ponds (water logged)	162.000	22.200	184.200
4.	Brackish water aquaculture ponds	290.000	27.200	317.200
5.	Mangrove afforestation	--	3.300	3.300
6.	Fisheries management plan	30.900	6.000	36.900
Total		491.696	67.870	559.566

6. PROJECT PROBLEMS

At the full developmental level of the estuarine sector, the additional fish/produce production would be 7500 tonnes annually valued at Rs.350 million. The programme will give employment to 3124 families. The construction works under various programme will provide lump employment to the extent of 11410 million man days. The programmewise benefits are detailed in the following Table.

Sr. No.	Name of programme	Additional fish pro- duction (tonnes)	Value (Rs. Million)	Employment opportunities	
				Permanent No.of Rural Families	Tempora- ry(mill- ion Man- days.
1.	Hilsa Hatchery	--	--	20	0.890
2.	Macrobrachium Hatchery	--	--	20	0.072
3.	Polyculture ponds	5000	100.000	2000	2.200
4.	Brackishwater aquaculture	500	250.000	1000	8.050
			132		

5. Environmental Enhancement	--	--	24	0.057
6. Fisheries Management	--	--	60	0.061

Total	7500	350.000	3124	11.410
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The additional social benefits will be the availability of fresh fish in rural areas, control of water borne diseases, utilization of fallow land for economic use, control of aquatic pollution by continuous monitoring by research institutions and fish farmers

#####

WS4:ESTUARY
05.02.1991

WORK PLAN FOR FISHERIES
III FISHERY DEVELOPMENT IN ESTUARINE AREAS

ANNEXURE - 1

COST ESTIMATES FOR HILSA HATCHERY & CULTURE FARM
(RS THOUSANDS)

1. Civil works

Site preparation	30
Earth work	1100
Bank protection	220
Site Finishing	100
Water supply	660
Office Building	165
Hatchery Building	165
Staff Quarters	220
Storage Building	110
Electric supply	220
Fencing and gates	220
Engineering	330

Subtotal Civil works 3540

II EQUIPMENT

Jeep with Trailer	300
Water Pump	60
Air Blower	45
Standby Generator	70
Hatchery Equipment	100
Nets & Ropes	60
Office furniture and equipments	60
Transport containers	40
Boat with outboard motor	100

855

III STAFF EXTENSION FOR FIVE YEARS

Superintendent of Fisheries 1	335
Survey Assistant 2	670
Fisheries Assistant 2	420
Senior Clerk 1	200
Fieldmen 2	300
Driver 1	150
Watchmen 1	130
Peon 1	130

Sub- Total Staff 2335

IV OPERATIONAL CONTINGENCIES LIKE
FEED, FUEL AND CONSUMABLE ITEMS

1000

Sub total of contingencies 1000

b) Consultancy 500

134

8235

WORK PLAN FOR FISHERIES
III FISHERY DEVELOPMENT IN ESTUA

ANNEXURE - 2
COST ESTIMATES FOR 10 HECTARE PRAWN FOR
MACROBRACHIUM ROSENBERGI I

I Civil Works

Site preparation	33
Earth work	1100
Bank protection	220
Site Finishing	100
Water supply	660
Office Building	165
Hatchery Building	165
Staff Quarters	220
Storage Building	110
Electric supply	220
Fencing and gates	220
Engineering	330

Subtotal Civil Works 3543

II EQUIPMENT

Jeep with Trailer	300
Water Pump	60
Air Blower	45
Standby Generator	70
Hatchery Equipment	100
Nets & Hapas	60
Office furniture and equipments	80
Transport containers	40
Boat with outboard motor	100

III STAFF EXTENSION FOR FIVE YEARS

Superintendent of Fisheries 1	335
Survey Assistant 2	670
Fisheries Assistant 2	420
Senior Clerk 1	200
Fieldmen 2	300
Driver 1	150
Watchmen 1	130
Peon 1	130

Sub- Total Staff 2335

b) Foreign expertise long time 48 mm short term 6 mm 1500

Sub total 3835

IV OPERATIONAL COST CONTINGENCIES AND CONSUMABLES 1500

GRAND TOTAL (I+II+III+IV) 9733

135

INROAD AIRBORNE PROJECT
JOINT PLAN FOR
AIRBORNE TAIL PROTECTION

FOREWORD

SECTION - IV

1. PURPOSE AND SCOPE
2. ORIGINATOR COMMAND AREA

SARDAR SAROVAR PROJECT
WORK PLAN FOR ENVIRONMENTAL PROTECTION
FISHERIES SECTOR
VOLUME IV
FISHERIES DEVELOPMENT IN IRRIGATION COMMAND AREA

INTRODUCTION

The main canal of the Sardar Sarovar Project which will be a contour canal offtake from Dyke No.4, with a capacity of 40,000 CuSecs at offtake, will be the largest lined irrigation canal in the world. Thirty-one branches will take off directly from the main canal. The larger and important ones are Miyagam, Vadodara, Saurashtra and Kutch Branches. The largest in capacity at the offtake point is Saurashtra Branch with 8966 CuSecs. The Kutch Branch is the longest (300 km). The system lower down consists of distributories, minors, subminors and water courses. One distributory will serve a gross command area of 34.3 lakh hectares. The system will be one of the largest irrigation net works in the world. The total length of the canals will be about 40,000 km. exclusive of main canal and branches.

1.2. The command area covers large areas, with varying agroclimatic conditions. For agriculture purposes, the command area has been divided into 13 regions, according to the agro-climatic conditions and feasible set of crops. Conjunctive use of ground water with canal water is planned with a view to maximising the benefits. Ground water will serve as a reservoir to be used, as per demand over seasons.

1.3. The gross command area of the project is estimated at 3.43 million hectares, of which cultivable command area would be 2.1 million hectares. The command area encompasses 12 districts viz, Bharuch, Vadodara, Panchmahals, Kheda, Ahmedabad, Gandhinagar, Mehsana, Bhavnagar, Surendranagar, Rajkot, Banaskantha and Kutch. The total number of talukas covered would be 62 consisting of 3344 villages.

2. Resources

The main canal and its branches, passing through various districts of the state will help ponds and irrigation tanks to become perennial sources of water. The lands which are unsuitable for agriculture can be dug and converted into fish ponds. It is estimated that out of the 3344 villages in the command area, 1343 villages will have perennial village ponds with an estimated water spread area of 4000 ha. It is also estimated that about 40,000 ha of water logged marshy areas will be available in different districts of the command area, when the irrigational canal starts functioning. Moreover, many seasonal ponds and low lying areas will become perennial ponds with shallow water accumulation.

3. Development strategy

The development strategy for the command area can be brought under the following categories:

1. Fish culture in perennial village ponds, after renovating them and providing production incentives.
2. Aquaculture in areas of possible water logging and fresh water marsh lands.
3. Utilization of construction borrow pits created by taking soil for canalwork for aquaculture after shaping them into fish ponds.
4. Aquaculture in Irrigation canals by stocking herbivorous fish in canals.
5. Setting up of pilot schemes to demonstrate viable culture methods for Indian Major Carps.

4. PROJECT CONCEPTS

The main objectives of the proposed command area fisheries development projects should be to put into use the perennial village ponds, lowlying water logged fallow areas, construction borrow pits, etc.

into economic use and for providing livelihood to hundreds of rural families. The project also envisages to introduce herbivorous fish in irrigation canals so as to prevent growth of aquatic weeds and at the same time to produce table fish from this water resource. It is also proposed to set up an ideal demonstration farmer where culture of carps will be undertaken with full utilization of the available technology so as to educate and train the farmers.

5. PROJECT DETAILS

The details of various components of command area development for fisheries are briefly described below and the project costs are estimated basing on the price level of 1993.

5.2. Fresh Water Pond Culture

The existing village ponds in the seven districts, as discussed elsewhere in this document, would become perennial and would hold perennial water wherein cultivation of fish could be undertaken. However, these ponds would require renovation, such as strengthening of bunds, reshaping, desilting, provision of inlets and wire screens, etc. It is estimated that the capital cost of renovating one hectare of pond will be approximately Rs.25,000/-. Besides the capital investment, it will be required to provide working capital and production incentive to the farmers in order to motivate them for taking up fish culture in the ponds. A subsidy of 50% of the cost of inputs will be provided limited to Rs.5000/ha. for the first cycle of the operation. The programme would benefit 4000 rural families directly, while 800 families will be benefitted indirectly through auxiliary activities.

The additional production from this component will be 10,000 tonnes of quality fish valued at Rs.200 million per annum. It is also proposed to cultivate the Fresh water Giant Prawn alongwith Major carps in these ponds and the production envisaged thereof would be about 800 tonnes of such prawn valued at Rs.80 million per annum. The programme will be implemented during a six year period from 1996 to 97 to 2002 to 2003. The physical and financial phasing would be as shown hereunder.

Year	Physical coverage	Financial requirement		
		Capital cost (Million Rs.)	Incentive (Million Rs.)	Total
1996-97	400	10.00	--	10.00
1997-98	1000	25.00	2.00	27.00
1998-99	1000	25.00	5.00	30.00
1999-2000	1000	25.00	5.00	30.00
2000-01	800	15.00	5.00	20.00
2001-02	--	--	5.00	05.00
Total	4000	100.00	20.00	120.00

In order to support this programme, assistance in the field of research and investigations will be provided by the unit created for Environment Studies. The extension services will be provided by the State Department of Fisheries through its existing Extension Division.

5.3. Aquaculture in Reclaimed water logged Areas

There are several thousand hectares of waterlogged areas in the districts falling under the command area of the project. When the main and branch canals are commissioned, it is likely that the water table in the area will raise creating water accumulation in the low-lying area.

The approximate waterlogged area, which may be available in the command area, is roughly estimated at 40,000 hectares. Under this project component, it is proposed to develop about 100 ha. of such

land into 500 specially constructed ponds for cultivating air breathing fishes. The ponds will be lined with wooden/brick/stone pitching so as to prevent burrowing by the cultured fishes. It may also require small fencing around the pond so as to avoid creeping out of the cultured fish or the entry of extraneous predators. The air breathing fishes cultured will be Magur (Clarius batrachus) Shingi (Heteropneustes fossilis), Murrels (Ophicephalus sp.). The cultivation will be very intensive so as to obtain high returns from one unit of land area utilized as from the experience of the countries like Thailand. The production can be as high as 80 tonnes/ha, when periodical harvesting and stocking is undertaken. The annual production from 100 ha. of such developed ponds is estimated to be atleast 4000 tonnes considering conservatively an average production of 40 tonnes/ha. These fishes would fetch a price of atleast Rs.40/kg and hence the annual income would be in the range of Rs.160 million.

These ponds will serve as a nucleus for commercial investment and for the extension of culture practices in the area. It is envisaged to provide on the site training to the farmers and extension workers through the experts from abroad or from within the country. It is proposed to provide operational capital and production incentive of 50% of the cost limited to Rs.15,000/hectare for one cycle of operation, which will include the cost of seed, feed and such other inputs. The cost of providing on the site training in the initial two to three years is estimated to be Rs.0.5 million.

The programme will be implemented during the six year period from 1998 to 2004. The physical and financial phasing would be as shown below.

Year	Physical		Capital	Financial requirement (Million Rupees)		
	No. of	Area (ha)		Incentive	Training	Total
1998-99	50	10	2.00	--	0.20	02.20
1997-2000	120	24	4.80	0.15	0.20	05.15
2000-01	120	24	4.80	0.36	0.10	5.26
2001-02	120	24	4.80	0.36	--	5.16
2002-03	90	18	3.60	0.36	--	3.96
2003-2004	--	--	--	0.27	--	0.27
Total	500	100	20.10	1.50	0.50	22.00

5.4. Utilisation of Construction Borrow Pits

The construction of the earthen dam, main canal and branch canals will involve excavation of earth for providing soil for the construction. The main canal has a length about 438 km (ending near Rajasthan border). The Saurashtra Branch canal is 103 km. long and the Kutch Branch is 375 km. long.

The borrow pits created due to the excavation of soil can be suitably shaped to form fish ponds. It is proposed to cultivate major carps in these ponds. It is also proposed to use some of these ponds for larvicidal fish culture, so as to make larvicidal fish available throughout the command area for controlling water borne diseases like malaria, filaria, guinea worm infection. If left alone such borrow pits can become health hazards as they provide congenial grounds for breeding of mosquitoes. Their conversion of fish ponds and their utilisation for fish culture has therefore, multiple utility.

It is estimated that improving and shaping the borrow pits will cost Rs.10000/ha, with provisions for water supply and sluice gates. The operational cost for cultivating major carp and larvicidal fish will be Rs.5000/hectare for one cycle of operation. The physical and financial phasing of this programme is given below.

Year	Physical coverage (ha)	Financial requirement (million Rs.)		
		Capital	Operational	Total
1995-96	50	0.50	--	0.50
1996-97	150	1.50	0.25	1.75
1997-98	150	1.50	0.75	2.25
1998-99	150	1.50	0.75	2.25
1999-2000	--	--	0.75	0.75
Total	500	5.00	2.50	7.50

The reshaped ponds will be able to yield fish @ 2500 kg/ha. and hence would result in an additional fish production of 1250 tonnes valued at 25.00 million.

5.5. Culture of Herbivorous Fish in Irrigation Canals

Weed growth in Irrigational canal is a major problem faced by most of the tropical countries in the world. Such weed growth obstruct the flow of water in the canal and cause breaches, which necessitates periodic maintenance and repairs of bunds. Though chemical means of control of weeds are already existing, the same cannot be deployed as the water laid with chemicals can be a health hazard in the command area and may result in adverse environmental changes. Moreover, such treatments are prohibitively expensive. Using herbivorous fishes, such as Grass carp (Ctenopharyngodon idella) is a sure, cheap and safe method to control weed growth. This method can be employed in the main and branch canals, where water discharge will be for a longer period. Fish shelters will have to be provided along the canal, so as to enable the fish to take shelter in them, when the canals become dry. It may be necessary to provide screens at the offtake sites of minor canals, so as to prevent the escape of fish into agricultural fields and getting lost there.

In India, Grass Carp has been successfully used to eliminate weed growth in the power canals of the Tungabhadra Project in Karnataka - Andhra Pradesh border.

A lump sum amount of Rs.1.00 million is provided for the provisions of screens and shelters. The cost of Grass carp seed is estimated to be Rs.0.3 million. The total cost of this programme would, therefore, be Rs.1.3 million.

5.6. Pilot Demonstration Scheme for Carp Culture

For the extension of scientific fish culture technique in the command area it will be necessary to have a good demonstration based extension service where from the fish farmers can observe and learn latest technical practices in fish culture. For providing this, it is proposed to establish 5 demonstration farms in the command area, each with a water spread area of 10 ha,

The farms will be provided with essential buildings, extension material, vehicles and technical extension officers. Periodical farmers meet and short term training programmes will be arranged in these demonstration centres so as to ensure effective technology transfer.

These centres will be managed by the Apex Cooperative (Gujarat Fisheries Central Cooperative Association Ltd.) or Corporate body (Gujarat Fisheries Development Corporation) in a commercial manner. The total cost of the programme will be Rs.18.5 million and the detailed phasing will be as detailed below;

Year	Physical Coverage		Financial requirement (million Rs.)		
	No.	Area	Capital	Operational	Total
1996-97	1	10	3.00	--	3.00
1997-98	2	20	6.00	0.70	6.70
1998-99	2	20	6.00	1.40	7.40
1999-2000	--	--	--	1.40	1.40
Total	5	50	15.00	3.50	18.50

The demonstration farms will produce on an average 4 tonnes of fish per hectare per annum, resulting in a total production 200 tonnes of additional fish valued at Rs.4 million.

5.8. Summary Of Cost Estimates

The total cost estimates of the work plan for the command area can be summarised as below;

Sr. Name of programmes	Cost Estimates (million Rs)			No.
	Capital	Operational	Total	
1. Freshwater pond culture	100.00	20.00	120.00	
2. Aquaculture in reclaimed water logged areas	20.00	2.00	22.00	
3. Utilization of construction borrow pits	5.00	2.50	7.50	
4. Culture of herbivorous fishes in Irrigation canals	1.00	0.30	1.30	
5. Pilot demonstration scheme for carp culture	15.00	3.50	18.50	
Total	141.00	28.30	169.30	

6.0. Project Benefits

At the full development level of the command area fisheries programmes a total additional fish production would be 20,250 tonnes produced valued at Rs. 431.75 million. The programme will give employment to 10,000 rural families. The construction work for the various programmes will provide temporary casual employment to the extent of 4.9 million man days. The programmewise employment benefits derived in view of the fisheries development in the command area are detailed in the following table.

Name of programme	Additional fish production (ton)	Value (Rs. million)	Employment opportunities created	
			Permanent (number of rural families)	Temporary (Mandays million)
1. Fresh Water pond culture	10,800	280.00	4000	4.000
2. Aquaculture in reclaimed water area	4,000	160.00	500	0.800
3. Utilisation of construction borrow pits	1,250	25.00	500	0.012
4. Culture of herbivorous fish in irrigation canal	--	--	--	--
5. Pilot demonstration scheme for carp culture	200	4.00	--	0.010
Total	16,250	469.00	5,000	4.822

The additional social benefits will be reduction in the incidence of water borne human diseases like Malaria, Filaria and Guinea Worm. Cattle diseases spread by aquatic Milluics also will be kept under control as many of the cultivated fish will eat up the milluscs and their larvae.

The availability of fresh fish in the rural areas of the command area will provide nutritive fresh fish as food to the population contributing to the general health conditions in the villages.

WS4: BASIN4
31.01.91

**OBSERVATIONS ON DRAFT FINAL REPORT ON EIA STUDIES ON
INLAND AND MARINE FISHERIES RELEVANT TO THE COMMAND AREA OF
SARDAR SAROVAR PROJECT.**

A good piece of work has been done by the research team. The quality & quantity of work done for the entire command area in such a short time with limited resources is commendable. The report prepared by the investigators may go a long way in developing the fisheries in the command area & may also fetch on it status of an industry.

To help investigator in their pursuit, following suggestions are made for a consideration by research team.

Recommendations:

Structure of the Report

Recognising that Environmental Impact Assessment process is still under its infancy, the basic structure of EIA report may include a data bank, interparation of the data, identification of the gaps & generation of additional data, identification of source of impacts, assessment of impact & management strategies and lastly prioritised action plan for implementation, we suggeste that the report may be restructure on the following lines.

Chap.1:: Chapter-1 should focus on the objective of proposed studies and should include the possible sources of impacts on existing fisheries & the development proposed in the present study.

Chap.2: In all fairness should serve as a model data bank for all past & present studies & findings.

May include review of literature & compilation of available established data. This may include all relevant Bibliography of the studies done so far, alongwith an abstract of the findings.

To achieve this objective chapter 2 & 3 may be combined & the inferences drawn from each table should also be outlined & indexed.

The data generated for development of fisheries in the SSP command focussing on regional priorities may also be included in this chapter. For example the data presented under chapter-3 on ground water modelling, recharge & discharge, quality, status of industrial & domestic discharges may from part of chapter-2.

Chap-3: This chapter may only includes the management strategies which may be devised and/or being devised or proposed to be devised. These may farm a part of chapter-3, for example chapter-

7 on ecomodelling & chapter-8 on aqua-culture site development aspects a part of management strategies may be included here.

Chap-4: may include only the suggested action with time bound programme. This may include short term & long term programme. Broad cost estimates & justification for the action suggested may also be outlined. Economics and/or social benefits may also be clearly spelled out.

This chapter should consider the action plan already developed by the state Governments & should provide a blue print for implementation.

Specific comments on the draft final report:

A number of studies have been referred to in the report. These reports are not available in this office to enable us to ascertain the facts. Yet following suggestions are offered

General

Social aspects & taboos attached with aquaculture in village areas may also be investigated.

Some models for fish farming alongwith cost estimated may be given.

Agencies which may give financial assistance to the villagers may also be indicated.

Suggestions for development of awareness & education or training programme, needed industrial development with planning for road links/ transport for fish seed/ fish harvest sale/purchase cold storage, ice plants etc may also be indicated.

Food chain & species diversity may also be attended.

Many of the recommendations though are built in the text but they do not find a place in the action plan delineated at the end of Vol-II eg. page 4 of Vol-I may be referred.

Many of the tables are given without offering interpretation of the data or reference in the text.

Vol-I,

Page-18, 4th para:

Production/ ha has direct bearing on size of the ponds which later becomes limiting factor. The fact may be further clarified to get a fair idea of the potential production.

Page-20, 4th para:

Steps for conservation which is defined as best utilization, are always needed not only in respect of food chain/ species diversity but also for observing of close season & regulation of Mesh size etc. therefore observation may need modification.

Page-22, last para::

As fish is only a major indicator of the aquatic ecosystem. prey predator ratio: ratio of various species, assessment of the primary productivity need to be addressed properly.

Table: 4.1. If the ranges referred to are for water quality suitable to psiculture the ranges recommended by MOEF for psiculture may also be indicated.

Fig.1.6 Regulatory regime under Indian conditions may only be given.

Fig. of 1.7: may be replaced by 1.9 on page 6.

VOL.11On page-30, 3rd para. :

It would have been better to consider all the phases encompassing all the 13 regions of the command instead of phase-1 only.

4th para: Recognising that it is not possible to precisely calculate the reverine flow after the canal system become operative. It would have been better if based on experiences elsewhere some projections would have been made.

5th para:

Quantification of the seasonal flows in the riverine stretch & estuary based on observed data for mean minimum, mean maximum flow may be made. Present productivity of estuary should be assessed & compared with projections upon impoundment through ameliorative measures.

Page-33, 4th para:

Increased use of agricultural chemicals in the command area may impair water quality. Study reports are available for Malwa region done under MAB programme & may be reviewed & laised with JNKVV Khandwa who are doing such studies for NSP.

Page-34:

Measures to mitigate hazard, from Industrial development, to surface drain flow & ground water may be outlined, specially in view of regulatory regeime. Table No.5.1 in this context may be relevant.

Fig. 5.20 The basis for projections on substantial increase in agril production may be given.

Page-38, last para:

The statement that spray of pesticide is done much before the rainy season may not be correct. During summer pests remain mostly dormant & they become active only with the advent of rains besides. the quality & quantity of pesticides currently in use under irrigated conditions may have to be collected.

Page-39. Last para:

Instead of periodic, regular qualitative estimations may be recommended.

Page-42: last but one para top line.

Economically positive plan may not be necessarily conservation oriented. therefore conservation approach may be recommended for inclusion in the approach.

In Figure 7.3 Water quality is not proposed to be modified even if it does not suit to the requirement of fisheries development. This may be modified & reconsidered

ANNEX-XXIV-IX.

Sub: Final Report on Limnological aspects, Submitted by Barkatullah University Bhopal to NVDA Entitled "PRE AND POST IMPOUNDMENT LIMNOLOGICAL STUDIES OF NARMADA BASIN DEVELOPMENT FOR ITS WATER QUALITY - A COMPILED REPORT ON THE THREE ZONES OF NARMADA BASIN.

A) Specific Recommendations of the Study Group

Following Parameters were suggested for regular surveillance of water quality of River Narmada through developing water quality indexing system during peak flow & lean flow conditions on a long term basis.

- | | |
|------------------------------|----------------------------|
| 1. Temperature | 10. Phosphates |
| 2. pH | 11. Ammonical nitrogen |
| 3. Suspended solids | 12. Chlorophyll a |
| 4. Dissolved oxygen | 13. Algal growth potential |
| 5. Biochemical oxygen demand | 14. Total coliforms |
| 6. Chlorides | 15. Faecal coliforms |
| 7. Dissolved iron | 16. Fecal streptococci |
| 8. Nitrates | 17. Recycling potential |
| 9. Sulphates | |

B) Eutrophication

Soon after the filling of the reservoirs several measures to prevent Eutrophication must be undertaken. Measures to prevent or reduce eutrophication should aim at maintaining or restoring positive conditions. However, it is often impractical to completely prevent eutrophication in reservoirs, but is usually possible to reduce the extent of this process.

Since the Western zone of Narmada represents the tailend of the river all the nutrients get accumulated in the waters of this zone providing the highest possibility of Eutrophication.

The high conductivity levels in the western zone of Narmada river the comparatively high phosphate and nitrate levels which are likely to build up further add to the fertility of these water helping in Eutrophication.

In the Omkareshwar and Maheshwar areas high phosphate levels and the highest zones of human activity are likely to be the areas of enhanced eutrophication. Separate tanks with bathing ghats may be constructed for religious activities like Ujjain Singhast Mela. This will prevent the reservoirs from high P containing detergents.

Submergence of macrophytes in Omkareshwar and Maheshwar project areas must be stopped to prevent Eutrophication before construction of dams.

The siltation in the reservoirs can also promote Eutrophication and cause several other problems. Therefore measures must be taken for arresting the silt. This could be done by making trenches with intensive afforestation in the catchment area.

Stress must be given on fish culture operation to prevent eutrophication. Fish seed nursery should be established on site.

C1 Reduction of Nutrient inputs

Sewage diversion or its treatment shall eliminate the input of nutrients and toxic compounds. Another source of phosphorus is the agriculture. It is suggested to practise agriculture at some distance away from the water body and not very near to the water, as is currently practiced at Mandla and Chiraidongari, to reduce phosphate levels contributed by application of fertilizers in the agriculture.

D1 Conditioning of watershed area

It was suggested that the silt load in River Narmada from its watershed area located between Dindori and Bargi should be reduced through large scale plantation with indigenous fast growing tree species.

E1 Aspects of fish conservation

The immediate danger of the proposed dam construction will be on the Biology of Narmada fish fauna. The following major changes are likely to occur as an impact of the dam construction.

1. The Narmada Mahaseer undertakes migration during the late monsoon period to the upstream hilly areas of Narmada river for Breeding. This migration and the Mahaseer breeding ground would be the first target to be effected by the proposed reservoir construction. Hence it is suggested that immediate studies on the location of Mahaseer breeding ground and their conservation must be undertaken.
2. It is suggested to establish centres of artificial breedings of Mahseer on the lines of those established in the state of Maharashtra and U.P.
3. Hilsa ilisha though extending into the state of Madhya Pradesh at one time could not be recorded in the state of Madhya Pradesh. Few specimens could be recorded from Navagoan area in Gujarat down stream of which the fish is comparatively common. As an impact of the construction of Sardar Sarovar Hilsa is likely to get restricted to the down stream estuarine area. Artificial propagation of this fish breeding and stocking may be taken up in reservoirs of Narmada in Madhya Pradesh also.

This idea shall be more promising in view of the successful artificial breeding of Hilsa through stripping done in ukai reservoir in Gujarat.

4. Rita pavementata the typical endemic Narmada catfish adapted to rapids is likely to be replaced. To conserve this fish population selected areas are suggested to be protected as fish sanctuaries.
5. Notopterus notopterus which is an already rare fish needs to be conserved after mapping out their dominant areas and breeding grounds.

F) Fluoride Contamination

Possibility of contamination from fluoride deposits in SSP areas must be eliminated.

G) Other Suggested Measures

1. All measures to prevent siltation must be taken.
2. Drastic fluctuations in flow rate volumes should be avoided.
3. A well equipped Narmada Limnological research station be established on the lines of the Burlington Limnology Research Institute near Ontario Canada to take care of regular monitoring of all the aspects of riverine and reservoir management. Long term monitoring through location specific field stations was recommended.
4. Establishing the health centres along each reservoir project area to monitor and combat incidence of water borne diseases.
5. Stress must be given on pisciculture in these areas help in rehabilitation of fisherman and also for controlling Eutrophication.
6. Clearance of the forest growth from submergence area must be ensured..
7. Input of Pollutants in the reservoir should be regulated.
8. Following additional studies were suggested:
 - a) Exploration studies on the fishing grounds of Western zone of Narmada along with details of the fecundity, breeding cycles, breeding areas location, number of eggs, hatchlings, fry and their rate or growths as a three year project study.
 - b) Detailed faunastic studies of western zone of Narmada river.

- c) Studies on establishing artificial fish breeding units along the river. Biomass densities and diversity.
- d) Studies on fish Bioenergetic in different project areas of Western zone of phytoplankton.
- e) Studies on establishing selected zones of fish sanctuaries and identification of conservation areas along the river.

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नर्मदा नियंत्रण प्राधिकरण
NARMADA CONTROL AUTHORITY

पर्यावरण उपदल
Environment Sub-Group

चौबीसवीं बैठक का कार्यवृत्त
Minutes of the Twenty Fourth Meeting

10 मार्च 1995 को
पर्यावरण भवन नई दिल्ली में हुई

Held at
Paryavaran Bhawan
New Delhi
On 10th March, 1995

इन्दौर
अप्रैल, 1995

INDORE
April, 1995

MINUTES OF 24TH MEETING OF THE ENVIRONMENT SUB-GROUP NCA
HELD ON 10TH MARCH, 1995, AT PARYAVARAN BHAWAN, NEW DELHI.

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MINUTES OF 24TH MEETING OF THE ENVIRONMENT SUB-GROUP
HELD ON 10TH MARCH, 1995 AT PARYAVARAN BAHAWAN, NEW DELHI.

The Member (Secretary), of the sub-group welcomed the participants to the 24th meeting. The list of participants is at Annex-XXIV.Min.1.

Discussions on the various agenda items were taken up thereafter.

Item No.XXIV-1(119): **CONFIRMATION OF THE MINUTES OF 23RD MEETING.**

Minutes of the 23rd meeting of the Environment Sub-group of Narmada Control Authority were circulated to all members and invitees vide letter No.Env-34(24)/95/394-420, dated 16,2,95.

The correction suggested by NVDA vide letter No. NVDA/E&F /TECH/95/525 dated 9.3.1995, under item No. XXIII-2(118)(ii) Command Area Development, Narmada Sagar Project (3rd line of page 7 of the minutes) for replacing of word "NSP", with "Omkareshwar project in command area of Narmada Sagar Complex Projects" was accepted. No comments were received from GOG and GDM.

Minutes were then confirmed with the modification as indicated above.

Item No.XXIV-2(120): **REVIEW OF ACTIONS TAKEN ON THE DECISIONS OF THE PREVIOUS MEETINGS.**

As per discussion of 23rd meeting presentations were made by CCF (SSP) of Govt. of Gujarat on catchment area treatment & compensatory afforestation works in Gujarat. Additional Director, Health Services, Govt. of Maharashtra made a presentation on existing & projected health facilities in the Impact area of SSP in Maharashtra. A presentation was also made by representative of the Central Soil & Water Conservation Research & Training Institute, (CSWCRI) on the objective and achievement of the project work on measurement of the silt load from treated areas in Gujarat. A note on the presentation made by CSWCRI is **Annexed-XXIV-Min.2.**

On the suggestion given by some members that CSWCRI may like to consider taking the such works in M.P. areas where both Pre & Post treatment areas are available officers from CSWCRI indicated that a decision in this regard has to be taken by the Director of the Institute. GOMP have already approached CSWCRI for this.

1. **Submission of Catchment Area Treatment (CAT) plans for freely draining critically degraded subwatersheds [Item No.XXII-2(112) (1)].**

Representative of Govt. of Madhya Pradesh informed that as per the guidelines laid down the for the river valley project (RVP) plan for treatment of freely draining critically degraded sub-watersheds was under revision. Member (E&F), NVDA informed that reports on 7 subwatershed has already been submitted and the requirement of funds to start the treatment during current financial year has also been indicated in the report.

Regarding Narmada Sagar Project it was informed that as per guidelines of National Afforestation Eco-Development Board (NAEB) treatment would be limited to forest areas alone. Member (E&F), NVDA sought the help of Ministry of Environment & Forests for inclusion of Narmada Sagar Project Catchment under the centrally sponsored scheme for river valley project.

Regarding submission of map for the Narmada Sagar Project areas, sub-group was informed that it was under preparation and would be submitted soon.

Regarding progress of work in Gujarat, sub-group was informed that except for 162 ha works have been completed in the entire planned area. This remaining area will be completed in 1995 monsoon. When asked about the progress of submission of scheme to the National Afforestation Eco-Development Board, for treating the freely draining areas, GDM officials informed that the areas of the SSP catchment do not fall in the districts where the works under NAEB scheme can be taken. As such they wanted to know whether they can still submit a scheme for doing works in the SSP catchment area. Since nobody from the NAEB was present in the meeting, Dr. Nalini Bhatt, Addl. Joint Director, Min. of Environment & Forests assured to confirm this with the board authorities and inform later on. GOMP officials also wanted clarification in this regard.

2. Cost Estimates for preparation of Action Plan and implementation of Environment safeguard measures [Item No. XXII-2(112) (2)].

The information on cost estimates and expenditure on studies and implementation of mitigation measures as presented in agenda papers was reviewed by sub-group and corrections were indicated.

Based on the correction suggested, the proforma annexed with agenda papers was revised. A copy of the revised proforma is enclosed at Annex-XXIV-Min.III.

On the issue of expediting the action on submission of the revised estimates for Command Area Development works, sub-group was informed that the complete details would be sent within a month's time.

3. Environmental Impact of Closure of Construction Sluices.

On the issue of visit of the committee members to the areas in Gujarat for submitting a report on ratification of closure of sluices, sub-group was informed that the visit to Gujarat had to be postponed at the request of Govt. of Gujarat due to assembly elections. However it was informed that this committee would visit the areas by the end of March, 1995.

Regarding schedule of construction of Sardar Sarovar Project, ~~Dr.~~ R.K. Katti, referred to the damage caused to the stilling basin by fall of water from a height of more than 50 mt in 1994 rains and cautioned that precautions should be taken before the 1995 monsoon during which water is expected to fall from still higher levels. The Sub-group was informed that the Dam safety panel constituted for the purpose, considers all such aspects and that CWPRS was carrying out hydraulic model studies. Results of these studies for the approved profile shall be available soon for assessment. Prof. Ramasheshan suggested that un-even raising of the indivisual blocks should be avoided and stilling basin for providing cushion effect on the downstream side should be made ready. Sub-group was informed that all necessary steps on these aspects are being taken up.

Item No.XXIV-3(121): **PRESENT STATUS OF STUDIES SURVEYS AND ENVIRONMENTAL ACTION PLANS.**

The Sub-group reviewed the progress of studies, surveys and the actions plans as follows:

i) **PHASED CATCHMENT AREA TREATMENT:**

Govt. of Madhya Pradesh

Narmada Sagar Project

Govt. of Madhya Pradesh informed that upto March, 1995 against a final target of 62975 ha. an area of 28987 ha. had been treated up. The survival rate of plants on an average was about 80%. Sub-group was informed that the maps of the plantation areas were still under preparation.

Sardar Sarovar Project

Govt. of Madhya Pradesh informed that by the end of Feb., 1995 against a target of 125725 ha. area, an area of 21431 ha. had been treated up.

Govt. of Maharashtra

Joint Secretary (R&F), Govt. of Maharashtra informed that by the end of Feb., 1995 in addition to comple-tion of treatment of 1930 ha. of non-forest areas, forest area to the extent of 7474 ha. had also been treated. He further informed that Govt. of Maharashtra proposed to treat 788 ha. of non forest areas in addition to 6653 ha for forest areas during 1995 rains. The balance area was proposed to be treated during 1996 rains.

Govt. of Gujarat

Govt. of Gujarat reported that as against a target of 27200 ha. of forest areas, except for 162 ha entire forest area had

been treated up. The net non-forest areas to be treated in Gujarat was 2080 ha. CCF (SSP) Govt. of Gujarat informed that by the end of February, 1995 against a target of 2080 ha non forest area, an area of 1850 ha. had been treated up.

ii) COMPENSATORY AFFORESTATION

Govt. of Madhya Pradesh

Narmada Sagar Project

Sub-group was informed that an area of 60633 ha. had been treated up against a total target of 80945 ha.

Sardar Sarovar Project

Member (E&F) informed that as against 8740 ha. area to be planted, works have been completed over an area of 8165 ha. by the end of February, 1995.

Report from DIG (FC), MOEF on his visit to the areas of inspection of CAF works going on in Madhya Pradesh as desired by Chairman during 23rd meeting was awaited.

Govt. of Gujarat

Govt. of Gujarat reported that the compensatory afforestation works had already been completed in both the forest as well as non-forest areas.

Govt. of Maharashtra

Sub-group was informed that against the target of 23666 ha. of planting the work, over an area of about 21797 ha. had been completed by the end of February, 1995. Govt. of Maharashtra further proposed to plant 928 ha. area during rains of 1995 and the balance area of 943.5 ha. was proposed to be planted during 1996 rains.

It was further informed that soon the plantation area maps would be made available to MOEF and NCA.

iii) COMMAND AREA DEVELOPMENT

Narmada Sagar Project

Regarding progress about the revision of the Command Area Development plan for Narmada Sagar Project in accordance with the guidelines given by the sub-group from time to time, Member (E&F), NVDA, assured the sub-group that the issue will be examined and latest position shall be reported to MOE&F & NCA soon.

Regarding the effects of pesticides, insecticides etc in the command area it was informed that the studies had commenced and the data collection would start from the coming Monsoon.

Sardar Sarovar Project

Govt. of Gujarat

Additional C.S., Govt. of Gujarat agreed to include Member (E&R), NCA as regular member of the High Level Steering Committee and expert Multi Disciplinary Groups formed by Govt. of Gujarat for monitoring of various studies related to Command Area Development.

Copies of the study reports completed during the last two years were required to be submitted to NCA & MOEF. These were assured to be submitted to MOE&F & NCA soon.

Regarding the scope of irrigated agro-forestry in SSP command, Govt. of Gujarat informed that consultations with Dr. Abrol were under progress. Sub-group was informed that further action would be taken as per his advice.

Govt. of Rajasthan

Additional Secretary, Department of Environment, Govt. of Rajasthan informed that a report on drainage aspects was expected from WAPCOS. However, due to non finalisation of the alignment of the canal, WAPCOS have not been able to produce this report so far. He informed that a comprehensive draft report incorporating the comments of NCA officers might be available by the end of April. He further assured that the discussion between the officers of NCA/MOEF & GOR with consultants would be arranged after the receipt of final draft report from the consultant.

iv) SURVEY OF FLORA, FAUNA & CARRYING CAPACITY STUDIES

Narmada Sagar Project

Govt. of Madhya Pradesh

Sub-group was informed that based on the recommendations of the study report by Wildlife Institute of India and Friends of Nature's Society, action Plan was under preparation and that proposal for creation of special protection areas had been submitted to State Govt. This was under scrutiny and examination by the Govt.

The main findings of these study reports, required to be circulated among the Members of the Sub-group, were under compilation by NVDA & would be submitted soon.

Sardar Sarovar Project

Govt. of Madhya Pradesh

Sub-group was informed that based on the final reports of the study groups, action plan was under preparation.

Govt. of Gujarat

Govt. of Gujarat informed that as many of the recommendations of M.S. University required policy decisions delay was inevitable. However, an expert deliberation on the findings of M.S. University report was to be arranged shortly for preparing the required action plan. It was suggested that the action on points based on recommendations of the M.S. University as they relate to the area undergoing submergence or area within the catchment may be taken up on priority.

Govt. of Maharashtra

Sub-group was informed that the discussions between Scientists of Department of Environmental Sciences, Pune University, Member (E&R), NCA and Secretary (Environment), Govt. of Maharashtra were held at Pune. Shri A.K. Mago, Secretary (Env.), GOM informed that the investigators would finalise the report on the basis of this discussions. At this point Member (E&R) requested GOM officials to ensure that the final report strictly adheres to the TOR.

v) ARCHAEOLOGICAL & ANTHROPOLOGICAL SURVEY**ARCHAEOLOGY****Narmada Sagar Project & Sardar Sarovar Project****Govt. of Madhya Pradesh**

Sub-group was informed that the State Deptt. of Archaeology and Museum and Archaeology, Survey of India (ASI), Govt. of India had completed survey(s) and prepared action plan(s) for the State, as well as centrally protected monuments. The NVDA had also accorded sanction for of Rs.4.79 crores outlined in the

action plan of State Deptt. of Archaeology & Museum. An additional sum of Rs.30 lakhs had also been sanctioned for the construction of two new museums and extension of existing museum at Maheshwar besides, construction of "Narmada Gallery" in Bhopal Museum. Thus the total allocation made for the state protected monuments came to Rs.5.09 crores. Similarly for the relocation of the centrally protected monuments, an amount of Rs.87 lakhs had been approved.

Steps for the implementation of the action plan had also been initiated. For collection of the materials of archaeological significance and sculptures and their transportation, two trucks and three jeeps alongwith other equipments have also been sanctioned. Documentation of the materials had been taken up and this job had now been assigned to Madhyam (a State Govt. Undertaking) instead of Film Vikas Nigam). The Madhyam has been paid an amount of Rs.20 lakhs to take up this work. The excavation at few sites has been completed and apart from materials of archaeological significance, coins pertaining to 700 B.C. have been found.

It was further informed that joint inspection of the Joga Fort had been done. However, assessment report on effect of the scouring effect of water on this monument was still awaited.

Govt. of Gujarat

Relocation of one temple namely Shoolpaneshwar has been completed and the idol has also been installed. The work related to Hamfeshwar temple was under progress and would be completed before its submergence. The action plan for relocation of Hamfeshwar temple is still awaited.

Govt. of Maharashtra

No works were required to be done in Maharashtra in this regard.

ANTHROPOLOGY**Govt. of Madhya Pradesh**

Necessary steps have been initiated to effect the amendment of the Constitution of India to give the benefits and previlages to the PAPs from SC & ST categories being resettled in Gujarat areas where otherwise they were not entitled to these benefits. It was also informed that Secretary, Govt. of India, Min. of Welfare had referred this matter to the Governor of Gujarat for his recommendations on this proposal as the same was required for making the amendment in the constitution. GOMP officials informed that their State tribal, SC and BCW department (Nodel department) had also agreed and communicated their recommendations for the amendment of the constitution. The Additional Chief Secretary, GOG informed that the matter was under the consideration of government and many things need to be sorted out before a final decision is taken. Shri N.R. Krishan an Chairman of the Sub-Group suggested that in case of any difficulty, the GOG may consider giving these benefits to the PAPs settled in their state on area specific basis. The Additional Chief Secretary, Govt. of Gujarat assured to work for this.

Member (E&F), NVDA, informed that the Anthropological Survey of India, have been requested by NVDA to make available the

copies of their studies/publications, namely, "Peoples of India" & 'Narmada Salvage Plan'.

Chairman suggested that the reports/studies under reference may be procured through special messenger.

vi) SEISMICITY AND RIM STABILITY OF RESERVOIR

Narmada Sagar Project

Govt. of Madhya Pradesh

The Sub-group was informed that tenders for micro-earthquake recorders have been finalised by the NVDA, and the supply has recently been completed.

For procurement of the balance imported seismic instruments, the proposal has been approved by the NVDA in its 40th Meeting dated 16.12.94.

As regards seismic studies of Narmada Sagar, Omkareshwar and Maheshwar Projects, one micro-earthquake recorder set has already been installed at these places and the construction of observatories at 11 stations in the C.A. is in progress and is likely to be completed by June, 1995.

Sardar Sarovar Project

In order to confirm the findings of the G.S.I., NVDA had entrusted some more time-bound studies to CWPRS, Pune. The final report was still awaited.

During the 23rd meeting of Environment Sub-group it was agreed that the copies of the interim report received by NVDA would be sent to NCA and other States. This was still awaited.

vi) HEALTH ASPECT

Govt. of Madhya Pradesh

Narmada Sagar Project & Sardar Sarovar Project

Sub-group was informed that the suggestions of ICMR regarding further studies on health aspect were conveyed to

Gandhi Medical College. So far as the control of vectors was concerned, Gandhi Medical College was being asked to follow an integrated approach by consulting experts of Malaria Research Institute, Delhi & Vector Control Research Institute, Bangalore. Action was being taken for establishment of infrastructural facilities as proposed in the Health Plan prepared by GOMP with a plan layout of Rs.748.73 lakhs. At present 20 bedded hospital with two doctors and necessary nursing staff was existing and functioning at Punasa (NSP). Progress on provision of health facilities in SSP areas was awaited.

Govt. of Maharashtra

As regard the studies on surveillance and control in Maharashtra, Additional Director of Health Services, Govt. of Maharashtra, informed that it has been decided to collect villagewise information on different diseases on identified indicators and that a volunteer organisation had been engaged for taking up studies in SSP areas.

Govt. of Gujarat

Govt. of Gujarat informed that discussions have been arranged on 15th March, 1995 on the draft report received from SCHMS and that the action plan on health aspect would be revised by Govt. of Gujarat after receiving the final report from SCHMS.

vii) FISHERIES DEVELOPMENT OF SSP AND NSP RESERVOIRS

Sub-group was informed that the expert group formed for laying down the guidelines on conservation aspects of SSP is a purely scientific body constituted with the aim to lay down technical guidelines aimed at conservation and development point of view. Member (E&R), NCA however, clarified that this Sub-

group was not concerned with the interstate fisheries development board as the matter was pending before the NCA.

Govt. of Maharashtra

Govt. of Maharashtra informed the sub-group of the studies entrusted to CICFRI. Member (E&R) however pointed out that the terms of reference of the studies were also required to be reviewed by the expert group constituted for the purpose. He further informed that Chairman of the proposed group has agreed to convene a meeting shortly. It was clarified that the proposed fisheries development in Maharashtra was related to the rehabilitation of the tribals and it may not be proper to charge it to environmental mitigation measures.

Govt. of Gujarat

The fisheries plans submitted by Department of Port and Fisheries, Govt. of Gujarat could not be discussed. It was suggested that comments if any may be sent to Govt. of Gujarat and NCA directly.

Govt. of Madhya Pradesh

Shri G.P. Dubey, Consultant (Fisheries), NVDA informed that based on comprehensive water development plan prepared in 1984 by him, as well as, considering the recommendations of the basic review report of the CICFRI, Barrakpore, an action plan containing budget estimate, time frame etc. was under preparation & would be submitted soon.

The meeting ended with a vote of thanks to the chair.

ANNEXURES

Annex.XXIV.Min-1.

**LIST OF PARTICIPANTS ATTENDED IN THE 24TH ENVIRONMENT
SUB-GROUP MEETING HELD ON 10TH MARCH, 1995 AT NEW DELHI.**

GOVERNMENT OF INDIA**Ministry of Environment & Forests:**

1. Shri N.R. Krishnan, Secretary, Ministry of Environment & Forests, New Delhi. - CHAIRMAN
2. Shri Kalyan Kumar Bakshi, Add. Secretary, MOEF,
3. Dr. (Mrs.) Nalini Bhat, Add. Director, MOEF.
4. Dr. S.C. Verma, Joint Director, MOEF., New Delhi.

Ministry of Water Resources

1. Shri R.S. Pathak, Joint Commissioner (FP), New Delhi.

Narmada Control Authority

1. Shri S.A. Char, Executive Member, NCA.
2. Dr. A.K. Malhotra, Member (E&R), NCA
3. Dr. Pawan Kumar, Specialist (Env.), NCA.
4. Dr. Afroz Ahmad, Impact Assessment Officer, NCA.

Sardar Sarovar Construction Advisory Committee

1. Shri N.V.V. Char, Secretary, SSCAC, Vadodara.

ICMR, New Delhi

1. Dr. C.R. Ramachandran, Sr. DDB, ICMR, New Delhi.

GOVERNMENT OF MADHYA PRADESH

1. Shri Naresh Narad, Principal Secretary, NVDD., Bhopal.
2. Shri Suresh Chandra, Member (E&F), NVDA, Bhopal.
3. Mrs. I.M. Chahal, Commissioner, Archaeology & Museum, Bhopal.
4. Shri J.P. Patel, Director, Agri. NVDA, Bhopal.
5. Shri R.K. Bahere.

GOVERNMENT OF MAHARASHTRA

1. Shri A.K. Mago, Secretary (Env.), GOM.
2. Shri Johnny Joseph, Secretary (R&R), GOM.
3. Shri J.N. Saxena, Jt. Secretary (R&F), GOM.
4. Dr. N.S. Wanare, Addl. Director, Health Services, GOM.
5. Shri M.K. Jiwarajika, OSD., GOM.
6. Shri Ashwani Kumar, Dy. Secretary.

GOVERNMENT OF GUJARAT

1. Shri P.B. Ramrakhiani, Add. Chief Secretary, GOG.
2. Shri P.A. Malwade, CCF (SSP), GOG.
3. Shri M.B. Singh, CSWCRI, Vasad, Gujarat.

GOVERNMENT OF RAJASTHAN

1. Shri S.P. Mathur, Add. Secy, Env. Department, GOR.

NON OFFICIAL MEMBERS

1. Dr. R.K. Katti, Prof., UNEECs, Bombay.
2. Dr. S. Ramasheshan, Prof. IIT., Kanpur.

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**CENTRAL SOIL & WATER CONSERVATION RESEARCH & AND TRAINING
INSTITUTE, RESEARCH CENTER VASAD-388306 GUJARAT**

Progress of work done on the project "Evaluation of soil and water conservation measures in Sardar Sarovar Catchment in Gujarat State"

Out of the total 88000 sq.km. catchment area of Sardar Sarovar Project 423 sq.km. falls in Gujarat State. Forest Department of Gujarat State has taken up this catchment area of 423 sq.km. for treatment with various soil and water conservation measures and afforestation to reduce the sediment yield. The soil and Water Conservation measures and afforestation done by the Forest Department since 1989-1990 was as under as per the present forest classification in the area.

Class	Forest classification	Treatments carried out since 1990
A	Upto 0.4 tree crown density	Soil moisture conservation measures + 2000 saplings/ha
B	0.4 to 0.6	Soil moisture conservation measures + 400 saplings/ha
C	0.6 and above	Protection, soil and moisture conservation and nala bunding only

The present studies will reflect the effect of various soil and water conservation measures and afforestation works carried out in the catchment on extent of reduction in sediment and runoff. As such the Forest Department of Gujarat State approached our Institute, Central Soil and Water Conservation Research and Training Institute, Dehradun in May 1993 for formulating and carrying out this evaluation work. Research centre, Vasad, Gujarat prepared a Project plan " Evaluation of soil & water conservation

measures in Sardar Sarovar Catchment in Gujarat State " and submitted to the SSP Gujarat Government by the Director, CSWCRTI., Dehradun in July 1993. The financial sanction after approval was obtained by the Sardar Sarovar Narmada Nigam and conveyed and transferred the estimated project cost of 8.70 lakhs to the CSWCRTI. on 18th March, 1994.

Objectives of the Project :

To assess the impact of soil and water conservation measures on :

- i) soil and water loss from the catchment
- ii) ground water recharge
- iii) biomass production in the catchment area
- iv) soil properties of the catchment and its erodibility
- v) socio-economic conditions of the inhabitation in the area.

Methodology :

Six treated micro-watersheds will be fitted with self recording raingauges one in each micro-watershed and three non-recording raingauges one each in top, middle and lower portions of the 10 micro-watersheds. Four untreated micro-watersheds will be identified in the vicinity of treated micro-watersheds under identical soil type, slope groups and vegetation cover.

All the ten micro-watersheds will be fitted with runoff gauging structure in the form of triangular weir constructed in stone masonry.

In order to find out the effect of the different types of vegetation present on the runoff and soil loss from the watersheds, the analysis of vegetation in the watersheds will be

carried out. This will be done by selecting 10 representative sites in each watershed at random and making 20mx20m permanent quadrates. The density and canopy cover of the different species will be recorded from these quadrats. These observations will be carried out twice in a year, 1) during the last week of May to find out the vegetation cover before rains and 2) during the first week of October to find out the maximum cover offered by the different species present in the watersheds. If possible an observation during the last week of July will also be recorded when the watersheds are expected to have almost maximum canopy cover.

Soil physical and chemical properties such as texture, structure, organic matter availability of NPK etc. will be determined in each micro-watershed every year. Infiltration rates and hydraulic conductivity will also be determined periodically.

Rainfall and runoff data will be recorded event wise and runoff samples will be analysed for soil loss after each event.

Socio-economic survey of all the ten micro-watersheds will be conducted and inferences will be drawn about the requirements and expected availability of fuel, fodder and timber and other produces from these micro-watersheds. Based on the sediment output from these micro-watersheds, any correction required in the treatment of catchment area can be ascertained.

OBSERVATIONS TO BE RECORDED

- a) Rainfall amount, duration and intensity.
- b) Runoff amount, peak rate and lag-time.
- c) Suspended and bed-load of sediments.
- d) Soil physical and chemical properties which affect the erodibility of soils and fertility to assess the impact of conservation measures every year.

- e) Moisture measurement at 60 days interval after monsoon at varying depths by Neutron Moisture Probe.
- f) Percent canopy cover of lower, middle and upper storey.
- g) Survival of different species.
- h) Plant population, DBH and height of different species.
- i) Leaf litter measurement.
- j) Biomass production.
 - i) Biomass production from trees
 - ii) Biomass production from shrubs
 - iii) Biomass production from grasses
 - iv) Benefits from minor forest produce like Jatropha seeds, agave fibre etc.
 - v) Fodder, fuel, fibre production.
- k) Socio-economic data collection on human and cattle population, their fuel, fibre fodder requirement and expected production from the area. Income generated from watershed due to treatment.
- l) Cost benefit ratio.

Works carried out so far :

The work of actual selection of the different catchments for the project was carried out in April 1994 and construction of the gauging station were initiated. Only 7 gauging stations were completed by July-Aug. 1994. The location of these watersheds and the classification as per Sardar Sarovar Narmada Nigam classification are as under :

Station	Range/Division	Type of forest as per SSNN classification	Priority grade
Sagai	Dadiapada/ Rajpipla	Control	-
Ingawadi	Dadiapada/ Rajpipla	B	High priority
Wagdamba	Dadiapada/ Rajpipla	B	-do-
Mokhadi	Rajpipla	A	Very high priority area
Gulwani	Kevadia	A	High priority
Dharsimal	Naswadi	B	-do-
Kumetha	Baroda	Control	-

Following administrative procedure coupled with the unprecedented incessant rainfall during the year, difficulty in approaching the watershed during this rainy season due to the flooded approach terrain leading to the watersheds for construction of checkdams, difficulty in procuring stage level recorders and raingauges and their installation after the construction of gauging station delayed the data collection considerably during the year. Data have been collected from these 7 watersheds and are being analysed. Due to difficulty in approaching the gauging stations during the rainy season coupled with lack of trained personnel for collection of data, hampered the data collection from these 7 watersheds.

The initial soil samples were collected from different depths in May/June 1994 from the individual micro-watersheds selected/identified for gauging. The pooled samples were analysed for physical and chemical characteristics viz. Texture, Aggregate stability, maximum water holding capacity, organic carbon, N, P, K, pH. Recording of infiltration rates and hydraulic conductivity to be done before monsoon. The soil samples will be collected and analysed periodically from the similar sites every year for different parameters to know the changes in soil physical properties effecting erodibility and fertility status due to impact of catchment area treatment and conservation measures.

To know the water recharge in the soil profile it is proposed to fix the access tubes in the selected micro-watershed in upper, middle and lower reaches of the watershed for Troxler Moisture Probe.

Preliminary data required for understanding the vegetation characteristics of these watersheds for their interpretation on the impact on soil and water conservation and reduction in erosion, have been completed in the first three watershed of Dadiapada range. The vegetation characteristics of the others will be carried out. The data collected so far are being processed.

From 15.2.95 to 17.2.95 the Sardar Sarovar Narmada Nigam staff comprising of Assistant Conservator of Forest, Range Forest Officers, Foresters and Forest Guards engaged for data collection were given a training in the maintenance of the equipments and for the collection of the different data for the project evaluation. With this training it is envisaged that the necessary data collected required for the project evaluation will be carried out systematically during the rainy season 1995 and 1996 (project period). At present survey works for the topography, the exact area of the catchment, soils, vegetation and socio-economic factors are under progress.

(H. B. Singh)
Officer-In-Charge

ANNEX-XXIV-Min-3.

ENVIRONMENTAL COST OF SSP**RELATED TO UNIT I & II DAM & POWER HOUSE :****A) Expenditure by project authorities:****i) Cost of Survey & Studies (in lacs.)**

S.No.	Component	<u>Estimate/Actual Expenditure</u>				Total
		GOG	GOM	GOMP	NCA	
1.	Compensatory Afforestation	<u>4.52</u> 4.52	<u>5.29</u> 5.29	<u>2.4375</u> 2.4375	-	<u>12.2475</u> 12.2475
2.	Catchment Area Treatment.	<u>8.77</u> 8.77	<u>7.00</u> 7.00	<u>3.28</u> 2.80	-	<u>19.05</u> 18.57
3.	Flora & Fauna	<u>52.2</u> 38.3	<u>38</u> 16	<u>20.334</u> 17.634	<u>15.27</u> 15.27	<u>127.804</u> 87.204
4.	Health	<u>2.5</u> 2.5	NA	<u>29.627</u> 26.000	-	<u>32.127</u> 28.5
5.	Archaeology/Anthropology.	<u>1.3</u> 0.40	NA	<u>59</u> 36.33	-	<u>60.3</u> 36.73
6.	Seismicity & Rim Stability.	-	NA	<u>23.00</u> 12.50	<u>1.98</u> 1.98	<u>24.98</u> 14.53
						<u>276.5085</u> 195.8955

ii) Cost of Implementation (in lacs)

1.	Compensatory Afforestation.	<u>1809.10</u> 1298.48	<u>2116</u> 1650.27	<u>1800.000</u> 774.77	<u>5725.1</u> 3433.52
2.	Catchment Area Treatment.	<u>3509</u> 1826.48	<u>2894.67</u> 409.61	<u>8835.05</u> 1336.48	<u>15238.72</u> 3572.58
3.	Flora & Fauna including Shoolpaneshwar	<u>75.31</u> 64.42	NA	<u>NA</u> NIL	<u>75.31</u> 64.42
4.	Health (incremental expenditure) for 10 yrs.	<u>3800.0</u> 101	<u>93.16</u> -	<u>1354.63</u> 515.225	<u>5247.79</u> 616.225
5.	Archaeology/Anthropology.	<u>156.00</u> 29		<u>700</u> NIL	<u>856</u> 29
6.	Seismicity & Rim Stability.	<u>129</u> 271	-		<u>129</u> 271

Total: 12827.358 27196.61 =29.25%
2724.1765 7955.211

* In addition several State/Central agencies have also incurred expenditure on various Environmental studies & Implementation aspects. Full details are not yet available.

NA : Not available.

केवल सरकारी प्रयोग के लिए
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नर्मदा नियंत्रण प्राधिकरण
NARMADA CONTROL AUTHORITY

पर्यावरण उपदल
Environment Sub-Group

पच्चीसवीं बैठक की कार्यसूची
Agenda for Twenty Fifth Meeting

स्थान : पर्यावरण भवन, नई दिल्ली
Venue : Paryavaran Bhawan
New Delhi

तारीख 11 जुलाई, 10 बजे,
Date : 11th July, 1995, 10.00 A.M.

इन्दौर
जून, 1995
INDORE
June, 1995

**AGENDA FOR 25TH MEETING OF THE ENVIRONMENT SUB-GROUP NCA
TO BE HELD ON 11TH JULY, 1995, AT PARYAVARAN BHAWAN, NEW DELHI.**

I N D E X

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XXV-1(122)	Confirmation of Minutes of the 24th meeting.	1
XXV-2(123)	Review of Action taken on the decisions of the previous meetings.	2 - 3
XXV-3(124)	Present Status of Studies Surveys and Environmental Action plans.	4 - 14
XXV-4(125)	Any Other Item	14
	Date & Venue of Next meeting.	

A N N E X U R E

XXV-1	Letter No. 64/1/93-EXT-II May 16, 1995 from Sr.DDG (NCD),ICMR, New Delhi.	1
XXV-2	Letter No.CE/SR/95/352 dated 25.4.95 from Prof. S. Ramashehan, IIT, Kanpur.	2
XXV-3	Letter from MOEF for CAT works under NAEDR schemes.	3
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XXV-6	SSP : Map of Priority Areas for CAT under progress.	35
XXV-7	Copy of Map showing compensatory Afforestation sites in the state of M.P.,Mah. & Gujarat.	36
XXV-8	Assessment of the report entitled "A study on Flora and Fauna of the commandd area of SSP lying between Narmada and Sabarmati rivers(EIA), submitted by S.P. University to NPG.	37-40
XXV-9	Observation on Draft final report on EIA studies on Flora and Fauna of the command area of SSP lying in Saurashtra and Katchchh area.	41-43
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contd...2/

2

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XXV-15	Minutes of the First meeting of high level expert group on fisheries development & conservation in SSP.	75-84

Item No. XXV-1(122): **CONFIRMATION OF MINUTES OF THE 24TH MEETING.**

Minutes of the 24th meeting of Environment Sub-Group of Narmada Control Authority were circulated to all Members and invitees vide letter No.Env-34(25)/95/722-748 dated 17th April, 1995.

Comments received from ICMR on minutes of the meeting are placed at Annex-XXV-1. Accordingly it is proposed to replace the word "Bangalore" appearing on page 14 line 4 with the word Pondichery.

Comments received from Prof. S. Ramasheeshan for addition of one para under item XXIV-2(120) at end of 1st para are placed at Annex-XXV-2.

The minutes are put up for confirmation.

Item No. XXV-2(123): **REVIEW OF ACTION TAKEN ON THE DECISIONS OF THE PREVIOUS MEETINGS.**

1. Submission of Catchment Area Treatment (CAT) plans for freely draining critically degraded sub-watersheds (Item No. XXII-2(112) (1)).

Govt. of Madhya Pradesh (GOMP) and Maharashtra (GOM) were directed to recast their plan keeping in view the guidelines for the schemes of National Afforestation Ecodevelopment Board & River Valley projects. During the 24th meeting officers of GOM & GOMP desired to know if CAT works can be undertaken in SSP areas. MOEF vide letter placed at Annex-XXV.-3 confirmed that CAT works in forest areas can be undertaken in SSP catchment.

GOM & GOMP have informed that plans are under revision & shall be submitted soon. Progress in this regard may please be reported. Treatment maps for balance of the critically degraded subwatersheds for both Narmada Sagar and Sardar Sarovar are yet awaited from GOMP.

Govt. of Gujarat is going ahead with the treatment of entire catchment within the state of Gujarat. It was informed that except 310 ha. all treatment works had been completed in forests as well as non forest areas.

GOMP was also directed to associate the Central Soil and Water Conservation and Research Institute, Dehradun (CSWCRI) for measuring the silt load during pre and post treatment phases of the catchment area treatment works in M.P. areas. GOMP had reported that Vadodara centre of CSWCRI was being approached. Further progress may please be reported.

2. Cost Estimates for preparation of Action plan and implementation of Environment safeguard measures (Item No.XXII-2(112) (2)).

During the earlier meetings of the Environment Sub-Group it was desired that the detailed cost (estimates and expenditures) on studies and implementation of mitigation measures for suggested environmental safeguards should be presented. The information available in the office of the NCA is presented in Annex-XXV-4 for information and consideration of the members.

Govt. of Gujarat agreed for revising cost estimates of Command Area Development works and for presenting the same during 24th meeting. Progress may please be reported.

3. Environmental Impact of Closure of Construction Sluices.

During the last few meetings of Environment Sub-Group members were informed that the process of ratification of the closure of sluices has been set in motion and MOE&F had constituted a committee of officials for undertaking field visit for this purpose. This committee was to visit the areas for submission of report during mid April '95. Progress may be reported by MOE&F.

As desired by the Chairman during the 23rd meeting a presentation on the status of implementation of environmental safeguard measures in relation to construction works of SSP & NSP with the help of slides & maps is yet awaited from the state Govts. of Madhya Pradesh, Maharashtra & Gujarat.

Item No. XXV-3(124): **PRESENT STATUS OF STUDIES SURVEYS AND ENVIRONMENTAL ACTION PLANS.**

A copy of the status report for the quarter ending March, 1995 is enclosed and placed at Annex-XXV-5.

The present status of studies surveys and action plans in brief is presented below for a review by the Sub-Group.

i) **PHASED CATCHMENT AREA TREATMENT**

Narmada Sagar Project

Govt. of Madhya Pradesh

An area of 28987 ha had been treated up by the end of March, 1995. NVDA was to report the survival rate of plantation & the extent of progress during the year 1994-95. A copy of map for the areas under treatment is still awaited.

Sardar Sarovar Project

A copy of the map showing the subwatersheds where treatment works are under progress is placed at Annex-XXV-6.

Govt. of Madhya Pradesh

Govt. of Madhya Pradesh had planned to treat 125725 ha area, out of which an area of 24.648 ha has been treated up by March, 1995. Further progress, may be reported.

Govt. of Gujarat

Govt. of Gujarat had taken up the entire catchment area upstream of the Sardar Sarovar Project in Gujarat for treatment.

By the end of January, 1995 an area of 28974 ha. had been treated up.

Govt. of Maharashtra

As per the plan submitted by Govt. of Maharashtra non forest area of 2768 ha was proposed to be treated by the end of 94-95. Out of this till the end of March, 1995, works over 1870 ha. area had been completed. The progress of work on the remaining non forest area may be reported.

In addition GOM had planned to treat 20,000 ha of forest areas. By the end of March, 1995 works on an area of 7480 ha had been completed. Besides an additional area of 6500 ha. was tackled with PPO works.

GOM may like to submit the completion report of CAT works finished so far.

iii) COMPENSATORY AFFORESTATION

Narmada Sagar Project

Government of Madhya Pradesh

Compensatory afforestation over an area of 60633 ha was reported to have been completed by the end of March, 1994. Further progress may be reported by NVDA.

Sardar Sarovar Project

A location map showing compensatory afforestation sites in three states is enclosed at Annex-XXV-7. However states should submit a detailed map urgently.

Govt. of Madhya Pradesh

Govt. of Madhya Pradesh by the end of January, 1995 had completed plantation works over an area of 8165 ha against the final target of 8740 ha.

Govt. of Gujarat

Govt. of Gujarat had completed plantation works in the entire planned area of 13950 (including non forest and degraded forest areas) by the end of September, 1994.

Govt. of Maharashtra

Out of total target of 19460 ha planned for treatment in lieu of the areas undergoing submergence, an area of 16380 ha had been planted up by the end of August, 1994. However detailed location map of some of the districts where compensatory afforestation works are progressing is yet awaited.

iii) COMMAND AREA DEVELOPMENT**Narmada Sagar Project**

As assured during the 23rd meeting current status of preparation of comprehensive environmental impact assessment report on command area development with integrated development plan including drainage aspect for NSP is to be submitted by GOMP.

Regarding studies on effect of pesticides insecticides in the command area being conducted by J.L.N. Agricultural University, Jabalpur, NVDA informed that data collection would commence from coming monsoon.

Sardar Sarovar Project**Govt. of Gujarat**

Following the concern expressed by Chairman, Environment Sub-group during its 15th meeting held on 25th February, 1992,

SSNNL constituted a High Level Steering Committee (HISC) for SSP in Gujarat alongwith 4 Expert Multi Disciplinary Groups for the sanctuaries in the command. The HISC included senior officers of SSNNL/State Govt./ MOEF, GOI and experts. Terms of References for the Expert Multi Disciplinary Groups & for other studies were circulated during the 16th meeting. Considering that the sub-group was ignorant of the deliberations of these committees, inclusion of Member (E&R) of NCA in the committees was agreed by Additional Chief Secretary, GOG during the 24th meeting. GOG may like to report regarding latest deliberations of the Experts Multi Disciplinary Group and inclusion of Member (E&R) in the committee.

Observation of the NCA office on the study reports received in this office are placed at Annex-XXV-8 to 12.

Copies of the reports related to command area development studies completed in the last two years were required to be submitted to NCA and MOEF. These are yet awaited.

On the issue of irrigated Agro forestry in SSP it was agreed by NPG to consult Dr. Abrol. Development in this regard are to be reported by NPG.

Govt. of Rajasthan

Final draft report on the studies conducted by WAPCOS on drainage aspects awaits finalization of the alignment of canal. Report which was to be available by the end of April '95 is yet awaited. GOR to please inform about the progress.

iv) SURVEY OF FLORA, FAUNA & CARRYING CAPACITY STUDIES

Narmada Sagar Project

Govt. of Madhya Pradesh

Flora & Fauna studies for Narmada Sagar Project areas have been carried out by two agencies viz., Friends of Nature Society, Bhopal and Wildlife Institute of India, Dehradun. Both of these agencies have submitted their final reports. NVDA was to circulate main findings of the report to the members.

Various action plans, based on the recommendations of these study reports were required to be made. Besides NVDA had submitted proposal for the creation of special protected areas to the Govt. of M.P. further developments may be reported.

Sardar Sarovar Project

Govt. of Madhya Pradesh

Final report of the Impact Assessment studies in the areas undergoing submergence in Madhya Pradesh completed by State Forest Research Institute, Jabalpur was made available to MOEF and NCA. NVDA has to report progress on preparation of action plan.

Govt. of Gujarat

Govt. of Gujarat may like to inform about further progress on the implementation aspect of various recommendations made in the report of M.S. University, Vadodara submitted in July, 1992.

Govt. of Maharashtra

The final report of studies on flora and fauna in and around the SSP in the areas in Maharashtra State being prepared by School of Environmental Science, Pune yet awaited.

v) **ARCHAEOLOGICAL & ANTHROPOLOGICAL SURVEY****ARCHAEOLOGY:-****Narmada Sagar Project & Sardar Sarovar Project.****Govt. of Madhya Pradesh**

Sub-group was informed that the State Deptt. of Archaeology and Museum and Archaeology Survey of India (ASI), Govt. of India have completed survey(s) and prepared action plan(s) for the State, as well as centrally protected monuments. NVDA had also accorded sanction for of Rs.4.79 crores outlined in the action plan of State Deptt. of Archaeology & Museum. An additional sum of Rs.30 lakhs had also been sanctioned for the construction of two new museums and extension of existing museum at Maheshwar besides, construction of "Narmada Gallery" in Bhopal Museum. Thus the total allocation made for the state protected monuments came to Rs.5.09 crores. Similarly for the relocation of the centrally protected monuments, an amount of Rs.87 lakhs had been approved.

Steps for the implementation of the action plan had also been initiated. For collection of the materials of archaeological significance and sculptures and their transportation, two trucks and three jeeps alongwith other equipments have also been sanctioned. Documentation of the materials had been taken up and this job had now been assigned to Madhyam (a State Govt. Undertaking) instead of Film Vikas Nigam). The Madhyam has been paid an amount of Rs.20 lakhs to take up this work. The excavation at few sites has been completed and apart from materials of archaeological significance, coins pertaining to 700 B.C. have been found.

It was further informed that joint inspection of the Joga Fort had been done. However, assessment report on effect of the scouring effect of water on this monument was still awaited.

Sardar Sarovar Project

Govt. of Madhya Pradesh

NVDA may like to indicate progress of implementation of the action plan prepared by the Department of Archaeology and Museum, Madhya Pradesh for protection/relocation and excavation works.

Govt. of Gujarat

Govt. of Gujarat may like to report the progress regarding further works undertaken by it for development of Shoolpaneshwar temple. Progress is also required to be reported on developments related to protection of Hamfeshwar temple. Action plan for relocation of Hamfeshwar temple is yet awaited.

Govt. of Maharashtra

No works are required to be done in Maharashtra in this regard.

ANTHROPOLOGY

Sardar Sarovar & Narmada Sagar Projects

Govt. of Madhya Pradesh

Necessary steps have been initiated to effect the amendment of the Constitution of India to give the benefits and privileges to the PAPs from SC & ST categories being resettled in Gujarat areas where otherwise they were not entitled to these benefits. It was also informed that Secretary, Govt. of India, Min. of Welfare had referred this matter to the Governor of Gujarat for

his recommendations on this proposal as the same was required for making the amendment in the constitution. GOMP officials informed that their State tribal, SC and BCW department (Nodal department) had also agreed and communicated their recommendations for the amendment of the constitution. The Additional Chief Secretary, GOG informed that the matter was under the consideration of government and many things need to be sorted out before a final decision is taken. During the 24th meeting Chairman of the Sub-Group suggested that in case of any difficulty, the GOG may consider giving these benefits to the PAPs settled in their state on area specific basis. The Additional Chief Secretary, Govt. of Gujarat assured to work for this. Further progress may be reported.

Besides NVDA was to report on procurement of the publication related to Tribal of Narmada from An.S.I. through special messenger progress be reported.

vi) SEISMICITY AND RIM STABILITY OF RESERVOIR

Narmada Sagar Project

Govt. of Madhya Pradesh

The Sub-group was informed that on the advise of the Dam Review Panel, CW&PS, Pune, I.M.D. etc the NVDA had decided to establish a network of 10 seismic stations along the periphery of NSP complex to record and collect pre and post impoundment seismic data. Orders for supply of 6 Nos photographic recorders and 12 Nos wood Anderson Seismographs had already been placed.

The sub-group was informed that tenders for micro-earthquake recorders have been finalized by the NVDA, and the supply has recently been completed.

For procurement of the balance imported seismic instruments, the proposal has been approved by NVDA in its 40th meeting dated 16.12.94.

As regards seismic studies of Narmadda Sagar, Omkareshwar and Maheshwar Projects, one micro-earthquake recorder set has already been installed at these places and the construction of observatories at 11 stations in the C.A. is in progress and is likely to be completed by June, 1995. Further progress on all these matters may be reported.

Sardar Sarovar Project

GSI had completed the survey and submitted its final report on rim stability analysis for the areas in Maharashtra and Madhya Pradesh in 1993. The survey for the rim stability analysis in Gujarat was completed much earlier by Jaipur branch of the GSI. In order to confirm the findings of the GSI, NVDA had entrusted some more time bound studies to CW&PRS, Pune at an estimated cost of Rs.12.55 lakhs. The CW&PRS had submitted an interim report. During the 24th meeting NVDA agreed to submit a copy of the report to NCA & MOEF each.

vi) HEALTH ASPECT

Narmada Sagar Project & Sardar Sarovar Project

Government of Madhya Pradesh

Action taken by GMP for providing the facilities as proposed in the health plan may be reported.

Sardar Sarovar Project

Govt. of Gujarat

GOG may like to submit its revised health plan.

Govt. of Maharashtra

GOM submitted a revised health plan. This is placed at Annex-XXV-13. Certain observation made by NCA office on this plan are placed at Annex-XXV-14 for review by the members.

GOM may like to report progress on creation of infrastructure and other facilities as proposed in the plan. GOM may also to report on the surveillance & control studies in Maharashtra, in consultation with the experts suggested by ICMR.

viii) FISHERIES DEVELOPMENT OF SSP AND NSP RESERVOIRS

To speed up the work on conservation and development of the fish resources in the reservoir, sub-group recommended the formation of a group of experts. The proposal for formation of a high level expert group was approved by NCA with inclusion of one more expert member to be nominated by GOMP. First meeting of this expert group was held on 10.5.95. Minutes of the meeting are placed at Annex-XXV-15. Second meeting is scheduled for 6th July. Out come of the discussion shall be reported during the meeting.

Govt. of Gujarat

The plan submitted by Govt. of Gujarat is being reviewed by the high level expert group on fisheries development & conservation

Govt. of Madhya Pradesh

NVDA was to submit the revised action plan prepared earlier during 1994. Progress may be reported.

Govt. of Maharashtra

TOR for the studies commissioned by GKM through Dr. S.N. Singh of CICFRI were put up for discussion during the first meeting of expert group & shall be reviewed during the 2nd meeting proposed to be held on 6th July '95. Outcome shall be reported during the meeting.

Item No. XXV-4(125): ANY OTHER ITEM:

DATE & VENUE OF THE NEXT MEETING

ANNEXURES

Annex- XXV.(1).

Tele: 652794 652895
652794 652895

तार: साइंटिफिक
Grams: SCIENTIFIC
टेलिग्राम:
Telex. 031-73067



भारतीय आयुर्विज्ञान अनुसंधान परिषद
INDIAN COUNCIL OF MEDICAL RESEARCH
अन्सारी नगर, पोस्ट बॉक्स 4508, नई दिल्ली-110 029
ANSARI NAGAR, POST BOX 4508, NEW DELHI-110 029

Dr. C.R. Ramachandran
Sr. Dy. Director General (NCD)

No. 64/1/93-EDD-II
May 16, 1995

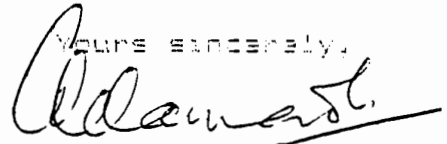
Dear Dr. Malhotra,

Kindly refer your letter No. मया-34/25/95/722-48 of 17.4.95 enclosing the minutes of the meeting held on 10 March 95.

The minutes are well recorded (health section) excepting a small correction at page 14, line 4 - Vector Control Research Centre is at Pondicherry (and not at Bangalore).

I suggest that the minutes are circulated to the Officer who actually participated in the meeting. If it is mandatory a copy may also be sent to the official member. This will assist in getting a quick and early feed back.

With kind regards.

Yours sincerely,

(C.R. Ramachandran)

Dr. A.K. Malhotra
Member (Env. & Rehabilitation) &
Member Secretary (Paryavaran Updai)
13, Scheme No. 74-C
Vijay Nagar
Indore 452008 (MP)

ANNEX-XXV-(2).

तार Gram : TECHNOLOGY

टेलिग्राम : Telex : 0325-296/0326-329 IITK-IN
Fax : (0512)-250260/259007

दूरभाष : Phone : 250864



भारतीय प्रौद्योगिकी संस्थान कानपुर
INDIAN INSTITUTE OF TECHNOLOGY KANPUR

सिविल अभियांत्रिकी विभाग

DEPARTMENT OF CIVIL ENGINEERING

डाकघर-बाई. आई. टी. कानपुर-208 016

P. O.—I. T. Kanpur-208 016, (India)

Dr. S. Ramaseshan
ProfessorNO:CE/SR/95/352
April 25, 1995.

Dr. A. K. Malhotra,
Member (Env.), NCA
113, B.G. Scheme No. 74/c,
Vijay Nagar
INDORE- 452008.

Dear Dr. Malhotra,

Ref: Minutes of NCA Env. Subgroup 24th
meeting held on 10/3/95.

item No. XXIV-2(120). While mentioning about
the presentation of CSWCRI, this may also be
added.

Since precipitation, runoff and sediments
in small water-sheets are being measured,
it is desirable to use modern digital
recording instruments in the watersheds
rather than conventional ones.

Thanking you very much,

Yours Sincerely,

(S. RAMASESHAN)

ANNEX-XXV-(3).

Dr.(Mrs.) Nalini Bhat
Additional Director

D.O.No. 3-87/80-LA

तार :

Telegram : PARYAVARAN,
NEW DELHI

दूरभाष :

Telephone : 4360478

टेलिक्स (द्विभाषीय) :

Telex : (bi-lingual) : W-66185 DOE IN

Fax : 4360678

भारत सरकार

पर्यावरण एवं वन मंत्रालय

GOVERNMENT OF INDIA

MINISTRY OF ENVIRONMENT & FORESTS

पर्यावरण भवन, सी. जी. ओ. कॉम्प्लेक्स

PARYAVARAN BHAWAN, C.G.O. COMPLEX

लोदी रोड, नई दिल्ली-110003

LODHI ROAD, NEW DELHI-110003

April 24, 1995.

Dear Dr. Pawan Kumar,

This has reference to your letter No.ENV-34(25)/95/571 dated 3rd April, 1995 regarding follow up of the discussions held in the 24th meeting of the Environment Sub Group of NCA.

2. I have discussed the matter regarding programmes for catchment area treatment of River Valley Projects covered under National Afforestation and Eco Development Board. There are a number of on-going Schemes in Madhya Pradesh and Maharashtra and 229 districts have been identified for implementation of centrally sponsored schemes "Area Oriented Fuelwood and Fodder Projects". List for these two categories alongwith the procedure of the Board regarding various Schemes are enclosed.

3. There are no definite districts/blocks which have been identified for catchment area treatment. The project proponents are expected to identify degraded catchments in the forest area and submit the proposal through State Forest Department for seeking financial assistance. You may like to inform this to the concerned officials from Narmada Valley Development Authority, Madhya Pradesh and the Government of Maharashtra.

With regards,

Yours sincerely,

Nalini Bhat
(Nalini Bhat)

Dr. Pawan Kumar
Specialist (ENV),
Narmada Control Authority,
B.G.113, Scheme No.74-C, Vijay Nagar,
INDORE-452008 (M.P.).

ANNEX-XXV-4

ENVIRONMENTAL COST OF SSP**RELATED TO UNIT I & II DAM & POWER HOUSE :****A) Expenditure by project authorities:****i) Cost of Survey & Studies (in lacs.)**

S.No.	Component	<u>Estimate/Actual Expenditure</u>				Total
		GOG	GOM	GOMP	NCA	
1.	Compensatory Afforestation	4.52 4.52	5.23 5.23	2.4375 2.4375	-	12.2475 12.2475
2.	Catchment Area Treatment.	8.77 8.77	7.00 7.00	3.23 2.80	-	19.05 18.57
3.	Flora & Fauna	52.2 38.3	38 16	20.334 17.634	15.27 15.27	127.804 87.204
4.	Health	2.5 2.5	10 .1	22.627 28.000	-	42.127 28.6
5.	Archaeology/Anthropology.	1.3 0.40	NA	59 36.33	-	60.3 36.73
6.	Seismicity & Rim Stability.	-	NA	23.00 12.50	1.98 1.98	24.98 14.53
						276.5085 195.8955

ii) Cost of Implementation (in lacs)

1.	Compensatory Afforestation.	1809.10 1238.48	2116 1650.27	1800.000 774.77	5725.1 3433.52
2.	Catchment Area Treatment.	3509 1826.48	2894.67 445.657	8835.95 1336.48	15238.72 3608.627
3.	Flora & Fauna including Shoolpaneswar	75.31 64.42	NA	NA Nil	75.31 64.42
4.	Health (incremental expenditure) for 10 yrs.	3800.0 101	546.60 .5	1354.63 515.225	5701.23 616.725
5.	Archaeology/Anthropology.	156.00 29		700 NIL	856 29
6.	Seismicity & Rim Stability.	129 271	-		129 271
Total:				12827.358 2724.1765	27649.54 =28.9% 7991.758

* In addition several State/Central agencies have also incurred expenditure on various Environmental studies & Implementation aspects. Full details are not yet available.

NA : Not available.

STATUS REPORT
SARDAR SAROVAR PROJECT (SSP) ENVIRONMENTAL ASPECTS
MARCH - 1985

The action plans and status of studies and implementation of Environmental Safeguard Measures upto quarter ending December, 1994 is as indicated below:

Environmental Safeguard Studies/Measures

- 1) Phased Catchment Area Treatment,
- 2) Compensatory Afforestation,
- 3) Command Area Development,
- 4) Flora, Fauna & Carrying Capacity,
- 5) Seismicity,
- 6) Health Aspects,
- 7) Archaeological & Anthropological, Studies,
- 8) Fisheries,
- 9) Rim Stability Analysis.

I. 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.

GOI issued a Directive in June 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 and Land Use Survey (AISLUS). 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 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 SSP catchment.

- 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.

1- DIRECTLY DRAINING SUB-WATERSHEDS:

Table 1.1 The total catchment area of SSP below NSP is 2442440 ha.

	GOMP	GOG	GOM	Total for the Basin
Total Catchment	2248600	30230	163610	2442440 ha
Very High & High	546702	30230	116355	688410
Directly draining Very High & High	121330	29537	28226	175565
Areas directly damaged by project activities.	-	500	-	500
Planned to treat	125725	29284	22768	177.77

According to the data available in NCA office the total area of directly draining subwatersheds in M.P. is 1,14,606 ha.

Table 1.2 Summary of Status of CAT Planning

	GOG	GOM	GOMP
Preliminary Surveys)		
Prioritisation of sub-watersheds	:		
Development of Management Options	:	"Complete for all item in all States."	
Annual Action Plan	:		
Effective monitoring	:		
Phased Programme)		

Table 1.3 Principal Elements of Action Plans for CAT

Elements of Action Plans	GOG	GOM	GOMP
Survey work	)	"Complete" for all item & all States.	
Preparation of detailed map)		
Micro-watershed development map	Complete	Complete	Complete

Assignment of responsibility for conducting the work)
Timetable	: "Yes" for all item for
Budget	: all States
Menu of treatment	:
Proposals for monitoring)

Table 1.4 Implementation of CAT

	Gujarat (29284)	Maharashtra (22768)	Madhya Pradesh (125725)			
<u>Area to be treated in ha.</u> (Area in brackets indicate actual progress)						
Monsoon year	Forest	Non-Forest	Forest	Non-Forest	Forest	Non-Forest
1990-91	<u>4528</u> (4528)	<u>898</u> (898)	-	-	-	-
1991-92	<u>4770</u> (4770)	<u>230</u> (230)	-	-	-	-
1992-93	<u>6013</u> (6013)	<u>336</u> 336	-	-	-	<u>8800</u> (8800)
1993-94	<u>6000</u> (6000)	<u>286</u> (286)	<u>960</u> (960)	-	<u>966</u> (966)	<u>6246</u> (6246)
1994-95	<u>5893</u> 5730	<u>167</u> 167	<u>6347</u> 6514	<u>2768</u> 1980	<u>17000</u> 4268	<u>20000</u> 594
1995-96	162	183	6653	788	18000	20000
1996-97	-		5873	-	15964	18749
TOTAL:	<u>27204</u> 27042 *	<u>2080</u> 1897	<u>20000</u> (7474)**	<u>2768</u> (1980)	<u>51930</u> *** (5234)	<u>73795</u> 16640

* As reported by GOG 162 ha. could not be treated due to resistance from the local people.

** GOG had reported that out of 3025 ha of Agriculture are planned for treatment earlier, 945 ha. area is untreatable hence targets are reduced from 3025 ha to 2080 ha.

*** Out of 51930 ha. area, an area of 13930 ha is fully stocked where minor soil engineering works will only be carried out w.e.f. 1994-95 @ 4000 in (1994-95), 5000 (95-96) & Balance in 96-97.

In addition 6500 ha. area was tackled by PPO works during 1994-95.

	<u>Gujarat</u>	<u>Maharashtra</u>	<u>Madhya Pradesh</u>
Implementation	Complete work scheduled to finish 1995-96	work recently commenced scheduled to finish 1997.	Completed work scheduled to finish 1997.

II. FREELY DRAINING SUBWATERSHEDS: (Excluding directly draining Subwatersheds).

Table 1.5 Summary of Status of CAT Planning:

	GOMP	GOM	GOG
Preliminary Survey	Yes	Yes	
Prioritization of Sub-watersheds	Yes	Yes	Already Under implementation.
Development of Management options monitoring	Yes	Yes	
Phased programme	Yes	Yes	

Table 1.6 Principal Elements of Action Plan for CAT:

	GOMP	GOM	GOG
Survey work	Yes	Yes	
Preparation of development map	Yes	Yes	Already under implementation.
Micro watershed map	Awaited	awaited	
Work responsibility	Yes	Yes	
Menu of treatment	Yes	Yes	
Time Table	Yes	Yes	
Proposal for monitoring	Yes	Yes	
Budget	Yes	Yes	

Availability of funds

*

*

* Agreed by Planning Commission for inclusion in River Valley Project" Scheme and funds are also promised by MOE&F from National Afforestation & Eco-Development Board.

A. Govt. of Madhya Pradesh:

Table 1.7 Total Area of freely draining critically degraded sub-watersheds below NSP is 54,6702 ha.

	Phase I Area (Directly draining)	Phase-II (Balance Area)	Total Area
SSP	121330	356484	477814
Jobat	-	-	28211
Man	-	-	12720
Maheshwar	-	-	13209
Omkareshwar	-	-	14748
			546702 *

* According to AISLUSO, this area is 541825 ha. The plan submitted by NVDA is under scrutiny in NCA.

Table 1.8

PHASE - II (356484 ha.)			
<u>Forest Area</u>		<u>Non Forest Area</u>	
Gross Area	Net Working Area	Gross Area	Net working Area
1,11,479	78,368	2,66,388	2,39,750

Table 1.9 Schedule of Implementation (Madhya Pradesh):(318118 ha)

Year	Forest Area	Non Forest Area
	Phy. (ha.)	Phy. in ha
1997-98	8000	15750
1998-99	8000	16000
1999-2000	8000	16000
2000-01	8000	16000
2001-02	8000	16000
2002-03	8000	16000
2003-04	8000	16000
2004-05	8000	16000
2005-06	8000	16000
2006-07	6368	16000
2007-08	-	16000
2008-09	-	16000

2009-10	-	16000
2010-11	-	16000
2011-12	-	16000
	-----	-----
	78,368	2,39,750

B. Govt. of Maharashtra:

PHASE-II

Table 1.10 Schedule of Implementation of freely draining Sub-watersheds.

Year	<u>Forest Area</u> Phy. in ha.	<u>Non Forest Area</u> Phy. in ha.
1994-95	5600	3145.66
1995-96	5600	4186.97
1996-97	5600	4511.86
1997-98	5600	5044.1
1998-99	5600	4993.48
1999-2000	5600	5453.93
2000-2021	6400	-
	-----	-----
	40,000	27,336

11. COMPENSATORY AFFORESTATION

Approval for the diversion of forest land 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 conduct of CAF. Principal amongst these are the following stipulations.

- For every hectare of forest land 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. This represents a two fold increase of the usual requirement.
- For the 4,200 hectares of forest land 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

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

- Sardar Sarovar (Narmada) Project Development Plan, Volume-II prepared by the Narmada Planning Group (NPG) in 1983.
- Studies on Ecology 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-Environmental and Wildlife Management Studies on the Sardar Sarovar Submergence Area in Gujarat 1992 by MSU.
- Impact Assessment of Madhya Pradesh Land to be Submerged Under Sardar Sarovar Project and Adjoining Ecosystems by State Forest Research Institute, Jabalpur (1989-92).
- Draft report on Flora and Fauna in and Around Sardar Sarovar Project, Maharashtra by the University of Pune 1994.

The Action Plans

In compliance with the conditions set by the MOE&F, each state has prepared an action plan for the CAF of areas within its 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 Kutch, 1986.
- Project for Afforestation in Sardar Sarovar Project Impact Areas due to Diversion of Forest Lands 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 multi-purpose river-valley project (1989).

These plans were submitted in varying stages of completeness but each has now been revised and updated to take account of the comments of the MOEF and the NCA. Action plans of 3 State Govts.

contained following components:

1. Identification of areas for CAF;
2. Description of selected areas,
3. Justification of Selection of Areas,
4. Identification of responsible agency,
5. Description of staffing requirements,
6. Description of material requirements,
7. Estimate of costs,
8. Identification of tree species,
9. Description of preparatory work needed,
10. Description of planting techniques,
11. Provision for aftercare,
12. Yearly planting target,
13. Yearly budget,
14. Provision made for monitoring implementation

These action plans spell out a programme of tree planting in the three states on both non-forest and degraded forest areas as shown in Table 2.1 & 2.2.

Table 2.1 Areas for Compensatory Afforestation

	Area of Forest diverted for SSP	Area of Degraded forest to be Replanted	Area of Non-Forest Land to be Afforested	Total area for CAF
GCG	4,523	9,300	4,650	13,950
GOM (a)Submer.	6,488*	12,980	6,488	19,468
(b)R&R *	4,200	-	4,200	4,200
GOMP	2,732	6,550	2,190	8,740
TOTAL :	17,943	28,830	17,528	46,358

* This includes 2700 ha released in 1990 & 1500 in 1993 for R&R works in Maharashtra for which only equal non forest area is being raised as stipulated.

Table 2.2a Schedules for Implementation of CAF (Against Submergence)

	Gujarat		Maharashtra		Madhya Pradesh	
	Area to be Afforested in ha (Area in brackets indicates actual progress)					
	Degraded Forest	Non- Forest	Degraded Forest	Non- Forest	Degraded Forest	Non- Forest

Monsoon year						
1990		<u>2,150</u> (2150)			<u>132</u> (132)	<u>716</u> (716)
1991	2,834 (2,834)	350 (350)	8,383 (8383)		1580 (1200)	400 (373)
1992	2,450 (2450)	847 (847)	4,552 (4552)	2,276 (2276)	1580 (2400)	400 (-)
1993	<u>2,500</u> (2,500)	<u>455</u> (455)	<u>45</u> (20)	<u>1,156</u> (1,156)	<u>1580</u> (2215)	<u>400</u> (-)
1994	<u>1,516</u> (1,516)	<u>848</u> (848)	-	2,911 (2894)	600*	1100*
1995	-	-		0,162	-	-

Total:	9,300	4,650	12,977	6,488	6550	2190

Achievement in ha.	(9300)	(4650)	(12977)	(6316)	**	**

* Net target considering progress of the previous years.

** Total Progress achieved is 8165 ha. against a target of 8740.

Table 2.2b Schedule for Implementation of CAF in lieu of Forest Land released for R&R works.

State	Year	Land released Area in ha.	Target & Progress		
			1993-94	94-95	95-96
Maharashtra	1990	2700	<u>2192.37</u> (2192)	<u>307</u> (311)	<u>197</u> (-)
	1993	1500	-	-	1500
	TOTAL	4200	2192	307	1697
Achievement			(2192)	(311)	

Other Additional Afforestation Activities:

Plantation along Canal Banks:

The total potential of canal bank plantations is estimated to be 18000 ha. A project report prepared for this purpose by forest Deptt. is under scrutiny of SSNNL. The plantation

programme is likely to be launched effectively from the year 1995. However to give a start to the work of canal bank plantations, plantations on 215 ha have already been established till rains of 1994.

Additional Plantation Activities

(a) Dam Vicinity Plantation (235 ha)

An area of 240 ha. in the vicinity of the dam has also been planted. This work was completed in 1992.

(b) Revine Land Afforestation (200 ha.)

On the left bank of the river Sabarmati an area of 200 ha. in two villages i.e. Ratanpur (150 ha.) and Pirojpur (80 ha.) is also planned to for plantation. An area of 200 ha. is till 1994 rains.

(c) Project area plantations: (255 ha)

An area of 300 ha. has been planted in the project area as per the target and the work completed in the rain of 1992.

III. COMMAND AREA DEVELOPMENT: (Including Drainage Studies)

(A) Government of Gujarat:

Government of Gujarat have undertaken several studies related to the Command area development. Some of which have been completed and the remaining are in progress. Their position is as follows:

Sl. No.	Name of Study	Name of Agency	Year of Completion

1. Completed Studies:			
1.	Pre-Feasibility study for Low Level Canal.	Jyoti Consultants Ltd. Vadodara.	1981
2.	Mathematical Modelling of Ground Water for system single layer model-Narmada Mahi-Doab.	Operation Research Group, Vadodara.	1982
3.	Pre-Feasibility level Drainage study of Narmada Mahi Doab of SSP Command.	Core Consultants Ltd. Ahmedabad.	1982
4.	Some Aspects of Role of Panchyats and Institutional	Institute of Cultural and Urban Anth-	1982

Arrangements for canal irrigation in Two Talukas of Ahmedabad District.

- | | | | |
|-----|---|--|---------------------|
| 5. | A study of settlement Pattern (6 Talukas in the Narmada Command Area of Mahesana District of Gujarat). | Department of Geography, Gujarat University, Ahmedabad. | 1982 |
| 6. | Regionalisation of Narmada Command. | Operations Research Group, Vadodara. | 1982 |
| 7. | Marginal cost study of two Typical Distributerries and Two Typical Branches. | Dr. C.R.Shah, Vadodara. | 1983 |
| 8. | Socio-Economic Bench Mark survey of 62 Talukas (Sub-districts) of Narmada Command Area. | Fourteen Different Agencies Including Universities, Research Institutions etc. | Between 1982 & 1983 |
| 9. | Population Projection and Migration study for Narmada Command Area. | Operations Research Group, Vadodara. | 1983 |
| 10. | Study on Water Demand for Non-Agricultural use from Narmada Project. | Gujarat Water Supply and Sewerage Board, Gandhinagar. | 1983 |
| 11. | Consumer Expenditure, Assets and Indebtedness of Rural Households of the Command Areas of Sardar Sarovar (Narmada) Project, 1982. | Directorate of Economics & Statistics, Gandhinagar. | 1983 |
| 12. | Wasteland Development Project for command Area of Narmada Canal (Region 11 and 12). | Gujarat State Rural Development Corporation Ltd., Gandhinagar. | 1984 |
| 13. | Mathematical Modelling of Ground Water System Narmada Mahi Doab. | Operations Research Group, Vadodara. | 1985 |
| 14. | Additional work on Mathematical Modelling of Ground Water System-Single Layer Model Narmada Mahi Doab. | Operations Research Group, Vadodara. | 1985 |
| 15. | Rate of Adoption of Imp- | Operations Research | 1985 |

- roved Technology in Narmada Command and Rest of Gujarat State (Based on Analysis of Crop cutting Experiments Data).
16. Computer aided Planning of conveyance and delivery Network. Indian Institute of Management, Ahmedabad. 1986
17. Land Use and Cropping Pattern Survey and Mapping of Narmada Command Area Zone 4A & 4B. Department of Geography, M.S.University, Vadodara. 1986
18. Survey and Investigation work of Ground Water Resources in Narmada-Mahi Doab. Gujarat Water Resources Development Corporation Ltd.Gandhi-Nagar. 1987
19. Cropping Pattern and Water Demand Study in Narmada Command Area. Operations Research Group, Vadodara. 1987
20. Inter-Regional Water allocation and Determination of Branch Canal capacity. Operations Research Group, Vadodara. 1989
21. Extended study on Inter Regional Water Allocation and determination of Branch Canal Capacity. Operations Research Group, Vadodara. 1989
22. Growth of Agro-Processing Industries in Phase-I of the Sardar Sarovar Project. Gujarat Industrial & Technical Consultancy Organisation Ltd. Ahmedabad. 1990
23. Consultancy work for Control, Telemetry and Communication Net Work on Narmada Canal System for SSP. Gujarat Communication & Electronics Ltd., Vadodara. 1991
24. Techno-Economic Study for utilising Village Tanks as Borrow Area for Construction of Canal Net Work. Operations Research Group, Vadodara. 1992
25. Area Development Strategies for selected Regions Adjacent to Narmada Main Canal (Vadodara, Surendra-nagar & Banas Khatha Dist.) Operations Research Group, Vadodara. 1992

26. Studies in Water Rates Policy in 3 parts.
- i) Pricing of a public Utility Survey of Literature Department of Economics, South Gujarat University, Surat. 1992
 - ii) Financial working of Irrigation Projects - A case of four projects in Gujarat. Department of Economics, Sardar Patel University, Vallabh Vidyanagar. 1992
 - iii) Some policy issue for Canal Water Rates in Gujarat. Department of Economics, Sardar Patel University, Vallabh Vidyanagar. 1992
27. Mathematical Modelling of Ground Water System for SSP Command between Rivers Shedhi and Sabarmati. Consultancy Engineering Services, New Delhi. 1993
28. Mathematical Modelling of Ground Water System for SSP Command between Rivers Sabarmati and Banas. Operation Research Group, Vadodara. 1993
29. Mathematical Modelling of Groundwater System for SSP Command beyond Banas upto Rajasthan Border. Dalal Consultants, Ahmedabad. 1993
30. Prefeasibility level Drainage study for SSP Command beyond Mahi. Consultancy Engineering Service, New Delhi. 1993
- II. ON GOING STUDIES:**
- 1. Monitoring and Evaluation of Resettlement & Rehabilitation Programme. Centre for Social Studies, Surat. 1985
 - 2. Development of Alfabet Island in the Estuary of River Narmada. Multi Disciplinary Expert Group. Sept.'92
 - 3. Agricultural Research Studies. Gujarat Agricultural University, 1987
 - 4. Survey and Investigation Work of Ground Water Resources beyond River Mahi in SSP Command. Gujarat Water Resources Development Corporation Ltd., Gandhinagar. 1989

5. Action Research on People's Participation in Water Management in SSP. Gandhi Labour Institute, Ahmedabad. 1991
6. Development of Nal Sarovar Bird Sanctuary. Multi Disciplinary Expert Group. Sept. 1992
7. Development of Black Buck National Park at Velavadar. Multi Disciplinary Expert Group.
8. Development of Wild Ass Sanctuary in Little Rann of Kachchh. Multi Disciplinary Expert Group. Sept. 1992
9. * Study on preparation of a detailed Integrated Command Area Development Plan for SSP. M/s Wamana Consultants Pvt.Ltd., Hyderabad. Dec. 1992
- 10.* Environmental Impact Assessment Studies on Inland and Marine Fisheries relevant to the Command Area of Sardar Sarovar (Narmada) Project. M.S. University, Vadodara. Dec. 1992
11. 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. Commissionerate of Health, Medical Services & Medical Education, Govt. of Gujarat, Gandhinagar. Dec. 1992
12. Study of Flora and Fauna of the Command Area of Sardar Sarovar (Narmada) Project : Lying between the Narmada & Sabarmati Rivers. (Environmental Impact Assessment Studies). Sardar Patel University, Valalabh Vidyanagar. Feb. 1993

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|--|---|-------------|
| 13.* Study on Flora and Fauna of the Command Area of Sardar Sarovar (Narmada) Project Lying in Saurashtra and Kachchh Area (Environmental Impact Assessment Studies). | Saurashtra University, Rajkot. | March, 93 |
| 14.* Study on Flora and Fauna of the Command Area of Sardar Sarovar (Narmada) Project: Lying between Sabarmati River and Rajasthan Border (Environmental Impact Assessment Studies). | Gujarat University, Ahmedabad. | March, 1993 |
| 15. Ecological study of Wild Ass Sanctuary and surrounding area using remote sensing technology for Environmental Impact Assessment. | Guj. Ecological Education & Research Foundation (GEER Foundation), Gandhinagar. | Dec., 93 |
| 16.* Environmental Impact Assessment of Nal Sarovar Bird, Sanctuary. | GEER Foundation | Dec., 93 |
| 17. Environmental Impact Assessment of Velavadar National Park located in the command area of SSP. | GEER Foundation | Dec., 93 |
| 18. Environmental Impact Assessment (EIA) studies on Aliabet Island. | Chief Engineer, (CAD SSP) Expert Multidisciplinary Group. | Dec., 93 |
| 19. Review of ground water drainage study. | H.R. Wallingford | Jan., 94 |
| 20. Agro Pollution aspect of Command Area. | -do- | Jan., 94 |
| 21. EIA on downstream of Sardar Sarovar Dam upto Gulf of Cambay. | -do- | Jan., 94 |

 **Draft/interim reports received in NCA.

(B) Government of Rajasthan

The Government of Rajasthan had submitted a report on Environmental & Ecological aspects and remedial measures for Narmada Canal Project. Copy of the report was submitted to Ministry of Environment and Forests. Govt. of Rajasthan have assigned studies on EIA of Command area in Rajasthan portion to WAPCOS & the TOR finalised and WAPCOS have since started the work & interim reports submitted.

IV. FLORA, FAUNA, WILDLIFE 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.

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 Narmada Control Authority would ensure in-depth studies on flora & fauna needed for implementation of Environmental Safeguard measures.

Studies/Surveys :

- Important survey work has 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). Interim 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 is completed & report is 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 Universities of Bhopal, Vikram and Rani Durgavati 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.
- 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 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.

The Action Plans

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 which will avoid the possibility of animals being trapped in the submergence area;
- plans for improvement works in the wildlife sanctuaries of Gujarat;

Fisheries Component:

Three state Govts. 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 NSP, 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 were 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 hydrobiological 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.
- 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 proposed by GOM through CICFRI.

Subsequently, the state governments 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. This plan is presently under scrutiny of NCA. 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.

Table 4.1 Summary of Status of Environmental Planning:

A) - Wildlife

	Gujarat	Maharashtra	Madhya Pradesh
Preliminary Surveys	Complete	Complete	Complete
In-Depth Studies	Complete	Completed	Complete
Development of Management Options	Complete for Shoolpaneshwar	Some work completed but awaiting deliberations of the expert group.	Some work completed but awaiting results of study and deliberations of the expert group

Action Plan

Migratory corridors	Not needed	Completed	Complete
Sanctuary development	Complete for Shoolpaneshwar development.	Plans for establishment of wildlife sanctuaries await study results and expert group's recommendations	Plans for establishment of wildlife sanctuaries await study result and expert group's recommendations.
Wildlife conservation	Massive afforestation in entire catchment of SSP	It depends on deliberations of expert group	Await final outcome of study.
Implementation	Shoolpaneshwar development complete, CAT work (increasing carrying capacity) nearing completion	Awaiting outcome of the study. CAF nearly completion, CAT work recently accelerated	Arrangements complete, awaiting final outcome of study

Progress in Shoolpaneshwar Sanctuary Development

	Target	Achieved to	% Complete
Fencing	100km	107	100
Firelines	60km	251 km	100
Barricades	2km	2.8 km	100
Check Dams	14	14	100
Construction of Quarters	21	21	100
Construction of Rest House	1	1	100
Improvement of Communications	50 km	70.5 km	100

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.
- Velvadar Black Buch Nation Park.

Summary of Status of Environmental Planning:

B) Fisheries

		GOG	GOM	GOMP

Preliminary surveys work plan		Yes	Yes	Yes
Updating of Detailed surveys/ studies of fish fauna		Yes	-	Yes
Updated Action plans		Yes	Yes	Underformu- lation
Implementation				
1. Plan for clear felling	Completed	Yes to synchronise with submer- gence	Yes to synchronise with submer- gence	
2. Development of fish farms	Under imple- mentation	Yes, awaits submergence	Yes, awaits submergence	
3. Establishment of IFDB for future R&D management	Agreed	Agreed	Yet to agree	
4. Expert group to lay down guide- lines for conser- vation & Development )	) : : )	Yes agreed by the states & constituted by the NCA.		

Progress of Implementation

CICFRI have already established one hatchery in Gujarat for augmenting the numbers of the Hilsa fish in the reservoir. This currently produce around 250,00 spawn per year. CICFRI have also been commissioned to monitor the whole of the estuary and their study has been extended to examine pollution and to undertake modelling studies in the downstream environment.

A draft plan for the creation of an Interstate Fisheries Development Board (IFDB) has been prepared by the NCA and agreed, in principle, by the governments of Gujarat and Maharashtra. However GOMP has disagreed & suggest an alternative proposal. Reaction from GOG & GOM are awaited. The organisation is expected

to be set up and fully functioning prior to reservoir filling. 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 followup action.

GOG has already provided 16 hectares of land to the project for the development of fish farms. In addition, the State Fisheries Department is exploring the development of riverine fisheries and the development of the reservoir for commercial and game fisheries.

Execution of felling as per felling plans prepared will await the commencement of impounding.

V. 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 I&II.
- 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.

Progress of 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 river bed.

The Government of Gujarat has identified 9 locations for the installation of seismic monitoring stations, 4 each on either side of the Sardar Sarovar reservoir in Madhya Pradesh and Maharashtra and 1 at Kevadia in Gujarat. By Dec. 1994, 8 stations had been installed. Construction of building for the 9th station in progress.

The progress of implementation is illustrated in Table below:

Implementation of Actions

Action	Status
Dam design modifications	Complete
Installation of monitoring stations	8 stations installed by June, 1994, 1 more awaited
GSI (Nagpur Division) rim stability studies	Completed
Tracer Studies by CWPRS	Ongoing

VI. HEALTH ASPECTS

Studies

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 was 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 produced a report on the health profile of 33 project-affected villages in Dhule District, Maharashtra.
- Health Statistic 1982-84, GOMP. This study, published by GOMP in 1985 & updated is 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 by, amongst others, by the Malaria Research Centre (MRC) and Dr. Kalra.

Status of Implementation of Actions for Public Health

Action	Gujarat	Maharashtra	Madhya Pradesh
Baseline studies	Complete	Complete	Complete
Preparation of state action plan	Submitted and modified in 1986; Urban Malaria Scheme proposed	Original submitted in 1987, revised in 1991 and 1992 & 1993	Original submitted in 1986, revised in 1988 and final plan submitted in 1991
Survey of existing facilities	Complete	Complete	Sufficient facilities
Establishment of new facilities	Hospital at Kevadia for workers; laboratory and mobile unit complete, drug dispensaries	Somawal village hospital; health centres and health units sanctioned.	Hospital, mobile unit and civil dispensaries for labour; detailed scheme for resettled population
Vector control measures in place	NMEP; SSNNL workshop on malaria control; laboratory established; entomological studies underway	NMEP; adoption malaria control guidelines of irrigation Department	NMEP; state malaria control organisations strengthened
Appointment of specialist staff	Complete	Awaits financial approval by State Govts.	Needs identified

Disease Monitoring and responsibility	Entrusted to SCHMS Action Plan of 1986 will be revised.	Entrusted to regular health department	Evaluation cell established monitoring by Gandhi Medical College, Bhopal. 3rd Six monthly report submitted.
	EIA report Submitted by SCHMS. Final plan awaited.		

VII. ARCHAEOLOGICAL SURVEY AND ANTHROPOLOGICAL STUDIES/ ARCHAEOLOGICAL SURVEY

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:

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 of Department of Archaeology. A survey was carried out by the Department of Archaeology of cultural sites in 24 villages of Akkrani Taluk and nine village from Akkalikuwa Taluk, Dhule District.
- Madhya Pradesh : Survey of State Department of Archaeology and Museum (1992).
- Anthropological Survey of India: Narmada Salvage Plan.
- Anthropological Survey of India: People's of India.
- Parishad, A.K. Survey of Material Cultural in the Narmada Valley.
- Rashtriya Manav Sanghralaya : Narmada Salvage Plan.

Cultural Heritage in SSP Area

	Gujarat	Madhya Pradesh	Maharashtra
Relocation of Temples	8(2)*	37 (7)	-
Excavation site(s)	-	5	

* Figures in brackets indicate number of sites designated for relocation.

Summary of Current Situation and Progress

	GOG	GOMP	GOM*
Survey of Villages in Submergence Zone.			
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 present location.

ANTHROPOLOGICAL STUDIES

Government of Madhya Pradesh has informed that in view of the studies being carried out in connection with Narmada Sagar Project, no separate anthropological studies are required and that the Director General, Anthropological Survey of India has also expressed the same view. M.P. State Adivasi Kala Parishad has submitted its report on Tribal arts & culture. Besides Anthropological Survey of India has informed that Narmada Basin is already covered extensively under the project "people's of India". Besides Rashtriya Manav Sanghralaya has conducted needed studies in the past as follows. Further studies are covered under R&R plan of the state Governments.

- a study of the palaeo-ecology of quaternary fossils in the central Narmada Valley;
- excavation of upper palaeolithic site of Mehtakhaeda and further exploration of Nimar;
- collection of tribal artifacts in Madhya Pradesh.

Institutional responsibility for these actions was specified in the action plan whereby the first two elements were completed by Deccan College, Puna and the third by Adivasi Kala Parishad, for the Rashtriya Manav Sanghralaya, Bhopal.

STATUS REPORT
NARMADA SAGAR PROJECT (NSP) ENVIRONMENTAL ASPECTS,
MARCH, 1995

1) Phased Catchment Area Treatment:

The freely draining area of Narmada Sagar Project down stream of Bargi Dam is about 39,25,422 ha. 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. Prioritisation survey of the watersheds was entrusted earlier to SGSIT&S, Indore. Later on, as per GOI's instructions the prioritisation survey was entrusted to the All India Soil & Land Use Survey Organisation, New Delhi. The Survey has been completed by AISLUSO, New Delhi and the Survey reports have been received in the NVDA.

On the basis of the reports submitted by the AIS&LUSO, 30 sub-watersheds belonging to the very high and high priority categories and directly draining into the reservoir have been identified for treatment. These 30 sub-watersheds cover an area of about 73,456 ha.

1. DIRECTLY DRAINING SUB-WATERSHED OF HIGH & VERY HIGH PRIORITY CATEGORIES:

Critically degraded Sub-watersheds below Bargi dam (Figure in ha).

	FOREST		NON FOREST		TOTAL	
	Gross	Net	Gross	Net	Gross	Net
Critically degraded sub-watersheds.	15759	11048	57697	51927 *	73456	62975

* In addition an area of 1636 ha. was treated up under pilot project earlier.

Programme and Progress of Works:

	<u>Upto 92-93</u>	<u>93-94</u>	<u>94-95</u>	<u>95-96</u>	<u>96-97</u>
	Comulative Progress		Target/Progress	Target	
Non-Forest area/ ha. (51,927 ha)	11439	<u>13636</u> 10261	<u>15375</u> 7224	19651	3352
Forest area/ (11,048 ha)	-	-	<u>3700</u> 2623	4777	3648
Total Area: (62,975 ha)	11439	<u>13636</u> 10261	<u>15700</u> 9847	23824	7000

II. FREELY DRAINING AREA: (EXCLUDING DIRECT DRAINING SUB-WATERSHED

Number of watersheds	- 478
Gross Area	- 10,12,650 ha.
Net Area	- 9,15,150 ha.

Schedule of Implementation:

Year	Forest (in ha.)		Non Forest (in ha.)	
	Gross Area	Net Area	Gross Area	Net Area
1995-96				18000
1996-97				18000
1997-98		10000		27000
1998-99		10000		28800
1999-2000		10000		28800
2000-2001		10000		28800
2001-2002		10000		28800
2002-2003		10000		28800
2003-2004		10000		28800
2004-2005		10000		28800
2005-2006		10000		28800
2006-2007		10000		28800
2007-2008		8430		28800
2008-2009				28800
2009-2010				28800
2010-2011				28800
2011-2012				28800
2012-2013				28800
2013-2014				28800
2014-2015				
2015-2016				28800
2016-2017				28800
2017-2018				28800
2018-2019				28800
2019-2020				28800
2020-2021				28800
2021-2022				28800
2022-2023				26400
2023-2024				26120
<hr/>				
	1,24,732	1,08,430	8,96,361	8,06,720
<hr/>				

2) Compensatory Afforestation :

A total of 40332 ha forest land would come under submergence and an additional 779.9 ha of forest land has been diverted for the residential colony, power house complex, dam, saddle dam and approach roads. Subsequently, another 308.4 ha of forest land was

permitted to be diverted for power house. Thus a total of 41,420 ha of forest land has been permitted to be utilised for the construction of ISP. To compensate for this loss of forest, 10,143 ha of non-forest and 70,802 ha of degraded forest land has been identified for compensatory afforestation.

Programme of Compensatory Afforestation:

	Commulative Progress till 91-92	<u>92-93</u> Target/ Progress	<u>93-94</u> Target/ Progress	<u>94-95</u>	<u>95-96</u>
Degraded Forest area (70,802 ha)	23048	<u>12528</u> 11919	<u>12400</u> 12427	<u>12400</u> 4056	10035
Non-Forest area (10,143 ha)	5239	<u>1534</u> 1390	<u>1500</u> 1327	<u>1500</u> 667	514
(80,945) (say 81,000 ha)	28287	<u>14062</u> 13309	<u>13900</u> 14314	<u>13900</u> 4723	11549

3) Command Area Development :

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 6/2007. Monthly observation of water levels started in November, 1991 for subsequent supply of this data to the consultants, already shortlisted, are likely to be continued for 2 seasons to draw inference for preparation of master plan for drainage. 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 ~~17/6/92~~ for this work was finalised.

4) Flora, Fauna, Wildlife and Carrying Capacity :

Studies on these aspects were entrusted to the Wildlife Institute of India, Dehradun in December, 1989 and were scheduled to be completed by March, 1993. The studies have been completed. The final study report is submitted to MOE&F & NCA.

Besides this, the Friends of Nature's Society, Bhopal, was entrusted with the preparation of Wildlife Retrieval and Conservation Plan. They have submitted the final report. Action plan is under formulation.

Actions have been taken up by NVDA to implement the recommendation of the WLI regarding construction of National Park & protected areas.

2) Limnological Competency

The reservoir competency survey has been done by GSI and report is submitted. In the report, GSI has suggested further studies for some patches of narrow water divide. As such they were requested to carry out the study in the required area. GSI is further reviewing the need to survey the area identified earlier.

Establishment of 10 nos. of seismic observatories in the Narmada Sagar Complex area is taken up. NVDA 12 nos. of wood Anderson Seismometers and six nos. of photographik recorders are being procured from IMD. Procurement of Micro Earthquake recorders is also in progress. In the mean time on the initiatives taken by NVDA, CWPRS has already installed the instrument to records. Preimpounding data and for undertaking seismic studies at NSP, Omkareshwar & Maheshwar projects through Analogic micro earthquake recorder & strong motion accillograph as an interim measure.

6) Health Aspect:

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. Three six monthly report 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 is under formulation.

7) Fisheries Development:

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, 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. 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.

8) Archaeological and Anthropological Survey:

A survey of the 254 villages is required for identification of the archaeological monuments falling within the submergence area. The State Department of Archaeology and Museum, Bhopal was entrusted with the survey of 87 villages which has been completed. Archaeological Survey of India has also completed the survey for 167 villages assigned for identification of the monuments of significance.

Action plan is available. Action will be taken to preserve material of archaeological importance in consultation with experts.

As only lower bastion in north of the Joga Fort is likely to be affected by Scour action of water and the Siddheshwar temple is well above the FRL of 880 ft., these two structures are not considered as affected by the project. The state Department of Archaeology & Museum has already submitted an action plan for relocation & monuments of Archaeological significance. This plan is being implemented.

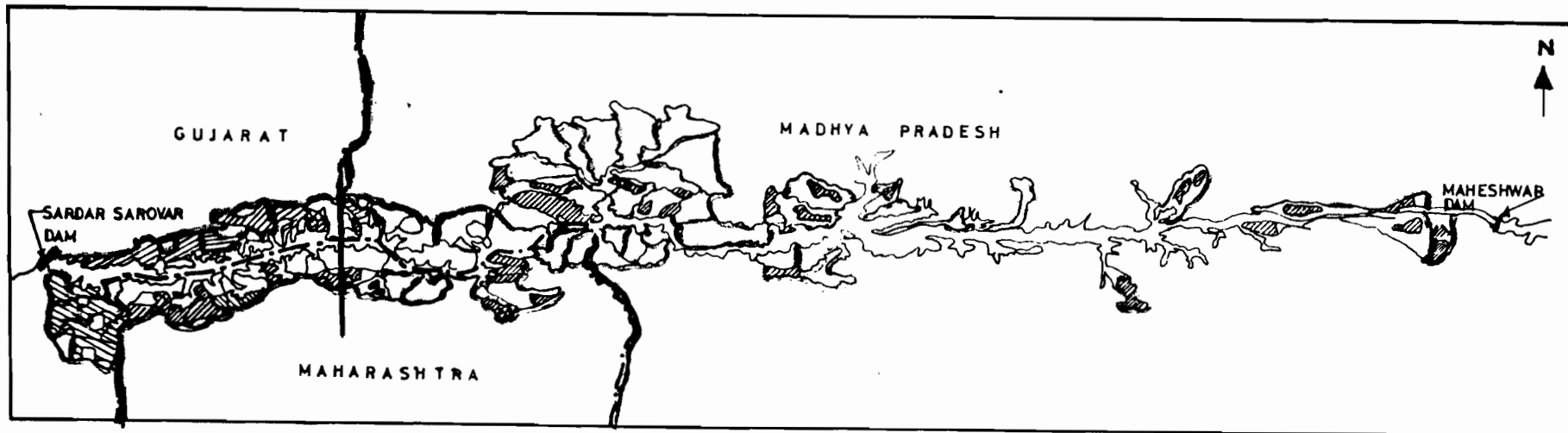
Anthropological Studies:

Efforts are being made for retrieval of bio-cultural material from the Narmada Basin. A lot of information is gathered from the field which generates immense data of Socio-Anthropological significance.

Rashtriya Manav Sanghralaya has constituted a working group for the retrieval of bio-cultural material in Narmada Basin. Survey of tribal art and handicraft entrusted to M.P. Adivasi Kala Parishad is completed and report is available. Besides Anthropological Survey of India has covered these studies under its own project called "people of India". The report is in 81 volume out of which 7 volume are under final editing. A Narmada Salvage plan is also launched by Anthropological Survey of India recently and the entire area is scanned and some ancient tools have been found.



PRIORITY AREAS FOR CATCHMENT AREA TREATMENT



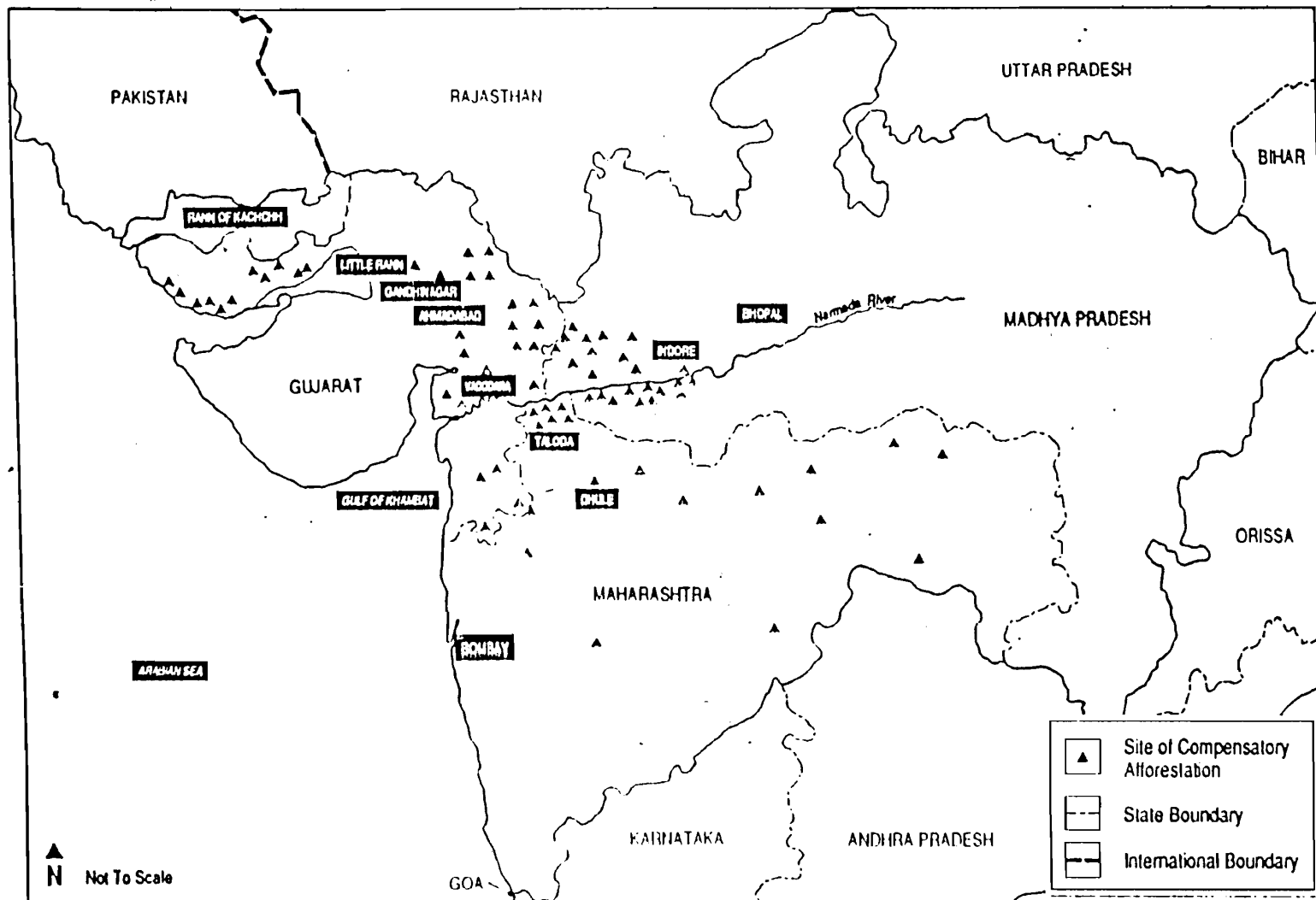
LEGEND

- SUB WATER SHED BOUNDARY
- WORK TACKLED BY 1994 RAINS
- STATE BOUNDARY
- 1994 81 EL. 45100 M. Ch. 5280 ha. Area under submergence.

NOT TO SCALE

ANNEX - XXV. (7).

Compensatory Afforestation in Gujarat, Maharashtra, Madhya Pradesh



ANNEX- XXV-(8).

No.Env-4(5)/95/966

14th June, 1995.

15th

To

Shri K.M. Pathak,
Officer on Special Duty,
Narmada Planning Group,
Block No.12, 3rd Floor,
New Sachivalaya Complex,
GANDHINAGAR ! 382 010.

Sub: Observations on the draft final report entitled "A study on Flora and Fauna of the command area of SSP lying between Narmada and Sabarmati Rivers (EIA) studies), submitted by S.P. University, NPG.

.....

Sir,

This has reference to your letter No. NPG-ENV-EIA/F&F/CA/224/Part.II/503 dated 1.5.1995 enclosing above mentioned draft report. Please find enclosed herewith our comments & suggestions on this report for consideration of inclusion in the final report by the investigators.

Yours faithfully,

Encl: As above.


MEMBER (E&R)

OBSERVATIONS ON THE DRAFT FINAL REPORT ENTITLED "A STUDY ON FLORA AND FAUNA OF THE COMMAND AREA OF SARDAR SAROVAR PROJECT LYING BETWEEN NARMADA AND SARARMATI RIVERS (EIA STUDIES), SUBMITTED BY SARDAR PATEL UNIVERSITY, NARMADA PLANNING GROUP

A good piece of work has been done by the investigators. Resource of inventory of flora and fauna has been presented in the related chapters. This may form a useful basis for monitoring and further studies in the command area. Profile of floral regime is presented very nicely. An assessment, of the plant species which are on the decline at present or the species which are already listed as rare and endangered, is also very well presented. However, a similar assessment of the faunal regime is required to be incorporated under Chapter - VI.

While report presents an inventory of resources base and the nature of impact is attempted, the source of impact is not very clearly brought out. For example, the command area would be impacted from the change in hydraulic regime through introduction of canal irrigation. The quantum and magnitudes of such changes are necessary for evaluation of actual impacts from canal irrigation and are required to be outlined in the present report.

We understand that a great deal of data on command area development activities, the volume of water, expected to flow through the main canal, branch canal and distributaries and actual quantum of water to be made available as per the requirement of the crop, data on availability of the soil water, salinity, soil canal use irrigability, water-logging, etc. is available with NPG may be used in identifying impacts on flora and fauna. Investigators may also like to consider the mitigatory measures like volumetric distribution of water, conjunctive use of surface and ground water, system of drainage, development of road and infrastructure facilities, off farm development works etc. in built into the planning.

Investigators may like to incorporate relevant data needed for correct and precise evaluation of identified impacts. This would be useful in assessing the impact of flora and fauna in space and time. In turn this would help in preparing an effective management plan for undesirable impacts.

In the chapter entitled "Environmental Impact Assessment" (EIA), some of the identified impacts have been listed whereas some others have been left out. However, in case of SSP, unlike other projects, a number of modifications based on the experiences drawn from the past have been incorporated and therefore a correct understanding of the project is essential for identifying predicting and evaluating the impacts. For instance, under the positive impact of agriculture pattern it is indicated that ultimate crop pattern will depend on trends of market. This is based on the hypothesis that the crop like sugarcane, rice, horticulture, etc. would replace the traditional crop grown since many centuries. We understand that release of excess water to

meet the requirement of such crops is not envisaged in the project to ensure that the water reaches to the tail-end users.

Thus, there may be a need for regulating the crop pattern, according to the availability of the water specially during the initial reach of the canal system. Crop pattern can be regulated among others through legislative measures. Thus understanding of the project is necessary before any environmental impact is correctly evaluated. In this connection, observations on genetic erosion presented by the investigator on page-42 are important and may require management norms to mitigate the same. There are other areas like salinity of the soil and ground water, consunctive use, provision of, drainage system, etc. complete set of data on all such aspects is available with Narmada Planning Group, in addition to the simulation from the Mahi command may be used by the investigators for correct evaluation of the impacts.

Under the chapter on Management Plan, the recommendations for preserving the diversity of germ plasm through biologist working at various universities etc. appear sound but the adaptation of similar approach to poultry, animals, may not be as practical and may be modified.

Detailed maps at district levels are now available with the Planning Commission and efforts may made with the help of Narmada Planning Group to use these in achieving the objectives of better management options.

SPECIFIC OBSERVATIONS:

In the Executive Summary, certain terms are used loosely and certain sweeping statements may better be avoided for instance on page-II big and small game animals may be better substitute for the word wild life used in the beginning of para-7.

On page-III, observations on command area development of Mahi as recorded in the first para are not in harmony with further observations presented in para-2 & 4.

Similarly on page-V, para 3.2 word "scientific" would have been a better substitute to word sensitive.

Spelling mistakes resulting from typographical errors for instance on page-2, para-6, the world demarkation, on page-22 benghalensis, on page-24 angoes, etc. and may be rechecked.

On page-22 culturable fisheries are included under Sub-chapter 6.4 meant for special class of birds.

Whereas, a comprehensive list of birds and fishes is included in the text, other animal species are list in the annexures. This may be avoided and a uniform pattern may be followed.

Under the Chapter, Environmental Impact Assessment, certain statements may be avoided like the last sentence of the para. on page 34 historical development on EIA discussed in para-2 may include a reference to the guidelines issued in Ministry of Irrigation and Power.

It is one of the most thoroughly investigated project where a number of studies have been undertaken by the project. Details may also be mentioned in the report.

On page-50 on the graphic presentation on the issue of dealing with the aquatic weeds, we understand that eco-friendly and bio-control is recommended whereas chemical and mechanical removal is discouraged by the experts, however, this is not reflected so.

On page-52, a mention has been made that about 3600 ha. of area will be submerged, however, the related data about the extent of the submergence has not been presented.

The established methodology for assessment of environmental impacts also need to be followed for unbiased estimation of likely impacts.

CONCLUSION:

Overall, the whole good and sincere efforts has been made by the experts for taking up the studies for a vast area in such a short time and the nature of impacts emanating from water projects on flora and fauna have been presented nicely. There is scope for improvement through identification of source of impact based on the data available with NPI. If correctly the evaluation of the real impacts would be done which in turn would pave the way for development of an effective management plan.

meet the requirement of such crops is not envisaged in the project to ensure that the water reaches to the tail-end users.

Thus, there may be a need for regulating the crop pattern, according to the availability of the water specially during the initial reach of the canal system. Crop pattern can be regulated among others through legislative measures. Thus understanding of the project is necessary before any environmental impact is correctly evaluated. In this connection, observations on genetic erosion presented by the investigator on page-42 are important and may require management norms to mitigate the same. There are other areas like salinity of the soil and ground water, consunctive use, provision of, drainage system, etc. complete set of data on all such aspects is available with Narmada Planning Group, in addition to the simulation from the Mahi command may be used by the investigators for correct evaluation of the impacts.

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Detailed maps at district levels are now available with the Planning Commission and efforts may be made with the help of Narmada Planning Group to use these in achieving the objectives of better management options.

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Similarly on page-V, para 9.2 word "scientific" would have been a better substitute to word sensitive.

Spelling mistakes resulting from typographical errors for instance on page-2, para-6, the world demarkation, on page-22 benghalensis, on page-24 mangoes, etc. and may be rechecked.

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Whereas, a comprehensive list of birds and fishes is included in the text, other animal species are list in the annexures. This may be avoided and a uniform pattern may be followed.

ANNEX - XXV-(9).

No.Env-4(5)/95/

14th June, 1995.

To

Shri K.M. Pathak,
Officer on Special duty,
NPG, Block No.12, 3rd Floor,
New Sachivalaya Complex,
GANDHINAGAR - 382 010.

Sub: Draft Final report on EIA studies on Flora and Fauna
of the command area of SSP lying in Saurashtra and
Katchchh area.

.....

Sir,

This has reference to your letter No. NPG/ENV/EIA/F&F/
CA/225/I/186 dated 13th February, 1995 enclosing above mentioned
draft report. Please find enclosed herewith our comments &
suggestions on this report for consideration of inclusion in
the final report by the investigators.

Yours faithfully,

Encl: As above.

MEMBER (E&R)

OBSERVATIONS ON THE DRAFT FINAL REPORT ENTITLED "A STUDY ON FLORA
AND FAUNA OF THE COMMAND AREA OF SARDAR SAROVAR PROJECT LYING
BETWEEN SAURASHTRA AND KUCHHA AREA (EIA STUDIES)" SUBMITTED
BY DEPTT.OF BIO-SCIENCE, SAURASHTRA UNIVERSITY
TO NARMADA PLANNING GROUP

A good piece of work has been done by the investigators a inventory flora and fauna has been nicely presented. This may form a useful basis for long term monitoring and studies in the command area. However, an attempt has been made to list out endangered plant species but the same is lacking on the faunal aspect.

Volumarous data on physical, social and meteorological aspects of the Sardar Sarovar Command available with NPG may be used for identification and evaluation of environmental impacts which may result from change in hydraulic regime through introduction of canal irrigation. Though nature of impact is documented in the report under Chapter - Environmental Impact Assessment. On page-14, under point 4.1 5th para a reference has been made to the first inform repeat, this may be rounded and final report should be made self contained. Type of negative and positive impacts expected in the command and documented in the report are required to be elaborated in the context of SSP considering the specific needs and this may be achieved through proper analysis of the data available with NPG. within the scope of this report in addition

- area to be cleared of natural vegetation as a result of the project and the planned to be put up under three cover may also be given.
- if any of the speices of animal or plant are affected by the project with regard to their freedom of movement, access to water and food availability of shelter of spawning nesting or resting sites, or protection from predatory or competition species including from domestic animals may be arplined.
- Domegraphy of the population including a chapter on the beneficiary. Main pests or weeds which may threaten the crops in the project
- New disease of the animals/new vector a plants that the project can favoaur may also be artlined alongwith method of control.
- Animals which are to get fvaour from the project and may become nuisance to the project or the population may be listed introduction of exotie livestock crop plants trees - Other species which are likely to be introduced as a result of the project.

Under the chapter of Management programme suggestions are made based on the zoning however these should be site specific. Extent a magnitude of the actual problem may be identified for translating into action plan. The action plan should include manpower, budget, training and monitoring needs. Management norms described will go a long way in ensuring sustainable development only if these are translated into action plan. Number of actions have been recommended. It would be appropriate if evaluation of impact using specific data of SPT is also incorporated as one of the chapter.

Report may be submitted with charts and maps to make it easier to understand setting of the project. It will add to the presentation of the report if a sketch map of the project, showing water source, reservoirs, main roads, levees, canals and drains, areas proposed to be irrigated, drained or to be reclaimed project boundary existing villages, growth centers site of planned new village etc. is also included. For achieving the objective as available with the Planning Commission may be obtained with the help of NPG if possible and used in the proposed planning to mitigate negative impacts.

CONCLUSION:

On the whole excellent attempt has been made in preparing the inventory of the resource base and recommendations made by the investigators are acceptable. The immediate need is to convert these into action plan. Investigators may be requested to submit a report with the data on meteorology, social and physical aspects generated through number and studies by the NPG.



Dr. A. K. Malhotra
LFS.

No. Env-4(5)/95/ 7472

5th May, 1995.

To

Shri P.A. Raj,
Vice Chairman,
Sardar Sarovar Narmada Sagar Project &
Chairman Multidisciplinary Group,
Gandhinagar.

Sub: Study on Environmental Impact Assessment of Nal Sarovar
bird sanctuary located in the command area of Sardar
Sarovar (Narmada) Project.

Ref: Letter No. NPG/NAL/EIA/228/560 dated 24.3.95 from OSD.,
NPG.

Sir,

Please find enclosed herewith our observations on the report
under reference.

I shall be happy to discuss the report during the workshop
proposed to be organised shortly.

Yours faithfully,

(Signature)

(Dr. A. K. MALHOTRA)
MEMBER (E&R)

Issued

२७, प्रेस कॉम्प्लेक्स, ए.बी.रोड, इन्दौर - ४५२ ००८ (म.प्र.)

27, Press Complex, A.B. Road, Indore - 452 008 (M.P.)

• T:l.- 0731-440927 • Fax 0731-441785 • Gram - NARCONTROL

NARMADA CONTROL AUTHORITY

Observations on the 1st interim report on EIA of Nal Sarovar Bird Sanctuary located in the command area of Sardar Sarovar (N) Project.

A study on Environmental Impact Assessment (EIA) of Nal Sarovar bird sanctuary located in the command area of Sardar Sarovar (N) project was undertaken by Director, GEER Foundation, Gandhinagar. Geer foundation presented its first interim report on 24th March, 1995.

The report is reviewed in Environment section, observations made are presented below.

GENERAL

The report discusses the basic features like water quality of the lake, soil analysis, food web, succession, socio-economic condition of the people within & out side the impact zone of the Nal Sarovar in a very sketchy manner. Detail work even on present status regarding all these is yet to be takenup (refer last para page 35).

The report is very preliminary in nature and deals with the description of study area, its biotic & abiotic components beside socio-economic aspects. Eventhough the identification impact of various impacts is the most important step in EIA studies source of impact emnating from SSP were confirmed to a brief note on entrophication only.

Since the report is still in the making & complete set of data is yet to be generated we suggest that the report should adhere to the acceptable EIA norms.

SCOPE OF THE REPORT

In order to help the investigators in their pursuit we suggest that the final report should be comprehensive & should include all the three basic functions of EIA including identification of vital areas of human concern like forests, wildlife habitat & other natural resources which should be exempted from over use. This should include identification of the source & impact of varied environment manipulations in the impact zone.

Dimensions of change in the identified environmental parameters of the impact zone should also be predicted. This should include effect of the changes resulting from development of command area on other interacting variable of the ecological systems of the area under study.

In addition, the costs & benefits of a proposed action should also be evaluated. This should include the evaluation of alternatives that generate more benefit & provide better environmental protection.

Integration of knowledge of project impacts, future further predictions & mitigation planning should form an integral part of the EIA report.

CONTENTS OF THE REPORT

SSP will introduce significant ecological changes over a large area through the introduction of irrigated agriculture. Understanding baseline conditions concerning the ecology of the command is needed for making predictions about the effect of the project on Nalsarovar bird sanctuary.

SSP may impact Nal Sarovar through varied sources & may be studies. Some aspects needing more investigation are suggested below:

1. Unique vegetation features both extrinsic and intrinsic should be assessed. The assessment should also include detail account of
 - Species of high visual historic or aesthetic appeal, sports, commercial, recreational or educational values.
 - Plants associated with particular habitat.
2. Special relationships study aspect includes:
 - Vegetation to substrat.
 - Birds to substrat.
3. The report does not highlights any basic ecological concept hence following should be addressed in the future report:
 - Indicator species.
 - Ecological niche.
 - Competition.
 - Carrying capacity of the lake environment in terms of habitat and food supplies,
 - Habitat partitioning, identification of the area which need conservation and full protection.
4. The report does not contain information on meteorological parameters, which is very important parameters for the adaptation of the wild fauna. There is apprehension that after introduction of irrigation system in the area, the

micro climate will change which may result both positive and negative impacts. In view of this, based on the experiences in other bird sanctuaries, prediction should also be made for the likely impacts on Nal Sarovar.

5. The report indicate that 'Nal Sarovar' is fed by local streams during monsoon. In view of this, it is suggested that the quality of stream water without canal supplies is the crucial factor in maintaining the integrity of this system. It is suggested that detail study on the existing runoff and drainage system over the 1500 sq. km. area of Nal Sarovar, and the impact of proposed surface drainage network should also be assessed.
6. The ecology of lake bottom has not been presented in the report. Hence, chemical and mechanical analysis of bottom sediments should be made to study water-rocks-sediments interactions to understand whether the lake water chemistry is controlled by precipitation, by interaction with rocks in drainage basin or by evaporation and other processes.
7. It is proposed to fill the water in the lake from the canal to maintain the water during non-monsoon period. In view of this, the assessment should be made to point out whether proposed storage in this natural lake would be feasible without negative impacts on migratory birds?
8. The report should also highlights the extent the additional water can be stored in the lake for optimum benefits in the form of attracting migratory birds, maintaining shore lines and habitat.
9. The report should also include the aspect like introduction of fishes in the lake (post project scenario) so as to provide adequate food supplies to the migratory birds.
10. The socio-economic aspects highlighted in the report clearly indicate that there is heavy pressure of population on the lakes ecosystems. In view of this, the final report should also address on the role of the community in the long term management and protection of the area including programme for community development.
11. The management strategies should also includes the management activities for people to check the alarming pressure of the population already settled in the vicinity of the sanctuary. The programmes for minimising the pressure of population on fishing, grazing, removal of grasses, rhizome and encroachment in lakes should also be highlighted.

All such sources of impact may be identified, quantified, evaluated for predicting possible changes in the ecosystem for the purpose of devising a management plan.

Quantification of the impact would require assembly of data on soil, irrigation, slope, catchment human use etc. within & outside the command area of SSP & we understand such data is already available with NPG & may be used here also.

Some traditional methodologies like checklist, matrix & networks in combination with computer aided evaluation techniques are already available. Besides, habitat suitability index may still be used. Even ecologically diverse bird communities are a good index for even broad environmental quality in extensive land use planning and may be used for evaluation of impacts of SSP.

MANAGEMENT PLAN

- The management plan for the Nal Sarovar should identify specific management goals, should include & present means for obtaining these goals & provide sufficient data and evaluation to substantiate the approach.
- The field data should be used to document the relationship of the hydrological cycle of the lake to the types of biota which thrive in the area including bird species.

Ecological changes within the command area which are expected to result from introduction of wide spread irrigation practices including alteration of the hydraulic regime of the lake and analysis of its potential or stimulating impacts should be predicted.

Responses of the identified plant and animal species to alteration in soil moisture, humidity, vegetative cover, land use should be included. Additional stress on rare, endangered or threatened sp. may also be described. Change in the cropping pattern, seasonal migratory pattern, increase in the number of animals beyond carrying capacity should also be considered while preparing the plan.

Management plan should also identify institutional needs for management. In terms of responsibilities, agencies resources, linkages, budget, manpower, training & monitoring structure.

Public participation should also be included in the decision making to ensure sustainability of the project.



ANNEX- XXV - (11).

नर्मदा नियंत्रण प्राधिकरण NARMADA CONTROL AUTHORITY

BG-113, Scheme No.74-C, Vijay Nagar, INDORE - 452 008 (M.P.)

No. Env-4(5)/95/ 500

BY FAX

21st March, 1995.

To

Shri K.M. Pathak,
Officer on Special Duty,
Narmada Planning Group,
Block No.12, 3rd Floor,
New Sachivalaya Complex,
GANDHINAGAR - 382 010.

Sub: Draft Final Report on EIA studies on Flora and Fauna of the
Command Area of SSP lying between Sabarmati River and
Rajasthan Border.

Sir,

This has reference to your letter No. NPI/ENV/EIA/E&R/
CA/113/1/269 dated 1st March, 1995 enclosing above mentioned
draft report. Please find enclosed herewith our comments &
suggestions on this report for consideration of inclusion in the
final report by the investigators.

Yours faithfully,

Encl: As above.

(Signature)
(Dr. A.K. MALHOTRA)
Member (E&R)

NARMADA CONTROL AUTHORITY

Sub EIA STUDIES ON FLORA AND FAUNA OF COMMAND AREA NORTH OF RIVER SABARMATI UPTO RAJASTHAN

BY BOTANY DEPTT., GUJARAT UNIVERSITY, AHMEDABAD.

Good peice of work has been done by the investigators in such a short time. However followup suggestions are being offered for further improvements.

A) OBSERVATIONS

- Report is devoid of any map, chart or diagramme, making it difficult to understand the setting of the project and area of study.
- Laboratory works on soil sampling water quality etc carried out by the investigators should be compared with the data available with NPG through a number of studies already carried out by the agencies engaged by the project authorities.
- Eco-zoning has been takenup independent of the Agro-ecozoning already carried out by the ISRD after exhaustive work. For Gujarat area 22 ecozones have been identified earlier. Map of eco zoning should be included. Report makes reference to the interim report submitted by the investigators earlier. This should be avoided & final report should be self contained.
- Assessment of the impact or prediction of the likely changes are mixed up with the observations or inventory of resource base. These may be separated out & should be included as separate chapter.
- The basis for listing certain sp as rare/endangered has not been given. (e.g. last para on page 28).
- Plant communities already under different stages of succession may be clearly pointed out. (eg. 1st para. page 29).
- Statements, as in last para on page 29. 2nd para on page 30 may be corroborated by scientific presentations of the facts & figures, fiction may be avoided.
- Spelling correction of the Botanical/Zoological terms may be done eg. Soladora on page 30. Danus on page 32 etc & should be underlined or written in italics.
- A reference has been made to notified & non notified sanctuaries. This should be further clarified.
- Statement that "Supply of water for irrigation in saline desert is a waste of precious Narmada Water" should be qualified with scientific reasoning.

Management plan on page 51 need to be recasted.

1) GENERAL OBSERVATIONS & SUGGESTIONS.

The style & presentation of the EIA report conforms more to the style of a journal. Presentation needs to be improved. Following suggestions are being offered for the consideration of the investigators.

Suggestions:

We understand that a lot of work on resource base line data has already been done under the umbrella of Narmada Planning Group and SSNNL. Instead of duplicating the efforts, review of literature & data available with NPG may be reassembled & used in the present report. Obviously the data generated through the present study due to various limitation is not enough to carryout a comprehensive environmental assessment needed by the project authorities.

Maps should be used to illustrate environmental resources and project activities focusing primarily on salinity contours, soil types and land use. In particular Land use maps for Gujarat state have been prepared by the remote sensing Application Group. There are 12 land use categories shown on the maps. This work has been done at the request of planning commission as part of the nation wide effort for mapping of specific agro-ecological zones. We also understand that soil maps have been prepared by the SSNNL. These may be useful for identifying the areas that have a potential for becoming water logged and for identifying saline soils cropping pattern etc. There is a need to integrate drainage plan. In addition an operation plan for irrigation and ground water withdrawal in problem area, plan for conjunctive use may be required for correct prediction of the impacts on resource base due to the operation of canal system in the command area.

Environmental issues should be viewed in terms of the effects of project activities on physical, biological and socio-economic resources and should include base line data and Environmental assessment sections under these broad category of resources. Two distinct phases, impacting resource base viz. construction and operation requiring environmental assessment may be identified.

Keeping in view the above points investigators may like to include the following in the report under separate chapters.

CHAPTER : BASELINE DATA

Baseline data on physical resources may include climate, rainfall, Geology topography, surface & groundwater hydrology, soil, soil salinity, water logging, drainage water quality etc. Biological resources base should include existing data on flora fauna forests, wildlife, wetlands, habitats, endangered sps, Fisheries etc. Socio-economic resources should include land use and settlement, Demographic & socio-economic profile, urban centers, Agricultural practices, animal husbandary, industrial development, water use, infrastructural development, health status, traditional values etc. Review of literature should

Identify information gaps & resources baseline inventory to plug these gaps should be undertaken. The baseline data so updated should be used for all further studies.

CHAPTER: SOURCE OF IMPACT ON FLORA & FAUNA:

Project operation:

Increase in soil salinity & water logging in the command area are two of the major potential impacts of project operation. These however can be controlled through design & installation of drainage facilities and sound irrigation water management. Impact of this on issues related with industrial & urban development, agriculture chemical use, biological resistance of plant pests, chemical exposure need to be assessed to device strategies for mitigation. Ecological change expected in the immediate vicinity of flora & fauna need to be assessed & included here.

Project construction:

Land acquisition, relocation of people due to construction of the main & secondary canal & distributaries etc alterations in the employment, forest loss and afforestation, impact on aquaculture, wildlife to be disturbed due to networking of the canals, borrow pits may be included under this sub chapter.

Impact mitigation:

To forecast the effect of microclimate and land use changes on flora & fauna may be elaborated here. Operational plans, strategies suggested for mitigating the adverse impact may be given here.

CHAPTER : ENVIRONMENTAL MANAGEMENT PLAN:

Should include scoping of the key issues and the conclusions regarding the potential impacts of the projects.

- Description of the suggested mitigation measures.
- May include need for strengthening of institutions for long term & short term plans. This should include linkages, agency, resources, budget, manpower, training program etc.
- Monitoring and approach for evaluation, public participation etc may also be included.
- PERT chart may be included for timely action.

The report should also include an executive summary in the beginning & necessary annexures at the end of the report.

ANNEX - XXV -(12).



नर्मदा नियंत्रण प्राधिकरण

NARMADA CONTROL AUTHORITY

No. Env-1057/1995

463

15th March, 1995.

To

FAX

Shri K.M. Pathak,
Officer on Special Duty,
Narmada Planning Group,
Block No.12, 3rd Floor,
New Sachivalaya Complex,
GANDHINAGAR.

Sub: Draft final report on Environmental Impact Assessment
Studies on water related diseases in SSP command area
including the areas downstream of the SSP Dam.

Sir,

Please refer to your letter No. NPG/ENV/EIA/216/11/130 dated
1.2.95 & find enclosed herewith our comments on the report under
reference for a consideration by the investigators.

Please also refer to the letter No. NPG/ENV/EIA/216/11/225
dated 16.2.95 extending an invitation for attending the
discussions on the study report. In this connection I am to
convey you that I would not be able to attend the discussion
sheduled for 15th March, 1995.

Yours faithfully,

af *AK* 1573
(Dr. A.K. MALHOTRA)
Member (E&R).

स्कीम नम्बर 74-सी. विजयनगर, इन्दौर 8

Home No. 74-C, Vijay Nagar Indore-452008 (M.P.)

551 44 M. (P). 554333 M (E&R) 553344 M (CI)

557888 (EPABX)

53

Gram : NAI

Fax 91

NARMADA CONTROL AUTHORITY
Environment Cell

OBSERVATIONS: THE REPORT ON EIA STUDY ON WATER RELATED DISEASES IN SARDAR SAROVAR PROJECT (SSP) COMMAND AREA GUJARAT - INDIA - VOL. I & II; Submitted by CHMS-Gandhinagar, Gujarat to NPG - Gujarat.

General Observations and Suggestions:

Investigators may like to consider for inclusion in the present study survey data from the proposed Narmada Command area, instead of predicting post development scenario only on the basis of Mahi Project case study. For instance demographic profile containing information on numbers, location and characteristics of existing population, local environmental and social conditions may have a direct relationship with disease pattern in the area.

Disease pattern in the command area may be affected by sanitary conditions, human contacts, disposal of human wastes, eating habits etc. This may require first hand survey, which may include medical examination of a sample of the local population.

Movement of the people within and outside the command has related health hazards both through introduction of new diseases into the area and through increased transmission of existing diseases amongst immigrants who have no immunity and may be included in the first hand survey.

Considering that increased use of chemicals as fertilizers and pesticides in agriculture, in drinking cooking washing etc, may contaminate surface run off, and that as irrigation return flows contains more salt than the original water, increase in salt levels of ground and surface water is expected. Rise in water table may increase the alkalinity of the soil which may be

associated with increase in bone diseases as happened in Nagarjuna Sagar Project. The survey may also include future cropping pattern, use of chemicals, frequency of water reuse facilities for safe drinking water etc.

Also considering that changes in the vegetation microclimate, human settlement may effect the composition and distribution of diseases vectors, survey may also include possible control of habitats favourable to disease organisms, provision for refuse collection and disposal, Land use restriction etc.

Approach suggested for controlling diseases in the command areas should be an integrated one. This should include means for avoiding contact between human and diseases vectors. All physical (including improved housing, bed nets, reclamation of water logged areas, drainage, flushing of channel through sluicing manipulation of water levels). Chemical (including regulation of salinity and water quality, chemotherapy, treatment for human carriers, spray of chemicals, mimmic jvenoids etc.) Biological measures (including introduction of competitor species, controlling secondary diseases hosts like rat, pigs, dogs, manipulation of habitat introducing of larvicidal fishes etc.) may be included for prevention of diseases in the command area. This should be based on actual house hold surveys.

Provision for continuous health monitoring for current residents and migrants. Introduction of health awariness through education and development of community participation may also be considered while formulating an action plan. .Suggested plan

should be phased out pari-passu with the development of the command.

Specific Observations:

Key for the abbreviations used may be annexed.

1. Vol-1, Page-5, 2nd Para:

Considering that most of the irrigation projects in the World (including Zimbabwe, Sudan, Ghana, Tanzania, Nigeria, Egypt, Puerto Rico, Mauritiana, Kenya, Gambia, etc) had schistosomiasis in the command area, recognising that studies on SSP showed that this disease is completely absent from the Narmada Command yet for preventing every possibility of introduction through migration, regular monitoring may have to be considered for inclusion.

2. Vol-1, Page-9, 1st Para and Page-13, 4th Para:

Financial constraints for carrying out insecticidal spray must be removed.

3. Vol-1, Page-19, 6th Para:

This para may be avoided as the study is already completed and forming a part of the present report itself.

4. Vol-11, Page-2, Last Para:

This para is incomplete & may be completed.

Factual errors may be removed :

1. 01-11, Page-26, Table-VI.

Factual error in vertical columns 1 & 2, may be removed.

2. 01-11, Page-27, Point 9.1, 2nd Para:

The percentage of WRD cases in the Narmada Command is indicated as 20% this may be replaced by 19.5%

3. 01-11, Page-28, 2nd Para, 2 Line:

'Compared to Kheda-1' may be replaced by 'compared to Kheda-2.'



DR. N. S. WANERE,

DIRECTOR (PDE)

ANNEX - XXV - (13).

D.O. Letter No. DHS/MM/Sardar Sarowar,
D-XIIDIRECTORATE OF HEALTH
SERVICES, MAHARASHTRA
STATE, BOMBAY - 400 00DATE : 5th May, 199

XXV-13

SUB : Sardar Sarowar Project
Health Plan.

Sir,

As suggested in the meeting held at Delhi on 29th September, 1994 and subsequently on 10th March, 1995 a revised Health Plan is submitted. In this Health Plan revised budgetary provision for each activity is spelled out which comes out to Rs. 546.60 lacs instead of Rs. 93.16 lacs which was incorporated in previous Health Plan.

Government of Maharashtra has given sanction for establishment of Primary Health Centre at rehabilitation site i.e. Narmada Nagar (Walheri). The remaining proposals are under consideration of G.O.M.

Government has also permitted to undertake the survey and surveillance studies with the help of T. N. Medical College, Bombay.

The expenditure incurred so far is as follows -

SR. NO.	ACTIVITY	BUDGETORY PROVISION SUGGESTED	ACTUAL EXPENDITURE
1.	Cost of Survey and studies (in lacs)	Rs. 10.00	0.10
2.	Cost of implementation (in lacs)	Rs. 546.60	0.50

You are requested to make the change in Environmental Cost SSP (Please see Annex XXIV-1-a) shown

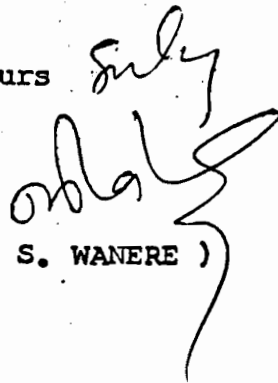
P.T.O..... 2/-

- 2 -

in the agenda item of Twenty Fourth Meeting dated 10-3-1995 held at Delhi for which the expenditure of GOM on Health activities was shown NIL.

With Regards.

Yours



(N. S. WANERE)

✓ Dr. A. K. Malhotra,
Member (E & T),
2nd Floor,
27, Press Complex,
A. B. Road,
INDORE - 452 008.

MAHARASHTRA STATESARDAR SAROVAR PROJECT - HEALTH PLAN

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 Tahsil will undergo submergence. It is estimated that more than 15,000 persons from about 3500 families will be displaced because of the submergence. About 15000 people are proposed to be rehabilitated at four different sites at i. Rojwe, ii Amla iii Dekati and iv Valheri (Narmada Nagar) in Taloda tahsil of Dhule District, Maharashtra. It would be necessary to provide adequate health coverage to these oustee families being resettled at rehabilitation sites.

The submergence water would affect an area measuring 10 X 40km 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 Government of India time to time. The norms prescribed for tribal area and non tribal area are different. The smallest unit of health infrastructure is Subcentre where one male and one female worker look after the population of 5000 in non tribal and 3000 in tribal area. Above the Subcentre, there is a Primary Health Centre for every 3000 population in non-tribal area and 20000 population in tribal area. As a first level referral centre, a Community Health Centre for every 4 - 5 Primary Health Centres is established.

The State Government has taken decision recently that in addition to establishment of Subcentres, 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 Tahsil (Population 96851) and 170 villages in Akkalkuwa Tahsil, out of which 24 villages in Dhadgaon and 9 villages in Akkalkuwa are under going submergence. Nearby this belt of submergence, there are 24 villages and 40 padas with 8000 population which also needs critical attention in relation to 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 institutions are shown in Annexure No 1)

Type of Institutions	Taluka Dhadgaon	Taluka Akkalkuwa	Remarks
Sub-Centre	40	53	
Primary Health Centre	8	10	
Primary Health Unit	2	3	
Mobile Health Unit	6	4	
Community Health Centres (Rural Hospitals)	1	1	

- 3 -

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/Subcentres are already sanctioned in Dhadgaon Tahsil. Average population per Subcentre in Dhadgaon Taluka is 1950 and per Primary Health Centre is 7800 and in Akkalkuwa Taluka the average population per Subcentre is 2300 and per Primary Health Centre is 15250.

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 Cl.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 honorium of Rs.4000/- per month at these rescue camps for the period of six months (i.e. May to October).

The Health Institutions going under Submergence

	<u>Dhadgaon</u>	<u>Akkalkuwa</u>
1. Primary Health Centre	2 (Roshmal, Bilgaon)	1 (Bamni)
2. Primary Health Unit	1 (Sadri)	-
3. Subcentres	3 (Sadri, Bilgaon, Roshmal)	2 (Manibeli, Bamni)

These institutions will be shifted when they will be actually submergence.

- 4 -

Existing Infrastructure functioning in the 10X40 km
area at the dam site next to site of submergence

	<u>Dhadgaon</u>	<u>Akkalkuwa</u>
1. Primary Health Unit	-	2 (Kanjala, Wadphali)
2. Subcentres	4 (Kuktar, Chikhali, Bhabri)	3 (Kanjala, 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 following 4 sites i.e. Rojwe, Dekati, Amla 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 Valheri, Somawal Primary Health Centre. One old Primary Health Centre is 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 Amla will be established. Staff for every dispensary would be a Medical Officer, Pharmacist, ANM and one Cl.IV. These dispensaries will be giving outreach services by house to house visit through ANM and also run the OPD in the dispensary. Similarly Primary Health Centre Valheri will run the OPD at the H.Q. & ANM will give outreach services for the rehabilitated population.

- 5 -

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 Pondage Area

In view of expected problems like Malaria, Water borne diseases in the vicinity of pondage areas following services are proposed to be established

Sr.No	Type of Services	No.	Total Cost (Rs. in Lakhs)
a	Floating Dispensary	1	19.50
b	Laboratory Technicians	16	7 20
c	Mobile Public Health Lab.	1	20.00
d.	Anti Malarial Activities	-	2.00

(a) Establishment of Floating Dispensary

There are 28 villages along with 42 padas with 6800 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, Subcentres, 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 Government. 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.

- 6 -

(b) Creation of posts of Lab. Technicians

As there would be a pondage effect of dam water in the beld of 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 porposed 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) Antimalarial 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 lakhs per year. As mosquitos are partially resistant to DDT it is proposed to procure Deltamethrin for spraying.

-7-

Study of Disease Pattern in Submergence Area

As discussed in the last meeting the State has finalised the study group with the involvement of PSM Department of T.N.Medical College, Bombay. The terms and references, strategy of the study etc. is being finalised. It has also been decided to take up the study in two phases -

1. Present status of the disease pattern by taking base line survey
2. Follow up study for next 5 years

This study will need Rs.10.00 lakhs.

For establishment of proposed infrastructure and to carry out other activities about Rs.546.60 lakhs approximately will be needed. It is presumed that the cost involved for establishment and functioning of proposed infrastructure will be borne by Rehabilitation Department from the incremental charges and the cost involved for carrying out the study will be borne by the Narmada Control Authority.

The infrastructure which is proposed is already under active consideration of the State Government and it would start functioning before next monsoon.

SUMMARY OF INFRASTRUCTURE AND FUND REQUIRED

(Rs.in lakhs,

Sr. No.	Name of Scheme	Expenditure for one year				Recurring Expd.for 10 years	Total for 10 yr (4+5+)
		Recur- ring	Non- Rec- urr- ing	Capi- tal	Total		
1.	2.	3.	4.	5.	6.	7.	8.
<u>A) Institutions at Rehabilitation Site</u>							
1.	Establishment of PHC Valheri (Narmada Nagar)	7.26	3.50	35.00	45.76	72.60	111.10
2.	Establishment of 3 Dispensaries	8.79	1.50	60.00	70.29	87.90	149.40
<u>B) Plan for Intensive Health Care Area near the Dam</u>							
1.	Establishment of Floating Dispensary	3.50	6.50	20.00	30.00	35.00	61.50
2.	Sanctioning of 16 posts of Lab. Technicians at 16 PHCs	7.20	-	-	7.20	72.00	72.00
3.	Conduction of Antimalarial activities	2.00	-	-	2.00	20.00	20.00
4.	Establishment of Mobile Public Health Laboratory	5.00	15.00	-	20.00	50.00	65.00
5.	Study of disease pattern in dam site	10.00	-	-	10.00	10.00	10.00
6.	Establishment of temporary 24 Rescue camps for 4 months (June to Sept.)	5.76	-	-	5.76	57.60	57.60
		49.51	26.50	115.00	191.01	405.10	546.60

SARDAR SAROWAR PROJECT EXISTING HEALTH INFRASTRUCTURE IN
DHADGAON AND AKKALKUWA TAHSILS OF DISTRICT DHULE

Sr. No.	Type of Institutions	DHADGAON					AKKALKUWA				
		Sanction under					Sanction under				
		Old	SAP	Plan for 1472 Dif-fic-ult vil-lages	ITDP	Total	Old	SAP	Plan for 1472 Dif-fic-ult vil-lages	ITDP	Total
1.	Community Health Centres (Rural Hospitals)	1	-	-	-	1	1	-	-	-	1
2.	*Primary Health Centres	3	4*	-	1	8	5	4*	-	1	10
3.	Primary Health Units	-	-	2	-	2	-	-	3	-	3
4.	Mobile Health Units	-	6	-	-	6	-	4	-	-	4
5.	Subcentres	22	-	-	18	40	33	-	-	20	53

* These Primary Health Centres are being considered through growth centres. Still then Mobile Health Units are functioning at the same headquarter of Primary Health Centres

S.A.P. = Special Action Plan

I.T.D.P. = Integrated Tribal Development Project

ANNEXURE

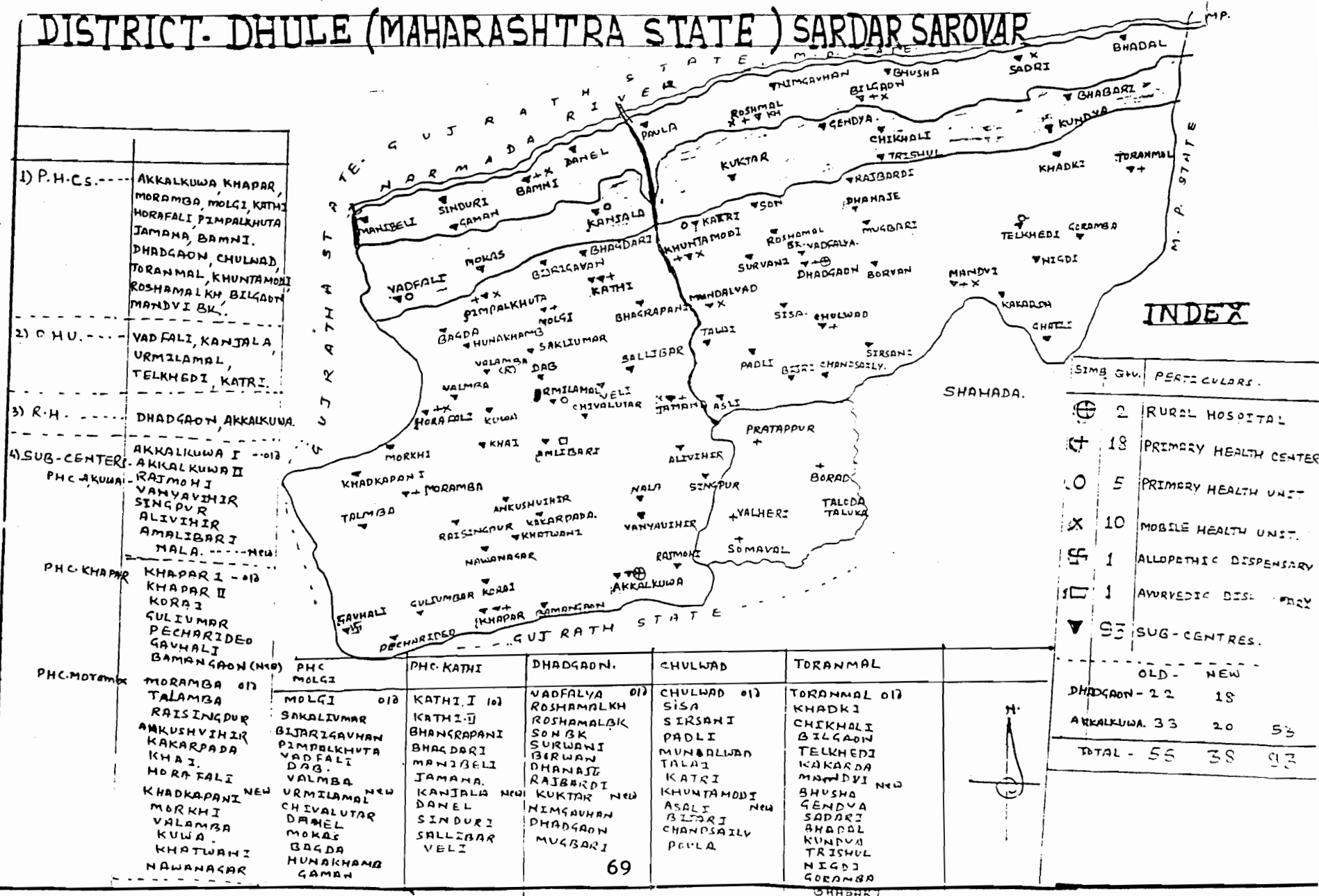
SARDAR SAROVAR PROJECT
EXISTING HEALTH INFRASTRUCTURE

Insti- tution	Dhadgaon Tahsil	Sanction under	Insti- tution	Akkalkuwa Tahsil	Sanction under
------------------	-----------------	-------------------	------------------	---------------------	-------------------

<u>R.H.</u>	Dhadgaon		<u>R.H.</u>	Akkalkuwa	
<u>P.H.Cs.</u>	1. Dhadgaon		<u>P.H.Cs.</u>	1. Akkalkuwa	
	2. Toranmal			2. Kathi	
	3. Chulwad			3. Moramba	
	4. Khuntamodi	S.A.P.		4. Molgi	
	5. Roshmal	S.A.P.		5. Pimpalkhuta	S.A.P.
	6. Bilgaon	S.A.P.		6. Horafalli	S.A.P.
	7. Mandvi	S.A.P.		7. Jamana	S.A.P.
	8. Dhanaje	I.T.D.P.		8. Bamni	S.A.P.
<u>M.H.U.</u>	1. Sadri	S.A.P.	<u>M.H.U.</u>	1. Pimpalkhuta	S.A.P.
	2. Mundalwad	S.A.P.		2. Horafalli	S.A.P.
	3. Khuntamodi	S.A.P.		3. Jamana	S.A.P.
	4. Roshmal	S.A.P.		4. Bamni	S.A.P.
	5. Bilgaon	S.A.P.			
	6. Mandvi	S.A.P.			
<u>P.H.U.</u>	1. Telkhedi	1472	<u>P.H.U.</u>	1. Urmilamal	1472
	2. Katri	Plan		2. Wadfali	Plan
				3. Kanjala	

EXISTING HEALTH FACILITIES IN DHADGAON & AKKALKUWA BLOCK.

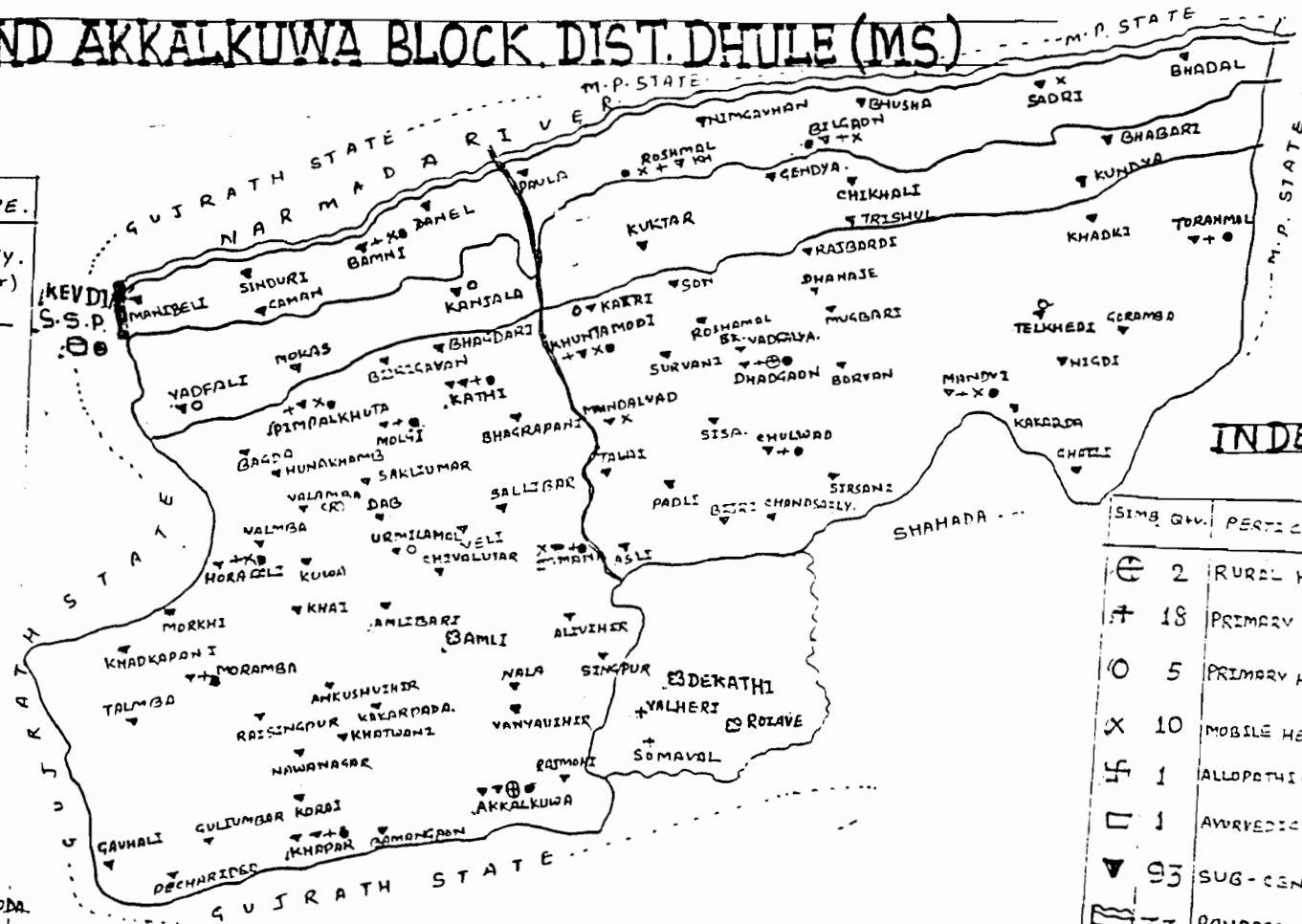
DISTRICT. DHULE (MAHARASHTRA STATE) SARDAR SAROVAR



EXISTING AND PROPOSED INFRASTRUCTURE HEALTH FACILITIES IN

DHADGAON AND AKKALKUWA BLOCK, DIST. DHULE (MS.)

PROPOSED INFRASTRUCTURE.	
1) FLOATING DISPENSARY	KEODIA COLONEY. (Sardar Satowar)
2) MOBILE LAB.	—
3) LAB-TECH.	1) AKKALKUWA 2) KHAPAR 3) MORAMBA 4) MOLGI 5) KATHI 6) HORAFALI 7) PIMPALKHUTA 8) JAMANA 9) BAMNI 10) DHADGAON 11) CHULWAD 12) TORANMAL 13) KHUNTAMODI 14) ROSHAMAL KH. 15) BILGAON 16) MANDVI BK. VALHERI, TAL-TALODA Rehabilitation Area
4) P.H.C.	—
5) DISPENSARY	1) DEKATI, TAL-TALODA 2) ROZAVE — 3) AMALI, TAL-AKKUWA.



INDEX

Symb.	Q.W.	PARTICULARS.
⊕	2	RURAL HOSPITAL
+	18	PRIMARY HEALTH CENT.
○	5	PRIMARY HEALTH UNIT
x	10	MOBILE HEALTH UNIT
+	1	ALLOPATHIC DISPENSARY
□	1	AYURVEDIC DISPENSARY
▼	93	SUB-CENTRES.
▨	33	PONDAGE VILLAGE
□	28	10x40 KM AREA
+	1	REHABILITATED P.H.C.
+	1	DISPENSARY -
+	1	FLOATING DISPENSARY
⊙	1	MOBILE LABORATORY
•	16	LABS

ANNEX - XXV (14).

Send Post

No.Env-4(6)/95/ 936

26th June, 1995.

To

Dr. N.S. Wanere,
Joint Director (PDE),
Govt. of Maharashtra,
Directorate of Health Services,
BOMBAY - 400 001.

Sub: Sardar Sarovar Project - Health Plan.

.....

Sir,

This has reference to your D.O. letter No. DHC/MM/
Sardar Sarovar-D-XII dated 5th May, 1995 enclosing above
mentioned Health Plan. Please find enclosed herewith our
comments & suggestions on this report for consideration.

Yours faithfully,

Encl: As above.

C/c *[Signature]* 76/6/95
(Dr. A.K. MALHOTRA)
Member (E&R)

issued
5/7/95

ERVATIONS OF THE HEALTH PLAN SUBMITTED BY DIRECTORATE OF
LTH SERVICES MAHARASHTRA STATE.

.....

CIFIC OBSERVATIONS:

On page 7 the plan presume that the cost involved for
abishment & functioning of proposed infrastructure will
born by rehabilitation deptt. and the cost involved for
ryingout the studies will be born by the NCA is not
rect.

The plan proposed to provide one PHC 3,dispensaries,
floating dispensary, 16 lab. technicians centers and 1 mobile
oratory.

PHC is proposed at Valheri

Dispensaries: 1- Amli Village in Akkalkuan
2- Rozane village in Dhadgaon.
3- Dekathi village in "

Floating dispensary is proposed at Nevadia Colony (on
river launch to cater area of submergence.

Mobile laboratory is proposed to be attached with
floating dispensary.

16 Lab Tech. centers are proposed at 16 nos of primary
health centres already existing.

24 rescue camps for 4 months (rainy season) every year
are proposed.

In addition anti-malarial activities and 5 year study
on diseases pattern is proposed.

All this is estimated to cost 54.66 million rupees.

It may be seen that details cost estimates are not
osed. In this connection following points are relevant.

Under point B(6), Rescue camps are proposed for providing
medical facilities during progressive filling of the
reservoir. This phase however may not last more than 5
years. Hence the expenditure should have been only for
5 years instead of ten years.

:: 2 ::

2. 16 posts of lab technicians to be posted at each existing PHC's may be considered if such posts already do not form the package of standard PHC.
3. Under A-1 at column (5) capital expenditure for establishment of PHC at Valheri is estimated to be of the order of Rs.45.76 lacs. This is not in harmony with the observation on progress of PHC at Valheri (Somval). According to the information available.
 - a) one PHC is functioning at Walheri.
 - b) Floating dispensary pressed in service during last monsoon.

However, as the details furnished in the forwarding letter on page 1 on expenditure of Rs.50,000 only is incurred so far whereas estimates are more than 100 times. This may require justification.

Standard norms of the state Govts. of Maharashtra for cost & manpower etc. are required for an objective assessment.

This would ensure that the gap between estimate & actual expenditure is narrowed to reflect true state of progress on implementation.

(4) In the earlier plan the total cost of health plan was estimated as 93.16 lacs. This cost is now revised upward more than $5\frac{1}{2}$ times.

The increase in expenditure is attributed to the following aspects.

1. For rehabilitation site one PHC & 3 sub center/dispensaries were proposed.
 - PHC was sanctioned for vill. Bamni under normal state plan, hence no cost was attached earlier.
 - Cost of 3 sub center was estimated 11.58 lacs.

These estimates are now revised as follows.

:: 3 ::

- PHC - 111.10 lacs.
 - 3 sub-centres - 149 lacs.
2. Cost of Surveillane studies is enhanced 3 time from 3 lacs to 10 lacs.
 3. Floating dispensaries (recurring expenditure) is revised from 4 lacs to 6.5 lacs.

These points may be rechecked & actual position may be informed.

ANNEX - XXV - (15).

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**HIGH LEVEL EXPERT GROUP ON FISHERIES DEVELOPMENT AND CONSERVATION
IN SARDAR SAROVAR RESERVOIR**

MINUTES OF THE FIRST MEETING

**Venue: Committee Room No. 139,
Krishi Bhawan,
Ministry of Agriculture,
New Delhi**

**Date: 10.05.1995
Time: 03.00 pm.**

**NARMADA CONTROL AUTHORITY
INDORE**

**MAY, 1995
INDORE**

MINUTES OF THE FIRST MEETING OF HIGH LEVEL EXPERT GROUP ON
FISHERIES DEVELOPMENT AND CONSERVATION IN
SARDAR SAROVAR RESERVOIR

I N D E X

Item No.	C O N T E N T S	Page No.
Item No. I-(1)	Nomination of Member(s) to the Expert Group	1-2
Item No. I-(2)	Status of the Studies and Plans on fisheries development and conservation	3
Item No. I-(3)	Guidelines for development and conservation of aquatic eco-system of Sardar Sarovar Reservoir	4
Item No. I-(4)	Any other item	5
	Date and Venue of next meeting	

ANNEXURE

Annex. 1-(1)	List of Participants	6
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MINUTES OF THE FIRST MEETING OF EXPERT GROUP ON FISHERIES
DEVELOPMENT AND CONSERVATION HELD ON 10.05.1995
AT 3.00 PM IN KRISHI BHAWAN, NEW DELHI

First meeting of the expert group on fisheries development and conservation was held on 10th May, 1995 under the chairpersonship of the Additional Secretary (F), Department of Agricultural Cooperation (DOAC), Ministry of Agriculture at New Delhi in the committee room of DOAC. List of participants is enclosed at Annexure-I-Min-1.

At the outset, Member (E&R), Narmada Control Authority briefed the members on the need for constitution of the group by Narmada Control Authority and also informed about the various works done so far. He further stated that the committee was mainly for laying down guidelines for the conservation and development of fish and fisheries in SSP presently under construction on river Narmada.

Chairperson, however, expressed reservation on issuing guidelines only for Sardar Sarovar and desired that the mandate of the group may be enlarged to cover the entire impact area of the river basin as, for studying the effect on the fish fauna, the whole river basin is to be treated as a unit and attention should not be restricted to one or two projects while taking up the work of conservation and development of fisheries. Member (E&R), NCA informed that it was only the NCA who could take any decision, regarding this and assured to appraise the NCA about

and all group members
the feelings of the chairperson, While expressing her views regarding increasing the scope of the committee the chairperson made it clear that the guidelines to be formulated by the ministry of agriculture will only be directional and it would be for the States to act accordingly.

After discussion it was agreed that the guidelines would be circulated to the state Governments for consideration to be implemented in Sardar Sarovar Project on priority.

Agenda Item No I-(1): Nomination of Member(s) to the Expert Group

this expert group.

Group recommended the inclusion of the Director, Central Inland Capture Fisheries Research Institute, Barrackpore and Dr. S.P. Ayyar Limnologist and ex-Director, Central Inland Capture Fisheries Research Institute, Barrackpore as nominated members to this expert group.

Nomination from Government of Madhya Pradesh was awaited. Expert group also recommended inclusion of Executive Member, NCA, Member (E&F), NVDA; Secretary (R&R), GOM, Additional Chief Secretary (R&E) , GOG as regular invitees.

-- Agenda Item No. I-(2): Status of the Studies and Plans on fisheries development & conservation

Contents of the Action Plan enclosed with agenda papers were noted by the Members and a need to have a closer look on the plans developed by State Governments for Sardar Sarovar Project was felt necessary.

It was agreed that a status paper on fisheries development and conservation including summary of Action Plans and Observations on the studies conducted so far and/or under progress may be presented to the group by Member (F&R), NCA before the next meeting.

Agenda Item No I-(3): Guidelines for development and conservation of aquatic eco-system of Sardar Sarovar Reservoir.

The issue was discussed in detail and it was noted that apart from compiling the basic data immediate guidelines are required for addressing to the needs of fisheries development and conservation during the coming monsoon months. Considering this it was suggested that DDG (Fisheries), ICAR and Fisheries Development Commissioner (DOAC), GOI should visit the impounded area of the SEP at the earliest.

It was also suggested that, the actions initiated by the state Governments may be brought out in the form of a note to be presented to the group before the next meeting.

Agenda Item No I-(4): Any Other item

Shri T. Balramam, Principal Secretary, GOM placed a copy of the TOR of the studies currently under progress by Vadodara Centre of CICFRI in Maharashtra stretch of the river. He stated that the TOR was based on the action plan already suggested by CICFRI in the desk review sponsored by NCA.

Member (E&R), NCA informed that as per the decision of the environment sub-group of the NCA this TOR need to be vetted by the group.

Principal Secretary, Government of Maharashtra agreed to consider modification of the TOR to the extent necessary and submitted copies of the TOR to the members of the group and sought their comments at the earliest.

Meeting ended with a vote of thanks to the chair.

DATE AND VENUE OF THE 2ND MEETING

JULY 12TH AT 3.30 PM.

ANNEX- (MIN-I

Narmada Control Authority - First Meeting of High Level Expert Group on Fisheries Development and conservation in Sardar Sarovar Reservoir held on 10.05.95 at 3 pm. in Committee Room No. 139 of the Department of Agricultural Cooperation, Krishi Bhawan, Ministry of Agriculture, New Delhi.

LIST OF PARTICIPANTS

Deptt. of Agricultural Cooperation (MOA), GOI

1. Mrs. Asha Das, Additional Secretary (F) - Chairperson
2. Dr. Y.S. Yadav, Fisheries Development Commissioner
3. Dr. D.P.S. Chauhan, Asstt. Commissioner Fisheries

Narmada Control Authority:

1. Shri M.S.Menon, Executive Member
2. Dr. A.K. Malhotra, Member (E&R)
3. Dr. Pawan Kumar, Specialist (Env.)

Indian Council of Agricultural Research:

1. Dr. P.V. Dehadrai, Deputy Director General (F)

Government of Maharashtra:

1. Shri T. Balraman, Principal Secretary

Government of Madhya Pradesh:

1. Shri R.N. Verma, Joint Director (Fisheries)

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नर्मदा नियंत्रण प्राधिकरण
NARMADA CONTROL AUTHORITY

पर्यावरण उपदल
Environment Sub-Group

पच्चीसवीं बैठक का कार्यवृत्त
Minutes of the Twenty Fifth Meeting

11 जुलाई 1995 को
पर्यावरण भवन नई दिल्ली में हुई

Held at
Paryavaran Bhawan
New Delhi
On 11th July, 1995

इन्दौर
अगस्त, 1995

INDORE
August, 1995

MINUTES OF 25TH MEETING OF THE ENVIRONMENT SUB-GROUP NCA
HELD ON 11TH JULY, 1995. AT PARYAVARAN BHAWAN, NEW DELHI.

I N D E X

Item Nos.	Contents	Page No.
	Introduction	1
XXV-1(122)	Confirmation of Minutes of the 24th meeting.	2
XXV-2(123)	Review of Action taken on the decisions of the previous meetings.	3 - 4
XXV-3(124)	Present Status of Studies, Surveys and Environmental Action plans.	5 - 11

A N N E X U R E

XXV-Min-(1)	List of participants	1
XXV-Min-(2)	Cost Estimates (Environmental Aspects) of SSP.	2
XXV-Min-(3)	Wildlife Retrieval and Conservation Plan, Indira Sagar Project.	3 - 69
XXV-Min-(4)	Impact Assessment Studies of Narmada Sagar and Omkareshwar Projects on Flora and Fauna with Attendant Human Aspects.	70 - 119
XXV-Min-(5)	Impact Assessment of Madhya Pradesh Lands to be submerged under SSP and Adjoining Ecosystem: Flora, Fauna and other Biotic Components.	120-140

MINUTES OF 25TH MEETING OF ENVIRONMENT SUB-GROUP HELD
ON 11TH JULY, 1995 AT PARYAVARAN BHAWAN, NEW DELHI.

The Member (Secretary), of the sub-group welcomed the participants to the 25th meeting. The list of participants is at Annex-XXV.Min-(1).

Discussions on the various agenda items were taken up thereafter.

Item No. XXV-1(122): CONFIRMATION OF MINUTES OF THE 24TH MEETING.

Minutes of the 24th meeting of Environment Sub-Group of Narmada Control Authority circulated to all Members and invitees vide letter No.Env-34(25)/95/722-748 dated 17th April, 1995 were confirmed with the following modification.

It was agreed to replace the word "Bangalore" appearing on page 14 line 4 with the word "Pondichery".

Item No. XXV-2(123): REVIEW OF ACTION TAKEN ON THE DECISIONS OF THE PREVIOUS MEETINGS.

1. Submission of Catchment Area Treatment (CAT) plans for freely draining critically degraded sub-watersheds (Item No. XXII-2(112) (1)).

- Regarding revision of the plans by Govt. of Maharashtra & Madhya Pradesh in accordance with the guidelines of River Valley project & National Afforestation & Eco-development boards, the information presented to the sub-group was as follows:

Government of Madhya Pradesh

Sardar Sarovar Project

GOMP informed that 5 schemes had been sanctioned under RVP scheme during 1994-95 but funds were received late in March '95. However now these have been revalidated for execution during 1995-96. It was also informed that maps for SSP areas had been submitted to MOE&F vide letter dated 28.11.94. Member (E&F), NVDA on behalf of GOMP informed that plans as required were being finalised and would be submitted in a month's time.

Narmada Sagar Project

Regarding preparation of schemes as per NAFB guidelines it was informed that so far 34 subwatersheds for Narmada Sagar Project have been identified. Collection of basic data was in progress. Member (E&F) NVDA sought MOEF's help in seeking RVP support for NSP. Regarding submission of detailed maps, it was informed that these had been submitted to MOEF on 11.7.95.

Government of Maharashtra

Officer on Special Duty (OSD), GOM on behalf of the Govt. of Maharashtra informed that the plans as required are being finalised & shall be submitted within a months time.

- Regarding measuring silt load during pre-post treatment phases of catchment area treatment. NVDA informed that due to shortage of staff CSWCRI had suggested that they could help NVDA in planning & layout of the silt monitoring posts but for collection of data & analysis, NVDA would have to engage their own staff. It was further informed that NVDA was drawing up a proposal for this purpose. Chairman desired that trained people of NVDA might be engaged.

2. Cost Estimates for preparation of Action plan and implementation of Environment safeguard measures (Item No. XXII-2(112) (2)).

The information as broughtout during the meeting is presented in Annex-XXV-Min-(2).

Perf charn

update in figures all states

mp detail of the scheme sometimes

mp Submit the plan on mp month on month over

ms m month same

mp make detail layout including staff for budgeting on indian

cost estimates [Regarding cost estimates of command area developments Govt. of Gujarat informed that revision of cost estimates was awaiting the outcome of some study reports & that these reports were under finalisation.

3. Environmental Impact of Closure of Construction Sluices.

mp & expenditure [Additional Director, MOEF informed that the committee had undertaken the field visit and their report was being finalised. She further informed that they had sought some information from Madhya Pradesh which was still awaited. In this connection she made a mention of a letter from Dr. Maudgal, Advisor, MOEF to GOMP.

Letter to mosp [On the suggestion of Member (E&R), NCA it was agreed by Additional Director, MOEF to reconcile the data in consultation with NCA before finalising their report.

Chairman desired to know whether R&R aspects of Narmada Sagar project were being looked into by the R&R sub-group of NCA. It was informed that R&R sub-group was only looking into the R&R aspects of the interstate SSP.

Member (E&R), NCA informed that according to the Environment clearance given by the MOEF, NCA was entrusted with the task of monitoring of R&R aspects of NSP also. Chairman desired that R&R of NSP should not be ignored. GOMP officials were, therefore, requested to forward views of GOMP on this aspect.

Item No.XXV-3(124): PRESENT STATUS OF STUDIES SURVEYS AND ENVIRONMENTAL ACTION PLANS.

i) PHASED CATCHMENT AREA TREATMENT

Narmada Sagar Project

Govt. of Madhya Pradesh

It was informed that an area of 32589 ha had been treated by the end of June, 1995. NVDA reported that the survival rate of plantation varied between 70-90%. A copy of map for the areas under treatment was submitted to MOEF on 11.7.95. Member (E&R), NCA requested a blockwise detailed note on survival of plantation.

Sardar Sarovar Project

Govt. of Madhya Pradesh

Govt. of Madhya Pradesh had planned to treat 125725 ha area, out of which an area of 26.114 ha has been treated by June'95.

Govt. of Gujarat

Govt. of Gujarat had taken up the entire catchment area upstream of the Sardar Sarovar Project in Gujarat for treatment by the end of January, 1995 an area of 28939 ha.had been treated.

Govt. of Maharashtra

As per the plan submitted by Govt. of Maharashtra non forest area of 2768 ha was proposed to be treated by the end of 94-95. Out of this till the end of March, 1995, works over 1980 ha. area had been completed.

In addition GOM had planned to treat 20,000 ha of forest areas. By the end of March, 1995 works on an area of 7480 ha had been completed. Besides an additional area of 6500 ha. had been tackled with PPO works.

ii) COMPENSATORY AFFORESTATION

Narmada Sagar Project

Government of Madhya Pradesh

It was informed that compensatory afforestation over an area of 60633 ha had been completed by the end of June, 1995.

Sardar Sarovar Project

Govt. of Madhya Pradesh

Govt. of Madhya Pradesh informed that by the end of June, 1995 plantation works over an area of 8165 ha against the final target of 8740 ha had been completed.

Govt. of Gujarat

Govt. of Gujarat had completed plantation works in the entire planned area of 13950 (including non forest and degraded forest areas) by the end of September, 1994.

Govt. of Maharashtra

Out of total target of 19460 ha planned for treatment in lieu of the areas undergoing submergence, an area of 16380 ha had been planted up by the end of August, 1994. GOMP submitted a copy of the detailed note containing blockwise survival percentage. However detailed location map of some of the districts where compensatory afforestation works are progressing was yet awaited.

iii) COMMAND AREA DEVELOPMENT

Narmada Sagar Project

NVDA informed that short listing of consultant was in progress. Member (E&R), NCA requested for a copy of the TOR under negotiation.

Sardar Sarovar Project

Govt. of Gujarat

Regarding inclusion of Member (E&R), NCA in the High Level Steering Committee (HLSC) and Expert Multi Disciplinary Groups for the sanctuaries in the command, GOG agreed to expedite the issue before the next meeting. Chairman was of the view that this matter is outstanding since long. It was also informed that Observations of the NCA office on the study reports have been forwarded to the study group for consideration.

Copies of the reports related to command area development studies completed in the last two years were required to be submitted to NCA and MOE&F. These were yet awaited.

On the issue of irrigated Agro forestry in SSP it was agreed by NPG to consult Dr. Abrol. Developments in this regards are yet to be reported by NPG.

Govt. of Rajasthan

Final draft report on the studies conducted by WAPCOS on drainage aspects was awaiting the finalisation of the alignment of the canal and discussion between officer of NCA, GOR & WAPCOS. GOR agreed to arrange the discussion soon.

iv) SURVEY OF FLORA, FAUNA & CARRYING CAPACITY STUDIES

Narmada Sagar Project

Govt. of Madhya Pradesh

Main findings of the report of the studies done by Friends of Nature Society, Bhopal and Wildlife Institute of India, Dehradun submitted by NVDA during the meeting are enclosed at Annex-XXV-Min-(3 & 4). for perusal of the members.

It was informed that NVDA had submitted proposal for the creation of special protected areas to the Govt. of M.P. & detailed action plan was under preparation.

Sardar Sarovar Project

Govt. of Madhya Pradesh

A copy of the main findings of the study completed by State Forest Research Institute, Jabalpur made available during the meeting is placed at Annex-XXV-Min.(5). NVDA informed that action plan was under preparation.

Govt. of Gujarat

Govt. of Gujarat informed that report of M.S. University was being revised.

Govt. of Maharashtra

The final report of studies on flora and fauna in and around the SSP in the areas in Maharashtra State was being given finishing touches by the Principal investigator who has just returned from abroad. It was expected that the report might be received within a months time.

Chairman expressed concern & stated that outcome of the studies have to be implemented pari-passu. He stated that generally university scientist do not give due importance to the urgency of the cause & this aspect should be looked into. He also expressed concern over delay in formulation of action plan by Madhya Pradesh.

v) ARCHAEOLOGICAL & ANTHROPOLOGICAL SURVEY

ARCHAEOLOGY:

Govt. of Madhya Pradesh

Narmada Sagar Project

Sub-group was informed that the State Deptt. of Archaeology and Museum and Archaeology Survey of India (ASI), Govt. of India have completed survey(s) and prepared action plan(s) for the State, as well as centrally protected monuments. NVDA had also accorded sanction for of Rs.4.79 crores outlined in the action plan of State Deptt. of Archaeology & Museum. An additional sum of Rs.30 lakhs had also been sanctioned for the construction of two new museums and extension of existing museum at Maheshwar besides, construction of "Narmada Gallery" in Bhopal Museum. Thus the total allocation made for the state protected monuments came to Rs.5.09 crores. Similarly for the relocation of the centrally protected monuments, an amount of Rs.87 lakhs had been approved. A Video presentation on archaeological sites was made. Chairman desired that the presentation should be edited (~~for inclusion of details & sound~~) & may be presented again during the next meeting.

Regarding, assessment report on the scouring effect of water on north bastion of Joga fort it was informed that there was an effect of scouring action of water on the plinth of the lower bastion cum well of Joga fort. This was being studied & final reports would be ready soon.

Sardar Sarovar Project

Govt. of Madhya Pradesh

The implementation of action plan prepared by the Deptt. of Archaeology & Museum for protection/relocation and excavation works under Sardar Sarovar Project has been initiated. For collection of the materials of Archaeological significance & sculptures and their transportation, two trucks and three jeeps along with other equipments have been sanctioned. Documentation of the materials has also been taken up and this job has been assigned to Madhyam (A State Govt. undertaking). Madhyam has been paid an amount of Rs. 20 lakhs to take up this work. Excavation at few sites has been completed and apart from materials of Archaeological significance, coins pertaining to 700 BC have been found.

Govt. of Gujarat

Govt. of Gujarat informed that relocation of Shoolpaneshwar temple has been completed & an annual fair was arranged there, this year. However action plan for

relocation of Hamfeshwar temple was yet awaited. It was informed that tenders etc. have been completed and work would start soon.

Govt. of Maharashtra

No works were required to be done in Maharashtra in this regard.

ANTHROPOLOGY

Sardar Sarovar & Narmada Sagar Projects

Govt. of Madhya Pradesh

It was informed by NVDA that a note on the proposed constitutional amendment was prepared by NVDA and sent to Secretary, GOI, Ministry of Welfare with the information that the resettlement and rehabilitation of the oustees of the SSP has already started and so far about 2518 families mostly tribals from tribal districts of Jhabua, Dhar and Khargone, have been shifted. The Secretary, GOI, Ministry of Welfare was requested to take up the matter urgently regarding the amendment in Article 341,342 as per the suggestions given in the appended note of NVDA.

It was also informed that Secretary, GOI had written to Govt. of Gujarat and asked their comments and recommendations but the same were still awaited. GOG officials were requested to expedite this.

Regarding procurement of the publication related to Tribal of Narmada from An.S.I. through special messenger progress is yet awaited.

vi) SEISMICITY AND RIM STABILITY OF RESERVOIR

Narmada Sagar Project

Govt. of Madhya Pradesh

Seismicity

It was informed that out of 11 micro earth quake recorders procured by NVDA to install in 10 locations finalised by IMD, New Delhi, installations at 3 sites viz. Narmada Nagar, Omkareshwar and Maheshwar (Seismic Observatories at dam sites) have been completed and these have been commissioned. Data collection would also start from the date of commissioning of equipments at remaining seven observatories where works were in progress.

One set of Wood Anderson Seismograph has already been received at Indira Sagar Dam site at Narmada Nagar. Scientists from IMD, New Delhi have been requested to

install the same. During his last visit, the Director General of Meteorology, New Delhi had agreed to carryout the detailed analysis of the seismic data and communicate the inferences etc. on the basis of regular supply of data to be maintained by NVDA.

Sardar Sarovar Project

Rim Stability

Three interim reports submitted by CW&PRS, Pune have been sent to NCA and MOEF each. Final report is expected soon.

vi) HEALTH ASPECT

Narmada Sagar Project & Sardar Sarovar Project

Government of Madhya Pradesh

It was informed that action plan for establishment of infrastructural facilities costing Rs.748.73 lacs was proposed by GOMP. At present 20 bedded hospital was functioning at Punasa Dam site (NSP) with two doctors and necessary nursing staff to take care of the project staff & labour force. Epidemic surveillance studies and the present & future health profile monitoring are being conducted by the Deptt. of Preventive & Social Medicine, Gandhi Medical College, Bhopal. The final report of the studies would recommend suitable measures for epidemic surveillance in both NSP & SSP areas.

Report on Pre & Post Impoundment studies of Narmada Basin Development for its water quality was available. The study was conducted jointly 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 & Kolar Reservoirs) by Barkatullah University, Bhopal and studies in the lower Narmada by Vikram University Ujjain. The studies covered mainly two aspects, viz., water quality & certain aspects of fisheries. Based on the recommendations in final report on the limnological and fish and fisheries aspects an action plan was under finalization. Implementation of the proposed action plan would involve further studies on water quality and certain aspects of fish and fisheries. These studies were proposed to be conducted in NSP, Omkareshwar, Maheshwar and SSP projects areas.

Sardar Sarovar Project

Govt. of Gujarat

Regarding submission of final report on health aspect being prepared by SCHMS. GOG informed that expert

deliberations were held & the action plan would be ready by end of August for implementation.

Govt. of Maharashtra

Progress from Maharashtra was awaited.

viii) FISHERIES DEVELOPMENT OF SSP AND NSP RESERVOIRS

To speed up the work on conservation and development of the fish resources in the reservoir, sub-group had recommended the formation of a group of experts. The proposal for formation of a high level expert group was approved by NCA with inclusion of one more expert member to be nominated by GOMP. First meeting of this expert group was held on 10.5.95. Second meeting was scheduled for 12th July.

Govt. of Gujarat

GOG was requested to supply a readable copy of the action plan for review by the high level expert group on fisheries development & conservation.

Govt. of Madhya Pradesh

It was informed that Dr. G.P. Dube, Fisheries Adviser, NVDA has been nominated as expert member in high level expert group approved by NCA. Regarding action plan for development of fisheries in SSP, the State Department of fisheries and Fisheries Development Corporation M.P. have been consulted. It was informed that the action plan would be submitted shortly.

Govt. of Maharashtra

TOR of the studies on ecological aspects carried out by GOM were to be reviewed by the expert group scheduled to meet on 12.7.95.

ANNEXURES

ANNEX.XXV.Min-(1).

**LIST OF PARTICIPANTS ATTENDED IN THE 25TH ENVIRONMENT SUB-GROUP
MEETING HELD ON 11TH JULY, 1995 AT NEW DELHI.**

GOVERNMENT OF INDIA

Ministry of Environment & Forests:

1. Shri N.R. Krishnan, Secretary, MOEF, New Delhi. - CHAIRMAN
2. Shri N. Bagchi, Advisor, MOEF, New Delhi.
3. Shri D. Mishra, DIG (FC), MOEF, New Delhi.
4. Dr.(Mrs.) Nalini Bhat, Add. Director, MOEF.
5. Shri Suresh Chandra, C.F.(C), R.O, GOI, MOEF, Bhopal.
6. Dr. S.C. Verma, Joint Director, MOEF., New Delhi.

Ministry of Water Resources

1. Shri R.C. Batra, Under Secretary, MOWR, New Delhi.

Narmada Control Authority

1. Shri S.A. Char, Executive Member, NCA.
2. Dr. A.K. Malhotra, Member (E&R), NCA and Member Secretary of the Sub-group.
3. Dr. Pawan Kumar, Specialist (Env.), NCA.
4. Dr. Afroz Ahmad, Impact Assessment Officer, NCA.

ICMR, New Delhi

1. Dr. R. Arora, ICMR, New Delhi.

Wildlife Institute of India.

1. Dr. Asha Rajvanshi, Faculty Incharge, EIA Cell, WII, Dehradun.

GOVERNMENT OF MADHYA PRADESH

1. Shri Suresh Chandra, Member (E&F), NVDA, Bhopal.
2. Shri J.P. Jain, Project Officer, Archaeology & Museum, Bhopal.
3. Shri R.K.Bahere, Specialist (Hydrology & Sedi.), NVDA, Bhopal.
4. Dr. G.P. Dubey, Fisheries Consultant, NVDA, Indore.

GOVERNMENT OF MAHARASHTRA

1. Shri M.K. Jiwarajika, OSD (Project), GOM, Bombay.

GOVERNMENT OF GUJARAT

1. Shri Arjun Singh, Secretary (R&R) & Director (R&E), SSNNL, Govt. of Gujarat, Gandhinagar.
2. Shri V.C. Trivedi, Specialist Environment, SSNNL, Gandhinagar.

GOVERNMENT OF RAJASTHAN

1. Shri D.C Sud, Add.Secy.(Env.) Environment, Department, Jaipur.
2. Shri C.S. Ramaswamy, DCF, Env. Department, GOR, Jaipur.

NON OFFICIAL MEMBERS

1. Dr. R.K. Katti, Prof., UNEECs, Bombay.

ANNEX-XXV-Min.(2).

ENVIRONMENTAL COST OF SSPRELATED TO UNIT I & II DAM & POWER HOUSE :A) Expenditure by project authorities:i) Cost of Survey & Studies (in lacs.)

S.No.	Component	<u>Estimate/Actual Expenditure</u>				Total
		GOG	GOM	GOMP	NCA	
1.	Compensatory Afforestation	<u>4.52</u> 4.52	<u>5.29</u> 5.29	<u>2.4375</u> 2.4375	-	<u>12.2475</u> 12.2475
2.	Catchment Area Treatment.	<u>8.77</u> 8.77	<u>7.00</u> 7.00	<u>3.28</u> 2.80	-	<u>19.05</u> 18.57
3.	Flora & Fauna	<u>52.2</u> 38.3	<u>38</u> 16	<u>20.334</u> 17.634	<u>15.27</u> 15.27	<u>127.804</u> 87.204
4.	Health	<u>2.5</u> 2.5	<u>10</u> .1	<u>29.627</u> 26.000	-	<u>42.127</u> 28.6
5.	Archaeology/Anthropology.	<u>1.3</u> 0.40	NA	<u>59</u> 36.33	-	<u>60.3</u> 36.73
6.	Seismicity & Rim Stability.	-	-	<u>23.00</u> 12.50	<u>1.98</u> 1.98	<u>24.98</u> 14.53
						<u>276.5085</u> 195.8955

ii) Cost of Implementation (in lacs)

1.	Compensatory Afforestation.	<u>1809.10</u> 1298.48	<u>2116</u> 1650.27	<u>1800.000</u> 779.08	<u>5725.1</u> 3437.73
2.	Catchment Area Treatment.	<u>3509</u> 1826.48	<u>2894.67</u> 445.657	<u>8835.05</u> 1615.47	<u>15238.72</u> 3887
3.	Flora & Fauna including Shoolpaneshwar	<u>75.31</u> 64.42	NA	<u>NA</u> Nil	<u>75.31</u> 64.42
4.	Health (incremental expenditure) for 10 yrs.	<u>3800.0</u> 101	<u>546.60</u> .5	<u>1354.63</u> 515.225	<u>5701.23</u> 616.725
5.	Archaeology/Anthropology.	<u>156.00</u> 29		<u>700</u> 10	<u>856</u> 39
6.	Seismicity & Rim Stability.	<u>129</u> 271	-		<u>129</u> 271

Total: 12827.358 27942.75
2724.1765 7991.758

* In addition several State/Central agencies have also incurred expenditure on various Environmental studies & Implementation aspects. Full details are not yet available.

NA : Not available.

**WILDLIFE RETRIEVAL
AND
CONSERVATION PLAN**

INDIRA SAGAR PROJECT

**Narmada Valley Development Authority
BHOPAL**

**EXECUTIVE SUMMARY INCLUDING
THE RECOMMENDATIONS, SUGGESTIONS,
AND COST ESTIMATES AT A GLANCE**

....



**By
FRIENDS OF NATURE SOCIETY, BHOPAL
1994**

EXECUTIVE SUMMARY

Chapter I : Introduction

- (i) Indiasagar Project was accorded environmental clearance on June 24, 1987 subject to certain environmental safeguards being implemented, catchment area treatment and rehabilitation plans being completed ahead of reservoir filling, suggested studies being taken up and permission for diversion of forest land being obtained separately
- (ii) GOI's permission for diversion of 41,111.97 ha of forest land was accorded on October 7, 1987 and Jan. 8, 1989 subject to a plan for wildlife conservation and management being drawn up by a Committee, for implementation at the cost of the Project and forest clearance being done only upto 4 metres below FRL.
- (iii) GOMP appointed a committee accordingly and the job of preparing a Project Report was entrusted by NVDA to the Friends of Nature Society, November 29, 1988.
- (iv) The main terms of reference were (a) updating the list of wild animals prepared by Zoological Survey of India, (b) identifying rare, endangered and threatened species in the submergence area, (c) drawing up a policy statement regarding species that need specific/particular protection/attention including the threatened ones and estimation of their population; (d) identifying possible migration routes of wildlife to be displaced and possible receiving areas; (e) proposing management action to prepare the receiving areas for supporting additional wildlife biomass from the submergence area (f) suggesting forest clearance sequences for helping wildlife migration in the direction of future habitats (g) assessing existing and foreseeable pressures on receiving habitats and suggesting ameliorative action, (h) suggesting feasibility of creating artificial migratory corridors and physical translocation of marooned wildlife on temporary islands; (i) studying feasibility of creating sanctuaries and national parks, (j) studying impacts of project related developments on wildlife and suggest ameliorative action; (k) study forecast of island ecology in the new islands (l) identifying endangered plant eco-systems/species and suggesting alternative areas for protection-propagation in nature for such species; and (m) suggesting necessary strengthening of relevant institutions and regulations and their administration including their staffing.
- (v) FONS utilised the services of several ex-Government experts, expert bodies and institutions such as Madras Snake Park Trust, Wildlife Institute of India, Indian Institute of Forest Management etc. in conducting the study
- (vi) Apart from verification of secondary data used in the Report, primary data was sought to be collected through the established techniques of census sample surveys and

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observations. For purposes of estimation of population, direct count supported by signs and evidences was adopted. The results so received were further confirmed by local enquires from neighbouring villagers. Method of frequency of sightings was resorted to in respect of reptilia and birds.

- (vii) Habitat suitability was worked out by comparison of submergence habitat types to receiving habitat types.
- (viii) Cover density, food availability, shelter and water, fawning/denning sites availability, human and animal interactions, range conditions and successional stages were studied. Effect of large water impoundment on riverine and shallow water species was also studied.

Chapter II : The Project and its Problems

- (i) The Indirasagar Project is on Narmada river which has a length of 1312 km of which 1079 km is in M.P.
- (ii) The total availability of water in the Narmada is 28 MAF and of this 18.25 MAF is allotted to M.P., 9 MAF to Gujarat, 0.50 MAF to Rajasthan and 0.25 MAF to Maharashtra.
- (iii) The total drainage area of Indirasagar Project at the dam site is 61,642 sq km, of which 7,159 sq km is intercepted by the existing Barna, Tawa and Sukta projects and about 16,495 sq km would be intercepted by the on-going Bargi, Kolar and Upper Narmada Projects.
- (iv) The Narmada basin gets an average annual rainfall of 1288 mm, of which 95 % has been running off to the Arabian sea.
- (v) No concrete steps for harnessing the river could be taken until the NWDT's award in 1979 because of an inter-state dispute about sharing the water and height of the proposed Dam on the Gujarat- M.P. border.
- (vi) The Indirasagar Project with an irrigation potential of 2.65 lakh ha and an installed capacity of 1000 MW was cleared by the CWC and CEA in 1989 at an updated cost of Rs 2167.67 crores including the cost of environmental improvements and rehabilitation of oustees.
- (vii) The project will be located near village Punasa in E.Nimar (Khandwa) distt. in M.P. and will have a height of 92m over a length of 653 metres with gross storage (BM3/MAF) of 12.22 (9.9) and live storage (BM3/MAF) 9.75 (7.9). The cost of command area development has been assessed at Rs.50 crores while that of catchment area treatment at Rs. 124.00 Crores.

- (viii) The Project would submerge 91,349 ha of Narmada valley land in E. Nimar, Dewas and Hoshangabad districts affecting 237 Revenue villages and 12 Forest villages and a human population of 86,578 as per 1981 census.
- (ix) 35,325 ha of Reserved and Protected forest, 5005 ha of unclassified forest (Total 40332 ha forest area), 2,477 ha of irrigated and 41,886 ha of unirrigated culturable area and 6,653 ha of government land would get submerged by the lake formed by the project.
- (x) The additional production of cereals through irrigation to be provided by the project would be 0.4 million MT and those of non-cereal crops around 1.055 million MT.
- (xi) The project area generally encompasses the Narmada stone lineament-the area being composed of massive and compact basaltic lava flows of 6.5 m to 30 m thickness at lower depths. Black cotton and alluvial soils occur in the valley of the Narmada river.
- (xii) The Dam foundation is being laid on sound and fairly impervious rocks, quartzites of Vindhyan (Super group) and the power house on the stable right bank in a deep pit where predominating rock is quartzite.
- (xiii) 29.5% of the gross command area of the project falls in irrigability class II, 21.5% in class III, 25.7% in class IV and 23.3% in class VI.
- (xiv) It may be necessary to provide adequate surface and sub-surface drainages when the land in the area is subjected to intensive irrigation and cultivation if water-logging and loss of fertility are to be prevented.

The project has to take care of three formidable problems besides construction of the Dam, powerhouse and the canals viz. (i) rehabilitation of oustees; (ii) environmental issues especially compensatory afforestation and shifting of wildlife from forest area coming under submergence; and (iii) catchment and command area development.
- (xv) The Government of Madhya Pradesh have in the year 1989 finalised and announced the policy for the rehabilitation of oustees from the submergence areas which is far more liberal than followed elsewhere.
- (xvi) The total forest area coming under submergence would be 8619.57 ha in Mundi Range, 9119.63 ha in Baldi Range, 2891.41 ha in Singaji Range and 7489.41 ha in Chandgarh Range of Khandwa Forest Division, 3227.80 ha of Handia Range in Harda Forest Division and 3977.39 in Satwas Range of Dewas Forest division besides 4006 ha of forests under Revenue department in E Nimar District, 450 ha in Hoshangabad District and

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551 ha in Dewas District. In addition to 40,332 ha of forest area coming under submergence 779.89 of forest lands have been permitted to be diverted for approach roads, dam seat, saddle dam, power house complex, residential colony etc. Thus the total loss of forest land (including revenue forests) to the project would be 41,111.97 ha.

- (xvii) The Botanical Survey of India which conducted a limited study of the area have observed (1985) that "There is not very rich vegetation in this area", that " no floristic elements are exclusive to the area" and "some of the rare species of the area can be easily transplanted."
- (xviii) The forests in the submergence belong to sub-groups 5A/C1a very dry teak, C1b-dry and C-3 dry mixed southern tropical dry deciduous forests. While degradation types DS-1 dry deciduous scrub and DS-2 Dry Savannah types are found intimately mixed up the edaphic types E-2 Boswellia and E-4 Hardwickia (anjan) are occasionally found. E-9 dry bamboo brakes are also found. Notable species found in the submergence area are given in para 2.17.1 and appendix to chapter II.
- (xix) No species have been reported in the area which can be termed as rare species or rare associations or which would become extinct with submergence. The Botanical Survey of India, have, however, recommended plantation of anjan (*Hardwickia binata*) despite there being no apprehension of its extinction.
- (xx) As many as 69 plants of medicinal and food value have been identified in the submergence area by the Botanical Survey of India. These have been listed in para 2.17.3
- (xxi) Out of the 40,332 ha area recorded as forest and coming under submergence 10,996 ha is tree-less having no positive contribution to environmental richness. The loss of real forest cover, would thus be in an area of 29,336 ha of which 5177 ha is non teak forest.
- (xxii) The State Forest Department has estimated loss of 36,25,587 teak poles, 7,86,317 cmt. teak logs, 15,28,225 stacks teak fuel 53,631 misc. Poles, 55,516 cmt miscellaneous logs and 40,29,715 stacks miscellaneous fuel which would have to be felled and shifted before submergence.
- (xxiii) An important problem to be countered will be the pressure that may build up perpetually on the forests outside the submergence area for meeting nistar and other requirements of the population viz. poles (391 cmt), fuelwood (5160 stacks), bamboo (364 N.T.) besides grazing and salai wood and bamboo requirements of Nepa Mills estimated at 1000 stacks of 2m x 1.2m x 1m and 975 N.T. respectively.
- (xxiv)

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The loss of 44,363 ha of cultivated land, of which around 2,500 ha is irrigated, to submergence is formidable because the entire human population getting displaced (excepting that of the forest villages) was dependent on it for its living.

(xxv) The NVDA has identified 30,572 ha of degraded forests in East Nimar district, 22,739 ha in Hoshangabad distt/, 17,491 ha in Dewas district (totalling 70,802 ha) and 10143 ha of area other than forests in the E.Nimar, Hoshangabad, Dewas, Sehore, W.Nimar and Dhar districts for compensatory afforestation, as detailed in para 2.20. An area of 70,802 ha of degraded forests has been targetted as against 62,555 ha required.

(xxvi) Catchment area treatment and command area development are two important aspects of irrigation development.

Catchment area treatment (CAT) for preventing soil erosion, siltation of reservoir, regulating cropping intensity and optimising production would be necessary.

(xxvii) Out of the project's catchment area of 61,642 Sq. km the freely draining area is about 24,587 Sq.km most of which would require treatment. NVDA has decided on prioritisation of highly eroding and degrading watersheds for treatment based on the sediment yield index.

(xxviii) The catchment area treatment plan also envisages better land use for not only meeting fuel and fodder needs of the area but also for providing an effective vegetative cover necessary for improving ecology of the area.

(xxix) The technology to be adopted for catchment area treatment is 3 dimensional - engineering biological and agronomical-using the three measures singly or in combination with others as the situation may warrant. The measures proposed are detailed in para 2.21.5 and 2.21.6.

(xxx) The CAT work on government land, community land and forest land would be carried out at the cost of the Project, whereas treatment of the areas privately owned would be done at subsidised rates with S.C/S.T being subsidised at higher rates.

(xxxiv) Command area development envisages on-farm development, familiarising farmers with practices of irrigated agriculture, regulated supplies of water, adoption of improved technology, and also development of infrastructure for transportation, storage, marketing and processing of agro-produce etc.

(xxxv) There are numerous other problems like land acquisition for canals and for the development of new townships, town planning, funding of the project etc. etc. which would require attention and would be subject of independent studies.

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Chapter III :Wild Life in Submergece Area

- (i) M.P. forests were once known for the rich and large variety of their flora and fauna and wild game hunting was a favourite sport.
- (ii) Most of the pre independence legislations for the protection of birds and game remained dead letters. Though poaching was not encouraged, forest villagers and tribals killed wild-life in self-defence or for food and festivity and government officials shot animals no less for protecting their workers than for sport.
- (iii) Hunting for sport led to the extinction of animals like elephants lions cheetahs from the forests in the Narmada catchment especially in Narsimhapur district.
- (iv) Working Plans of Khandwa (1952-53 to 1964-65) and Harda (1954-44 to 1970-71) reveal that 46 tigers were shot in Khandwa Forest division, 62 were shot in Harda Forest Division, 38 leopards or panthers were killed in Khandwa and 72 in Harda Forest Divisions 50 and 77 sambhars 30 and 37 cheetals and 89 and 15 barking and other deer were shot during the periods given above in Khandwa and Harda Forest Divisions respectively, besides other game.
- (v) An idea of poachings can be had from the fact that in Khandwa Forest Division alone 414 animals were shot during 1952-53 to 1965-66 against permits for 125 killings issued.
- (vi) The Elephant Preservation Act 1879, The C.P. Game Act, 1935, the M.B. Wild Birds Protection Act, 1952, the M.B. Game Act, 1952 were followed by C.P. shooting Rules as contained in the C.P. Forest Manual (Vol II) the Game Rules, 1954, the M.B. shooting Rules, 1954 the M.P. Games Rules, 1962 the M.P. Forest (Hunting, shooting, fishing poisoning setting traps or snares in Reserved and protected Forests) Rules, 1963 and the wildlife Protection Act, 1972 were all framed for protecting Wildlife and birds from human depredation, though not very effectively until 1972.
- (vii) Under clause (1) of Article 252 of the Constitution of India and by the 42nd amendment to the Constitution of India, forests and wildlife protection were brought on the concurrent List. The GOI's action in 1972 and onwards were preceded by the enunciation of the revised National Forest Policy in 1952 which laid emphasis on wildlife protection and conservation.
- (viii) Forest Department sources assert that, with the enactment of the 1972 legislation, wild life in M.P. has registered an all over increase though not phenomenal.
- (ix) Amongst nine of the avowed objectives of the National Forest Policy, 1983 is the aim "to ensure environmental stability and maintenance of ecological balance in-

cluding atmospheric equilibrium and the concern for wildlife has been voiced in paras 3.3 and 4.5 thereof

- (x) The forests in the area to be submerged by Indirasagar are not replete with wildlife now and there are no wildlife reserves or national parks in the area either, but a few panthers, tigers, black bucks, neelgai, bears, wolves, hyaenas, jackals, fox, wild dogs, monkeys, rabbits and antelopes etc. are still found which have to be saved from being lost to submergence by ensuring their shift to other natural and safer habitats.
- (xi) It has also to be ensured that the receiving areas are able to carry the additional load of wildlife, domestic cattle and human use pressures, withstand the changes in the environment of the new habitat under reservoir effects and adapt themselves to the changed biome characteristics.
- (xii) Besides mitigation of unavoidable losses of major wildlife by effectively providing better reproductive and conservation habitats and enriching such habitats through ameliorative activities it would be necessary to save the burrowing animals reptiles arboreal animals, aquafauna, avi-fauna etc. in the submergence area and to induce their movement to safer habitats to the extent possible and wherever necessary.
- (xiii) Fortunately the forests adjoining the submerging areas, the islands likely to be formed, the banks in the upper reaches of the river and its tributaries would provide havens for such displaced animals and other creatures.
- (xiv) Since clear felling of forests results in fast and dense growth of climbers, tall grasses rhizomes and young coppice shoots, drawing herbivora for feeding and grazing and their predators to prey on them, felling of forests and migration of animals has to be carefully planned and regulated in such a manner that no animals get trapped in the smaller islands and die of starvation or get no time or route to escape to safer areas when inundation takes place.
- (xv) The following chapters deal with the existing state of fauna the endangered species the measures necessary for their protection before and after submergence the plan of forest clearing and planned migration of wildlife etc.

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Chapter IV : Retrieval and Conservation of Terrestrial Wildlife

- (i) Mundi and Chandgarh Ranges of Khandwa Forest Division are rich in wildlife the other areas are not. When inundation starts, consequent upon the closure of the Indirasagar Dam the wildlife in the north of the submergence area will move to the adjoining forests without any hindrance; but elsewhere, the receiving habitats will have to be improved and ameliorative works will have to be carried out to make the conditions therein suitable for migration of wildlife.
- (ii) The construction of buildings and roads of the project was started from 1966 without any study of their over-all impact on the wildlife of the area. The residential colony at Narmadanagar and Punasa dam site link road cut across the only movement route available to the wildlife of the submergence area of Mundi Range. The Bhopal-Indirasagar Dam site road under construction also passes through the forest areas of Dewas and Khandwa Forest Divisions and would be a constant nuisance to the wildlife.
- (iii) The dam construction activities will be employing around 28,000 skilled and unskilled workers for a period of more than 8 years. The collection of stone, sand, murrum, earth and the felling operations of the forest areas, besides the noise from the power house pumping stations and moving vehicles will be a source of constant disturbance to the wildlife.
- (iv) The dam, canals, channels and the embankments will cause further impediments to the movement of wildlife.
- (v) In spite of the fact that the Govt of India have issued instructions to the State Govt for opening of depots for free supply of fuel to the labour the chances are that a large population working in the area would be cutting and collecting fuelwood and causing other damage to the forests and disturbance to the forests and disturbance to wildlife.
- (vi) A detailed study of the working Plans of Khandwa, Dewas and Harda Forest divisions was done to check the displacement areas coming under submergence of the reservoir and those that would be the receiving habitats of the wildlife. Receiving habitats were also verified in the field and their attributes noted. These are as under:-

(a) Forest areas under diversion	41,111.97 ha
(b) Forest areas coming under submergence (Total)	40,332.00 ha
R F & P F	35,325.00 ha

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Revenue Forests	5, 307.00 ha
(c) Impact areas	1,83,493.30 ha
(d) Receiving areas	49,360.40 ha

(vii) The study was divided into three segments:

- (a) A sample Survey in the wildlife displacement area
- (b) Complete Survey of the receiving areas and
- (c) Collection of data from secondary sources for the balance areas i.e. where wildlife may move at a later stage.

The habitat suitability assessment for displacement areas has been done for pre-dam scenario and for receiving areas it has been assessed for the post dam scenario and shown on the map.

(viii) For facilitating wildlife retrieval and conservation the displacement areas were linked to corresponding receiving areas keeping in view natural shift of wildlife induced by progress of submergence. The entire displacement areas and the receiving areas have been divided into 19 migratory units as follows:-

Unit No	Name of Unit	Displacement Area (Ha)	Receiving area (ha)	Total area of Units (ha)
1	2	3	4	5
1.	Joga	1,943.97	4,168.46	6,112.43
2.	Bichhola	2,047.46	552.05	2,599.51
3.	Domri	712.06	1,746.92	2,458.98
4.	Kukdhal	3,823.63	3,435.35	7,258.98
5.	Balri	3,819.32	625.42	4,444.74
6.	Junapani	2,366.33	1,856.72	4,223.05
7.	Balwada	983.82	487.20	1,471.02
8.	Bhogani	1,764.13	513.44	2,277.57
9.	Chandel	1,904.70	976.23	2,880.93
10.	Chickhdhalia (North)	-	7,633.79	7,633.79
	Chikhhdhalia (South)	1,600.56	1,544.71	3,145.27

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1	2	3	4	5
11.	Ashapur	650.80	7,320.28	7,971.08
12.	Selda	2,240.71	3,393.36	5,634.07
13.	Namanpur	563.77	3,355.16	3,918.93
14.	Dhansar	2,568.68	660.41	3,229.09
15.	Khariya	1,570.45	291.27	1,861.72
16.	Titwas	1,726.81	200.12	1,926.93
17.	Chandgarh	1,535.76	1,743.51	3,279.27
18.	Pamakhedi	2,872.28	5,204.53	8,076.81
19.	Chhahin	361.78	3,651.47	4,013.25
	Total	35,057.02	49,360.40	84,417.12

- (ix) The receiving habitats in Harda Forest Division carry forests of poor quality with teak pollards and very little mixture of miscellaneous species like mahua tendu and achar etc. The forests are interspersed with villages and have low density of wildlife confined along the Narmada.
- (x) In Balri Range (Khandwa Forest Division) near Kukdhar the forest composition as well as the wildlife density are better particularly along the banks of Machak and Narmada rivers. South of the Narmada near Balri the forest patches are small interspersed with cultivation and with poor wildlife. Receiving habitats in this area will be in the islands only. It is the most problematic area where loss of some wildlife, particularly those inhabiting near the villages, would be unavoidable. Further south, around Singhaji and Selda, in Singhaji Range, the forests are very poor, heavily damaged and have practically no wildlife.
- (xi) In the west, in Mundi Range south of the Narmada, the wildlife habitats are very rich. The receiving areas in this part will be mostly in the islands. The non-island portions will have very heavy biotic pressure because of which they would be rendered unsuitable as wildlife receiving areas/habitats.
- (xii) In the north of the displacement area there exists a good and fairly vast patch of forests suitable for receiving the wildlife but this patch of forests gets disconnected because of the Narmadanagar township and intake channel for the main canal. This forest patch will be useful only if a very effective corridor is provided for wildlife movement.

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- (xiii) The forests east of Pahadi nadi in Satwas and Balri Ranges are interspersed with cultivation because of which the forest composition and the wildlife density is poor.
- (xiv) In the west of Pahadi nadi in Chandgarh Range there is a big chunk of forest which is largely free from biotic pressures and makes a rich wildlife habitat. This will further improve as it gets encircled on three sides by the reservoir and on the north side where it remains open there exists a continuous patch of forests extending over 20 kms or more.
- (xv) Fons have prepared an inventory of the terrestrial wildlife where in 32 species have been identified to exist in the Project area against 27 species listed by Z.S.I. as under

S.No. Common name		Declining Status
1	2	3
1.	Tiger	Vulnerable
2.	Leopard or Panther	vulnerable
3.	Jungle cat	Threatened
4.	Desert Cat	endangered
5.	small Indian Civet	-
6.	Common Mongoose	-
7.	Striped Hyaena	Threatened
8.	Wolf	Endangered
9.	Jackal	Endangered
10.	Indian Fox	Endangered
11.	Dhole or Indian Wild Dog	Vulnerable
12.	Indian wild Boar	
13.	Smooth Indian Otter	
14.	Ratel or Honey Badger	
15.	Striped squirrel or Indian palm squirrel	
16.	Gerbilles	
17.	Rats and mice	
18.	Sloth Bear	Endangered
19.	Porcupine	

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1	2	3
20.	Flying fox	
21.	Fulvous fruit Bat	
22.	Common leaf nosed Bat	
23.	Indian hare	
24.	Common Langur	
25.	Monkey	
26.	Chinkara or Indian Gazelle	
27.	Black buck or Indian Antelope	
28.	Chousingha or Four Horned antelope	
29.	Nilgai or Blue Bull	
30.	Sambhur	
31.	Cheetal or Spotted Deer	
32.	Barking Deer	

(xvi) Population counts of the wildlife of the study area, were carried out. This includes ungulates and predators. The values and data recorded under these studies form the baseline data. Wildlife population estimates are based mainly on direct count supported by signs and evidences. Their distribution has been indicated on maps, separately for each unit.

(xvii) The wildlife counted is as follows:-

Species	No. of Wild Animals		Total
	Submergence area	Receiving area	
1	2	3	4
Nilgai	851	619	1470
Chinkara	144	150	294
Sambhur	63	139	202
Cheetal	218	141	359
Barking deer	180	149	329

1	2	3	4
Tiger	4	4	8
Leopards	23	13	36
Bears	24	34	58
Hyaena	4	-	4
Dhole	5	-	5
Black buck	6	1	7
Wolf	1	1	2

- (xviii) The clearance of forests has got to be done prior to impoundment. Manipulation of the forest clearing programme has to be done in a manner as to induce safe movement of wildlife from the submergence area towards their future habitats. A Forest Clearance Plan has accordingly been drawn up.
- (xix) The receiving habitats have varied conditions at different places and accordingly need different short term and long term treatments depending upon factors like physical and biological conditions, availability of food, water and cover, co-existence of avi-fauna, aquatic fauna, vegetation and predation. These have been classified into five categories for the purpose of future forest and wildlife management viz.,
- (a) Category-I Areas already burdened with existing wildlife and under considerable biotic and human-use pressures.
 - (b) Category-II Areas whose existence is at stake on account of their location and extent.
 - (c) Category-III Submergence areas which can be converted into shallow water swamps for formation of bird sanctuaries and aquatic fauna and flora (Back water impoundments).
 - (d) Category-IV Islands
 - (e) Category-V Receiving habitats with very little or no biotic pressures.
- (xx) Proposed treatment for Category-I covers
- (a) Afforestation programme to cover the entire area with species including those suitable for browsing by herbivora and supplemented by fruit bearing trees like aonla, ber, gular, pipal, bad, mahua, aam, jamun, ghont, bahera, achar, kachnar and bamboo for sustaining monkeys, squirrels, bears etc.
 - (b) Suitable amendment to the forest working plans for accommodating the requirements of wildlife management.

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- (c) Intensive social and farm forestry in the rural areas.
- (e) Strict enforcement of the M P Grazing Rules in the areas.
- (xxi) Four compartments have been identified in Category II whose areas will get reduced after submergence as follows:

Range (Division)	Compartment	
	No.	Area (ha)
Handia (Harda)	403	3.24
Balri (Khandwa)	P-85	11.01
	P-86	0.39
Satwas (Dewas)	P-70	8.45

The Government of M P Forest Department would be well advised to examine and decide whether these areas need be maintained under the same legal status and to their utilisation as hitherto, or declare them as protected areas under sanctuary or national park as may be.

- (xxii) The remaining Category II areas are as under:

Range (Division)	Compartment	
	No.	Area (ha)
Handia (Harda)	406	101.96
Balri (Khandwa)	P-94	60.71
	385	126.81
Mundi (Khandwa)	358	60.22
	359	142.26
Satwas (Dewas)	370	112.95
	371	44.74
	372	238.68
	373	47.93
	374	36.35
	375	115.84 Two patches.

These would have to be provided with a permanent fencing and each patch guarded by a special guard or chowkidar for its protection. Alternatively the areas could be developed into a fodder area managed under social forestry project wherefrom only the cutting and collection of fodder may be permitted and grazing completely prohibited.

- (xxiii) In category III areas coffer dams across Chhahin nala and Machak nadi are proposed to be constructed which would result in the creation of wetlands ideal for aquatic fauna sanctuaries. As soon as these areas are declared as such, their management plans should be got prepared and the wetland sanctuaries managed accordingly. Foreshore plantings are suggested.
- (xxiv) It would be desirable to bund the Rupami nala. This would be ideal for management as a village tank and for fishery development activities. foreshore plantings are suggested.
- (xxv) The islands (category IV receiving areas) have been classified into two sub-categories viz.
 - (A) Islands fit for use as receiving habitats of displaced wildlife as well as future abode for wildlife; and
 - (B) Islands not fit or not required for utilization as receiving habitats.
- (xxvi) The following action is recommended for islands falling in sub-category 'A'
 - (a) Islands Nos. 14 to 51 and 59 to 66 may be given status of sanctuaries.
 - (b) Effective cattle proof fencing be done at all points where the cattle may enter the islands during draw down periods so as to protect wild animals against infectious and contagious diseases
- (xxvii) In the islands of Sub-category 'B':
 - (a) Nothing should be done for the time being and they may be left on their own as nature reserves, and
 - (b) The islands of 10 hectare or more area (out of 37 islands in the revenue lands eleven (11) are larger than ten ha in area and 3 islands are of ten ha area,) should be included in the compensatory afforestation programme of N V D A but species to be planted should be those which are normally preferred by wildlife viz. bamboos, mahua, achar, tendu, mango, ber, ghont, harra, bahera, aonla, anjan, bad, pipal, saja, dhaoda, lendia etc. Palatable shrubs and fodder grasses should also be planted as nucleus and allowed to spread.

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- (xxviii) For Category V areas, it is recommended that
- (a) the entire area falling under this category be declared as a national park. Minor areas, equally suitable, from the adjoining forests of Khandwa and Dewas Forest Divisions are proposed to be added to it, and
 - (b) an effective fencing around the power-house complex be erected for keeping wildlife away from it.
- (xxix) The only problematic area where there are possibilities of wildlife getting trapped to death is unit. No. 5 Balri. While the forest dwelling wildlife will simply climb over to the islands, wildlife which generally prefers to live in the neighbourhood of villages is likely to get trapped. Wildlife like partridges, hare, fox, jackal, hyaena etc. May get trapped in the smaller elevations during inundation which may completely get submerged finally. However excepting for jackal which is classified as endangered there is no fear of any other species getting extinct. Even for jackal there is no fear of their extinction as, their numbers, though declining, they still exist adequately all over the study area. With the implementation of the proposed prescriptions and the formation of special protection areas, these will also multiply and the loss due to their getting drowned will be mitigated. Capturing and relocation of any of the wild animals will thus not be required.
- (xxx) Provision of two corridors for wildlife one near the Narmadanagar colony and another over the proposed exit tunnel for main canal would be necessary for their migration. Presently their passage for movement is blocked by the Narmadanagar colony and the intake channel for main canal. The stretch of the corridors through which the roads pass, need to be guarded day and night to avoid possibilities of poaching
- (xxxi) The Bhopal- Indirasagar dam site road will cause some impediment to the movement of wildlife to the north of the receiving habitats. It would be necessary to ensure that no avoidable disturbances occur on this road during the reservoir filling period so that wildlife moving north of this road from the south is not disturbed. This road will ultimately pass through the proposed national park and its discontinuance may be considered after the work of transportation of machinery has been completed
- (xxxii) Till such time as the areas are legally notified as sanctuaries, national parks, as an amelioration measure the areas allotted to categories IV and V may be declared closed to grazing and removal of fire-wood by headloads. Effective implementation of these activities has to be ensured.

- (xxvii) Whatever grasslands exist in the area at present are degraded dry and poor with unpalatable grasses and shrubs. It will be necessary to identify such natural meadows and grasslands and clear them of unpalatable grasses and shrubs. A few nucleus patches should be selected, ploughed and seeds of improved grasses and legumes should be sown. The nucleus patches should be protected against damage from wildlife. The seed dispersal from these patches will ensure enrichment of grass-lands in due course.
- (xxviii) Development of tree shelters in the forest patches having a density of 0.4 to 0.6 and their fencing for protection against damage by wildlife would be helpful. Enrichment plantation in such patches may be undertaken. In general planting of achar, gular, pakad, anjan, mahua, am, jamun, imli, baheda, tendu, kachnar, lasoda, aonla, dudhi, ber, ghont is recommended. Apart from these ber, pipal and jamun can be specially planted near water sources. Efforts should be made to introduce bamboos wherever it is wanting.
- (xxix) Availability of water is not likely to be much of a problem in these areas because the distance between the F R L and M D D L is not much. The wildlife normally travels this distance for water.
- (xxx) Provision of salt licks, eradication of weeds and replacement by palatable shrubs, planting of shrubs like ber, karonda, etc and edible roots and herbs have been prescribed.
- (xxxi) Cover is as important for wildlife as food and water and it needs to be ensured at places where food and water is available. Establishment of escape covers, ambush covers and reproductive covers has been suggested. Specific refuges like rock shelters, caves, talus, snags and tree hollows are to be protected.
- (xxxii) The extant major wildlife species of the area have the conservation status as shown against each

E = Endangered R = Rare
V = Vulnerable T = Threatened

1. The Jackal	E
2. The Wolf	E
3. The Indian Fox	E

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4. The Wild Dog	V
5. The Striped Hyena	T
6. The Panther	V
7. The Tiger	V
8. The Desert Cat	E
9. The Jungle Cat	T
10. The Sloth Bear	E
11. The Four horned antelope	V
12. The Black Buck	E

(xxix) This is the classification in national context. The local status is much better except for the tiger. FONS during their survey have not found the area rich in wildlife. The variety of course encompasses all the typical animals found in Central India except the gaur or Indian Bison. The numbers of each species are very low indeed, compared to the vast habitat for them area-wise. The causes are unlimited grazing and human pressures.

(xL) Policy statement regarding endangered vulnerable, rare, and threatened species:

For the endangered species, four of them are carnivora, the prey base will have to be made more extensive by creating improved primary production. The fifth species i.e. the sloth bear is at a disadvantage due to loss of hiding cover and non-availability of its frugivorous diet throughout the year due to indiscriminate and unlimited headload removals wherein every species except teak is removed by headloads. This will be mitigated by enrichment plantings of bear use species.

(xLi) The vulnerable species are the wild dog, the leopard (Panther) and the tiger. All of these are at the apex of the biotic pyramid. The causes of decline at the national and state level have already been identified. The local causes, plus the state level causes will have to be removed.

(xLii) There are two species viz the hyena and the jungle cat both carnivorous, which could become endangered or vulnerable but there is very little information about them to categorize them as either. Being carnivorous their survival in better numbers must necessarily depend on the availability of better prey base. The improvement of prey base i.e herbivorous species can be achieved by creating special conservation areas. FONS has therefore recommended creation of two sanctuaries and a national park

where protection of the habitat and its enrichment will entail highly improved biome for secondary users. It would also help many other lesser known species e.g. of birds, reptiles, amphibia and fishes.

- (xLiii) The recommendation aims at creating new habitats not merely for the endangered species but also for other species creation of such engineering structures as may be necessary for creating permanent water bodies at the tail ends of the streams coming into the main reservoir thereby creating highly productive and useful well managed habitats for wet land species including many species of fish and amphibia.
- (xLviii) The management of these special conservation areas would be the responsibility of the N V D A which should take technical guidance from the wildlife wing of the Forest Deptt. and such other sources like W.I.I. Dehradun as may be found necessary. The project will create its own trained manpower for this special job as for many other specialized fields of activity.

Chapter V : Impact of Submergence on Reptilian and Amphibian Fauna

- (i) Reptiles and other creeping creatures, amphibians and avi- fauna are integral components of the ecosystem.
- (ii) Construction of high rise dams affects all wildlife. While some species may get endangered, some may find the submergence a temporary set back to their habitat and breeding and some may even find themselves in a very happy situation. Imbalances introduced in the ecosystem may take a long time to get corrected and may even be harmful in the short run. A prior assessment of the possible effects of submergence on the faunal wealth (and the ecosystem too) can thus help in devising and taking appropriate remedial measures for their rehabilitation, relocation and conservation before it is too late.
- (iii) FONS commissioned the Madras Snake Park Trust (MSPT) for a study of the reptiles and amphibians in the Project Area and supplemented it with their own field observations and findings and opinions.
- (iv) The MSPT team's observation is that "there will not be any serious adverse environmental impacts on the faunal communities or any loss of species as a result of the proposed project."
- (v) The MSPT study has proved to be significant from the taxonomic point of view in as much as one species of lizard - *Cyrtodactylus collegalensis* - generally found in southern India and Sri Lanka was found in Pipalghat and northwards and two species of amphibians- *Tomopterna breviceps* and *Bufo microtypanum* - whose existence in M.P. was not reported earlier- were found.

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- (vi) The MSPT felt that "the creation of a large reservoir would serve as an effective barrier for the movement of the fauna between the northern and southern sides." FONS however feel that this assumption may not hold good for the amphibians and the avifauna. Moreover, straying of a few reptiles, through some connecting dry areas or being washed ashore, on trees, branches etc. during floods, can also not be totally ruled out. As of today the Narmada is as effective a barrier as it would be after the dam.

- (vii) Twentyone species of reptiles (out of 63 identified for the State of Madhya Pradesh) were found in the study area. viz:

Turtles: *Lissemys punctata* and *Trionyx gangeticus*.

Lizards: *Cryptodactylus collegalensis*, *Hemidactylus triedrus*, *Hemidactylus leschenaulti*, *Hemidactylus brooki*, *Sitana ponticeriana*, *Calotes versicolor*, *Psammophilus blanfordianus*, *Agama minor*, *Mabuya carinata*, *Varanus bengalensis*.

Snakes: *Lycodon aulicus*, *Amphiesma stolata*, *Xenochrophis piscator*, *Ptyas mucosus*, *Dendrelaphis tristis*, *Boiga trigonata*, *Bungarus caeruleus*, *Naja naja oxiana*, *Echis carinatus*,

- (viii) There may not be any food problem for the reptiles because of loss of large vegetated areas and the insects therein to submergence as they may start escaping to new areas in search of food, consequent upon the clearing of areas in stages, but the possibility of a few being trapped in their burrows/holes when inundation takes place or getting killed while escaping cannot also be entirely ruled out. It is however, difficult to estimate such deaths because reptiles have a variety of habitats- terrestrial, arboreal and aquatic and their food is equally varied
- (ix) A rough idea of the density of population of various species can be had from the frequency of their sightings in the course of the field survey. These are given in para 5.7.1
- (x) The Indian wildlife (protection) Act, 1972 lists 8 species in Schedule I and II as rare, endangered and threatened viz., *Trionyx gangeticus*, *Crocodylus palustris*, *Varanus bengalensis* and *Python molurus* in schedule I and *Ptyas mucosus*, *Naja naja oxiana*, *Vipera russelli* and *Xenochrophis piscator* in Schedule II. Barring *Vipera russelli* which was not sighted and *Crocodylus palustris* and *Python molurus* which were not seen but whose presence in the area was established in local enquiries, the remaining 5 species were frequently sighted at different locations.

- (xi) None of the lizards and amphibians found in the area can be termed as threatened though python and crocodiles may be listed as rare. There was no evidence of endemism or variations either.
- (xii) Barring the amphibian reptiles which would continue to remain in the river/ashore and the checkered keelback, rat snake and black cobra which can swim well, other reptiles may be forced to leave their present habitats as clear felling of trees in the submergence area proceeds or when submergence takes place. Since there would be no natural or man-made barriers other than the river, it may not be possible to pre-determine the routes of their migration. Their migration may be in all directions and perhaps in stages viz. Flight to immediate safety first and then movement in search of food and congenial habitat and so on.
- (xiii) The chances of food resources (insects mainly) falling short for the lacertilian species are negligible and so also the chances of conflicts. The conflicts may arise locally amongst snakes where shortages of frogs, toads, mice, lizards etc. occur, but generally there is no anticipation of such shortage.
- (xiv) The increase in irrigation facilities, perennial nallahs, canals and their minors etc. are likely to boost up the insect, rat and frog population and attract lizards and snakes which feed on them. However, there may be problems of and struggles for, food and survival in the transitory stage though subsequently there may be plenty for the reptilian population to survive upon.
- (xv) In the long run the laws of population would prevail whence the surviving and breeding population would limit its reproduction rate to a level equal to the carrying capacity of the habitat.
- (xvi) Intra-specific competition is triggered by extrinsic factors (resource availability, predation etc) and intrinsic factors such as population explosion, genetic changes, behavior and dispersal etc. It is very difficult to make any forecast in this behalf as evidence of intra-specific competitions and their effect on the species involved are some areas of ecology about which very little is really known.
- (xvii) The reptilia may have to compete more for food than space in the receiving areas initially.
- (xviii) The most important-decimating agent, as far as serpents are concerned is man with all his ignorance, beliefs and superstitions about snakes.
- (xix) There was no evidence of reptiles being killed for their skins or food in the project area excepting that of turtles for food by Bangladeshi displaced persons. However,

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- the chances of killings of snakes by forest workers at the time of clear felling of forests in the submergence area are quite real. Such killings would have to be forbidden and prevented as long as the reptiles do not pose a direct threat to human life. Professional snake charmers are not likely to have any decimating effect on the snake population.
- (xx) Amongst the three species of crocodilians found in India - *Crocodylus porosus*, *Crocodylus palustris* and *Gavialis gangeticus*, - *Crocodylus palustris* is the only species found in the Narmada waters though *ghariyals* (*Gavialis gangeticus*) are also found in fairly good numbers in Chambal, and some other rivers of Madhya Pradesh. eg. Ken and Sone.
 - (xxi) The *mugger* (*Crocodylus palustris*) population has declined steeply all over the world, including in India, and the Narmada is no exception to it. Important amongst the causative factors for the decimation of its population are the insatiable demand for its costly hide in the leather markets of the world and their killings for preventing fishery losses. Crocodile killing has since been banned in India under the wildlife (protection) Act, 1972.
 - (xxii) Both *mugger* and *ghariyal* can quickly adapt to changed environments and can multiply rapidly to become a resource again. The increase in their numbers in the sanctuaries e.g. the Chambal in natural surroundings indicates the potential of revamping these reptiles in the reservoirs, including Indira Sagar, provided an effective check on their killings can be exercised. A few *muggers* and *ghariyals* can also be translocated/introduced in Indira Sagar successfully. By dovetailing fishery development with sustainable *mugger* and *ghariyal* population the process of extinction of these species can be successfully reversed. FONS would suggest that the matter of introducing gharial in Narmada where it has not been reported earlier may be decided in the IBWL.
 - (xxiii) For want of taxonomic studies of the amphibia in M.P. the task of compiling a list thereof was rendered rather difficult. Eleven species of amphibians had been identified for M.P. of which eight species were found in the study area. Two new records for M.P. were however established with the finding of *Bufo microtympanum* (South Indian hill-toad) and the burrowing frog (*Tomopterna breviceps*).
 - (xxiv) No truly fossorial species, one of which is known to occur in Madhya Pradesh, was located in the area.
 - (xxv) The highest numerical density, noticed among the eight species found in the area, was that of *Rana limnocharis*, followed by *Tomopterna breviceps*, followed in order of density.

by *Polypedatus maculatus*, *Microhyla ornata*, *Rana cyanophlyctis*, *Bufo melanostictus*, *Rana tigerina*, and *Bufo microtympanum*. It is however, by no means, an indicator of their population in the study area

- (xxvi) The amphibians are found in clusters, lowest in dry areas, absent in areas with volcanic fragmented rocks and the highest in and around water and wetlands
- (xxvii) All amphibians are insect eaters and are found in moist areas along nallah, river and reservoir banks, in paddy fields, under litter in forests and in gardens. *Tomopterna breviceps* likes to burrow itself in wet soils or below litter, *Rana tigerina* (the Bull frog) prefers to stay in grass or hollows of large waterbodies, *Rana cyanophlyctis* has preference for stagnant water bodies, *Rana limnocharis*, though found in all ponds etc. seeks shelter amongst vegetation, stones and rocks on river banks, and *Microhyla ornata* is found more at home on moist earth with grass and creepers feeding on ants and small insects. *Polypedatus maculatus* is an arboreal frog while *Bufo melanostictus* and *Bufo microtympanum* are nocturnal in habits, and great insect feeders
- (xxviii) The submersion of a large area and the consequent increase in humidity and soil moisture, leading to lush vegetation around river banks and adjoining areas would provide good habitat for amphibia. So would canals, water courses and channels. Increased cropping intensities would also provide enough insect food to support better breeding success and stable amphibia populations. The formation of a few islands in the reservoir would result in a higher percentage of metamorphosis and better colonisation prospects therein for the adults of the species. It would also sustain reptiles which feed on them
- (xxix) Clear felling of forests will initially largely deplete the amphibian's valuable food (insects) which may not survive exposure to scorching sun and desiccation. The frogs and toads being slow and defenceless may perish in large numbers while escaping and/or killed by man or eaten by snakes. Frogs like *Polypedatus maculatus*, *Microhyla ornata* and *Tomopterna breviceps* which do not habitually live in water, would find it difficult to escape or survive desiccation caused by deforestation.
- (xxx) Such of the species as live in the shallow streams or nallahs draining into the Narmada or the reservoir would be able to move up along the streams during inundation and establish their niches. The toad species, tree frogs, narrow mouthed frogs and burrowing frogs shall, however, be confronted with submergence leading to a total change of their habitat. The reproduction of some species like tree frogs is likely to be adversely affected as they may not find submerged vegetation for anchoring their eggs, till the formation of the lake (after clear felling) and the establishment of marginal flora.

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- (xxxi) There are, however, no rare or endangered species of amphibia in the proposed submergence area though a number of different species may perish in the interregnum. The assured availability of water after sometime would eventually lead to a natural population build up to the amphibia and there is no need of any translocation or rehabilitation measures being resorted to for saving any particular species.
- (xxxii) It may, however, be necessary to take some measures for the conservation of amphibia and reptilia in the area. For amphibia, it is recommended that the margins of the reservoir be planted with water plants or plants which can stand inundation for long as it would help in conserving a large diversity of fauna therein. Annual draw-downs may be helpful for the littoral species of amphibia as such areas may turn into ideal shallow lagoons and/or marshy habitats for the amphibia as demonstrated by Mulla, Periyar, Pampadum and Idukki reservoirs.
- (xxxiii) Dry habitats in sanctuaries have their own complement of amphibian fauna which need not be disturbed, for accommodating the wet area amphibia. However, the wet, marshy and water-logged areas, if any, should not be allowed to be dumped unless absolutely essential or economic otherwise.
- (xxxiv) As for reptilia, it may be desirable to trap and translocate some of the rock lizards and ant-hills from the submergence area. It would also be necessary to ban night traffic on the forest section of the 25 metre wide highway being constructed for linking Punalur with Bhopal, prohibit workers going into the jungle for collection of fuelwood, prohibit use of bright lights at work-sites or on road (as they attract snakes to eat amphibia, which may themselves be attracted to eat insects attracted by such lights and get killed by man or speeding vehicles), instruct workmen not to kill snakes, lizards or other fauna but to shoo them away from the worksites or camp sites, discourage mining or removal of stones etc. on either side of the roads (as they very often serve as niches for lesser reptiles and arthropods vital to the food chain of reptilian and amphibian fauna), fencing, with wire mesh, both sides of the road for preventing encroachment/poaching in the forest areas, strictly avoiding misuse of dynamite sticks at the dam site and keeping adequate stock of anti-venom serum drugs in nearby hospitals and dispensaries for the treatment of cases of snake bite which are not uncommon in works in forest areas. These precautions need also be taken on haulage roads nos 4, 6, and 7 and all haulage roads should be closed after the works are over in the interest of conservation of flora and fauna.

- (xxxv) While cutting, dumping, quarrying or mining stones care should be taken to see that no reptiles get crushed, buried or killed in such manoeuvres and that no removals result in soil erosion.
- (xxxvi) While sand mining, crocodile or turtle eggs/nests, if found, should either not be disturbed or carefully removed to safer sandy areas on the river bank. The nesting season is February to June.
- (xxxvii) The proposed NVDA colony which happens to be in the middle of the proposed fauna migration corridor of the southern submergence zone leading to Punasa Range reserved forest should be located elsewhere, preferably to the south of Punasa town.
- (xxxviii) Pollution of river upstream should be monitored so that potability of water is not affected, and the sequence of fellings needs be so engineered that it induces natural movement of the affected wildlife to the pre-conceived receiving areas.
- (xxxix) Construction of small check-dams at suitable intervals on the nalas in the non-submergence zone would help the migrating fauna to settle down on the banks thereof and around. These could also serve the purpose of silt traps.
- (xL) If rock lizards and ground lizards, found in the vertical rocky face zone of the submergence are not found in the non-submergence area, attempts should be made to translocate a few specimen of such reptilian fauna from such vertical rocky zones to vertical rocky face areas of non-submersion area which should better be identified right now.
- (xLi) Small sanctuaries for the lacertilians like lizards, geckos, amphibia and smaller animals can be created in areas where big trees and water pools are found among clusters of big rocks in the volcanic trap belt of the non-submersion area.
- (xLii) Bigger ant-hills which serve as niches for a variety of lizards, snakes, termites etc should be carefully translocated alongwith their reptilian population in the non-submersion area.
- (xLiii) FONS believe that there does not appear to be any justification for provision of fish ladders, migration corridors and underground tunnels between the four successive dams on the Narmada for genetic exchange as recommended by the Madras Snake Park Trust.
- (xLiv) It would be essential to prevent the entry of the domestic animals and inhabitants of Dam colonies and others into reserved forest for anything.
- (xLv) Exotic flora which are not found in the submergence/non- submergence area upstream of Indirasagar should not be propagated in the region. However, while doing plantation

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in the area the species of under-storey and undergrowth should also be planted so that a forest is created and not a plantation alone.

- (xLvi) It would be worthwhile educating the people in the villages, NVDA colonies, the workers of the area and school children about the utility of reptiles and the manner of rendering first aid in case of snake-bite etc.
- (xLvii) It would be essential to set up a full scale Biological and Ecological Research Centre, preferably in new Punasa. This station could take up various studies for the three downstream reservoirs as well.

Chapter VI : Impact of Indirasagar Submergence on Aquatic Fauna

- (i) The river Narmada falls from 1051 metres, at its origin, to 75 metres at the point it leaves M.P. thus registering a fall of 975 metres over a distance of 1079 km within the State of its origin itself forming several rapids/falls and a number of large pools providing niches to fish and other aquatic fauna. The river's several tributaries (15 principal ones joining on the left bank and 11 on the right upstream of Indira Sagar) also afford shelter to a large variety of aquatic fauna. There are also 39 main rivulets joining it upto the same point, as listed in para 6.1.3, and 9 main water pools as listed in para 6.1.4, providing habitats to fish.
- (ii) The M.P. Pollution Prevention Board's studies of the quality of water at four points in the Narmada, including two upstream of Indira Sagar in Hoshabgabad district, have shown that judged by the important parameters of pH, dissolved oxygen content, temperature and so on it is generally within acceptable limits for the survival of fish and other aquatic fauna.
- (iii) Potability of water can, however, be judged only on conducting bacteriological tests from time to time especially at points immediately past such areas where industrial effluents, sewage and organic wastes are discharged into the river. The findings of the limnological studies, being got done by NVDA, may be helpful in this regard.
- (iv) During floods which are quite heavy in the Narmada, lots of weeds (which increase possibilities of eutrophication) are washed into the sea. Proliferation of aquatic vegetation has to be avoided for promoting healthy pisciculture in any water-body.
- (v) Weeds commonly found along the banks of the river are *Ceratophyllum*, *Najas*, *Hydrilla*, *Chara* and *Vallisneria*. According to a CIFRI study conducted in 1964 at Sisodra, plankton concentration of 0.06 to 1.14 (numbers) per litre was found in the river.

which is much lower than that recorded for the Cauvery and the Ganga (at Allahabad). Pande and Tuli feel that lower production of fish in the Narmada (0.364 tonnes/km) as compared to that in the Ganga (0.7 tonnes to 1.463 tonnes/km) or Yamuna (0.643 tonnes/km) or in Govavari (1.125 tonnes/km) can be correlated to some extent to low plankton count in the river. However the Indirasagar reservoir would have no problem of eutrophication and the quality of its water and availability of food would be conducive to pisciculture.

- (vi) The number of fish species found in the river varies according to different studies. The State Directorate of Fisheries has identified 46 species of fish belonging to 14 families in the Narmada flowing through M.P. (1967-71), while Pande and Tuli have identified 24 species belonging to 7 families in 84 km from Nemavar to Dhardighat (of which 66 km would come in Indira Sagar submergence). 13 of these species belonged to Cyprinidae family dominant in the whole of the Narmada.
- (vii) Out of 37 species of fish listed as predatory in India, 24 were reported in the Narmada by the CIFRI while Pande and Tuli identified 10 in their limited study referred to above.
- (viii) No particular species of fish found in the Narmada has, however been reported to have become extinct in the river. Some fish found in the lower reaches are, however, not found in the upper reaches.
- (ix) An over-all decline in large-sized commercially important fish in the area has been reported and experienced by the catching of larger number of smaller sized, but lower in weight, important fish resulting in a decline in adult breedable stock of those species. It focusses on and under-scores the need for better fish management.
- (x) The fishes found in the Narmada, which grow upto 250 mm or less can be classified as falling in the categories of weed fish forage fish and larvicidal fish. These have been listed category wise in para 6.4.3 These fishes are neither economically important nor have any importances as food fishes in fresh condition.
- (xi) Mahseer is considered to be next only to trout as the top sport fish. Out of the six species of Mahseer found in India presence of *Tor putitora*, *Tor tor* and *Tor khudree* has been registered in the Narmada waters. A decline in the availability of Mahseer in the Narmada has to be viewed with concern. The Directorate of Fisheries, M.P. attribute the fall in the natural stock of important fish including Mahseer to increasing fishing pressure for food by tribals and the local population (which generally goes unrecorded) and wanton killings by dynamiting. However efforts are being made to set up Mahseer

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hatchery in Sukta reservoir as techniques for hatchery-bred production of Mahseer have been developed by the scientists.

- (xii) Even though Mahseer breeds during July to December by ascending upstream in shallow running waters in areas where river bed is strewn with clean pebbles and gravel or has a rocky surface, it has been established from the observations in Tawa, Bargi and Sukta reservoirs on the tributaries of the Narmada, that the change from riverine to lacustrine environment would not affect natural breeding of Mahseer. The species is not threatened and there is a big possibility of its stock increasing in the near future.
- (xiii) The table given in para 6.4.7 broadly indicates the size and weight of various species of fish caught in the Indira Sagar catchment for commercial purposes.
- (xiv) The studies conducted by Don W. Levenhagen World Bank consultant, Pande and Tuli and EPCO, separately do not indicate threat of extinction to any existing species or any likely adverse effect on the fish fauna with the impoundment of waters in the Indira Sagar reservoir. Even though upward movement of fish from downstream of Indira Sagar would be impossible induced breeding of some varieties in the lake area and upstream cannot be ruled out as a scientific possibility.
- (xv) Pollution of water can be a threatening element to the survival of fish fauna in any water-body especially in a changed environment. However the pollutants upstream have been found to get diluted to the extent of becoming harmless and the steps being taken by NVDA to contain pollution of the river and the flooding of the reservoir in the rainy season coupled with regular release of water therefrom would help in keeping the reservoir fit for fish culture.
- (xvi) Other things remaining the same a change in environment if not wholly inimical would not be unfavourable to the breeding of fish and survival of the young ones largely because of the survival instinct in fish through gradual adaptation and acclimatisation to changed environment.
- (xvii) The Zoological Survey of India have listed (1981) only 2 varieties of fish viz. *Aborichthys kempfi* and *Enobarbichthys maculata* as rare and endangered in India. None of these two varieties is found in the Narmada waters.
- (xviii) The State's Directorate of Fisheries have experienced in Gandhisagar and Tawa reservoir that fish production per hectare of water area of reservoir can be increased manifold with proper breeding, stocking and fishing management and Indirasagar has no reason

to being as exception to it. Properly handled, fish farming in the Indirasagar also can be a viable commercial proposition.

- (xbx) An important factor in fish management would be to ensure that there is an acceptable balance between predatory and non- predatory species in the reservoir though existence of predatory fish in the reservoir is essential for checking undesirable increase in the population of weed-fish which compete for food with fishes which are planktivorous and because the weed fish multiply fast claiming larger share of the available food than fish having higher commercial value.
- (xx) It has been observed that carnivorous fishes (including predatory ones) have shown compatible existence with other species. Major carps (Cyprinidae family) have averaged 74.1% in the fish catches in Gandhisagar (during 1979-80 to 1985-86) and the experience in Tawa reservoir has been more or less identical. A similar situation can be anticipated in Indirasagar reservoir and the composition of fish population can be manipulated to achieve 70% major carp. This would require heavy and continued stocking since the production may be nearly proportional to the stocking rate.
- (xxi) With the formation of the lake the existing lotic conditions would yield place to lentic environment. 5481 ha of the river area is going to get enlarged to 91,348 ha and bring about a lot of change in the habitat conditions. It may lead to:
 - (a) a reduction in the fish fauna of the rapids which are mostly uneconomic varieties e.g. *Garra gotyla*, *Neemacheilus botia*, *Garra mullya* though possibilities of their getting re-established would be there; and
 - (b) creation of deep and shallow lentic zones would create more secure areas for the fish and for their natural propagation. The draw-down between FRL and MDDL will affect 65,000 ha (ie. 71.57%) of the water spread at FRL) and below the MDDL there would be a permanent deep pool of 25,820 h. From the fisheries point of view this 65,000 ha of draw-down zone would be significant. 28.46% of the draw-down level area would play a major role in the development of aquatic vegetation weed fish and aquatic insects and molluscan fauna.
- (xxii) Weed fish like *Danio spp.*, *Esomus danrica*, *Rasbora daniconius*, *Puntius spp.* and *Chela laubuca* etc. are likely to proliferate in weedy areas and fishes like *Labeo rohita* and Mahseer are however expected to check the excessive growth of aquatic vegetation and snails.

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(xxiii) Since the designed annual draw-down between FRL and MDDL in Indirasagar is reportedly 18.89 metres, there may be little scope for the onslaught of aquatic vegetation as similarly observed in the Tawa reservoir and the Gandhisagar reservoir.

(xxiv) Based on the experience of Tawa and Gandhisagar reservoirs, it can also be anticipated that there may not be much nuisance of floating vegetation in the Indira Sagar.

(xxv) The planned draw-down between FRL and MDDL in the Indira Sagar reservoir (18.89m) is such as would afford little chances for the proliferation of molluscs in the reservoir.

This would be in conformity with the observations in Tawa and Gandhisagar reservoirs. Need for keeping a regular watch on molluscs in the reservoir would however always be there, as these are vectors of some problem diseases.

~~(xxvi) The small-sized fishes do not appear in the commercial catches and are generally~~ netted on a small scale for local consumption. Hilsa basically an estuarine fish is not found even upstream of M.P. border in the River. Though small-sized shrimps are caught large-sized prawns do not seem to occur in the river above the Dharighat fall. Crocodiles are reported to be present in the deep pool below the Dharighat fall.

(xxvii) Out of the 24 species of fishes identified by Pande and Tuli, 13 were Carps, 7 cat-fishes, 2 murrels, and feather-back and spring eel one each. *Labeo limbriatus* (Narmada Rohu) *Tor tor* (Mahseer) and *Rita pavementata* (Gegra catfish) are the dominant and also the most typical species of riverine fishes in the Narmada.

(xxviii) Experience of reservoirs like Gandhisagar, Tawa and Sukta shows that most of the original fish fauna of the river not only survives but also breeds well in the reservoirs. Carps – both indigenous and exotic – have demonstrated their in-built capability of adapting to new environment. The experience pertaining to Silver carp (Deoli farm to Gobindsagar in H.P.) also confirms it.

(xxix) It can be safely inferred that not only carps but also other riverine fishes of the Narmada, whether commercially important or not, will continue to breed in the new lake environment as they do now. The lotic zones acting as breeding grounds and the lentic zone as nurseries for growth of fish can be safely presumed for the Indirasagar reservoir as well.

(xxx) Mahseer is being netted regularly in the Tawa reservoir where no stocking of Mahseer had ever been done and stocking of Mahseer fingerlings and fry (collected at Hoshangabad,

Nemawar, Maheshwar and Khalghat) in various tanks and reservoirs of the State of breeding (e.g. in Gandhisagar, Tawa, Govindgarh (Rewa) and Sarodnagar (Rajnandgaon) reservoirs etc.) clearly establishes its potential for development as a reservoir fishery.

- (xxxi) Kat Rohu or Narmada Rohu (*Labeo frimbriatus*) has been found to spawn profusely in an eight kilometre U-shaped cut-off portion of the river known as Boorthi Narmada and to survive on whatever phytoplanktonic organisms are available at the bottom of the river or pockets of shallow marginal areas. Its capability to adapt to changed environment make it a potential reservoir fish which can breed during floods.
- (xxxii) Though *Ompok bimaculatus* (the Butter fish) can be developed as a reservoir fish, it is not recommended for being stocked in Indirasagar because of its not being of commercial significance and its being highly predatory.
- (xxxiii) *Mystus aor*, locally known as Singhar, of the cat fish group (which are highly predacious and carnivorous) is reported to have well adapted to the lacustrine conditions in Bhavanisagar and Nagarjunsagar reservoirs (where their productivity has shown improvement with the age of the reservoir) can also be expected to establish and grow in Indirasagar as well.
- (xxxiv) Four species of murrels of Channidae family viz., *Channa gachua*, *C. punctatus*, *C. striatus* and *C. marulius*, all omnivorous and cannibalistic, are found in the Narmada of which the former two are found mostly in stagnant water pools, tanks or shallow waters where hydrostatic pressure is less or little and the latter two are found in deeper waters of the lakes and river. Since murrels are considered valuable and delicious food these can be developed as a reservoir fish with commercial promise.
- (xxxv) *Labeo boggut*, *Puntius sarana* and *Cirrhinna reba* which also can thrive well as tank and reservoir fishes are not recommended for culture in Indirasagar as they have limited food and economic value. Other Narmada water fishes of low value which can be stocked in the reservoir are *Barilius bendelis*, var. chedra, *Barilius barila*, *Barilius evezardi* and *Barilius radiolatus*.
- (xxxvi) Prawns of smaller size are found in M.P. and in the Narmada. *Macrobrachium lamarrei* has also been found in Sami and Barna reservoirs. *Caridina weberi sumatrensis* and *Caridina rajdhari* in Kolar reservoir. *Macrobrachium dayanum*, a large growing species locally available and economically important has potential of culture in Indirasagar because of its properties such as hardiness early maturation short interbreeding period, fairly

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good fecundity, totally abbreviated development, high percentage of survival and adaptability to wide range of environment. Cultural management of *Macrobrachium lamarrei lamarrei*, *Macrobrachium sankollii* and *Macrobrachium kistensis* is also possible and can be advantageously explored.

(xxxvii) Induced breeding of Hilsa and its establishment in Vallabhsagar reservoir (Ukai lake) and induced breeding of Mahseer (*Tor tor* and *Tor khudree*) has also been successfully done in Lonavala and of *Tor putitora* in Bhimtal. Scientific management and induced breeding would indeed be very helpful in faster multiplication of Mahseer's stock both in the river and Indirasagar.

(xxxviii) *Labeo fimbriatus* (kat Rohu) can also be induced bred for obtaining its seed for stocking. Crossing of *Labeo fimbriatus* females with *Cyprinus carpio* males has also been successfully done and their hybrids successfully reared upto the fingerling stage at Bombay and Hyderabad thus opening new areas of reservoir pisciculture.

(xxxix) *Ompok bimaculatus* (the Butter fish) and *Wallago attu*, both catfishes of Siluridae family, can be induced bred but the former does not hold any promise of achieving commercial viability while the latter, *Wallago attu*, has the potential of commercial seed production and culture technology but because of its predacious and cannibalistic tendencies its population in any fishing area may have to be very carefully monitored.

(xL) Riverine fish breeding activity is likely to be more successful and marked on the southern flank of the river because greater and flatter area will be under submergence on that flank. The fish can move upstream for breeding right upto Hoshangabad and even beyond upto Bargi Dam (almost 400 km away from the submergence area). Fourteen species of fish breeding in the submergence area have been listed in para 6.10.1 and the main tributaries of the Narmada to which riverine fishes can be expected to migrate for breeding have been indicated separately for north and south banks in para 6.10.2.

(xLi) The marginal areas of the reservoir submergence would also provide good breeding areas for the fishes and would hopefully be so used. Since fishes of the Narmada, especially those of commercial importance, are largely non-migratory or resident or local migratory (as listed in para 6.10.3) they are expected to themselves find environment conducive to their breeding activity.

(xLii) Long distance migratory fishes are found in Narmada waters downstream of Sardarsarovar Dam-site. These are Hilsa (anadromous) and eel (catadromous). The Sardarsarovar

would become a permanent man-made barrier for these migratory species for entry in M.P.

- (xLiii) FONS does not think that construction of fish-passes for allowing fish from downstream Indirasagar to travel upstream for breeding etc. would at all be helpful. It has shown no promise in Dehri-on-Sone and Ropar (Punjab) nor the fish locks in Farrakka Barrage. It would be far more beneficial instead to do fish farming in the Omkareshwar, Maheshwar, Indirasagar and Sardar Sarovar reservoirs separately.
- (xLiv) Since four dams are to be constructed on the Narmada down stream of Hoshangabad, whose lakes would be largely formed in M.P, downstream fishery in the Narmada is not likely to be adversely affected in Madhya Pradesh. It would on the other hand afford good opportunity for better fish production and management and provide much enlarged breeding area. The seasonal peak production of fish in rains will yield place to round the year sustained production of a much higher level than in the original stream. The experience of Gandhi Sagar (55,194ha) and Ranapratapsagar (20,000ha) reservoirs in M.P. and Rajasthan respectively has clearly established increasingly higher fish yields (per hectare of water area) from year to year because of availability of larger volume and continuous stretches of water than in the river earlier. Experience of Indirasagar is not likely to be different.
- (xLv) There will be no peak flow channel scouring and ground water recharge around Indirasagar complex and downstream will be much better. Flushing effect of floods may be reduced but siltation and benthic conditions in the reservoir would provide good food for some carnivorous fish, larvae and fingerlings.
- (xLvi) There is a possibility of introducing Hilsa and Silver carp in Indirasagar with success as seen earlier.
- (xLvii) Recent and past experiences indicate that there need not be any apprehension of an adverse effect on fishery in Indirasagar. Not only the fish production in the M.P zone of the Narmada may go up from 1200 tonnes to 2750 tonnes per annum on full development of fishery in Indirasagar but there may also be an upsurge in the fish production in the river and its tributaries upstream.
- (xLviii) For achieving various objectives a few pre-impoundment studies and works would need to be taken up e.g. area for commercial net fishing will have to be demarcated for clearance shore lines at different reservoir levels (especially in June, July, August and

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September) will have to be ascertained for following the fish, to their new breeding areas for collection of spawn etc. limnological and detailed flora studies in the river and its tributaries would have to be taken, planned cultural management of fishing, setting up of hatcheries and training of fishermen and fishery personnel would have to be done; besides, preparation of fish landing sites and refrigeration facilities will have to be developed and total ban on dynamiting for killing fish would have to be imposed.

- (xLix) FONS is not suggesting establishment of any Fish Sanctuaries at this stage but the idea can be explored after studying in detail the movement of fish from the reservoir to river during the monsoon periods for sometime. The water areas of Narmada National Park and Omkareshwar Sanctuary will act as fish sanctuary also.
- (L) Closure of an area of 500 metres upstream and downstream of the Dam-site to fishing may be seriously considered for reasons of security, as easy fishing in such areas would result in quicker elimination of stocks which may grievously affect the development of fisheries in the area.
- (Li) Setting up of three modern fish hatcheries around the reservoir for controlled breeding of different varieties of fish-one of these may be exclusively for Mahseer and other Narmada fish, the other for Catla, Rohu, Mrigal and other exotic carps and the third for the propagation of freshwater giant prawns.
- (Lii) In addition to the modern hatcheries, breeding and rearing facilities would need to be created at suitable locations on the periphery of the reservoir for augmenting the supply of fish seed.

Chapter VII : Impact Of Indirasagar Submergence On Avifauna

- (i) Avifauna are an important constituent of any ecosystem and an important link in the food chain.
- (ii) The Narmada Valley and its forests have been fairly well known for the rich and wide variety of its birds. The valley's climatological, ecological and environmental factors, humidity, vegetation and insect population etc. have influenced the composition, size and migratory habits of the avifauna of the area.
- (iii) There is no authentic list of avifauna species found in E. Nimar, Dewas and Hoshangabad districts in the valley but it may not be very much off the mark to presume that many of the 308 species of avifauna listed by Hewetson in 1955 for the state of M.P. can

be found in the area in varying numbers. FONS study over a period of 3 years has confirmed sighting of 191 species belonging to 51 families.

- (iv) It may be noted from the details given in para 7.2.1 that 126 species of birds found in the study area are resident, 31 local migrants, 25 are commonly found bird species 70 are found only occasionally and 25 are rather uncommon in the study area. 25 of these are herbivorous/vegetarians and the remaining 166 are carnivorous/omnivorous.
- (v) The very fact that as many as 166 species of the birds found in the area coming under submergence are carnivorous with feeding choices ranging from small insects, termites to spiders, mice, reptiles snakes and small mammals indicates the vital role the avifauna have been playing and can play in containing the mice, rodents termites and insect populations which could be very damaging to any agricultural or forest ecosystem.
- (vi) An ecological balance exists in the area with a complete food chain for all species of birds including the predator birds and also those which feed on carrion and keep the environment clean. However any temporary imbalance in the area's ecology caused by submergence is likely to get naturally corrected in a short period provided man himself does not become a further imbalancing agent.
- (vii) No attempt to estimate the numbers of the different species of birds in the submergence area was made because of the obvious inherent and insurmountable difficulties in such countings.
- (viii) Species are generally threatened with extinction or becoming rare when their reproduction rate falls below the rate of their elimination by natural deaths, epidemics, forest fires, killings by man and the species predators. Environmental changes over a long period which deprive them of their habitats or sudden environmental changes that may be caused or brought about by human activity (such as a nuclear war) can also threaten a species.
- (ix) Though there are no known species of birds which have become extinct in the Narmada Valley in the recent past, the following find a place in the list of birds likely to become rare endangered and threatened prepared by GOI for coverage under CITES: Peregrine falcons; Shaheen falcons; Great Indian bustard; Rose-ringed parakeet; Blue-breasted quail and Painted bush quail.
- (x) Spoonbills Comb-ducks Grey jungle fowls and Indian Pittas have also been listed amongst those likely to get rare or endangered if timely regulatory action is not taken for their

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protection. Infact locally the Grey jungle fowl is extinct as not sighted by us as well as the W.I.I team.

- (xi) It can be safely aserted that none of the avi-fauna species would be threatened in the area only because of Indirasagar submergence.
- (xii) There are no bird species endemic to the study area. The movement of local migrants either-ways has been noticed as being restricted to generally six species viz., paradise flycatcher, pitta, golden oriole, southern blackbird, yellow-throated sparrow and pied crested cuckoo. The movement is usually for food rather than for reproduction though there is a general thinning of the bird population in the area during monsoon.
- (xiii) some birds like crows, sparrows, parrots, Indian Robin, larks, pitpits, doves, common swift, bank mynahs, babblers, bee-eaters and drongos do not generally migrate.
- (xiv) Roosting of migratory birds with local migrants like swallows and wagtails in reed-beds has however been observed.
- (xv) Bird life in the submergence area would be affected to the extent that they would be shifting to new areas on the mainland or on the islands and would be temporarily deprived of the varieties of insects etc. on which they had been feeding hitherto in the forest and cultivated land being lost to submergence. However the changes due to multiple cropping in areas to come under irrigation or in the islands due to increased moisture and growth of new plants there are likely to cause a spurt in the insect population and that of rats etc. (in cultivated areas) providing enough food for the avifauna and resulting in their multiplication.
- (xvi) Terrestrial birds like peacock, partridges, quails, jungle fowls, etc. may however suffer a bit because of reduced habitats due to submergence.
- (xvii) Birds like bushquails, titars, munias, and peacock may nowever multiply in the interregnum of tree felling and inundation as the ground flora in the area would grow faster.
- (xviii) Availability of large waterbodies would enable the migrant and local-migrant birds to stay longer in the area. Near absence of grazing, lesser fires, lesser human interference would be conducive to the growth in understoreys and improvement in the availability of quality food (vegetation, insects, vermins, reptiles, fish etc.) plenty for the resident and migrant birds in the islands.

- (xix) Increased bird life in the cultivated areas may, however, pose a menace to the crops unless effectively prevented. Though birds consume insects relentlessly, and in all their stages and help in keeping the insect population in check, they also eat seeds, corn fruits, etc. and some insects like honey-bees silk worms, lac insects etc. economically beneficial to man.
- (xx) Small birds form an important link in the food chain of the birds of prey and snakes etc. and the birds of prey such as owls, kestrel hawks etc. feed on rats and are also carriers of human and animal diseases. The vultures, kites and crows serve also as scavenging birds.
- (xxi) The birds are nevertheless unwittingly helpful as flower pollinating agents and disseminators of seeds of some plants.
- (xxii) Permitting limited shooting of such birds (as are not likely to become rare or endangered or threatened with extinction) in cultivated and plantation areas in our opinion may not only help in keeping their numbers in check and in preventing economic losses caused by them but may also serve the interests of sport and partially meet the food requirements of humans. However the revised wildlife Act does not make any provision for sport hunting.
- (xxiii) As there are no flightless species of birds in the area, the question of physically translocating any species would not arise. As already stated, no avifauna species is endemic to the study area.
- (xxiv) No loss of such bird life as lay their eggs on ground under bush cover and are short distance fliers is anticipated nor is there any likelihood of their extinction as they are found in large numbers all over the State. However there is a possibility of some eggs of such species getting washed off during inundation.
- (xxv) Bigger islands can be developed as excellent bird sanctuaries affording habitats for different species including water birds which prefer lagoons with shallow waters and tall trees in the vicinity for perching. Smaller sanctuaries can also be developed on other permanent islands.
- (xxvi) Conducive habitats and environment for the migrating species can be created/manipulated by appropriate habitat management in the manner indicated in para 7.10.2 especially by providing basic facilities of food, water, shelter, all types of cover, reducing biotic interference and protection against fires etc.

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Chapter VIII : Impact of Indirasagar Project on Insect Fauna

- (i) Insects are an important component of an eco system as they form a source of energy to avifauna, amphibia, fish and reptiles which in their turn constitute sources of energy to other wildlife and even to mankind.
- (ii) Insects are found everywhere in the forests, in the cultivated areas, in waste lands and around human habitations etc
- (iii) Since the forests offer many niches, a large number of micro habitats and a great diversity of plant life, a larger number of insect species are found in the forest ecosystem as compared to the agro-ecosystem. The insects found in the agro ecosystem differ from those found under the forest ecosystem mainly because of the variations in environmental stability in the two systems.
- (iv) Clear felling of the forests may affect insect fauna adversely for a while though in the interregnum of clear felling and inundation, there is likely to be a lush growth of grasses and ground flora providing good niches for the insect fauna.
- (v) The probability of the invertebrates perishing in inundation and becoming feed of the fish, reptiles and amphibia etc. would be fairly high on clear felled areas coming under submergence. However, vertebrates like rodents, mice, rabbits, mon-goose and insects like grasshoppers, hairy caterpillars, white flies, crickets etc. escaping to non-submergence areas is probable.
- (vi) The forest likely to come under submergence has teak, anjan, salai, bija, palas trees besides understorey bushes and hedges which are infested by different species of insect fauna thriving on different parts of the trees/plants (leaf, bud, flower, stem, root, under-bark etc) without causing lasting damage or annihilating any host species. They have some sort of a symbiotic or commensalistic relationship.
- (vii) The insect menace is more acute in plantations than in natural forests as restricted species of plants restrict the diversity of insects, reduce genetic variations, eliminate competing vegetation and biotic controlling agents resulting in exposure of plantations to large scale infestation by the fewer species of insects.
- (viii) The agro-systems are also infested by insects of various descriptions, some of which are peculiar to specific crops
- (ix) There are quite a few well-known insects common to both the ecosystems e.g. grubs, cutworms, termites, crickets, grasshoppers, hairy caterpillars, jassids, gram pod borer, white flies, aphids, earhead worms, army worms etc

- (x) Insects are known to increase multifariously in mono-culture areas and new species of insects are known to crop up in new areas brought under HYV or multiple cropping or under canal irrigation etc.
- (xi) Insects are largely known to be vulnerable to environmental variations and man-induced soil and moisture conditions. Lesser direct exposure of earth to sun, continued and prolonged moisture in sub-soils, humidity in plant beds etc. help in the multiplication of many of the insect species.
- (xii) The effect of Indirasagar project on the insect fauna has to be studied in inundation and post-inundation phases.
- (xiii) In the inundation phase aquatic insects like water bugs and water beetles may be washed ashore and may multiply as well in the tributaries and nullahs joining the river/reservoir. Since they are harmless, no adverse or beneficial effect or any fluctuations in their population can be foreseen. An increase in the mosquito population can be foreseen though they may be good feed for amphibia and some fish.
- (xiv) Submergence of a limited forest area will not endanger the species of saprophagous and coprophagous insects like dung-rollers, cockchafers and termites though quite a good number there of may get perished in submergence. Defoliators and skeletonizers are also not going to be anyway affected.
- (xv) Some insects are beneficial crops and some are economically useful insects. While honeybees, dammer bees, rock-bees, little bees (*Apis indica*) are not likely to be affected by submergence as they can fly to equally good habitats, opportunities for rearing Tussar and Mulberry silkworms in the non-submergence areas getting irrigation facilities would considerably increase.
- (xvi) No complete inventory of the Lepidoptera of the submergence area has ever been made and no check-list is available either. It is, therefore, not possible to say if any of the lepidoptera species notified by the GOI as being endangered are found in the area to be inundated.
- (xvii) However, there are bright chances of some of lepidoptera species escaping from the submergence area to the islands, adjoining forest and cultivated lands and other of the species in unaffected areas surviving and breeding naturally. There does not, therefore, appear to be even a remote possibility of the extinction of these endangered species on account of the area coming under submergence.
- (xviii) Emergence of new insects and resurgence of the established ones due to micro

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and macro level changes in the ecology of the non-submergence areas coming under irrigation is possible.

- (xix) Multiple cropping in areas getting irrigation facility and taking up of high yielding crops would leave little time for the insects to get exposed to sun helping them to multiply fast. Use of fertilisers for restoring soil nutrients and of insecticides and pesticides for checking proliferation of insects and pests may in the long run harm the human, animal and bird populations.
- (xx) Many storage insects which exist in small numbers in the field record phenomenal increase in favourable micro-climates (in storage). In the post-inundation phase, storage of increased forest and agro-produce may cause an increase in the population of such insects.
- (xxi) Grass bedding of canal banks and side-walls of water courses and rains can provide niches to a large variety of insects which, may also affect the crops. However bushes and weeds around the fields also provide niches to many natural predators of several pests and insects which keep the insect population in check.
- (xxii) Judicious irrigation during vulnerable stages of the insects and slight manipulations in the sowing timings of crops can be helpful in keeping their population in check.
- (xxiii) Use of fertilisers has also to be done very carefully as unbalanced nutrition exposes the crops to the vagaries of the insects.
- (xxiv) There may be growth of insecticide resistant insects as well, as more and more insecticides are used in multi-cropped areas.
- (xxv) If avifauna is not deliberately, indiscriminately and drastically reduced, the damage by insects can be contained to a considerable extent.

Chapter IX : Ecology of Islands formed by Indirasagar Submergence and Endemism in the Flora Species

- (i) An Island ecosystem is sustained by its biotic and abiotic environment conditions. The abiotic inputs are energy and inorganic matter which determine the organisms that can sustain in the system. The biotic inputs are basically organisms living or moving in there and serving as producers and consumers. The lentic and lotic situations help evolution of ecological groups of organisms and ecological adaptations resulting in vegetation till it reaches a climax. These environmental factors condition the sustenance of fauna and their food chain. In short, it is the plants and animals in an island through which the island ecosystem works.

- (ii) With the Indirasagar reservoir filling up, as many as 97 islands are likely to be formed in the forest and 37 in non-forest areas coming under submergence.
- (iii) In the absence of any human disturbance, the faunal population of different species existing and migrating to any island would stabilise around the numbers which can find habitat and resources enough for their survival.
- (iv) A riverine island may be natural or a man-made one. The study is however restricted to the islands which would be formed by the filling up of the Indirasagar reservoir (though some such islands may get connected to the mainland when water recedes after the monsoons). These islands would become the habitat of several species of fauna and would come to have a variety of flora with an ecosystem of their own. The ecology of these islands would also have a bearing on the environmental resources upstream in the Narmada Valley.
- (v) The ecology of such new islands would be a synthesis of both the aquatic and terrestrial ecosystems with both affecting each other. In the aquatic ecosystem phytoplanktons and rooted or floating plants, (which support a variety of life) use solar energy for photosynthesis whereas in the terrestrial system the trees and plants overland use solar energy directly for photosynthesis and channel the energy to other members of the community viz., mammals ungulates, reptiles, avifauna etc..
- (vi) The islands which would get formed after submergence would vary in size. As many as 39 islands, in the forest area and 14 in the non-forest area would be in the size-group 1-5 ha, 20 and 10 respectively in the group 10-20 ha, 9 and 5 respectively in the group 20-40 ha. there would be 13 islands of more than 40 ha in size and one above 2000 ha in the forest area whereas only 4 islands in the non-forest areas would be in size-group 80-150 ha and 4 islands in the forest area and 1 in the non-forest area would be of less than 1 ha
- (vii) The size and the resources of an island have a direct relation to the flora and fauna it can support. Small islands are also unable to support animals requiring longer range or large territory. The extinction rates are low in large islands and high in small islands due to diversity in habitats and carrying capacity which is obviously lower in smaller islands. The biota of any island however reaches a point of equilibrium where the surviving population of different species is able to maintain the food chain at the optimum level. Temporary disequilibriums get restored in the long run but in the newly formed islands it takes time to reach an equilibrium though in the process quite a few immigrants get exterminated.

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- (viii) Some islands in Indirasagar submergence area are going to be small, close to each other and not far from the mainland on either side in the Narmada Valley affording possibilities of genetic exchange and migration from one island to another in periods of draw-down.
- (ix) Areas around the islands which had been green or dry would come under water on a permanent basis and the submerged over-land vegetation would come to develop an aquatic flora, weeds and planktons.
- (x) It is very difficult to even make a guess of the numbers of different species which would succeed in migrating to the islands and/or the safer areas or of those that would perish, entrapped in submergence or in their flight to safety, because of the migratory character of reptiles and some amphibians and flying capabilities of the avi-fauna. However, most of the lower groups of invertebrates (soil and litter fauna, myriapods arachnids, insects etc.) with restricted capacity of locomotion would be adversely affected by the flooding of the reservoir.
- (xi) The flooding of the reservoir would affect the flora of the islands and even the aquatic fauna in the submergence zone of the river would take time to get to and establish itself on the riverine banks of the islands. It may, to some extent, also affect the avifauna and lizards etc (which prey on aquatic fauna) during and for sometime after submergence.
- (xii) The increase in soil moisture in and around the newly created islands would result not only in lush growth of vegetation and thereby an increase in the herbivorous animal species of the ecosystem but also lead to a change of the flora species of the islands to such as can stand inundation and increased moisture regime.
- (xiii) Not only the composition of the flora species would undergo a change over some years but the faunal species also would register a consequential change in favour of those which flourish in damp and moist areas.
- (xiv) The change in the quality of water (impounded in the river) because of the sub-stratum in the submergence area would favour growth of aquatic arthropods, molluscs and tubicolous worms.
- (xv) There is no substance in the thinking that the islands will have only a short span of life commensurate with the officially calculated life of the reservoir. Barring any natural upheaval the islands would be there far far beyond the assumed project life of Indirasagar and intra-specific variations could set in, but such variations are very occasional, and only the evolutionarily hapier ones get fixed. Endemism takes thousands of years to set in.

- (xvi) Some islands may alternately have periods of submersion and drying up because of annual draw-downs. In such areas weak and soft bodied plants may not survive and some hardy species of plants firmly anchored in the bottom with the help of spreading fibrous roots and rhizomes can be expected to emerge and get established there.
- (xvii) In nature, variations in the phenotypes of various species depend largely on edaphic and climatic conditions - phenotypic variations are expressions of slight changes in the genetic make up of species.

Recommendations

- (i) FONS recommends that, barring light fires at the end of winters, all forest fires in the islands should be avoided at all cost lest they destroy fauna in the islands in large numbers directly and indirectly by reducing the food-chain.
- (ii) No exotic flora or fauna with doubtful adaptability to new islandic environment, should be introduced in the islands; nor should shifting cultivation, grazing or any human disturbance permitted therein.
- (iii) Collection of minor forest produce should be very strictly regulated in these islands so that no harm is caused by human interference to the flora or fauna in the islands. No such collection should be allowed in islands made into sanctuaries or national park.
- (iv) Break out of any epidemic or contagious diseases of animals should be promptly and very carefully checked in the islands.
- (v) Sand mining from island banks should be controlled so that nesting sites for crocodiles and turtles etc. are protected on the one hand and on the other there is no unnecessary accumulation of sand affecting the reservoir capacity.
- (vi) Stones which serve the purpose of stone pitches in critical soil erosion areas should not be allowed to be removed.
- (vii) Existing ant-hills, rocky outcrops and captive ponds on the island should not be disturbed.
- (viii) All major islands may be considered for being notified as wildlife sanctuaries and some islands could be developed as tourist spots for watching wildlife and avifana while insuring that no pollution is caused by tourists to the island's environment.
- (ix) No trees in the riparian zones and islands should be cut and more such trees as can withstand continuous flooding, e.g. *Terminalia arjuna*, should be planted around the island's banks.

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- (x) The trees in the draw-down zones may be cut 1/2 to 1 M above the ground for holding soil and for providing ecological niches for micro-fauna in water, and on land. Fons however think that natural forestry practice should continue.
- (xi) Fruit bearing trees if planted in the islands would improve the habitats for monkeys, squirrels, bears and other herbivora.
- (xii) The Research Station recommended to be set up in Punasa township should also be entrusted with the task of conducting periodical census and listing of flora and fauna in the islands, monitoring in the genetic behavioral and other changes in the island ecosystem gradually taking place, as such studies would be of immense scientific significance for the improvement of riverine/island ecology in the tropics.
- (xiii) Botanical gardens should be created as a measure of protecting the biodiversity of the area and preserving the likely to be rare species of the area.

Chapter X : Eco-development

- (i) The displacement of wildlife from the submergence area would pose two challenges to NVDA- one of the ensuring rehabilitation of displaced wildlife in as natural surrounding as possible, and secondly, that of preventing exploitation of forests, in the non-submergence area, beyond scientifically permissible limits and maintaining them in good health. Here was a case of urgent need for a total ecosystem development. FONS entrusted the study of the Ecological aspects of the project to Dr. N.P. Melkania of the Indian Institute of Forest Management, Bhopal. This study is summarized below.
- (ii) The Eco development study concerned itself with the analysis of the human use systems in the submergence influenced area(SIA) of Indiasagar, so as to plan ecodevelopment of the area, and to create better habitat for wildlife, which would be displaced and migrate to other forest areas, which are to bear an ever increasing burden of human usage and grazing. The functional relationships in the ecosystem have been identified using energy - flow analysis. On this data the ecosystem model was developed to illustrate man-animal- nature inter relationship. On basis of this model an ecodevelopment plan is suggested.
- (iii) The study realized that (i) wildlife, particularly the displaced wildlife cannot be rehabilitated sustainably in the area without peoples co-operation. (ii) the ecologic- socio-economic needs of the people of the SIA have to be catered to have their participation and support in ecosystem conservation, and (iii) the natural receiving habitat can be improved to cater to an increased population of wildlife by minimising the

anthropogenic pressure on natural forests, and reducing harvesting of the ecosystem to a sustainable level.

(iv) The results of the ecosystem analysis in brief are as follow:

- a) These human-use-systems are inhabited by forestry dependent human being. Majority are illiterate.
- b) Farming is largely marginal. Traditional biomass-based subsistence farming is in vogue. Landless people are largely labourers.
- c) The cultivated area is rainfed and will remain so being outside the command area mostly Monocropping is usual. Millets are the major crop. Agroecosystems are poor in organic matter, water and nutrient availability.
- d) The human diet is largely vegetarian. Non vegetarian food, when consumed, is locally raised, i.e. at village level.
- e) The human beings depend on natural forest and revenue land for raw materials, wood, fodder and grazing.
- f) Agriculture residues are main source of energy for cooking, followed by firewood and dung cake. A significant amount of biomass is left in forest for recycling of nutrient. FONS would like to qualify this statement. The surplus is only if local consumption is considered. The fact is that the area supplies wood needs of a far larger catchment than the study area and in fact there is no surplus in the forest.
- g) People use traditional open 'chulhas' and are not aware of energy alternatives and energy efficient devices

Suggestions:

- (v) To improve and develop the status of the human-use-system a model for ecodevelopment is suggested. The major suggestions are:
 - a) Ecodevelopment must use biophysical and cultural resources of the ecosystem and the technological packages available with development agencies. People should be made partners in this development from resource creation to resource utilization.
 - b) Development agencies must realise their complementary role in eco development.
 - c) In agro ecosystems, multipurpose trees and shrubs should form an integral component. Farm forestry and other multiple use land management systems should be emphasized.

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- d) Community based social forestry and wasteland development programmes should be implemented.
- e) Animal husbandry should be upgraded by improved breeding, animal health care and adequate fodder supply.
- f) Forestry based rural development to be practiced integrating development of fodder, water resources and energy alternatives.

Recommendations

- (vi) In keeping with these suggestions FONS recommends:
 - a) A saturation level of farm and social forestry programmes to be intensively carried out in the area, because FONS believe that wildlife cannot be preserved in isolation and in detachment from human needs from the same habitat. Even with this it is questionable whether pressures on forest would be relieved if existing nistar policies and settlements of forest encroachments continue. Nobody would like to invest in producing what government professes to give them free.
 - b) It is also important to satisfy the local people that Govt. is not merely spending for wildlife, but also for improvement of life of people. In our financial proposals, only about 13% of the expenditure (non-recurring) is on wildlife, the remaining 87% is on eco-development. Of the recurring expenses of first five years, 66% is on wildlife and 34% on ecodevelopment.
- (vii) The objective of Social and Farm forestry is to reduce the biotic and anthropogenic pressure on the forests as also to open avenues of employment, stimulate community involvement in plantations, improving ecology of the non-submergence area, providing raw materials for forest based industries, enriching wildlife habitats by diverting pressure on forests to social forestry, educating masses in fuel-saving devices and replacement of conventional sources of energy by non-conventional sources, prevention of soil erosion and further degradation of forests, providing fodder and making people more conscious of the value of trees
- (viii) The forests in non-submergence areas are hardly able to provide grazing facilities for 16 to 20 weeks in a year and are ill-equipped to handle the nistar needs of about 2.31 lakh domestic animals and 2.6 lakh people (of which about 77,000 belonging to Scheduled Tribes depend exclusively on these forests for a living). The pressure would thus keep on increasing with every increase in cattle and human population.

- (ix) It calls for an intensive and sustained extension work for the propagation of farm/social forestry and education of the people for protecting forest and pastures in their own interest and that of their posterity.
- (x) The attempts of the State Government in planting trees in all vacant lands under Van- Mahotsava programme, and introduction of Social Forestry under the Panch-Vaj and the scheme taken up with USAID assistance have not borne the desired results for lack of people's cooperation and, to some extent, lack of technical know-how in afforestation of barren lands, as also denial of funds in the long run. The survival of plants was also poor for want of care and because of official apathy. The only useful contribution of the programme, taken up with USAID, was creation of a number of decentralised nurseries for supply of plants and seedlings to the department and public for plantation.
- (xi) From 1987-88 onwards a new Social Forestry programme with 35 newly created Social Forestry Divisions was introduced in the State for subsidising individuals, groups, NGOs and institutions in setting up decentralised nurseries and for giving subsidy to the rural people for field bund plantations, Agro-forestry, Farm Forestry etc. and setting up community plantations to serve as demonstration centres. A higher rate of subsidy was offered to the small and marginal farmers as also participation in the Hitgrahi Yojana for afforestation of denuded forest areas. The Rural Labour Employment Guarantee programme introduced in the Sixth Plan (and subsequently converted into the Jawahar Rozgar Yojna in 1989) also had social forestry as one of its important components. Road-side and canal bank plantations were also taken up.
- (xii) It is a sad commentary on the general attitude towards social forestry that over a period of 25 years not even one plantation is reported to have been harvested in the State, in the interest of the farmers who planted them. It can be attributed to lack of appreciation of its benefits by the people, lack of sincerity amongst officials and above all lack of political will.
- (xiii) It has to be realised at all levels that survival of humanity through preventing environmental degradation and sustained maintenance of ecological balance is very important. If the government are firm, things can change for the better in no time but that would always need a strong political will.
- (xiv) All social forestry programmes and the like, have to be tailored to the perceived needs of the people for which micro-planning is necessary. Some compulsion, some persuasion and a lot of education of all concerned is necessary for a successful

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Forest and Wildlife policy in the area.

- (xv) FONS has identified 143 villages having direct impact on the proposed receiving areas for displaced wildlife which would need special consideration. Unit-wise these are Joga (15 villages), Bichhola (9), Domri (12), Kukdhal (9), Balri (13), Junapani (4), Balwada (4), Bhogani (6), Chandel (2), Chikdhalia (3), Ashapur (3), Selda (14), Namanpur (9), Dhansar (2), Khariya (1), Titwas (4) and Pamakhedi (4).
- (xvi) Apart from the area proposed to be taken up for plantation under compensatory afforestation, FONS recommends plantation of permanent fallow lands with the cultivators (1330 ha), field boundary plantations (8100 ha), roadside plantations (200 km), canal-side plantations (1500 ha), rail-side plantation (60 km), fringe of submergence area plantation (11,000 ha), 75% of forest fringe area (5000 ha) and river and nala banks plantations (300 km). The total area thus available shall be about (30,000 ha) for block planting and 2060 kms for roadside, canal, rail-side and nala bank plantations.
- (xvii) The choice of species for planting, and pasture development shall be governed by the objective of management, terrain and soil of the area, necessities of soil and moisture conservation and the needs of the local population. Different species soil-wise, terrain-wise and use-wise have been identified and given in paras 10.25.8.5.
- (xviii) Planting technique and species mix will be area specific and decided by executing officers.
- (xix) Availability of seedlings and plants is a pre-requisite for social forestry. These should be available from the departmental nurseries as also from the decentralised nurseries (raised under the Forest Deptt. scheme of decentralised nurseries each of not more than 10,000 seedlings) on the roadside so as to be easily approachable during the rainy season when they would be required for planting.
- (xx) The five year requirement of seedlings (including casualty replacement) has been estimated at 74.73 million or 15.0 million annual approximately.
- (xxi) Social Forestry/Farm forestry may not be able to take care of all the biotic pressure on the forests and it may be necessary to supplement the effort by non- forestry measures such as reduction in the use of wood as fuels, as raw material for furniture, or as a building materials, generation of power by use of bio- mass, human and animal wastes, finding and using substitutes for timber, recycling of waste paper for manufacture of paper etc. besides preventing illicit fellings of trees and theft of forest produce, unauthorised and excessive grazing and encroachment on forest lands etc.

- (xxii) One of the measures for checking grazing in the forests and newly planted areas is to have cattle camps for stall-feeding of cattle, their health care, use of their dung for gobar-gas and manure and genetic improvement through artificial insemination in the camps. One such camp can be set up in each of the 150 Gram panchayats in the area. The cost of such camps over 5 years is expected to be Rs. 4.75 crore but the return in terms of ecological improvement would be worth it.
- (xxiii) Bio-mass and Bio-gas plants for generation of energy can be installed in the villages where cattle camps are located with the help of M.P. Urja Vikas Nigam, M.P. Forest Development Corporation and the M.P. State Agro-Industries Development Corporation.
- (xxiv) Supply of improved portable smokless chulhas, solar-cookers and popularisation of fuel saving crematoria should be done under various subsidised schemes of the State Government.
- (xxv) Under agro and farm forestry efforts can be made to take to Tasar and mulberry plantations, growing medicinal plants, Sabai grass, Sisal and bamboo etc. for providing raw materials for industries, employment opportunities in the rural areas and for better utilisation of resources. Bee-keeping and silk-worm rearing can also be encouraged as supplementary occupations.
- (xxvi) Extension for adoption of farm forestry and education of the rural people about the utility of plantation, protection of forests, conservation of wildlife and the need for and the manner of achieving environmental improvement and ecological equilibrium through a multi-pronged approach is essential.
- (xxvii) Establishment of ecomusium, arboretum, conservation and energy parks in educational institutions, Gram sachivalays etc. can be instrumental in creating awareness about environmental protection etc.
- (xxviii) The people have also to be convinced to the extent of their themselves taking over the protection of social community forests apart from their own farm/agro-forests from cattle, fires, misuse, thefts etc. for the common good.
- (xxix) It would be highly advantageous to constitute a Forest Protection and Development Committee in each Gram Panchayat comprising of Forest officials, Gram Sarpanchas, representatives of SC & ST populations and women and youth who can play a pivotal role in the movement. These committees can be utilised also for assessing and suggesting the forest produce requirements of the population, species to be grown, areas in which to be grown, disposal of crops etc. It is only when they feel

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fully involved that social and farm forestry can take roots in the area. Such committees can be subsidised for meeting their expenses @ Rs 1500 per Gram panchayat per year.

- (xxx) It would be very helpful having a team of trained and dedicated non-officials in each Gram panchayat for manning and helping in Social/ Agro forestry in the area. Four 8 day courses for atleast 20 persons of each Gram panchayat can be organised every year so that at the end of 5 years there are atleast 100 such trained persons in each panchayat. One centre can be organised for a group of 5 Gram panchayats each. Payment of an out of pocket allowance of Rs 10 per day to each trainee would cost Rs. 12.00 lakh in 5 years.
- (xxxi) Farm/ Social Forestry should also help in soil nutrient conservation, reduction in sediment load of the rivulets, etc. and meet the energy demands of the human use systems and employment opportunity needs of the displaced wildlife and their conservation in better habitats.

Chapter XI : Management, Monitoring and Research

- (i) Effective management by objectives would be essential for the wildlife retrieval and conservation plan discussed in earlier chapters
- (ii) It would involve (a) spelling out the objectives; (b) chalking out a well co-ordinated time table of all relevant activities; (c) placing of well-trained go-getting staff at various levels; (d) removal of all bottle-necks foreseen; (e) adoption of PERT and CPM for location and identification of problem activities and areas for remedial measures; and (f) prompt attention to and satisfactory management of the problems.
- (iii) Personnel selected should be knowledgeable, good, extension workers with enlightened outlook and fully committed to the objectives
- (iv) All objectives should be sub-divided into a number of sub-objectives and placed under a responsible team
- (v) The function of the middle level functionaries would be to carefully monitor the progress in the achievement of the sub-objectives within the prescribed time-frame and to take action to remove the bottlenecks, if any
- (vi) The top level field officers have not only to monitor the progress of the middle and lower level functionaries but also to ensure that they work in perfect cohesion

to achieve their sub-objectives in time.-

- (vii) Effective reporting is essential for monitoring, constructive appraisals and action-oriented attention to the areas of concern. Use of PERT/CPM is recommended for the purpose of reviewing/monitoring.
- (viii) Adequacy of well-trained and objective oriented personnel with adequate number of vehicles for quicker mobility is essential for successful project implementation. The vacancies against sanctioned strength should be filled up early.
- (ix) An additional Forest Division for Social Forestry and Extension/Environmental education work, one Forest Division for Wildlife Conservation work in sanctuaries and national park, a Joint Director of Veterinary Services with supporting staff need to be posted in addition to the existing sanctioned strength.
- (x) The existing rules, regulations and order of the different departments of the Government should be followed by the different wings of NVDA, as having different sets of rules may create avoidable complexities and intra-departmental controversies.
- (xi) The Member (Forest & Environment), NVDA should co-ordinate and monitor all activities related to wildlife retrieval and conservation and reduction of biotic and anthropogenic pressure on the forests.
- (xii) A standing committee of the three Conservators of Forests posted to NVDA should be formed with the Conservator posted at the headquarters (who may preferably be the senior-most amongst the three) as convener. This committee should meet more frequently, atleast once on a fixed date every month for reviewing progress of plantations, social forestry, wildlife migration, island ecology etc., identifying areas of concern and deciding and taking appropriate action.
- (xiii) It is by working jointly and in close coordination with each other (intra-departmentally and inter-departmentally) that the tasks can be accomplished.
- (xiv) A more sophisticated Management Information System needs to be introduced for effective two-way communication of problems and decisions thereon.
- (xv) Use of computers by the Monitoring Cell of Forest and Environment wing of NVDA for processing of data is strongly recommended.
- (xvi) It should be ensured that essential activities at all levels are continued and do not suffer because of the large number of holidays declared by the Government and those

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enjoyed by the officials otherwise (though authorisedly)

- (xvii) The international community is watching how India handles the Indirasagar Project which has acquired quite a lot of sensitivity in the face of opposition of environmental activists. It is necessary, therefore, for the State Government to set up a Surveillance Cell at the State Government level itself under the Chairmanship of the Chief Secretary, with Home Secretary, Forest Secretary, Revenue Secretary and Vice-Chairman NVDA as members for over-seeing that no section of the affected population suffers from undue hardship and all reasonable demands, genuine complaints and difficulties are looked into at the appropriate level promptly and sympathetically and that political considerations do not outweigh the public interest.
- (xviii) The NVDA should utilise the services of third parties like Economists and Evaluation Experts, Non-Governmental or Voluntary organisations etc. for getting an outside and independent view of the success of the project and its impact on the State's economy etc.
- (xix) A centre for Coordinated Research should be set up in the project area by NVDA for continuing Studies and Research on the Anthropological, Zoological, Botanical, Limnological, Geological, Meteorological, Ecological, Environmental, Demographic and other related aspects of the project with special reference to the genetic and behavioural changes taking place in the area because of the project.

Chapter XII : Organisation, Administration and Cost Estimates

- (i) The existing administrative set-up would need to be suitably augmented besides setting up an institution for continuing research on multiple problems related to the flora and fauna in the area.
- (ii) The expenditure estimates given in the chapter are on 1990-91 prices and may have to be revised in the light of the wages and prices prevailing at the time of implementing the works etc.
- (iii) The estimated expenditure on various recommendations made in chapter IV to XI would be as given in the Table 12.1

Table 12.1

Item		Non-recurring on works building, equipments etc. (Rs. in Lakhs)	Recurring (Rs in Lakhs) (Five years)
(i)	Wildlife retrieval and conservation, Park, Sancturaries etc.	700.00	625.00
(ii)	Reptilia Development	50.00	55.00
(iii)	Fisheries Development	300.00	130.00
(iv)	Social Forestry, Extension and Energy Saving measures	144.00	6756.00
(v)	Veterinary Cell	12.00	40.00
(vi)	Coordinated Research	500.00	250.00
Total		1706.00	7856.00

The total estimated expenditure over a period of five years would thus be Rs. 9562.00 lakhs or say Rs. 96.00 Crores

ORGANISATION, ADMINISTRATION

AND

COST ESTIMATES

Organisation, Administration and Cost estimates

12.1 General :

As has been stated earlier in Chapter XI, Indirasagar has become a rather sensitive project and the eyes of the international community are focussed on India's efforts in its implementation while meeting the challenges of the environmental and anti-high-rise-dam activists at home and abroad, rehabilitating the submergence oustees in the most eclectical manner ever and ensuring that the project also adequately compensates the likely damage to the ecosystem. The world Bank which is a potential aid agency for the Indirasagar dam construction project, is also taking no chances and has been insisting on several studies and measures based thereon, being undertaken by Narmada Valley Development Authority in respect of various environmental and rehabilitation issues, as a pre-requisite for their considering the project for financial assistance. The present wildlife retrieval and conservation study (being one of them), conducted by FONS, has revealed that several steps would need to be taken for the Submergence Impact Area (SIA). The existing administrative set-up would also need to be suitably augmented besides setting up an institution for continuing research on multiple problems related to the flora and fauna in the area. The cost of organisational strengthening and various measures recommended in Chapters IV to XI earlier have been indicated in this Chapter. It may be added that these estimates are approximate and based on 1990-91 prices and may need upward revision on the basis of wages and prices prevailing during implementation.

12.2 Wildlife Retrieval and Conservation :

12.2.1 Broadly the works proposed for wildlife retrieval and conservation in the receiving areas in Chapter IV are as follows :

- (i) enrichment plantings in receiving habitats in Category I areas and provision of water sources by small nala bundings;
- (ii) establishment of Surmánya and Omkareshwar Sanctuaries in Dewas and Khandwa Forest Divisions;
- (iii) establishment of Narmada National Park in Dewas and Khandwa Forest Divisions;
- (iv) development of three shallow water swamps for bird sanctuary and aquatic fauna and flora.
- (v) plantations in islands of ten ha and more in area emerging in revenue land;
- (vi) provision of woven mesh fencing on islands at entry points, formed during drawdown period to prohibit entry of cattle in islands. approximate length 5 Kms;

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- (vii) fencing and special protection of isolated forest patches over FRL, difficult to be managed and protected for use as fodder production areas;
- (viii) construction of three stop dams on Chhahin Nala, Machak River and Rugarani Nala;
- (ix) fencing and creation of corridor for movement of wildlife across Punasa-Narmadanagar road, approximate length 2 Kms ;
- (x) fencing and creation of corridor over Punasa tunnel for movement of wildlife between unit No.8 Bhogani and 9 Chandel, approximate length 2 Kms; and
- (xi) creation of aquatic reptile hatchery and rearing facilities and creation of aquatic mammal breeding centre for otter. Starting of fish hatchery will be done by the Fisheries Department for which NVDA have mounted another project, and ours is only a rough projection.

12.2.2 The works at serial Nos (i) and (v) in para 12.2.1 above, are proposed to be carried out by the existing NVDA staff for compensatory afforestation hence no additional expenditure will be required for their implementation. Fencing, protection and management of isolated patches falling under Category II are also proposed to be got done by the same personnel of NVDA unless the Forest Department decides to do it itself. For the remaining works, it is proposed to create one forest division to be manned by a wildlife trained officer assisted by at least three Assistant Conservator of Forests for sanctuaries and staff as per existing norms. This forest division would work under the NVDA until the project is completed and thereafter the Chief Wildlife Warden can take it over, if necessary. In any case, management guidance by the Chief Wildlife Warden, Madhya Pradesh will be essential at all stages, as he is the statutory authority for management of all wildlife within the state.

12.2.3 As regards the proposed research wing, it should be managed by the Wildlife Division, but with regular contact and guidance from the Wildlife Research Institute of India, Dehradun (U.P) and other expert bodies of the related/asociated disciplines.

12.2.4 The estimated expenditure on the measures suggested in 12.2.1 is as follows :-

Non-Recurring Expenditure :

S.NO.	Particulars	Qty	Rate Rs. in Lakhs	Amount Rs. in lakhs
(1)	Equipment			
(i)	Tractor and trolly	3	1.66	5.00
ii)	Jeep	3	1.75	5.25
(iii)	Jeep trolly	1	0.25	0.25

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(iv)	Motor boat	1	3.50	3.50
(v)	Rowing boat (for transport of labour)	2	1.00	2.00
(vi)	Survey and drawing instruments		L.S.	1.00
(vii)	Tools and plants		L.S.	1.00
			Total (1)	<u>18.00</u>

(2) Buildings :

(i)	Office for DFO Wildlife	1	10.00	10.00
(ii)	Office for Asst. Conservator of Forests	3	5.00	15.00
(iii)	Range office	6	2.00	12.00
(iv)	Residence for DFO Wildlife	1	5.00	5.00
(v)	-do- for ACF	3	4.00	12.00
(vi)	-do- for Range Officers	6	3.00	18.00
(vii)	-do- Dy. Rangers	18	2.00	36.00
(viii)	-do- other staff		L.S.	10.00
(ix)	Garage, stores, sheds etc.		L.S.	10.00
(x)	Rest houses & and inspection huts		L.S.	10.00
(xi)	Barriers		L.S.	7.00
			Total (2)	<u>145.00</u>

(3) Other office items :

(i)	Provision of computers, photocopiers, typewriters, etc.		L.S.	5.00
(ii)	Office furniture for DFO, ACFs, Range officers and other staff		L.S.	5.00
			Total (3)	<u>10.00</u>

(4) Work expenditure on Sanctuaries and National Park

(i)	Erection of watch towers in sanctuaries and national park ten number @ Rs. 1 lakh per tower	1.00	10.00
(ii)	Erection of telephone lines and electricity poles	L.S.	10.00

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(iii)	Provisions of wireless system in the national park and sanctuaries including provision of sets in vehicles	L.S.	20.00
(iv)	Construction of roads	L.S.	50.00
(v)	Provision of water-holes (stop dams, hand-pumps etc) and fire protection measures and equipment	L.S.	210.00
(vi)	Panther-proof fencing around power house in Comptt 447 of Changarh Range	L.S.	5.00
Total (4)			<u>305.00</u>

(5) Other Works:

(i)	Three dams for formation of shallow water swamps	50.00 each	150.00
(ii)	Woven mesh fencing along two corridors, one across Punasa- Dam site road and one over Punassa Tunnel 2 Km x 2 x 2 = 8 kms	2.00 Per Km	16.00
(iii)	Woven mesh fencing on entry points in Unit Nos 5 to 10-approx. 5 Km	2.00 Per Km	10.00
(iv)	Fencing in isolated forest patches falling under category II	L.S.	46.00
Total (5)			<u>222.00</u>
Total Non-Recurring Expenditure (1 to 5)			<u>700.00</u>

Recurring Expenditure

(1) Office and Establishment:

	Monthly (Rs in lakh)	Annual
(i) Pay and allowance	5.00	60.00
(ii) Office expenditure (including stationary etc)	0.20	2.40
(iii) P O L	0.15	1.80
Total (1)		<u>64.20</u>

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(2) Plantation Works (for initial five years only)

(i)	Enrichment planting in receiving areas	L.S.	15.00
(ii)	Plantation (irrigated) in corridor proposed over Punasa Tunnel	L.S.	2.00
(iii)	Plantation over Islands emerging on revenue lands (irrigation to be done wherever possible)	L.S.	2.00

Total (2)	<u>19.00</u>
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(3) Works for Sanctuaries & National Park Management:

(i)	Habitat manipulations (including works in proposed shallow water swamps)	L.S.	12.00
(ii)	Creation and maintenance of meadows and grasslands	L.S.	5.00
(iii)	Enrichment plantations	L.S.	2.00
(iv)	Maintenance of Water-holes	L.S.	1.00
(v)	Clearance & maintenance of fire lines	L.S.	5.00

Total (3)	<u>25.00</u>
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(4) Sanctuaries and National Park Maintenance Works:

(i)	Maintenance of roads	L.S.	6.00
(ii)	Maintenance of buildings	L.S.	6.00
(iii)	Maintenance of telephone, wireless equipment etc.	L.S.	2.50
(iv)	Maintenance of watch towers	L.S.	0.50
(v)	Maintenance of fencings erected on entry points	L.S.	0.50

Total (4)	<u>15.50</u>
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(5) Other Works:

(i)	Maintenance of two corridors	L.S.	0.20
(ii)	Miscellaneous	L.S.	1.30

Total (5)	<u>1.50</u>
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Total annual recurring expenditure (1) to (5)	125.20
or say	125.00

The total expenditure over a period of 5 years is estimated to be Rs 700.00 lakhs plus (125 x 5) 625.00 lakhs i.e. 1325.00

12.3 : Reptilia Development:

The proposals under Reptilia Development (Chapter V) are as under:

- (I) Creation of Snake Park at Narmadanagar as a centre for education, tourism, conservation, service and research.
- (II) Developing a Crocodile, Turtle and Tortoise breeding farm at Narmadanagar for dwindling Reptilia/ Chelomian species.

The above works will be under the technical and administrative control of D F O Wildlife. Additional staff consisting of 2 Forest Rangers @ 1 for each Park/ Farm, 4 Foresters (@ 2 each) and 8 Forest Guards (@ 4 each) would be broadly needed.

(1) Non -Recurring Expenditure: (Rs. in lakhs)

(i) Construction of Incubation chambers for the eggs of Snakes, Crocodiles, tortoise, turtles etc.	5.00
(ii) Construction of pond for crocodiles tortoise and turtles etc.	15.00
(iii) Construction of small chambers for Snakes	2.00
(iv) Buildings for Pond/Farm's offices and staff	15.00
(v) Fencing of the area	5.00
(vi) Roads and electrification	5.00
(vii) Other expenses	3.00
Total	50.00

(2) Recurring Expenditure:

(i) Salary of staff, T A & D A	3.00
(ii) Maintenance of reptiles etc.	5.00
(iii) Office expenditure (Postage, stationary, electricity, telephones, transport etc.)	3.00
Total	11.00

The estimated expenditure for 5 years would thus be Rs. 50.00 lakhs plus (11 x 5) 55.00 lakhs i.e. 105.00

12.4 Fisheries Development :

The works proposed for fisheries development in chapter VI are as follows:-

- (i) Pre-impoundment work and clearing of all tree trunks, bushes, rocks, construction of fish landing sites and camping grounds for staff and fishermen
- (ii) Preparation of hatcheries (Fish Farms), seasonal fish ponds.
- (iii) Net making boat building and training centre
- (iv) Fish landing and fishing centres, ice plants cold-storages and motor boats etc
- (v) Fisheries research & development, wages and salaries to staff and maintenance for 5 years

The works are to be executed through Fisheries Department.

The cost on the above works is estimated to be :

		(Rs in lakhs)
(1) Non-Recuring		
(i)	Jungle clearance for clearing fishing areas	50 00
(ii)	Fish/Prawn hatcheries	160 00
(iii)	Training boat-building, net making centre	16 00
(iv)	Fishing & landing centres, ice plant, cold storages, and motorboat etc.	74 00
Total		300.00
(2) Recurring		
(v)	Contingencies @ 10%	30.00
(vi)	Office and residential buildings, roads and electrification etc.	30 00
(vii)	Salaries/wages/maintenance etc for 5 years	70 00
Total		130.00

The estimated expenditure for five years will thus be : 430 00

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12.5. Social/Farm Forestry/Miscellaneous, Afforestation :

12.5.1 The works proposed in Chapter x for Social/Farm Forestry are as follows:

(A) Afforestation Measures

- (i) (a) farm forestry and pasture development in 141 villages having direct impact on the receiving areas and needing special consideration.
- (b) farm forestry and pasture development in the 307 inhabited villages of the Submergence Impact Area.
Total (a) and (b) = 10,900 ha;
- (ii) road side/canal side and railway line plantations – 1760 kms
- (iii) fringe plantations – 16,000 ha;
- (iv) river and nala bank plantations – 300 kms.
- (v) development of pastures;
- (vi) cottage industry plantations; and
- (vii) creation of Botanical Gardens.
- (viii) In addition 20-50 ha demonstration plots will be created at the Gram Panchayat headquarters in the villages of SIA.

(B) Non-Afforestation Measures In the SIA:

- (i) setting up of cattle camps;
- (ii) Installation of energy saving devices;
- (iii) extension and education of villagers;
- (iv) forest Protection and Development Committees in Villages and
- (v) training of personnel.

12.5.2 All the above works, will be rather too much for the existing staff of NVDA to execute efficiently besides doing compensatory plantation. As such one more forest division will be created and the entire work-load redistributed in the divisional staff. The cost non-recurring and recurring will be :

Non-Recurring Expenditure:

Particulars		Qty.	Rate (Rs. in lakhs)	Amount (Rs. in lakhs)
(1) Equipment :				
(i)	Tractor and Trolly	3	1.66	5.00
(ii)	Jeep	3	1.75	5.25
(iii)	Jeep Trolly	1	0.20	0.20
(iv)	Survey & drawing instruments		L.S.	1.00
(v)	Tools and plants		L.S.	1.00
			Total (1)	12.45
(2) Buildings:				
(i)	Office D F O	1	10.00	10.00
(ii)	Office A C F	2	5.00	10.00
(iii)	Range Offices	6	2.00	12.00
(iv)	Residence D F O	1	5.00	5.00
(v)	-do- A C F	2	5.00	10.00
(vi)	-do- Range officers	6	3.00	18.00
(vii)	-do- Dy Ranger	18	2.00	36.00
(viii)	-do- other staff		L.S.	10.00
(ix)	Garrages, stores, sheds etc		L.S.	10.00
			Total (2)	121.00
(3) Other Office Items:				
(i)	Provision of computer, photocopiers, Typewriters		L.S.	5.00
(ii)	Office furniture for DFO and others		L.S.	5.00
			Total (3)	10.00
Total non-recurring expenditure			143.45 or say	144.00
Recurring Expenditure:				
(1) Office Establishment:				
(i)	Pay and allowance		3.00	36.00
(ii)	Office expenditure		0.20	2.40
(iii)	POL		0.15	1.80
			Total (1)	40.20

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(2)	Cost of Works:	Rate Rs/ha	Amount
(i)	(a) Plantation of mixed species 30.000 ha	13000	3900.00
	(b) Engineering works 5320 ha	1900	101.00
(ii)	Road/Rail/Canal side plantations 2060 Kms	80000	1648.00
(iii)	Forest Protection & Development Committees	L.S.	8.00
(iv)	Maintenance of 150 cattle camps with 100 cattle per cattle camp	L.S.	475.00
(v)	Installation of energy saving devices	L.S.	333.00
(vi)	Publicity & extension	L.S.	5.00
(vii)	Training Panchayat Personnel and villagers	L.S.	12.00
(viii)	Subsidy (supply of forest produce to tribals at concessional rates)	L.S.	40.00
(ix)	Botanical Gardens/Unforeseen expenditure	L.S.	28.00
Total (2)			<u>6550.00</u>

The total estimated expenditure on social forestry/education, installation of energy saving devices and related works would thus be 144.00 lakhs plus 6550.00 lakhs plus (40.20 x 5 years) Rs. 201.00 lakhs i.e. 6895.00 lakhs or say 6900.00

12.6 : Wildlife and Live-Stock Health Care :

For the health and care of wildlife and live-stock of the project area it has been proposed to create a veterinary cell in the NVDA. The cell would be headed by a Joint Director, Veterinary Services and supporting staff with HQS at Bhopal besides 3 dispensaries under an Asstt Director, Veterinary Services in the project area. The cost of the cell would be :

	Amount (Rs.in lakhs)
(1) Non-Recurring	
(i) 3 Dispensary buildings in the project area @ Rs. 3.00 lakh each.	9.00
(ii) Cost of furniture, equipment etc.	<u>3.00</u>
Total	<u>12.00</u>
(2) Recurring:	
(i) Establishment cost of staff HQ and in the field	5.00
(ii) Cost of medicines	1.80
(iii) Office expenses etc.	<u>1.20</u>
Total	<u>8.00</u>

The estimated expenditure over a period of 5 years on this item would be 12.00 lakhs plus (8.00 x 5) 40.00 lakhs i.e. 52.00

12.7 Centre for Coordinated Research:

The Centre for Co-ordinated Research to be set up for taking care of all research activities recommended in the previous chapters, on various aspects of the project and on changes (genetic, ecological, economic and other) gradually taking place in the project area and around is likely to cost over a period of 5 years :

(1)	Non-recurring expenditure	(Rs. in lakh)
(i)	Cost of Centre's building	200.00
(ii)	Staff quarters	200.00
(iii)	Furniture and equipment	0.50
(iv)	Vehicles etc.	0.25
(v)	Other non-recurring expenditure	0.25
Total (1)		500.00
(2)	Recurring	
(i)	Pay, T.A and D.A	30.00
(ii)	Office expenses	5.00
(iii)	Research expenses	10.00
(iv)	P O L etc.	2.50
(v)	Other expenses	2.50
Total (2)		50.00
The estimates of expenditure over a period of five years would be Rs.500.00 lakhs plus (50.00 x 5) Rs 250.00 lakhs i.e.		750.00

12.8 Total Estimated Expenditure :

The estimates of expenditure on various activities recommended in Chapters IV to XI above can be summarised as follows:

Items		Non-Recurring	Recurring	Total
		(Rs in lakh)	(Rs in lakh)	(Rs in lakh)
(i)	Wildlife retrieval and conservation	700.00	625.00	1325.00
(ii)	Sanctuaries etc			
(iii)	Reptilia Development	50.00	55.00	105.00
(iv)	Fisheries Development	300.00	130.00	430.00
(v)	Soil fertility extension and energy saving measures	144.00	6756.00	6900.00

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(vi)	Wildlife and Live-stock health care	12.00	40.00	52.00
(vii)	Co-ordinated Research	500.00	250.00	750.00
Total		1706.00	7856.00	9562.00

The total estimated expenditure over a period of five years would thus Rs 9562.00 lakhs or say 96.00 Crores

APPEXDIX - 12.1
Normal Staff in a Forest Division

Name of Post		No. of post for One Unit
1.	Deputy Conservator of Forests	1
2.	Asstt Conservator of Forests	3
3.	Forest Ranger	6
4.	Deputy Ranger	12
5.	Forest Guard	16
6.	Head Clerk	1
7.	Accountant	2
8.	Upper Division Clerk	4
9.	Lower Division Clerk	4
10.	Steno	1
11.	Drivers (Light)	3
12.	Drivers (Heavy)	6
13.	Draftsman	2
14.	Orderly	9
15.	Peon	6
16.	Chowkidar	9
17.	Sweeper	3

ANNEX-XXV-Min.(4).

NARMADA VALLEY DEVELOPMENT AUTHORITY
NARMADA BHAWAN, TULSI NAGAR, BHOPAL.

No. NVDA Tech 94-95 - 1514

Bhopal, dtd. 7-7-95

To,

✓ The Member,
Environment & Rehabilitation,
Narmada Control Authority,
M.I.G. 113, Scheme No. 73-3,
Vijaya Nagar, Indore-452 008

Sub:- Main findings on flora, fauna & carrying
capacity studies.

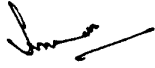
Ref:- 24th meeting of Environmental Sub-Group of NCA.

Kindly find enclosed herewith 15 copies of main
findings on the studies mentioned under subject conducted by:-

1. Friends of Nature Society Bhopal M.P.
2. Wild Life Institute of India, Dehradun , U.P.
3. State Forest Research Institute, Jabalpur M.P.

These were required for circulation amongst the
members of the Environmental Sub-Group of NCA.

Encl. 3 reports as above
in 15 copies each.


Member (Envt. & Forest)
Narmada Valley Dev. Authority
Narmada Bhawan, Bhopal.

IMPACT ASSESSMENT STUDIES OF NARMADA SAGAR AND
OMKARESHWAR PROJECTS ON FLORA AND FAUNA
WITH ATTENDANT HUMAN ASPECTS

NARMADA VALLEY DEVELOPMENT AUTHORITY

NARMADA BHAWAN, BHOPAL-(M.P.)

.....

IMPACTS AND MITIGATION PLANNING

BY

WILDLIFE INSTITUTE OF INDIA
YEAR- 1994

4.0 IMPACT IDENTIFICATION

The most important step in EIA is the impact identification. The process of EIA revolves around the identification of cause and effect, a cause being any action of the proposed project which has an effect upon the environment. These effects are the environmental impacts of the project. Any effect on the biophysical and socio-economic environment that arises from a cause directly related to the project is termed as a "first order" or "primary impact". "Secondary impacts" are those effects on the biophysical and socio-economic environments which also arise from an action but which are not initiated directly by that action. Their occurrence is defined by the inter-dependencies which exist within and between the two systems (Shopley and Fuggle, 1984). Project induced change can directly act upon an environmental resource or a condition and can result in primary impacts. The primary impacts in turn induce stress over the residual environment leading to secondary impacts. In this section an attempt has been made to identify the project related primary and secondary impacts of NSP and OMP on different components of the biological and social environment.

The basis for impact identification is the baseline information that has been collected from NSP and OMP area on different biological and social attributes (vegetation, wildlife habitat, large mammalian and aquatic vertebrates, avifauna and people of the area) determined by the scope of this EIA study. The significance and severity of impacts has been determined by the uniqueness and proneness of habitat, distribution of animals and plant species likely to be impacted as well as duration, reversibility and areal extent of the change associated with the project related activities.

The impact related information is organised into two sections. Section 4.1 deals with impact identification of the Narmada Sagar project, while section 4.2 outlines the impacts of the Omkareshwar project. Further, each section is divided into five sub-sections. The first sub-section deals with impacts on vegetation, second with impacts on wildlife habitats, third deals with impacts on large mammalian fauna and aquatic vertebrates, fourth deals with impacts on birds and the last deals with habitat loss due to submergence and resultant imbalance in man-resource equations.

4.1 IMPACTS OF NARMADA SAGAR PROJECT

4.1.1 Impacts on Vegetation

Vegetation is considered to be one of the most vital components of any ecosystem as it controls the various functions of ecosystems viz. biomass production, energy flow in different trophic strata and bio-geochemical cycling of minerals, gases and water. Since the vegetation occupies the lowest position in the trophic strata, it essentially supports all living forms. Knowledge of vegetation structure and function is essential to studying impacts on target groups, especially, when these are the wild animals and forest dependent tribal population. Any impact, primary or secondary, on vegetation would, adversely affect (i) the wild animals by altering their habitat quality and (ii) the forest dependent people by changing the existing natural resource equation in terms of availability and utilization. In this context, in the present study, impacts on vegetation were visualized at two different levels. At the first level, we focused on the impacts upon existing vegetational values themselves and at the second level we focused on the concomitant impacts upon wild fauna and forest dependent people.

Impacts on vegetational values of the area can be identified by critical evaluation of baseline information obtained on the vegetation of the area. Impacts can be visualized in terms of (1) direct losses (Primary impacts) due to the submergence of large forest areas and (2) indirect losses (Secondary impacts) due to the alteration in the resource equations in the residual forest areas *vis-a-vis* the inevitability that a larger segment of affected people will settle near the submergence boundary and would cultivate the draw-down areas. The magnitude of secondary impacts will only be further compounded if the rehabilitation plan is not properly executed.

The following impacts on vegetational values have been visualized as resulting from NSP.

4.1.1.1 Impacts on Floral Values

Species having a very limited distribution in any area can be very sensitive even

to the small habitat alterations (Gomez-Pompa *et al.* 1972), as these species require some specific micro-habitat conditions. Presence of a large number of species, 31 in all, with limited distribution in the NSP area (Appendix 3.1), suggests a threat of local extinction to these species, as their potential habitat would further be reduced owing to the submergence of large forest areas, including some specific micro-habitats. Furthermore, among these species the herbaceous/ climber species will be even more sensitive to the loss of such micro-habitats. Some of the important herbaceous and climber species, sensitive to these losses are given in Table 4.1.

Table 4.1 List of some of the important herbs and climbers likely to be impacted due to the Narmada Sagar Project.

S.No.	Species	Family
1	<i>Elytraria acaulis</i>	Acanthaceae
2	<i>Haplanthodes verticillata</i>	Acanthaceae
3	<i>Blumea lacera</i>	Asteraceae
4	<i>Siegesbeckia orientalis</i>	Asteraceae
5	<i>Sphaeranthus indicum</i>	Asteraceae
6	<i>Mosla dianthera</i>	Lamiaceae
7	<i>Polygala arvensis</i>	Polygalaceae
8	<i>Polygala erioptera</i>	Polygalaceae
9	<i>Exacum</i> sp.	Gentianaceae
10	<i>Swertia minor</i>	Gentianaceae
11	<i>Gloriosa superba</i>	Liliaceae
12	<i>Periploca aphylla</i>	Periplocaceae
13	<i>Curculigo orchoides</i>	Hypoxidaceae

In the residual forest areas, some of these herbaceous species could face further threats of local extinction as these also have some ethnobotanical uses. Loss of large forest area under submergence will only leave the residual forest areas to the local people to collect these species for their different uses. In this context, *Sphaeranthus indicum*, *Periploca aphylla* and *Curculigo orchoides* will be the species most vulnerable

orded in the area, 30 families were mono-specific and 37 were mono-generic (Table 3.17). Furthermore, among these mono-specific and mono-generic families, seven families were represented by the species having, either very limited distribution or unknown distribution. The list of families and their representative species is given in Table 4.2.

Table 4.2 List of mono-generic and mono-specific families and their representative species likely to be impacted due to the Narmada Sagar Project.

S.No.	Family	Species
1	Hypoxidaceae	<i>Curculigo orchiodides</i>
2	Moringaceae	<i>Moringa oleifera</i>
3	Pedaliaceae	<i>Sesamum orientale</i>
4	Periplocaceae	<i>Periploca aphylla</i>
5	Polygalaceae	<i>Polygala arvensis</i> <i>Polygala erioptera</i>
6	Portulacaceae	<i>Portulaca oleracea</i>
7	Passifloraceae	<i>Passiflora foetida</i>

After the proposed submergence, there are likely chances that these families will also become vulnerable to local extinction due to both primary and secondary impacts as discussed earlier. Hypoxidaceae and Periplocaceae could be the most vulnerable families as their representative species are exploited for their ethnobotanical values.

The species and family level diversity could, therefore, be adversely affected in the residual forest areas in the post- dam scenario.

4.1.1.2 Impacts on Vegetation Associations

Traditionally, the impact identification has been confined to qualitative assessments (Ortolano, 1973; Shopley and Fuggle, 1984). Qualitative assessment alone, however, would not give any meaningful information about the magnitude of the impacts on different vegetation associations. In such a situation, it is extremely important to quantify the loss of different-vegetation associations in forest areas. This task could be more complicated if the vegetation is homogeneous as in the present study.

The major physiognomic vegetation types of the study area under different vegetation series were described by Gaussen *et al.* (1970). They have classified the vegetation of the area under *Anogeissus - Terminalia - Tectona* series and *Tectona - Terminalia* series, and recorded five major physiognomic types (Fig. 4.1). It is, however, observed that scrub woodland type of *Anogeissus-Terminalia-Tectona* series has very restricted distribution, only in the submergence zone of NSP and, therefore, faces an immediate threat of local extinction in the post-dam scenario.

Although the broad vegetation communities of the area were described by Champion and Seth (1968) and Gaussen *et al.* (1970), there is a need to objectively assess the vegetation associations in different study zones in order to assess the loss of any particular association due to the project.

In the three study zones, 17 associations were identified (Tables 3.2, 3.6 and 3.10). However, 11 associations showed some degree of similarity with one or the other (Table 3.13). Three associations, identified in submergence zone, were also recorded either in impact zone or in outside zone. It can be argued therefore, that since these associations are also represented in the residual forests, there would be no loss of these associations. However, if we consider the net loss of association in terms of the area they covered, association type IV of submergence zone (*Tectona-Holarrhena-Lagerstroemia-Cassia*) and association type II of impact zone (*Tectona-Diospyros-Anogeissus-Lagerstroemia*) would be a major loss. Loss of association type I of submergence zone (*Tectona-Zizyphus-Helicteres-Holarrhena*) may be compensated in

the residual forest areas.

Out of the total 17 associations, six associations (three in submergence, two in impact and one in outside zone) were recorded exclusively in their respective zones (Table 3.14). The loss of association type II (*Tectona-Chloroxylon-Lantana-Vitex*) and III (*Tectona-Anogeissus-Gymnosporia-Lantana*) of submergence zone can't be compensated in the residual forest areas, both in terms of their quality and quantity.

The association type I (*Hardwickia-Gymnosporia-Dichrostachys-Acacia*) and V (*Helicteres-Aegle-Grewia-Diospyros-Chloroxylon*) were exclusively recorded in the impact zone (Table 3.14), and the secondary impacts are bound to cause these associations to be lost or severely degraded in the impact zone due to the increased human activities in this zone.

NSP area has a good network of watersheds ranging from small streams to the river Narmada itself and its major tributaries. In linear strips along water courses the vegetation is typically riparian which requires unimpounded banks of free flowing water courses where conditions are more moist than normal (Franklin and Dryness, 1973; Minore and Smith, 1971). The riparian zones provide the crucial and well defined moister habitat amidst the much drier forest areas eventhough this may be only a small proportion of the overall area. These zones command much more favourable growth conditions viz. fertile alluvial soil and relatively a much richer soil moisture regime and so are more productive in terms of biomass than the remainder of the area and also much richer in diversity (Thomas *et al.*, 1979, Tramer, 1969). This habitat zone with its unique structure and composition of vegetation, is an all important habitat type, especially in the dry tropical forests, as it provides crucial food and shelter to a variety of wild animals (Wesley Sunderaj *et al.*, 1989; Rodgers, 1990; Rai, 1991; Joshua, 1992; Dutta, 1993; Pai, 1993). The association type VI of submergence zone (*Terminalia arjuna-Syzygium-Vitex*) is considered to be the most threatened one, as it represents the typical riparian species association and thus has high wildlife values. Although the extent of this association in the submergence zone is very small (2.8 km²), but considering (i) its extremely low occurrence in the impact and contiguous forest zones, (ii) poor recruitment pattern of *Terminalia arjuna* in the impact and contiguous forest

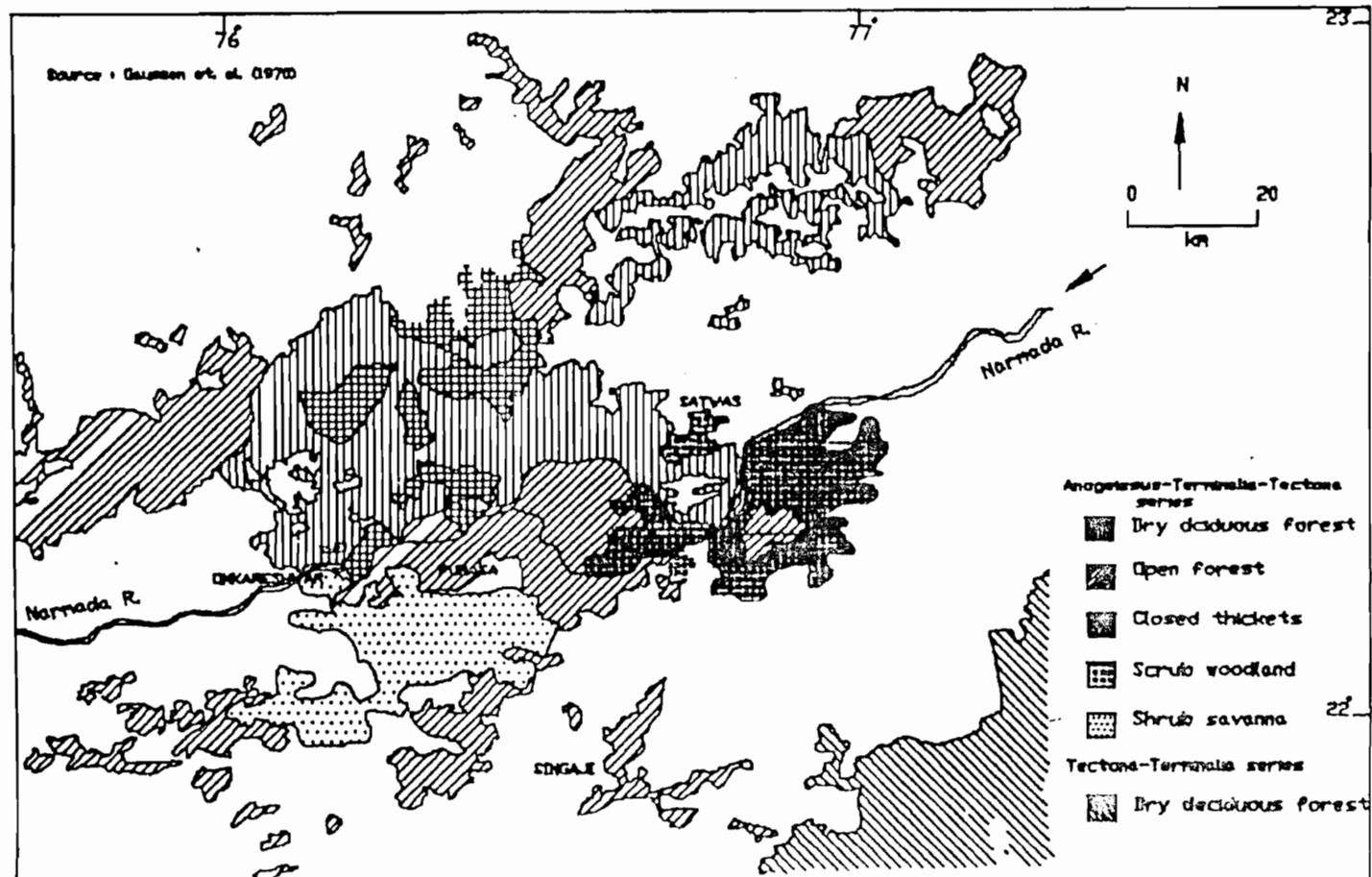


Fig. 4.1 Distribution of major physiognomic vegetation types around the study area.

zones (Table 3.26) and (III) its linear distribution capable of providing key habitat for wildlife, in extensive dry tropical forest; this loss would be a major and permanent one.

In terms of plant communities therefore, six associations would be affected by the NSP. Out of these six associations, four will be sensitive to the primary impacts in submergence zone and two to the secondary impacts in impact zone. The list of these sensitive associations is given in Table 4.3.

Table 4.3 List of vegetation associations likely to be impacted by the Narmada Sagar Project.

Study Zone	Associations	Nature of Impact
Submergence	<i>Tectona-Holarrhena- Lagerstroemia- Cassia</i>	Primary
Submergence	<i>Tectona- Chloroxylon- Lantana-Vitex</i>	Primary
Submergence	<i>Tectona-Anogeissus- Gymnosporia-Lantana</i>	Primary
Submergence	<i>Terminalia arjuna- Syzygium-Vitex</i>	Primary
Impact	<i>Hardwickia-Gymnosporia- Dichrostachys-A. leucophloea</i>	Secondary
Impact	<i>Helicteres-Aegle-G. tiliaefolia Diospyros-Chloroxylon</i>	Secondary

Apart from these six associations, likely to be affected by the NSP, one association in contiguous forest zone viz. *Anogeissus-Acacia catechu-Hardwickia-Helicteres*, would also have serious threat to its existence due to the poor recruitment of *Hardwickia binata* in this zone (Table 3.26).

4.1.1.3 Impacts on Timber and NTFP Values

It was observed that submergence zone has relatively higher tree density (549/ha) as compared to the impact zone (456/ha) and contiguous forest zone (369/ha) (Table 3.19). The State Forest Department has estimated loss of 36,25,587 teak poles; 7,86,317 cmt. teak logs; 15,28,225 stacks teak fuelwood; 53,631 miscellaneous poles; 55,516 cmt. miscellaneous logs and 40,29,715 stacks miscellaneous fuelwood, which have to be felled and shifted before submergence (Anon., 1994). Additionally, there would be pressure on the forest outside the submergence area for meeting nistar and other requirements of the population viz. poles (391 cmt.), fuelwood (5160 stacks), bamboo (364 M.T.) besides salaiwood and bamboo requirements of Nepa mills estimated at 1000 stacks of 2m x 1.2m x 1m and 975 M.T., respectively (Anon., 1994). This outright loss of a large number of trees and loss of forest capacity in meeting nistar requirements after the proposed submergence is a value that cannot be compensated. In fact these requirements will continued to be obtained from the residual forest areas and consequently the tree density in the residual forest areas will further be decreased. The loss of this forest would cause a substantial decline in the timber and NTFP values in the area. Relatively higher density of Teak (*Tectona grandis*) (298/ha) and Tendu (*Diospyros melanoxylon*) (33/ha) in the submergence zone as compared to the impact and contiguous zones further substantiates this view (Table 3.20). Other species considered to have good NTFP value in the area are *Aegle marmelos*, *Buchanania lanzan* and *Embllica officinalis*. However, these species were recorded in substantial numbers, either in the submergence zone or in impact zone (Table 3.20). It is, therefore, considered that after the proposed submergence and the acting of secondary impacts the number of these species will be drastically reduced and which in turn would adversely affect the NTFP potential of the area.

4.1.1.4 Impacts on Ethnobotanical values

Out of 175 plant species of ethnobotanical value belonging to 138 genera and 65 families, recorded from NSP area, not a single species belongs to the list of threatened or rare plant species given by Jain and Sastry (1983) or from Red Data Book of IUCN. All these species of NSP area also occur elsewhere in Central India and

there is no species endemic to this area. Substantial dependence of the local people occurs on forest vegetation to meet their ethnobotanical requirements, such as fodder, food, fuel, gum/resin, liquor, medicines, basket/mat making, tanning, thatching/fencing, house building/agricultural implements/households, fibre, fish poison/poison, mythological/religious and recreational/ornamental (Table 3.32). This study reveals that presently the ethnobotanical use appears to be environment friendly because barring a few cases, exploitation for these uses is done by these people only as and when required, and in the quantity they need. For example, root bark of *Butea monosperma* and *Careya arborea* is used as a fish poison for easy catch, only during the rainy season. As fish poison is applied in extremely localised stretches the toxic effect of the plant poison has a limited localised impact which does not influence water upstream or downstream.

Due to the construction of Narmada Sagar dam 403.32 km² forest area of proposed submergence zone will come under direct impact and people who are utilising forest resources of this zone to meet their ethnobotanical needs will be deprived of these uses. Some plant species such as *Curculigo orchoidis*, *Dichrostachys cinerea*, *Dioscorea pentaphylla*, *Ventilago maderaspatana*, *Ampelocissus latifolia*, *Hardwickia binata*, *Ceraptopteris wallichii*, *Periploca aphylla*, *Spehaeranthus indicum*, *Biophytem sensitivum* and *Albizia amara* which are less abundant in the NSP and OMP areas and are being used by the people for various ethnobotanical uses may completely disappear from these areas. After completion of dam and redistribution of the affected people in and around the residual forest area, some plants e.g. *Curculigo orchoidis*, *Dichrostachys cinerea*, *Dioscorea daemona*, *Dioscorea pentaphylla*, *Ventilago maderaspatana* and *Ampelocissus latifolia* whose roots/tubers are extracted for medicinal use and *Hardwickia binata* used for fibre and fodder and *Morinda pubescens* used for making dye may altogether disappear from impact and contiguous forest zones, because the propagative parts of these plant species are likely to be extracted to exhaustion in near future from these areas. Similarly in the post-dam scenario, five species out of 33 species of which the entire plant is exploited (*Ceraptopteris wallichii* for yagna, *Periploca aphylla* and *Spehaeranthus indicus* for medicinal use and *Biophytem sensitivum* for fodder) may also suffer a similar fate in the residual forest areas in future.

Ethnobotanical knowledge of local people provides an insight into the new or less known medicinal herbs of traditional medicine and also yields clues for new material for pharmacological and clinical research. Knowledge about the unique uses of medicinal values of the parts of about 53 plant species (Table 3.35) which were not recorded earlier by other workers from Central India or from any other part of the country, also be undermined because of the displacement of user community from the submergence zone.

4.1.2 Impacts on Wildlife Habitat

During the execution of Narmada Sagar Project and after its completion, two types of impacts, i.e. primary (direct) and secondary (indirect) have been visualised on wildlife habitat. Natural characteristic determinants and biotic pressure assessment form the basis of primary and secondary impact identification on wildlife habitat. This study has helped in proper evaluation of present status of wildlife habitat and different biotic pressures operating on it.

4.1.2.1 Primary Impacts

Primary impacts of NSP on wildlife habitat include a complete loss of 403.32 km² wildlife habitat (forest area) due to impoundment by the dam. This also includes 50.07 km² unclassified forest of Khandwa forest Division and remaining 353.25 km² classified forest (reserved and protected forest) in Baladi (91.20 km²), Mundi (86.19 km²), Chandgarh (74.89 km²), Satwas (39.28 km²), Handia (32.28 km²) and Singaji (28.91 km²) ranges. Direct loss of habitat to impoundment involves 23.0 percent area under good and 77.0 percent area under medium quality habitat (Table 3.37). In the direct impact zone (submergence zone), Singaji and Chandgarh ranges suffer almost half, i.e. 50.0 and 45.45 percent loss of their good habitat quality category, followed by Satwas 30.0, Baladi 23.1 and Mundi 10.0 percent, respectively. Residual area after impoundment left in all the ranges belongs to the medium habitat quality class.

About 14.92 km² wildlife habitat has also been cleared for the construction of hydroelectric generation units, main canal, link canals, project colony, bundings and

roads (Plate 4.1). This will also be a direct loss of the wildlife habitat. Further 3 km² wildlife habitat has been cleared for the construction of a highway linking Narmada Nagar with Bhopal (Plate 4.2) and a bridge over Narmada to connect it with Narmada Nagar. This shows that in all 421.24 km² wildlife habitat of high and medium categories will disappear under the direct impacts of Narmada Sagar Project.

4.1.2.2 Secondary Impacts

A 1.5 km² belt of forest situated adjacent to the submergence line which was delineated as impact zone will be used as refuge area by people as well as wildlife displaced by NSP submergence. It includes 78.46 km² and 14.23 km² area of Chandgarh and Satwas ranges, respectively, on the north bank, and 11.31 km² area of Mundi range (Table 3.44) on the south bank. Out of 92.69 km² north bank impact zone 8.88 km² area is under good quality habitat type and remaining 83.71 km² is of medium habitat quality type. Whereas on the south bank, entire 11.31 km² of Mundi range is of medium habitat quality type.

Tables 3.19 and 3.28 give a comparative account of tree density/ha, tree dominance (m²/ha), forage volume (m³/ha), species diversity index, area with high soil depth (%), clayey terrain (%), fire affected area (%), area with rocky/bouldery terrain (%) for submergence zone, impact zone and contiguous forest. It shows that wildlife habitat in the impact zone is comparatively low in quality than that of submergence zone, and wildlife habitat in contiguous forest is of at lower quality than that of submergence and impact zones. In such a situation, if entire wildlife from its habitat in submergence zone will move to impact zone, which is already having most of its area (89.5%) under medium quality habitat type, there is likely to be a further decline in habitat quality. Average ungulate dung density in the impact zone is 93.84/ha which is more than that of submergence zone (70.45/ha). Thus, although habitat quality in the impact zone is somewhat lower, it is used by more number of ungulates than the submergence zone. Additional pressure of much of the displaced wildlife population of submergence zone on this area will lead to further deterioration of its habitat quality. It is estimated that in the absence of a properly executed rehabilitation plan, about 5,000 people from the north bank submergence zone will also move to settle and make

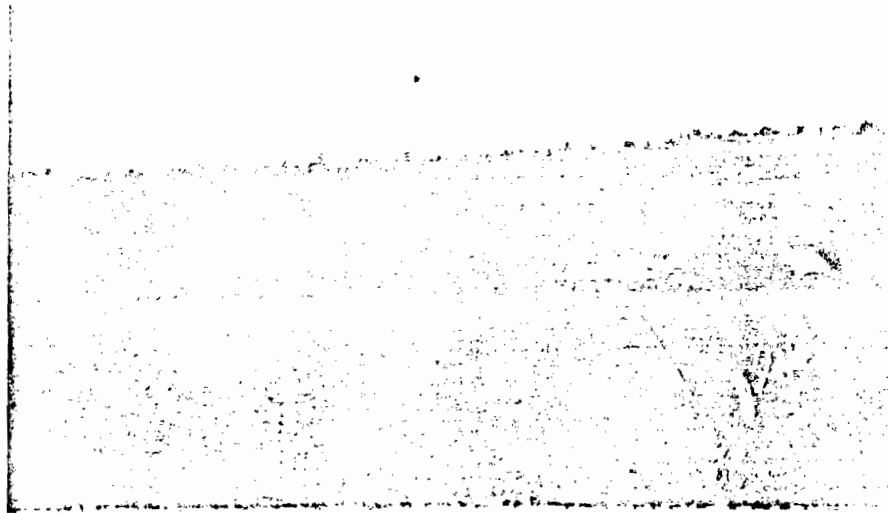


Plate 4.1

Diversion of wildlife habitat for road building and construction phase activities is also a major primary impact of the project



Plate 4.2

use of forest resources in the impact zone. Resources in the impact zone are not currently being exploited as only 1,600 people inhabited this area. A large number of wild animals exists in these forests. In future the rehabilitation of people in these areas will drastically degrade the existing quality of wildlife habitat in this zone. On the south bank, only 11.31 km² forest of Mundi range falls under the impact zone. After submergence of wildlife habitat and people's use area on the south bank, existing medium quality habitat of impact zone, which is already small in extent will get severely degraded due to its over use by additional people and wildlife moving in here from submergence zone. Further, on the south bank, contiguity of Mundi range with Punasa range has been broken by the construction of a road linking Punasa with Narmada Nagar and construction of dam colony. This may inhibit wildlife movement from submergence zone to contiguous forest of Punasa range here.

It can also be predicted that impact of people and wildlife moving out from impoundment areas of NSP will not only be limited to the adjacent impact zone but will also be in the contiguous forest of Chandgarh (142.14 km²) and Punasa (157.98 km²) ranges on north and south banks, respectively. It is evident from Table 3.37, that in contiguous forest 8.57 and 2.86 percent areas are under good and poor habitat quality categories, respectively, whereas majority of its area is under medium habitat quality category (88.57%). It can be further observed from the information given in Tables 3.19 and 3.28, that existing wildlife habitat in the contiguous forest is comparatively of a lower quality than that in the submergence zone and impact zone. If these areas will be utilised by the additional number of livestock and people moving out from the submergence zone than it is expected that existing wildlife habitat which is of medium quality type may be further degraded to poor habitat quality type (Plates 4.3 and 4.4).

Furthermore, impact and contiguous zones, in their present status, offer relatively more productive habitat to wild animals, in terms of the food and cover. High shrub density (3182/ha) and forage volume (555 m³/ha) in the contiguous zone (Table 3.19) strengthens this view. Relatively higher density of some of the palatable species like *Helicteres isora*, *Zizyphus xylopyra*, *Zizyphus mauritiana* and *Dendrocalamus strictus*, substantially enhances the habitat quality in the impact and contiguous zones (Table 3.24). The contiguous zone also shows high forage productivity (Table 3.30). These two



Plate 4.3

The already stressed man resource situation would be further aggravated
on the diversion of forests for two projects

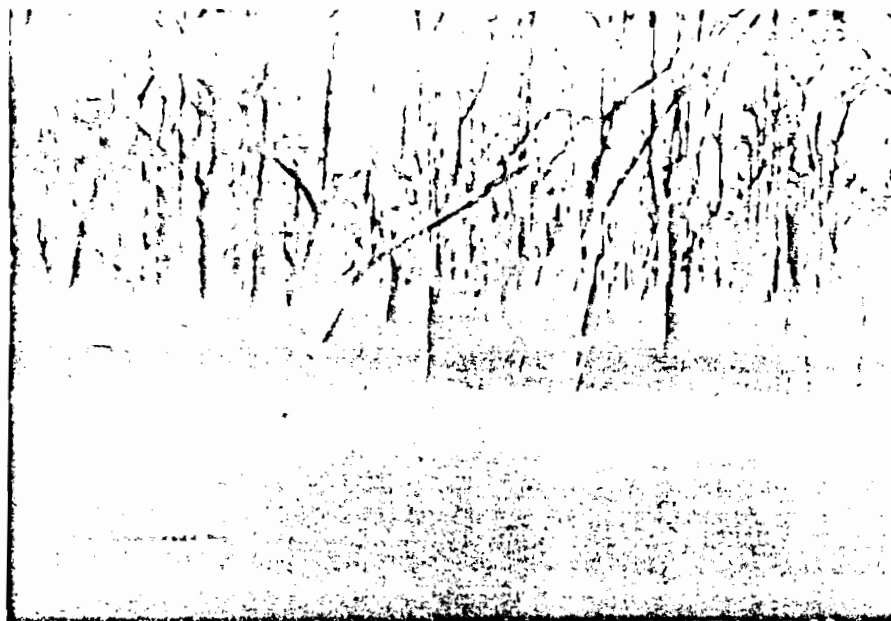


Plate 4.4

factors enable the contiguous zone to support many wild animals that are likely to be displaced by the project. Further, in the contiguous zone the incidence of cattle grazing was lowest as indicated by the low cattle dung density (Table 3.28). However, the loss of a large segment of forest area to proposed submergence, would force a large number of cattle to move into these residual forest areas for grazing. The proposed submergence will, therefore, not only directly reduce the available habitat but will also negatively affect the habitat quality in these residual forest areas. The impacts on the wildlife values are discussed in detail in section 4.1.3.

4.1.3 Impacts on Large Mammalian Fauna

Critical evaluation of baseline information is the basis for identification of impacts on large mammalian fauna. Primary impacts due to habitat loss and secondary impacts due to the project induced habitat alteration in the residual forest would impact the large mammalian fauna in the region.

4.1.3.1 Primary Impacts

The primary impacts visualized in case of NSP are as follows :

(i) Habitat Loss

The submergence zone forests support diverse wild mammalian fauna, represented by 30 species of large mammals (**Appendix 3.6**). For impact identification large mammals found in the area were delineated into three guilds viz. ungulates, carnivores and omnivores.

Impacts on Ungulates

Seven species of ungulates were recorded from the project area viz. chital, sambar, nilgai, chinkara, chowsingha, barking deer and wild boar. These species generally occur in very low densities in the study area (Table 3.52 and 3.53). NSP submergence would result in a direct reduction of their home ranges to the extent of

40,332 ha, cutting of especially the riparian segment currently would be totally lost. Although anthropogenic pressures have considerably undermined the natural habitat in the area, some of the forest tracts like Mundi and Chandgarh ranges still hold good potential as wildlife habitat. This has been substantiated by high HSI values of chital and sambar in Mundi and Chandgarh forest ranges in the submergence zone. Clear felling of large areas of forest prior to the submergence will result in a direct loss of 99 Habitat Units (as calculated from HSI for chital) and 80 Habitat Units (as calculated from HSI for sambar). In other words, this is equivalent to a loss of 99 km² and 80 km² of optimum chital and sambar habitat, respectively. Further, the ungulate population on the south bank of Narmada is more threatened by the submergence of forested areas because of the absence of peripheral forest areas that could have provided some refuge to displaced wildlife and also due to the near absence of corridors between submergence zone and refuge areas. Interspersed human settlements and crop fields further threaten the ungulate populations on the south bank. On the north bank the submergence zone forests are fringed by contiguous forest of Chandgarh range and the ungulates in this area have better chances to migrate to other refuge areas.

Carnivores

The important carnivores found in the submergence zone of the project area are tiger, leopard, jungle cat, fishing cat, wolf, hyaena, jackal, Indian fox and ratel. The loss of habitat due to submergence will adversely effect the tiger which is a territorial species. Although there is no real danger of carnivores getting "trapped to death" in the submergence, they might face persecution while passing through areas interspersed with human population and crop fields, during their movement from submergence to nearby refuge areas. As the prey base is generally low in the project area any increase in carnivore numbers due to immigration might trigger of interspecific and intra specific competition. This shift in equilibrium may ultimately lead to enhanced man-animal conflict and spurt in cattle lifting incidence.

Fishing cat is another carnivorous species probably occurring only in the Kitti islands in the study area (Plate 4.5). As these islands would be fully submerged after the last phase of submergence the total loss of fishing cat habitat in the project area



Plate 4.5 Submergence of Kiti group of islands will lead to the loss of the habitat of fishing-cat (*Felis viverrina*)



Plate 4.6 Submergence of large stretches of river would result in the loss of otter (*Lutra perspicillata*) habitat

would have a direct impact on this species and might even lead to local extinction of the species

Aquatic Vertebrates

(i) Impact on otter population

After the inundation of all Zones only the small stretch of about 10 km of Narmada river in Zone 7 with medium otter abundance will remain a natural habitat Fig 2.5). Because of the barrier of the Narmada Dam at Narmada Nagar (Punasa) the impacted otter population in Zone 1 to 6 will not be in a position to migrate downstream to utilise the available natural otter habitat. While the otter population in Zone 2 (Kiti Island) may have the option to migrate upstream during the slow and gradual process of inundation, this upstream riverine habitat above Joga Kalan Fort is already human impacted may not meet the habitat needs of the displaced otters

The lateral spread of reservoir water along Zone 4 and Zone 5 may provide some otter habitat once the FRL is achieved. However, the draw down area effected during seasonal decrease of water level will not make this an ideal otter habitat as the fluctuation of the water level and siltation of grooming sand banks will severely impact breeding and denning sites in the newly created reservoir habitat. In this scenario, the otter population is bound to be severely impacted (Plate 4.6).

(ii) Impacts on aquatic reptiles

The Narmada Sagar submergence will inundate all the zones with turtle and crocodile presence. The static waterbody thus created will favour the softshell turtles and the mugger crocodile. The hardshell turtles will lose their preferred sandy nesting sites. Migration and movement of turtles below the dam site is not possible nor they have the ability to cross rapids to move upstream. In the immediate post-impoundment scenario the turtle fauna will be badly impacted eventhough a gradual slow increase in number of adaptable species like *Lissemys punctata* and high-fecund species like *Aspiderate gangeticus* is expected. The other softshell turtle *Chitra indica* is a sandy

river bottom dwelling species and does not adopt to static waterbodies. This species will largely become locally extinct over the river stretch which goes under submergence.

Other Mammals

Common giant flying squirrel, common langur, rhesus macaque, mongoose, small Indian civet are some of the other mammalian species found in the area. The loss of habitat would adversely alter the vegetation cover conditions in the area. This might have impacts on distribution, food and feeding ecology of primates viz. rhesus macaque and common langur. Arboreal species like giant flying squirrel would have their distribution severely impacted due to changes in canopy cover contiguity, crucial for its movement.

4.1.3.2 Secondary Impacts

Increased biotic pressures, construction of roads and infra structural facilities are some of the project induced influences visualized to impact the residual forest area in the study area. This is largely due to the fact that proper care and concern about environmental factors has not been taken in alignment of roads and siting of project colony and other project related infra-structural facilities. Experience in other similar situations suggests that the project infrastructure (manpower, building, equipment) grows exponentially and causes environmental stress in addition to the impact caused due to submergence and habitat loss.

Biotic Pressures

In the absence of proper rehabilitation plan for the NSP affected people, it is assumed that most of the people would settle on the fringe of the reservoir to exploit the draw-down areas for cultivation. This has also been the case with post impoundment scenario of Tawa and Bargi dams. These people would also exploit the forest resources available in the residual forests to meet their biomass needs. This would further accentuate the already depleted man resource equation in the region

leading to habitat degradation. Ultimately this would impact the large mammalian fauna in the contiguous forest zone leading to further compromise in the conservation of the species.

Construction of Roads

There are two important roads constructed by NVDA to connect Narmada Sagar dam site with Khandwa town and Bhopal city for movement of man and machinery. The road connecting Khandwa passes through the only remaining forest corridor on the south bank, between Mundi range in the submergence zone and Punasa range on the periphery. The impact of this heavily used road is already beginning to show up in the form of constrained movements of wild animals from submergence zone to contiguous forest. The road connecting dam site to Bhopal situated on the north bank passes through the forests of Chandgarh and Satwas ranges in the impact zone, exposing hitherto inaccessible forests to increased biotic pressures (Plate 4.2). If the vehicular traffic on this road is not effectively controlled, checked and regulated it would not only lead to restricted movement of wild animals from impact zone to contiguous forest zone, but may also undermine habitat quality from secondary impacts of enhanced biotic pressures.

Infra-structural Facilities

Building up of infra-structural facilities like residential colony and roads for the work force involved in NSP construction began in 70s. The main residential colony at Narmada Nagar is situated right in the middle of the forest corridor connecting Mundi range in the submergence zone and Punasa range in the contiguous forest. With an expected influx of about 20,000-25,000 labour force during the peak construction phase, biotic pressures in the residual forest would increase manifolds. This would have a direct bearing on the habitat structure, composition and quality of the residual forests and would further impact upon the distribution of already decimated large mammalian fauna and its habitat.

4.1.4 Impacts on Avifauna

The results of the ornithological evaluation have indicated the potential richness of woodland and riverine bird species in the area. The submergence of this woodland habitat would be a direct and irreversible loss to the overall avian diversity of the area. No endemic species was recorded during the study which might be impacted, but there is likely to be a potential impact on highly specialised species viz. carnivore, insectivore and frugivore species. Their migration to adjoining forest may create a resource competition with existing avifauna. Moreover, the size of a forest patch is strongly related to the habitat requirements of the species and therefore species which have large home ranges may face difficulties in adjusting with existing avifauna in adjoining forests. Serious depletion in numbers, particularly of the more specialized species may occur as a result of primary impact of submergence of forest habitat, specially the riverine areas. Following impacts on specialized species of birds have been identified:

1. The inundation of small rivers and streams will cause decline in variety of fishes and invertebrates which may affect bird species such as Herons, Egrets, Bitterns, Water hens and King fishers. Loss of feeding ground such as shallow areas on the banks of rivers and streams would affect species like Lapwings, Plovers, Sandpipers and Shanks.
2. Loss of riverine trees and shrubs will lead to the loss of perching and nesting sites for species such as Flycatchers and Owls.
3. Loss of bushes and dense herbaceous vegetation, which are important for feeding and nesting, may affect species such as Warblers, Babblers, Munias and Weaver birds.
4. Forest clearing in proposed submergence area would adversely affect the ground dwelling birds such as Partridges, Quails, Peafowls and Spurfowls. These birds nest on ground and any activity like forest clearing on a large scale would severely impact the breeding ecology of these species which may result in their population decline.

5. Species such as Buzzards, Hawks, Eagles and Owls which are highly territorial and require large areas as home ranges would be adversely affected by the loss of the forest due to submergence. The movement of these species to the adjoining forest may create resource competition with the existing population of these species.
6. Species such as Woodpeckers, Nuthatches, Barbets, Tits and Hornbills, which are bark gleaning and dependent on old trees for feeding and nesting would be affected by the loss of old mature trees, and would face competition from existing avifauna of the forest adjoining the submergence area.
7. The presence of more than 30 species of riverine birds shows that Narmada river and its tributaries have great potential to support riverine bird communities (Appendix 3.11). These communities will be adversely impacted by the proposed submergence. Changing a lotic riverine ecosystem to lentic reservoir system would adversely modify the existing habitat condition and impact most of the riverine birds. Migrant birds are affected by the condition of their wintering grounds and situations along their migratory pathways. The abundance of migrant bird species, however, may also reflect the condition of a particular site because the condition of the resources in the area may affect a bird's "decision" to remain or migrate further. In the study area some of the migrant species were recorded in good numbers. Most of these migratory species are aquatic and dependent on river system for feeding and breeding requirements. Inundation of sand and rocky banks and islands would affect the ecology of these species. The fish fauna will be changed when reservoir is formed. The present fish diversity will be lost and commercially important fish species like carps will dominate the new aquatic system. The piscivorous bird species such as Cormorants, Darters, Egrets, Herons, Storks, Ibis and Spoonbill would be affected by this change of aquatic system and fish fauna. The proposed reservoir will be very deep and the composition of aquatic vegetation would be very different than what it is at present. It has been observed that aquatic weeds take over the deep reservoirs (Moss, 1980). This would affect the feeding ecology of birds such as Pintails, Gadwalls, Spotbill ducks and Shovellers which feed on

vegetation growing in shallow water.

4.1.5. Impacts on Socio-economic Condition

The major problems in anticipating the impacts of most developmental projects on the people is largely a result of abysmal lack of information of some of the very crucial and basic aspects of planning. The lacuna are particularly realised in the inadequate policies for rehabilitation of project impacted people. Inadequacies and unplanned resettlement with little or no share in the benefits from the developmental feats, leaves the affected people discontented, frustrated and uncertain about their future in the environment which would become both socially and ecologically modified in the post project scenario.

Distortions and negligence in the planning process occurs when projects are begun much before the clearance for such a project is granted by the planning commission and other relevant authorities. A still greater neglect of the welfare of the local people in the project area occurs when the extension of rural development facilities are suspended in most villages in anticipation that the area would be diverted to one or the other activities associated with proposed development.

It is clearly reflected from the documented information on development projects that inadequacy in rehabilitation planning in the absence of coherent rehabilitation policies have been the single largest factor that has resulted in the failure to maximize the benefits of most hydro-electric projects. Although examples to substantiate the above facts are available in plenty the rehabilitation planning involved in Machkunda hydro-electric project reflects clearly the failure of the rehabilitation programme. The above project displaced 2338 families in 1960 of this the tribal component was nearly 50%. The project ensured rehabilitation of only 30% of the total affected population (Mahapatra, 1989). Another project, the Sunei irrigation project also in Orissa led to forcible eviction of the people from the newly allotted land by the earlier settlers. In some cases instances of burning down of the houses constructed by the oustees in the earmarked rehabilitation colony were also reported. Some conflicts with pre existing settlers in the rehabilitation area have also been reported from Rengali dam project

(Mahapatra, 1989). The other extreme of illconceived rehabilitation planning in the Sardar Sarovar project on Narmada itself where families to be displaced, mostly tribals, would be entitled to compensation for land (upto three acres) encroached by them either in government wasteland or in the forest land. It is also feared that the oustees of the Narmada Sagar and Omkareshwar projects would suffer from the ills of the similar inadequate rehabilitation planning. The magnitude of the suffering of the oustees of NSP would be far more because their number would be atleast 10 times more than the oustees of earlier conceived projects.

Due to the construction of Narmada Sagar dam 403.32 km² forest area of proposed submergence zone will come under direct impact. The proposed submergence will affect 12 forest villages and 242 revenue villages involving 86,578 persons of which over 85% population is rural and 16.50% being predominantly tribal. One of the inevitable consequence of the construction of the dam is the large scale displacement and rehabilitation of the people. In addition to displacement, the project will cause loss of vast tracts of arable land and forests on which the economy of the people depend. Based on the conclusions drawn from the baseline study following impacts on the socio-economic conditions can be visualized.

1. The economic life of the people in the project area, irrespective of caste, revolves around agriculture and allied activities (Table 3.72 and 3.79). About 61.5% of the population in revenue villages and 82.5% of the population in the forest villages are engaged in agriculture (Table 3.66). Even the land for land compensation will not ensure the compensation of land of the riverside farmers that are mostly fertile, enriched by the silt deposited on the river bank. These agriculture land are usually well drained and capable of yielding multi crops even without irrigation. No amount of compensation can would replace the productivity of these lands lost to submergence.

2. Next to agriculture, forest constitutes an important source of subsistence for villagers irrespective of the caste, occupation and size of the landholding. They are dependant on the forest for fuel, fodder, timber and NWFP. From the socio-economic survey it was found that people, both in revenue and forest villages, with less than 30 ha of agricultural land (i.e. marginal and small farmers) and landless are relatively more

dependant on forest. 33.3% of the income of landless families in forest villages come from collection of NWFP and fishing. People are totally dependant on forest for fuelwood. Apart from being used for cooking, wood is also used for warming and light in winter. A household requires 14.72 kg/day of fuelwood in revenue villages and 23.98 kg/day in forest villages in summers whereas this demand increases in winter. Thus forest constitutes an important source of fuelwood and NWFP. On the relocation of people from forested tracts to areas affording little forest based resource dependency the lifestyle of the people would become totally incompatible with the ecological setting. This would obviously result in further decline of their income. The inadequate supply of the raw material for household industry in the changed scenario and the diversion of cash from the meagre for the purchase of substitutes for forest based resources (cooking gas, kerosine oil, wood and fodder) would result in the economic instability of the people particularly in the forest villages.

3. Some people in the project area supplement their income by rearing livestock. Plenty of grazing land and fodder is available from the forests in the proposed submergence to sustain the livestock population of the forest dwelling community. Of the total inhabitants of the project area 93% of the population depends on forest for fodder (Table 3.71). Failure to provide sufficient grazing lands for livestock in the rehabilitation sites would constrain the people to sell their livestock. This would deprive the people of the income from livestock which remained an important source of income in the rural setting. It is also evident from our data on income (Table 3.72, 3.74, 3.76, 3.78, 3.80 and 3.82) that livestock contributes nearly 5% of the total income.

4. Fishing is the major source of income of the fishing community (Dhimars) found in forest villages. The experiences from the past are plenty to visualise a scenario in which the large contractors made a profit by using the reservoir for fish resource (Pers. Comm. with oustees of Tawa project, 1993). The Dhimars or fishing community would have no excess to fishing in the reservoir. This would not only result in the serious impact on the economy of the fishing community but would also limit the fish resource available for consumption to the Dhimars.

5. The socio-economic survey indicates that a large percentage of the population

In the project area were unskilled and illiterate. The average literacy per family was 30.81% in forest villages and 21.66% in revenue villages. The people inhabiting areas in the vicinity of the forest derived directly or indirectly a substantial part of the income by rendering services as labour in the department of forest. Unskilled and illiterate lot of the villagers would be deprived of any other employment opportunity after the rehabilitation occurs. This would result in the serious impact on the socio-economic condition of the people whose income is largely substantiated by the daily wages.

6. Drop in income and rise in expenditure would cause an imbalance in the economy of the people in the project area, irrespective of caste, landholding and occupation pattern. From the results of the survey it was found that the families have no net saving as the expenditure in all income groups remains higher than the income (Table 3.72 and 3.73).

The rehabilitation will further widen the gap between the income and expenditure as the source that offer supplement to the income would only diminish in the post project scenario. Further the diversion of income in purchase of commodities that were freely available in the pre project scenario from the forest areas would be a major dent in the economy of the forest based resource dependent rural community of the Narmada Sagar Project area.

The impacts on socio-economic status of the people would have still more adverse long term consequences of the disruption of the symbiotic relationship between man and nature. The forest dependent people would be forced to find alternative means of sustenance in the post project scenario. The inadequate rehabilitation and compensatory measures would increase the number of landless people. The agitated and hapless lot of villagers whose agriculture land would strive to maximize the agriculture production by clear felling the forested areas and wildlife habitat in the residual areas that have better stocked forest and undisturbed habitats for wilderness species. The hunter gatherer tribals would also fend for themselves forest resources from the residual areas. As a consequence of this, the biodiversity and natural resource conservation of some pristine forest and prime wildlife habitats would be threatened by the predatory attitude of the oustees towards land and resources.

4.2. IMPACTS OF OMKARESHWAR PROJECT

4.2.1 Impacts on Vegetation

1. The submergence of large forest area i.e. 52.77 km² due to the Omkareshwar Project is a direct loss of floral values from the area.
2. Although none of the plant species lost to submergence are endemic, rare, endangered or threatened, their significance is largely due to their very limited distribution within the study area. Species like *Terminalia belarica*, *Feronia elephantum* and *Cayratia trifolia* have limited distribution in the project area. The submergence of these species would reduce the overall diversity of the area. Detailed distribution of plant species is given in **Appendix 3.21**.
3. *Hardwickia binata* has a very patchy distribution in the stretches of forest both within the proposed submergence and in the areas lying outside. Loss of *Hardwickia binata* to submergence is a direct loss of valuable fodder resource which cannot be compensated by the patchy distribution of this species in forests adjoining the submergence area (Plates 4.7 and 4.8).
4. Tribal community of this area have varied and many ethnobotanical uses of most plants found in the region. Excessive exploitation of the species having limited distribution may result in local extinction of some plant species.
5. The irreversible loss of all the association types, found in forest stretch within the proposed submergence, is inevitable. One unique association - *Tectona-Kastar-Cassia occidentalis-Holarrhena* is found only in the submergence area of Omkareshwar Project and loss of this unique association due to submergence cannot be compensated through any mitigation planning.
6. Our results indicate that the area under proposed submergence is already under tremendous anthropogenic pressure. The submergence of the area would lead



Plate 4 7

Submergence of *Hardwickia binata* and its exploitation for fodder from areas with restricted distribution would be a significant post project impact



Plate 4 8

to a shift of these anthropogenic pressures to the adjoining forest. As a result of this accentuation of anthropogenic activities in the adjoining forests, vegetation structure and composition in these forest would be drastically altered (Plates 4.3 and 4.4).

4.2.2 Impacts on Wildlife Habitat

4.2.2.1 Primary Impacts

Primary impacts on wildlife habitat include all such impacts which will result in the direct loss of habitat due to the dam related development activities. This includes a direct loss of 52.77 km² wildlife habitat (forest area) due to impoundment by the dam. Forest area to be submerged by the project includes areas of Chandgarh and Nimanpur reserved forests and Selani protected forest on north bank of the river Narmada, and Punasa reserved and protected forests and Gunjari reserved and protected forests on south bank. Entire 52.77 km² wildlife habitat to be lost directly due to impoundment is under medium quality type (Table 3.94). About 0.98 km² wildlife habitat has also been cleared for the construction of hydroelectric generation units, main canal, link canals, project colony near Omkareshwar and Sanawad, bundings and roads. This will also be a direct loss of the wildlife habitat of medium quality type which has come under direct impact of Omkareshwar project.

Omkareshwar Project would submerge riparian stretches along Narmada, Ajnal and Kaveri rivers. Submergence of a riparian habitat of 35 km length along Narmada and 10 km length of Kaveri and Ajnal rivers would be a direct loss of wildlife habitat. These riparian forests may not be of very high quality because these have been subjected to constant biotic pressures but are certainly the only available riparian stretches being extensively used by wild animals of the area. The loss of such riparian habitats cannot be compensated as no pristine stretch would be left along Narmada after the completion of all the dams proposed under Narmada Valley Development Project.

4.2.2.2 Secondary Impacts

The contiguous forest zone of Punasa forest range adjacent to the Omkareshwar submergence zone on the south bank is comparatively good in quality (18.75% is of good and 81.25% is of medium habitat quality category) than that of submergence zone (100% medium quality category). In the contiguous forest zone apart from current use of this area by inhabiting wildlife and people, expected shift of resource use pressure of wildlife and 5,000 people (half of the displaced population) and their livestock will result in the deterioration of existing wildlife habitat quality to poor quality habitat. Anthropogenic pressure from southern bank of Narmada Sagar submergence zone will also shift to this area after displacement of the people from that area. Similar indirect impacts can be visualised in the contiguous forest zone (Nimanpur reserved and Selani protected forest) on north bank of Narmada.

4.2.3 Impacts on Large Mammalian Fauna

1. Punasa and Chandgarh Reserved Forest and Gunjari and Selani north Protected Forests together support diverse wild mammalian fauna. Some important species are tiger, leopard, sloth bear, sambar, barking deer and giant flying squirrel.
2. In contrast to Punasa and Chandgarh Reserved Forests mammalian diversity in Selani north and Gunjari protected forests is already low due to the high level of biotic pressures operating in the area. Biotic pressures have considerably altered all the natural habitats in the entire project area. It is therefore understandable that with the progress in the activities associated with dam construction, these biotic pressure would increase manifold and lead to further degradation of habitat quality.
3. Construction of Omkareshwar dam and resultant submergence will not only cause the loss of 5375 ha of habitat but would further fragment the habitat contiguity between north Selani PF and Nimanpur RF on the north bank and between Punasa RF and Gunjari PF on the south bank of the Narmada river.

This fragmentation will adversely impact territorial species like tiger and leopard which require large contiguous forest tracts. Habitat fragmentation would also adversely impact common giant flying squirrel, a frugivorous arboreal species, by breaking the canopy contiguity crucial for their movement. This will further compromise the conservation of diversity.

4. All the future islands that would form in post impoundment scenario would be too small (not exceeding 5 km²) to support viable population of large mammalian fauna.
5. The only aquatic mammal found in Narmada river in the area is smooth Indian otter (*Lutra perspicillata*). This species uses rocky stretches along the river for denning (holts) and littering sites (Plate 2.4). Submergence of this crucial habitat along a 100 km river stretch due to Omkareshwar and Narmada Sagar dams will adversely impacts the otters. Inclusion of a 10 km free Narmada river stretch in the proposed PA cannot adequately compensate or mitigate this loss.

4.2.4 Impacts on Avifauna

1. Distribution of forty different bird species in the forest areas reflect potential richness of woodland bird habitat. The submergence of this woodland habitat would be a direct and irreversible loss to the overall avian diversity of the area (See Appendix 3.22).
2. Narmada river and its tributaries have great potential to support diverse riverine bird communities. Thirty species of birds have been recorded from this riverine stretch. These communities will be adversely impacted by the proposed submergence. Changing a lotic riverine ecosystem to lentic reservoir, would adversely modify the existing habitat conditions and impact most of the migratory bird species like pintails, ruddy shell ducks and waders.

4.2.5 Impacts on Socio-economic Conditions

It is now widely acknowledged that developmental projects often lead to the narrowing of the natural resource base essential for the survival of the economically poor and powerless, either by direct transfer of resources away from basic needs or by the destruction of the essential ecological processes that ensures renewability of the life supporting natural resources.

1. It is clear from the results of our socio-economic study of the area that man-resource equation is not optimum even in the pre-dam situation and if the proposed project submerges 9,393 ha of land including 5277 ha of forest area, the exploitative pressure upon natural resources will mount on the forests that lie around the reservoir putting man : resource equation under greater stress in fringe areas.
2. Our socio-economic study has further confirmed that while the economy of both revenue and forest villages in the submergence area derives most from agriculture, the direct and indirect contribution from forests adds to 28.5% for revenue villages and 57.5% for forest villages. Most of the forest areas close to habitation centres are degraded/ overused because of very heavy dependence of the people upon forests. When a substantial portion of forest areas will come under submergence, the residual forest areas will come under even greater pressure and an accelerated pace of degradation will set in leading to denudation, soil loss and decelerating productivity.
3. The drop in productivity will cause further over-use of the area. This will then be a recipe for further degradation of the overall conservation values, the flora and fauna included. Since a very substantial proportion of people are landless (47%), these are the persons who will be adversely affected economically also. In making this statement it is presumed that most of the people who are rehabilitated are going to settle close by i.e. still within the impact area of the project.

4. Land for land compensation can rarely be realistic. This has already been proved by post impoundment scenario studies of Rani Awanti Bai Sagar (Bargi) Project.

MITIGATION PLANNING

According to Webster's Dictionary mitigation is "the act of mitigating, abatement or diminution of something painful, harsh, severe alleviation". Mitigation is the development and implementation of specific measures to offset *unavoidable* losses associated with a particular land use alternative (Farmer, 1979). Development projects often make long term withdrawals from the "pool" of potentially productive and manageable wildlife habitats. Mitigation involves the management of habitats left in the "pool". However, as applied in practice, mitigation has seldom amounted to more than *post facto* token acknowledgement of some "unfortunate disruption". Where it has been addressed *ante facto*, mitigation may have been little more than a sugar coating to render a bitter pill more palatable (Jahn, 1979).

Worldover, there is now a discerning change in the approach towards planning of mitigation strategies. Mitigation is now being recognised as a continuing obligation to be carried out during the implementation of a project.

There are several examples of mitigation planning undertaken with respect to individual species subjected to adverse environmental impacts due to development projects (Mih and Bailey, 1979, Dorfman, 1979, Jaroslow, 1979). However, there are perhaps no examples of mitigation planning being undertaken with respect to a mega-development project like the present one. The compensation of the combined adverse impacts of Narmada Sagar and Omkareshwar projects is neither possible nor is being suggested here. These will have to be reckoned as the price for the perceived socio-economic benefits. Mitigating or even attempting to mitigate the entire environmental impacts of the Narmada Sagar and Omkareshwar Projects outlined in Chapter Four is a gigantic task and would require the active cooperation and effort of all the agencies involved in implementing this project. Mitigation planning can only minimize the severity of the impacts on biological resources that would be lost to the two projects

Submergence and diversion of forests and concomitant loss of floral and faunal diversity are some of the irreversible primary impacts of the proposed Narmada Sagar

and Omkareshwar Projects. An inevitable though indirect impact of the loss of these forests will be the further degradation of residual forests because pressures of demand will have to be borne by this much reduced area. In other words, the traditional land use and resource use practices would further aggravate the already vitiated situation of the man to forest ratio in the tract.

The present section deals with the basic approach towards mitigation planning to be adopted with respect to the two mega projects on the river Narmada and outlines the strategies to be implemented if mitigation planning is to become a reality. The underlying philosophy of the mitigation planning would be restoration of some of the aquatic vertebrates and delineation of a substantial area of the contiguous forest which has similar conservation values that are being lost in submergence and to elevate its status to a protected area- a combination of national park and sanctuary.

5.1 RESTORATION OF SOME AQUATIC VERTEBRATES

5.1.1 Restoration and Translocation of Otter

In the scenario explained in the previous section of this report, the otter population in the Narmada river submergence stretch will be a total loss. The mitigation plan suggested is based on a rehabilitation strategy using translocation as the method for the impacted population. Otter populations elsewhere in Narmada river needs to be located and their status and the habitat condition in such locations be assessed to examine the possibility of capture and translocation of the impacted otters of Narmada Sagar into these identified localities. Otters being social group living animal, new introduction may bring problems, however, this mitigatory strategy is based on the assumption that there remains several vacant niches for otters in Central Indian rivers in the light of large scale confiscation of otter pelts that (TRAFFIC-INDIA) may have originated from the Central India.

5.1.2 Restoration of Aquatic Reptiles

In a bid to restore quickly the impacted population, a turtle species restoration

plan is suggested. The target species for this programme will be the softshell turtle, *Aspiderates gangeticus* and *Lissemys punctata* within the submergence zone. However, the hardshell turtle restoration is proposed to be carried out in zone 1 (Joga Kalan Fort to Imali Ghat) and zone 7 (Dam site to Sarni Ghat) (Fig.2.5). The hardshell turtles of the genus *Kachuga* needs to be restored in other stretches of the river with rocky structures and sandy banks. These locations need to be surveyed both upstream and downstream of the submergence zone. The Muggar crocodile should also be a target species for restoration. The restoration programme should be based on captive rear and release strategy as is in practice for crocodilians in various states including Madhya Pradesh at Deori, Morena district.

5.2 PROPOSAL FOR NEW PROTECTED AREAS

Conservation communities worldwide have accepted that establishment of protected areas is one of the best means to ensure the long term security and integrity of the conservation values of flora and fauna. The establishment of protected areas in many parts of the country in the last three decades has largely been an outcome of a growing concern for mitigation of the environmental degradation. Protected areas are an indispensable element of conservation because they maintain the essential ecological processes that go with natural ecosystems. They preserve the diversity of species and the genetic variation within them, they maintain the productive capacities of an ecosystems and safeguard habitats critical for the local range of species (McNeely and Miller, 1984).

We suggest the establishment of three new protected areas for mitigating the environmental impacts of Narmada Sagar and Omkareshwar projects. The proposal includes setting up of:

(i)	Narmada National Park	475.22 km ²
(ii)	Surmanya Sanctuary	163.70 km ²
(iii)	Omkareshwar Sanctuary	119.96 km ²

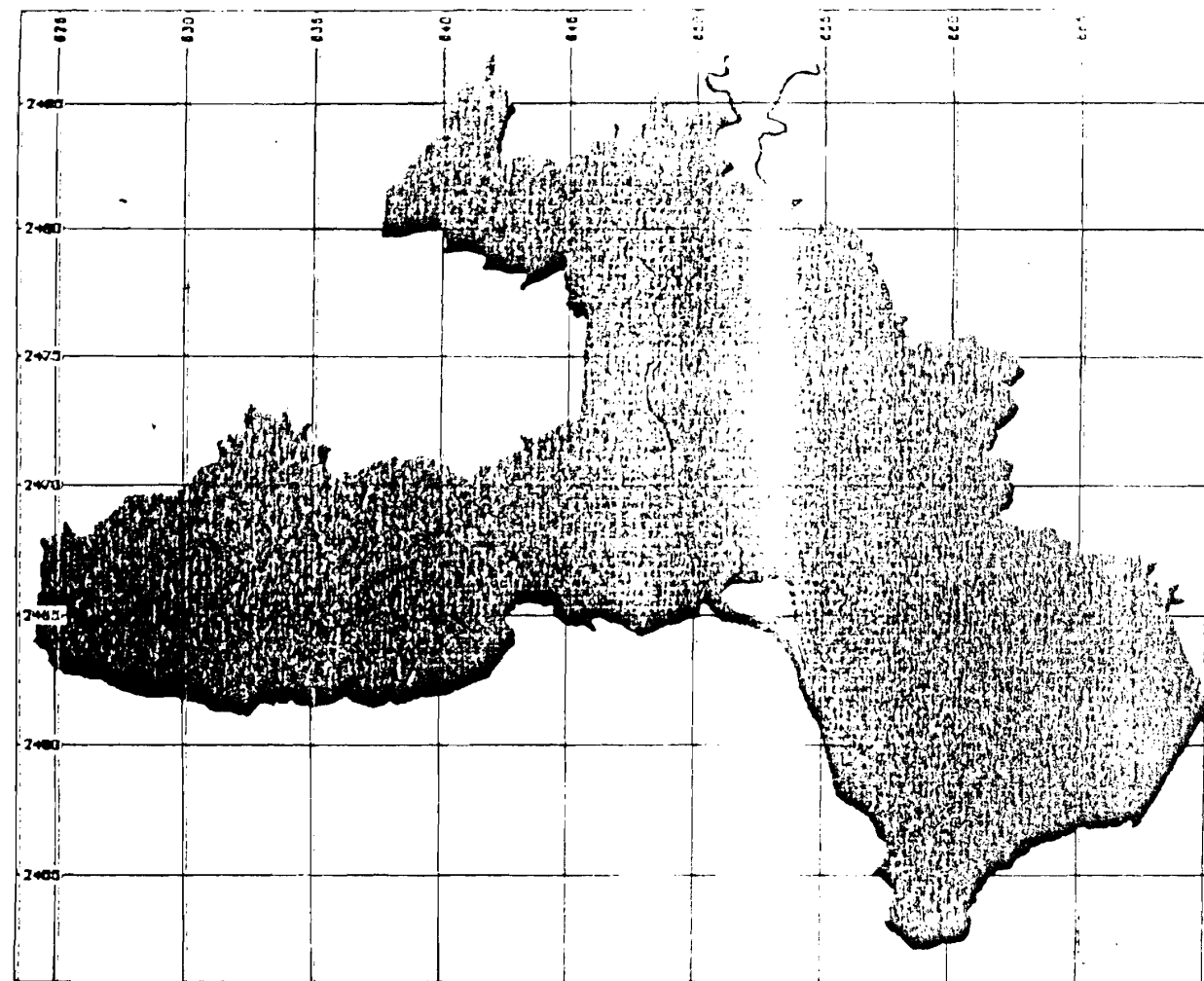
	Total	758.88 km ²

The area and compartment details of these PAs are given in Appendix 5.1 and, Figs. 5.1 and 5.2.

The twin objectives of conserving wildlife and providing sustenance to forest dependent communities has been central in suggesting these protected areas. No area smaller than this can be visualized to provide mitigation for impacted biological values and to accommodate the forest based needs of the local people. The PAs include portions of Satwas, Main vindhyan, Punasa, Chandgarh, Nimanpur, Mundi, Baldi, Kantaphod, Punjapura, Udainagar Reserved Forest of Dewas and Khandwa Forest Divisions (Fig. 5.1). This area is the only compact contiguous forest in the tract and occupies the surrounds of the lower Narmada Sagar and upper Omkareshwar reservoirs. This has been well known for its rich wildlife and wildlife habitats. As the forests included lie next to the two reservoirs, these would also be able to offer refuge to wild animals displaced by submergence. We have based our recommendations on careful field research over three years coordinated by a Geographic Information System (GIS) overview involving satellite image interpretation and ground truthing. We have also had the benefit of discussions and joint field visit with Shri J.J. Dutta, Retd. Principal Chief Conservator of Forests, Madhya Pradesh and the proposal is the outcome of these collective efforts. A joint, Wildlife Institute of India (WII) and Indian Institute of Remote Sensing (IIRS), Dehradun, remote sensing survey of the proposed protected areas was conducted between October, 1993 to April, 1994 for preparation of the thematic maps of geomorphology, vegetation, drainage, landuse and water resources. Interpretation of satellite imageries (SPOT FCC, 1988) was done and the thematic maps developed were digitized for carrying out analyses using GIS software, GRASS. The detailed report of the WII-IIRS remote sensing survey is being submitted separately.

5.2.1 Biological Values

The area largely has dry deciduous teak forest with *Acacia leucophloea*, *Hardwickia binata*, *Aegle marmelos*, *Lagerstroemia parviflora*, *Diospyros melanoxylon* and *Anogeissus latifolia* as the top canopy associates (Plate 5.1). In the high elevated areas, although teak predominates, the characteristic mix includes *Hardwickia binata*, *Odina wodier* and *Boswellia serrata* in the top storey and *Gymnospria montana*,

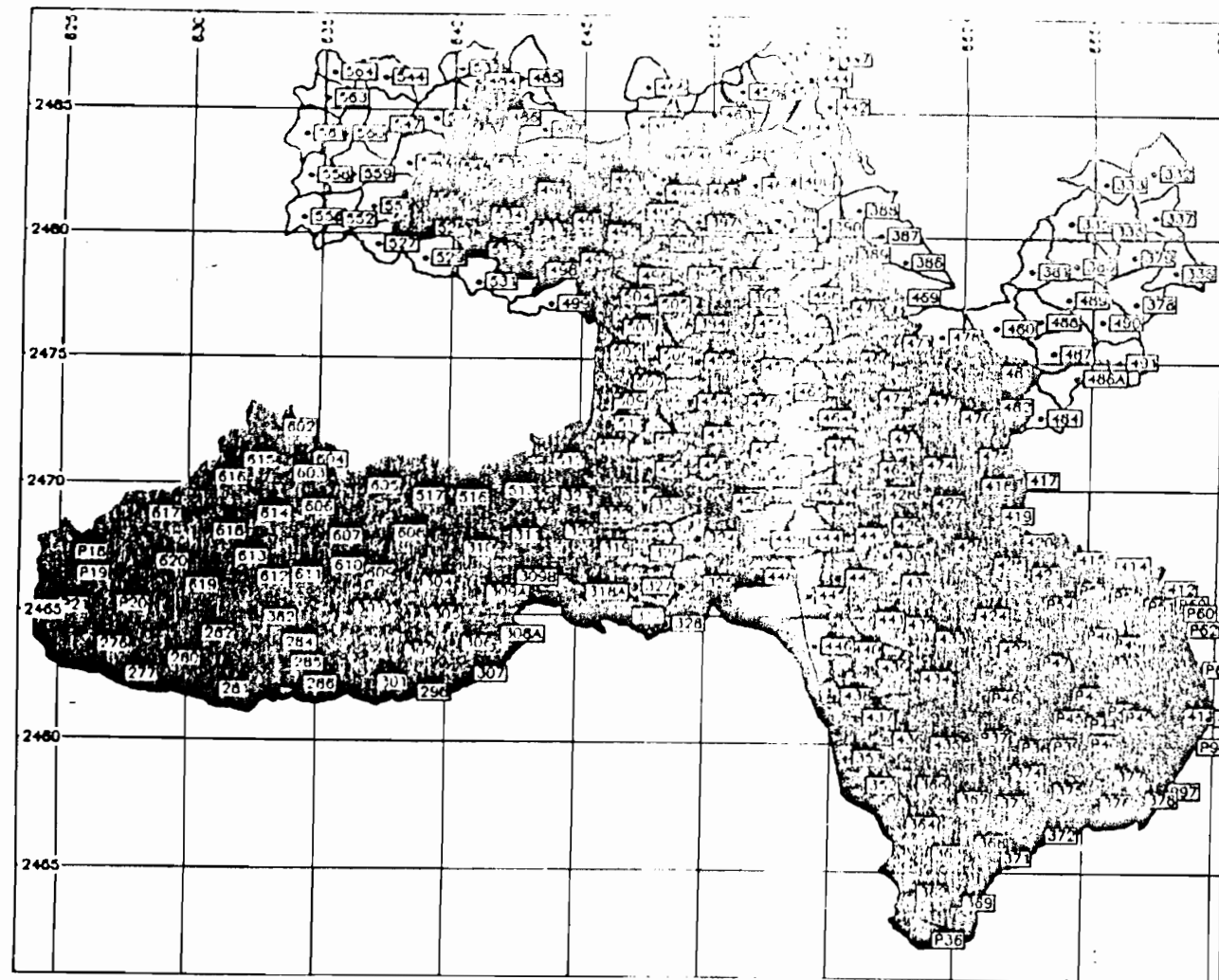


SCALE: 1 : 213891



1. Gir Forest National Park - 163.7 sqkm
2. Gir Forest Sanctuary - 119.96 sqkm
3. Gir Forest Sanctuary - 425.22 sqkm
4. Gir Forest Sanctuary

Fig. 5.1 Map of the proposed protected areas



SCALE: 1 : 218891



Fig. 5.2. Compartment details of proposed protected areas

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Surmanya Sanctuary - 163.7 sqkm
 Omkareshwar Sanctuary - 119.96 sqkm
 Harmada National Park - 475.22 sqkm
 River Harmada

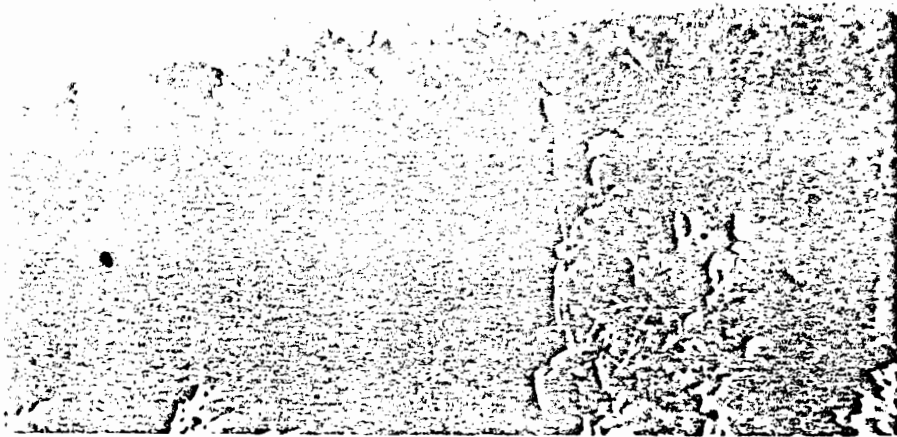


Plate 5 1 Undisturbed and well stocked forest within
the proposed protected areas



Plate 5 2 The riparian area of Khadi river that would form
parts of the proposed protected areas

Flacourtia ramontchii, *Holarrhena antidysenterica* and *Zizyphus xylopyra* in the understorey. All the eight forest types of the Champion and Seth (1968) Classification viz. 5A/C1a - very dry teak forest, 5A/C1b - dry teak forest, 5A/C3 - southern dry mixed deciduous forest, 5/E2- *Boswellia* forest, 5/E4 - *Hardwickia* forest, 5/E9 - Dry bamboo brakes, 5/1S1 - dry tropical riverine forest and 3B/C1c - Slightly moist teak forest; would be lost to submergence of Narmada Sagar and Omkareshwar Projects are represented in the proposed NP area. 369 plant species in 256 genera of 76 families contribute to the floral diversity of these forests. Presence of thirty mammalian species including tiger, leopard, barking deer and flying squirrel is confirmed from the proposed NP.

The forage volume and the shrub density are higher in the contiguous forest of the proposed PAs as compared to the forests in the submergence and impact zones. Riparian areas, springs and other water sources, which are exceptionally important and deserve special protection are found in the proposed PAs. One perennial river (K) adi ensures year round water availability in a large portion of the NP (Plate 5.2)

The proposed NP also incorporates the only residual stretch of free river portion of Narmada (10.5 km) between Omkareshwar and Narmada Sagar Projects. It is to be recognized that with the implementation of these two major projects nearly 100 km length of the free river ecosystem will get transformed into two reservoir ecosystems leading to a very substantial loss of riparian habitats including major natural riverbed islands (as distinct from a few hill islands which will be formed within the submergence area). At the same time the two reservoirs will be a new ecosystem type added to the tract. A segment of this new type also features in the proposed NP. Besides catering to ecological concerns, such a PA covering reservoir segments will provide a fish breeding nursery and thus greatly support the fisheries in the non-PA segment of the reservoirs where commercial fishing would be permissible.

Besides the above ecological and biological attributes, a major consideration in defining the boundaries of the proposed PAs has been the relatively much lower pressure of the local biomass demands upon the forests included. The area suggested is compact, contiguous and reasonably removed from major habitation tracts. The entire area has just 18 very small to small villages, many of which are already slated

for rehabilitation because of their falling in the submergence area (**Appendix 5.2**).

Contiguity of habitat, low anthropogenic pressures and the presence of riparian stretches are features ideally suited for bringing this area into the protected area network. Habitat evaluation studies reveal that the forest in the proposed area is eminently suitable for the local fauna typified by indicator terrestrial ungulates viz. chital and sambar. Such suitability would be enhanced after the upgradation of its status to a protected area.

A record of 204 bird species representing 52 families from the area is a reflection of the richness of avian fauna and diversity that is typical of contiguous and relatively undisturbed central Indian forests.

The proposed configuration for the PA lends some special features to it. The largest forest island (20.4 km²) that would be formed on the south bank of Narmada by the inundation under the Narmada Sagar would be within the proposed NP. In addition to direct contribution to conservation, this would also enable studying the ecology of communities trapped in an artificially created island situation, with the main land NP serving as a bench mark. This and other smaller islands would of course provide special habitats for most water birds. Its value in acquiring knowledge about pre-torture changes in islands of sudden artificial creation will prove useful in visualising impacts as well as appropriate management imperatives in similar situations in future.

5.2.2 Boundaries and Zonation

The alignment of the proposed PA boundaries so as to include a part of the reservoir ecosystem, the draw down areas and contiguous forests, provide a good mix of habitats with concomitant floral and faunal values. By appropriate management measures in the fringe forests and the draw down areas, the overall habitat values can be brought up over a period of time. This would thus be some mitigation of the loss of flora - fauna values inherent in the free river and riparian ecosystems.

No protected area can become successful in isolation from local people.

Therefore, the two objectives of conserving wildlife and providing sustenance to the forest dependent communities can be best achieved by a proper zonation of the proposed PA. A disturbance free core zone of 475.22 km² as Narmada National Park surrounded by Omkareshwar (119.96 km²) and Surmánya (163.70 km²) sanctuaries as a buffer that can simultaneously accommodate the penumbral habitat needs of wildlife as well as partly the biomass needs of the neighbouring people, is being recommended. There are about 30 villages on the fringe of the proposed PAs (Appendix 5.3). An ecodevelopment package comprising on-farm and off-farm income generation activities and rationalised utilization practices for forest biomass, is being suggested which can bring back some of the lost man-resource balance.

5.3 ECODEVELOPMENT PLANNING STRATEGY

If an integrated perspective of the post-dam scenario combining the changed demographic patterns, the much higher pressure on forests at the reservoir fringes and the coming into being of the recommended protected areas is visualised, the present scope and direction of compensatory afforestation shall have to be reconsidered. A realistic approach should not merely look at land to land compensatory afforestation (which includes restoration of degraded forests) but rather seek to ameliorate the extremely stressed equations at the fringes. It is a well known experience of the forest department that whenever restoration (through afforestation) of degraded forest has been undertaken, the success is short lived. So long as the watch and ward continues the plants survive, and once this is withdrawn the degradation sets in again. This is primarily because a simplistic afforestation attempt does not take into account the gap in demand and supply. When a certain area for restoration is taken out of people's use by enforcement measures, it shows good recovery, but the needs of the people are not reduced and their pressures are diverted to certain other areas. Once the protection is withdrawn people find the rehabilitated resources too tempting. Degradation again is then but a natural corollary. What is, therefore, really required is a package of measures which seeks to reduce this dependence, provide alternatives, as well as involve people in the now well established joint forest management approaches. This conforms to an ecodevelopment approach, which needs to be followed if compensatory afforestation is to succeed. Ecodevelopment will also be necessary to be introduced

even on a higher priority in the buffer zone and the surrounds of the new protected area.

5.3.1 Ecodevelopment Measures

Ecodevelopment is seen as a site specific conservation friendly package of measures for rural development and use of biomass resources so as to be of help in bringing up the socio economic condition of the people while at the same time supporting effective conservation of forests in general and protected areas in particular (Panwar, 1992).

- Enhancing sustainable economic productivity of Private Property Resources (PPRs), as well as augmenting incomes from on-farm and off-farm activities, so that communities have less economic dependence upon the resources of the protected areas.
- Enhancing productivity of the buffer zones especially to meet the resource needs of people while rationalizing practices for gathering/utilizing the resources.
- Providing technology to improve efficacy of use of conventional resources and to promote use of substitutes, where necessary and feasible.

Ecodevelopment measures in a given area are bound to need inputs at levels higher than presently going there, but it is not visualized as an investment intensive programme. The main criteria of success will be trust building and full participation of people in the planning process and in the implementation of the package. Another requirement will be the redirection of the present inputs from other rural development agencies to pick up related components of the package. The importance of credible NGOs in this effort cannot be overemphasized, especially in trust building with people as well as trust worthy feedback at all stages of planning and implementation. If credible NGOs do not exist or cannot be attracted, their formation may have to be catalysed. Having said so, it is necessary to emphasize the nodal role that the administration (forest department and rural development agencies included) shall have

to play because the aim of the whole exercise is also to achieve strengthening of conservation of wildlife and biodiversity and promote local acceptance of PAs.

Ecodevelopment may not succeed if prior effort is not invested in formulating a holistic and site specific plan prepared with full participation of people. Use of participatory rural appraisal (PRA) methods in the planning exercise and later for monitoring the quality and the impact of implementation will be essential.

An illustrative inventory of possible activities under eco-development is given at **Appendix 5.4**. Different sites may lend themselves to different combinations of such activities. It is stressed that innovativeness will be the password in eco-development and that the best source of ideas will be the people themselves.

There are excellent examples of successful joint forest management and eco-development not too far from the project area. These can be seen in Harda and nearby forest tracts of Harda Forest Division where the present Divisional Forest Officer Shri B.M.S. Rathore has been successful in not only achieving excellent forest recovery but also in substantially enhancing the economic conditions of the forest dependent people. The present Divisional Forest Officer at Dewas Division (from which a sizeable area of forests is proposed to be included in the recommended PA), Shri Mudit Kumar Singh also has a similar rich experience having done some very good work in Jhabua forest division before coming to Dewas. With the help of these examples it should not be difficult to develop packages of restoration of the forest areas outside the submergence zone, as well as application of eco-development in the impacted tract as a whole.

A detailed Management Planning and Eco-development Planning exercise shall have to be taken up to decide the either way influence zone of the PA lying outside the core-buffer unit. This will be designated as the eco-development zone.

As has been seen in Tawa and Bargi dam projects, the draw down areas of the reservoirs are taken over by the people for cultivation. It is strongly urged that no such cultivation should take place within the reservoir area included in the PA and certainly

not in the core segment of the PA. If at all the very fringe sections of the draw down areas within the buffer zone can be considered for cultivation. It is also stressed that cultivation of draw down areas in the buffer zone as well as in the identified ecodevelopment zone should become a well planned activity of ecodevelopment. This should also include lift irrigation support so as to derive highest benefits from such cultivation of draw down areas for the landless, as a strategy for mitigating pressures on the residual forests.

Fisheries again will not be permissible within the core zone of the protected area. Even outside i.e. in the buffer zone and the ecodevelopment zone, this should be organised in such a manner that intermediaries do not take away most of the benefits. User group cooperatives, cold storage and marketing facilities should become a part of the ecodevelopment package.

A very important aspect of ecodevelopment will also be a gradual reduction in the number of scrub livestock and their substitution by smaller number of cattle of better breed. This should be accompanied by pasture development and, where feasible green fodder farming in the permitted draw down areas.

The next most important measure will be to provide alternatives for domestic energy in the form of fuel efficient chulhas, gobar gas plants and solar cookers. Solar powered street lights can be another application in villages/households where there is no electricity.

The colony at Narmada Sagar and Omkareshwar for the Project construction and management will eventually grow into townships. If not visualized and provided against now, the pressure growing from them will lead to degradation of nearby forest areas. A very important aspect of the town planning should, therefore, be the creation of a proper sewerage system. The sewage collected should be treated before discharge not only to take out the pollutants but also to generate bio-gas which can atleast meet the needs of the hotel/restaurant industry in these townships.

It would be seen that the proposed PAs encompass the catchment and

submergence areas of both Omkareshwar and Narmada Sagar Projects. The onus for meeting the PA management and ecodevelopment costs should hence be shared by both these projects.

ANNEX-XXV.Min-(5).

IMPACT ASSESSMENT OF MADHYA PRADESH LANDS
TO BE SUBMERGED UNDER SARDAR SAROVAR PROJECT
AND ADJOINING ECOSYSTEM: FLORA, FAUNA AND
OTHER BIOTIC COMPONENTS

NARMADA VALLEY DEVELOPMENT AUTHORITY
NARMADA BHAWAN: BHOPAL-(M.P.)

....

(FUTURE STRATEGIES FOR FOREST MANAGEMENT IN
SUBMERGENCE AND IMPACT AREAS AND SUMMARY OF
OBSERVATIONS)

.....

BY

STATE FOREST RESEARCH INSTITUTE, JABALPUR-(M.P.)

YEAR- 1994

CHAPTER VII)

Forest Management in submergence and impact areas

It is considered that for the purposes of integrated forest management the forests in the submergence zone (excluding forests that will actually be submerged) and the forests in the impact zone should be constituted into one unit for special development. Such development should be based on three cardinal principles, namely (i) ecological and environmental security,

meeting the reasonable requirements of the local population in respect of timber for agricultural implements, rural housing

required for their bonafide consumption, and (iii) providing forest and self employment opportunities to the local population.

In the interest of ecological security, the first step should be to prevent or minimise soil erosion and water losses in the area, which forms a part of a larger Sardar Sarovar catchment. This will not only be conducive to the restoration of the ecological balance, but will have a beneficial effect on the Sardar Sarovar reservoir itself by slowing the process of sedimentation. The first step in the special development of this area will therefore, be catchment protection work, both engineering and biological. This coupled with skilled forest management is expected to lead in due course of time to the re-establishment, of the indigenous forest ecosystem and local biodiversity.

As regards meeting the requirements of the local

population in respect of timber, fuelwood etc., a quantification of the requirements is necessary, so that definite goals could be set not only in terms of the area to be treated each year but also in terms of the quantity of material that has to be produced. The important items are discussed below.

1. Fuelwood

Detailed investigation have been carried out both in the submergence zone and the impact zone to arrive at the quantities of fuelwood that is actually consumed. These have been shown in tables 5.31 to 5.36 & 6.16 to 6.21.

It has been brought out that villagers both in the submergence and impact areas do not use fuelwood alone to meet their domestic requirements. They also use agricultural residue like cotton and juwar stalks and cattle-dung-cakes to meet their domestic requirements. It has also been brought out that the proportion of fuelwood and agriculture residue varies with the distance of the village from forests. In villages close to forests more fuelwood is consumed than agricultural residue; conversely in villages that are situated far away from the forests, more agricultural residue and less of fuelwood are consumed. There is no significant difference in the consumption of cattle-dung-cakes. The summarised position is that in all, about 2,67,000 M³ (solid) of fuelwood is consumed both in the submergence and impact zones. There are no statistics on the actual production of fuelwood from the forests in the study area. An estimate has to be made from the growing stock figures that were collected during the study. The total growing

stock over an area of 1,537 ha actually enumerated comes to about 10,340 M³. Assuming a rotation of 50 years for these forests, the annual availability comes to 207 M³ or 0.13 M³/ha/year. The forest area mostly in a degraded condition, available for the development in all the 3 districts is estimated to be 660 sq. km. Assuming that the annual availability from these forests would be the same as from the forest actually enumerated, it is estimated that at present they are capable of producing only about 8,600 M³ of wood (timber and fuelwood) which is less than 3.5 per cent of the actual requirements of fuelwood alone, which will increase with the population increase in the coming decade.

Timber

The study did not include the assessment of the requirements of timber for agricultural implements, rural housing, etc. However, the Working Plan Officer, Dhar has estimated the requirements for the entire Dhar district which works out to about 0.07 M³ per capita per year. On this basis the total requirements of the population in the study area comes to about 19,250 M³. The actual production of timber from the forests enumerated is not available but is assumed to be a negligible figure. Fortunately however Jhabua is fairly rich in teak; Dhar and Khargone also have a small proportion of valuable timber species. Other species which have a timber value also occur. It is considered that the forests should be managed for combined production of household timber and fuelwood, though this would be herculean task.

Bamboo

Bamboo does not occur in any of the forests covered by

the study except, may be, in negligible patches. The fact however remains that bamboo, widely recognised as the poor man's timber, is required everywhere for a variety of purposes. It has been estimated by W.P.O., Dhar that the per capita requirement is 3 bamboos per annum which appears very reasonable. It is also doubtful if bamboos can be raised in a concentrated form in any of the forests in the submergence and impact zones. A big fillip can however be given to the production of bamboos under farm forestry and agroforestry schemes. This will be referred to later.

Fodder

The population of cattle, including sheep and goats, in the study area is about 1.65 lakhs. From available studies the required quantity of grass per cattle head per annum is about 1 tonne (dry). This is supplemented by a larger component of crop residues (1.5 tonnes) and other items of cattle feed. The production of grass from the study area is not available, neither can a reasonable estimate be made. The scope for production of fodder combined with forestry for timber-cum-fuelwood in the forests will be limited. In view of this intensive management of village wastelands, particularly village grazing grounds under agroforestry or silvipastoral system is recommended. This will again be referred to in a later section.

As already brought out earlier all the forests in the submergence and impact zones should be brought under an intensive management plan to cater to the ecological, environmental and economic requirements of the region.

Badwani division of Khargone district which includes a considerable portion of the study area has no Working Plan. It is urgently necessary to bring the forests of Badwani division also under a suitable working plan or area treatment plan. Jhabua division is covered by an obsolete working scheme. The Working plan for Dhar is for the period 1989-90 to 2003-2004. There is also a government ban on felling of forests in all the three divisions. However, the area covered under the study should be brought under a special management plan to cover the objectives referred to above. It may be repeated that the proposed plan for the study area should be based on the principles of conservation and rehabilitation of degraded forests and sustained research for upgradation of technology is also needed. It needs to be stressed that a prerequisite for the application of any technology would be (1) complete protection from fire and (2) very stringent control on grazing in the development areas. An intensive campaign for forestry-cum-environment awareness, and people's participation, backed by developmental legislation to the extent necessary, should also be launched without delay.

An estimate may be made of the potential production from these forests, all of which have been shown under site quality IV in Working Plan maps, though extensive areas have also been shown as under stocked or blanks owing to the crop density being below 0.4. Another ailment with these forests is the overpening of immature trees; no tree is allowed to grow up to the mature stage or even to the pole stage. What is actually found in the forests is largely bushy growth, which however has a large component of locally valuable species. Under a regime of strict

protection and suitable management supplemented by plantation to the extent necessary, most of the forests can be expected to recover themselves within a period of, say about two decades. studies carried out by SFRI indicate that over these site-quality forests it should be possible to obtain yields up to $3.5^3/\text{ha}/\text{year}$. If this is assumed as a working basis, the forests can under appropriate inputs be expected to yield upto 2,31,000 m^3 of timber and fuelwood per year which will take care of the bulk of the present requirement of about 2,86,000 m^3 of timber

requirements due to increase in population and unpredictable risk factors. A massive social forestry programme should be launched, which will not only supplement the production of timber and fuelwood, but will also augment the production of species like bamboo, which does not occur over most of the natural forest. The farm-forestry component of social forestry will also, hopefully, add to the income of the farmers.

Experiments carried out by SFRI indicate that a number of species is available for growing in plantations in these forests. At Nepanagar field centre of SFRI some of the species are also reported to be showing promising growth. In addition to these, there are also other species not experimented upon in the area, but which can be grown. A full list of species is given at the end of this chapter. There would be no escape to the introduction of quick growing exotics in the interests of stabilisation of soil and meeting the requirements of the people in as short a time as possible.

Social Forestry

It has been brought out in the preceeding paragraphs that even if all the forests in the study area were brought under intensive management, it will not be possible to meet all of the requirements of the local population of timber, fuelwood and other forest produce in daily use. An estimated gap of approximately 20 per cent of the present requirements will be left. Projections have also to be made for increased demand in the future. A number of assumptions have also been made to arrive at the estimated yield figures. There are also other risks involved in the present estimates.

Alongside with forestry in conventional forests, it is pointed out, the social forestry programme will not only be beneficial from the ecological angle but may also become remunerative in due course of time. Social forestry should therefore be properly organised outside the conventional forests, on village wastelands and village commons. Such lands are classified under the following heads in village papers.

1. Barren and unculturable wastelands
2. Permanent pastures and other grazing lands
3. Land with miscellaneous tree crops and groves
4. Culturable wastelands
5. Fallow land

A different category of social forestry can be organised in each type of land as under.

1. Barren and unculturable land

This type covers all barren and unculturable lands like

mountains, hills, deserts etc. which cannot be brought under cultivation unless at a high cost. It may be assumed that from the silvicultural angle also this will be a rather refractory type of land but a serious attempt should be made to put as much of the land as possible under tree cover.

2. Permanent pasture and other grazing lands

This type generally includes the village grazing lands. It will be appropriate to bring it under a silvipastoral system of management, that would combine the cultivation of fodder grasses and tree crops that will provide leaf fodder, small timber and fuel.

3. Village wastelands

This type includes all lands available for cultivation but not cultivated at present. It also includes fallows more than 5 years old. It is considered that an agroforestry system aiming at simultaneous production of agricultural and forest crops should be applied.

4. Fallow land

Except current fallows, other fallow land may also be brought under agroforestry giving preference to tree crops that would yield edible fruits and other items of food.

5. Net Area Sown

Strictly speaking, this does not form part of village wastelands, but on this type of land, which receives better protection and care than others, a massive farm forestry programme should be organised with the objective of not only increasing the tree wealth of the area, but also to bring in additional income to the owners of the land. Among the species

be used bamboo, which is a scarce commodity in the area, but both a household timber and raw material for paper industry, recommended to be introduced.

There are no reliable statistics for the area under each type of land in the study area. The district figures given below, may give an idea of the extent of land that may be available.

District/ Land use	(Area in ha) (1990-1991)		
	Dhar	Jhabua	Khargone
<hr/>			
(a) land put to non-agricultural uses	44,878	48,377	51,268
(b) Barren and unculturable lands	50,919	83,421	80,177
<hr/>			
Total	95,797	1,31,798	1,11,395
<hr/>			
2. Other uncultivated land excluding fallow land			
(a) Permanent pastures and other grazing lands	56,733	43,228	95,955
(b) Land under miscellaneous trees, crops and grooves	37	Nil	4
<hr/>			
Total	56,770	43,228	95,959
<hr/>			
3. Cultivated wasteland			
(a) land that can be brought cultivation immediately	7,896	5,712	9,923

(b) land that can be brought under cultivation after some improvement	6.185	4,873	4,331
(c) uneconomical patches of land	6.649	7,916	15.583
Total	20,730	18,501	29,837

4. Fallow land

(a) Current fallow	4,087	5,961	3,957
(b) Old fallow	4,383	4,238	8,395
Total	8,470	10,199	12,352
	5,01,071	3,58,417	3,10,540

Source: Table of Agriculture Statistics of M.P. 1950-51

Attachment Development

As in the case of any River Valley Project a considerable land area, both agricultural and forest, is lost under submergence. The production from submerged agricultural land is made up often more than made up, by increased production in the command area owing to irrigation facilities that would be available. This principle should be made applicable in the case of forest crops also scope for irrigated block forest plantations in the command area should be fully examined. In addition to this all the canal banks and roads on either side should be brought under strip plantations. Apart from converting a low-yield area to high-yielding assets, the plantations would also contribute towards canal bank stabilisation and the solution of problems like waterlogging and increased salinity.

List of Species suggested for planting

Agricultural Implements

1. Acacia nilotica
2. Chloroxylon swietenia
3. Grewia tiliaefolia

House Repairs

1. Albizzia amara
2. Albizzia lebbek
3. Albizzia procera
4. Bridelia retusa
5. Dalbergia sissoo
6. Dalbergia sissoo
7. Dalbergia sissoo
8. Gmelina arborea
9. Hardwickia binata
10. Tectona grandis

Furniture Making

1. Dalbergia latifolia
2. Dalbergia sissoo
3. Gmelina arborea
4. Tectona grandis

Fodder Trees

1. Acacia nilotica
2. Azadirachta indica
3. Bauhinia variegata
4. Ficus religiosa
5. Hardwickia binata

6. Holoptelia integrifolia
7. Leucaena leucocephala
8. Moringa oleosa
9. Sesbania grandiflora
10. Zizyphus jujuba

Fodder Legumes and Grasses

1. Cenchrus ciliaris
2. Cenchrus settoqerus
3. Dichanthium annulatum
4. Pennisetum pedicellatum
5. Pennisetum polystachyon
6. Stylosanthes scabra
7. Stylosanthes haemata
8. Stylosanthes scabra

Fuelwood

1. Acacia auriculiformis
2. Acacia catechu
3. Acacia nilotica
4. Acacia tortilis
5. Cassia siamea
6. Casuarina equisetifolia
7. Eucalyptus sp.
8. Holoptelia integrifolia

9. Leucaena leucocephala
10. Poinciana alata
11. Prosopis juliflora

Edible Fruits

1. Anona squamosa
2. Carissa opaca
3. Embllica officinalis
4. Feronia limonia
5. Madhuca latifolia
6. Mangifera indica
7. Morilkana hexandra
8. Norinda sp.

10. Strydom curini
11. Tamarindus indica
12. Tournefortia

Oil Seeds

1. Azadirachta indica
2. Jatropha curcus
3. Madhuca latifolia
4. Pongamia pinnata
5. Schleichera trijuqa

Cottage Industries

1. Agave sisalana
2. Cymbopogon martini
3. Nyctanthes arbortristis
4. Saccharum munja
5. Saccharum spontangum

Wild Life

During the study no species of wildlife that was endemic to the area was observed. No rare or endangered species was also recorded. The area is comparatively scarce in wild life, which may be due to the extremely degraded condition of the forest. It is however necessary to provide alternate habitat to the wild life that exist in the area, not just to protect them but also to give them a reasonable chance to multiply. For this purpose, two sanctuaries, namely Mathwad (34659 sq.km) in Jhabua district and Pokrata (3559 sq km) in Khargone district are proposed. A map showing the location of these sanctuaries is given at the end of

A map of the area is also enclosed at the end of this chapter.

As many as 60 islands will be formed in the reservoir. They will have an extent from 1 ha to 75 ha. It is recommended that these should be left undisturbed for study of the process of natural succession and to provide refuge to bird life in the area.

SUMMARY OF OBSERVATIONS

1. Definition of Study Area

The study area covers the forests and revenue areas coming under the submergence of the Sardar Sarovar Project (148.68 m above msl) and a peripheral area known as the impact area (forests as well as revenue area within a distance 5 km from the submergence boundary) falling within the State of Madhya Pradesh.

2. The field work consisted of :

- (a) Total enumeration of the trees (species wise as well girth class wise) standing in the submergence area only.
- (b) Floristic survey of the ground vegetation in the whole study area.
- (c) Faunal survey in the whole study area.
- (d) Ecological studies of the ground vegetation (density, frequency, abundance, biomass and species-diversity, concentration of dominance) in the whole study area.
- (e) Ethnobotanical studies in the whole study area.
- (f) Socio-economic survey, consisting of the human and live-stock populations, fuelwood consumption pattern, minor forest produce collection, occupational pattern etc. in the whole study area.
- (g) Inspection of the surrounding forest area.

3. The observations contained in No. V.1 to No. V.6 are based on the field studies referred to above and secondary data collected from various sources.

4. Endemism

No plant or animal species endemic to the study area was recorded.

5. Species Diversity, Frequency and Abundance

78 plant species in 69 genera and 17 families were collected in the submergence area. Among them only 3 species, namely Cassia tora, Indigofera linnaefolia and Solanum nigrum were found distributed all over the area. Solanum nigrum, Desmodium triflorum, Cynodon dactylon and Apluda nutica were found having the highest density of 61,500/ha, 89,700/ha, 73,000/ha and 86,2090/ha respectively. Maximum concentration of dominance as calculated by Simpson's Index Formula was found varying from 0.06734 in Maheshwar tahsil to 0.02455 in Badwani tahsil. Species diversity index as calculated under the Marglef formula varied from 1.2148 in Maheshwar tahsil to 1.6351 in Alirajpur tahsil.

69 species in 57 genera and 15 families were recorded from the impact area. Apluda nutica, Cynodon dactylon and Cassia tora were found having the highest density of 39,700/ha, 77,500/ha and 35,100/ha respectively. The maximum concentration of dominance, 0.05768, was found in Maheshwar tahsil. The species diversity ranged from 1.4935 to 1.3207.

6. Biomass

Biomass production of ground vegetation in the submergence area was found to be about 3.93 tonnes dry weight/ha, which amounts to a total of approximately 77,000 tonnes of dry biomass in the whole of submergence area. Biomass productivity of ground vegetation in the impact area was found to be about

4.57 tonnes dry weight/ha. which amounts to approximately 2,83,088.01 tonnes of total dry biomass in the impact area.

7. Forests

The total forest area both in the submergence and impact zones is estimated to be 660 sq km in extent. The forests are generally recorded in working plan stockmaps as being under site quality M.P. IV. The forests are however, seriously understocked with the general density being in the range of 0.2 to 0.4; they are also interspersed with extensive blanks and patches of cultivation. The results of enumeration in the forest of the submergence area clearly bring out the extent of the depletion of the forests. The total basal area which, is reflective of the volume of the standing crop, works out to 1.947 sq. m. in Jhabua and 1.2134 sq. m in Dhar. According to yield tables the basal area should be 8.723 sq km for the same site quality.

Jhabua division has a considerable component of teak, accounting for 16.4 % of the crop by number of trees. It also has a small component of valuable timber species such as shisham, saja and bija. Dhar has no teak, and only a sprinkling of timber species limited to saja and haldu. As the forests of Badwani division (Khargone district) have not been organised into compartments and there is no working plan, it was not possible to make an analysis of the growing stock. It is also interesting that in addition to recognised timber species there are a number tree species, of local importance such as salai and moyan, kastar, anjan, neem, khair, babul, etc.

The distribution of existing trees by girth classes is also

erratic. The position in Dhar is very serious as about 97% the crop is in girths below 31 cms. The figure for Jhabua is . This reveals the serious extent to which the forests have been over exploited in the past.

The carrying capacity of the forest cannot be estimated in any accuracy, except to the extent that all the forests have been shown as being under site quality M.P. IV in the working plan stockmaps. Further studies of the site with particular reference to topography, physical and chemical properties of the soil and soil moisture regime are necessary. It may however be assessed that the forests should be capable of yielding 25 times the present yield under a proper regime of protection and management.

Present levels of human use

Detailed studies were carried out on the consumption of fuelwood by the villagers in the submergence and impact areas. It was observed that the closer the villages are to forests, the consumption of fuelwood is heavy in comparison to agricultural waste, which is the alternative source of domestic fuel. Conversely the farther the village from forests, the consumption of agricultural waste is heavier compared to fuelwood. There is no significant difference in the consumption of cattle dung cake as fuel irrespective of distance from forests.

9. Based on the studies, it is estimated that both in the submergence and impact zone a total quantity of 2,67,000 M³ of fuelwood is being consumed. An allowance has to be made for a higher consumption in the future consequent on increasing

population.

10. No data were collected during the study on the consumption of timber for agricultural implements, rural housing and household furniture. Based on the per capita consumption figures given in the working plan for Dhar division, it is estimated that the requirements would be to the tune of 19,250 M³ for all villages in the submergence and impact zones. Again this needs to be projected to work out the future requirements.

The total requirements of timber and fuelwood at present therefore works out to about 2,86,000 M³ per year.

11. No reliable information exists on the actual production from the forest in the submergence and impact zones. Based on the existing growing stock and assuming a rotation age of 50 years the annual availability at present would be limited to 207 M³. which is only a negligible fraction of the requirements. It appears or even is obvious that the gap between requirements and availability from forests is filled up by obtaining supplies from the existing farm forests import from other areas and possibly by overfelling in the forests.

12. Grazing

No reliable statistics are available for the fodder requirements or for fodder availability in the forests and village grazing lands in the study area. Based however, on the figures given in the working plan for Dhar division it is estimated that approximately 1,65,000 tonnes of grass would be required by the cattle in the submergence and impact zones. It is also estimated that the present availability of grass from the

forests would be limited to about 26000 tonnes. No estimates are available for the production from village grazing lands. Again, there is a huge deficit, which has necessarily to be made up through special measures to increase the production of grass from all available lands.

13. The area is not rich in wildlife, presumably due to the extremely degraded condition of the forests. Whatever wildlife is encountered is confined to denser patches of forests particularly along watercourses. No rare or endangered species have been recorded.

केवल सरकारी प्रयोग के लिए
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नर्मदा नियंत्रण प्राधिकरण
NARMADA CONTROL AUTHORITY

पर्यावरण उपदल
Environment Sub-Group

छब्बीसवीं बैठक की कार्यसूची
Agenda for Twenty Sixth Meeting

स्थान : पर्यावरण भवन, नई दिल्ली
**Venue : Paryavaran Bhawan,
New Delhi.**

तारीख 12 अक्टूबर, 1995, 10 बजे
Date : 12th, October 1995, 10.00 A.M.

इन्दौर
सितम्बर, 1995

INDORE
September, 1995

AGENDA FOR 26TH MEETING OF THE ENVIRONMENT SUB-GROUP NCA TO BE
HELD ON 12TH OCTOBER, 1995, AT PARYAVARAN BHAWAN, NEW DELHI.

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Item No. XXVI-1(126): CONFIRMATION OF MINUTES OF THE 25TH MEETING

Minutes of the 25th meeting of Environment Sub-group of Narmada Control Authority circulated to all Members and invitees vide letter No. Env-34(26)/95/1536-65 dated 17th August, 1995.

No comments have been received so far.

The minutes are put up for confirmation.

Item No. XXVI-2(127): **REVIEW OF ACTION TAKEN ON THE DECISIONS OF THE PREVIOUS MEETINGS.**

1. Submission of Catchment Area Treatment (CAT) plans for freely draining critically degraded sub-watersheds (Item No. XXII-2 (112) (1)).

During the 25th meeting Govt. of Madhya Pradesh (GOMP) and Maharashtra (GOM) were directed to recast their plan keeping in view the guidelines for the schemes of National Afforestation Eco-Development Board & River Valley Projects.

Representative of GOM & GOMP to submit the plans within a months time. Information requested by NCA on further progress of works vide letter No.Env-32(2)/95/340 dated 4th September, 1995 is yet awaited.

Govt. of Gujarat (GOG) is going ahead with the treatment of entire catchment within the state of Gujarat. It was informed that except for 310 ha area all treatment works had been completed in forests as well as non forest areas.

During the 25th meeting NVDA agreed to formulate a plan for installing silt measuring devices in consultation with CSWCRI. Information requested by NCA on further progress of works vide letter No.Env-32(2)/95/340 dated 4th September, 1995 is yet awaited.

2. Cost Estimates for preparation of Action plan and implementation of environmental safeguard measures (Item No. XXII-2(112)(2))

During the earlier meetings of the environment Sub-group it was desired that the detailed cost (estimates and expenditures) on studies and implementation of mitigation measures for suggested environmental safeguards should be presented. The information available in the office of the NCA is presented in Annex-XXVI-1 for information and consideration of the members.

3. Environmental Impact of Closure of Construction Sluices.

During the 25th meeting of Environment Sub-group members were informed that finalisation of the report of the Committee constituted for ratification of the closure of sluices awaits submission of data by NVDA. Information requested by NCA on further progress of works vide letter No.Env-32(2)/95/340 dated 4th September, 1995 is yet awaited.

As desired by the Chairman during the 23rd meeting a presentation on the status of implementation of environmental safeguard measures in relation to construction works of SSP & NSP with the help of slides & maps were to be presented by the state Govts. of Madhya Pradesh, Maharashtra & Gujarat. Response from the state Govts. on the request by NCA vide letter No.Env-34(24)/95/386, 387, 395 dated 2nd March '95 is yet awaited.

Item No.XXVI-3(128): PRESENT STATUS OF STUDIES SURVEYS AND ENVIRONMENTAL ACTION PLANS.

A copy of the status report for the quarter ending June, 1995 is enclosed and placed at Annex-XXVI-2.

The present status of studies surveys and action plans in brief is presented below for a review by the Sub-group.

1) PHASED CATCHMENT AREA TREATMENT

Narmada Sagar Project

Government of Madhya Pradesh

An area of 28987 ha had been treated by the end of June, 1995. NVDA was to report the survival rate of plantation & the extent of progress during the year 1994-95. Information requested by NCA on further progress of works vide letter No.Env-32(2)/95/340 dated 4th September, 1995 is yet awaited.

Sardar Sarovar Project

A copy of the map showing the sub-watersheds where treatment works are under progress is placed at Annex-XXVI-3.

Govt. of Madhya Pradesh

Govt. of Madhya Pradesh had planned to treat 125725 ha area, out of which an area of 26114 ha has been treated by August'95. Information requested by NCA on further progress of works vide letter No.Env-32(2)/95/340 dated 4th September, 1995 is yet awaited.

Govt. of Gujarat

Govt. of Gujarat had taken up the entire catchment area upstream of the Sardar Sarovar Project in Gujarat for treatment.

By the end of August, 1995 an area of 29284 ha. had been treated.

Govt. of Maharashtra

As per the plan submitted by Govt. of Maharashtra non forest area of 2768 ha was proposed to be treated by the end of 94-95. Out of this till the end of June, 1995, works over 1970 ha. area had been completed. The progress of work on the remaining non forest area may be reported.

In addition GOM had planned to treat 20,000 ha of forest areas. By the end of March, 1995 works on an area of 13963 ha had been tackled.

GOM may like to submit the completion report of CAT works finished so far. Information requested on further progress of works by NCA vide letter No.Env-32(2)/95/1340 dated 4.9.95 and letter No.Env-32(2)/95/1568 dated 12th Sept'95 is yet awaited.

ii) COMPENSATORY AFFORESTATION

Narmada Sagar Project

Govt. of Madhya Pradesh

Compensatory afforestation over an area of 60633 ha was reported to have been completed by the end of June, 1995. Further progress may be given by NVDA.

Sardar Sarovar Project

A location map showing compensatory afforestation sites in three states is enclosed at Annex-XXVI-4. Information requested by NCA on further progress of works vide letter No.Env-32(2)/95/340 dated 4th September, 1995 is yet awaited.

Govt. of Madhya Pradesh

Govt. of Madhya Pradesh by the end of June, 1995 had completed plantation works over an area of 8165 ha against the final target of 8740 ha.

Govt. of Gujarat

Govt. of Gujarat had completed plantation works in the entire planned area of 13950 (including non forest and degraded forest areas) by the end of September, 1994.

Govt. of Maharashtra

Out of total target of 19460 ha planned for treatment in lieu of the areas undergoing submergence, an area of 16380 ha had been planted by the end of August, 1994. However detailed location map of some of the districts where compensatory afforestation works are progressing is yet awaited. Progress of work during 1995 rains may please be reported.

111) COMMAND AREA DEVELOPMENT

Narmada Sagar Project

As assured during the 23rd meeting current status of preparation of comprehensive environmental impact assessment report on command area development with integrated development plan including drainage aspects for NSP is to be submitted by GOMP.

Regarding studies on effect of pesticides insecticides in the command area being conducted by J.L.N. Agricultural University, Jabalpur, NVDA informed that data collection would commence from current monsoon. Progress may be reported.

Sardar Sarovar Project

Govt. of Gujarat

As agreed by GOG during the 25th meeting of Environment Sub-group, Member (E&R), NCA is included as one of the member of a High Level Steering Committee (HLSC) for SSP in Gujarat and also in the 4 Expert Multi Disciplinary Groups for the sanctuaries in the command vide Annex-XXVI-5. A meeting of this Expert Group to discuss the first interim report on Velavador National Park was arranged by NPG on 25th August, 1995. The observations of the NCA office on the study reports received, are placed at Annex-XXVI-6.

Copies of the reports related to command area development studies completed in the last two years were required to be submitted to NCA and MOE&F. Information requested by NCA on further progress of works vide letter No.Env-32(2)/95/340 dated 4th September, 1995 is yet awaited.

On the issue of irrigated Agro forestry in SSP it was agreed by NPG to consult Dr. Abrol. Developments in this regards are yet to be reported by NPG.

Govt. of Rajasthan

Final draft report on the studies conducted by WAPCOS on drainage aspects awaits finalisation of the alignment of canal. Report which was to be available by the end of April '95, shall now be available by the year end. Meeting to finalise the report is being arranged. Deliberations shall be reported during the meeting.

iv) SURVEY OF FLORA, FAUNA & CARRYING CAPACITY STUDIES

Narmada Sagar Project

Govt. of Madhya Pradesh

Flora & Fauna studies for Narmada Sagar Project areas have been carried out by two agencies viz. Friends of Nature Society,

Bhopal and Wildlife Institute of India, Dehradun. Both of these agencies have submitted their final reports. A copies of the main findings of the report were circulated to the members as annex to the minutes of 25th meeting. Various action plans, based on the recommendations of these study reports were required to be made. Besides NVDA had submitted proposal for the creation of special protected areas to the Govt. of M.P. Progress on further developments requested by NCA vide letter No.Env-32(2)/95/340 dated 4.9.95 is yet awaited.

Sardar Sarovar Project

Govt. of Madhya Pradesh

✓ Final report of the Impact Assessment studies in the areas undergoing submergence in Madhya Pradesh completed by State Forest Research Institute (SFRI), Jabalpur was made available to MOE&F & NCA. NVDA was requested vide letter No.Env-32(2)/95/340 dated 4.9.95, report progress on preparation of action plan. The information requested is yet awaited.

Govt. of Gujarat

✓ Govt. of Gujarat may like to inform about further progress on the implementation aspect of various recommendations made in the report of M. S. University, Vadodara submitted in July, 1992 and also step taken if any for updating the report. Main findings of the report may please be circulated to the members.

✓ Govt. of Maharashtra

The report of studies on flora and fauna in and around the SSP in the areas in Maharashtra State was being prepared by School of Environmental Science, Pune. Final report is yet awaited.

v) ARCHAEOLOGICAL & ANTHROPOLOGICAL SURVEY

ARCHAEOLOGY:

Narmada Sagar Project

Govt. of Madhya Pradesh

Sub-group was informed that the State Dept. of Archaeology and Museum and Archaeology Survey of India (ASI), Govt. of India have completed survey(s) and prepared action plan(s) for the State, as well as centrally protected monuments. Progress on implementation of the plan requested by NCA vide letter No.Env-32(2)/95/340 dated 4.9.95 is yet awaited.

It was further informed that joint inspection of the Joga Fort had been done. However, assessment report on effect of the scouring effect of water on this monument requested by NCA vide letter No.Env-32(2)/95/340 is yet awaited.

Sardar Sarovar Project*Publicity by TV.*

Govt. of Madhya Pradesh

NVDA may like to indicate progress of implementation of the action plan prepared by the Dept. of Archaeology & Museum for protection/relocation and excavation works.

Govt. of Gujarat

Govt. of Gujarat may like to report the progress regarding further works undertaken by it for development of Shoolpaneshwar temple. Progress is also required to be reported on developments related to shifting of Hamfeshwar temple. Action plan for relocation of Hamfeshwar temple requested by NCA vide letter No.Env-32(2)/95/340 dated 4.9.95 is yet awaited.

Govt. of Maharashtra

No works were required to be done in Maharashtra in this regard.

ANTHROPOLOGY

Sardar Sarovar & Narmada Sagar Projects

Govt. of Madhya Pradesh

Necessary steps have been initiated to effect the amendment of the Constitution of India to give the benefits and privileges to the PAPs from SC & ST categories being resettled in Gujarat areas where otherwise they were not entitled to these benefits. It was also informed that Secretary, Govt. of India, Ministry of Welfare had referred this matter to the Governor of Gujarat for his recommendations on this proposal as the same was required for making the amendment in the constitution. GOMP officials informed that their State tribal, SC and BCW department (Nodal department) had also agreed and communicated their recommendations for the amendment of the constitution. The Additional Chief Secretary, GOG informed that the matter was under the consideration of government and many things need to be sorted out before a final decision is taken. During the 24th meeting Chairman of the Sub-group suggested that in case of any difficulty, the GOG may consider giving these benefits to the PAPs settled in their state on area specific basis. The Additional Chief Secretary, GOG assured to work for this. Further progress requested by NCA vide letter No.32(2)/95/340 dated 4.9.95 is yet awaited.

Besides NVDA was to request by NCA vide letter No.32(2)/95/340 dated 4.9.95 on procurement of the publication related to Tribals of Narmada from An.S.I. through special messenger. The information is yet awaited.

vi) SEISMICITY AND RIM STABILITY OF RESERVOIR

Narmada Sagar Project

Govt. of Madhya Pradesh

The sub-group was informed that on the advise of the Dam Review Panel, CW&PRS, Pune, I.M.O. etc the NVDA had decided to establish a network of 10 seismic stations along the periphery of NSP complex to record and collect pre and post impoundment seismic data. Orders for supply of 6 Nos. photographic recorder and 12 Nos. wood Anderson Seismographs had already been placed.

The sub-group was informed that tenders for micro-earthquake recorders have been finalised by the NVDA, and the supply has recently been completed.

For procurement of the balance imported seismic instrument, the proposal has been approved by NVDA in its 40th meeting dated 16.12.94.

As regards seismic studies of Narmada Sagar, Omkareshwar and Maheshwar Projects, one micro-earthquake recorder set has already been installed at these places and the construction of observatories at 11 stations in the C.A. is in progress and is likely to be completed by June, 1995. Further progress requested by NCA vide letter No.Env-32(2)/95/340 dated 4.9.95, in this matter may be reported.

Sardar Sarovar Project

GSI had completed the survey and submitted its final report on rim stability analysis for the areas in Maharashtra and Madhya Pradesh in 1993. The survey for the rim stability analysis in Gujarat was completed much earlier by Jaipur branch of the GSI. In order to confirm the findings of the GSI, NVDA had entrusted some more time bound studies to CW&PRS, Pune at an estimated cost of Rs.12.55 lakhs. Progress in this regard may please be reported.

vi) HEALTH ASPECTS

Narmada Sagar Project & Sardar Sarovar Project

Govt. of Madhya Pradesh

Action taken by GOMP for providing the facilities as proposed in the health plan and requested by NCA vide letter No.32(2)/95/340 dated 4.9.95 is yet awaited.

Sardar Sarovar Project

Govt. of Gujarat

GOG may like to submit its revised health plan.

Govt. of Maharashtra

Certain observations were made by NCA office in the revised health plan submitted by GOM. Replies received are placed at Annex-XXVI-7.

GOM may like to report progress on creation of infrastructure and other facilities as proposed in the plan. GOM also to report on the surveillance & control studies in Maharashtra, in consultation with the experts suggested by ICMR.

viii) FISHERIES DEVELOPMENT OF SSP AND NSP RESERVOIRS

To speed up the work on conservation and development of the fish resources in the reservoir, sub-group recommended the formation of a group of experts. The proposal for formation of a high level expert group was approved by NCA with inclusion of one more expert member to be nominated by GOMP. Two meetings of this expert group were held & working groups have been formed for drafting the guidelines. Minutes of the 2nd meeting are placed at Annex-XXVI-8 for perusal of the members.

ITEM NO. XXVI-4(129):

ANY OTHER ITEM.

DATE & VENUE OF THE NEXT MEETING.

ANNEXURES

ANNEX-XXVI.(1).ENVIRONMENTAL COST OF SSPRELATED TO UNIT I & II DAM & POWER HOUSE :A) Expenditure by project authorities:i) Cost of Survey & Studies (in lacs.)

S.No.	Component	<u>Estimate/Actual Expenditure</u>				Total
		GOG	GOM	GOMP	NCA	
1.	Compensatory Afforestation	<u>4.52</u> 4.52	<u>5.29</u> 5.29	<u>2.4375</u> 2.4375	-	<u>12.2475</u> 12.2475
2.	Catchment Area Treatment.	<u>8.77</u> 8.77	<u>7.00</u> 7.00	<u>3.28</u> 2.80	-	<u>19.05</u> 18.57
3.	Flora & Fauna	<u>52.2</u> 38.3	<u>38</u> 16	<u>20.334</u> 17.634	<u>15.27</u> 15.27	<u>127.804</u> 87.204
4.	Health	<u>2.5</u> 2.5	<u>10</u> .1	<u>29.627</u> 26.000	-	<u>42.127</u> 28.6
5.	Archaeology/Anthropology.	<u>1.3</u> 0.40	NA -	<u>59</u> 36.33	-	<u>60.3</u> 36.73
6.	Seismicity & Rim Stability.	-	-	<u>23.00</u> 12.50	<u>1.98</u> 1.98	<u>24.98</u> 14.53
						<u>276.5085</u> 195.8955

ii) Cost of Implementation (in lacs)

1.	Compensatory Afforestation.	<u>1809.10</u> 1298.48	<u>2116</u> 1650.27	<u>1800.000</u> 779.08	<u>5725.1</u> 3437.73
2.	Catchment Area Treatment.	<u>3509</u> 1826.48	<u>2894.67</u> 445.657	<u>8835.05</u> 1615.47	<u>15238.72</u> 3887
3.	Flora & Fauna including Shoolpaneshwar	<u>75.31</u> 64.42	NA	<u>NA</u> Nil	<u>75.31</u> 64.42
4.	Health (incremental expenditure) for 10 yrs.	<u>3800.0</u> 101	<u>546.60</u> .5	<u>1354.63</u> 515.225	<u>5701.23</u> 616.725
5.	Archaeology/Anthropology.	<u>156.00</u> 29		<u>700</u> 10	<u>856</u> 39
6.	Seismicity & Rim Stability.	<u>129</u> 271	-		<u>129</u> 271

Total:

12827.358 27942.75
2724.1765 7991.758

* In addition several State/Central agencies have also incurred expenditure on various Environmental studies & Implementation aspects. Full details are not yet available.

NA : Not available.

ANNEX-XXVI.(2).

STATUS REPORT
SARDAR SAROVAR PROJECT (SSP) ENVIRONMENTAL ASPECTS
JUNE - 1995

The action plans and status of studies and implementation of Environmental Safeguard Measures upto quarter ending June, 1995 is as indicated below:

Environmental Safeguard Studies/Measures

- 1) Phased Catchment Area Treatment,
- 2) Compensatory Afforestation,
- 3) Command Area Development,
- 4) Flora, Fauna & Carrying Capacity,
- 5) Seismicity,
- 6) Health Aspects,
- 7) Archaeological & Anthropological, Studies,
- 8) Fisheries,
- 9) Rim Stability Analysis.

I. 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.

GOI issued a Directive in June 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 and Land Use Survey (AISLUS). 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 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 SSP catchment.

- 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.

I- **DIRECTLY DRAINING SUB-WATERSHEDS:**

Table 1.1 The total catchment area of SSP below NSP is 2442440 ha.

	GOMP	GOG	GOM	Total for the Basin
Total Catchment	2248600	30230	163610	2442440 ha
Very High & High	546702	30230	116355	688410
Directly draining Very High & High	121330	29537	28226	175565
Areas directly damaged by project activities.	-	500	-	500
Planned to treat	125725	29284	22768	177.77

According to the data available in NCA office the total area of directly draining subwatersheds in M.P. is 1.14.806 ha.

Table 1.2 **Summary of Status of CAT Planning**

	GOG	GOM	GOMP
Preliminary Surveys	}		
Prioritisation of sub-watersheds	:		
Development of Management Options	:	"Complete for all item in all States."	
Annual Action Plan	:		
Effective monitoring	:		
Phased Programme	}		

Table 1.3 **Principal Elements of Action Plans for CAT**

Elements of Action Plans	GOG	GOM	GOMP
Survey work	}	"Complete" for all item & all States.	
Preparation of detailed map	}		
Micro-watershed development map	}	Complete	Complete

Assignment of responsibility for conducting the work	}
Timetable	:"Yes" for all item for
Budget	all States
Menu of treatment	}
Proposals for monitoring	}

Table 1.4 Implementation of CAT

	Gujarat (29284)	Maharashtra (22768)	Madhya Pradesh (125725)			
Area to be treated in ha. (Area in brackets indicate actual progress)						
	Forest	Non-Forest	Forest	Non-Forest	Forest	Non-Forest
Monsoon year						
1990-91	4528 (4528)	898 (898)	-	-	-	-
1991-92	4770 (4770)	230 (230)	-	-	-	-
1992-93	6013 (6013)	336 (336)	-	-	-	8800 (8800)
1993-94	6000 (6000)	286 (286)	960 (960)	291	966 (966)	6246 (6246)
1994-95	5893 5730	167 167	6347 6514	1860 1980	17000 4268	20000 594
1995-96	162	183	6653	617	18000	20000
1996-97	-	-	5873	-	15964	18749
TOTAL:	27204 27042 *1	2080 1897*2	20000 (7474)	2768 (2151) \	51930 *3 *4	73795 *4 / 26,114

- *1 As reported by GOG 162 ha. could not be treated due to resistance from the local people.
- *2 GOG had reported that out of 3025 ha of Agriculture are planned for treatment earlier, 945 ha. area is untreatable hence targets are reduced from 3025 ha to 2080 ha.
- *3 Out of 51930 ha. area, an area of 13930 ha is fully stocked where minor soil engineering works will only be carried out. w.e.f.94-95 @ 4000 in (94-95), 5000 (95-96) & Balance in 96-97.

- *4 Progress of forest & non forest areas put together is reported as 26,114.

	Gujarat	Maharashtra	Madhya Pradesh
Implementation	Complete work scheduled to finish 1995-96	work recently commenced scheduled to finish 1997.	Completed work scheduled to finish 1997.

II. **FREELY DRAINING SUBWATERSHEDS:** (Excluding directly draining Subwatersheds).

Table 1.5 Summary of Status of CAT Planning:

	GOMP	GOM	GOG
- Preliminary Survey	Yes	Yes	Already
- Prioritization of Sub-watersheds	Yes	Yes	under
- Development of Management options monitoring	Yes	Yes	implemen-
- Phased programme	Yes	Yes	tation.

Table 1.6 Principal Elements of Action Plan for CAT:

	GOMP	GOM	GOG
- Survey work	Yes	Yes	
- Preparation of development map	Yes	Yes	Already
- Micro watershed map	Awaited	awaited	under
- Work responsibility	Yes	Yes	impleme-
- Menu of treatment	Yes	Yes	ntation
- Time Table	Yes	Yes	
- Proposal for monitoring	Yes	Yes	
- Budget	Yes	Yes	
- Availability of funds	*	*	

* Agreed by Planning Commission for inclusion in River Valley Project" Scheme and funds are also promised by MOEF from National Afforestation & Eco-Development Board.

A. **Govt. of Madhya Pradesh:**

Table 1.7 Total Area of freely draining critically degraded sub-watersheds below NSP is 54,6702 ha.

	Phase I Area (Directly draining)	Phase-II (Balance Area)	Total Area
SSP	121330	356484	477814
Jobat	-	-	28211

Man	-	-	12720
Maheshwar	-	-	13209
Omkareshwar	-	-	14748
			546702 *

* According to AISLUSO, this area is 541825 ha. The plan submitted by NVDA is under scrutiny of MOEF & NCA.

Table 1.8

PHASE - II (356484 ha.)			
Forest Area		Non Forest Area	
Gross Area	Net Working Area	Gross Area	Net working Area
1.11,479	78,368	2.66,388	2.39,750

Table 1.9 Schedule of Implementation (Madhya Pradesh):(318118 ha)

Year	Forest Area	Non Forest Area
	Phy. (ha.)	Phy. in ha
1997-98	8000	15750
1998-99	8000	16000
1999-2000	8000	16000
2000-01	8000	16000
2001-02	8000	16000
2002-03	8000	16000
2003-04	8000	16000
2004-05	8000	16000
2005-06	8000	16000
2006-07	6368	16000
2007-08	-	16000
2008-09	-	16000
2009-10	-	16000
2010-11	-	16000
2011-12	-	16000
78,368		2,39,750

B. Govt. of Maharashtra:

PHASE-II

Table 1.10 Schedule of Implementation of freely draining Sub-watersheds.

Year	Forest Area Phy. in ha.	Non Forest Area Phy. in ha.
1994-95	5600	3145.66
1995-96	5600	4186.97
1996-97	5600	4511.86

1997-98	5600	5044.1
1998-99	5600	4993.48
1999-2000	5600	5453.93
2000-2021	6400	-
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	40,000	27,336
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II. COMPENSATORY AFFORESTATION

Approval for the diversion of forest land 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 conduct of CAF. Principal amongst these are the following stipulations.

- For every hectare of forest land 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. This represents a two fold increase of the usual requirement.
- For the 4,200 hectares of forest land 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

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

- Sardar Sarovar (Narmada) Project Development Plan, Volume-II prepared by the Narmada Planning Group (NPG) in 1983.
- Studies on Ecology 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-Environmental and Wildlife Management Studies on the Sardar Sarovar Submergence Area in Gujarat 1992 by MSU.

- Impact Assessment of Madhya Pradesh Land to be Submerged Under Sardar Sarovar Project and Adjoining Ecosystems by State Forest Research Institute, Jabalpur (1989-92).
- Draft report on Flora and Fauna in and Around Sardar Sarovar Project, Maharashtra by the University of Pune 1994.

The Action Plans

In compliance with the conditions set by the MOEF, each state has prepared an action plan for the CAF of areas within its 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 Kutch. 1986.
- Project for Afforestation in Sardar Sarovar Project Impact Areas due to Diversion of Forest Lands 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 multi-purpose river-valley project (1989).

These plans were submitted in varying stages of completeness but each has now been revised and updated to take account of the comments of the MOEF and the NCA. Action plans of 3 State Govts. contained following components:

1. Identification of areas for CAF;
2. Description of selected areas.
3. Justification of Selection of Areas.
4. Identification of responsible agency.
5. Description of staffing requirements.
6. Description of material requirements.
7. Estimate of costs,
8. Identification of tree species.
9. Description of preparatory work needed.
10. Description of planting techniques,
11. Provision for aftercare,
12. Yearly planting target,
13. Yearly budget,
14. Provision made for monitoring implementation

These action plans spell out a programme of tree planting in the three states on both non-forest and degraded forest areas as shown in Table 2.1 & 2.2.

Table 2.1 Areas for Compensatory Afforestation

	Area of Forest diverted for SSP	Area of Degraded forest to be Replanted	Area of Non-Forest Land to be Afforested	Total area for CAF
GOG	4,523	9,300	4,650	18,950
GOM (a) Submer.	6,488*	12,980	6,488	19,468
(b) R&R *	4,200	-	4,200	4,200
GOMP	2,732	6,550	2,190	8,740
TOTAL :	17,943	28,830	17,528	46,358

* This includes 2700 ha released in 1990 & 1500 in 1993 for R&R works in Maharashtra for which only equal non forest area is being raised as stipulated.

Table 2.2a Schedules for Implementation of CAF Against Submergence)

	Gujarat		Maharashtra		Madhya Pradesh	
	Area to be Afforested in ha (Area in brackets indicates actual progress)					
	Degraded Forest	Non-Forest	Degraded Forest	Non-Forest	Degraded Forest	Non-Forest
Monsoon year						
1990		2,150 (2150)			132 (132)	716 (716)
1991	2,834 (2,834)	350 (350)	8,383 (8383)		1580 (1200)	400 (373)
1992	2,450 (2450)	847 (847)	4,552 (4552)	2,276 (2276)	1580 (2400)	400 (-)
1993	2,500 (2,500)	455 (455)	45 (20)	1,156 (1,156)	1580 (2215)	400 (-)
1994	1,516 (1,516)	848 (848)	-	2,911 (2894)	600*	1100*
1995	-	-		0,162	-	-
Total:	9,300	4,650	12,977	6,488	6550	2190
Achievement in ha.	(9300)	(4650)	(12977)	(6342)	**	**

* Net target considering progress of the previous years.

** Total Progress achieved is 8165 ha. against a target of 8740.

Table 2.2b Schedule for Implementation of CAF in lieu of Forest Land released for R&R works.

State	Year	Land released Area in ha.	Target & Progress		
			1993-94	94-95	95-96
Maharashtra	1990	2700	2192.37 (2192)	307 (311)	197 (-)
	1993	1500	-	-	1500
	TOTAL	4200	2192	307	1697
Achievement			(2192)	(311)	

Other Additional Afforestation Activities:

Plantation along Canal Banks:

The total potential of canal bank plantations is estimated to be 18000 ha. A project report prepared for this purpose by forest Deptt. is under scrutiny of SSNNIL. The plantation programme is likely to be launched effectively from the year 1995. However to give a start to the work of canal bank plantations, plantations on 215 ha have already been established till rains of 1994.

Additional Plantation Activities

(a) Dam Vicinity Plantation (235 ha)

An area of 240 ha. in the vicinity of the dam has also been planted. This work was completed in 1992.

(b) Revine Land Afforestation (200 ha.)

On the left bank of the river Sabarmati an area of 200 ha. in two villages i.e. Ratanpur (150 ha.) and Pirojpur (80 ha.) is also planned to for plantation. An area of 200 ha. is till 1994 rains.

(c) Project area plantations: (255 ha)

An area of 300 ha. has been planted in the project area as per the target and the work completed in the rain of 1992.

III. COMMAND AREA DEVELOPMENT: (Including Drainage Studies)

(A) Government of Gujarat:

Government of Gujarat have undertaken several studies related to the Command area development. Some of which have been completed and the remaining are in progress. Their position is as follows:

Sl.No.	Name of Study	Name of Agency	Year of completion
I. Completed Studies:			
1.	Pre-Feasibility study for Low Level Canal.	Jyoti Consultants Ltd. Vadodara.	1981
2.	Mathematical Modelling of Ground Water for system single layer model-Narmada Mahi-Doab.	Operation Research Group, Vadodara.	1982
3.	Pre-Feasibility level Drainage study of Narmada Mahi Doab of SSP Command.	Core Consultants Ltd. Ahmedabad.	1982
4.	Some Aspects of Role of Panchyats and Institutional Arrangements for canal irrigation in Two Talukas of Ahmedabad District.	Institute of Cultural and Urban Anthropology, Ahmedabad.	1982
5.	A study of settlement Pattern (6 Talukas in the Narmada Command Area of Mahesana District of Gujarat).	Department of Geography, Gujarat University, Ahmedabad.	1982
6.	Regionalisation of Narmada Command.	Operations Research Group, Vadodara.	1982
7.	Marginal cost study of two Typical Distributerries and Two Typical Branches.	Dr. C.R.Shah. Vadodara.	1983
8.	Socio-Economic Bench Mark survey of 62 Talukas (Sub-districts) of Narmada Command Area.	Fourteen Different Agencies Including Universities, Research Institutions etc.	Between 1982 & 1983
9.	Population Projection and Migration study for Narmada Command Area.	Operations Research Group, Vadodara.	1983
10.	Study on Water Demand for Non-Agricultural use from Narmada Project.	Gujarat Water Supply and Sewerage Board, Gandhinagar.	1983
11.	Consumer Expenditure, Assets and Indebtedness of Rural Households of the Command Areas of Sardar Sarovar (Narmada) Project, 1982.	Directorate of Economics & Statistics, Gandhinagar.	1983

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| 12. | Wasteland Development Project for command Area of Narmada Canal (Region 11 and 12). | Gujarat State Rural Development Corporation Ltd., Gandhinagar. | 1984 |
| 13. | Mathematical Modelling of Ground Water System Narmada Mahi Doab. | Operations Research Group, Vadodara. | 1985 |
| 14. | Additional work on Mathematical Modelling of Ground Water System-Single Layer Model Narmada Mahi Doab. | Operations Research Group, Vadodara. | 1985 |
| 15. | Rate 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 |
| 16. | Computer aided Planning of conveyance and delivery Network. | Indian Institute of Management, Ahmedabad. | 1986 |
| 17. | Land Use and Cropping Pattern Survey and Mapping of Narmada Command Area Zone 4A & 4B. | Department of Geography, M.S. University, Vadodara. | 1986 |
| 18. | Survey and Investigation work of Ground Water Resources in Narmada-Mahi Doab. | Gujarat Water Resources Development Corporation Ltd. Gandhinagar. | 1987 |
| 19. | Cropping Pattern and Water Demand Study in Narmada Command Area. | Operations Research Group, Vadodara. | 1987 |
| 20. | Inter-Regional Water allocation and Determination of Branch Canal capacity. | Operations Research Group, Vadodara. | 1989 |
| 21. | Extended study on Inter Regional Water Allocation and determination of Branch Canal Capacity. | Operations Research Group, Vadodara. | 1989 |
| 22. | Growth of Agro-Processing Industries in Phase-I of the Sardar Sarovar Project. | Gujarat Industrial & Technical Consultancy Organisation Ltd. Ahmedabad. | 1990 |

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|-----|--|---|------|
| 23. | Consultancy work for Control, Telemetry and Communication Net Work on Narmada Canal System for SSP. | Gujarat Communication & Electronics Ltd., Vadodara. | 1991 |
| 24. | Techno-Economic Study for utilising Village Tanks as Borrow Area for Construction of Canal Net Work. | Operations Research Group, Vadodara. | 1992 |
| 25. | Area Development Strategies for selected Regions Adjacent to Narmada Main Canal (Vadodara, Surendranagar & Banas Khatha Dist.) | Operations Research Group, Vadodara. | 1992 |
| 26. | Studies in Water Rates Policy in 3 parts. | | |
| | i) Pricing of a public Utility Survey of Literature | Department of Economics, South Gujarat University, Surat. | 1990 |
| | ii) Financial working of Irrigation Projects - A case of four projects in Gujarat. | Department of Economics, Sardar Patel University, Vallabh Vidyanagar. | 1992 |
| | iii) Some policy issue for Canal Water Rates in Gujarat. | Department of Economics, Sardar Patel University, Vallabh Vidyanagar. | 1990 |
| 27. | Mathematical Modelling of Ground Water System for SSP Command between Rivers Shedhi and Sabarmati. | Consultancy Engineering Services, New Delhi. | 1993 |
| 28. | Mathematical Modelling of Ground Water System for SSP Command between Rivers Sabarmati and Banas. | Operation Research Group, Vadodara. | 1993 |
| 29. | Mathematical Modelling of Groundwater System for SSP Command beyond Banas upto Rajasthan Border. | Dalal Consultants, Ahmedabad. | 1993 |
| 30. | Prefeasibility level Drainage study for SSP Command beyond Mahi. | Consultancy Engineering Service, New Delhi. | 1993 |

II. ON GOING STUDIES:

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| 1. Monitoring and Evaluation of Resettlement & Rehabilitation Programme. | Centre for Social Studies, Surat. | 1985 |
| 2. Development of Aliabet Island in the Estuary of River Narmada. | Multi Disciplinary Expert Group. | Sept. '92 |
| 3. Agricultural Research Studies. | Gujarat Agricultural University. | 1987 |
| 4. Survey and Investigation Work of Ground Water Resources beyond River Mahi in SSP Command. | Gujarat Water Resources Development Corporation Ltd., Gandhinagar. | 1989 |
| 5. Action Research on People's Participation in Water Management in SSP. | Gandhi Labour Institute, Ahmedabad. | 1991 |
| 6. Development of Nal Sarovar Bird Sanctuary. | Multi Disciplinary Expert Group. | Sept. 1992 |
| 7. Development of Black Buck National Park at Velavadar. | Multi Disciplinary Expert Group. | |
| 8. Development of Wild Ass Sanctuary in Little Rann of Kachchh. | Multi Disciplinary Expert Group. | Sept. 1992 |
| 9.* Study on preparation of a detailed Integrated Command Area Development Plan for SSP. | M/s Wamana Consultants Pvt. Ltd., Hyderabad. | Dec. 1992 |
| 10.* Environmental Impact Assessment Studies on Inland and Marine Fisheries relevant to the Command Area of Sardar Sarovar (Narmada) Project. | M.S. University, Vadodara. | Dec. 1992 |
| 11.* 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. | Commissionerate of Health, Medical Services & Medical Education, Govt. of Gujarat, Gandhinagar. | Dec. 1992 |
| 12.* Study of Flora and Fauna of the Command Area of Sardar Sarovar (Narmada) Project : Lying between the Narmada & Sabarmati Rivers. (EIA Studies). | Sardar Patel University, Valalabh Vidyanagar. | Feb. 1993 |

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| 13.* Study on Flora and Fauna of the Command Area of Sardar Sarovar (Narmada) Project Lying in Saurashtra and Kachchh Area (Environmental Impact Assessment Studies). | Saurashtra University, Rajkot. | March, 93 |
| 14. *Study on Flora and Fauna of the Command Area of Sardar Sarovar (Narmada) Project: Lying between Sabarmati River and Rajasthan Border (Environmental Impact Assessment Studies). | Gujarat University, Ahmedabad. | March, 1993 |
| 15. Ecological study of Wild Ass Sanctuary and surrounding area using remote sensing technology for Environmental Impact Assessment. | Guj. Ecological Education & Research Foundation (GEER Foundation), Gandhinagar. | Dec., 93 |
| 16.* Environmental Impact Assessment of Nal Sarovar Bird, Sanctuary. | GEER Foundation | Dec., 93 |
| 17. Environmental Impact Assessment of Velavadar National Park located in the command area of SSP. | GEER Foundation | Dec., 93 |
| 18. Environmental Impact Assessment (EIA) studies on Aliabet Island. | Chief Engineer, (CAD SSP) Expert Multidisciplinary Group. | Dec., 93 |
| 19. Review of ground water drainage study. | H.R. Wallingford | Jan., 94 |
| 20. Agro Pollution aspect of Command Area. | do- | Jan., 94 |
| 21. EIA on downstream of Sardar Sarovar Dam upto Gulf of Cambay. | -do- | Jan., 94 |

* Draft/interim reports received in NCA.

(B) Government of Rajasthan

The Government of Rajasthan had submitted a report on Environmental & Ecological aspects and remedial measures for Narmada Canal Project. Copy of the report was submitted to Ministry of Environment and Forests. Govt. of Rajasthan have assigned studies on EIA of Command area in Rajasthan portion to WAPCOS & the TOR finalised and WAPCOS have since started the work & interim reports submitted.

IV. FLORA, FAUNA, WILDLIFE 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.

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 Narmada Control Authority would ensure, through studies on flora & fauna needed for implementation of Environmental Safeguard measures.

Studies/Surveys :

- Important survey work has 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). Interim 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 is completed & report is 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 Universities of Bhopal, Vikram and Rani Durgavati 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.
- 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 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.

The Action Plans

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 which will avoid the possibility of animals being trapped in the submergence area;
- plans for improvement works in the wildlife sanctuaries of Gujarat;

Fisheries Component:

Three state Govts. submitted the fisheries development plans which are as follows:

- The Narmada Basin Water Development Plan: The Development of Fisheries, 1984. This comprehensive plan for GOMF addressed the development of fisheries in the NSF, 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 were 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 hydrobiological studies, studies on the morphology of the river, investigations into the physical and chemical characteristics of the water and soil, and studies on flora, fauna, fish yield, plankton, and productivity in the reservoir.
- 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 proposed by GOM through CICFRI.

Subsequently, the state governments 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. This plan is presently under scrutiny in NCA. 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.

Table 4.1 Summary of Status of Environmental Planning:

A) Wildlife

	Gujarat	Maharashtra	Madhya Pradesh
Preliminary Surveys	Complete	Complete	Complete
In-Depth Studies	Complete	Completed	Complete

Development of Management Options	Complete for Shoolpaneshwar	Some work completed but awaiting deliberations of the expert group.	Some work completed but awaiting results of study and deliberations of the expert group
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Action Plan

Migratory corridors	Not needed	Completed	Complete
Sanctuary development	Complete for Shoolpaneshwar development.	Plans for establishment of wildlife sanctuaries await study results and expert group's recommendations	Plans for establishment of wildlife sanctuaries await study result and expert group's recommendations.
Wildlife conservation	Massive afforestation in entire catchment of SSP	It depends on deliberations of expert group	Await final outcome of study.
Implementation	Shoolpaneshwar development complete, CAT work (increasing carrying capacity) nearing completion	Awaiting outcome of the study. CAF nearly completion, CAT work recently accelerated	Arrangements complete, awaiting final outcome of study

Progress in Shoolpaneshwar Sanctuary Development

	Target	Achieved to	% Complete
- Fencing	100km	107	100
- Firelines	60km	251 km	100
- Barricades	2km	2.8 km	100
- Check Dams	14	14	100
- Construction of Quarters	21	21	100
- Construction of Rest House	1	1	100
- Improvement of Communications	50 km	70.5 km	100

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.
- Velvadar Black Bush Nation Park.

Summary of Status of Environmental Planning:

B) Fisheries

	GOG	GOM	GOMP
Preliminary surveys work plan.	Yes	Yes	Yes
Updating of Detailed surveys/studies of fish fauna	Yes	-	Yes
Updated Action plans	Yes	Yes	Underformulation
Implementation			
1. Plan for clear felling	Completed	Yes to synchronise with submergence 26.00 ha felled marking on 714 ha.	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	Yet to agree
4. Expert group to lay down guidelines for conservation & Development	Yes agreed by the states & constituted by the NCA. First meeting held on 10.5.1995.		

Progress of Implementation

CICFRI have already established one hatchery in Gujarat for augmenting the numbers of the Hilsa fish in the reservoir. This currently produce around 250,00 spawn per year. CICFRI have also been commissioned to monitor the whole of the estuary and their study has been extended to examine pollution and to undertake modelling studies in the downstream environment.

A draft plan for the creation of an Interstate Fisheries Development Board (IFDB) has been prepared by the NCA and agreed, in principle, by the governments of Gujarat and Maharashtra. However GOMP has disagreed & suggest an alternative proposal. Reaction from GOG & GOM are awaited. The organization is expected to be set up and fully functioning prior to reservoir filling. 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 followup action.

GOG has already provided 16 hectares of land to the project for the development of fish farms. In addition, the State Fisheries Department is exploring the development of riverine fisheries and the development of the reservoir for commercial and game fisheries.

Execution of felling in M.P. & GOM as per felling plans prepared awaits the commencement of impounding.

V. 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 I&II.
- 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.

Progress of 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 river bed.

The Government of Gujarat has identified 9 locations for the installation of seismic monitoring stations, 4 each on either side of the Sardar Sarovar reservoir in Madhya Pradesh and Maharashtra and 1 at Kevadia in Gujarat. By Dec. 1994, 8 stations had been installed. Construction of building for the 9th station in progress.

The progress of implementation is illustrated in Table below:

Implementation of Actions

Action	Status
Dam design modifications	Complete
Installation of monitoring stations	8 stations installed by June, 1994, 2 more awaited
GSI (Nagpur Division) rim stability studies	Completed
Tracer Studies by CWPRS	Ongoing

VI. HEALTH ASPECTS

Studies

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 was 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 produced a report on the health profile of 33 project-affected villages in Dhule District, Maharashtra.
- Health Statistic 1982-84, GOMP. This study, published by GOMP in 1985 & updated is 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 by, amongst others, by the Malaria Research Centre (MRC) and Dr. Kalra.
- Revised health plan by GOM, 1995.

Status of Implementation of Actions for Public Health

Action	Gujarat	Maharashtra	Madhya Pradesh
Baseline studies	Complete	Complete	Complete
Preparation of state action plan	Submitted and modified in 1986; Urban Malaria Scheme proposed	Original submitted in 1987, revised in 1991 and 1992 & 1993	Original submitted in 1986, revised in 1988 and final plan submitted in 1991
Survey of existing facilities	Complete	Complete	Sufficient facilities
Establishment of new facilities	Hospital at Kevadia for workers; laboratory and mobile unit complete, drug dispensaries	Somawal village hospital; health centres and health units sanctioned.	Hospital, mobile unit and civil dispensaries for labour; detailed scheme for resettled population
Vector control measures in place	NMEP; SSNNI workshop on malaria control; laboratory established; entomological studies underway	NMEP; adoption malaria control guidelines of irrigation Department	NMEP; state malaria control organisations strengthened

Appointment of specialist staff	Complete	Awaits financial approval by State Govts.	Needs identified
Disease Monitoring and responsibility	Entrusted to SCHMS Action Plan of 1986 will be revised. EIA report Submitted by SCHMS. Final plan awaited.	Entrusted to regular health department. Surveillance studies commenced.	Evaluation cell established monitoring by Gandhi Medical College, Bhopal. 3rd Six monthly report submitted.

VII. ARCHAEOLOGICAL SURVEY AND ANTHROPOLOGICAL STUDIES/ ARCHAEOLOGICAL SURVEY

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:

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 of Department of Archaeology. A survey was carried out by the Department of Archaeology of cultural sites in 24 villages of Akkrani Taluk and nine village from Akkaluwa Taluk, Dhule District.
- Madhya Pradesh : Survey of State Department of Archaeology and Museum (1992).
- Anthropological Survey of India: Narmada Salvage Plan.
- Anthropological Survey of India: People's of India.
- Parishad, A.K. Survey of Material Cultural in the Narmada Valley.
- Rashtriya Manav Sanghralaya : Narmada Salvage Plan.

Cultural Heritage in SSP Area

	Gujarat	Madhya Pradesh	Maharashtra
Relocation of Temples	8(2)*	37 (7)	-
Excavation site(s)	-	5	

* Figures in brackets indicate number of sites designated for relocation.

Summary of Current Situation and Progress

	GOG	GOMP	GOM*
Survey of Villages in Submergence Zone.	}	"Complete" for all item in all the States.	
Identification of Cultural Sites			
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 present location.

Progress of implementation:

State	Relocation	Target	Progress
Gujarat	2/2	-	-
Maharashtra	-	-	-
Madhya Pradesh	7/5 *1	5/3 *2	188/9 *3

***1 Relocation**

Work for relocation of following temples is in progress.

	Village	Temple	
1.	Roliqaon	Shiv temple	} Plan elevation & line drawing } inspection rock type etc } before monsoon.
2.	Semalda	Kalanjeshwar	}
3.	Barda	Shiv Mandir	} Land allotment under
4.	Khujawa	Bhawani Mata temple	} progress of estimate
		etc.	} under preparation.
		Jaleshwar temple	}

***2 Excavation**

- For excavation at vill Khaparkheda & Brahmangaon. Funds sanctioned by NVDA. Work under progress.
- For excavation at village Utarad. Work was completed earlier by ASI, Govt. of India.

***3 Collection & display at Museum**

- Land for museum at Barwani & Indore requested. Rock cut sculptures at Vill. Papaldagarhi are being studied for shifting.

ANTHROPOLOGICAL STUDIES

Government of Madhya Pradesh has informed that in view of the studies being carried out in connection with Narmada Sagar Project, no separate anthropological studies are required and that the Director General, Anthropological Survey of India has also expressed the same view. M.P. State Adivasi Kala Parishad has submitted its report on Tribal arts & culture. Besides Anthropological Survey of India has informed that Narmada Basin is already covered extensively under the project "people's of India". Besides Rashtriya Manav Sanghralaya has conducted needed studies in the past as follows. Further studies are covered under R&R plan of the state Governments.

- a study of the palaeo-ecology of quaternary fossils in the central Narmada Valley;
- excavation of upper palaeolithic site of Mehtakhaeda and further exploration of Nimar;
- collection of tribal artifacts in Madhya Pradesh.

Institutional responsibility for these actions was specified in the action plan whereby the first two elements were completed by Deccan College, Puna and the third by Adivasi Kala Parishad, for the Rashtriya Manav Sanghralaya, Bhopal.

STATUS REPORT
NARMADA SAGAR PROJECT (NSP) ENVIRONMENTAL ASPECTS.
JUNE, 1995

1) Phased Catchment Area Treatment:

The freely draining area of Narmada Sagar Project down stream of Bargi Dam is about 39,25,422 ha. As per the guidelines of MOWR, directly draining watersheds of very high and high priority categories only are to be treated. Prioritisation survey of the watersheds was entrusted earlier to ECOTAS, Indore. Later on, as per GOI's instructions the prioritisation survey was entrusted to the All India Soil & Land Use Survey Organisation, New Delhi. The Survey has been completed by AISLUISO, New Delhi and the Survey reports have been received in the NVDA.

On the basis of the reports submitted by the AISLUISO, 30 sub-watersheds belonging to the very high and high priority categories and directly draining into the reservoir have been identified for treatment. These 30 sub-watersheds cover an area of about 73,456 ha.

I. DIRECTLY DRAINING SUB-WATERSHED OF HIGH & VERY HIGH PRIORITY CATEGORIES:

Critically degraded Sub-watersheds below Bargi dam (Figure in ha).

	FOREST		NON FOREST		TOTAL	
	Gross	Net	Gross	Net	Gross	Net
Critically degraded sub-watersheds.	15759	11048	57697	51927 *	73456	62975

* In addition an area of 1636 ha. was treated up under pilot project earlier.

Programme and Progress of Works:

	Upto 92-93	93-94	94-95	95-96	96-97
	Cumulative Progress Target/Progress			Target	
Non-Forest area/ ha. (51,927 ha)	11439	13636 10261	15375 7224	19651	3352
Forest area/ (11,048 ha)	-	-	3700 2623	4777	3648
Total Area: (62,975 ha)	11439	13636 10261	15700 9847	23824	7000

II. FREELY DRAINING AREA: (EXCLUDING DIRECT DRAINING SUB-WATERSHEDS)

Number of watersheds	- 478
Gross Area	- 10,12,650 ha.
Net Area	- 9,15,150 ha.

Schedule of Implementation:

Year	Forest (in ha.)		Non Forest (in ha.)	
	Gross Area	Net Area	Gross Area	Net Area
1995-96				18000
1996-97				18000
1997-98		10000		27000
1998-99		10000		28800
1999-2000		10000		28800
2000-2001		10000		28800
2001-2002		10000		28800
2002-2003		10000		28800
2003-2004		10000		28800
2004-2005		10000		28800
2005-2006		10000		28800
2006-2007		10000		28800
2007-2008		8430		28800
2008-2009				28800
2009-2010				28800
2010-2011				28800
2011-2012				28800
2012-2013				28800
2013-2014				28800
2014-2015				
2015-2016				28800
2016-2017				28800
2017-2018				28800
2018-2019				28800
2019-2020				28800
2020-2021				28800
2021-2022				28800
2022-2023				26400
2023-2024				26120
<hr/>				
	1,24,732	1,08,430	8,06,361	8,06,720
<hr/>				

2) Compensatory Afforestation :

A total of 40332 ha forest land would come under submergence and an additional 779.9 ha of forest land has been diverted for the residential colony, power house complex, dam, saddle dam and approach roads. Subsequently, another 308.4 ha of forest land was

permitted to be diverted for power house. 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, 10,143 ha of non-forest and 70,802 ha of degraded forest land has been identified for compensatory afforestation.

Programme of Compensatory Afforestation:

	Commulative Progress till 91-92	92-93 Target/ Progress	93-94 Target/ Progress	94-95	95-96
Degraded Forest area (70,802 ha)	23048	12528 11919	12400 12987	12400 4656	10035
Non-Forest area (10,143 ha)	5239	1534 1390	1500 1327	1500 667	514
(80,945) (say 81,000 ha)	28287	14062 13309	13900 14314	13900 4723	11549

3) Command Area Development :

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 6/2007. Monthly observation of water levels started in November, 1991 for subsequent supply of this data to the consultants, already shortlisted, are likely to be continued for 2 seasons to draw inference for preparation of master plan for drainage. 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.

4) Flora, Fauna, Wildlife and Carrying Capacity :

Studies on these aspects were entrusted to the Wildlife Institute of India, Dehradun in December, 1989 and were scheduled to be completed by March, 1993. The studies have been completed. The final study report is submitted to MOEF & NCA.

Besides this, the Friends of Nature's Society, Bhopal, was entrusted with the preparation of Wildlife Retrieval and Conservation Plan. They have submitted the final report. Action plan is under formulation.

Actions have been taken up by NVDA to implement the recommendation of the WLI regarding construction of National Park & protected areas.

5) Seismicity and Rim Stability

The reservoir competency survey has been done by GSI and report is submitted. In the report, GSI has suggested further studies for some patches of narrow water divide. As such they were requested to carry out the study in the required area. GSI is further reviewing the need to survey the area identified earlier.

Establishment of 10 nos. of seismic observatories in the Narmada Sagar Complex area is taken up. NVDA 12 nos. of wood Anderson Seismometers and six nos. of photographik recorders are being procured from IMD. Procurement of Micro Earthquake recorders is also in progress. In the mean time on the initiatives taken by NVDA, CWPRS has already installed the instrument to records. Preimpounding date and for undertaking seismic studies at NSP, Omkareshwar & Maheshwar projects through Analogic micro earthquake recorder & strong motion accelerograph as an interim measure work on establishment of remaining seven observatories is in progress..

6) Health Aspect:

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.748.72 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. Three six monthly report 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 is under formulation.

7) Fisheries Development:

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, studies in the Middle Narmada (Tawa, Barna and Kolar Reservoirs) by Harkatullah 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. 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.

8) Archaeological and Anthropological Survey:

A survey of the 254 villages is required for identification of the archaeological monuments falling within the submergence area. The State Department of Archaeology and Museums, Bhopal was entrusted with the survey of 87 villages which has been completed. Archaeological Survey of India has also completed the survey for 167 villages assigned for identification of the monuments of significance.

Action plan is available. Action will be taken to preserve material of archaeological importance in consultation with experts.

As only lower bastion in north of the Joga Fort is likely to be affected by Scour action of water, this is being studied and the Siddeshwar temple is well above the FRL of 860 ft. These two structures are not considered as affected by the project. The state Department of Archaeology & Museum has already submitted an action plan for relocation & monuments of Archaeological significance. This plan is being implemented.

Excavation of the early historic mound in village Khedirama in Hoshangabad distt. is completed and report is available in NCA. Actual tools & artifacts have been found. However in order to ascertain this history after Mughal period. It is proposed to work further on this mound.

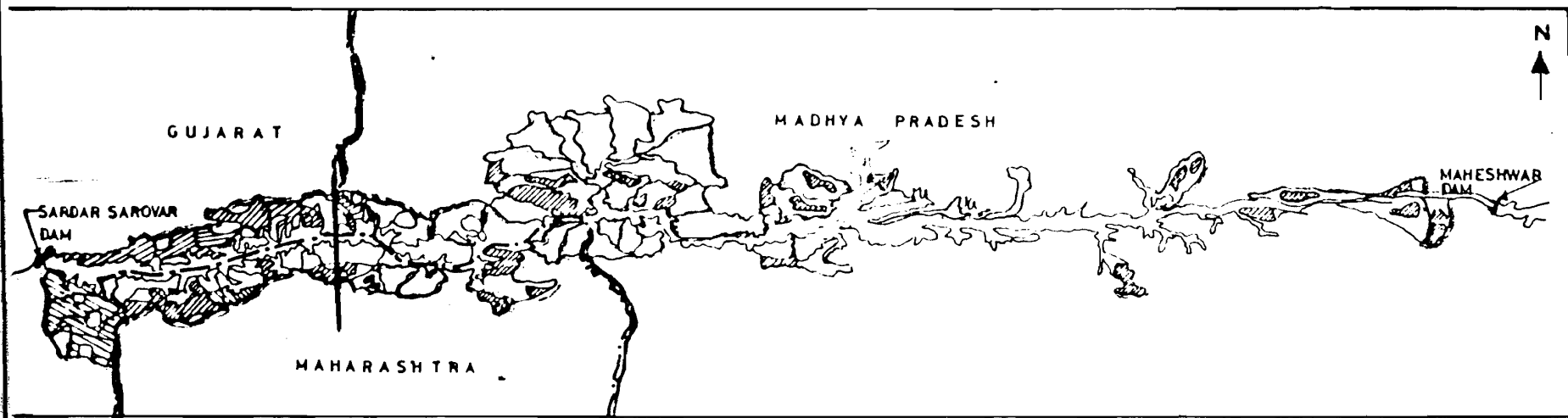
Anthropological Studies:

Efforts are being made for retrieval of bio-cultural material from the Narmada Basin. A lot of information is gathered from the field which generates immense data of Socio-Anthropological significance.

Rashtriya Manav Sanghralaya has constituted a working group for the retrieval of bio-cultural material in Narmada Basin. Survey of tribal art and handicraft entrusted to M.P. Adivasi Kala Parishad is completed and report is available. Besides Anthropological Survey of India has covered these studies under its own project called "people of India". The report is in 61 volume out of which 7 volume are under final editing. A Narmada Salvage plan is also launched by Anthropological Survey of India recently and the entire area is scanned and some ancient tools have been found.



PRIORITY AREAS FOR CATCHMENT AREA TREATMENT



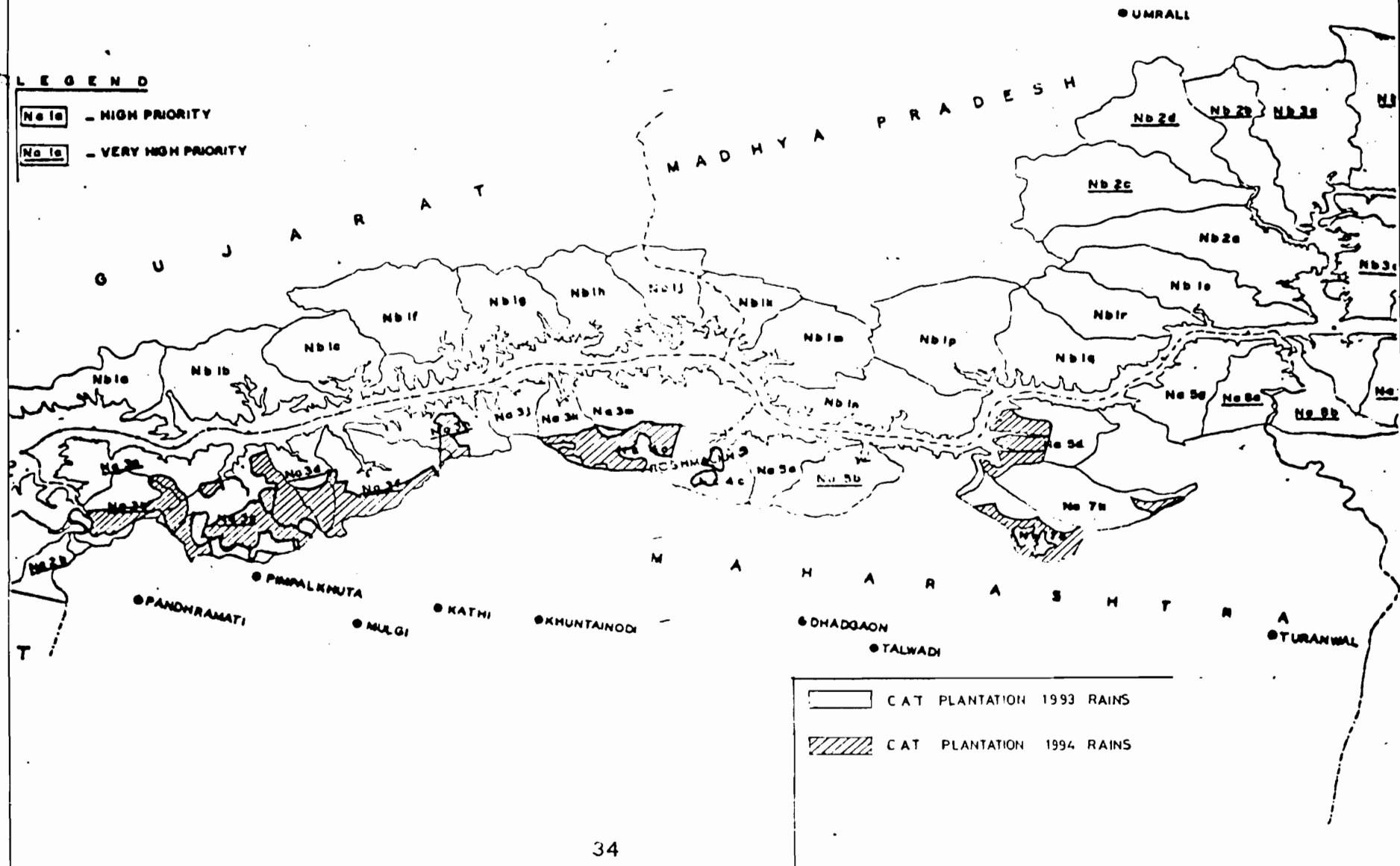
LEGEND

- [] SUB WATER SHED BOUNDARY
- [] WORK TACKLED BY 1994 RAINS
- [] STATE BOUNDARY
- [] 1994 81 EL. 45100 M. Ch. 5280 ha. Area under submergence.

NOT TO SCALE

SARDAR SAROVAR PROJECT - PROGRESS OF CATCHMENT AREA TREATMENT WORKS IN MAHARASHTRA

ANNEX-XXVI-3(c)



SUBCATCHMENT AREA
OF

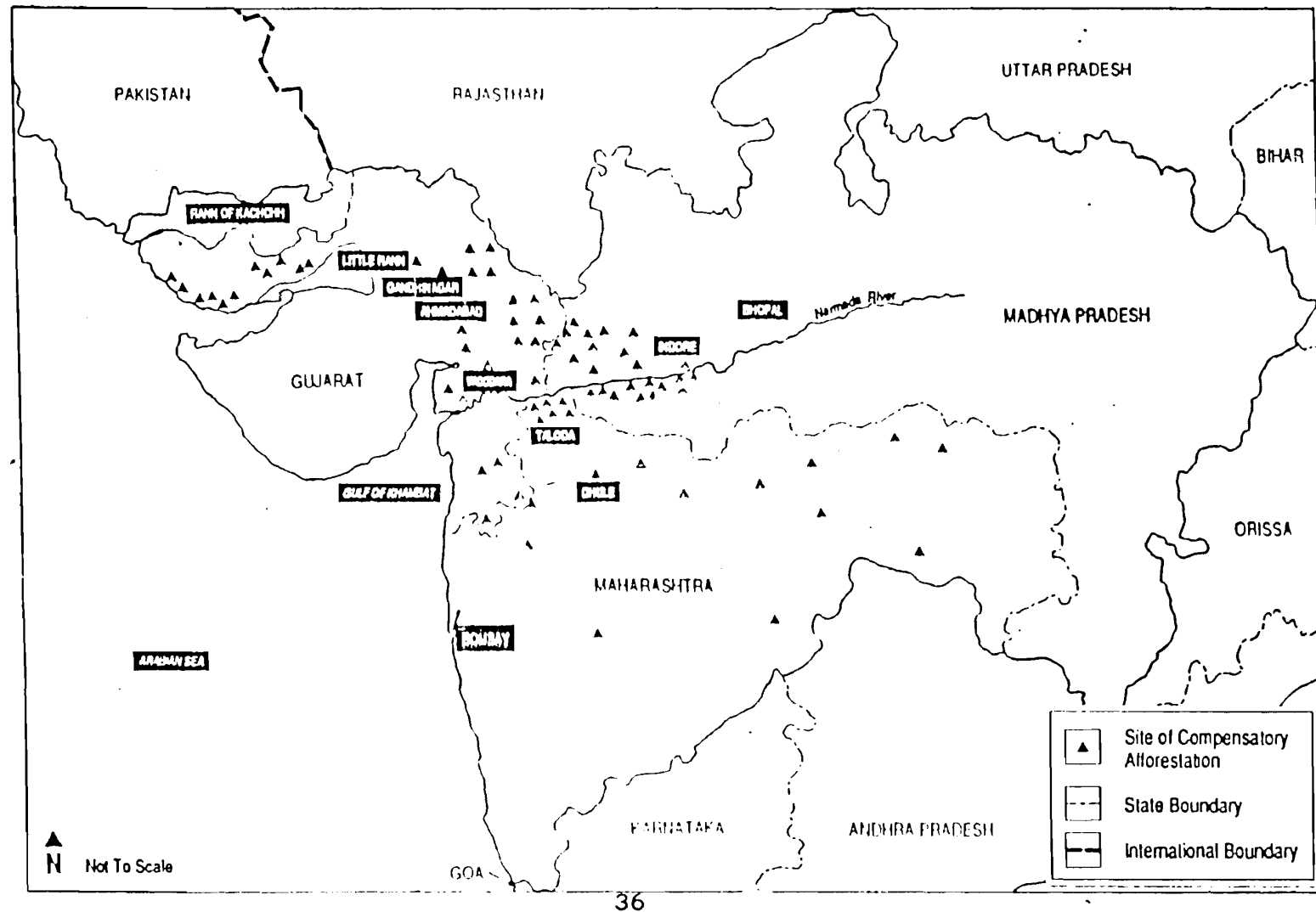
ANNEX-XXVI-3(d).

SARDAR SARDAR NARAYAN PROJECT,

GUJARAT -



Compensatory Afforestation in Gujarat, Maharashtra, Madhya Pradesh





Officer on Special Duty

Phone No. 2335 ANNEX-XXVI.(5).
 NARMADA PLANNING GROUP
 Government of Gujarat
 12, Narmada Block, 3rd floor,
 New Sachivalaya Complex,
 Gandhinagar - 382 010.
 Dated : 7/1995.

24 JUL 1995

Inclusion of Dr. A.K. Malhotra, Member (E&R) nsa NCA
 as a member of HLSC and four Expert Multidisciplinary
 Groups.

Narmada Planning Group,
 Block No. 12, 3rd Floor,
 New Sachivalaya,
 Gandhinagar-382010.

Office Order No. NPG/ENV/EIA/219/821
 dated : 24 JUL 1995

- Read : (1) Office Order No. SSNNL/NPG/ENV/EIA/214/
 1300 dt. 6-7-1992.
- (2) O.O. No. SSNNL/NPG/ENV/EIA/219-I/1686,
 dtd. 4-9-1992.
- (3) O.O. No. SSNNL/NPG/ENV/EIA/219-II/1687,
 dtd. 4-9-1992.
- (4) O.O. No. SSNNL/NPG/ENV/EIA/219-III/1688,
 dtd. 4-9-92.
- (5) O.O. No. SSNNL/NPG/ENV/EIA/219-IV/1689,
 dtd. 4-9-92.

PREAMBLE :

The Sardar Sarovar Narmada Nigam Ltd./NPG has
 constituted High Level Steering Committee (HLSC) to
 provide overall guidance and direction for Environmental
 Impact Assessment studies, vide Office Order read at (1)
 above. In addition to this SSNNL/NPG has constituted
 four Expert Multidisciplinary Groups for (1) Nal
 Sarovar Bird Sanctuary (2) Black Buck National park
 at Velavadar (3) Wild Ass Sanctuary in Little Rann of
 Kutch and (4) Aliabet island in estuary of river
 Narmada vide Office Order read at (2), (3), (4), & (5)

respectively. The matter regarding inclusion of the name of Dr. A.K. Malhotra, Member (ESR) Narmada Control Authority as member of aforesaid Committee/Expert Groups was under consideration of SSNNL/NPG.

O R D E R :

In partial modification of Office Order read at (1), (2), (3), (4) and (5) above, the SSNNL/NPG is pleased to nominate Dr. A.K. Malhotra, Member (ESR) Narmada Control Authority as a member of the following committee/Expert Groups.

- (1) High Level Steering Committee for Sardar Sarovar Project.
- (2) Expert Multi-disciplinary Group on Wal Sarovar Bird Sanctuary.
- (3) Expert Multi-disciplinary group on Black Buck National Park at Velavadar.
- (4) Expert Multi-disciplinary Group on Wild Ass Sanctuary in Little Rann of Kachchh.
- (5) Expert Multi-disciplinary Group on Eco-development of Aliabet Island in estuary of river Narmada.

2. This order is issued in pursuance of decision of Vice Chairman, SSNNL, Gandhinagar on dt. 24-7-95 on the file NPG/ENV/EIA/219.

(A. S. PATEL)
Officer on Special Duty,
Narmada Planning Group,
Gandhinagar.

To
Dr. A.K. Malhotra,
Member (ESR),
Narmada Control Authority,
113-2G, Scheme No. 74C,
Vadgaon,
Gandhinagar.

-3-

Copy fws to:

1. The Secretary of Chairman, SSNNL, Gandhinagar.
2. The Personal Secretary to Vice Chairman, SSNNL, Gandhinagar.
3. The Personal Secretary to Director (AES) SSNNL, Gandhinagar.
4. The Executive Member, NPG, Gandhinagar.
5. The Chief Controller of Account, SSNNL, Block No.12, Gandhinagar.
6. The PAO (NP), Gandhinagar.
7. The Executive Engineer, NF Colony Division, Vastunirman Society, Sector. 21, Gandhinagar.
8. The Administrative Officer, NPG, Gandhinagar.
9. Select file of respective group.

ANNEX-XXVI.(6).

No.Env-4(5)/95/ 1281

Dated, the 22nd August, 1995.

To

Shri A.S.Patel,
Officer on Special Duty,
Narmada Planning Group,
Govt. of Gujarat,
12, Narmada Block
3rd Floor, New Sachivalaya Complex,
Gandhinagar-382010.

Sub:-First interim report on EIA of Velavadar Black Buck
National Park located in the command area of SSP.

Ref:-Letter No.KPG/VEL/EIA/229/897 dated 20.7.1995.

Sir,

In continuation to your letter under reference on
the above subject I have to inform you that the said
interim report was examined in this office. Our comments
on these reports are enclosed for necessary action.

Yours faithfully,


(DR.A.K.MALHOTRA)
MEMBER (E&R)

g/c

FIRST INTERIM REPORT ON ENVIRONMENTAL IMPACT ASSESSMENT (EIA) STUDY
ON VELAVADAR BLACK BUCK NATIONAL PARK PREPARED BY GEER FOUNDATION
(An Assessment by Narmada Control Authority)

The present report is not an Environmental Impact Assessment (EIA) report. The report is descriptive in nature and is also not in the line on the standard EIA methods.

The background of the study, biomass production, invasion of Prosopis juliflora, habitat and community organisation, movement pattern, territorial belongings, mating behaviour, etc of Black buck are described in detail. The account on the lesser florican (bustards), prey-predators relations, agricultural pattern and factors of impact are also described in detail. The report is mostly based on the secondary data collected by various experts of Government agencies.

Based on NCA assessment, some views and suggestions for improving the Interim report and making it a comprehensive EIA acceptable to National/International fora are given below for incorporating in the final report.

1. The study should also be oriented towards assessment of the entire vegetation features both extrinsic and intrinsic.
2. Detail account on following concerning flora and fauna should be presented:
 - Rare and endangered species.
 - Species of high visual historic or aesthetic appeal, sports, commercial, recreational or educational values.
 - Special relationship aspects includes: vegetation to substrate and wild life to substrate.
3. The basic ecological concept which needs to be incorporated includes:
 - Indicator species, ecological niche etc.
 - Competition, habitat/partitioning.
4. Identification of the area which needs conservation and protection considering the presently available wilderness, as well as migratory habitats of Black buck.
5. Ecosystem zoning of the area from floral and faunal angles.
6. The introduction of the canal in the area and its impact on Black bucks movement should be identified, predicted and evaluated.
7. Detail account on census, habitat, food and feeding etc. of Black buck have been presented. The findings indicate that biomass production in the park is directly co-related to rainfall. It is clear from these findings that the introduction of canal will definitely lead to improvement in the ecology of the area through enrichment of the moisture regime which will result in the increase in biodiversity as well as biomass in the area. In view of this, detail account should also be presented about the forestry programmes which will be conducive to Black buck habitation as well other fauna available in the park.

8. The existing water holes and its adequacy for the wild life in the national park has not been presented. It is suggested that prediction should be made about the approximate quantity of the water required to be diverted for meeting the demand of the wild life keeping in view the concept of carrying capacity.
9. It is clear from the report that 32 villages form part of the ecosystem (ecological boundary of the national park). However, the report does not highlight about the dependency as well as impact of anthropogenic activities on the flora and wild life of this national park. Realising the importance of this aspects, detail account are required to be presented in the final report on this issue alongwith the measures for minimising human/livestock interference on this National Park.
10. The report highlights that vast tract of saline land are available in the park. It is suggested that proposal should be made to introduce salt tolerance grass/tree species of ecological values to increase the carrying capacity of the park in terms of biomass.
11. Since the park is surrounded by 32 villages, the final report should also address the role of the community in the long term management and protection of the park including the programme for community development. It is suggested that eco-development Centre should be established in the areas for better management of the park with the help of people/NGOs.
12. The management plan of Velavadar National Park should be oriented on following lines:
 - a. Active Protection of the reserve.
 - b. Passive Protection of the reserve.
 - c. Management of Parks: Priorities for what is being managed, management activity needed, management zone, special management considerations, (grazing by livestock, fires, damage to crops by wild life, updatng of impact assessment around the reserve etc.)
 - d. Management activities for Wildlife: (Influencing food production, habitat improvement)
 - e. Management activities for people: (Setting up hides to watch wildlife, good trail system into parks, interpretation sign to educate people, eco-development Centre etc.)
13. The final reports should be concise and prepared on the following lines:
 - Executive summary (significant findings and recommendations).
 - Project descriptions.
 - Scope of EIA.
 - Methodology used in conducting studies.
 - Baseline environmental studies.
 - Identification of impacts.
 - Prediction of impacts.
 - Evaluation of impacts (with environmental management plan and without environmental management plan)
 - Environmental management plan for National Park (all components of environment).
 - Monitoring and surveillance programmes, budgetary programmes, training needs, etc.

DIRECTORATE OF HEALTH SERVICES

[GOVERNMENT OF MAHARASHTRA]

Telephones :

Office : 262 10 31—36
 Director (Personal) : 262 10 06
 Jt. Director (..) (Med) : 262 11 86
 Jt. Director (..) (PDE) : 262 09 25
 Jt. Director (..) (Oph) : 262 08 65

St. George's Hospital Compound
 Govt. Dental College Building
 4th Floor, Bombay 400 001 (INDIA)

Telegrams :
 "HEALTH SERVICES", BOMBAY

No.DHS/PDE/S.S/D-7/T-3/95.

Date : 18 July 1995.

To,

✓ Dr. A. K. Malhotra,
 Member (E and R),
 2nd floor,
 27, Press Complex,
 A.B.ROAD,
INDORE: 452008 (M.P.)

Subject:- Sardar Sarovar Project- Health Plan.

Reference:- Your office letter No. Env.4(6)95/996,
 dated 26th June 1995.

Sir,

Please refer to your letter No. cited above. Following remarks are offered.

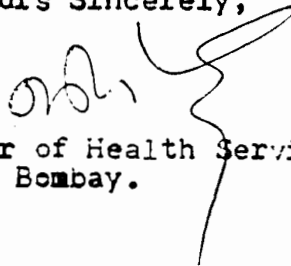
- 1) It was discussed in the Delhi meeting that the cost involved for establishment and functioning of proposed infrastructure and the cost involved for carrying out the studies will be born by Rehabilitation Department as incremental charges.
- 2) Detailed estimated cost of the proposed infrastructure is given in the enclosed statement.
- 3) Under point B(6) expenditure of Reserve Camps are calculated for 10 years. As per your suggestion the cost of 24 Reserve Camps, are calculated for 5 years instead of 10 years. The cost of 5 years comes to Rs. 28.80 lakhs. (Revised statement is enclosed).
- 4) There is no post of Laboratory Technician in the staffing pattern of Primary Health Centre. Hence 16 posts of Lab. Technician are proposed.
- 5) Valheri is a newly created Primary Health Centre. The cost includes the construction of Primary Health Centre building, & staff quarters at present Primary Health Centre, Valheri is functioning.
- 6) The expenditure Rs. 50,000/- incurred as shown as page No.1 is only on the infrastructure available at present post of the institutions proposed in the health plan are yet to be sanctioned. Hence expenditure is less.

: 2 :

7) Government of Maharashtra has not prescribed standard norms of cost and manpower.

8) Health Plan is revised as per the discussion held in the meeting at New Delhi on 29.9.1994. Hence there is increase in the revised plan.

Yours Sincerely,



for Director of Health Services,
Bombay.

Copy to Secretary, R and R., Mantralaya, Bombay.

Copy to Secretary, Public Health Department, Mantralaya,
Bombay.

Details of estimated cost for one year

Sr. No.	Name of the Scheme	Pay & Allow.	Office Exp.	Mat. Supplies	Motor Vehi/ Boat	POL M.U.	Genst.	Total
1.	2.	3.	4.	5.	6.	7.	8.	9.
1.	Establishment of Primary Health Centre, at Valheri.	6.46	0.10	1.10	3.00	0.10	35.00	45.76
2.	Establishment of 3 Dispy.	8.64	0.15	1.50	-	-	60.00	70.29
3.	Establishment of Floating Disp.	4.20	0.10	0.60	5.00	0.10	20.00	30.00
4.	Sanction of 16 posts of Lab.Tech.at P.H.Centres.	7.20	-	-	-	-	-	7.20
5.	Conduction of Antimaterial activities.	-	-	2.00	-	-	-	2.00
6.	Establishment of Public Health Lab.	5.00	-	15.00	-	-	-	20.00
7.	Impact study of disease.	-	10.00	-	-	-	-	10.00
8.	Establishment of 24 Reserve Camps.	5.76	-	-	-	-	-	5.76
R Total:		37.26	10.35	20.20	8.00	0.20	115.00	191.01

SUMMARY OF INFRASTRUCTURE AND FUNDS REQUIRED

Name of Scheme	Expenditure for one year				(Rs.in lakhs)	
	Recur- ring	Non- Rec- urr- ing	Capi- tal	Total	Recurring Expd.for 10 years	Total for 10 yrs (4+5+7)
2.	3.	4.	5.	6.	7.	8.
<u>Institutions at Rehabilitation Site</u>						
1. Establishment of PHC Valheri (Nandada Nagar)	7.26	3.50	35.00	45.76	72.60	111.10
2. Establishment of 3 Dispensaries	8.79	1.50	60.00	70.29	87.90	149.40
<u>Plan for Intensive Health Care Area near the Dam</u>						
1. Establishment of Floating Dispensary	3.50	6.50	20.00	30.00	35.00	61.50
2. Sanctioning of 16 posts of Lab.Tech- nicians at 16 PHCs	7.20	-	-	7.20	72.00	72.00
3. Conduction of Antimalarial activities	2.00	-	-	2.00	20.00	20.00
4. Establishment of Mobile Public Health Laboratory	5.00	15.00	-	20.00	50.00	65.00
5. Study of disease pattern in dam site	10.00	-	-	10.00	10.00	10.00
6. Establishment of temporary 14 Rescue camps for 4 months (June to Sept.)	5.76	-	-	5.76	28.80 (For 5 years)	28.80
	49.51	26.50	115.00	191.01	376.30	517.80

ANNEX-XXVI.(8).

**MINUTES OF THE SECOND MEETING OF HIGH LEVEL EXPERT GROUP ON
FISHERIES DEVELOPMENT AND CONSERVATION IN SARDAR SAROVAR RESERVOIR
HELD ON 12.07.95 AT 3.30 PM. IN KRISHI BHAVAN, NEW DELHI.**

I N D E X

<i>Item No.</i>	<i>C O N T E N T S</i>	<i>Page No.</i>
	<i>Introduction</i>	<i>1</i>
<i>Item No.11-1(5)</i>	<i>Confirmation of the minutes of 1st meeting.</i>	<i>2</i>
<i>Item No.11-2(6)</i>	<i>Review of action taken on the decision of previous meeting.</i>	<i>3-7</i>

A N N E X U R E

<i>Annex.11-Min.(1)</i>	<i>List of Participants</i>	<i>1</i>
<i>Annex.11-Min.(2)</i>	<i>Letter No.Fish/40 dated 29.6.96 from NVDA, Bhopal to Nomination of Shri G.P.Dubey, Director Fish (Retired), Indore.</i>	<i>2</i>
<i>Annex.11-Min.(3)</i>	<i>List of Members & Invitees of the High Level Expert Group on Fishe- ries Development & Conservation in SSP.</i>	<i>3 - 4</i>
<i>Annex.11-Min.(4).</i>	<i>Narmada river basin map showing location of the major projects.</i>	<i>5</i>

**MINUTES OF THE SECOND MEETING OF EXPERT GROUP ON FISHERIES
DEVELOPMENT AND CONSERVATION HELD ON 12.07.1995
AT 3.30 PM IN KRISHI BHAVAN, NEW DELHI**

Second meeting of the expert group on fisheries development and conservation was held on 12th July, 1995 under the chairpersonship of the Additional Secretary, Department of Agricultural Cooperation (DOAC), Ministry of Agriculture at New Delhi in the committee room of DOAC. List of participants is enclosed at Annex-1-Min-(1).

Member (E&R), Narmada Control Authority on behalf of the Chairperson welcomed the members & invitees to the second meeting of the expert group.

Discussion on Agenda items was taken up thereafter.

Item No 11-1(5): Confirmation of the minutes of 1st meeting.

Minutes of the first meeting on fisheries development
& conservation held on 10.5.95 as circulated to all members
& invitees vide letter No. Env-4(10)/95/1189-1204 dated
5.7.1995 were confirmed.

Item No.11-2(6): Review of action taken on the decision of previous meeting.

(A) Nomination of Member(s) & Invitees to the expert group. (Item-1.(1)).

GOMP have nominated Dr. G.P. Dubey, Fisheries Consultant, NVDA as expert nominee from the state. Letter received from GOMP is placed at Annex-11.Min-(2). It was also agreed to extend invitation to technical Director/Commissioners from the states dealing with fisheries for better followup. Accordingly the revised composition of the group is placed at Annex-11.Min-(3).

(B) Scope of the Expert Group:

Regarding enlarging the scope of the expert group with a purpose to adopt a basinwide approach, it was informed that necessary action was being taken by NCA office for taking up the issue with the competent authority.

(C) Status of the studies & plans on fisheries development & conservation [Item (1-2)].

Expert group noted the contents of the brief note enclosed with the agenda. State Govts were requested to update or correct the information contained in the note, if considered necessary.

Govt. of Gujarat were requested to supply a readable copy of the plan at the earliest.

Regarding fisheries development plan submitted by Govt. of Maharashtra, Commissioner (F), GDM, informed that in the absence of a clearance from NCA he was unable to proceed with the implementation aspect of the action plan.

Fisheries Dev. Commissioner (GOI) referring to plan submitted by GOM stated that the plan enclosed with agenda papers did not coverup the conservational aspects & needed extensive revision. He however requested Comm. (F), GOM to supply a copy of a time bound comprehensive action plan for perusal of the expert group.

Dr. G.P. Dubey, informed that he had already revised the action plan prepared by him during 1984 & that the plan covered the areas of Narmada Sagar, Maheshwar & Omkareshwar projects. He stated that the plan included lim nological aspects to be covered during initial impoundment. He further informed that the plan was under consideration for approval by the NVDA.

Chairperson summed up the discussion and stated that the plans should envisage integrated approach & include very specific studies with time bound schedule. Plan should also cover upstream /downstream concerns (where applicable) & also pre-impoundment & post impoundment phases. Defining of the scope of key issues & scheduling of stages of activity should also be included.

Fisheries Dev. Commissioner, GOI requested for a detailed note on the implementation aspect of the actions initiated so far & their current status from the party states.

It was agreed that the revised action plans should be made available for discussion during the next meeting proposed to be convened during 1st week of Sept. 1995.

(D) Guidelines for development and conservation of aquatic ecosystem of Sardar Sarovar Reservoir (Item- 1-3).

1- Short term strategies and guidelines:

After discussion it was agreed that Dr. Y.S. Yadav, Fisheries Development Commissioner, Govt. of India and Dr. P.V. Dehadrai, Deputy Director General (Fisheries) of ICAR of Ministry of Agriculture, Govt. of India would visit the dam site, for an on the spot assessment of what needed to be done for the fisheries development & conservation aspects during progressive filling of the reservoir. During this they would also hold consultation with Comm. (F), GDM, Director (R&E), GOG and Member (E&R), NCA.

A copy of the Narmada river basin map showing location of the major projects requested during the meeting is placed at Annex-11.Min(4).

2- Long term strategies and guidelines.

Member (E&R), NCA briefed the expert group about the strategies which had been evolved through a number of studies commissioned by the party states & NCA during the last decade or so.

While discussing the suggested strategies expert group was of the opinion that monitoring of hydrobiological parameters had to be done on a long term basis and should form an integral part of the plan.

Regarding clearfelling of the trees/forest growth from the reservoir bowl, Commissioner (F), GOM expressed difficulty in felling the areas prior to submergence due to various reasons. Member (E&R), NCA pointed out that in accordance with the environmental clearance granted by MOEF in 1987, clearfelling upto 4 mt. below the FRL was required to be completed prior to submergence. After detailed discussion it was decided to clearfell all such tree growth before submergence as it was very essential for the long term sustainability of the reservoir from the fisheries angle.

Chairperson requested the party states to submit a report on status of clear felling and also desired information about the yearly schedules of felling alongwith schedule of submergence within a month's time.

Expert group felt that well defined strategies were required for integrated development of fish resources. This should include strategies for main reservoir, tributaries, upstream, downstream & command areas of the water resources project. Chairperson expressed that the guidelines to be framed were to be applicable not only to the Sardar Sarovar Project but all similar projects in future.

It was felt that as the guidelines could not wait either revision of the plan or completion of specific studies, working groups for formulation of draft suggestion on specific areas of activities may be formed, so that once these draft suggestions were available these could be discussed during the next meeting.

It was agreed to constitute following working groups and it was also agreed that these group would submit their report by 15th August, 1995.

Fisheries Development Comm. (GDI) and Comm. (Fish.), GOG were entrusted with the task of drafting suggestion for the areas in the command. This was to include cooperatives, training, tanks & ponds, canals, distributions, etc.

Director, CICFRI, ICAR was requested to take up the task of drafting suggestions on the issue of fisheries dev. & conservation in the reservoir during pre & post impoundment phases.

Shri G.P. Dubey, Expert Member from M.P. was requested to take up the task of drafting guidelines in consultation with Comm. (F), GDI for tributaries, small dams & water bodies.

Expert group suggested that as finalisation of the guidelines might take some time, GOG should take all necessary steps for stocking of the reservoir during its initial impounding.

(E) TOR for the studies [Item-1(4)]:

Regarding the suggestions offered by NCA office on the Terms of reference of the studies entrusted by GOM to CICFRI, Comm.(F), GOM informed that a reference had been may made by GOM to CICFRI and their reply had just been received. He agreed to send a copy of the response to NCA soon.

ANNEX-II-MIN-(1).

NARMADA CONTROL AUTHORITY

Second Meeting of High Level Expert Group on Fisheries Development and conservation in Sardar Sarovar Reservoir held on 12.07.95 at 3.30 pm. in Committee Room No. 142 of the Department of Agricultural Cooperation, Krishi Bhawan, Ministry of Agriculture, New Delhi.

LIST OF PARTICIPANTS

GOVERNMENT OF INDIA:

Deptt. of Agricultural Cooperation (MOA), GOI.

1. Mrs. Asha Das, Additional Secretary (F) - Chairperson
2. Dr. Y.S. Yadav, Fisheries Development Commissioner
3. Dr. D.P.S. Chauhan, Asstt. Commissioner Fisheries

Narmada Control Authority.

1. Dr. A.K. Malhotra, Member (E&R)
2. Dr. Pawan Kumar, Specialist (Env.)

Central Inland Capture Fisheries Research Institute.

1. Dr. M. Sinha, Principal Scientist, CICFRI, Barrackpore. West Bengal.

GOVERNMENT OF MADHYA PRADESH

1. Shri S. Minj, Secretary (F), Fish Deptt. GOMP. Bhopal.
2. Shri Suresh Chandra, Member (E&F), NVDA, Bhopal.
3. Shri G.P. Dubey, Fisheries Consultant, NVDA. Indore.

GOVERNMENT OF MAHARASHTRA

1. Shri J.P. Dange, Commissioner (F), GOM. Bombay.

GOVERNMENT OF GUJARAT

1. Shri Arjun Singh, Secretary (Reh.) & Director (R&E), SSNNL, Gandhinagar.

ANNEX-II-MIN. (2).

नर्मदा घाटी विकास प्राधिकरण

पर्यावरण एवं वन प्रकोष्ठ

नर्मदा भवन, तुलसी नगर-भोपाल. 462003.

क्रमांक/मत्स्य / 40

भोपाल, दिनांक. 24/6/95 ।

प्रति,

✓ डॉ. ए. के. मल्होत्रा

सदस्य पर्यावरण एवं वन प्रकोष्ठ

नर्मदा नियंत्रण प्राधिकरण,

बो. जी. 113, स्कीम नं. 74-सी, विजयनगर,

इंदौर-8

विषय :- मत्स्य विकास एवं संरक्षण को उच्च स्तरीय तकनीकी समिति के गठन बाबत ।

संदर्भ :- आपका पत्र क्रमांक पर्या-4/10/95/603 दिनांक 10 अगस्त 95

0000

संदर्भित पत्र द्वारा लेख किया गया था कि विन्यासित समिति के म. प्र. की ओर से एक अतिरिक्त वैज्ञानिक सदस्य का नामांजन कर लूचना भेजी जावे । म. प्र. की ओर नर्मदा घाटी विकास प्राधिकरण द्वारा जो. पी. दुबे, संचालक मत्स्योद्योग सेवानिवृत्त, 11/2 विजासन रोड रामचन्द्रनगर इंदौर म. प्र. का निर्देशानुसार नामांजन किया जाता है ।

सदस्य पर्यावरण एवं वन
नर्मदा घाटी विकास प्राधिकरण

पृष्ठांक/क्रमांक/मत्स्य/

प्रतिलिपि :-

भोपाल, दिनांक. /95 ।

डॉ. जी. पी. दुबे, संचालक मत्स्योद्योग सेवानिवृत्त 11/2 विजासन रोड, रामचन्द्र नगर इंदौर की ओर सूचार्थ ।

सदस्य पर्यावरण एवं वन
नर्मदा घाटी विकास प्राधिकरण
भोपाल.

**LIST OF MEMBERS & INVITEES OF THE HIGH LEVEL EXPERT GROUP ON
FISHERIES DEVELOPMENT & CONSERVATION IN SSP**

CHAIRMAN

1. Ms. Asha Das, Additional Secretary (F), Govt. of India, Ministry of Agriculture & Cooperation, Krishi Bhawan, New Delhi - 110 001.

M E M B E R S

Ministry of Agricultural & Cooperation

1. Dr. Y.S. Yadav, Fisheries Development Commissioner, Ministry of Agricultural and Cooperation, Govt. of India, Krishi Bhawan, New Delhi- 110001.

Indian Council of Agricultural Research

1. Dr. P.V. Dehadrai, DDG, ICAR, Ministry of Agriculture and Cooperation, Krishi Bhawan, New Delhi - 110 001.

Narmada Control Authority

1. Dr. A.K. Malhotra, Member (Environment & Rehabilitation), Narmada Control Authority, BG-113, Scheme No.74-C, Vijay Nagar, Indore.

Member Secretary.

Government of Gujarat

1. Shri C.J. Jose, Secretary (Fisheries & Ports), Govt. of Gujarat. Block No.V, 11nd Floor, New Sachivalaya Complex, Gandhinagar - 10.

Govtornment of Maharashtra

1. Shri S.V. Joshi, Principal Secretary (A&ADF Department), Govt. of Maharashtra, 5th Floor, Annex, Mantralaya, Bombay - 400 032.

Government of Madhya Pradesh

1. Shri M. Minz, Secretary (Fisheries), Govt. of Madhya Pradesh, Vallabh Bhawan, Bhopal.

Expert nominated by GOMP

1. Shri G.P. Dubey, Director Fisheries (Retired), 11/2. Bijasan Road, Ramchandra Nagar, Indore.

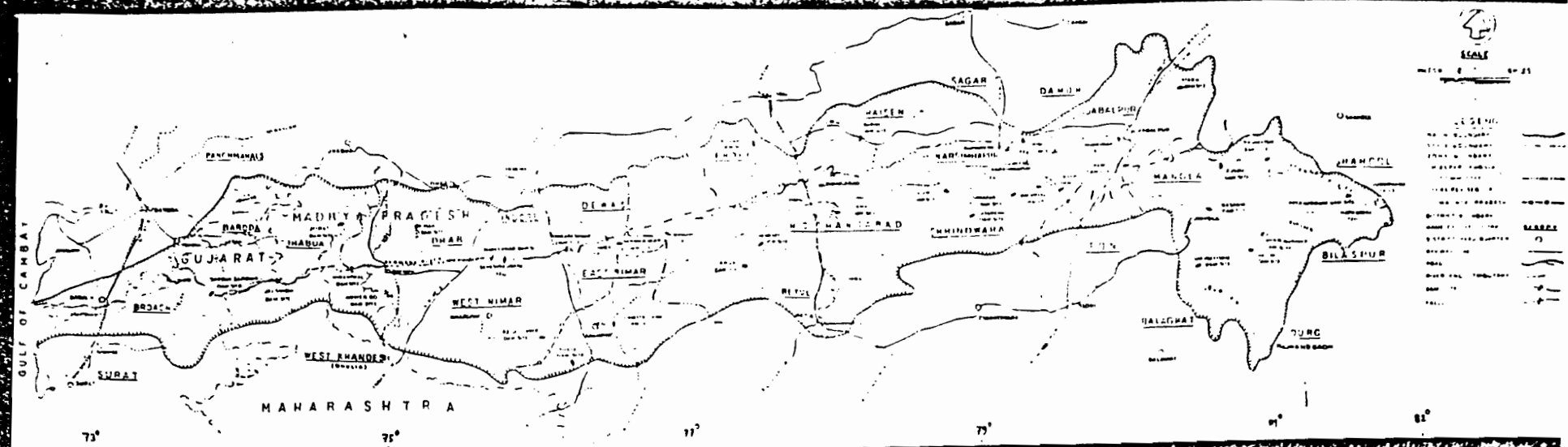
Experts nominated by Chairman

1. Director, Central Inland Capture Fisheries Research Institute, Barrackpore, West Bengal-743101.
2. Shri Parmeshwaran Ayyar, C-205, Ushas Apartment, 16 Main, 4th Block, Jai Nagar, Bangalore - 560 011.

I N V I T E E S

1. *Shri S.A. Char, Executive Member, Narmada Control Authority, BG-113, Scheme No.-74-C, Vijay Nagar, Indore - 452 010.*
2. *Additional Chief Secretary (R&E) Government of Gujarat, New Sachivalaya Complex, Gandhinagar - 382 010.*
3. *Shri Johny Joseph, Secretary (R&R), Govt. of Maharashtra, Revenue & Forest Department, Mantralaya, Bombay - 400 032.*
4. *Shri Suresh Chandra, Member (E&R), Narmada Valley Development Authority, Narmada Bhawan, Tulsi Nagar, Bhopal-462003.*
5. *Shri J.P. Dange, Commissioner of Fisheries, Govt. of Maharashtra, Department of Fisheries, Taraporevala Aquarium, Bombay - 400 002.*
6. *Commissioner of Fisheries, Gujarat State, 3rd Floor, Block No. 10, Jivraj Mehta Bhawan, Gandhinagar - 382 010.*
7. *Director (Fisheries), Narmada Valley Development Authority, Narmada Bhawan, Tulsi Nagar, Bhopal*

ANNEX-II- MIN. (4).



MAP - 1. Index Map of Narmada Basin showing proposed plan of impoundments.

NARMADA CONTROL AUTHORITY

Environment Sub Group

26th meeting

12th October 1995

Minutes

MINUTES OF 26TH MEETING OF THE ENVIRONMENT SUB-GROUP NCA
HELD ON 12TH OCTOBER, 1995, AT PARYAVARAN BHAWAN, NEW DELHI.

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MINUTES OF 26TH MEETING OF ENVIRONMENT SUB-GROUP HELD
ON 12TH OCT. 1995 AT PARYAVARAN BHAWAN, NEW DELHI.

The Member (Secretary), of the sub-group welcomed the participants to the 26th meeting. The list of participants is at Annex-XXVI.Min-(1).

Various agenda items were taken up for discussion thereafter.

Item No. XXVI-1(126): CONFIRMATION OF MINUTES OF THE 25TH MEETING.

Minutes of the 25th meeting of Environment Sub-Group of Narmada Control Authority as circulated to all Members and invitees vide letter No.Env-34(26)/95/1536-65 dated 17th August, 1995 were confirmed.

Item No.XXVI-2(127): REVIEW OF ACTION TAKEN ON THE DECISIONS OF THE PREVIOUS MEETINGS.

1. Submission of Catchment Area Treatment (CAT) plans for freely draining critically degraded sub-watersheds (Item No. XXII-2(112) (1)).

Govt. of Madhya Pradesh

Narmada Sagar & Sardar Sarovar Project

On the issue of revision of the plans by Govt. of Madhya Pradesh, in accordance with the guidelines of River Valley projects & National Afforestation & Eco-development Boards (NAFB), the information presented to the sub-group was as follows:

Sub-group was informed that the work on 5 schemes sanctioned under River Valley Project (RVP) earlier was to commence shortly & that 3 more schemes covering an area of 7136 ha of non forest land from 3 subwatersheds have been submitted for seeking funds under RVP.

Regarding Narmada Sagar Project (NSP) Sub-group was informed that 4 schemes covering about 40,326 ha forest areas from 24 sub-watersheds have been submitted for seeking funds under NAEB.

In reply to a question from Member (E&R), NCA, it was informed that as the area of NSP was very large compared to SSP there was an urgent need for exploring funds from other sources as well. NVDA also agreed to submit schemes for seeking funds from NAEB for SSP also, provided NAEB agreed to consider the same.

Regarding measuring silt load during pre-post phases of catchment area treatment, NVDA informed that efforts were being made to devise a suitable system to prepare a detailed plan for layingout silt monitoring ports by engaging NVDA staff.

It was also informed that it was not feasible to prepare a detailed CAT plan for over 12 hundred thousand ha. areas without a detailed survey. However an yearly plan, a year in advance of its implementation, was promised. According to the information presented, the plan would stretch upto 2011-12 for SSP & 2023-24 for NSP.

Regarding submission of Maps for freely draining critically degraded areas of NSP & SSP, it was informed that these have been submitted to MOEF & NCA might like to share these maps with MOEF.

Government of Maharashtra

Regarding submission of Phase-II CAT plans officers of the GOM made a presentation of the good work of catchment treatment being done by them through a series of studies. A pictorial presentation of the damages caused to plantation and nurseries of CAT works by NBA activists was also made.

Officer on Special Duty (OSD), GOM on behalf of the Govt. of Maharashtra informed that the plans as required were being finalised & would be submitted soon.

2. **Cost Estimates for preparation of Action plan and implementation of Environment safeguard measures (Item No.XXII-2(112) (2)).**

The information as broughtout during the meeting is presented in Annex-XXVI-Min-(2).

Regarding cost estimates of command area developments, Govt. of Gujarat informed that revision of cost estimates was awaiting the outcome of some study reports & that these reports were under finalisation. However GOG agreed to add a column to the annexure on CAD costs.

3. Environmental Impact of Closure of Construction Sluices.

Additional Director, MOEF informed that the committee constituted for giving its views regarding ratification of the closure of construction sluices has submitted its report to the Chairman of the Sub-Group only a day before the meeting. When asked to tell in brief about the salient points of this report, she expressed concern over the delay in CAT works in Madhya Pradesh areas & drew attention to the needs of M.P. oustees resettled in Gujarat. She also referred to the delay in submission of reports by School of Environmental Sciences, Pune & expressed concern over the slow pace of work on formulation of action plan on flora & fauna aspects.

Executive Member, NCA observed that as per the given plan. It would be possible for NVDA to treat Directly draining subwatersheds in time to allow raising of dam height upto 110 mt as envisaged earlier. Vice Chairman, NVDA expressing concern for shortage of funds and agreed to prepare a separate scheme for CAT works for the purpose. Chairman however pointed out that cost of treatment of critically degraded directly draining subwatersheds was chargeable to the project, thereafter GOMP should get the required funds from the state budget as an additionality over & above the limits imposed in the state plan.

Presentation by the state Govts. on the status of implementation of Environmental Safeguard Measures in relation to construction of works of SSP & NSP with help of slides & maps was awaited.

Item No.XXVI-3(128): PRESENT STATUS OF STUDIES SURVEYS AND ENVIRONMENTAL ACTION PLANS.

i) PHASED CATCHMENT AREA TREATMENT

Narmada Sagar Project

Govt. of Madhya Pradesh

It was informed that an area of 33138 ha had been treated by the end of Aug., 1995. NVDA reported that the survival rate of plantation of the year 1993-94 & 94-95 varied between 75-90%. Blockwise detailed note on survival of plantation as requested during 25th meeting was awaited.

Sardar Sarovar Project

Govt. of Madhya Pradesh

Govt. of Madhya Pradesh had planned to treat 125725 ha area, out of which an area of 32,791 ha had been treated by August, 1995.

Govt. of Gujarat

Govt. of Gujarat had taken up the entire catchment area upstream of the Sardar Sarovar Project in Gujarat for treatment. By the end of Sept., 1995 an area of 28995 ha.had been treated against a target of 29,284 ha.

Govt. of Maharashtra

As per the plan submitted by Govt. of Maharashtra non forest area of 2768 ha was proposed to be treated by the end of 94-95. Out of this till the end of March, 1995, works over 1980 ha. area had been completed.

In addition GOM had planned to treat 20,000 ha of forest areas. By the end of Sept., 1995 works on an area of 14016.47 ha had been completed.

ii) **COMPENSATORY AFFORESTATION**

Narmada Sagar Project

Government of Madhya Pradesh

It was informed that compensatory afforestation over an area of 63666 ha had been completed by the end of August, 1995 against the target of 80945 ha.

Sardar Sarovar Project

Govt. of Madhya Pradesh

Govt. of Madhya Pradesh informed that by the end of Aug., 1995 plantation works over an area of 8225 ha, against the final target of 8740 ha, had been completed.

Govt. of Gujarat

Govt. of Gujarat had completed plantation works in the entire planned area of 13950 (including non forest and degraded forest areas) by the end of September, 1994.

Govt. of Maharashtra

Out of total target of 19466 ha planned for treatment in lieu of the areas undergoing submergence, an area of 19293 ha had been planted by the end of August, 1995. GOM submitted a copy of the detailed note containing blockwise survival percentage of the plantation.

iii) **COMMAND AREA DEVELOPMENT**

Narmada Sagar Project

NVDA informed that short listing of consultant has been completed. Member (E&R), NCA requested for a copy of the TOR under negotiation. It was informed that work on collection of

data for study on use of insecticide pesticides etc. in the command of NSP could not be taken up.

Sardar Sarovar Project

Govt. of Gujarat

Sub-group noted the contents of the reports & observation of the NCA office on preliminary report of Nal Sarovar in SSP command, annexed with the Agenda. Add. Director, MOEF pointed out that the progress of various survey reports was not available in the Ministry. Secretary (R&R), Govt. of Gujarat agreed to send copies of the reports to MOEF also.

Copies of the reports related to command area development studies completed in the last two years were required to be submitted to NCA and MOE&F. These were yet awaited. Chairman requested GOG to expedite submission of the reports.

On the issue of irrigated Agro forestry in SSP it was agreed by NPG to consult Dr. Abrol. However it was informed that Dr. Abrol had joined ICRISAT and as such an alternative was sought. ADG, ICAR, present during the meeting, stated that the relevant issues may be referred to ICAR for needful guidance in the matter.

Govt. of Rajasthan

Sub-group was informed that as the report on drainage aspects has been received recently and its finalisation work would be completed by 1st week of November.

iv) SURVEY OF FLORA, FAUNA & CARRYING CAPACITY STUDIESNarmada Sagar Project

Govt. of Madhya Pradesh

Director, Wildlife Institute of India informed that report prepared by Wildlife Institute was okeyed by wildlife Advisory Board. He clarified that the proposal included creation of protected area requiring resettlement of two villages. He further pointed out that the recommendation made by study group were flexible. Vice Chairman, NVDA stated that the recommendations made more being acted upon, despite resistance of some of villagers. He informed that the issue however was with the Chief Wildlife Warden and a meeting is to be convened shortly to finalise the plan of action.

Sardar Sarovar Project

Govt. of Madhya Pradesh

Sub-group was informed that based on their own recommendations State Forest Research Institute (SFRI) had been requested to prepare an action plan.

Govt. of Gujarat

Sub-group was informed that the M.S. University was reviewing their recommendations & that the Action plan would be submitted shortly.

Main findings of the report under reference requested from Govt. of Gujarat for circulation to the member were awaited. Time frame for updating of the report & submission of the Action plan was also awaited.

Govt. of Maharashtra

Secretary (Forest), GOM stated that according to the information available with him, the final report was under printing and would be submitted soon. However, exact information regarding this will be given by their Secretary (Environment) who could not come for this meeting. Chairman however stated that the Key officers should come a day before for the meeting to avoid situations like this & desired that this should be conveyed to the all concerned.

v) ARCHAEOLOGICAL & ANTHROPOLOGICAL SURVEYARCHAEOLOGY:Govt. of Madhya PradeshNarmada Sagar Project

Sub-group was informed that excavation of archaeological mounds at Khedinema which was coming under submergence due to Indira Sagar Project was complete. Similarly, excavation of mounds at Khaparkheda, Brahmangaon were also completed and their video film had been prepared. Besides, the archaeological Survey of India, Branch Nagpur had also completed the excavation of mound at Utowad.

A copy of the preliminary report on Joga fort assessing the scouring effect of water is enclosed as Annex.XXVI.Min-3.

Sardar Sarovar Project

Progress of implementation of the action plan, prepared by the Department of Archaeology and Museums, Govt. of M.P. for protection/relocation and excavation works was reported as follows:

- i) Action for relocation of the monuments has already been initiated. A committee has been formed under the chairmanship of Padmashri Shri R.Sen Gupta to give advice. Necessary steps for joint inspection and consultation with Geological Survey of India, Archaeological Survey of India etc., have been initiated.
- ii) Shiv Temple at village Roligaon which was earlier proposed to be relocated elsewhere has now, in consultation with the specialists and the afforested committee, been decided to be kept there at its original place and be protected by constructing a wall.
- iii) Estimates for shifting 7 monuments, namely Kalanjeshwar Temple, Semarda; Shiv Temple, Barda; Jalaleshwar Temple, Khujawa; Bhawanimata Temple, Khujawa; Satmata Temple, Panthia; Shiv Temple' Panthiya and Shiv Temple, Roligaon have already been got prepared.
- iv) Chemical treatment of rock cut statue at piplagarhi has already been started. This monuments was proposed to be shifted to relocation site.
- v) Construction of a section- 'Narmada Dirgha' in the Museum at Bhopal has been started. Similarly, construction of museums at Khandwa also being started soon and for other two museums at Khargone and Barwani suitable land was being procured from Collector, Khargone.
- vi) Preparation of film documentation of all the monuments of SSP was in progress; it was likely to be completed within three months.

Govt. of Gujarat

Govt. of Gujarat informed that relocation of Shoolpaneshwar temple has been completed & annual fair was arranged this year. Action plan for relocation of Hamfeshwar temple was awaited. Sub-group was informed that tenders etc. for work on Hamfeshwar Temple have been completed and work had already commenced. GOG agreed to send a copy of the action plan to NCA soon.

Govt. of Maharashtra

No works were required to be done in Maharashtra in this regard.

Chairman after reviewing the progress appreciated the good work being done and he desired that the scientific presentation of the factual position should be made through slides, films. In addition, small booklets depicting clearly the good works being done also may be issued.

ANTHROPOLOGY**Sardar Sarovar & Narmada Sagar Projects****Govt. of Madhya Pradesh**

Government of Gujarat have sent their comments and opinion to Govt. of India, Ministry of Welfare. The final decision was to be taken by GOI.

Sub-group was informed that NVDA has procured the five volumes of "People of India" these include an introduction Vol.I, Scheduled Caste Vol.II, Scheduled Tribe Vol.III, Biological

Variation in Indian Population Vol.X, Anthropological Atlas Vol.XI. In reply to a question from Chairman it was informed that the relevant information contained in these reports would be made use of in R&R plans.

vi) SEISMICITY AND RIM STABILITY OF RESERVOIR

Narmada Sagar Project

Govt. of Madhya Pradesh

Seismicity

Sub-group was informed that the issue of procurement of balance imported seismic instruments was under consideration with the Narmada Control Board.

As regards progress of works on construction of observatories for collection of seismic data at 11 stations in the catchment area the sub-group was informed that the work was likely to be completed by June, 1996.

Sardar Sarovar Project

NVDA had entrusted the task of conducting some more studies to CW&PRS, Pune. The institute had submitted two reports No.3229 and 3234 recently.

Prof. Ramasheshan, stated that further studies on the issue might not be necessary and requested copies of the reports for his perusal.

vi) HEALTH ASPECT

Narmada Sagar Project & Sardar Sarovar Project

Government of Madhya Pradesh

Sub-group was informed that the Health Plan of Rs.748.73 lac for Narmada Sagar Complex and Sardar Sarovar Project had been

prepared by the Director, Public Health Services, Govt. of M.P. at the instance of NVDA. The health plan did not have project wise breakup of different activities and its costs. NVDA has therefore requested the Director, to furnish the details, which were awaited.

Progress of the studies being done by Gandhi Medical College was awaited.

Sardar Sarovar Project

Govt. of Gujarat

Regarding submission of final report on health aspect being prepared by SCHMS. GOG informed that expert deliberations were held & that the Director, Health Services was detailing the plan. This plan estimated to cost about 9 crores was expected to be ready soon.

Govt. of Maharashtra

Progress from Maharashtra was awaited.

viii) FISHERIES DEVELOPMENT OF SSP AND NSP RESERVOIRS

Govt. of Madhya Pradesh

Sub-group was informed that plan on fisheries development and conservation in Sardar Sarovar Reservoir has been drawn up in consultation with the Secretary to GOMP, Department of Fisheries, and Managing Director, M.P. Fisheries Development Corporation. The plan was under approval of the NVDA.

Govt. of Gujarat

A readable copy of revised plan requested from GOG was awaited.

Govt. of Maharashtra

Progress was yet awaited.

Member (E&R), NCA briefed the members on the discussion held during the last meeting of the high level expert group on fisheries development & conservation, held recently & expressed the hope that guidelines for development & conservation would soon be issued for consideration of the party states.

Item No. XXVI-4(129):

ANY OTHER ITEM.

MONITORING OF R&R FOR NSP

Additional Director, MOEF drew the attention of the subgroup to the concern raised by Chairman on the issue of monitoring of R&R aspects of Narmada Sagar Project. She pointed out that the clearance given to Narmada Sagar & Sardar Sarovar Project by the Ministry called for monitoring of all the issues concurrently and therefore R&R aspects of Narmada Sagar Project should also be monitored. Vice Chairman, NVDA quoting the discussions of NCA meetings stated that the detailed monitoring of R&R aspect is outside the jurisdiction of NCA. He however clarified that the NCA might seek information on R&R as it relates to construction of NSP.

After hearing various views, Chairman desired that this aspect should be looked into by the NVDA and report to the Ministry at the earliest.

ANNEXURES

ANNEX.XXVI.Min-(1).**LIST OF PARTICIPANTS OF THE 26TH MEETING OF ENVIRONMENT
SUB-GROUP HELD ON 12TH OCTOBER, 1995 AT NEW DELHI.****GOVERNMENT OF INDIA****Ministry of Environment & Forests:**

1. Shri N.R. Krishnan, Secretary, Ministry of Environment & Forests, New Delhi. - CHAIRMAN
2. Shri D. Mishra, DIG (FC), MOEF, New Delhi.
3. Dr.(Mrs.) Nalini Bhat, Add. Director, MOEF.

Narmada Control Authority

1. Shri S.A. Char, Executive Member, NCA.
2. Dr. A.K. Malhotra, Member (E&R), NCA and Member Secretary of the Sub-group.
3. Dr. Pawan Kumar, Specialist (Env.), NCA.

Sardar Sarovar Construction Advisory Committee

1. Shri R.S. Prasad, Secretary, SSCAC, Vadodara.

Ministry of Water Resources

1. Shri R.C. Batra, Under Secretary, MOWR, New Delhi.

Wildlife Institute of India.

1. Shri S.K. Mukherjee, Director, WLI, Dehradun.

ICAR, New Delhi

1. Dr. T.N. Chaudhary, A.D.G., ICAR, New Delhi.

GOVERNMENT OF MAHARASHTRA

1. Shri A.K. Mago, Secretary (Forest), GOM, Bombay.
2. Shri L. Mehendale, Commissioner, Nashik Div. GOM.
3. Shri M.K. Jiwrajika, O.S.D. (Projects), GOM.

GOVERNMENT OF GUJARAT

1. Shri Arjun Singh, Secretary (R), SSNNL, GOG, Gandhinagar.

GOVERNMENT OF MADHYA PRADESH

1. Shri Naresh Narad, Vice Chairman, NVDA, Bhopal.
2. Shri Jauwad Hasan, CF, C.A. & CAT, Bhopal Circle, NVDA.
3. Shri R.K. Bahere, Specialist (Hyd. & Sedi.), NVDA, Bhopal.
4. Shri J.P. Jain, Project Officer, Archaeology & Museum, Bhopal.
5. Shri P.J. Abraham, Project Engineer, Archaeology Deptt., Bhopal.

GOVERNMENT OF RAJASTHAN

1. Shri C.S. Ramaswamy, DCF, Env. Department, GOR, Jaipur.

NON OFFICIAL MEMBERS

1. Dr. R.K. Katti, Prof., UNEECS, Bombay.
2. Dr. S. Ramasheshan, Prof., IIT, Kanpur.

ANNEX-XXVI. Min. (2).ENVIRONMENTAL COST OF SSPRELATED TO UNIT I & II DAM & POWER HOUSE :A) Expenditure by project authorities:i) Cost of Survey & Studies (in lacs.)

S.No.	Component	<u>Estimate/Actual Expenditure</u>				Total
		GOG	GOM	GOMP	NCA/GOR	
1.	Compensatory Afforestation	<u>4.52</u> 4.52	<u>5.29</u> 5.29	<u>2.4375</u> 2.4375	-	<u>12.2475</u> 12.2475
2.	Catchment Area Treatment.	<u>8.77</u> 8.77	<u>7.00</u> 7.00	<u>3.28</u> 2.80	-	<u>19.05</u> 18.57
3.	Flora & Fauna	<u>52.2</u> 38.3	<u>38</u> 16	<u>20.334</u> 17.634	<u>15.27</u> 15.27	<u>127.804</u> 87.204
4.	Health	<u>2.5</u> 2.5	<u>10</u> .1	<u>29.627</u> 26.000	-	<u>42.127</u> 28.6
5.	Archaeology/Anthropology.	<u>1.3</u> 0.40	NA	<u>59</u> 36.33	-	<u>60.3</u> 36.73
6.	Seismicity & Rim Stability.	-	-	<u>23.00</u> 12.50	<u>1.98</u> 1.98	<u>24.98</u> 14.53
7.	Command area development.	N.A.	-	-	N.A.	-
						<u>276.5085</u> 195.8955

ii) Cost of Implementation (in lacs)

1.	Compensatory Afforestation.	<u>1809.10</u> 1298.48	<u>2116</u> 1650.27	<u>1800.000</u> 790.32	-	<u>5725.1</u> 3456.97
2.	Catchment Area Treatment.	<u>3509</u> 1826.48	<u>2894.67</u> 445.657	<u>8835.05</u> 1789.90	-	<u>15238.72</u> 4061.43
3.	Flora & Fauna including Shoolpaneshwar	<u>75.31</u> 64.42	NA	<u>NA</u> Nil	-	<u>75.31</u> 64.42
4.	Health (incremental expenditure) for 10 yrs.	<u>3800.0</u> 101	<u>546.60</u> .5	<u>1354.63</u> 521.2	-	<u>5701.23</u> 622.925
5.	Archaeology/Anthropology.	<u>156.00</u> 29	-	<u>700</u> 10	-	<u>856</u> 39
6.	Seismicity & Rim Stability.	<u>129</u> 271	-	N.A.	-	<u>129</u> 271
7.	Command area Develop.	N.A.	-	-	N.A.	-
Total: (i & ii)				<u>12827.680</u> 3209.12	<u>27943.08</u> 8476.7035	

N.A. : Not available.



(1564)

भारत सरकार
GOVERNMENT OF INDIA

NO.6/120/93/M-

ANNEX-XXVI.Min.(3).

हेतु - 0705/325 रस्त. नं. 1

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अधीक्षक पुरातत्त्वविद

भारतीय पुरातत्त्व 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

दिनांक

Date.....6 July '95

To

The Director General,
Archaeological Survey of India
Janpath, New Delhi-110011

Sub:-Regarding Narmada Valley work.

Sir,

With reference to your letter No.1/5/87-EE(Pt.)-BC dated 10-5-95, on the subjected cited enclosing a copy of the minutes of Narmada Control Authority's 23rd meeting. As per para (v) Archaeological & Anthropological Survey under Archaeology Narmada Sagar Project, the Joga Fort, Joga Kalan, Distt.Khandwa has again been inspected in the company of Shri K.G.Bhagchandani, Dy.Superintending Archaeological Engineer to assess the effect of scouring action river water on this monument. It has been noticed that there ~~will be~~ effect of scouring action of river water on the plinth of the lower bastion cum well of Joga fort. Scouring effect and amount required for protective measures is being worked out. A preliminary note of Joga fort is enclosed herewith for your kind information & necessary action please.

Encl: as above

Yours faithfully,

S/L

(D.Bayalan)

Superintending Archaeologist I/c

3

G.F.8


-2-

Encl. No. 6/120/83/N-1179

Bhopal, dated 6-7-45

✓ Copy to the Director, Tribal Welfare, N.V.D.A. Narmada
Bhopal, alongwith copy of preliminary note on effect
of water scouring action on Joga fort, Joga Kalan, District
Khandwa.

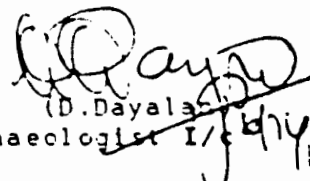
Encl: As above


Suptg. Archaeologist I/c

(1566)

NOTE ON JOGA FORT

Joga fort was inspected in the company of Shri K.O. Bhagchandani, Dy. Superintending Archaeological Engineer, Bhopal Circle, Bhopal and Shri S.N. Shrivastava, Conservation Assistant Gr.I, Headquarter, Bhopal. Of course the fort is at higher altitude and as such it is safe but the toe of the lowest bastion touches the river water. This bastion contains the well in the midst and was found full of silt. This speaks that during the high flood this bastion must have been getting submerged and subsequently the bastion must have been filled up with silt. Since the bastion cum well is important architectural member as it was used as one of the main source of water for the fort, this has to be preserved from the scouring effect of the river water. The high plinth constructed at the bottom of this bastion has developed cracks at its joining with the rocky strata adjoining to it. These joints has developed cracks by the scouring effect of the water. This is being studied and the final report will be sent soon.


(D. Dayal)
Superintending Archaeologist I/4/4

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नर्मदा नियंत्रण प्राधिकरण NARMADA CONTROL AUTHORITY

पर्यावरण उपदल
Environment Sub-Group

सत्ताइसवीं बैठक की कार्यसूची Agenda for Twenty Seventh Meeting

स्थान : पर्यावरण भवन, नई दिल्ली
Venue : Paryavaran Bhavan,
New Delhi.

तारीख 18, दिसम्बर, 1995,
Date : 18th, December 1999, ^{SIX}eo-

इन्दौर
दिसम्बर, 1995

INDORE
December, 1995

AGENDA FOR 27TH MEETING OF THE ENVIRONMENT SUB-GROUP NCA TO
BE HELD ON 18TH DECEMBER, 1995, AT PARYAVARAN BHAWAN, NEW DELHI

I N D E X

Item Nos.	Contents	Page No
XXVII-1(130)	Confirmation of Minutes of the 25th meeting.	1
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XXVII-4(133)	Monitering of R&R aspect of Narmada Sagar Project (NSP).	12
XXVII-5(134)	Any other item Date & Venue of next meeting.	13
<u>ANNEXURES</u>		
XXVII-1	Cost estimate (Environmental Aspects) of SSP.	1
XXVII-2	Studies and Activities : Environmental Aspects of Sardar Sarovar and Narmada Sagar Projects, September, 1995.	2-31
XXVII-3	Executive Summary of final report: Flora, Fauna, EIA and EM of SSP command (between Narmada & Sabarmati), by Sardar Patel University, NPG., 1995.	32-40
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XXVII-5	Recommendations contained in : 4th Six Monthly progress report on Epidemeo-logical & Surveillance study of NSP areas, submitted by Gandhi Medical College, Bhopal., 1995.	47
XXVII-6	Executive Summary of Final report on Environmental Impact Study on Water Related Diseases in SSP command area, Gujarat, by Commissionerate of Health, Medical Services & Medical Education, GOG., 1995.	48-50

Item No.XXVII-1(130): CONFIRMATION OF MINUTES OF THE 26TH MEETING.

Minutes of the 26th meeting of Environment Sub-group of Narmada Control Authority were circulated to all Members and invitees vide letter No.Env-34(27)/95/2300-2328 dated 20th November, 1995.

No comments have been received so far.

The minutes are put up for confirmation.

Item No.XXVII-2(131): REVIEW OF ACTION TAKEN ON THE DECISIONS OF THE PREVIOUS MEETINGS.

1. Submission of Catchment Area Treatment (CAT plans for freely draining critically degraded sub-watersheds [Item No.XXII-2(112){1}].

a) SUBMISSION OF CAT PLAN FOR FREELY DRAINING CRITICALLY DEGRADED SUB-WATERSHEDS.

During the 25th meeting, Govt. of Madhya Pradesh (GOMP) and Govt. of Maharashtra (GOM) were directed to recast their plan keeping in view the guidelines for the schemes of National Afforestation Eco-development Board & River Valley Projects. Representatives of GOM & GOMP agreed to submit the plans within a months time.

Subsequently during the 26th meeting NVDA expressed difficulty in preparing Phase-2 catchment area treatment plan for SSP & NSP due to the short time available for a detailed survey. However an yearly plan an year in advance of its implementation was promised.

Information requested by NCA from GOM & GOMP on further progress of works vide letter No.Env.34(27)/95/1903 dated 13.11.95 is yet awaited.

During the meeting NVDA expressed difficulty in getting the funds for even treating the directly draining sub-watersheds, due to the financial limits imposed by State Govts. Chairman of the sub-group suggested that the budget for catchment area treatment atleast for the directly draining subwatersheds (as the cost is chargeable to SSP) should be over and above the limits imposed in the State Plans. Information requested by NCA on further progress of works vide letter No.Env.34(27)/95/1903 dated 13.11.95 is yet awaited.

b) SILT MONITERING PORTS:

NVDA was requested to install silt monitoring ports by engaging NVDA staff during pre and post phases of catchment area treatment on the lines being installed in Gujarat. NVDA was advised to get in touch with Central Soil and Water Conservation Research & Training Institute. Efforts made in this direction may please be reported.

2. Cost Estimates for preparation of Action plan and implementation of environmental safeguard measures [Item No.XXII-2(112)(2)].

During the earlier meetings of the environment Sub-group it was desired that the detailed cost (estimates and expenditures) of studies and implementation of mitigation measures for suggested environmental safeguards should be

presented. The information available in the office of the NCA is presented in **Annex-XXVII-1** for information and consideration of the members. Information from Govt. of Gujarat (GOG) on cost estimates of Command Area Development works requested by NCA vide letter No.34(27)/1903 dated 13.11.95 is yet awaited.

3. Environmental Impact of Closure of Constrution Sluices.

During the 26th meeting of Environment Sub-group members were informed that report of the Committee constituted for ratification of the closure of sluices has been submitted to Ministry of Environment & Forest (MOE&F).

As desired by the Chairman during the 23rd meeting a presentation on the status of implementation of environmental safeguard measures in relation to construction works of SSP & NSP with the help of slides & maps were to be presented by the state Govts. of Madhya Pradesh, Maharashtra & Gujarat. Whereas presentation on catchment area treatment & compensatory afforestation was made by representatives of GOG & GOM and on health aspect by officers of GOM, a summary presentation on all other aspect in relation to construction works on the project is yet awaited. Response from the state Govts. on the request made by NCA vide letter No.Env-34(27)/95/1903 dated 13.11.95 is yet awaited.

Item No.XXVII-3(132): PRESENT STATUS OF STUDIES SURVEYS AND ENVIRONMENTAL ACTION PLANS.

A copy of the status report for the quarter ending Sept. 1995 is enclosed and placed at Annex-XXVII-2.

The present status of studies surveys and action plans in brief is presented below for a review by the Sub-group.

1) PHASED CATCHMENT AREA TREATMENT

Narmada Sagar Project

Government of Madhya Pradesh

By the end of October, 1995 an area of 331⁵⁴ ha had been treated against a target of 62975 ha area. NVDA was to present a Blockwise detailed note on the survival rate of plantation & the extent of progress upto the year 1994-95. Information requested by NCA on further progress of works vide letter No.Env-34(27)/95/1903 dated 13.11.95 is yet awaited.

Sardar Sarovar Project

Govt. of Madhya Pradesh

Govt. of Madhya Pradesh had planned to treat 125725 ha area, out of which an area of 32791 ha has been treated by August '95. Information requested by NCA on further progress of works vide letter No.Env-34(27)/95/1903 dated 13.11.95 is yet awaited.

Govt. of Gujarat

Govt. of Gujarat had taken up the entire catchment area upstream of the Sardar Sarovar Project in Gujarat for treatment.

By the end of August, 1995 an area of 28995 ha had been treated up against a target of 29284 ha.

Govt. of Maharashtra

As per the plan submitted by Govt. of Maharashtra non forest area of 2768 ha was proposed to be treated by the end of 94-95. Out of this till the end of June, 1995, works over 2151 ha area had been completed. The progress of work on the remaining non forest area requested by NCA vide letter No. Env-34(27)/95/1903 dated 13.11.95 is yet awaited.

In addition GOM had planned to treat 20,000 ha of forest areas. By the end of March, 1995 works on an area of 14016 ha had been completed.

GOM may like to submit the completion report of CAT works finished so far. Information requested on further progress of works by NCA vide letter No.Env.34(27)/95/1903 dated,15.11.95 is yet awaited.

ii) **COMPENSATORY AFFORESTATION**

Narmada Sagar Project

Govt. of Madhya Pradesh

Compensatory afforestation over an area of 63666 ha against the target of 80,975 ha was reported to have been completed by the end of October, 1995. Further progress requested by vide letter No.34(27)/95/1903 dated 13.11.95 is yet awaited.

Sardar Sarovar Project

Govt. of Madhya Pradesh

Govt. of Madhya Pradesh by the end of October, 1995 had completed plantation works over an area of 8225 ha against the final target of 8740 ha. Information requested by NCA on further progress of works vide letter No.Env-34(27)/95/1903 dated 13.11.95 is yet awaited.

Govt. of Gujarat

Govt. of Gujarat had completed plantation works in the entire planned area of 13950 (including non forest and degraded forest areas) by the end of September, 1994.

Govt. of Maharashtra

Out of total target of 19466 ha planned for treatment in lieu of the areas undergoing submergence, an area of 19293 ha had been planted by the end of October, 1994. However detailed location map of some of the districts where compensatory afforestation works are progressing requested by NCA vide letter No.34(27)/95/1903 dated 13.11.95 is yet awaited

iii) **COMMAND AREA DEVELOPMENT**

Narmada Sagar Project

As assured during the 23rd meeting current status of preparation of comprehensive environmental impact assessment report on command area development with integrated development plan including drainage aspects for NSP was to be submitted by GOMP.

During the 26th meeting it was informed that the work on collection of data for study on use of insecticides,

pesticides in the Command of NSP could not be taken up. Progress in this regard may be reported. In addition progress on preparation of integrated Command Area Development Plan may also please be reported. Information requested by NCA vide letter No.34(27)/1903 dated 13.11.95 is yet awaited.

Sardar Sarovar Project

Govt. of Gujarat

During the 26th meeting Govt. of Gujarat agreed to send copies of the reports on Nalsarovar Bird Sanctuary ~~to~~ MOEF also. Progress may please be reported.

During the earlier meetings, Sub-Group noted that a number of studies were commissioned by the Govt. of Gujarat on the Command Area Development. These reports were required to be categorised on the basis of issues addressed in each report in consultation with Dr. Abrol of ICAR. Dr. Abrol was requested by the sub-group to refer to these studies from ~~an~~ agriculturist point of view and to suggest whether studies were sufficient or there was something more required to be studied. ~~Further~~. Besides, on the issue of irrigated Agroforestry in SSP it was agreed by NPG to refer the issues to ICAR for needful guidance. Subsequently one meeting was held with Dr. Abrol at New Delhi where it was suggested that the Planning Commission had prepared certain maps which may be helpful in preparing ~~An~~ integrated Command Area Development Plan. Govt. of Gujarat was requested to get in touch with him with copies of the needed reports to expedite the issue. Now in view of the fact that Dr. Abrol had left ICAR, it was suggested during the meeting of sub-group that a reference may be made to the ICAR for the purpose. Progress in this regard may please be reported.

Copies of the reports related to command area development studies completed in the last two years were required to be submitted to NCA and MOEF. Information requested by NCA on further progress ~~of~~ works vide letter No.Env-32(2)/95/340 dated 4th September, 1995 is yet awaited. Final reports of the studies entitled (1) "Flora, Fauna, EIA and EM of SSP Command (between Narmada & Sabarmati) and (2). EIA studies on Inland and Marine Fisheries relevant to the command area of the Sardar Sarovar (Narmada) Projects were submitted by NPG. Executive Summary of these reports are placed at Annex-XXVII-3 & 4.

Govt. of Rajasthan

Sub-group was informed that report on drainage aspect was received recently and official report would be available by first week of November. Progress in this regard may please be reported. Information requested by NCA vide letter No.34(27)/95/1903 dated 13.11.95 is yet awaited.

iv) SURVEY OF FLORA, FAUNA & CARRYING CAPACITY STUDIES

Narmada Sagar Project

Govt. of Madhya Pradesh

Flora & Fauna studies for Narmada Sagar Project areas have been carried out by two agencies viz. Friends of Nature Society, Bhopal and Wildlife Institute of India, Dehradun. Both of these agencies have submitted their final reports. Copies of the main findings of the report were circulated to the members as annex to the minutes of 25th meeting. Action plans, based on the recommendations of these study reports were required. In accordance of one of the recommendation, NVDA had submitted proposal for the creation of special protected areas to the Govt. of M.P. Progress on further developments requested by NCA vide letter No.Env.34(27)/95/1903 dated 13.11.95 is yet awaited.

Sardar Sarovar Project

Govt. of Madhya Pradesh

Final report of the Impact Assessment studies in the areas undergoing submergence in Madhya Pradesh completed by State Forest Research Institute (SFRI), Jabalpur was made available to MOE&F & NCA. NVDA was requested vide letter No.Env-32(2)/95/340 dated 4.9.95 to report the progress on preparation of action plan. The information requested is yet awaited.

Govt. of Gujarat

During the earlier meetings Govt. of Gujarat was requested to circulate the main findings of the M.S. University to the Members of the sub-group. This is yet awaited.

During the 26th meeting of Sub-group was informed that the recommendations made by M.S. University were under review. Time frame for the review for preparation of Action Plan and implementation of the resulting recommendations may please be reported.

Govt. of Maharashtra

During the meeting of Sub-group it was informed that the final report on flora, fauna studies prepared by School of Environmental Science, Pune University was under printing and that the report will be available soon. This is yet awaited.

v) **ARCHAEOLOGICAL & ANTHROPOLOGICAL SURVEY**

ARCHAEOLOGY

Narmada Sagar Project

Govt. of Madhya Pradesh

Sub-group was informed that the State Deptt. of Archaeology and Museum and Archaeology Survey of India (ASI), Govt. of India have completed survey(s) and prepared action plan(s) for the State, as well as centrally protected monuments.

It was further informed that joint inspection of the Joga Fort had been done. Assessment report on effect of the scouring effect of water on this monument was enclosed with minutes of the 26th meeting.

In follow up of the discussions of 26th meeting Prof. S. Ramasheshan desired to know the status of Joga fort in relation to the submergence to be caused by the back water effect. A letter written in this regard was forwarded to NVDA. FActual position may please be reported.

While discussing the archaeological aspects. Chairman desired that a small booklet on the good works being done by Project authorities may be issued.

Sardar Sarovar Project

Govt. of Madhya Pradesh

A number of agencies have developed interest in archaeological & anthropological history of the Narmada Basin coordination between these organisation seems to be lacking. A detailed review is therefore necessary for smooth implementation of the required actions in time. NVDA may like to report on the works being done by various agencies on archaeological & anthropological aspects of Narmada basin in Madhya Pradesh.

Govt. of Gujarat

Govt. of Gujarat may like to report the progress of further works being undertaken by it for development of Shoolpaneshwar temple. Progress is also required to be reported on developments related to shifting of Hamfeshwar temple. Action plan for relocation of Hamfeshwar temple requested by NCA vide letter No.Env.-32(2)/95/340 dated 4.9.95 is yet awaited.

Govt. of Maharashtra

No works were required to be done in Maharashtra in this regard.

ANTHROPOLOGY

Sardar Sarovar & Narmada Sagar Projects

Govt. of Madhya Pradesh

Necessary steps have been initiated to effect the amendment of the Constitution of India to give the benefits and privileges to the PAPs from SC & ST categories being resettled in Gujarat areas where otherwise they were not entitled to these benefits. It was also informed that the issue was under consideration of the Govt. of India, Ministry of Welfare.

Besides NVDA was requested by NCA vide letter No.34(27)/95/1902 dated 13.11.95 on procurement of the balance publication related to Tribals of Narmada from An.S.I. through special messenger. The information is yet awaited.

vi) SEISMICITY AND RIM STABILITY OF RESERVOIR

Narmada Sagar Project

Govt. of Madhya Pradesh

The sub-group was informed that on the advise of the Dam Review Panel, CW&PRS, Pune, I.M.O. etc the NVDA had decided to establish a network of 10 seismic stations along the periphery of NSP complex to record and collect pre and post impoundment seismic data. Orders for supply of 6 Nos. photographic recorders and 12 Nos. wood Anderson Seismographs had already been placed.

The sub-group was informed that tenders for micro-earthquake recorders have been finalised by the NVDA, and the supply has recently been completed.

For procurement of the balance imported seismic instrument, as reported by NVDA during the 26th meeting the proposal was under consideration of Narmada Control Board.

As regards seismic studies of Narmada Sagar, Omkareshwar and Maheshwar Projects, one micro-earthquake recorder set has already been installed and the construction of observatories at 11 stations in the catchment area was in progress and was likely to be completed by June, 1996.

Sardar Sarovar Project

GSI had completed the survey and submitted its final report on rim stability analysis for the areas in Maharashtra and Madhya Pradesh in 1993. The survey for the rim stability analysis in Gujarat was completed much earlier

by Jaipur branch of the GSI. In order to confirm the findings of the GSI, NVDA had entrusted some more time bound studies to CW&PRS, Pune at an estimated cost of Rs.12.55 lakhs. During the 26th meeting NVDA informed that the institute had submitted two reports No.3229 & 3234 & that these reports suggests some more time bound studies. Prof. Ramasheshan however suggested that further studies on the issue may not be necessary & requested copies of the report for his perusal. Further progress may please be reported.

vi) **HEALTH ASPECTS**

Narmada Sagar Project

Govt. of Madhya Pradesh

Action taken by GOMP for detailing the cost estimates for providing the facilities as proposed in the health plan may please be reported.

Epidemeoligical surveillance studies are being persued by Gandhi Medical College, Bhopal. Copies of the 4th Six monthly report received from NVDA were sent to DG, ICMR for his valued observations vide letter No. Env-4(6)/95/1830 dated 2.11.95. Recommendations of the study group are placed at Annex-XXVII-5.

Sardar Sarovar Project

Govt. of Madhya Pradesh

Action taken by GOMP for detailing the cost estimates for providing the facilities as proposed in the health plan may please be reported.

Status of epidemeoligical surveillance studies for the SSP areas may also please be reported.

Govt. of Gujarat

GOG submitted a copy of the final report entitled "Environmental Impact Study on water related diseases in SSP command area, Gujarat, India prepared by Commissionerate of Health, Medical Services & Medical Education, GOG. The report was sent to DG, ICMR for his valued observations vide letter No.Env-4(6)/95/1824 dated 8.11.95. Recommendations made by the study group are placed at Annex-XXVII-6. Detailed action plan based on the findings of this study was under preparation. Progress may please be reported.

Govt. of Maharashtra

Revised health plan was submitted by GOM.

GOM may like to report progress of creation of infrastructure and other facilities as proposed in the plan. GOM also to report the progress on the surveillance & control studies in Maharashtra.

viii) FISHERIES DEVELOPMENT OF SSP AND NSP RESERVOIR

To speed up the work on conservation and development of the fish resources in the reservoir, sub-group recommended the formation of a group of experts. The proposal for formation of a high level expert group was approved by NCA with inclusion of one more expert member to be nominated by GOMP. Two meetings of this expert group were held & working groups have been formed for drafting the guidelines. Third meeting to review the progress is to be held shortly. Progress shall be reported during the meeting.

Revised plan on fisheries development & conservation is awaited from Govt. of Madhya Pradesh.

Item No.XXVII-4(133): MONITERING OF R&R ASPECT OF NARMADA SAGAR PROJECT (NSP).

According to the clearance order issued under EPA 1986 by MOEF to NSP & SSP, responsibility for monitering of Environmental Safeguard Measures was entrusted to NCA. The suggested Environmental parameters for monitoring included R&R, CAF, CAT etc. Accordingly the scope of NCA was enlarged to include under clause 9(1) "The role of the authority will mainly comprise 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 project.

Whereas progress on all Environmental aspects of NSP & SSP other than the R&R issues of SSP are being monitored by Environment sub-group. This sub-group on R&R issues of SSP is guided by the observations of R&R sub-group of the NCA.

During 25th meeting it was noted that R&R sub-group of NCA was monitering only the issues related to SSP. A concern was therefore expressed by the sub-group on the issues related to the monitering of R&R aspect of NSP. This issue was discussed during the 26th meeting also. Chairman of the sub-group suggested that NVDA should look into this important aspect urgently. Progress may please be reported.

Item No. XXVI-5(134): ANY OTHER ITEM

DATE & VENUE OF THE NEXT MEETING

ANNEXURES

- Report on Prioritisation of Sub-watersheds in sub-catchments of Narmada Catchment, 1991.

I- DIRECTLY DRAINING SUB-WATERSHEDS:

Table 1.1 The total catchment area of SSP below NSP is 2442440 ha.

	GOMP	GOG	GOM	Total for the Basin
Total Catchment	2248600	30230	163610	2442440 ha
Very High & High	546702	30230	116355	688410
Directly draining Very High & High	121330	29537	28226	175565
Areas directly dama- ged by project acti- vities.	-	500	-	500
Planned to treat	125725	29284	22768	177.77

According to the data available in NCA office the total area of directly draining subwatersheds in M.P. is 1,14,606 ha.

Table 1.2 Summary of Status of CAT Planning

	GOG	GOM	GOMP
Preliminary Surveys	}		
Prioritisation of sub-watersheds	:		
Development of Management Options	:	"Complete for all item in all States."	
Annual Action Plan	:		
Effective monitoring	:		
Phased Programme	}		

Table 1.3 Principal Elements of Action Plans for CAT

Elements of Action Plans	GOG	GOM	GOMP
Survey work	}	"Complete" for all item & all States.	
Preparation of detailed map	}		
Micro-watershed development map	}	Complete	Complete

Assignment of responsibility for conducting the work	}	
Timetable	:	"Yes" for all item for
Budget	:	all States
Menu of treatment	:	
Proposals for monitoring	}	

Table 1.4 Implementation of CAT

	Gujarat (29284)	Maharashtra (22768)	Madhya Pradesh (125725)			
	Area to be treated in ha. (Area in brackets indicate actual progress)					
	Forest	Non- Forest	Forest	Non- Forest	Forest	Non- Forest
<u>Monsoon year</u>						
1990-91	4528 (4528)	898 (898)	-	-	-	-
1991-92	4770 (4770)	230 (230)	-	-	-	-
1992-93	6013 (6013)	336 336	-	-	-	8800 (8800)
1993-94	6000 (6000)	286 (286)	960 (960)	291	966 (966)	6246 (6246)
1994-95	5893 5730	167 167	6347 6514.50	1360 1980	17000 4268	20000 594
1995-96	162	183	6653 6541.97	617	18000	20000
1996-97	-	-	5873	-	15964	18749
TOTAL:	27204 27042 *1	2080 1897*2	20000 (14016.47)	2768 (2151)	51930 *3 26114/32,791	73795 *4 /

- *1 As reported by GOG 162 ha. could not be treated due to resistance from the local people.
- *2 GOG had reported that out of 3025 ha of Agriculture are planned for treatment earlier, 945 ha. area is untreatable hence targets are reduced from 3025 ha to 2080 ha.
- *3 Out of 51930 ha. area, an area of 13930 ha is fully stocked where minor soil engineering works will only be carried out w.e.f.94-95 @ 4000 in (94-95), 5000 (95-96) & Balance in 96-97.

- *4 Progress of forest & non forest areas put together is reported as 32,791.

	<u>Gujarat</u>	<u>Maharashtra</u>	<u>Madhya Pradesh</u>
Implementation	Complete work scheduled to finish 1995-96	work scheduled to finish 1997.	Complete work scheduled to finish 1997.

II. FREELY DRAINING SUBWATERSHEDS: (Excluding directly draining Subwatersheds).

Table 1.5 Summary of Status of CAT Planning:

	GOMP	GOM	GOG
- Preliminary Survey	Yes	Yes	Already
- Prioritization of Sub-watersheds	Yes	Yes	under
- Development of Management options monitoring	Yes	Yes	implemen-
- Phased programme	Yes	Yes	tation.

Table 1.6 Principal Elements of Action Plan for CAT:

	GOMP	GOM	GOG
- Survey work	Yes	Yes	
- Preparation of development map	Yes	Yes	Already
- Micro watershed map	Awaited	awaited	under
- Work responsibility	Yes	Yes	impleme-
- Menu of treatment	Yes	Yes	ntation
- Time Table	Yes	Yes	
- Proposal for monitoring	Yes	Yes	
- Budget	Yes	Yes	
- Availability of funds	*	*	

* Agreed by Planning Commission for inclusion in River Valley Project" Scheme and funds are also promised by MOE&F from National Afforestation & Eco-Development Board.

A. Govt. of Madhya Pradesh:

Table 1.7 Total Area of freely draining critically degraded sub-watersheds below NSP is 54,6702 ha.

	Phase I Area (Directly draining)	Phase-II (Balance Area)	Total Area
SSP	121330	356484	477814
Jobat	-	-	28211
Man	-	-	12720
Maheshwar	-	-	13209
Omkareshwar	-	-	14748
			546702 *

* According to AISLUSO, this area is 541825 ha. The plan submitted by NVDA is under scrutiny of MOEF & NCA.

Table 1.8

PHASE - II (356484 ha.)			
Forest Area		Non Forest Area	
Gross Area	Net Working Area	Gross Area	Net working Area
1,11,479	78,368	2,66,388	2,39,750

Table 1.9 Schedule of Implementation (Madhya Pradesh):(318118 ha)

Year	Forest Area	Non Forest Area
	Phy. (ha.)	Phy. in ha
1997-98	8000	15750
1998-99	8000	16000
1999-2000	8000	16000
2000-01	8000	16000
2001-02	8000	16000
2002-03	8000	16000
2003-04	8000	16000
2004-05	8000	16000
2005-06	8000	16000
2006-07	6368	16000
2007-08	-	16000
2008-09	-	16000
2009-10	-	16000
2010-11	-	16000
2011-12	-	16000
	78,368	2,39,750

*1 NVDA had already submitted 5 schemes under RVP which have been approved for the year 94-95 to 96-97. Funds revalidated for the year 95-96 have been received. In addition 3 more schemes covering an area of 7186 ha from 3 subwatershed have been submitted by NVDA for seeking funds from RVP.

B. Govt. of Maharashtra:

PHASE-II

Table 1.10 Schedule of Implementation of freely draining Sub-watersheds.

Year	Forest Area	Non Forest Area
	Phy. in ha.	Phy. in ha.
1994-95	5600	3145.66
1995-96	5600	4186.97
1996-97	5600	4511.86
1997-98	5600	5044.1

1998-99	5600	4993.48
1999-2000	5600	5453.93
2000-2021	6400	-
-----		-----
	40,000	27,336
-----		-----

II. COMPENSATORY AFFORESTATION

Approval for the diversion of forest land 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 conduct of CAF. Principal amongst these are the following stipulations.

- For every hectare of forest land 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. This represents a two fold increase of the usual requirement.
- For the 4,200 hectares of forest land 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

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

- Sardar Sarovar (Narmada) Project Development Plan, Volume-II prepared by the Narmada Planning Group (NPG) in 1983.
- Studies on Ecology 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-Environmental and Wildlife Management Studies on the Sardar Sarovar Submergence Area in Gujarat 1992 by MSU.
- Impact Assessment of Madhya Pradesh Land to be Submerged Under Sardar Sarovar Project and Adjoining Ecosystems by State Forest Research Institute, Jabalpur (1989-92).

- Draft report on Flora and Fauna in and Around Sardar Sarovar Project, Maharashtra by the University of Pune 1994.

The Action Plans

In compliance with the conditions set by the MOE&F, each state has prepared an action plan for the CAF of areas within its 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 Kutch, 1986.
- Project for Afforestation in Sardar Sarovar Project Impact Areas due to Diversion of Forest Lands 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 multi-purpose river-valley project (1989).

These plans were submitted in varying stages of completeness but each has now been revised and updated to take account of the comments of the MOEF and the NCA. Action plans of 3 State Govts. contained following components:

1. Identification of areas for CAF;
2. Description of selected areas,
3. Justification of Selection of Areas,
4. Identification of responsible agency,
5. Description of staffing requirements,
6. Description of material requirements,
7. Estimate of costs,
8. Identification of tree species,
9. Description of preparatory work needed,
10. Description of planting techniques,
11. Provision for aftercare,
12. Yearly planting target,
13. Yearly budget,
14. Provision made for monitoring implementation

These action plans spell out a programme of tree planting in the three states on both non-forest and degraded forest areas as shown in Table 2.1 & 2.2.

Table 2.1 Areas for Compensatory Afforestation

	Area of Forest diverted for SSP	Area of Degraded forest to be Replanted	Area of Non-Forest Land to be Afforested	Total area for CAF
GOG	4,523	9,300	4,650	13,950
GOM (a) Submer.	6,488*	12,980	6,488	19,468
(b) R&R *	4,200	-	4,200	4,200
GOMP	2,732	6,550	2,190	8,740
TOTAL :	17,943	28,830	17,528	46,358

* This includes 2700 ha released in 1990 & 1500 in 1993 for R&R works in Maharashtra for which only equal non forest area is being raised as stipulated.

Table 2.2a Schedules for Implementation of CAF (Against Submergence)

	Gujarat		Maharashtra		Madhya Pradesh	
	Area to be Afforested in ha (Area in brackets indicates actual progress)					
	Degraded Forest	Non-Forest	Degraded Forest	Non-Forest	Degraded Forest	Non-Forest
Monsoon year						
1990		2,150 (2150)			132 (132)	716 (716)
1991	2,834 (2,834)	350 (350)	8,383 (8383)		1580 (1200)	400 (373)
1992	2,450 (2450)	847 (847)	4,552 (4552)	2,276 (2276)	1580 (2400)	400 (-)
1993	2,500 (2,500)	455 (455)	45 (20)	1,156 (1,156)	1580 (2215)	400 (-)
1994	1,516 (1,516)	848 (848)	-	2,911 (2894)	600*	1100*
1995	-	-		0,162	-	-
Total:	9,300	4,650	12,977	6,488	6550	2190
Achievement in ha.	(9300)	(4650)	(12977)	(6316)	8225	

- * Net target considering progress of the previous years.
 ** Total Progress achieved is 8225 ha. against a target of 8740.

Table 2.2b Schedule for Implementation of CAF in lieu of Forest Land released for R&R works.

State	Year	Land released Area in ha.	Target & Progress		
			1993-94	94-95	95-96
Maharashtra	1990	2700	2192.37 (2192)	307 (311)	197 (184.50)
	1993	1500	-	-	1500 (896)
	TOTAL	4200	2192	307	1697
Achievement			(2192)	(311)	(1080.50)

Other Additional Afforestation Activities:

Plantation along Canal Banks:

The total potential of canal bank plantations is estimated to be 18000 ha. A project report prepared for this purpose by forest Deptt. is under scrutiny of SSNNL. The plantation programme is likely to be launched effectively from the year 1995. However to give a start to the work of canal bank plantations, plantations on 215 ha have already been established till rains of 1994.

Additional Plantation Activities

(a) Dam Vicinity Plantation (235 ha)

An area of 240 ha. in the vicinity of the dam has also been planted. This work was completed in 1992.

(b) Revine Land Afforestation (200 ha.)

On the left bank of the river Sabarmati an area of 200 ha. in two villages i.e. Ratanpur (150 ha.) and Pirojpur (80 ha.) is also planned to for plantation. An area of 200 ha. is till 1994 rains.

(c) Project area plantations: (255 ha)

An area of 300 ha. has been planted in the project area as per the target and the work completed in the rain of 1992.

III. COMMAND AREA DEVELOPMENT: (Including Drainage Studies)

(A) Government of Gujarat:

Government of Gujarat have undertaken several studies related to the Command area development. Some of which have been

completed and the remaining are in progress. Their position is as follows:

Sl.No.	Name of Study	Name of Agency	Year of completion
I. Completed Studies:			
1.	Pre-Feasibility study for Low Level Canal.	Jyoti Consultants Ltd. Vadodara.	1981
2.	Mathematical Modelling of Ground Water for system single layer model-Narmada Mahi-Doab.	Operation Research Group, Vadodara.	1982
3.	Pre-Feasibility level Drainage study of Narmada Mahi Doab of SSP Command.	Core Consultants Ltd. Ahmedabad.	1982
4.	Some Aspects of Role of Panchyats and Institutional Arrangements for canal Irrigation in Two Talukas of Ahmedabad District.	Institute of Cultural and Urban Anthropology, Ahmedabad.	1982
5.	A study of settlement Pattern (6 Talukhas in the Narmada Command Area of Mahesana District of Gujarat).	Department of Geography, Gujarat University, Ahmedabad.	1982
6.	Regionalisation of Narmada Command.	Operations Research Group, Vadodara.	1982
7.	Marginal cost study of two Typical Distributerics and Two Typical Branches.	Dr. C.R.Shah, Vadodara.	1983
8.	Socio-Economic Bench Mark survey of 62 Talukas (Sub-districts) of Narmada Command Area.	Fourteen Different Agencies Including Universities, Research Institutions etc.	Between 1982 & 1983
9.	Population Projection and Migration study for Narmada Command Area.	Operations Research Group, Vadodara.	1983
10.	Study on Water Demand for Non-Agricultural use from Narmada Project.	Gujarat Water Supply and Sewerage Board, Gandhinagar.	1983
11.	Consumer Expenditure, Assets and Indebtedness of Rural Households of the Command Areas of Sardar Sarovar (Narmada) Project, 1982.	Directorate of Economics & Statistics, Gandhinagar.	1983

12.	Wasteland Development Project for command Area of Narmada Canal (Region 11 and 12).	Gujarat State Rural Development Corporation Ltd., Gandhinagar.	1984
13.	Mathematical Modelling of Ground Water System Narmada Mahi Doab.	Operations Research Group, Vadodara.	1985
14.	Additional work on Mathematical Modelling of Ground Water System-Single Layer Model Narmada Mahi Doab.	Operations Research Group, Vadodara.	1985
15.	Rate 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
16.	Computer aided Planning of conveyance and delivery Network.	Indian Institute of Management, Ahmedabad.	1986
17.	Land Use and Cropping Pattern Survey and Mapping of Narmada Command Area Zone 4A & 4B.	Department of Geography, M.S. University, Vadodara.	1986
18.	Survey and Investigation work of Ground Water Resources in Narmada-Mahi Doab.	Gujarat Water Resources Development Corporation Ltd. Gandhinagar.	1987
19.	Cropping Pattern and Water Demand Study in Narmada Command Area.	Operations Research Group, Vadodara.	1987
20.	Inter-Regional Water allocation and Determination of Branch Canal capacity.	Operations Research Group, Vadodara.	1989
21.	Extended study on Inter Regional Water Allocation and determination of Branch Canal Capacity.	Operations Research Group, Vadodara.	1989
22.	Growth of Agro-Processing Industries in Phase-I of the Sardar Sarovar Project.	Gujarat Industrial & Technical Consultancy Organisation Ltd. Ahmedabad.	1990

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|-----|--|---|------|
| 23. | Consultancy work for Control, Telemetry and Communication Net Work on Narmada Canal System for SSP. | Gujarat Communication & Electronics Ltd.,
Vadodara. | 1991 |
| 24. | Techno-Economic Study for utilising Village Tanks as Borrow Area for Construction of Canal Net Work. | Operations Research Group, Vadodara. | 1992 |
| 25. | Area Development Strategies for selected Regions Adjacent to Narmada Main Canal (Vadodara, Surendranagar & Banas Khatha Dist.) | Operations Research Group, Vadodara. | 1992 |
| 26. | Studies in Water Rates Policy in 3 parts. | | |
| | i) Pricing of a public Utility Survey of Literature | Department of Economics, South Gujarat University, Surat. | 1992 |
| | ii) Financial working of Irrigation Projects - A case of four projects in Gujarat. | Department of Economics, Sardar Patel University, Vallabh Vidyanagar. | 1992 |
| | iii) Some policy issue for Canal Water Rates in Gujarat. | Department of Economics, Sardar Patel University, Vallabh Vidyanagar. | 1992 |
| 27. | Mathematical Modelling of Ground Water System for SSP Command between Rivers Shedhi and Sabarmati. | Consultancy Engineering Services, New Delhi. | 1993 |
| 28. | Mathematical Modelling of Ground Water System for SSP Command between Rivers Sabarmati and Banas. | Operation Research Group, Vadodara. | 1993 |
| 29. | Mathematical Modelling of Groundwater System for SSP Command beyond Banas upto Rajasthan Border. | Dalal Consultants, Ahmedabad. | 1993 |
| 30. | Prefeasibility level Drainage study for SSP Command beyond Mahi. | Consultancy Engineering Service, New Delhi. | 1993 |

II. ON GOING STUDIES:

- | | | |
|---|---|---|
| 1. Monitoring and Evaluation of Resettlement & Rehabilitation Programme. | Centre for Social Studies, Surat. | 1985 |
| 2. Development of Aliabet Island in the Estuary of River Narmada. | Multi Disciplinary Expert Group. | Sept.'92 |
| 3. Agricultural Research Studies. | Gujarat Agricultural University, | 1987 |
| 4. Survey and Investigation Work of Ground Water Resources beyond River Mahi in SSP Command. | Gujarat Water Resources Development Corporation Ltd., Gandhinagar. | 1989 |
| 5. Action Research on People's Participation in Water Management in SSP. | Gandhi Labour Institute, Ahmedabad. | 1991 |
| 6. Development of Nal Sarovar Bird Sanctuary. | Multi Disciplinary Expert Group. | Sept.1992 |
| 7. Development of Black Buck National Park at Velavadar. | Multi Disciplinary Expert Group. | |
| 8. Development of Wild Ass Sanctuary in Little Rann of Kachchh. | Multi Disciplinary Expert Group. | Sept,1992 |
| 9.* Study on preparation of a detailed Integrated Command Area Development Plan for SSP. | M/s Wamana Consultants Pvt.Ltd., Hyderabad. | Dec.1992 |
| 10.* Environmental Impact Assessment Studies on Inland and Marine Fisheries relevant to the Command Area of Sardar Sarovar (Narmada) Project. | M.S. University, Vadodara. | Dec.1992 |
| 11.*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. | Commissionerate of Health, Medical Services & Medical Education, Govt. of Gujarat, Gandhinagar. | Dec.1992 (Final report received in NCA, |
| 12.*Study of Flora and Fauna of the Command Area of Sardar Sarovar (Narmada) Project : Lying between the Narmada & Sabarmati Rivers.(EIA Studies). | Sardar Patel University, Valalabh Vidyanagar. | Feb.1993 |

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|--|---|-------------|
| 13.* Study on Flora and Fauna of the Command Area of Sardar Sarovar (Narmada) Project Lying in Saurashtra and Kachchh Area (Environmental Impact Assessment Studies). | Saurashtra University, Rajkot. | March, 93 |
| 14. *Study on Flora and Fauna of the Command Area of Sardar Sarovar (Narmada) Project: Lying between Sabarmati River and Rajasthan Border (Environmental Impact Assessment Studies). | Gujarat University, Ahmedabad. | March, 1993 |
| 15. Ecological study of Wild Ass Sanctuary and surrounding area using remote sensing technology for Environmental Impact Assessment. | Guj. Ecological Education & Research Foundation (GEER Foundation), Gandhinagar. | Dec., 93 |
| 16.* Environmental Impact Assessment of Nal Sarovar Bird, Sanctuary. | GEER Foundation | Dec., 93 |
| 17. Environmental Impact Assessment of Velavadar National Park located in the command area of SSP. | GEER Foundation | Dec., 93 |
| 18. Environmental Impact Assessment (EIA) studies on Aliabet Island. | Chief Engineer, (CAD SSP) Expert Multidisciplinary Group. | Dec., 93 |
| 19. Review of ground water drainage study. | H.R. Wallingford | Jan., 94 |
| 20. Agro Pollution aspect of Command Area. | -do- | Jan., 94 |
| 21. EIA on downstream of Sardar Sarovar Dam upto Gulf of Cambay. | -do- | Jan., 94 |

* Draft/interim reports received in NCA.

(B) Government of Rajasthan

The Government of Rajasthan had submitted a report on Environmental & Ecological aspects and remedial measures for Narmada Canal Project. Copy of the report was submitted to Ministry of Environment and Forests. Govt. of Rajasthan have assigned studies on EIA of Command area in Rajasthan portion to WAPCOS. Report is under finalisation.

IV. FLORA, FAUNA, WILDLIFE 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.

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 Narmada Control Authority would ensure indepth studies on flora & fauna needed for implementation of Environmental Safeguard measures.

Studies/Surveys :

- Important survey work has 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). Interim 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 is completed & report is 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 Universities of Bhopal, Vikram and Rani Durgavati 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.
- 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.

The Action Plans

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 which will avoid the possibility of animals being trapped in the submergence area;
- plans for improvement works in the wildlife sanctuaries of Gujarat;

Fisheries Component:

Three state Govts. 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 NSP, 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 were 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 hydrobiological 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.
- 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 proposed by GOM through CICFRI.

Subsequently, the state governments 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 plan submitted by state Govts. are under scrutiny of this expert group.

Table 4.1 Summary of Status of Environmental Planning:

A) Wildlife

	Gujarat	Maharashtra	Madhya Pradesh
Preliminary Surveys	Complete	Complete	Complete
In-Depth Studies	Complete	Completed	Complete
Development of Management Options	Complete for Shoolpaneshwar	Some work completed but awaiting deliberations of the expert group.	Some work completed but awaiting results of study and deliberations of the expert group

Action Plan

Migratory corridors	Not needed	Completed	Complete
Sanctuary development	Complete for Shoolpaneshwar development.	Plans for establishment of wildlife sanctuaries await study results and expert group's recommendations	Plans for establishment of wildlife sanctuaries await study result and expert group's recommendations.
Wildlife conservation	Massive afforestation in entire catchment of SSP	It depends on deliberations of expert group	Await final outcome of study.
Implementation	Shoolpaneshwar development complete, CAT work (increasing carrying capacity)nearing completion	Awaiting outcome of the study. CAF nearly completion, CAT work recently accelerated	Arrangements complete, awaiting final outcome of study

Progress in Shoolpaneshwar Sanctuary Development

	Target	Achieved to	% Complete
- Fencing	100km	107	100
- Firelines	60km	251 km	100
- Barricades	2km	2.8 km	100
- Check Dams	14	14	100
- Construction of Quarters	21	21	100
- Construction of Rest House	1	1	100
- Improvement of Communications	50 km	70.5 km	100

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.
- Velvadar Black Buch Nation Park.

Summary of Status of Environmental Planning:**B) Fisheries**

	GOG	GOM	GOMP
Preliminary surveys work plan.	Yes	Yes	Yes
Updating of Detailed surveys/studies of fish fauna	Yes	-	Yes
Updated Action plans	Yes	Yes	Underformulation
Implementation			
1. Plan for clear felling	Completed	Yes to synchronise with submergence 26.00 ha felled marking on 714 ha.	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	Yet to agree
4. Expert group to lay down guidelines for conservation & Development	} Yes agreed by the states & constituted by the NCA. Two meeting held on 10.5.95 & 12.7.1995.		

Progress of Implementation

CICFRI have already established one hatchery in Gujarat for augmenting the numbers of the Hilsa fish in the reservoir. This currently produce around 250,00 spawn per year. CICFRI have also been commissioned to monitor the whole of the estuary and their study has been extended to examine pollution and to undertake modelling studies in the downstream environment.

A draft plan for the creation of an Interstate Fisheries Development Board (IFDB) has been prepared by the NCA and agreed, in principle, by the governments of Gujarat and Maharashtra. However GOMP has disagreed & suggest an alternative proposal. Reaction from GOG & GOM are awaited. The organisation is expected to be set up and fully functioning prior to reservoir filling. 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 followup action. Guidelines are on the anvil.

GOG has already provided 16 hectares of land to the project for the development of fish farms. In addition, the State Fisheries Department is exploring the development of riverine fisheries and the development of the reservoir for commercial and game fisheries.

Execution of felling in M.P. & GOM as per felling plans prepared awaits the commencement of impounding.

V. 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 I&II.
- 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.

Progress of 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 river bed.

The Government of Gujarat has identified 9 locations for the installation of seismic monitoring stations, 4 each on either side of the Sardar Sarovar reservoir in Madhya Pradesh and Maharashtra and 1 at Kevadia in Gujarat. By Dec. 1994, 8 stations had been installed. Construction of building for the 9th station in progress.

The progress of implementation is illustrated in Table below:

Implementation of Actions

Action	Status
Dam design modifications	Complete
Installation of monitoring stations	8 stations installed by June, 1994, 2 more awaited
GSI (Nagpur Division) rim stability studies	Completed
Tracer Studies by CWPRS	Ongoing

VI. HEALTH ASPECTS

Studies

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 was 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 produced a report on the health profile of 33 project-affected villages in Dhule District, Maharashtra.
- Health Statistic 1982-84, GOMP. This study, published by GOMP in 1985 & updated is 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 by, amongst others, by the Malaria Research Centre (MRC) and Dr. Kalra.
- Revised health plan by GOM, 1995.

Status of Implementation of Actions for Public Health

Action	Gujarat	Maharashtra	Madhya Pradesh
Baseline studies	Complete	Complete	Complete
Preparation of state action plan	Submitted and modified in 1986; Urban Malaria Scheme proposed	Original submitted in 1987, revised in 1991 and 1992 & 1993	Original submitted in 1986, revised in 1988 and final plan submitted in 1991
Survey of existing facilities	Complete	Complete	Suifficient facilities
Establishment of new facilities	Hospital at Kevadia for workers; laboratory and mobile unit complete, drug dispensaries	Somawal village hospital; health centres and health units sanctioned.	Hospital, mobile unit and civil dispensaries for labour; detailed scheme for resettled population
Vector control measures in place	NMEP; SSNNL workshop on malaria control; laboratory established; studies on health completed.	NMEP; adoption malaria control guidelines of irrigation Department	NMEP; state malaria control organisations strengthened
Appointment of specialist staff	One senior health officer is posted at Kevadia.	Awaits financial approval by State Govts.	Needs identified

Disease Monitoring and responsibility	Entrusted to SCHMS Action Plan of 1986 will be revised. EIA report Submitted by SCHMS. Final plan awaited.	Entrusted to regular health department Surveillane studies commenced.	Evaluation cell established monitoring by Gandhi Medical College, Bhopal. Four Six monthly report submitted..
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VII. ARCHAEOLOGICAL SURVEY AND ANTHROPOLOGICAL STUDIES/ ARCHAEOLOGICAL SURVEY

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:

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 of Department of Archaeology. A survey was carried out by the Department of Archaeology of cultural sites in 24 villages of Akkrani Taluk and nine village from Akkalkuwa Taluk, Dhule District.
- Madhya Pradesh : Survey of State Department of Archaeology and Museum (1992).
- Anthropological Survey of India: Narmada Salvage Plan.
- Anthropological Survey of India: People's of India.
- Parishad, A.K. Survey of Material Cultural in the Narmada Valley.
- Rashtriya Manav Sanghralaya : Narmada Salvage Plan.

Cultural Heritage in SSP Area

	Gujarat	Madhya Pradesh	Maharashtra
Relocation of Temples	8(2)*	37 (7)	-
Excavation site(s)	-	5	

* Figures in brackets indicate number of sites designated for relocation.

Summary of Current Situation and Progress

	GOG	GOMP	GOM*
Survey of Villages in Submergence Zone.	}	"Complete" for all item in all the States.	
Identification of Cultural Sites			
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 present location.

Progress of implementation:

State	Relocation	Target	Progress
Gujarat	2/2	-	-
Maharashtra	-	-	-
Madhya Pradesh	7/5 *1	5/3 *2	188/9 *3

***1 Relocation/Protection**

Work for relocation of following temples is in progress.

	Village	Temple	
1.	Semalda	Kalanjeshwar	} Land allotment under progress of estimate under preparation.
2.	Barda	Shiv Mandir	
3.	Khujawa	Bhawani Mata temple	
4.	Khujawa	Jaleshwar temple	}
5.	Panthia	Satmata temple	
6.	Panthia	Shiv temple	

The monuments viz. Shiv temple of Religaon is proposed to be protected by constructing a wall.

***2 Excavation**

- For excavation at vill Khaparkheda & Brahmangaon. Funds sanctioned by NVDA. Work under progress.

- For excavation at village Utarad. Work was completed earlier by ASI, Govt. of India.

*3 Collection & display at Museum

- Land for museum at Barwani & Indore requested. Chemical treatment of rock cut statue at Piplagarhi has already been started. This monument is proposed to be shifted at relocation site.
- Construction of a section 'Narmada Dirgha' in the museum at Bhopal has been started.
- Besides, Film documentation of all the monuments of SSP is in progress.

ANTHROPOLOGICAL STUDIES

Government of Madhya Pradesh has informed that in view of the studies being carried out in connection with Narmada Basin Project, no separate anthropological studies are required and that the Director General, Anthropological Survey of India has also expressed the same view. M.P. State Adivasi Kala Parishad has submitted its report on Tribal arts & culture. Besides Anthropological Survey of India has informed that Narmada Basin is already covered extensively under the project "people's of India". Besides Rashtriya Manav Sanghralaya has conducted needed studies in the past as follows. Further studies are covered under R&R plan of the state Governments.

- a study of the palaeo-ecology of quaternary fossils in the central Narmada Valley;
- excavation of upper palaeolithic site of Mehtakhaeda and further exploration of Nimar;
- collection of tribal artifacts in Madhya Pradesh.

Institutional responsibility for these actions was specified in the action plan whereby the first two elements were completed by Deccan College, Puna and the third by Adivasi Kala Parishad, for the Rashtriya Manav Sanghralaya, Bhopal.

STATUS REPORT
NARMADA SAGAR PROJECT (NSP) ENVIRONMENTAL ASPECTS,
SEPTEMBER, 1995

1) Phased Catchment Area Treatment:

The freely draining area of Narmada Sagar Project down stream of Bargi Dam is about 39,25,422 ha. 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. Prioritisation survey of the watersheds was entrusted earlier to SGSIT&S, Indore. Later on, as per GOI's instructions the prioritisation survey was entrusted to the All India Soil & Land Use Survey Organisation, New Delhi. The Survey has been completed by AISLUSO, New Delhi and the Survey reports have been received in the NVDA.

On the basis of the reports submitted by the AIS&LUSO, 30 sub-watersheds belonging to the very high and high priority categories and directly draining into the reservoir have been identified for treatment. These 30 sub-watersheds cover an area of about 73,456 ha.

I. DIRECTLY DRAINING SUB-WATERSHED OF HIGH & VERY HIGH PRIORITY CATEGORIES:

Critically degraded Sub-watersheds below Bargi dam (Figure in ha).

	FOREST		NON FOREST		TOTAL	
	Gross	Net	Gross	Net	Gross	Net
Critically degraded sub-watersheds.	15759	11048	57697	51927 *	73456	62975

* In addition an area of 1636 ha. was treated up under pilot project earlier.

Programme and Progress of Works:

	Upto 92-93	93-94	94-95	95-96	96-97
	Cumulative Progress		Target/Progress	Target	
Non-Forest area/ ha. (51,927 ha)	11439	<u>13636</u> 10261	<u>15375</u> 7224	<u>19651</u> 1367	3352
Forest area/ (11,048 ha)	-	-	<u>3700</u> 2623	<u>4777</u> 240	3648
Total Area: (62,975 ha)	11439	<u>13636</u> 10261	<u>15700</u> 9847	<u>23824</u> 1607	7000

II. FREELY DRAINING AREA: (EXCLUDING DIRECT DRAINING SUB-WATERSHEDS)

Number of watersheds	- 478
Gross Area	- 10,12,650 ha.
Net Area	- 9,15,150 ha.

Schedule of Implementation:

Year	Forest (in ha.)		Non Forest (in ha.)	
	Gross Area	Net Area	Gross Area	Net Area
1995-96				18000
1996-97				18000
1997-98		10000		27000
1998-99		10000		28800
1999-2000		10000		28800
2000-2001		10000		28800
2001-2002		10000		28800
2002-2003		10000		28800
2003-2004		10000		28800
2004-2005		10000		28800
2005-2006		10000		28800
2006-2007		10000		28800
2007-2008		8430		28800
2008-2009				28800
2009-2010				28800
2010-2011				28800
2011-2012				28800
2012-2013				28800
2013-2014				28800
2014-2015				28800
2015-2016				28800
2016-2017				28800
2017-2018				28800
2018-2019				28800
2019-2020				28800
2020-2021				28800
2021-2022				28800
2022-2023				26400
2023-2024				26120
<hr/>				
	1,24,732	1,08,430	8,96,361	8,06,720
<hr/>				

2) Compensatory Afforestation :

A total of 40332 ha forest land would come under submergence and an additional 779.9 ha of forest land has been diverted for the residential colony, power house complex, dam, saddle dam and approach roads. Subsequently, another 308.4 ha of forest land was

permitted to be diverted for power house. Thus a total of 41,420 ha of forest land has been permitted to be utilised for the construction of ISP. To compensate for this loss of forest, 10,143 ha of non-forest and 70,802 ha of degraded forest land has been identified for compensatory afforestation.

Programme of Compensatory Afforestation:

	Commulative Progress till 91-92	92-93 Target/ Progress	93-94 Target/ Progress	94-95	95-96
Degraded Forest area (70,802 ha)	23048	<u>12528</u> 11919	<u>12400</u> 12987	<u>12400</u> 4056	<u>10035</u> 2982
Non-Forest area (10,143 ha)	5239	<u>1534</u> 1390	<u>1500</u> 1327	<u>1500</u> 667	<u>514</u> 131
(80,945) (say 81,000 ha)	28287	<u>14062</u> 13309	<u>13900</u> 14314	<u>13900</u> 4723	<u>11549</u> 3033

3) **Command Area Development :**

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 6/2007. Monthly observation of water levels started in November, 1991 for subsequent supply of this data to the consultants, already shortlisted, are likely to be continued for 2 seasons to draw inference for preparation of master plan for drainage. 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.

4) **Flora, Fauna, Wildlife and Carrying Capacity :**

Studies on these aspects were entrusted to the Wildlife Institute of India, Dehradun in December, 1989 and were scheduled to be completed by March, 1993. The studies have been completed. The final study report is submitted to MOE&F & NCA.

Besides this, the Friends of Nature's Society, Bhopal, was entrusted with the preparation of Wildlife Retrieval and Conservation Plan. They have submitted the final report. Action plan is under formulation.

Actions have been taken up by NVDA to implement the recommendation of the WLI regarding construction of National Park & protected areas.

5) Seismicity and Rim Stability

The reservoir competency survey has been done by GSI and report is submitted. In the report, GSI has suggested further studies for some patches of narrow water divide. As such they were requested to carry out the study in the required area. GSI is further reviewing the need to survey the area identified earlier.

Establishment of 10 nos. of seismic observatories in the Narmada Sagar Complex area is taken up. NVDA 12 nos. of wood Anderson Seismometers and six nos. of photographik recorders are being procured from IMD. Procurement of Micro Earthquake recorders is also in progress. In the mean time on the initiatives taken by NVDA, CWPRS has already installed the instrument to records. Preimpounding date and for undertaking seismic studies at NSP, Omkareshwar & Maheshwar projects through Analogic micro earthquake recorder & strong motion accillograph as an interim measure work on establishment of remaining seven observatories is in progress..

6) Health Aspect:

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. Three six monthly report 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 is under formulation.

7) Fisheries Development:

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, 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. Acquatic 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.

8) Archaeological and Anthropological Survey:

A survey of the 254 villages is required for identification of the archaeological monuments falling within the submergence area. The State Department of Archaeology and Museum, Bhopal was entrusted with the survey of 87 villages which has been completed. Archaeological Survey of India has also completed the survey for 167 villages assigned for identification of the monuments of significance.

Action plan is available. Action will be taken to preserve material of archaeological importance in consultation with experts.

As only lower bastion in north of the Joga Fort is likely to be affected by Scour action of water, this is being studied and the Siddeshwar temple is well above the FRL of 860 ft., these two structures are not considered as affected by the project. The state Department of Archaeology & Museum has already submitted an action plan for relocation & monuments of Archaeological significance. This plan is being implemented.

Excavation of the early historic mound in village Khedinama in Hoshangabad distt. is completed and report is available in NCA. Actual tools & artifacts have been found. However in order to ascertain this history after Mughal period. It is proposed to work further on this mound.

Anthropological Studies:

Efforts are being made for retrieval of bio-cultural material from the Narmada Basin. A lot of information is gathered from the field which generates immense data of Socio-Anthropological significance.

Rashtriya Manav Sanghralaya has constituted a working group for the retrieval of bio-cultural material in Narmada Basin. Survey of tribal art and handicraft entrusted to M.P. Adivasi Kala Parishad is completed and report is available. Besides Anthropological Survey of India has covered these studies under its own project called "people of India". The report is in 61 volume out of which 7 volume are under final editing. A Narmada Salvage plan is also launched by Anthropological Survey of India recently and the entire area is scanned and some ancient tools have been found.

ANNEX-XXVII.(3).

EXECUTIVE SUMMARY OF FINAL REPORT : FLORA, FAUNA, EIA
AND EM OF SSP-COMMAND (BETWEEN NARMADA & SABARMATI
RIVERS), Submitted by Sardar Patel University, NPG.

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EXECUTIVE SUMMARY

STUDY AREA

- *In* accordance to the terms of reference laid down by NPG and the present study group the flora and fauna were worked out in the command area lying between the rivers Narmada and Sabarmati. This covered 10,626.67 km² gross command spreading through 31 talukas of five districts : Bharuch, Vadodara, Panchmahal, Kheda and Ahmedabad. Mahi command in Kheda district was also studied as a model of irrigated land.

- Narmada command under our study is mainly a plain-Gujarat zone, comprising of plain land with overlapping gradation of soil from sandy loam in the extreme northern part to deep black in the southern part of the command. Though no clearcut zonal boundaries can be laid down between any areas, four eco-zones are visualized in the study area, based on their little differences in climatic and soil conditions. Two of them are minor, one lying in Panchmahal in the form of a narrow strip of degraded forest land used for agriculture, and the second in coastal part of Bharuch district having condition of salinity; and two are large, one of which is a northern region comprising of parts of Kheda and Ahmedabad districts having sandy loam to alluvial loam soil in plains, and the southern eco-zone embodying Baroda and central-western Bharuch districts with light to dark black soil. The climatic conditions overlap in all the four eco-zones. Temperature-humidity pattern is almost identical in the entire command, but the rainfall has marginal difference in four zones.

STUDY AREAS COVERED

- * SSP command - 10,626.67 km²
(31 Talukas of Five Districts)
- * Mahi command - 3,157.90 km²

- Our extensive field work over a period of two years revealed that a large area of the command suffers from paucity of water for agriculture.

FLORA

- The Flora is identified and recorded under two major categories : nonvascular and vascular plants. Algae and Fungi are very large and diversified groups in the command.

- Algal flora is based on the recent documents produced by our home -Department at the Sardar Patel University in the form of Doctoral theses, and verified by Professor R. J. Patel, a leading algologist of the country. Fungal flora is based on information available with us, as well as at the Gujarat Agricultural University, Anand campus, and is verified by Dr. Ashok Mishra, Professor of Plant Pathology. Angiosperm flora is based on our own field collection and the examination of specimens in Sardar Patel University herbarium.

- Algal flora comprises of 57 species of Cyanophyceae, 186 of Chlorophyceae, 32 of Bacillariophyceae and 36 of Euglenophyceae. Fungal flora comprises of 2 species of Chytridiomycetes; 23 of Oomycetes; 15 of Zygomycetes, 3 of Hemiascomycetes, 15 of Plectomycetes, 23 of Pyreniomyces; 8 of Discomycetes; 18 of Teliomycetes; 7 of Hymenomycetes; 3 of Gastromycetes; 58 of Hyphomycetes and 22 of Coelomycetes. Note-worthy Bryophytic, and Pteridophytic forms are 4 and 6, respectively. Four Gymnosperm species are found as garden plants.

- The angiosperm flora comprises of 443 species of 298 genera under 86 dicotyledonous families; and 111 species of 77 genera under 21 monocotyledonous families. This clearly shows the occurrence of a very good floral diversity in the command area.

FLORAL DIVERSITY	
Algae	- 311 species
Fungi	- 197 species
Bryophytes	- 04 species
Pteridophytes	- 06 species
Gymnosperms	- 04 species
Angiosperms :	
Dicotyledons	- 443 species
Monocotyledons	- 111 species

- One hundred sixty-four species of angiosperm families are employed for their cultivation. There are quite a few aquatic forms belonging to 15 families. Only four parasitic species are found in the command.

- Vegetation is of continuous overlapping pattern. However, if the extreme

northern and southern parts are considered in pockets, some variations in vegetation are discerned. Panchmahal represents some species of degraded forests; most of the southern zone is dominated by grass species; in the north zone a part of Kaira district is lush green with a variety of tree species; whereas, in the uppermost part of the north region the trees and general vegetation become sparse.

- Keeping the utility point in mind, phenology and economic importance of some floral components, such as trees, shrubs, crop plants and weeds, are schematically presented. A very large number of plant species are of medicinal importance. This should be helpful in management of flora after commissioning SSP. The phenological information in the present report includes only flowering and fruiting times. This is done with a view to provide the tips for the management of sowing-calender (including its probable shift) in case of crops.

- The agricultural pattern is quite variable throughout the command, comprising of coarse and fine grains, cash crops like tobacco, groundnut, sugarcane and cotton. Horticultural practice is not very uncommon.

- To provide a coherent idea on flora, various aspects related to vegetation such as scientific name, common name, general morphology, habitat and special features, if any, of all the major floral components of angiosperms are given in a composite enumerative tabular form.

- None of the recorded species in the present study qualifies itself to be classified as endangered or rare, in accordance to the established National and International norms for this purpose. According to the recent status report of the World Conservation Monitoring Centre (1994) only two

ENDANGERED SPECIES

No plant species qualified to be considered as Engangered.

angiosperm species - *Ceropegia odorata* (from Pavagarh Hills) and *Eriocaulon eurypeplon* are endangered in Gujarat, which do not belong to the command under the present study.

BETWEEN NARMADA AND SABARMATI

FAUNA

- As far as fauna is concerned, the four eco-zones donot have any demarcation of distributional pattern of various animals. Wherever aquatic bodies are present, particularly in Kheda and Bharuch districts, great variety of aquatic birds are found to be in large number.

- The number of species belonging to various animal taxa are as follows : (a) *Invertebrates* : Protozoa 33, Coelenterata 01; Helminthes 08, Nematoda 36, Annelida 02, Arthropoda 281 (Crustacea 09 + Arachnida 14 + Myropoda 05 + Insecta 253), Mollusca 07; (b) *Vertebrates* : Amphibia 02, Reptilia 17, Aves 67, Mammalia 22.

FAUNAL DIVERSITY

Invertebrates	: 368 Species
Vertebrates	: 108 Species

- Wild life (in conventional meaning only) is almost absent, but for the presence of a few species of snakes, Indian monkey, pig, mongoose, etc.

- Different groups of birds depending on their food habits, habitat and association to agriculture are also presented. They are : (i) grain-eating birds - 20, fruit/nut-eating birds - 07, insect-eating birds - 42, fish-eating birds - 08, birds visiting water bodies - 20, birds nesting near the water bodies - 11, animals associated with the farming operations and farms - 09.

PLANT-PESTS

Insects	- 116
Nematodes	- 19

- Plant-related insects in the command area are about 116, and nematodes are 19.

- There are fifteen culturable fish species and three culturable shell-fish species in the command.

MAHI- EXPERIENCES

- Mahi-command area was taken as a model for the EIA studies, and it was found that agriculture, horticulture and social forestry have taken good shape in it.

- A high degree of development of villages in Mahi-command clearly

shows that they are prospered after availing the Mahi waters. Farm practices are supplemented by large number of mechanical devices; cattle and poultry have taken a revolutionary development and fish-farming has entered the command. In the footstep of revolution in agriculture in Mahi-command; the use of NPK-fertilizers and chemical-pesticides has also gone up. However, their use is yet to touch the upper limits of recommended doses.

- Social and agro-forestry programmes have taken a remarkable shape in the Mahi-Command during last two decades. All the major road-sides have been covered with forestry programme by Forest Department of Government of Gujarat. Village social-forests are fast coming up. Tree-plantations in industrial, educational, institutional campuses and towns are on increase, e.g., townships of Vallabh Vidyanagar, Vitthal Udyognagar, N.D.D.B. - Anand, Fertilizernagar - Vadodara, Khetiwadi - Anand; Charutar Aarogya Mandal Campus - Karamsad and Ash-fly deposits of the Gujarat Electricity Board.

- Industrial development, solar energy utilization, and biogas production are commendable in Mahi-command. This is due to the prosperity and awakening of the people going hand in hand.

- However, some of the areas are water-logged due to over and uncontrolled irrigation by the farmers. Land having water-table level at 0.0 to 1.5 m was 2121 ha, and that at 1.5 to 3.0 m was 29,165 ha in command on right bank of Mahi as surveyed in 1991-92 by the Soil Survey Office at Vadodara. This is about 16 per cent of the total command area. The problem

of aquatic weeds is very common in Mahi-command. However, while discussing the water-table level, we should also take into consideration the fact that the command area under study has the recurrent history of drought-spells to the tune of 9, 21, 19 and 14 times in Kheda, Panchmahal, Vadodara and Bharuch districts, respectively, between 1961 and 1990 (Sheth, 1994). With improved water

management, the area having water-table level at 1.5 to 3.0 m is on decrease.

BIODIVERSITY

- No species will face threat of endangeredness after SSP-irrigation
- Present species will have better population.

EIA

- Environmental impact assessment has been carefully and extensively discussed on positive and negative lines. Our observations on this sensitive point are presented schematically, taking all the related information into consideration at a glance. These models have the bases of the past knowledge of similar situations, as that of the Mahi-Command, as well as the facts established by the modern science. While making our assessments we have also considered the drought conditions faced by the present command year after the year, the agricultural need of water, the plantations in forestry programmes, aquatic weeds, use of fertilizers, pesticides and the scope of using bio-control mechanisms against weeds and pests.

EIA

- Agro-patterns will be changed
- More use of NPK-fertilizers/pesticides is envisaged
- Agro-based industry will have new heights
- Socio-economic improvement is also envisaged
- Green cover will be improved
- Improvement in turn-over of $O_2/CO_2/N$ expected

(1) Biodiversity None of the present floral forms will face the situation of rarity or endangeredness after the SSP-water is availed by the command. On the contrary, we feel the diversity of natural flora has the scope of betterment in terms of number of species and/or the increased population of the existing species. This view has the backing of the fact that the sustainable environmental conditions will be brought about by the development of green cover which in its turn will be benefitted by the assured moisture round the year.

(2) Social Forestry : With the increase in sub-soil moisture and availability of water to waste lands, green cover of social forestry is likely to increase. Enhanced growth and development of flora will lead to improved bioenergy generation.

(3) Agricultural Pattern : Sugar cane, groundnut, other cash crops, chilli, banana etc. will replace/dominate some of the traditional crops. Due to the introduction of crops of varied sowing-calender, the harvesting pattern will shift from one or two-point to multi-point harvest.

(4) Dairy/Poultry/Agro-chemical Industries : With the increase in fodder and grain production, dairy and poultry industries will have a hike. Bio-fertilizer production, agro-chemical industries, production of bio-gas plants, food/fruit storage and processing industry etc. are likely to touch the new heights. Due to the overall increase in biomass including agro-produce, and agro-based industries, general socio-economic status of the people of command will improve. This will revert the trend of migration of people to cities in search of jobs.

(5) Environmental Status : Due to the increase in green cover O_2/CO_2 turn-over will be improved keeping the environment free of excess CO_2 ; improved C-fixation will result into more biomass production; litter-fall will be higher than that of the present day, which will improve the soil-quality. Local availability of fodder will decrease the migration of cattle from this command area to other places. Similarly, improved fodder-conditions in other command areas of SSP, will reduce the pressure of their cattle on this command. Moist condition would encourage the growth of blue-green algae which in turn will help more nitrogen-fixation.

(6) Water Logging : The loss of present vegetation due to water logging conditions is ruled out due to the careful and logical water-mangement as assured by the planners. A large number of birds are likely to be the residents near the new water bodies that are going to be created directly or indirectly by the SSP.

(7) Antagonism on Traditional Varieties Mesophytes/Xerophytes : Amidst many good points, loss of germplasm of local varieties of some crops is feared of. This is due to the employment of newer high-yielding varieties by the farmers. Similarly moist condition may affect some xerophytic and mesophytic forms up to a small extent.

(8) Agro-chemicals and Environment : Repeated cropping and use of high yielding varieties would naturally demand on higher doses of NPK fertilizers and pesticides. These will result into changed soil chemistry, and pollution of surface and underground water bodies. Pesticides will enter the food webs at various levels. Application of weedicides will remove some of the important and eco-friendly organisms also.

(9) **Health Hazards :** Due to the increased water-surface in the form of canals and ponds, some water-borne diseases are likely to pose some health problems to humans and cattle. The long-term use of pesticides for public health purposes would induce the resistance in pests against their killers. Not only that but eco-friendly insects, fish, pollinator birds and useful microflora may get reduced either in terms of number of taxa or population of individual taxa.

MANAGEMENT PLANS

EIA

- To avoid the forest, suggested to be cleared in forest forest
- Eco-friendly management of weeds suggested
- To maintain Bank and Erosion control and to be done over
- Farmers' training and extension programmes designed
- EIA plans to cost Rs. 35,45,04,745

We have made some suggestions, while discussing the negative and positive aspects, to mitigate or to develop them, respectively

- (1) Conservation of Genetic
- (2) Intensive irrigation and HYV-agricultural pattern pose a serious threat to the genetic pool of the hardened crop varieties, which withstood the concurrent dry conditions and

various diseases over many centuries. We suggest the establishment of Germplasm Bank, at a state level to conserve important traditional crop species, medicinal plants, economically important plant species, local breeds of milching animals, and insects.

(2) **Water Logging :** In spite of careful water management plans of the SSP-authorities, if water logging conditions develop at some points in future, plantation of water-pumping plant species like *Eucalyptus* is suggested. If the situation is of high degree logging, culturing of *Azolla* and like species may be introduced, so as to make the best possible use of the situation for the production of biofertilizers. In case of increased salinity, salt-tolerant plant species may be introduced in accordance to the level of salinity in soil.

(3) **Weed Management :** The use of biocontrol and Eco-friendly management techniques is recommended for weed management. Weeds can be managed either by introduction of species-specific herbivorous insects; or

their use as biofertilizers, animal feed, component of paper pulp, soil conditioner, and biogas source.

(4) **Green Cover Development** : The road-side and canal-bank plantation, tree-growing around the irrigated fields and social forestry programmes on waste lands are suggested to develop green cover of about 7,30,55,552 trees.

(5) **Multi-purpose Social Forestry** : Twenty-four tree species are suggested for their employment in the multipurpose social forestry programme, based on their 12- point merits.

(6) **Establishment of Biological Parks** : Three Biological Parks, one each at Rajkot, Vallabh Vidyanagar and Baroda, are suggested to be established for preserving plants/birds/insects prevalent in command.

(7) **Farmers' Training / Extension Work** : Farmers' training programmes are suggested for the purpose to awaken them towards the positive/negative aspects of irrigation projects, and make the best possible use of the situation in eco-friendly way. This includes the judicious use of water and agro-chemicals; agro-planning; participation in multipurpose social forestry programme, development of "Gram-Vatika" agro-based industries; environmental health; human-health problems etc. For this purpose the involvement of social organizations, service clubs, NGOs, local youth clubs and local societies is suggested.

(8) **Total Management Cost** : The following is the estimate of the total management cost envisaged.

Purpose		Non-recurring Cost (Rs.)	Recurring Cost (Rs.)
1	Germ-plasm Bank	45,50,000	4,00,000
2	Farmers' Training	4,30,000	5,80,000
3	Tree-growing programme	-	30,63,76,745
4	Biological Parks	1,23,00,000	46,68,000
5	Other Costs	-	56,00,000
Total		1,72,80,000	31,76,24,745
Total of non-recurring and recurring (First Year)			Rs. 33,49,04,745

(add 15% to recurrent costs in each subsequent year).

BETWEEN NARMADA AND SABARMATI

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ANNEX-XXVII.(4).

Executive Summary of Final Report: EIA studies on Inland and Marine Fisheries Relevant to the Command area of Sardar Sarovar (Narmada) Project.

EXECUTIVE SUMMARY

The Sardar Sarovar Project (SSP) on Narmada river has been developed with multidimensional potentials of growth. The water of Narmada river will be brought within the limits of Bhavnagr, Rajkot and Kachchh districts. The command area covers fully or partially 12 districts, 62 talukas and 3,344 villages of Gujarat (Summary Table 1). In Vadodara, Ahmedabad and Surendranagar districts the beneficiary villages are more than 50% of total villages. In all there are 28 talukas falling in the command area which have more than 70% beneficiary villages. It is expected that availability of water for irrigation in the command area will increase the potentials of fisheries sector development.

The command area has widely variable agroclimatic conditions and for the purpose of studies, planning and implementation, it has been divided into 13 regions. As environmental impacts of SSP would also vary according to the agroclimatic conditions, the analyses have been carried out on such regional basis :

The major objectives of present studies were :

- i) to evaluate likely impacts of SSP on existing and proposed potentials of fisheries development.
- ii) to suggest mitigatory measures, frame management and action plans for implementation of recommendations.

The statistical data on growth and performance of fishery activities was obtained from the Commissionerate of Fisheries, Government of Gujarat to evaluate the current status of fisheries sector in Gujarat.

The waterbodies throughout the command area were surveyed during pre-monsoon, monsoon and post-monsoon seasons and a data bank on water and soil qualities and plankton diversity was prepared. Almost all the parameters assessed were within the normal ranges during various seasons in different regions :

Parameter	Range
pH	7.0 to 9.5
Turbidity (NTU)	0 to 100
Total dissolved solids (ppt)	0 to 1.5
Dissolved oxygen (mg/l)	4 to 12
Free CO ₂	0 to 20
Total alkalinity (mg/l)	100 to 300
Organic matter (%)	0 to 30
Phosphate (mg/l)	0 to 50
Chloride (mg/l)	30 to 260
Total hardness (mg/l)	75 to 225

The important observations relevant to fisheries are :

- i) carbon dioxide contents were higher during post-monsoon season in all the talukas of regions 1 and 2, and in Amod and Wagra talukas of regions 3 and 4, respectively,
- ii) chloride content was much higher in Padra, Thasra, Viramgam and Vallabhipur talukas of regions 2,5,6 and 8, respectively,
- iii) total dissolved solids were high in several parts of command area,
- iv) salinity values were higher in Sanand, Lakhter, Dhrangadhra, Vav and Santalpur talukas,
- v) in general, TDS, conductivity and salinity increased from the point of main canal towards Khar lands in region 4 and towards Little Rann of Kachchh in regions 9,10,11 and 12,
- vi) soil pH was usually alkaline for all the 13 regions,
- vii) the contents of nitrate nitrogen in soil were less in Vav and Santalpur talukas,
- viii) much variations were not observed in soils of different regions collected during different seasons,
- ix) among the zooplankton, cumulative density of arthropods and rotifers was 50% or more throughout the year,
- x) in the samples of marine water, highest density of Calanum species was noted from both the gulfs.

Conclusions :

- i) the quality of aquatic bodies is good throughout the command area,
- ii) the positive impacts, after SSP, will improve the water quality,
- iii) the aquatic bodies will be able to tolerate moderate negative impacts, if any, after SSP,
- iv) in general, present conditions are suitable for aquaculture in most part of command area.

IMPACTS ON FISHERIES AND MITIGATORY ASPECTS

General Positive Impacts

- i) qualitative improvement of waterbodies,
- ii) conversion of pond status towards long seasonal or perennial ones,
- iii) coverage of more number and area of village ponds, irrigation tanks, waste lands etc. for aquaculture,
- iv) abstraction of groundwater will make spare water available for aquaculture use, particularly in regions 7,8,10,11 and 12,
- v) increase in fishery associated activities and development of ancillary industries,
- vi) increase in scope of employment,
- vii) economic advancement of village.

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General Negative Impacts

- i) the main environmental impacts of SSP include salinity and waterlogging problems. Salinity ingress, 20 years or more after SSP becomes operative, will be seen in regions 7,8,10,11 and 12. The problem of waterlogging will be localized and probable waterlogging average for the command area has been estimated around 5-7%. However, waterlogging and soil salinization under well managed conditions can be converted into positive impacts relevant to fisheries,
- ii) likely flow of nitrogen and phosphate from culturable fields into freshwater bodies may change the trophic status,
- iii) likely flow of pesticides and agrochemicals may change qualitative status of freshwater bodies.

Measures to Mitigate Negative Impacts of SSP

Various studies conducted by NPG suggested two important measures to mitigate negative impacts :

- i) over 5800 tubewells and 13000 openwells to pump out 2.71 MAF of groundwater for conjunctive use,
- ii) more than 2700 tubewells to pump out about 0.67 MAF of unsuitable quality groundwater.

These extracted groundwater can be profitably used for fisheries development.

POTENTIALS OF FISHERIES DEVELOPMENT

A large water spread will be available in the command area following SSP development. Department of Fisheries, Government of Gujarat has estimated aquaculture development potentials. A total of 17000 ha area will be available and the fish yield is expected to be 64400 tonnes/yr of Rs. 209.7 crores (Summary Table 2).

During the course of the study 510 ponds were surveyed by research team of which 337 ponds (70 %) were either long seasonal or perennial ones, 354 ponds (69 %) had good water quality but fish culture was being practiced in only 133 ponds (22 %). Presently 186 ponds (36 %) have potentials for aquaculture and other 211 ponds (42 %) can be developed for aquaculture after SSP implementation.

RECOMMENDATION FOR DEVELOPMENT

Management of Negative Impacts on Fisheries

- i) selection of crops in regions 4,7,8,9,10,11, and 12,
- ii) restrict the use of agrochemicals including hazardous pesticides,
- iii) regularly monitor air and water qualities to identify polluted sites.
- iv) develop aquaculture farms in the susceptible areas of regions 7,9,10,11 and 12 and use abstracted saline groundwater.

Regions	No.of ponds surveyed	Ongoing aquaculture	Present potential	Proposed potential
1	70	15	20	35
2	60	25	13	22
3	50	13	24	13
4	30	08	14	08
5	25	10	08	07
6	20	06	06	08
7	30	04	06	20
8	20	02	08	10
9	25	07	10	08
10	20	04	10	06
11	60	08	25	27
12	50	06	20	24
13	50	05	22	23

(For details see Table 5.7)

Management of Positive Impacts on Fisheries

- i) Initiate aquaculture in all the ponds in different regions having present potentials for culture practice.
- ii) develop the village ponds/waste lands used as borrow areas for making ponds suitable for aquaculture in regions 1-4.
- iii) take proper measures while borrowing earth for canal preparation in regions 5-13.
- iv) lots of waste lands are available in regions 7,8,9,10,11 and 12 where ponds should be excavated and used for aquaculture practice.
- v) measures should be taken to control riverine pollution and losses in riverine fishery should be compensated by pond culture fishery in regions 5 and 6.
- vi) in region 13, check-dams should be used for short duration aquaculture.
- vii) highlight the benefits of aquaculture practice through special socio-economic development programmes, particularly in regions 8,11 and 12.
- viii) strengthen the already available fish seed farms and develop new farms in regions 2,8 and 12.
- ix) more numbers of fishery ancillary industries should be established particularly in regions 8,10,11,12 and 13 as these regions are agriculturally less productive and industrially less developed.

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- x) develop brackishwater farms in the neck region of Little Rann of Kachchh,
- xi) over exploitation of marine fishery should be controlled and compensated by freshwater prawn culture in the area at the periphery of Little Rann of Kachchh,
- xii) establish Regional Fishery Laboratory at Vadodara for regions 1-5, at Surendranagar for regions 6-9 and at Radhanpur for regions 10-13.

Our drive to compile all aspects of fisheries related activities in the command area was not successful as they were not made available by all the talukas to the research team. Hence, implementing agencies should collect the following information :

- i) a taluka-wise list of existing total number of perennial, long seasonal and seasonal ponds, their maximum and minimum water spread areas and depth of water column,
- ii) a taluka-wise list of the number of ponds with reference to salinity influence, domestic pollution influence, weed infestation, renovation requirements etc.
- iii) estimated present contribution of riverine and marine fisheries and that of pond aquaculture in respective areas.

Summary Table 1

List of districts and number of talukas and villages to be benefited by the supply of Narmada canal water in command area.

District	Beneficiary talukas	Total villages	Beneficiary villages	Percentage (for villages)
Bharuch	5	1193	331	27
Vadodara	11	1655	948	57
Panchmahal	4	1909	30	1.6
Kheda	5	968	269	28
Gandhinagar	1	75	34	45
Ahmedabad	7	669	493	73
Mehsana	6	1099	312	28
Banaskantha	6	1375	392	28
Surendranagar	6	651	352	54
Bhavnagar	5	876	106	12
Rajkot	2	856	53	6.2
Kachchh	4	948	73	7.7

(For details see Table 1.1)

Summary Table 2

Details of fisheries development in SSP command area.

Culture	Area (ha)	Expected yield (t)	Development cost (Rs.in crores)	Total value of yield(Rs. in crores)
Reservoir	2000	3000	2	6
Village ponds	8000	20000	15	42
Construction pits	500	1250	0.75	2.5
Water-logged areas	6000	39900	17.90	153.2
Estuarine area	500	250	0.50	6
Total	17000	64400	36.15	209.7

(For details see Table 5. 22)

ANNEX-XXVII.(5).

4TH SIX MONTHLY PROGRESS REPORT ON EPIDEMIOLOGICAL &
SURVEILLANCE STUDY OF NSP AREAS,
RECOMMENDATIONS

At the end of the fourth phase of the study recommendation already made in the earlier phases still hold good viz.

- (1) Protection of health of workers engaged in construction work by appropriate immunoprophylaxis and chemoprophylaxis and making health services available at camp site.
- (2) For effective vector control in the area integrated vector control measures should be adopted simultaneously. A detailed entomological study to identify different species of arthropods should be carried out in the area.
- (3) Primary health care services should be effectively strengthened in post impoundment area so that health care services are available to them near their habitat.
- (4) To improve the physical quality of life in Narmada Valley area, measures for improving literacy status particularly female literacy should be undertaken. This will increase utilisation of available health services and improve nutritional status of children.
- (5) Epidemiological units should be established in post impoundment area as per the norms of N.I.C.D.. These units will keep watch on morbidity pattern in the area they will forecast morbidity trends in the area and identify possible risk factors. Thus helping in prevention and control of diseases in post impoundment area.

Environmental Impact Study on water related diseases in
SSP command area, Gujarat.

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EXECUTIVE SUMMARY

The Narmada Planning Group (NPG) of Sardar Sarovar Narmada Nigam Limited (SSNNL) entrusted the Commissionerate of Health, Medical Services and Medical Education (Health Section) (CHMS) Gandhinagar to conduct Environmental Impact Assessment (EIA) study on Water Related Diseases (WRD) in Sardar Sarovar Project (SSP) Command area .

The Preliminary report (Vol.I) based on morbidity and mortality data available at CHMS was submitted to NPG in March, 1993.

Institutional Data covering 21 institutions in Narmada Command Area (NCA) and 4 institutions in Mahi project Area (Kheda- 2) and about 3 lakhs OPD cases were analysed for 7 years, 1986-92. The OPD cases were classified into Water Related and other diseases. The WRD were further classified into four main groups viz; (i) Water Borne Diseases (ii) Vector Borne Diseases (iii) Water Washed Diseases and (iv) Water Based Diseases. Each of these groups of Water Related Diseases were further sub-divided into different diseases. Thus Water Related Diseases were classified into four main groups and 17 diseases.

The findings of the preliminary study as well as the study conducted based on institutional data indicates that malaria is prevalent in almost all parts of Gujarat, with much wider variations depending upon several factors viz; climatological like rainfall, temperature, humidity, availability of mosquito breeding places and parasitic load in the community. The analysis of OPD cases of selected PHCs/CHCs for 7 years for 1986-1992 also reported malaria cases with large variation in all the districts during all the years with very few exceptions.

It is quite interesting to observe that out of the four groups of Water Related Diseases only Vector Borne Disease particularly malaria has shown variation in the proportion of cases by year for the period under study and preliminary study also indicates that the year reporting maximum rain fall has reported higher number of malaria cases as compared to years with less rainfall. Both the studies also indicated that vector Borne Disease and particularly malaria is likely to be aggravated in epidemic form during the year of heavy rainfall and the following years. Thus transmission of Vector Borne Disease particularly Malaria is directly related to water accumulation from any source which facilitates breeding of different vector mosquitoes. In NCA when irrigation water starts flowing, mosquitogenic condition and breeding places may increase in large numbers and this will help perennial transmission of Vector Borne Disease like malaria which may further worsen the situation during period of heavy rainfall.

Filaria is not a threat to the Narmada Command Area as per the available data. But area having filaria is nearer to the command area. Hence constant vigil is required for effective surveillance and containment measures ensuring early detection and to curb the potential hazards of Vector breeding.

(vii)

Water Borne Diseases, like Gastro-enteritis, Cholera, Typhoid, Infective Hepatitis, are also prevalent in all the districts with wider fluctuations. These diseases are caused by poor personal hygiene, contaminated water, food etc, which can be taken care of by all due precautions to prevent contamination of water sources and to increase awareness about personal hygiene in the community. In addition to this regular chlorination of drinking water sources is to be ensured.

Skin diseases like scabies are also prevalent in all the 12 districts. But incidence of skin diseases and scabies may go down when SSP becomes operational due to adequate water supply for bathing and washing purposes.

Other water Related, but Vector Borne diseases viz; Japanese Encephelitis, Dengue Fever were not reported in the command area but with the increase in vector breeding habitats, when water starts flowing, we cannot rule out the occurrence of any vector Borne Disease. This can also be tackled under common Vector Control measures as in case of Malaria and Filaria.

The study reveals that Water Related Diseases constitute 20% of the total OPD cases and there is not much variation observed during the year under study. Out of 17 diseases classified as WRD only 4 diseases viz; Diarrhoea, Dysentery, Malaria and Skin diseases contribute to WRD. Out of these 4 diseases maximum contribution is by skin diseases (32.8%), and Diarrhoea (26.4%) which contributes almost 60% of WRD.

The drought prone areas covering districts of Surendranagar, Banaskantha, Mehsana, Ahmedabad and Kutch have reported significantly higher percentage of WRD as compared to other districts.

Seasonal variation exists in WRD. The proportion of WRD are significantly high, (more than one and half times as compared to pre-monsoon) during 3rd quarter i.e. monsoon period. Further comparison between NCA and Kheda-2 indicates that the proportion of WRD cases in Kheda-2 is significantly higher than NCA for the 2nd Quarter (pre-monsoon period) and 3rd Quarter (Monsoon period). This shows that gravity of WRD in Kheda-2 area is higher during pre-monsoon period while in NCA the gravity is not very high. However, when irrigation water starts flowing in NCA there is quite likelihood of increase in WRD even during pre-monsoon period. Thus utmost vigil should be kept during monsoon as well as post-monsoon period i.e. July-December, to minimise WRD and necessary preventive measures should be initiated from pre-monsoon period itself.

The analysis of OPD cases reveal that morbidity due to WRD cases is double amongst children with age group 0-4 as compared to age group 15 and above, while morbidity in the age group 5-14 is one and a half times more than the age group of 15 and above.

A comparison of data between Narmada Command area and Mahi project Area (Kheda-2) indicates that there is not much variation in the reporting of WRD cases in both the areas. Further there is no significant difference observed under various disease groups except Vector Borne Diseases during the period under study. Thus one may not be very apprehensive regarding increase in WRD due to irrigation alone, if adequate measures for controlling different

WRD are taken. However necessary measures for prevention of vector Borne Diseases particularly Malaria should be given highest priority in NCA and action plan should be formulated to control incidence of Malaria in NCA and all possible steps should be undertaken regularly.

Analysis of the Institutional Data for Kheda-1 and Kheda-2 has not shown variation in the reporting of Water Borne, Water Based and Water Washed Diseases. This indicates that even availability of abundant water has not shown decline in the reporting of Water Washed Disease, which may be due to lack of health education and personal hygiene. Thus a strong health education component will be necessary to built up with the help of NGO's in the NCA area, otherwise we will not be able to take advantage of availability of abundant water in the NCA area.

A detailed action plan for taking adequate measures at various levels is suggested as under:

(ix)

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केवल सरकारी प्रयोग के लिए
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नर्मदा नियंत्रण प्राधिकरण NARMADA CONTROL AUTHORITY

पर्यावरण उपदल
Environment Sub-Group

सत्ताइसवीं बैठक की कार्यवृत्त
Minutes of the Twenty Seventh Meeting

18 दिसम्बर, 1995

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पर्यावरण भवन नई दिल्ली में हुई

Held at

Paryavaran Bhawan

New Delhi

on

18th December, 1995

इन्दौर

जनवरी, 1996

INDORE

January, 1996

MINUTES OF 27TH MEETING OF THE ENVIRONMENT SUB-GROUP NCA
HELD ON 18TH DECEMBER, 1995 AT PARYAVARAN BHAWAN, NEW DELHI.

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MINUTES OF 27TH MEETING OF ENVIRONMENT SUB-GROUP HELD ON
18TH DECEMBER, 1995 AT PARYAVARAN BHAWAN, NEW DELHI.

The Member (Secretary), of the sub-group welcomed the participants to the 26th meeting. The list of participants is at Annex-XXVII.Min(1).

Agenda items were taken up for discussion thereafter.

Item No.XXVII-1(130): CONFIRMATION OF MINUTES OF THE 26TH MEETING.

Comments received from Member (E&F), NVDA vide letter No.NVDA/E&F/TECH./95/1992 dated 15.12.95 placed at **Annex XXVII-Min.(2)** were discussed & following amendments were made:

On page 5 under item No.3: 2nd para:Second sentence, was reworded as follows. " Vice Chairman NVDA expressed concern for shortage of funds for treatment of critically degraded sub-watersheds of freely draining catchment. No commitment to allow the raising of the Sardar Sarovar Dam upto 110 mt was made ."

Minutes were confirmed with the above amendment.

The issues brought out by Dr. Shekhar Singh, in his letter of December 15, 1995 addressed to the Chairman were discussed by the sub-group. One of the issue dealt with the manner of recording the minutes of the meeting. Sub-group was of the view that discussions which lead to some decision, can be recorded. Another issue raised by Dr. Shekhar Singh was that the construction schedule of the SSP should be approved by SSCAC only after taking the approval of NCA Environment Sub-group with regard to compliance with pari-passu requirement. Secretary, SSCAC clarified that raising of pondage was decided after considering recommendations and giving weightage to the direction of the sub-group.

Leave of absence was granted to Dr. Shekhar Singh.

Item No.XXVII-2(131): REVIEW OF ACTION TAKEN ON THE DECISIONS OF THE PREVIOUS MEETINGS.

1. Submission of Catchment Area Treatment (CAT plans for freely draining critically degraded sub-watersheds (Item No.XXII-2(112)(1)).
- a) SUBMISSION OF CAT PLAN FOR FREELY DRAINING CRITICALLY DEGRADED SUB-WATERSHEDS.

According to the information submitted by the NVDA it was proposed to treat 18000 ha area during 1995-96 for the NSP and an area of 23750 ha during 1997-98 for the SSP. Funds for treating 6117 ha of SSPcatchment have already been received under RVP scheme of GOI. The work had already commenced. More schemes seeking funds under RVP and NAEB have been submitted by the NVDA.

Regarding provision of funds for treatment of directly draining critically degraded sub-watersheds over and above the state plan ceiling NVDA requested that this may be taken up with the Planning Commission for issuing suitable directives to the State Govts. at the GOI level.

b) SILT MONITERING POSTS.

NVDA informed that as very large area was to be monitered , whole planning for monitering sediment outflow require more time.

2. Cost Estimates for preparation of Action plan and implementation of environmental safeguard measures [Item No.XXII-2(112)(2)].

The information as broughtout during the meeting is presented in **Annex-XXVII-Min.(3)**.

Regarding cost estimates of command area development work Executive Member, NPG recalled that the basic purpose of this exercise was two fold, first to determine the environmental cost of Sardar Sarovar Project and second to act as some reference to be used in other irrigation projects in future. He further informed that if we were to take into consideration the finances generated from the sources other than those to be shared by the states like CDA grants, the expenditure would be much higher than was being reflected. He agreed to give details of the expenditure incurred on survey /work undertaken so far and stressed that

the realistic cost estimates for implementation of environmental improvement programmes may be available within a years time when most of the studies would be completed and plans formulated.

3. Environmental Impact of Closure of Construction Sluices.

Since the report of the Fact Finding Team was discussed in the previous meeting, it was agreed that this item be deleted.

Presentation from the state govts was deferred.

Item No.XXVII-3(132): PRESENT STATUS OF STUDIES SURVEYS AND ENVIRONMENTAL ACTION PLANS.

1) PHASED CATCHMENT AREA TREATMENT

Narmada Sagar Project

Government of Madhya Pradesh

The information presented in the agenda was noted. Blockwise detailed note on the survival rate of plantation submitted by NVDA is enclosed at Annex-XXVII.Min(4).

Sardar Sarovar Project

Govt. of Madhya Pradesh

According to the information submitted by NVDA out of 125725 ha area, an area of 32857 ha had been treated by November '95. Vice Chairman, NVDA drew the attention of the members to the obstruction caused by NBA activists in smooth implementation of the works. Member (E&R) requested him for a detailed information on the issue and the measures proposed to be adopted for tackling the situation.

Govt. of Gujarat

Member (E&R), NCA requested Govt. of Gujarat to supply information on the findings of silt monitoring exercises. EM, NPG agreed to make a presentation during the next meeting.

Govt. of Maharashtra

Information presented in the agenda papers was noted by the members. However, detailed information on non forest area was awaited. Chairman was of the view that like in case of Gujarat and M.P., in Maharashtra also there should be a seperate authority for SSP who could be contacted for all the information. It was agreed by the Chairman to takeup the issue with the Govt. of Maharashtra.

ii) COMPENSATORY AFFORESTATION

Narmada Sagar Project

Govt. of Madhya Pradesh

Information presented in the agenda papers was noted by the members.

Sardar Sarovar Project**Govt. of Madhya Pradesh**

Information presented was noted by the members. Vice Chairman, NVDA, however, expressed difficulty in completing the balance work due to hurdles created by NBA activists. He further clarified that the area required to be afforested was very small and was being tackled.

Govt. of Gujarat

It was felt that since excellent plantations have been raised in Gujarat now it was our opportune time for the GOG to come out with some scientific observations concerning the improvement of the area, enrichment of biodiversity, improvement of soil humus and overall ecological restoration of the area. Such observations could be used to counteract the adverse propoganda being done by some groups.

Govt. of Maharashtra

Information presented was noted by the members. Chairman, Env-subgroup of NCA suggested that the plantation activities in Maharashtra may be given publicity on Doordarshan etc. highlighting the gains and benefits of catchment area & compensatory afforestation works.

iii) COMMAND AREA DEVELOPMENT**Narmada Sagar Project**

Outlines of technical terms of reference for preparation of integrated command area development plan submitted by NVDA is placed at **Annex-XXVII.Min.(5)** for consideration of the sub-group.

Regarding study on effect of pesticides, insecticide etc. in the command area of Narmada Sagar Complex Project, allocation of Rs.24.5 lakhs had been made by NVDA recently. The study is to commence shortly.

Sardar Sarovar Project**Govt. of Gujarat**

Executive Member, NPG informed that for Nal Sarovar Bird Sanctuary only interim report was available and as soon the final report was available, the same would be sent to MOEF. He also agreed to send three copies of the reports to NCA.

EM, NPG recalled his meeting with Dr. Abrol and colleagues. Giving details of his meeting he referred to the discrepancies in area details of the Agricultural Department

with the details contained in the map being published by the planning commission. According to him these were to be reconciled before these could be used. It was suggested that he might get in touch with DDG(ICAR), nominated for the subgroup and expedite all related issue referred to in the agenda papers.

Govt. of Rajasthan

No representative of Govt. of Rajasthan was present during the meeting.

iv) SURVEY OF FLORA, FAUNA & CARRYING CAPACITY STUDIES

Narmada Sagar Project

Govt. of Madhya Pradesh

Subgroup was informed that the proposal for creation of special protected areas was under consideration of the Govt. of Madhya Pradesh. Vice Chairman, NVDA, informed that activists of NBA have raised these issues in their meeting with the Hon'ble Chief Minister & finalisation of the issue may take a little more time.

Sardar Sarovar Project

Govt. of Madhya Pradesh

Member (E&F), NVDA informed that State Forest Research Institute was being pursued for preparation of action plan.

Govt. of Gujarat

Executive Member, NPG informed that as part of the flora & fauna studies action plan for Shoolpaneshwar sanctuary development had been prepared, a meeting to discuss the plan was recently held. However for other areas of the study M.S. University was being pursued for preparation of the action plan.

Executive Summary of the reports submitted by M.S. University was awaited. Time frame for finalisation of the action plan was also awaited.

Govt. of Maharashtra

Director (Env.) Govt. of Maharashtra informed that printing of the final report was being delayed due to procedural aspects. Chairman suggested that since the printing of final report was taking too long, Govt. of Maharashtra might consider to get it printed. It was also suggested that a meeting should be arranged by GOM in consultation with Member (E&R) of NCA before the report is finalised.

v) **ARCHAEOLOGICAL & ANTHROPOLOGICAL SURVEY****ARCHAEOLOGY****Narmada Sagar Project****Govt. of Madhya Pradesh**

Member (E&R), NCA brought to the notice of the members the interim report regarding some important historical mounds to be submerged by SSP prepared by the Nagpur branch of Archaeological Survey of India. This interim report of ASI has been filed with the Supreme Court by the NBA. He drew the attention of the members towards some adverse remarks of this report about the work done by the State department of Archaeology and Museum, GOMP.

At the outset GOMP officials denied having received any such report from the ASI. No such report has also been received by the NCA office at Indore. Chairman of the Sub-group suggested that a copy of this report should be obtained officially by GOMP as well as NCA from the ASI for further action. Vice Chairman, NVDA agreed to hold a meeting between the officials of ASI and the state department of archaeology to remove some communication gap. He also agreed to inform the Supreme Court about the factual position through their state government counsel when the case comes up for hearing in the last week of January, 1996.

Regarding the information on the status of Joga Fort in relation to the submergence to be caused by back water effect as desired by Prof. S.Ramasheshan during 26th sub-group meeting, NVDA informed that the Suprintending Archaeologist, Archaeological Survey of India, Bhopal had been requested to study this aspect and to report the results at the earliest.

Sub-group was further informed that action to prepare the booklet on the good works being done on the archaeological aspect had already been initiated by the Director, Archaeology and Museums, as well as Superintending Archaeologist, ASI, GOI Bhopal. It shall be made available shortly.

Sardar Sarovar Project**Govt. of Madhya Pradesh**

Sub-group was informed that NVDA had engaged two agencies namely department of Archaeology & Museum, M.P., & Superintending Archaeologist, Archaeological Survey of India, Bhopal for undertaking works regarding the safety of archaeological monument of importance to be submerged by SSP.

It was informed that work was also being done by some other agencies independantly. They are Rashtriya Manav Sanghralaya, Archaeological Survey of India and Deccan College, Poona.

Govt. of Gujarat

Sub-group was informed that the development works for Shoolpaneshwar temple have been completed. A copy of the action plan for development of the Hamfeshwar temple submitted during the meeting is placed as Annex-XXVII-Min-(6).

Govt. of Maharashtra

No works were required to be done in Maharashtra in this regard.

ANTHROPOLOGY

Sardar Sarovar & Narmada Sagar Projects

Govt. of Madhya Pradesh

Agenda item at para 1 was dropped.

NVDA informed that efforts were being made to procure the balance relevant volumes of the publication of An.S.I. Subgroup was also informed that volumes procured already were being studied for how best the facts and figures contained therein could be used in resettlement and rehabilitation of the tribal PAFs.

vi) SEISMICITY AND RIM STABILITY OF RESERVOIR

Narmada Sagar Project

Govt. of Madhya Pradesh

Sub-group was informed that the issue of procurement of the remaining seismic instruments (to be imported) was under consideration of the Narmada Control Authority.

As regards construction of observatories for collection of seismic data at 11 stations in the Catchment Area it was informed that the programme was completed by June, 1996

Sardar Sarovar Project

NVDA informed that CWPRS, Pune had submitted two reports No.3229 and 3234 so far, and these reports had already been made available to NCA. Vice Chairman, NVDA requested that these reports may be photo copied and sent to Prof. Ramashesan by NCA as requested by him.

vi) HEALTH ASPECTS

Narmada Sagar Project & Sardar Sarovar Project**Govt. of Madhya Pradesh**

Sub-group was informed that the Gandhi Medical College, Bhopal had been requested to conduct the studies in SSP areas also. The report was expected shortly.

A tentative breakup of the cost estimates was also given. This included a provision for Rs.525 lakhs for SSP, Rs.178 lakhs for NSP.

Dy. Director General, ICMR, while reviewing the reports of Gandhi Medical College, Bhopal, sent to DG, ICMR observed that the Govt. Health Services might not be preferred by the people of the post impoundment studies areas. It is possible that some private practitioner may be operating in the areas and this aspects has to be considered while making surveillance studies. She also stated that the level of the services offered in the post impoundment areas might be inadequate and state Govt. could look into that.

NVDA was requested to communicate the above views for consideration of the study group.

Govt. of Gujarat

After reviewing the action plan submitted by GOG, DDG, (ICMR) bserved that the high prevailence of Maleria was also observed in Indira Gandhi canal areas. Epidemic of Malaria was feared in the places where immunity is not build up in the population. Therefore inputs to avoid stagnation of water & prevention of disease have to be in place in time.

Govt. of Gujarat was requested to consider this point while finalising the action plan.

Govt. of Maharashtra

Govt. of Maharashtra informed that the infrastructure which was already recommended by the Committee for the areas of study in the villages had been completed by Govt. of Maharashtra on 15.11.95 except the construction of Mobile Public Health Laboratory. This was under the consideration of the Govt.

In addition to this, 24 temporary Medical Officers and 472 Volunteers were also working in this area. The plan which was approved would be made functional by the end of Feb. 1996. As per the instruction given the approved plan would be presented in the Committee meeting to be held on 18th Dec.1995.

Govt. of Maharashtra also submitted statements 1 to 4 placed at **Annex-XXVII-Min.(7)** showing the existing infrastructure in Akrani & Akkalkua Taluka alongwith progress of health infrastructure & studies on health.

viii) FISHERIES DEVELOPMENT OF SSP AND NSP RESERVOIR

Sub-group was informed that the third meeting of the High Level Expert Group was being arranged shortly.

NVDA informed that the plan on fisheries development & conservation was being put up to NVDA & it would be sent to NCA after it was approved by the NVDA.

Item No.XXVII-4(133): MONITERING OF R&R ASPECT OF NARMADA
SAGAR PROJECT (NSP).

NVDA submitted the progress on the construction of Dam placed at **Annex-XXVII-Min.(8)** and informed the sub-group that the anticipated flood level as a result of dam construction upto June '96 was R.L. 225 M. Felling of trees on the forest land in about 100 ha had already been carried out. As regards the GOMP's objection regarding monitoring of R&R works by the NCA, the MOEF was yet to take a view.

ANNEXURES

ANNEX.XXVII.Min-(1).

**LIST OF PARTICIPANTS OF THE 27TH MEETING OF ENVIRONMENT
SUB-GROUP HELD ON 18TH DECEMBER, 1995 AT NEW DELHI.**

GOVERNMENT OF INDIA

Ministry of Environment & Forests:

1. Shri N.R. Krishnan, Secretary, Ministry of Environment & Forests, New Delhi. - CHAIRMAN
2. Dr.(Mrs.) Nalini Bhatt, J.D., MOEF, New Delhi.
3. Shri R.K. Singh, DCF (C), Regional Office, MOEF, Bhopal.
4. Dr. S.C. Verma, J.D., MOEF, New Delhi.

Narmada Control Authority

1. Dr. A.K. Malhotra, Member (E&R), NCA and Member Secretary of the Sub-group.
2. Dr. Pawan Kumar, Specialist (Env.), NCA.

Sardar Sarovar Construction Advisory Committee

1. Shri R.S. Prasad, Secretary, SSCAC, Vadodara.
2. Shri V.K. Nagpure, Asstt. Secretary, SSCAC, Vadodara.

Ministry of Water Resources

1. Shri R.S. Pathak, Joint Comm. MOWR, New Delhi.

ICMR, New Delhi

1. Dr. Bela Shah, DDG, ICMR, New Delhi.

Wildlife Institute of India.

1. Dr. Asha Rajvanshi, WLI, Dehradun.

GOVERNMENT OF MAHARASHTRA

1. Shri R. Tiwari, Secretary, PHD, Mumbai.
2. J.P. Dange, Commissioner (F), GOM, Mumbai.
3. Shri P.M. Bayas, Director (Env.), GOM, Mumbai.
4. Dr. N.S. Wanere, Jt. DHS, GOM, Mumbai.
5. Shri M.K. Jiwrajika, O.S.D. (Projects), GOM.

GOVERNMENT OF GUJARAT

1. Shri Arjun Singh, Secretary (R&R), SSNNL, GOG,
2. Shri Mahesh Pathak, Executive Member, NPG., GOG.

GOVERNMENT OF MADHYA PRADESH

1. Shri Naresh Narad, Principal Secretary, NVDD & V.C. NVDA, Bhopal.
2. Shri Suresh Chandra, Member (E&F), NVDA, Bhopal
3. Shri R.K. Bahere, Specialist (Hyd. & Sedi.), NVDA, Bhopal.
4. Shri J.P. Jain, Project Officer, Archaeology & Museum, Bhopal.

NON OFFICIAL MEMBERS

1. Dr. R.K. Katti, Prof., UNEECs, Bombay.
2. Dr. S. Ramasheshan, Prof., IIT, Kanpur.

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ANNEX-XXVII.Min.(2).

NARMADA VALLEY DEVELOPMENT AUTHORITY

[ENVIRONMENT & FOREST CELL]

NARMADA BHAWAN:TULSINAGAR:BHOPAL-462003.

....

No.NVDA/E&F/TECH./95/1992

Date:15.12.95

To,

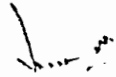
Dr. A.K.Malhotra,
Member (Env.& Rehabilitation),
Narmada Control Authority,
113,BG,Scheme No.,74-C,Vijay Nagar,
Indore-452001.

Sub: Minutes of 26th Meeting of Environmental Sub-Group
of NCA.

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As regards the statement of Vice Chairman NVDA expressed during the 26th Sub-Group meeting and recorded in the minutes under Item No.3 (Page-5) last para, it is to make clear that we agreed to prepare separate schemes for the treatment of critically degraded sub-watersheds of freely draining catchment area, not for directly draining sub-watersheds for which plan exists though it follows the revised schedule as communicated to the Fact Finding Team. We have not made any commitment to allow the raising of the Sardar Sarovar dam upto 110 meter.

It is also clarified that the issue of providing the budget as an additionality over and above the limits of the State Plan, would be taken up at GOI level with the Planning Commission for obtaining the suitable directions in this regards.


MEMBER (ENVT.& FORESTS)
NVDA,BHOPAL-(M.P.)

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ANNEX-XXVII-(Min.3).

ENVIRONMENTAL COST OF SSPRELATED TO UNIT I & II DAM & POWER HOUSE :A) Expenditure by project authorities:i) Cost of Survey & Studies (in lacs.)

S.No.	Component	<u>Estimate/Actual Expenditure</u>				Total
		GOG	GOM	GOMP	NCA/GOR	
1.	Compensatory Afforestation	<u>4.52</u> 4.52	<u>5.29</u> 5.29	<u>2.4375</u> 2.4375	-	<u>12.2475</u> 12.2475
2.	Catchment Area Treatment.	<u>8.77</u> 8.77	<u>7.00</u> 7.00	<u>3.28</u> 2.80	-	<u>19.05</u> 18.57
3.	Flora & Fauna	<u>52.2</u> 38.3	<u>38</u> 16	<u>20.334</u> 17.834	<u>15.27</u> 15.27	<u>127.804</u> 87.204
4.	Health	<u>2.5</u> 2.5	<u>10</u> 2.5	<u>29.627</u> 26.000	-	<u>42.127</u> 31.0
5.	Archaeology/Anthropology.	<u>1.3</u> 0.40	NA	<u>59</u> 36.33	-	<u>60.3</u> 36.73
6.	Seismicity & Rim Stability.	-	NA	<u>23.00</u> 12.50	<u>1.98</u> 1.98	<u>24.98</u> 14.53
7.	Command Area Development	N.A.	-	-	N.A.	-
Total - (i)						<u>286.5085</u> 200.2815

ii) Cost of Implementation (in lacs)

1.	Compensatory Afforestation.	<u>1809.10</u> 1298.48	<u>2116</u> 1650.27	<u>1800.000</u> 794.13	-	<u>5725.1</u> 3460.78
2.	Catchment Area Treatment.	<u>3509</u> 1826.48	<u>2894.67</u> 445.657	<u>8835.05</u> 1861.91	-	<u>15238.72</u> 478.44
3.	Flora & Fauna including Shoolpaneshwar	<u>75.31</u> 64.42	NA	<u>NA</u> Nil	-	<u>75.31</u> 64.42
3.1)	Fisheries	-	<u>102.10</u>	-	-	<u>102.10</u>
4.	Health (incremental expenditure) for 10 yrs.	<u>3800.0</u> 101	<u>546.60</u> 9.26	<u>1354.63</u> 521.2	-	<u>5701.23</u> 632.135
5.	Archaeology/Anthropology.	<u>156.00</u> 29		<u>700</u> 10	-	<u>856</u> 29
6.	Seismicity & Rim Stability.	<u>129</u> 271	-		-	<u>129</u> 271
7.	Command Area Development.	N.A.	-	-	N.A.	-
Total - (ii)						<u>27827.46</u> 4935.775

Total: (i & ii) 28113.968
5136.0565

NA : Not available.

ANNEX-XXVII.Min.(4)

**BLOCK-WISE DETAILS OF THE PLANTATION & SURVIVAL PERCENTAGE OF
CATCHMENT AREA TREATMENT UNDER NSP**

S.No.	Division/District	Block	Tehsil	Compartment No.	Year of Plantation	Area (ha.)	Number of Plants initially planted	Survival in May'95		Remarks
								No. of Plants survivals	Percentage of survivals	
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1.	Nagaraha	C.A. Harda	Harda	397	1994	119.708	11,190	6,940	62%	
	Dn. Harda									
	(Bohanganabad)									
2.	Ichhawar	C.A. Kannod	Kannod	130	1989	2.000	4,606	4,375	94.9%	
	Dn. Bhopal.			131	"	2.000	2,656	2,022	75%	
	(Dewas)									
		Kannod	Kannod	129	1990	6.000	6,120	3,978	65%	
				130	-	20.000	19,185	12,470	64.9%	
				146	-	5.000	1,405	407	28.96%	
				149	-	26.000	17,076	9,018	52.81%	
				158	-	21.000	16,546	9,100	55%	

.. 2 ..

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
		Kannod	Kannod	129	1991	180.000	42,679	19,205	44.9%	
				130	-	45.000	5,556	2,333	41.9%	
				160	-	127.000	41,425	11,961	28.9%	
				161	-	100.000	43,235	14,699	33.9%	
				150	-	261.000	60,016	30,608	51%	
				156	-	121.000	27,027	13,784	51%	
				158	-	110.000	29,250	16,965	58%	
				165	-	44.000	10,295	4,628	45%	
				166	-	168.000	27,700	1,896	49%	
		Kannod	Kannod	151	1992	74.000	9,330	6,997	74.5%	
				162	-	29.000	13,225	12,262	36.9%	
				163	-	235.000	57,000	14,327	24.9%	
				157	-	104.000	16,026	10,092	63%	
				159	-	75.000	35,720	18,748	54%	
				167	-	63.000	16,870	9,447	56%	
				168	-	103.000	24,500	16,482	48%	
		Kannod	Kannod	P-159	1993	200.000	100,000	47,709	44.99%	

....3/---

.. 3 ..

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
3.	Chhotatawa C.A	Punasa	Khandawa	345	1994	126.000	11,890	9,224	78%	
	Dn. Khandwa	Harsud	Harsud	292	-	86.000	27,225	21,780	80%	
		"-	"-	294	-	100.000	20,385	11,212	55%	
		Punasa	Khandwa	338	1995	80.000	30,754	27,409	90%	
		Harsud	Harsud	228/1	-	80.000	53,948	52,906	98%	
		"-	"-	228/2	-	80.000	50,681	49,870	98%	
Total :-		From 1989 to 1995				2,866,705	8,63,721	4,72,854		

ANNEX-XXVII.Min.(5).

THE DETAILED ACTION PLAN SHOULD COVER THE PRESENT STATUS
AND PROSPECTS FOR THE FOLLOWING ASPECTS IN THE
CAMMAND AREAS

1. Irrigation (main, subsidiary and sub-system)-
Complete schedule for their rotation &
maintenance- Suggesting improved mechanism for
collecting demands for surface irrigation water
and mechanism for monitoring required water-
releases. Water management beyond Polce.
2. Drainage (main, Collector, Interceptor etc.)
3. Ground Water Development including mechanism for
monitoring required ground water exploitation.
4. Conjunctive use of surface and ground water
assessment of additional requirement of staff for
water use extension activities.
5. Optimum cropping pattern for multi-cropped
irrigated farming, identification and mapping of
areas for localising major irrigated crops.
6. Environmental impact assesment studies. Likely
environment impact assesment due to irrigation and
suggesting mitigative measures there by along with
action plan.
7. Social forestry and plantations alongwith
feasibility studies for development of Non-
conventional Energy Sources.

.. 2 ..

8. Desired Onfarm Development- Plan for field channels for irrigation & drainage, farm roads connecting each parcel of land, various inputs including man machine management for optimum agriculture/agro-forestry production.
9. Agro-based Industries.
10. Mandies for marketing agricultural produce. (Regulated and non-regulated markets).
11. Development of Ware-housing facilities.
12. Infrastructural facilities-
 - (a) Communication facilities- roads including improvement of existing roads if necessary, postal, telegraphical, fax, etc.
 - (b) Cooperatives and credit institutions.
13. Fisheries Development.
14. Socio-Economic Survey in the Project Area.
15. Employment generation and its potential.
16. Short term & long term studies/monitoring necessary for various indicators relating deterioration of land resources & environment.

ANNEX-XXVII.Min-(6).

ACTION PLAN

SHOOLPANESHWAR

&

HANFESHWAR

TEMPLE

NB: Copy of
This was handed over during
26th ESG, held at Delhi on 12.10.45

SHORT NOTE ON ACTION PLAN OF SHOOLPUNESWAR AND HANFESWAR TEMPLE.

1. Shoalpuneswar Temple :

The plinth R.L. of the old temple was 57.00 m and it was already submerged during monsoon of 1993. Shri Shoal paneswar temple is shifted to Gora village on 2-6-1993.

The work of new temple is completed at new relocation site on 31-7-95, relocated near village Gora, Ta.Nanded. The expenditure incurred so far is amounting to Rs. 52.90 lacs.

The entire temple project consisting of Gurbhrah, Sabha mandap, Otta, compound wall, land scaping, Tribal museum, Punjaris quarter, Darmshala approach road, water supply, electrification etc. is costing to Rs. 206 lacs. The entire works including ancillary works are targeted to complete by 6/96.

2. HANFESWAR TEMPLE :

The Plinth R.L. of this temple is 103.225 m. and it is likely to be submerged partly (as per temp. submergence R.L. 110 m as per R.I.S. schedule of Navagam Dam) upto 6/96.

The entire temple complex consisting of temple, Sabhamandap, Otta, Land scaping, Museum, kitchen, Dharmshala, compound wall, water supply, electrification and approach road is likely to cost of Rs. 230.0 lacs.

The new temple site has been selected in Zarna Palla at village Hafeswar of Dist. Vadodara and Bhoomi Poojan is already done by Hon.Chief Minister of Gujarat on dt. 24-5-1993.

11-10-1995 12:34 FROM S.S.H.H.L.BHOPDA.

TO H.B.G'ner

P.93

-2-

New temple of Hanfeswar is under construction at higher level as finalised by competent authority. Construction of plinth work of Hanfeswar temple is under completed and temple work will be completed upto 6/96. The provision of Rs.92 lacs. Proposed upto 6/96, for construction of temple and approach road.

The construction of remaining part of temple and ancillary structure is proposed to be completed by 6/97 for which provision of Rs.202.43 lacs is proposed.

-11-

Action plan for Shoolpaneswar and Hanfeswar temple-submergence R.L. 85.00 mt. Temporary Sub.
R.L. 110.00 mt.

Sr. No.	Name of Temple	Plinth R.L.	Anticipated year of submergence	Overall anticipated cost of entire complex includ. temple ancillary structure land scaping etc. Rs. in lacs.	Cost of Temple Rs. in lacs.	Cost of ancillary structure Rs. in lacs.	Cost of approach road Rs. in lacs.	Progress upto 9/95	Target period.	Remaining exp. to be done.	Remarks.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1.	Shoolpan-war	57.00	1993	206	50	146	10	52.90	6/96	153.10	*
2.	Hanfeswar	103.225	1996	230	60	105	65	27.43	6/97	202.57	**

* (1) Temple is completed by 7/95 and ancillary ~~structure~~ ^{structure} shall be completed by the ~~temple~~ ^{6/96} by the trust.

** (2) The temple will be shifted and constructed by 6/96 at proposed new site and remaining work shall be completed by 6/97 by the trust.

N. Lal
Superintending Engineer
N.P. Const. Circle (Reh) No.-2.
S.S.N.L. VADODARA.

ANNEX-XXVII.Min-(7).

DHS/PDE/D-7/T.3/1995
Directorate of Health Services
Maharashtra State, Mumbai
Dated the 16th Dec. 1995

To

Dr.A.K.Malhotra,
Member (E & R)
2nd Floor, 27 Press Complex
A.B.Road, INDORE-452 008 (M.P.)

Subject:- Discussion on Sardar Sarovar
(Health Plan) on 18.12.1995
at Delhi.

(Through Secretary to Govt. Public Health
Department, Mumbai)

Sir,

As per the Agenda Items the progress on Health Plan is being discussed at Delhi on 18th Dec. 1995. I am enclosing herewith the information in Statement No. 1,2,3 and 4.

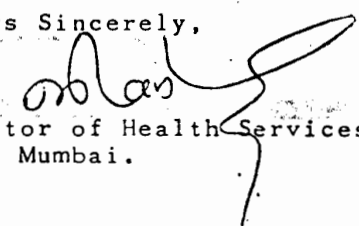
- Statement No. 1 : Shows the existing infrastructure in Dhadgaon (Akroni) and Akkalkuwa Taluka in Maharashtra State.
- Statement No. 2 : Shows the infrastructure created at the different sites of rehabilitation. One Primary Health Centre and 3 Subcentres cum dispensaries are sanctioned by State and PHC at Valheri (Narmada Nagar) is already functioning and other institutions are being operationalised soon.

The infrastructure which is already recommended by the Committee for the areas of Water Pondage and adjoining villages has been sanctioned by Govt. of Maharashtra on 15.11.95 except the establishment of Mobile Public Health Laboratory. This is under the consideration of the Govt.

In addition to this, 24 temporary Medical Officers and 472 Volunteers are also working in this area. The plan which is approved would be made functional upto end of Feb.1996. As per the instruction given the approved plan will be presented in the Committee meeting to be held on 18th Dec.1995. The expenditure incurred upto now is Rs. 9,26,000 on services and Rs.2.50 lakhs towards studies.

Thanking you,

Yours Sincerely,


for Director of Health Services
Mumbai.

STATEMENT - I

EXISTING INFRASTRUCTURE IN DHADGAON (AKRANI) & AKKALKUWA TALUKA MAHARASHTRA STATE

Rural Population as per 1991 census :

1] Dhadgaon : 96851 (166 villages)

2] Akkalkuwa : 125823 (170 villages)

Sr. No.	Type of Institution	Dhadgaon (Akrani)		Akkalkuwa	
		No.s	Per Institution Population served	No.s	Per Institution Population served
1	Community Health Centres	1	96,851	1	125,823
2	Primary Health Centres	8	12106 (8606 considering PHU/MHU)	8	15828 (12353 considering PHU/MHU)
3	Primary health Unit (mini PHCs)	2	5,000	3	5000 per PHU
4	Mobile Health Units	6	3,000	4	3000 per MHU
5	Sub-Centres	40	2,421	53	2,374

Note : 1] About 15000 population from both the talukas is being rehabilitated at new sites at different 4 sites in taluka tehsil.

2] The institutions submerged i.e. 3 PHCs , 1 PHU & 5 subcentres will be shifted in the same area.

STATEMENT - II
MAHARASHTRA STATE

Progress of the Health Infrastructure Proposed at Rehabilitated locating sites.

Sr.No.	Name of the Site	Proposed Health Infrastructure	Date of Sanction by State Govt.	Whether functioning or not Yes / No	Remarks
1	Valheri (Narmada Nagar)	Primary Health Centre	4/4/94	Yes	Functioning
2	Rojve	Sub-Centre cum dispensary	15/11/95	Yes	Being operationalised shortly. Instructions are already given
3	Amali	Sub-Centre cum dispensary	15/11/95	Yes	Being operationalised shortly. Instructions are already given
4	Dekati	Sub-Centre cum dispensary	15/11/95	Yes	Being operationalised shortly. Instructions are already given

STATEMENT - III MAHARASHTRA STATE

Progress of Health Infrastructure at Water Pondage area & adjoining villages

Sr. No.	Name of the Health Activity	Date of Sanction by State	Remarks
I	<u>Activities included in original Plan</u>		
	1. Establishment of floating dispensary at kewadia colony.	15/11/95	Recently sanctioned & instructions for procuring launch are given. The launch will be available before March 1996.
	2. Creation of posts of 16 lab technicians at PHC	15/11/95	Lab Technicians will be posted before February 1996.
	3. Establishment of Mobile Public Health Laboratory		This will be sanctioned in second phase i.e in 1996-97. However water sample examinations will be done at Community Health Centres.
	4. Anti Malaria activities		During 1996-97 deltamethrin will be spread. Budget provision is being made.
II	<u>Additional Facilities</u>		
	1. Appointment of temporary 24 Doctors at rescue camps.	20/11/95	They are actively working at 24 different sites from June 1995.
	2. Appointment of volunteers in every Pada(Hamlet) & villages on daily wages.	18/10/95	472 Volunteers were appointed for 4 months from 1st June, 1995 to 30th , September 1995.

STATEMENT - IV

SARDAR SAROVAR STUDY ON HEALTH PROBLEMS

1. The Project of study has been sanctioned by Govt. of Maharashtra on 3rd March, 1995.
2. PURPOSE OF STUDY
 - a] Assessment of current studies of disease pattern by doing baseline survey.
 - b] Follow-up studies for next 5 years.
3. The study is being conducted by the team of T.N.M.C. and Nair Hospital headed by Dr. Mrs. N.P. Pai, Professor & Head of P.S.M. Department.
4. Baseline survey has been conducted from 8 May, 1995 to 12 May, 1995.
5. In the initial phase budget of Rs. 530000/- has been sanctioned.
6. During the baseline study, 66 villages are covered in which 485 houses are surveyed which includes-
 - 138 villages from Sarovar area
 - 212 houses from nearby area
 - 75 houses from rehabilitation site.
 - Total population surveyed is 2194.
7. The computer processing of data is in progress. The baseline information would be presented in the last week of February 1996, by the team of T.N.M.C. & Nair Hospital, Bombay.
8. An expenditure incurred uptill now is Rs. 250000/-.

ANNEX-XXVII.Min.(8).

INDIRA SAGAR PROJECT (DAM)
 PROGRESS OF WORKS UP TO
 NOVEMBER 1995

S.No.	Item	Unit	Estima- ted qty.	Progress up to Nov. 1995	% Progress
1. MAIN DAM					
	Excavation	LCM	7.90	6.06	77%
	Concrete	LCM	13.20	11.99	15%
2. POWER HOUSE					
	Open Excavation :				
	Head Race Channel	LCM	22.32	20.53	92%
	Tail Race Channel	LCM	19.74	16.67	84.5%
	Intake & Power House	LCM	28.66	26.33	92%
	Underground Excavation :				
	Pressure Shafts	LCM	0.965	0.808	84%
	Concrete(Intake Structure and protection Wall)	LCM	1.40	0.26	19%
	Pen Stock Pipes	M.T.	5800	310	5%