Human Nature Interaction In and Around National Parks and Sanctuaries

Introduction and Recommendations

Sariska Tiger Reserve, Great Himalayan National Park, and Rajaji National Park

1995

HUMAN NATURE INTERACTION IN AND AROUND NATIONAL PARKS AND SANCTUARIES IN INDIA

A STUDY OF SARISKA TIGER RESERVE, GREAT HIMALAYAN NATIONAL PARK AND RAJAJI NATIONAL PARK

INTRODUCTION AND RECOMMENDATIONS

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1. INTRODUCTION

India has a very large network of national parks and sanctuaries, with a total of over 500 at the latest count. This network of protected areas has been established to preserve a wide range of wildlife and wildlife habitats, as also important areas of genetic diversity.

Unfortunately these areas continue to face a whole range of problems, the most common of which is human presence of a disturbing kind. The first Survey of National Parks and Sanctuaries in India, conducted by the Indian Institute of Public Administration, has revealed that a very high percentage of protected areas has one or more forms of human activity within its boundaries. For example, 56% of the national parks and 72% of the sanctuaries studied were found to have human settlements inside, while 43% of the parks and 68% of the sanctuaries studied had private rights and leases inside their boundaries.

While the Survey mentioned above has given a brief idea of human-wildlife interaction in national parks and sanctuaries in India, there is an urgent need to do more in-depth studies. The study of the human nature interactions in and around PAs is therefore a follow-up to the Survey already concluded. It also complements the Biogeographic Survey by the Wildlife Institute of India, which, while recommending a larger network of biogeographically representative protected areas, did not have in its purview the socio-economic factors related to these areas.

In recent times, wildlife managers and the Government have come around to the view that it is neither desirable, nor any longer possible to take a primarily policing approach to the protection of wildlife. The need for enlisting public participation, especially of the people living in and around national parks and sanctuaries is now widely recognised.

It is also recognised that co-operation of the local communities can be achieved only if their basic needs of fuel and fodder and other forest based raw-materials are not disrupted because of the protected area. Also, very often the forest is a source of employment to the local communities.

Keeping these points in mind, the Government of India has initiated, from 1991-92, a centrally sponsored scheme for ecodevelopment around wildlife protected areas. However, in order to ensure that this and other such schemes are successful, it is important to properly plan for undertaking ecodevelopment programmes. Such planning must be specific to the local conditions prevailing in and around each park or sanctuary.

This study is one small step in this direction, and attempts initially to plan for three national parks i.e. Rajaji National Park (Uttar Pradesh), Sariska National Park (Rajasthan), and Great Himalayan National Park (Himachal Pradesh).

The above mentioned parks were selected since the human pressures they are being subject to are typical of many other national parks in India. Also, in all these three parks, ecological studies have been carried out, establishing a baseline

of biological information.

1.1 Objectives of the Study

To determine :

- The nature and scale of existing human activities in selected national parks, historically and at present.
- The broad impacts of these activities on the eco-system, both positive and negative.
- The rationale, effectivity, and desirability of the management policies and activities of the park authorities, related to human activities.

To identify :

- The strategy for diverting all human pressures from the park to the surrounding and other areas.
- The nature and extent of human-wildlife interaction that could be allowed around each park, without causing irreversible damage, and in a sustainable manner.
- The methods of making such interaction sustainable for both the wildlife and the local human communities, with special reference to development of buffer and multiple-use zones.
- The methods of determining state-wide and national strategies for resolution of human-wildlife conflicts.
- The role of various sections of society -- State Government, Forest Department, NGOs, local people, and scientists -- in the resolution of human - wildlife conflicts
- Baseline information against which human-wildlife interaction can be evaluated in future

1.2 State of the Art

No detailed study has been done in India on the problems related to the people living in and around national parks and sanctuaries. In fact, no empirical survey of such pressures, by and on the people, exists for most areas.

The first study which tried to identify the pressures on parks and sanctuaries by various human activities was undertaken by the Indian Institute of Public Administration, New Delhi, and its findings published in 1989 in *Management of National Parks and Sanctuaries in India : A Status Report*. The study was sponsored by the Ministry of Environment and Forests, Government of India.

The IIPA study analysed data regarding national parks and sanctuaries aggregated for states and the country, but not for specific national parks and sanctuaries. A subsequent IIPA study: *Management of National Parks in India* [Mehta et al 1991] gives data on various national parks but on no sanctuaries. Besides, in covering over fifty national parks, the analysis is at a very general level.

Though a few studies of specific areas in other countries are available, these have little relevance in terms of methodology or findings to the Indian situation as the legal, organisational and social structures in India are very different.

1.3 Detailed literature survey

The available literature on wildlife management in India, which may be relevant to this study, can be categorised into three types:

i). Profiles: Containing information of zoological, botanical, geographical, or other physical aspects of wildlife areas, and other information of general or tourist interest. Much of the literature on wildlife reserves in India falls in this category.

ii). Management status reports: Containing information and analysis of various management parameters relating to wildlife protection and to wildlife areas in India. There is not much literature on this subject.

iii). Human-wildlife relationship studies: Containing information on and analysis of the human impact on wildlife areas, and on the impact of wildlife protection measures on the human communities living in and around these areas. Again, there is not very much literature on this aspect.

Some of the relevant books and reports available under these categories are listed and discussed below:

i). Profiles:

Department of Environment, Government of India (undated): *Project Tiger 1973-83*

Israel, S. & Sinclair, T. (eds). (1987): *Indian Wildlife*, Insight Guides, APA Productions, Hong Kong

Krishnan, M. (1983): *Handbook of India's Wildlife*, Madras

Saharia, V.B. (ed.) (1981): *Wildlife in India*, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India

Sheshadri, B (1986): *India's Wildlife and Wildlife Reserves*, Sterling Publishers Pvt. Ltd., N. Delhi

Singh, Samar (1986): *India's Wildlife Heritage*, Natraj, Dehra Dun

Singh, Samar (undated): *Protected Areas in India -- A Country Report*, Department of Forests and Wildlife, Government of India

ii). Management status reports:

Department of Environment/Indian National MAB Committee (1983): *Biosphere Reserves : Indian Approach* (Paper presented at the Ist International Biosphere Reserve Congress, Minsk, USSR, Sept. 26-Oct. 2, 1983)

Department of Environment (1985): MAB *India : Man and the Biosphere Programme*, Government of India

Kothari, A., Pande, P., Singh, S., and Variava, D. (1989) : *Management of National Parks and Sanctuaries in India : A Status Report*, Indian Institute of Public Administration, New Delhi

Mackinnon, J. and Mackinnon, K. (1986) : *Review of the Protected (Hal.) Areas system in the Indo-Malayan Realm*, IUCN

Rodgers, W.A. and Panwar, H.S. (1988) : *Planning a Wildlife Protected Area Network in India*, Wildlife Institute of India, Dehradun, March 1988 (in two volumes)

Singh, Samar (1983) : *India's Action Plan for Wildlife conservation and Role of Voluntary Bodies*, BNHS Centenary Seminar 'Conservation in Developing Countries - Problems and Prospects', 6-10 December 1983

Singh, Samar (1984): *Conservation of India's Wildlife Heritage*, Department of Environment, Government of India

Thorsel, J. W. (ed.) : *Conserving Asia's Natural Heritage : The Planning and Management of Protected Areas in the Indomalayan Realm* (Proceedings of the 25th Working Session of IUCN's Commission on National Parks and Protected Areas, Corbett National Park, India, 4-8th February, 1985), International Union for the Conservation of Nature and Natural Resources, May 1985

Most of the above documents are very general in nature and none contain detailed analysis or action plans for any individual area. Singh (1983), Singh (1984), Thorsel (1985), and MacKinnon (1986) contain a broad overview of the problems and prospects of managing India's wildlife reserves. Rodgers and Panwar (1988) discuss and recommend the extension and improvement of the network of wildlife reserves in India, but do not go into the related management issues. The two Department of Environment MAB reports spell out the concept of the MAB programme but also do not discuss in any detail the related management problems. Kothari et. al. (1989) gives state and country wide aggregate data on management issues, but not specific to individual parks/sanctuaries in any detail.

In addition to the above there are also detailed reports on each of the existing or proposed biosphere reserves, brought out by the Ministry of Environment and Forests. These reports are perhaps the only ones to attempt to analyse the major management problems of each area and suggest ways to best manage it, but even they are only preliminary documents which need to be worked out in much

greater detail for effective implementation.

iii). Human - wildlife relationship

Indian Board for Wildlife (1983) : *Eliciting Public Support for Wildlife Conservation*, Report of the Task Force, Indian Board for Wildlife, Department of Environment, Government of India, New Delhi, October 1983

Kothari, A., Pande, P., Singh, S., and Variava, D. (1989) : *Management of National Parks and Sanctuaries in India : A Status Report*, Indian Institute of Public Administration, New Delhi

Singh, Samar (1983) : *India's Action Plan for Wildlife conservation and Role of Voluntary Bodies*, BNHS Centenary Seminar 'Conservation in Developing Countries - Problems and Prospects', 6-10 December 1983

World Wildlife Fund - *India : Role of NGO'S in Wildlife Conservation : A Discussion Paper*, August 1987

Unfortunately there is very little relevant material on this, since no systematic effort has been made to judge human impact on the ecosystem (and vice versa). Of the references given above, the documents by the Indian Board for Wildlife (1983), Singh (1983), and World Wildlife Fund (1987) discuss the issue at a macro level, and have greater emphasis on the role of the public in wildlife conservation than on the specific interactions between humans and wildlife areas. The recommendations contained in these documents are of a generalised nature, without the specificity required for effective action. The fourth reference, Kothari et. al. (1989)

discusses human-wildlife relationships in some detail, but its data is aggregated at a state and country-wide level, not at an individual park/sanctuary level. Also, it contains only broad recommendations which are relevant for the country as a whole, and which will also need to be spelt out in specific detail for each park/sanctuary.

The available literature on the subject, therefore, provides only a broad context and nationwide information, within which more detailed studies and action plans need to be prepared.

1.4 **Agencies which can utilise the results of the project**

The results of this project should be of great use, at the central level, to the Planning Commission, to the Ministries of Rural Development, Labour, and Social Welfare, and to the Ministry of Environment and Forests, especially to the Forest and Wildlife Division, the National Afforestation and Ecodevelopment Board and the Man and Biosphere Programme.

It would also be of great use to the State Governments, especially to the corresponding departments of the Ministries mentioned above. Its primary use, however, would be to the officials managing national parks and sanctuaries, and to collectors of districts within which such parks and sanctuaries are located.

The report of this project should also be useful to various research and training institutions, especially the Wildlife Institute of India and the Central and State Forestry Institutes.

2. METHODOLOGY

The study was undertaken by the IIPA. The existing computerised data base of management parameters emanating from the Survey of National Parks and Sanctuaries was used as the base, and for the areas being studied the existing data were up-dated. New parameters for which information was needed were identified and questionnaires developed, to be completed by park authorities and the chief wildlife wardens.

TASKS
Develop questionnaires and send out a questionnaire I.
Compile available information, including secondary literature.
Visit NP/S to verify information/ to get perceptions of local officials and people, using the questionnaires.
Visit District/State HQs, and NGOs/NGIs, for district/state level information/policies/procedures/opinions.
Analyse the information in terms of the objectives.
Develop detailed recommendations for each area.
Write up detailed methodology
Develop detailed maps
Compile baseline information

These questionnaires were used to build up a base document for visits to the areas and the state headquarters, by the project team.

In the first phase the visits were conducted by the team of IIPA researchers with the purpose of being trained in the field. These trained researchers then conduct visits during the second phase of the project.

Park visits helped in getting a better understanding of the management efficiencies and constraints, of the

biogeographical profile of the area, of the pressures and activities in and around the area; and of the perceptions of local officials and people regarding the management of the area. Any gaps or confusion in the data was also discussed during the field trips.

The visits to state headquarters yielded a better understanding of the state level policies; of future plans and perspective; and of perceptions of the senior officers. In adition, discussions were also held with revenue and forest officials at the district and state level.

On the basis of the questionnaires and the discussions, a final profile for each area was developed giving data and other information on the identified parameters.

The project team analysed the data and information, and developed detailed recommendations on how to strengthen the management of each of the protected areas studied. These recommendations cover both activities at the park and those around the park which are related to park management.

2.1 **Issues and Sources**

2.1.1 Human Interaction with Ecosystem

Human activities (Q, MP, Pdisc, Ddisc, Vdisc, FDdisc, files, Census, Wrkpln, verif[1])

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[1] Abbreviations used

Budg : Budget
Map : map of park
MP : management plan
notif : notification
Q : questionnaire
verif : verify (field visits, etc.)
Wrkpln : forest working plan
files : park/state/district office files
disc : Discussions with:

(a) Quantum and nature of human activities, legal and illegal

(b) Rights, leases and concessions of local inhabitants

(c) Grazing and fodder extraction

(d) Habitation and cultivation pressures

(e) Employment of local people by park

(f) Development of alternatives for fuel and fodder

(g) Tensions/confrontations/co-operation between local people and park authorities

(h) Human/livestock injury or death, or crop damage, by wild animals

(i) Quantum, type and impact of tourism

(j) Extraction of timber and other forest produce

(k) Use by other government departments/ agencies

(l) Plantations

Human Relocation Programmes (Q, MP, Vdisc, Pdisc, Ddisc, Sdisc, files, verif)

(a) Necessity

(b) Willingness of the people, basic demands, reasons for opposition, past experiences

(c) Planning and management of the relocation, including impact of delays, if any

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Ddisc : district authorities
FDdisc : forest department
Pdisc : park personnel
Sdisc : state authorities
Vdisc : villagers and local people
Odisc : NGO/NGI/Others

(d) Adequacy of new sites and compensation

(e) Financial and other constraints in implementation

(f) Retrospective evaluation

Proposed activities (dams, canals, etc.)

2.1.2 Legal aspects

Completion of procedures (Q, Pdisc, Ddisc, Sdisc, files)

Ability to implement the act

(a) Administrative ability (Q, Pdisc, Ddisc, Sdisc)

(b) Political ability (Q, Pdisc, Ddisc, Sdisc)

Control over area (Q, Pdisc, Ddisc, Sdisc, FDdisc, files)

2.1.3 Management

Management plans/planning

(a) Existence (Q, Pdisc)

(b) Adequacy (Q, MP, Pdisc, WII)

(c) Clarity and appropriateness of objectives (Q, MP, Pdisc, Sdisc, WII)

(d) Effectivity of strategies (Q, MP, Pdisc, Sdisc, WII)

(e) Ability to Implement (Q, Pdisc, Sdisc)

(f) Future perspectives (MP, Pdisc, Sdisc)

Budgets

(a) Availability (Q, Pdisc)

(b) Quantum break up and adequacy (Budg, Pdisc, Sdisc)

(c) Sanctioning powers (Pdisc, Sdisc, files)

(d) Ability to spend (Budg, Pdisc, Sdisc, files)

(e) Appropriateness (Q, MP, Budg, Pdisc, Sdisc)

(f) Timely release (Pdisc, Sdisc, files)

(g) Future possibilities (Pdisc, Sdisc)

Zoning

(a) Existence (Q, Map, notif)

(b) Justification of categorisation/criteria (MP, Map, Pdisc, WII)

(c) Area and other details (MP, Map, notif, Pdisc)

(d) Ability to manage (Q, MP, Pdisc)

(e) Future plans (Pdisc, Sdisc)

Management equipment and facilities

(a) Availability and adequacy (MP, Budg, Q, Pdisc, verif)

(b) Appropriateness (MP, Pdisc)

(c) Access (Pdisc, verif)

(d) Maintenance and replacement (Pdisc, Verif)

(e) Future plans (Pdisc, Sdisc)

Personnel

(a) Quantum and adequacy (Q, MP, Budg, Pdisc, files, verif)

(b)	Training	(Q, Pdisc, files)
(c)	Allocation of work	(MP, Pdisc, files, verif)
(d)	Ability to monitor and evaluate work	(Pdisc, files)
(e)	Caliber and dedication	(Pdisc, verif)
(f)	Self perceptions	(Pdisc)
(g)	Outside perceptions	(Vdisc Odisc)
(h)	Length, Security of tenure	(Pdisc, files)
(i)	Availability of personal facilities	(Pdisc, Verif)

Research and monitoring (Q, MP, Pdisc, Sdisc, Odisc files, Reports, verif, WII)

(a) Existence and frequency

(b) Adequacy and appropriateness

(c) Facilities and staff

(d) Competence and training

(e) Effectivity

(f) Ability to link with other areas/outside expertise/external researchers

Education

(a) Visitor's orientation

(b) Extension programmes

2.1.4 Habitat pressures/phenomena

(a) Disease

(b) Overpopulation

(c) Occurrences (fire, drought, etc.)

2.1.5 Profile of the area

Information regarding human populations and settlements, fauna, flora, habitat, topography, climate, water sources, natural phenomena and history, necessary for building up a profile of the area.

2.2 **Field Methodology**

Relating to problems perceived by the park manager. A problem being something that either detracts from the achievement of the parks'objectives, or otherwise causes things undesirable.

2.2.1 Identify the currently perceived problems

Questions :

(a) Is it really a problem?

(b) What are the dimensions of the problem?

(c) How crucial is the solution of this problem for the better management of the park, or for other reasons ?

[e.g. Perceived problem : Over grazing by livestock.

Qa : Is it really over grazing? How authentic is this judgment?

Qb : How severe is the over grazing? Is it widespread or only in pockets?

Qc: What impact does this over grazing have on the habitat or on wild animals plants, and on the

management of the park?

Methodology

(a) Abstract list of problems from the questionnaire, management plan, and other available documents.

(b) Check this with park manager and other park officials, and where relevant with other officials and NGOs and the local communities, using the list of issues given earlier.

(c) Evaluate by field verification, wherever considered necessary and feasible (e.g. where information from different sources is contradictory, or where methodology used by park manager to determine existence, extent or impact of problem is inadequate).

(d) Make a judgment based on all the above and record reasons for the judgement.

Identify the <u>reasons</u> for the problem.

[e.g. perceived problem : Over grazing by livestock.

Q: Is this due to increase in livestock numbers?

If so

Q: When did the livestock population cross the carrying capacity?

Q: Is it because of human interventions?

If so

Q: What interventions? How?

Q: Is it because of changes in fodder/water availability?

If so

Q: Why? How? When?

Methodology

(a) Abstract reasons given, if any, from questionnaire, management plan, and other available documents. Look for documented causes of such phenomenon in other parks.

(b) Discuss with park officials and, if relevant, with other officials and non-governmental individuals/NGOs.

(c) Evaluate by field verification wherever considered essential.

(d) Make a judgement, based on all the above, and record reasons.

2.2.2 Evaluate <u>management efforts</u> and <u>constraints</u>

Questions

(a) Has a systematic effort been made to understand the nature, causes, dimensions and implications of the problems?

(b) If not, why not? If yes, by what

means/methods?

(c) Has a proper strategy been evolved for solving the problem?

(d) If not, why not? If yes, what is it?

(e) If it has, has it been implemented in a planned and sustained manner?

(f) If not, why not?

(g) If yes, has the strategy succeeded/or is likely to succeed?

(h) If not, why not? If yes, how?

(i) Is something further required? Is there a future strategy proposed?

Methodology

(a) Abstract information about earlier management efforts from questionnaire, management plan, and other available documents. Look for documented management efforts for such phenomenon in other parks.

(b) Discuss with park officials and, if relevant, with other officials and NGOs/NGIs.

(c) Evaluate by field verification wherever considered essential.

(d) Make a judgement, based on all the above, and

record reasons.

2.2.3 Based on above, build up a priority listing of problems to be tackled.

2.2.4 Identify management possibilities, in order of priority, and stating pre-conditions and implications.

Questions

(a) What are the strategies possible for containing/minimising/solving the problem?

(b) What are the pre-conditions (financial, administrative, legal, social, etc.) of each of the strategies.

(c) What are the implications (possible/certain un-intended results/effects) of each strategy.

(d) Given the prevailing reality, and a realistic rate of change, what are the optimal strategies : balanced between likelihood of success and likelihood of implementation. Also ascertain local peoples willingness to participate in management and to evolve joint strategies for preserving the environment.

Methodology

(a) Collect information about strategies used in the park, and in other areas, to solve similar problems.

(b) Analyse the problem, its extent, causes, and

implications.

(c) Evaluate the relevant parameters in the existing conditions, including laws, local population pressures, socio-economic and ecological profile of park and surrounding areas, etc.

(d) Draft strategies and discuss their feasibility and prioritisation with park officials and other concerned and knowledgeable persons.

(e) Put down final recommendation, giving recommended strategies, in order of priority, along with the pre-conditions and implications of each.

2.2.5 Relating to unperceived current problems, and future (perceived or unperceived) problems

There might be some problems which emerge after analysis of the information or after a field visit, which might not have been perceived by the park authorities.

Similarly, there might be indications of a possible future problem which it would be best to anticipate.

Identify the <u>unperceived/future problems</u>

Questions (a) Is it, or will it be, really a problem? What are the indicators?

(b) Why was it unperceived/ unanticipated?

(c) What are/ would be the dimensions of the

problem?

(d) How crucial is the solution/ anticipation of this problem for the better management of the park, or for other reasons?

[e.g. Unperceived problem : Pollution of water sources.

Qa: What indicators are there to determine this pollution?

Qb: Why were these indicators not earlier noticed? (lack of monitoring? Lack of expertise? etc.)

Qc: What is the extent of the pollution?

Qd: What impact is this pollution likely to have on the habitat and on flora-fauna species? Or on other aspects?]

Methodology

(a) Analyse the data from secondary material and from field visit, to check whether all the problems seen have been listed by park authorities.

(b) If not, identify the unlisted problems.

(c) Evaluate by discussion and, where necessary, by further field verification.

(d) Make a judgement based on all the above and record reasons for the judgment.

[e.g. Future problem : Possibility of grazing/MFP

pressure.

Qa: Why do you think this would be a problem in the future? (Remaining grazing land/forest rapidly shrinking? Population growing with no other sources of income? Agriculture collapsing due to increasing paucity of water or degradation of soil? Development project submerging forests/displacing people? etc.)

Qb: Why has it not been anticipated? (No regional perspective? Park authorities not aware of what is happening around? etc.)

Qc: How serious would be these pressures?

Qd: What effect would this have on the park? On other aspects?]

Methodology : similar to unperceived problem. Future problems can be identified both by studying trends of events, and by being sensitive to non-linear plausible events.

Identify the reasons for the problem.

Evaluate management possibilities.

2.2.6 Relating to identification of ways to improve management methodology, and strive for higher levels of achievement,

or achievement of more difficult objectives.

2.3 **Criteria for sample stratification of villages outside the Park**

CRITERIA	CATEGORIES	REASONS
Population	<500,500-1,000, >1,000	To capture vriability resulting from village population size.
Distance from park boundaries	<2km.,2km.-5km.,5km.-10km.	Villagers closer to the parke would ordinarily have a better access to resources of the Reserve.
Location relative to Reserve	North, South, East, West, North East, North West, South West, South East.	Different directions may have different types of habitat and varying social and geographical features relevant to the issues being studied.
Legal Status	Revenue, Forest	Different rights to forest resources, varying history and social structures.
Habitat available	As per FSI catogries : - Dense Forest (crown density above 40%) - Open forest (crown density below 40%) - Scrub - Forest banks	Will have bearing on use of Reserve's resources.
Agricultural land per capita	Categories to be decided after extracting information from District Census Handbook.	Per capita land holdings could affect the villages dependence on the forest resource.

Difference in size of land holding	Categories to be decided after extracting information.	Land distribution patterns could also affect dependence on forest resources, especially of the poorest segments of the society.
Caste / Religious breakup	Categories to be decided after extracting information from census and revenue records.	Cultural, social and dietary variation between castes and religions might have implications on forest use.
Occupation breakup	Categories to be decided after extracting information from census and revenue records.	Dependence on forest resources may vary between occupations.
Availability of/distance from : - nearest town - road head - Drinking Water - Educat-ional facilities - Medical facilities - Post office - Power supply - Markets - Bus stop/ Railway station	As per district census handbook - availability of facility - <5 km. away - >5 km to 10 km away - >10 km away	The access to infrastructure could also have an impact on forest dependence.

2.4 **Criteria for sample stratification of villages inside the Park**

CRITERIA	CATEGORIES
Caste	as exists
Religion	as exists
Occupation	As existing, broadly : - land-owners producing surplus - land-owners producing for subsistence - predominantly cattle and livestock oriented - Casual or regular labour, combined with 2 of the above - employed (in service) by private\ government agencies - artisans - Receiving income from relatives in urban areas - Others
Household size	<5, 5-10, >10
Amount of land owned	Categorise after getting more information
Amount of land per capita	- do -
Obvious signs of prosperity such as T.V., Vehicle posh house, etc.	By observation

3. PA OUTLINES AND RECOMMENDATIONS

3.1 PA Outlines

Sariska Tiger Reserve

The Sariska Tiger Reserve (800 sq km[2]) is located in Alwar District, in the State of Rajasthan.

The Sariska Tiger Reserve (STR) contains within it the Sariska Sanctuary (49,200 ha), a part of which (27,380 ha) is the proposed Sariska National Park. It also contains 30,800 ha of reserved forest, most of which is in the buffer zone. The STR is divided into three core zones and a buffer zone.

The zonation of the STR is as follows:

Core zone I	(sanctuary and proposed National Park)	:	27,380 ha
Core zone II	(Sanctuary)	:	12,650 ha
Core zone III	(Sanctuary)	:	9,750 ha
Buffer zone	(Reserved Forest)	:	30,220 ha
Total	**(Tiger Reserve)**	**:**	**80,000 ha**

There is also a Tourism zone, which is a linear stretch confined to the sides of the already existing roads, and a part of the other zones.

The Park is situated along the Aravalli Mountain Range, and is bissected by the Alwar-Jaipur State Highway No. 13. The other thoroughfares which pass through the Park include the Sariska-Kalighati-Tehla, and the Kalighati-Pandupole roads, which are used heavily throughout the year by pilgrims, tourists, and the

[2] Recently been increased to 860 sq km.

passersby. The Park faces many human pressures, and other problems, some of which are outlined below:

1. Human Presence in the Park: According to the Park authorities, there are 11 villages inside the proposed national park. These 11 villages are due for relocation. A relocation plan was prepared by the Park authorities in 1987, and was approved by the Collector, Alwar, with a sanctioned outlay of Rs. 50 Lakhs. However, the villagers have rejected this plan, and have been resisting the move to relocate them.

Meanwhile, these villagers are carrying out all their traditional subsistence activities some of which were also rights. These activities include cultivation and grazing within the boundary of the proposed national park. Among the two, grazing is a major problem, since most of the villagers living inside the Park are pastoralists. The other activities which result in significant pressures on the Park are collection of fuelwood and fodder. Since the lifestyle of these villagers is still quite primitive, even their their houses are made largely out of forest based raw-materials.

According to a study conducted by the Wildlife Institute of India in Sariska National Park, the impact of the activities of the villagers living inside the Park is felt on 128.8 sq km or 47.04% of its total area. In addition, there are also pressures of grazing, fuelwood and fodder collection etc, from villages outside the Park. This has resulted in the wildlife in the Park getting concentrated in the Kalighati valley which is the best protected

area in Sariska. Over the years this has led to overgrazing in Kalighati by wild animals.

2. Habitation in the Buffer Zone and in the Adjacent Areas of the Park: Apart from the villages within the boundary of the proposed national park in Sariska, human habitation is also present around it, and these villages also exert pressure on the Park in the form of activities like grazing of livestock, collection of fuelwood and fodder, timber, and other minor forest produce. Much of the buffer zone of Sariska National Park, probably as a result of these pressures, appears highly degraded. At present, the exact number of villages located in the buffer zone of the proposed national park is not known.

3. Legal Status: The legal status of forest land falling in the Sariska National Park is unclear. This is because land which has been recorded as forest land in the records of the Forest Department is not mentioned as such in the land records of the Revenue Department. This has resulted in the management of the Park being unable to effectively deal with offences like encroachment of forest land.

4. Quarrying and Mining: At present, there are about 400 dolomite/limestone/marble quarries and mines operating inside and adjacent to the southern boundary of the Sariska Sanctuary. According to the Park authorities, they are a source of great disturbance to the wildlife of the area, and if left unchecked, could even begin encroaching on the national park.

5. Poaching: Poaching has also been a problem for the Park

authorities. The two major reasons for the illegal hunting of wildlife have been protection from crop damage by the villagers, and the trading of meat, skins etc of animals.

6. Tourism: Expensive and inappropriate tourism is slowly becoming a problem for the Park. The average tourist visiting Sariska, is either a pilgrim, or a conventional weekend tourist. As their number gradually rises, the disturbance to the wildlife is increasing.

Great Himalayan National Park

The proposed Great Himalayan National Park is located in the north-western Himalayas, in Kullu District of Himachal Pradesh. Covering an area of 620 sq. km, the Park contains some of the least disturbed areas of natural habitat in Himachal Pradesh due to its relative inaccessibility. There are no motorable roads upto or within the Park. The nearest points accessible by vehicle are Ropah and Gushaini, 8 and 15 km away, respectively, from the nearest entry point to the Park. Furthermore, the terrain within and around the Park is extremely rugged. The Park consists mainly of protected forests (over 570 sq. km) and some reserve forest. A small area (83.96 sq. km) had been notified earlier as part of Tirthan Sanctuary on 17.6.1976. The intention to constitute the present Park was declared on 1.3.1984.

The Park has many conservation values. It contains the catchment areas of the Tirthan, Sainj and Jiwa rivers, which together form the upper catchment of the Beas river. The Park also contains great habitat diversity and harbours numerous rare and threatened species. The Park has a buffer zone of 1160 sq. km, under the control of the Territorial Wing of the Forest Department. The Park is also connected to Kanawar Sanctuary (60.70 sq. km) to the north-west, Pin Valley National Park (675 sq. km) to the north-east, Rupi Bhaba Sanctuary (269.15 sq. km) to the east and Tirthan Sanctuary (61.13 sq. km) to the south. Together, these conservation areas cover nearly 3000 sq. km and constitute Himachal Pradesh's largest wildlife conservation unit. The Great Himalayan

National Park was established on the basis of recommendations made by Dr. P.J. Garson and Dr. A.J. Gaston who made a detailed ecological study of the area.

Despite its relative inaccessibility, the Park faces a number of human pressures. Some proportion of these pressures results from the exercise of traditional land use rights, while some is illegal. These pressures are discussed below:-

1. Human Presence in the Park: There are four villages in the Park with over 100 families. Park villagers have various rights to use the Park's resources. The four villages are to be relocated and their rights acquired and extinguished. A Settlement Officer was appointed on 5.12.85, but no relocation plans have been prepared to date. The people of two of the villages are strongly opposed to being relocated, but have outlined the conditions under which they are prepared to shift if there is no other option. The views of people in the other two villages are not known.

2. Grazing of Livestock in the Park: In addition to Park villagers, people from buffer villages and migratory graziers have the right to graze livestock in the Park. The total number of livestock grazing in the Park regularly includes some 500 head from Park villages and about 1000 head from buffer villages. In addition, over 6,500 livestock are brought in by migratory graziers during the summer. The amount of unauthorized grazing is not known, but grazing is reported to be one of the more serious pressures on the Park.

3. Herb Collection: Large numbers of people enter the Park during the summer for herb collection. A certain proportion of collection is by rightholders from Park and Buffer villages, or by migratory graziers, but a substantial amount is illegal. Herb collection is believed to be the most serious pressure on the Park and is reported to be affecting the regeneration of certain herb species.

4. Other Forest Produce Collection: Villagers from the both the Park and the buffer have the right to collect fuelwood, fodder and minor forest produce in the Park. Park villagers also have the right to extract timber for house construction and repair and for making agricultural tools. In addition there is seasonal pressure on the Park's resources from herb collectors and migratory graziers. The amount of illegal collection of forest produce is not known.

Rajaji National Park

Rajaji National Park covering an area of 820.42 sq.km. comprises the erstwhile sanctuaries of Rajaji, Motichur, and Chilla and some adjoining Reserve Forests. The intention to constitute the area into a national park was declared on 12 August,1983. Spread across the districts of Dehradun, Haridwar, and Pauri Garhwal, the Park was primarily established to preserve the Shiwalik ecosystem and the rich variety of wildlife contained therein. There are, however, many human pressures which have become a serious threat to the habitat of the Park. Some of these pressures are discussed below:-

1. Human Presence in the Park: Officially, there are 512 *Gujjar* families living with their livestock in *deras* spread across the Park. They are perhaps the most dependant local community on the Park for its resources, and are therefore likely to have a significant impact. Some of the activities known to have a detrimental impact are grazing of livestock and collection of fodder and lopping for them, use of waterholes, grass cutting, firewood collection, extraction of timber for house construction etc. Studies carried out by the Wildlife Institute of India, have shown, habitat destruction, fodder and water scarcity for wildlife, and disturbance as among the major impacts of the presence of *Gujjars* inside the Park. A resettlement plan for the *Gujjars* was drawn up in 1983, with a total outlay of Rs. 300 Lakhs, which proposed to relocate them to Pathri R.F. in Haridwar District. This plan, however, has not been acceptable to the *Gujjars*. They are at

present resisting all efforts to move them out of the Park, and had earlier obtained a stay order from the Supreme Court of India. Besides the *Gujjars*, there are three *Taungya*, and two *Gothiya* settlements inside the Park. Their impact, however, is reported to be minimal.

2. Habitation in Adjacent Areas: There are 5 towns, and over 100 villages in the adjacent areas of the Rajaji National Park. All of these villages are dependent on the Park to varying extents for resources. These villages had traditional rights of use of the forests for grazing, fuelwood and fodder collection, MFP collection etc. Although officially these rights have now been extinguished, these people continue to go into the forest, and their activities are now regarded illegal. Extensive crop damage by wild animals, especially elephants, is also reported from the adjacent areas of the Park. Resentment has been building up among the affected local people over what is regarded as denial of their traditional use of the forests, and the perceived inability of the authorities to be able to control damage of crops by wildlife. This has resulted in cases of human-wildlife conflicts with an increasing number of fatal encounters.

3. Pressures on Forest Corridors: Rajaji is connected by a forest corridor to Corbett National Park, which together forms one of the last viable habitat for elephant in northern India. Movement along the corridor by elephants and other wildlife has been severely hampered due to several human made obstacles, perhaps the most difficult of which lie within Rajaji. Between the

Rajaji-Motichur block, and the Chilla block, the forest is reduced to less than a kilometre across. This already narrow stretch is further bissected by the Haridwar-Rishikesh road, Haridwar-Dehradun railway line, an army camp, resettled villages of the Tehri Dam oustees, and finally the River Ganga. Across the river lies the most difficult obstacle of all which is the Chilla Power Channel. This power channel is virtually impassable for the elephants, except at two places where footbridges have been constructed over it.

4. Other Pressures: Some of the other reported pressures on the Park include poaching, especially of elephants, illegal extraction of timber, encroachments, influx of pilgrims in the adjacent towns of Haridwar and Rishikesh during festivals etc. In addition, there are several other government agencies which are operating in and around the Park area. These include the BHEL, IDPL, PWD, Railways, Department of Irrigation, UP State Electricity Board, and the Indian Army.

3.2 **Recommendations**

Broadly the recommended strategy for all these three areas is to strengthen management, to initiate ecodevelopment activities and to increasingly involve the local peoople in the management of the park. Specific recommendations for each area are given at the end of the detailed report on each Park. Given below are the basic ecodevelopment principles and list of possible activities.

ECODEVELOPMENT PRINCIPLES

Definitions

1. Ecodevelopment is a strategy for protecting ecologically valuable areas (protected areas) from unsustainable or otherwise unacceptable pressures resulting from the needs and activities of people living in and around such areas.

2. It attempts to do this by atleast three means:

2.1 by identifying, establishing and developing sustainable alternatives to the biomass resources and incomes and other inputs being obtained from the protected areas in a manner, or to an extent, considered unacceptable.

2.2 by increasingly involving the people living in and around such protected areas into the conservation planning and management of the area, thereby not only channelising some of the financial benefits of conservation to them, but giving them a sense of identity with it.

2.3 By raising the levels of awareness, among the local community, of the value and conservation needs of the protected area, and of patterns of economic growth and development which are

locally appropriate and environmentally sustainable.

3. Though, by their very nature, ecodevelopment initiatives will differ from area to area (and even from village to village), the three basic principles defining ecodevelopment are:

3.1 Site - specific, micro-level planning

3.2 sectoral integration

3.3 People's participation.

4. Ecodevelopment is not just rural development, for it is not solely directed at the economic development of the rural population for its own sake, but seeks to protect an ecologically valuable area by eliciting the support of local communities.

5. Ecodevelopment is not policing in the sense that it does not seek to protect an area by keeping the pressures out solely or primarily through the enforcement of laws aimed at excluding local people. Rather it involves the local people in the process of protecting the park from destructive activities.

6. For any ecodevelopment plan to succeed, it must be backed by an appropriate management plan for the protected area. Such a plan must, in simple terms:

6.1 define the requirements of conservation, thereby defining limits to human utilisation

6.2. make provisions for the institutional structure and processes required to manage the area and implement the ecodevelopment activities.

6.3 Identify ways in which the local population can be involved in conservation planning for, and management of, the

protected area.

6.4 Identify the interface between the management plan and the ecodevelopment plan, especially details about employment and income generation opportunities for local people and the involvement of the local communities in the planning for, and management and protection of, the area.

Ecodevelopment Planning

7. As already mentioned, ecodevelopment planning needs to be site-specific, micro level, and participatory.

8. Ecodevelopment is not a once-and-for-all, prior-to-project-implementation, planning process. It is a dynamic, ongoing, planning process which is concurrent to implementation.

9. Considering the planning process is essentially participative (using appropriate participatory rural appraisal (PRA) techniques), it involves going into village after village and taking up many days of the villager's time. Whereas this would be justified when there is a certainty that funds are going to be shortly available for responding to the needs of the village, it seems very inconsiderate to waste so much of the villager's time and unnecessarily raise their hopes when funding is uncertain or much in the future.

10. Therefore, detailed microlevel, ecodevelopment planning, for this and many other reasons, is seen as starting as soon as the project is approved and running concurrently with the first phase of the ecodevelopment project implementation.

11. For the purpose of determining the broad thrusts and the budget required, and to avoid raising unnecessary expectations, a small sample of villages is visited and the costs worked out and extrapolated for the whole area. The village visits are conducted by non-governmental organisations selected and trained for the purpose, using PRA methodology, and the findings are incorporated into a preliminary, indicative, plan.

12. The planning process involves detailed discussion with the village communities on various aspects, including:

12.1 Negative impacts of the protected area on the village (wild animals causing human death or injury, livestock death or injury, crop depredation; restriction of access to natural resources, or culturally or religiously significant locations; denial of traditional routes; ban on hunting; etc.)

12.2 Negative impacts of the village on the protected area (illegal or unsustainable grazing; collection of timber, fuelwood and non wood forest produce; setting fire or otherwise degrading the habitat; poaching or disturbing wild animals; etc)

12.3 Possibilities of minimising both types of negative impacts through ecodevelopment (measures for protection of humans, livestock and crops, and for compensating death, injury and damage; generation of biomass like fuel, fodder and small timber; soil and water conservation activities, both to generate employment and to conserve the environment; income generation activities like bee-keeping, mat and rope weaving, poultry rearing, visitor facilitation and hospitality, manufacture and marketing of other

artisanal goods; education and awareness; participation in protected area planning and management; etc.)

12.4 Village level institutional structures and processes existing and required (ecodevelopment committees, panchayats, mahila mandals, etc.)

12.5 Finances, training, research and other inputs required for implementing ecodevelopment activities.

12.6 Constraints, if any, to the success of such activities

12.7 Strategy for the transitional process and period, between the stopping of use of protected area and the establishment of the ecodevelopment initiative.

12.8 Strategy for the withdrawal phase so that even after the completion of the project, when funding has stopped, the approach is sustained.

12.9 Strategy to ensure that ecodevelopment activities in the surrounds of the PA do not result in attracting more people to the region and thereby increasing rather than decreasing the pressure on the PA.

12.10 Perceptions of the villagers about the protected area, its value and management strategy.

Institutional Structures

13. There would be three main actors in the planning and implementation of ecodevelopment.

13.1 The protected area (park/sanctuary) management authority, who should have adequate staff, preferably exclusive staff, to look after their part of the work.

13.2 Local level NGOs or, where there are no suitable local level NGOs, regional or national level NGOs who are interested and capable of working in the area.

13.3 The village community, especially the women, who need to operate out of existing institutional structures (like panchayats or mahila mandals) or, where necessary, organise themselves into ecodevelopment committees.

14. In addition, there need to be district level co-ordination committees to co-ordinate between the various field agencies and departments.

15. Some regional and central research and training institutions also need to be identified and involved with the planning, training, research, monitoring and evaluation activities.

16. For the planning process, a planning team consisting of local wildlife officials (Rangers), local NGO representatives and some local community leaders needs to be set up. They would have the task of going from village to village and finalising village level plans in consultation with the people. They would be supported by a regional/national institution which would provide regional and macro level data, and help prepare the consolidated plan for the area.

17. Depending on the major thrust of ecodevelopment activities identified for the area, specialist groups, comprising of members from local NGOs and specialised government agencies, will be set-up to advise on specific issues (ground-water harvesting, water conservation, bee keeping, horticulture, poultry, etc. etc.).

These specialist groups will assist both in the planning process and in the implementation. Only in rare cases would there be a need to bring in experts from outside.

18. Independent institutions will be identified to monitor and evaluate the project, periodically and at the end.

19. There might be a need to set up a trust or a society, involving the local wildlife officials and NGOs, in order to:

19.1 Provide an alternate process for financially supporting some of the ecodevelopment activities.

19.2 raise additional resources for ecodevelopment activities.

19.3 undertake various tasks, like the training and appointment of tourist guides, development and sale of local handicrafts, development of appropriate tourist facilities, through the involvement of the local people, and to their benefit.

19.4 Develop educational and awareness programmes for visitors and local communities.

Transitional Phase Planning

20. Many, perhaps most, ecodevelopment activities have a gestation period of one to three years before they start giving the intended benefits to the local people. For ecodevelopment to succeed as a strategy, it has to be ensured that during the gestation period (transitional phase) the people are not put through unnecessary hardships, nor is the protected area allowed to degrade.

21. Measures aimed at tiding over the transitional period could include the making available of alternate sources of biomass (fuel, fodder, etc.) to the community on terms and conditions not worse

than what they were getting earlier. However, care should be taken to ensure that transitional measures do not compromise, for example by making people dependent on free handouts, the chances of success of sustainable ecodevelopment initiatives.

22. Such measures could also include developing alternate systems of income, for example long term employment as forest guards or occasional employment in the various management activities in the protected area. Training programmes, with stipends, intended to develop the skills required for pursuing various ecodevelopment activities can also be scheduled in the transitional period. Efforts must also be made to find employment in construction and other activities related to the ecodevelopment project and to schemes of districts agencies. Transitional planning must attempt to make accessible, to the local people, other areas in the region, especially waste, common and forest land. Whereas ecological regeneration and afforestation work in waste and common lands can provide almost immediate employment to a significant number of the local people, forest land outside the protected area can support Joint Forest Management (JFM) initiatives.

23. The development of appropriate tourism can also provide almost immediate employment to the local people, especially as tourist guides or through the provision of food and accommodation to the tourists.

24. The Environment (Protection) Act might also need to be invoked in the buffer areas for ensuring the success of ecodevelopment initiatives.

Financial Arrangements

25. The timely release of ecodevelopment funds to the park director and, further, to the concerned voluntary agencies and village committees has to be guaranteed.

26. There also has to be adequate decentralisation of financial powers to ensure that sanction of activities and expenditure are not delayed and that the required flexibility of decision making, at the field level, is retained. It also has to be ensured that field officers have the flexibility to respond to all of the various eco-development needs.

27. There must also be an ability to release funds to voluntary organisations and village level committees.

Criteria for Site Selection

28. From the protected areas in India, a list has to be developed of those whichare threatened by the types of pressures that can be tackled by ecodevelopment. Eco-development, as a strategy, is appropriate only for those areas where the threats are due to pressures from local (rural) communities. In areas where the major threat is from a national highway, or from commercial logging or industrial pollution, strategies other than eco-development might be more appropriate.

Ofcourse, an area can have both types of pressures. In such cases, ecodevelopment can become the means of tackling pressures from local communities while other strategies can be employed to tackle the other problems.

29. After a selection has been done of potential areas for

ecodevelopment, they need to be classified as follows.

I Areas where current, local community, needs for biomass (grass, fuelwood, fodder, non-timber produce etc.) are the major threats and these can be sustainably met from available resources, once these resources are better managed (closing/rotation of grazing areas, regeneration/plantation of fuelwood and other species, soil and water conservation activities etc.)

II. Areas where though current, local community, needs for biomass cannot be completely met, in a sustainable manner, from local resources, there is potential for reducing local needs for biomass to sustainable levels through indirect methods.

Such indirect methods could include minor interventions like stall feeding of livestock, replacement of local breeds of cattle with high yielding breeds, or introduction of smokeless chullahs, to major interventions like setting up schools and training programmes to enable villagers to seek non-biomass based employment, minor irrigation, water harvesting and soil conservation schemes to enhance agricultural productivity, development of cottage industries and artisanal skills, etc.

III. Areas where even the combination of direct (biomass regeneration) and indirect (diversion of biomass needs) strategies would not be adequate to remove the threat to the environment and where larger, perhaps regional, interventions would be required.

Within each category, the areas should be graded in accordance with the severity of the problem.

30. A decision has, then, to be made on which areas are to be

selected. In the long run it might be possible to cover all the areas, but in the short run a priority has to be established.

Given the circumstances, in some cases it might be preferable to first take up the easier areas (category I), especially if experience needs to be accumulated and resources are scarce. On the other hand, the more difficult areas (category II & III) might require attention more urgently and any further delay might cause irretrievable damage. Though the final decision would have to be made case by case, depending on the experience, training and confidence of the persons concerned, the resources available and the ecological value and level of threat pertaining to each area, as a general principle it is advisable to go from the simpler to the more difficult areas as the experience and confidence gained would help in facing increasing levels of difficulty.

Another factor that should influence the choice of the area is the willingness and ability of the local communities to participate in the process. Even simple problems cannot be tackled without involvement of local communities, while the most difficult ones can be overcome if the people are willing to co-operate.

31. Initially it is advisable to deal with each area separately, though at a later stage it might be advantageous to link up the various ecodevelopment initiatives in a region.

INDICATIVE LIST OF INFRASTRUCTURE/ACTIVITIES

PA MANAGEMENT INFRASTRUCTURE/ACTIVITIES			
Infrastructure/ Activities	**Description**	**Prerequisites**	**Constraints**
Protection Activities			
Construction of Roads Metalled/ Jeepable Motorcycle/Pony	To facilitate mobility leading to better protection. Construction and maintenance would generate local employment	A proper survey of the area is required, to decide on the optimal alignment	Construction of roads disturbs the environment. Availability of roads some times increases threats to the environment
Operationalising anti poaching squads	Comprising of local people, to help protection. Also generates employment and involves local people in PA management	Training of the recruits	Unless properly manages these squads can themselves become a disturbance/threat to the environment

Employment of fire watchers/protection workers	Fire watchers will be employed during the fire season to act as look-outs and as an early warning system. They would also assist in fighting fires. Other protection workers will be employed to make fire lines and clear inflammable undergrowth.	Men and women to be required as wage labourers and trained to perform the required functions.	Wage labour should only be a temporary phenomenon. It can lead to insecurity and oppression. Wage labourers must be urgently made self-employed or permanent.
Constructing stone walls as a crop protection measure	Stone walls with deep foundations can be built to prevent wild boar and other animals from entering the farmer's fields. Some local employment will be generated.	Availability of local stones or other appropriate building material	Expensive to build & maintain. Sometimes resented by the local people, because also prevent cattle from entering PA and at times interfere with drainage.

Infrastructure/ Activities	Description	Prerequisites	Constraints
Constructing elephant proof trenches as a crop protection measure	Trenches dug to specific dimensions in order to prevent elephants and other animals from leaving the PA. Also provides some local employment.	None	Likely to be filled up with silt and therefore requires regular maintenance. Villagers are also likely to fill it up in some places in order to allow their cattle into the forest.
Elephant proof energized fencing as a crop protection measures	Electrified fences around PA to keep elephant & other animals from straying out.	Energy source	Needs regular maintenance. Also, often wires are stolen and have to be replaced.
Tourism Related Activities			

Training and/or appointment of nature guides	Local people could be appointed to accompany tourists as guides. Given their local knowledge, they would be invaluable to the visitors. This activity would also generate income for the local people and give them a stake in the PA, as protecting the PA would mean sustained tourist traffic and, therefore, a sustained income for them.	Training for requisite skills and to familiarize them with local fauna, flora and habitats.	Unless strictly controlled, can lead to disturbance as guides compete with each other to show wildlife to tourists.

Infrastructure/Activities	Description	Prerequisites	Constraints
Development and provision of tourist accommodation	Local people around the PA could provide bed and breakfast to tourists in their houses. They could also form co-operative to run common tourist facilities, run on self-service, minimum disturbance, principles.	In appropriate tourist facilities run by the government or corporate/business interests will have to be phased out from the area. Training in 'appropriate hotel management' will have to be provided. Proper accommodation and other infrastructure; and marketing, of the tourist accommodation will have to be ensured.	Like all business ventures' there is an element of risk and, as the investment is heavy, there could be a loss. Also, if the facilities are not run on a minimum disturbance principle, there could be resultant environmental damage. Has the risks associated with any business venture.

Development & sale of literature on the PA	Literature such as bird/mammal lists, maps, information on the PA, & of historic monuments within PA tribal lore etc. can be published by co-operatives of the local people.	Requires research and survey and some training in publishing and marketing.	None
Setting up and running of interpretation centers	Interpretation centers can be a method for disseminating information on the PA and its fauna & flora. They can also be a centre for information exchange between local people and visitors and can provide some local employment.	Building, equipment, literature, audio visual aids and trained staff.	At present, interpretation centres in many PAs have not been functioning very well. Perhaps the reasons for this need to be assessed.

Operating a safari park	A safari park can divert some of the tourist pressure from the PA and also provide assured viewing of sought after species.	Space should be available in the periphery of the PA. Staff to manage.	Requires a large number of visitors to be viable. Is expensive to set up and maintain.

Infrastructure/ Activities	**Description**	**Prerequisites**	**Constraints**
Water, Soil, and Energy Related Activities			
Construction of check dams	Construction of check dams for soil and water conservation will provide local employment and other ecological benefits.	Selection of appropriate sites for the check dams, and the use of appropriate designs.	Need regular maintenance.
Plugging of gullies	Gully plugging for soil and water conservation will also provide local employment and other benefits.	Selection of appropriate sites	Need regular maintenance

Establishment of dug/bore/tube wells	For Provision of drinking and irrigation water. Will provide local employment and help local communities and their agricultural activities.	Availability, location and sustainability of ground water resources has to be determined.	Ground water levels need to be monitored and sources protected from contamination.
Development of lift irrigation	This would involve bunding of small depressions and installing pump sets with pipe lines.	A through hydrological survey for ground water sustainability should be carried out. Pump sets required.	Pipelines difficult to maintain. Expensive to set up and run.
Setting up of bio-gas plants	Individual and community bio-gas plants set up to utilise local dung, meet fuel demand and encourage stall feeding of cattle.	Training in running and maintenance of the bio gas plants. Sufficient gobar and water supply.	In the past, community plants have not proved very successful and individual plants are only viable in the homes of the richer people having at least five or six heads of cattle.

Infrastructure/ Activities	Description	Prerequisites	Constraints
Introduction of improved stoves	To provide fuel-efficient stoves suited to local needs and conditions, and thereby conserve fuel, especially wood, and prevent diseases caused by wood, fire smoke.	Training in the manufacture, installation & maintenance of these stoves.	Difficult to get the community to accept and keep.
Bio-mass Generation in Common Lands			
Establishment of nurseries	To supply fuel-fodder-timber and fruit saplings for local use. This would also generate local employment, especially among the women and ensure adequate supply of good quality saplings.	Adequate land for the nursery should be available in the project area. The local people might require some training.	Seed and sapling quality are critical to the success of the nursery. Nursery will not succeed in areas, where sapling are being distributed free or at subsidised rates by other agencies.

Establishment of fuel wood plantations	Fuelwood plantations outside the PA, especially in village common lands and on forest lands through joint forest management, will supplement local fuelwood supply. Local employment will also be generated.	Technical help from the Forest Department, adequate & timely supply of good quality saplings, and availability of land.	Usually difficult to protect, unless there is strong co-operation among the local people.
Establishment of fodder plantations	Fodder plantations in village common lands, and forest and other lands outside the PA, would supplement the local fodder supply. Local employment will also be generated.	Technical help from the Forest Department. Availability of village common land, forest and other lands.	As above.

INCOME GENERATION ACTIVITIES			
Primary Sector Activities			
Sericulture (family units)	Silk weaving has been a traditional craft in rural India. Local expertise can be tapped for silk cocoon rearing and production of silk yarn.	Where the climate is stable mulberry plantation can be started. Small plots in the project area are required to started mulberry plantations. Rearing sheds need to be built. Larvae are to be supplied.	This activity requires some land. Mulberry cultivation can be given only to those beneficiaries who have some land. The possibility of starting it on common lands as a co-operative venture should be explored. If exotic species are involved, it can be hazardous to the environment. It can also lead to the conversion of natural habitats into sericulture plantations.

Bee keeping	Keeping of bees for sale of honey and bees wax.	Bee hive and other equipment. Training	Not able for places far from forests. Coll on of nectar by bees comes constrained due lack of vege ion.
Pig rearing	Rearing of pigs for supply to the meat market.	Some land for sheds.	Can b iven as income gener .on unit only if there is a convenient market for pigs/pork.
Rearing of poultry (broilers)	Rearing broilers for both eggs and meat.	Broiler unit requires land to build the cages and store the feed. Veterinary care and insurance also required.	High yielding but requires well developed market structure. Subject to diseases.

Infrastructure/ Activities	Description	Prerequisites	Constraints
Rearing of poultry local variety	Rearing of poultry for eggs and meat.	The local variety of chicken can be maintained even by the landless.	Danger of depredation by predators. Some danger of disease.
Mushroom cultivation (button)	Edible mushroom has a ready market. It can be grown at the homestead in about 50 metal trays. Three crops can be raised per annum.	Shed Equipment Spawn Some training Market Linkages	
Mushroom cultivation (Paddy Straw Mushroom)	As above	-do-	

Inland Fisheries	Small ponds, the size varying from 0.25 to 2.5 acres may be excavated for breeding fish and to serve as seed farms. Larger ponds on common lands to be controlled by the ecodevelopment committee can also be planned.	Land and Water	Lack of land among the poor. May be suitable only for medium/large farmers.
Rabbit rearing	In colder climates rabbits can be reared for fur. Meat is also consumed. Animal husbandry department supplies the breeder unit and buys back the animals. The breed may be Angora or local breed as per site requisites.	Some cages are required. Feed concentrates are required. Insurance cover has to be arranged.	Not suitable for all area. There is a danger that exotic varieties of rabbits get accidentally introduced into the PA.

Primary Sector Activities (Community units)			
Infrastructure/Activities	**Description**	**Prerequisites**	**Constraints**
Sericulture (Kosa/Tassar)	Local varieties like Kosa silk worms can be established for producing silk.	Proper selection of host trees and training to the locals in yarn making. Market linkages to sell the collected cocoons and the yarn needs to be built up.	Can modify the environment and effect biodiversity if taken up too intensively.

Production of Lac	Lac insects can be introduced on the host trees in JFM areas. They grow on a number of host trees covering a wide range of climates. In western and central India, lac has been a traditional raw material for artisans.	Collection centers and training cum production centre for lac articles. Suitable host trees.	Tho jew lac yet cor res on of resp The adv eco int ins	ı lac bangles and :y are popular, roduction has not een developed on a rcial scale. More ch has to be done various stains insects and the tive host tree. night also be e impact on the tem. Through the uction of lac s.

Secondary Sector (family units)

Sissal/banana/coir/rope making	Rope from sissal fiber, banana fiber and coir fiber is made by hand or machines to be used for packing and also in making door-mats and other utilitarian articles.	Training for 6-10 months and availability of raw materials. Markets survey is also required.	The market for rope is uncertain, prices are low, and these is competition from the industrial sector and from plastic and other synthetic products.
Weaving khadi through the use of improved charkhas	Khadi village Industries Board will impart training, supply the charkhas, supply cotton and buy back the yarn	Training. Procurement of charkhas	none

Infrastructure/Activities	Description	Prerequisites	Constr ints
Chalk crayon making	Making of chalk crayons to be used by schools.	Training, procurement of raw materials and cooperatives Market linkages. Training will be given for these activities under DWACRA scheme of government.	Till m rket linkages are establ shed and the requir d quantity is estima ed, the activity may nc take off.
Envelope making	Making Paper envelopes for stationary stores	As above	As a e

Paper making from waste material	Some parts of Rajasthan have been having the tradition of making paper from waste collected in urban centres. Training will be given in paper making from recycled waste products. Will also generate some employment.	Waste paper & other material will be the raw material. Machinery & Shed, market linkages.	None
Tailoring	To teach tailoring skills, mainly to women.	Training, and loan for procuring raw materials Market survey and linkages	It may not be useful to train a large number from the same area as, one or two artisans are enough to service a large number of households.

Carpet Weaving	Where local expertise exist carpet weaving can be one of the income generation schemes.	Machinery, Wool, Shed and Market. Training will be given under IRDP scheme of Government.	He · initial in tments. For the su y of raw materials sh breeding may in ase which is not en› onmentally ber cial. This activity sh be based only in .c ionally sheep rear g areas.

Infrastructure/Activities	**Description**	**Prerequisites**	**Cons aints**
Blanket weaving	As above	As above	As a ve

Lantana Chip Board Cottage Industry	From eradicated Lantana weeds, compacted chip boards are being manufactured. This is a waste recycling unit suitable to areas having Lantana weed infestation.	Raw material from forest Unit. Machinery Markets.	Heavy initial investment is required. Whether this unit will have sustained raw material input has to studied.
Dal (Pulses) processing	De husking and cleaning the dal and pulses and packing for sale	Procurement of raw materials	Heavy initial investment in raw materials