CENTRAL WATER COMMISSION

GOVERNMENT OF INDIA

Dam Rehabilitation and Improvement Project (DRIP)

ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK

FINAL REPORT

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EXECUTIVE SUMMARY

1.0 PROJECT BACKGROUND

Over the years a large number of dams have been built all over India for development of water resources for irrigation, water supply, power generation and other benefits. Many of these dams are in urgent need of strengthening and rehabilitation to ensure their safety and to improve their performance. With this in view, Dam Safety Assurance and Rehabilitation Project (DSARP) was undertaken by the Central Water Commission (CWC) with the World Bank (WB) assistance in 1991. There were four participating States, namely, Orissa, Rajasthan, Madhya Pradesh and Tamil Nadu. The objectives of DSARP were to:

a) Strengthen the institutional framework for Dam Safety Assurance

b) Provide basic safety facilities and take up remedial works for up gradation of selected dams.

The project ended in 1999, but in view of the benefits obtained, it was decided to extend the dam safety activities to other States having significant number of major dams. DSARP Phase-II was thus conceived which included the States of Andhra Pradesh, Bihar, Gujarat, Karnataka, Kerala, Maharashtra and Uttar Pradesh. The DSARP Phase-II was later revised and updated as Dam Rehabilitation and Improvement Project (DRIP). The project development objective is to improve the safety and operational performance of selected existing dams. The proposed project deals with rehabilitation and modernization of existing dams. The purpose of the works is to prevent that the dams will operate under unsafe conditions due to prevailing safety issues. The project is now expected to be implemented in the following five states: Chhattisgarh, Kerala, Madhya Pradesh, Orissa, and Tamil Nadu

A good number of dams, referred to as sub-projects, have been identified by the States for rehabilitation and up gradation under the DRIP. While reviewing the rehabilitation activities to be undertaken in each of the sub-projects, it was observed that a number of them could have potential environmental / social impacts which need to be taken care of during implementation of such activities. Hence, CWC, in consultation with the World Bank, decided to undertake environmental and social

assessment of the sub-projects under consideration, in accordance with the relevant national and World Bank policies / guidelines.

Since majority of the activities were found to be common among the sub-projects, it was further decided to undertake environmental and social assessment of the activities in ten representative sub-projects to identify the potential impacts and their mitigation measures and, based on this exercise, to develop an environmental and social management framework (ESMF). The framework will indicate the impacts of each activity, the required mitigation measures and the responsible entities for implementation, supervision and monitoring of the mitigation measures. It will also categorize the impacts in terms of low, medium and high. The ESMF will then be used by the concerned officials for screening of the sub-projects and for implementation, supervision and monitoring of the mitigation measures at appropriate levels.

The ten representative sub-projects were selected from the States of Gujarat, Madhya Pradesh, Maharashtra and West Bengal. Environmental and social assessment of these sub-projects was carried out and an ESMF was developed, in accordance with the scope of the study.

1.2 Scope of the Study

The scope of the study required the following key issues to be covered:

1. Review of the activities in the selected sub projects
2. Review of Policy and Institutional Framework
3. Environmental and Social Assessment of the selected sub projects
4. Public Consultation
5. Scoping and screening of impacts
6. Development of an Environmental and Social Management framework.

2.0 POLICY AND INSTITUTIONAL FRAMEWORK

Policy and institutional framework of the Govt. of India as well as relevant safeguard policies of the World Bank with regard to environmental and social management of developmental projects were reviewed in the context of this study.

The Government of India by specific legislations regulates the environmental management of projects through the following Ministries / Statutory Bodies.

- The Ministry of Environment & Forests (MOEF)
- Central Pollution Control Board (CPCB)
- State Pollution Control Boards (SPCBs)
- Ministry / Department of Environment in the States

The relevant policies / acts / notifications in this regard are:

I. Environment Protection Act, 1986
II. The Forest Conservation Act, 1980
III. Water (Prevention and Control of Pollution) Act, 1974
IV. The Air (Prevention and Control of Pollution) Act, 1981
V. The National Rehabilitation and Resettlement Policy, 2007
VI. Environmental Impact Assessment Notification, 2006

The safeguard policies of the World Bank are given below:

OP / BP 4.01: Environmental Assessment: The objective of this policy is to ensure that Bank financed projects are environmentally sound and sustainable

OP/BP 4.04: Natural Habitats: The policy recognizes that the conservation of natural habitats is essential for long-term sustainable development. The Bank, therefore, supports the protection, maintenance and rehabilitation of natural habitats in projects funded by it. The Bank supports and expects the Borrowers to apply a precautionary approach to natural resources management to ensure environmentally sustainable development.

OP 4.36: Forestry: This policy focuses on the management, conservation, and sustainable development of forest ecosystems and resources. It applies to projects which may have impacts on
(a) The health and quality of forests;
(b) The rights and welfare of people and their level of dependence upon forests. The Bank does not support significant conversion or degradation of critical forest areas / natural habitats.

OP 4.09: Pest Management: The Policy encourages promotion and use of biological or natural pest control methods and reduced dependence on chemical pesticides.

OP/BP 4.12: Involuntary Resettlement: The objective of this policy is to avoid or minimize involuntary resettlement, exploring all viable alternatives. Furthermore, it intends to assist displaced persons in improving their living standards; to encourage community participation in planning and implementation of resettlement; and to provide assistance to affected people, regardless of their legal status on the title of land.

OP 4.10: Indigenous People: This policy aims to protect the dignity, right and cultural uniqueness of indigenous people; to ensure that they do not suffer due to development; and that they receive social and economic benefits of development.

OP N 11.03: Cultural Property: The objective is to ensure preservation of cultural property in the project area. This includes preservation of archeological remains and unique environmental features.

OP/BP 4.37: Safety of Dams: The policy requires that adequate measures are undertaken to ensure the safety of dams during its life cycle, both for new dams and dams taken up for rehabilitation and up-gradation.

OP/BP 7.50: Projects on International Waters: This policy is applicable in case of dams on rivers with basins falling in more than one country.

OP/BP 7.60: Projects in Disputed Areas: This policy is applicable where projects may affect relations between neighboring countries due to their location / operations.

3.0 ENVIRONMENTAL AND SOCIAL ASSESSMENT

The activities proposed in each of the ten representative sub-projects were studied and reviewed. A baseline survey was then carried out at each of the sub-projects to establish the existing environmental and social status. This included the study of physical, biological and socio-economic environment of the sub-projects and their surroundings, collection and study of secondary data, such as, meteorology, geology,

topography, flora & fauna, as well as, consultations with local communities and officials of Water Resources Department, Dam Safety Organisations, Irrigation, Fishery, Tourism and Power Departments of the concerned States. Details of consultations are discussed separately in the subsequent section.

Environmental and social assessments of the sub-projects were then carried out for potential impacts and mitigation measures.

4.0 Stakeholders and Public Consultation

The process of consultation involved formal and informal discussion including individual interviews, and meetings with local villagers including women and other weaker sections of the communities, as well as, concerned officials of the following government departments:

- Central Water Commission
- State Water Resources Department
- Agriculture Department
- Hydro Power Development Agencies
- Municipal Development Board
- Public Health Department
- State Forest Department
- Fishery Department
- Tourism Department

4.1 Issues Discussed:

A wide range of issues were discussed with various stakeholders which might have environmental / social concern. These are listed below.

- Intensity of rainfall and inflow from the upstream
- Downstream flooding problem due to dam water release.
- Structural aspects of dams.
- Water Quality and Siltation Problem
- Water distribution and canal related problems
- Local issues

- Tourism potential
- Hydro power generation
- Land use pattern
- Catchment Area Treatment
- Rainfall monitoring and Alarm system
- Environmentally sensitive areas in the vicinity
- Fishing activity within the reservoir

4.2 Major Findings and Recommendations

- The Alarm system to warn the local people during emergency water release need improvement. The system relies on mobile phone service which depends on the efficiency of such service providers.
- Adequate rainfall monitoring station be installed to assess the inflow from upstream in advance.
- Promotion of fishing activities should be taken up within the reservoirs. A part of the revenue should go to the Water Resource Dept. towards maintenance of the dams.
- There is good potential for tourism development with economic benefits for the locals. Development of suitable infrastructure is required for this purpose.
- Siltation rate is quite high in some places affecting the storage capacity and water quality of the reservoir.
- Catchment area treatment may be prioritized. Better coordination between the Forest Department and Irrigation Department may be ensured.
- There are some major structural problems in some of the dams. Extension of guide wall and increase in the height of sill is required to minimize flooding effect in the immediate downstream and to protect the scouring of the stilling basin.
- Canal systems need to be strengthened for better water distribution system and to minimize water loss.
- Hydropower should be developed where potential exists.
- Leakages in masonry work and choking of drains are major problems.

4.3 Assessment of key environmental and social issues:

A few points that were identified during the environmental and social assessment of the sample of dams are summarized in more detail.

Changes in water allocation upstream and downstream of project dams as a result of the project activities are not expected. The configuration of the dams will not change (no change in dam height, spillway crest level, etc.). Almost all dams do fill up now and spill, and this will continue after the project, but with a safer dam. As there are annual flood events there are limited opportunities to encroach on silted areas within the reservoir. Desilting of reservoir areas will not be a major activity under the project. There are only requests for possible desilting of a few State Electricity Board dams, and these are in remote areas where there is no encroachment.

In the unlikely event that the remedial work on the dam requires land acquisition or resettlement, OP 4.12 on Involuntary Resettlement has been triggered. The ESMF already details the process to be followed for the preparation of a Resettlement Action Plan (RAP) in the event this may be required.

There will be no change in reservoir volume for those dams that do spill already now. For the dams where the reservoir area is at the moment kept below full supply level for safety reasons, the rehabilitation works will allow a complete filing up afterwards, giving a positive impact (more water availability). Negative changes in overall water regime are therefore not expected. O&M manuals will be updated and the water delivery regime will be included.

OP 4.10 on Indigenous Peoples has been triggered to address the eventuality that any sub-project dam is in a tribal area and the DRIP activity affects tribal populations. The ESMF already provides the procedure for preparation of an Indigenous People's Development Plan following all requirements of OP 4.10 that will include a process map for implementation which includes free, prior, and informed consultations with affected communities leading to broad-base community support for the intervention. Significant impact on livelihood systems as a result of the project interventions is not expected, but as needed this will be covered in the Plan.

Although catchment rehabilitation was identified as an issue for some dams, addressing catchment management issues in a holistic way will not be carried out

under the project, as it will involve many institutions, stakeholders, and a set of complex socio-economic issues. The proposed project interventions at the dams do not have any negative impact on the catchment areas, so it will not worsen the situation. If for the sustainability of rehabilitation and improvement of a dam, some catchment area treatment is seen as essential it can become part of the sub-project interventions.

5.1 Identification of Activities

Based on the analysis of the sub-projects, activities have been identified where environmental/social impacts need to be addressed. The activities taken into consideration are:

Activities identified for DRIP

1. Reservoir Desiltation,
2. Tourism Development,
3. Approach road, dam crest roads, etc. construction / improvement,
4. Hydropower Generation,
5. Standby Generator,
6. River Regradation,
7. Flood Protection Network,
8. Wind Mill & Solar Power,
9. Treatment of leakage through masonry and concrete dams and reduction of seepage through earth dams and their foundations,
10. Improving Dam Drainage
11 Structural strengthening of dams to withstand higher earthquake loads,
12. Remodeling earth dams to safe, stable cross sections,
13. Improving toe drain and seepage measuring devices,
14. Improving ability to withstand higher floods including additional flood handling facilities, if needed,
15. Repairs to damaged spillways, stilling basins and downstream channels,
16. Improving dam safety instrumentation,
17. Improving communications – real-time as much as possible – between dams, upstream rain/river flow gauging stations and with other dams, control offices and civil authorities in flood plains downstream of the dam,
18. Flood marking,
19. Low voltage electrical supplies in inspection and drainage galleries
20. Improving lighting for external areas of dams,
21. Inspection launches provision,
22. Rehabilitation / Improvement of Spillway, head regulator and draw-off gates and their operating mechanisms,
23. Repair / Modification of Spillway Gates,
24. Cleaning of foundation drain & porous drain,
25. Repair and cleaning of irrigation outlets

Construction phase interventions, such as improvement of access roads, labor camps, silt disposal, and other ancillary temporary infrastructure may produce impacts on the communities in proximity. The ESMF does provide for addressing construction phase interventions, including how to deal with labor camps. The template discussed below will describe any major issues related to construction phase interventions that are identified at the investigation and pre-design phase. For example, in the rare instance there will be reservoir desilting, the design will have to determine the amount of silt and will have to prepare a specific plan where the silt will be deposited. The ESMF suffices to identify this as an environmental issue to be addressed during design and construction.

There may be some dams which are near protected areas. As a rule, activities inside protected areas, such as borrow pits and building access roads, will not be allowed. Construction management plans will take into account the protected areas. If indeed the rehabilitation and improvement of a specific dam is in the vicinity of a protected area, as identified by the template, it will be ensured that a (partial) EA/EMP will be prepared.

There are readily available, well-developed environmental specifications and it will be ensured that such specifications will indeed be included in the technical specifications of each tender document. The contractor will have to factor costs related to the implementation of environmental mitigation aspects in his bid. Site engineers will be instructed to supervise the compliance with the technical specifications, including the environmental clauses. As part of the third-party construction supervision and quality control, the Consultant will ensure compliance as well.

For some dams the water levels in the reservoir will have to be brought down to facilitate repairs of the upstream face or carry out other works, which may temporarily disrupt release schedules. This is an aspect that will be taken into account during the design phase of the project. The technical guidance is that all alternative technologically and financially viable options which do not require or reduce reservoir draw-down will be taken into account. If it is unavoidable, the needed works will be planned during the period when the reservoir is at its lowest level, which is typically after the Rabi irrigation season and before the monsoons. The disruption to the water users will thus be minimal. In the worst case, the project will be ready with a

communication strategy to inform the water users about temporary changes in water supply.

5.2 Scoping

In order to develop the ESMF for the identified activities, a scoping exercise was carried out to identify the components involved for execution of the activities. The components here signify the operational requirements for implementations of an activity in terms of manpower, machinery, materials (e.g. borrow/quarry materials etc) which are likely to cause environmental / social impacts. The components thus identified are listed below:

Components Identified

- Acquisition of forest land, if any
- Borrow materials/ area
- Quarry materials / area
- Blasting
- Dredging/Desiltation
- Resettlement and Rehabilitation (anticipated in rare cases)
- Labour Camps
- Heavy machinery
- Hot mix plant
- Concrete mixer and heavy pumps
- Material handling and storage
- Temporary land acquisition
- Tree felling/ vegetation clearance
- Haulage of machinery
- Debris Disposal
- Transport of materials
- Small tools and pumps
- Sheds to keep machines and tools

5.3 Categorisation of Components

The components were categorized as A, B and C based on extent of adverse impacts

Category A (major impact)	Category B (Moderate impacts)	Category C (Negligible impact)
Acquisition of forest land	Heavy machinery	Small tools and pumps
Borrow materials/ area	Hot mix plant	Sheds to keep machines and tools
Quarry materials / area	Concrete mixture and heavy pumps	
Blasting	Material handling and storage	
Dredging/Desilting of reservoir	Temporary land acquisition	
Resettlement And Rehabilitation (anticipated in rare cases)	Tree felling/ vegetation clearance	
	Haulage of machinery	
	Debris Disposal	
	Transport of materials	
	Labour Camps	

5.4 Screening

A Screening exercise was then carried out to delineate the potential environmental and social impacts due to the components identified.

6.0 ANALYSIS OF ALTERNATIVES

An analysis was carried out for the sub-project activities to develop alternative scenarios which included no-project alternatives, no-component alternatives and with-component alternatives. The preferred alternative suggested is with-component alternative.

7.0 ESMF

The ESMF is the instrument that provides the necessary guidance to identify salient environmental and social issues early on, prepare, as needed, remedies and plans to address these issues, and monitor implementation. Keeping in view the specific requirements of ESMF, five forms have been developed. These forms will serve as reference material for use by the field officials/engineers to enable them to develop and impact sub-project specific ESMF. The forms are briefly described below.

The 25 sub-project level activities identified for the development of the ESMF have been given in **Form SC-1** for the purpose of identifying the activities relevant to a specific sub-project and screening out the other activities. The responsible entity at the dam level will carry out this task.

To identify the potential environmental / social impacts of an activity, the tasks and facilities required to be performed and provided for the activity are needed to be identified. These have been termed as components of an activity. A list of all possible components have been prepared and given in **Form SC-2**. For each activity, the components involved can be identified by dam level officials.

Form SC-3 provides the identified sub-project activities in the first column, the components involved in the second column and potential impacts in the third column. Last two columns refer to implementation phase (I) and post-implementation phase (P).

Based on potential environmental and social impacts associated with each component, these have been categorized as A, B and C and are given in **Form SC-4**.

Category - A Components have major environmental / social impacts and require specific environment management plan (EMP) for implementation of mitigation measures. This EMP is to be incorporated in the bid document for the contractor / implementing agency to follow during implementation, as well as, post-implementation.

Category - B Components have moderate environmental / social impacts and certain precautionary measures have to be followed by the contractor and the project authorities to minimize impacts during implementation as well as post-implementation.

Category - C Components have negligible or nil environmental / social impacts and as such, no mitigation measures are proposed for these activities.

Form SC-5 has been developed to identify mitigation measures for each type of potential environmental and social impacts. For ease of understanding and use, the components identified are given in the first column, corresponding potential impacts are given in the second column and corresponding mitigation measures are provided

in the third column. The remaining three columns indicate the entities responsible for execution, supervision and monitoring of the mitigation measures, respectively.

7.1 APPLICATION OF ESMF

The ESMF may be used for sub-projects under the DRIP at the planning, implementation and post implementation phases to identify the environmental and social concerns, as well as, the opportunities to be addressed, so that these could be integrated in the relevant project documents.

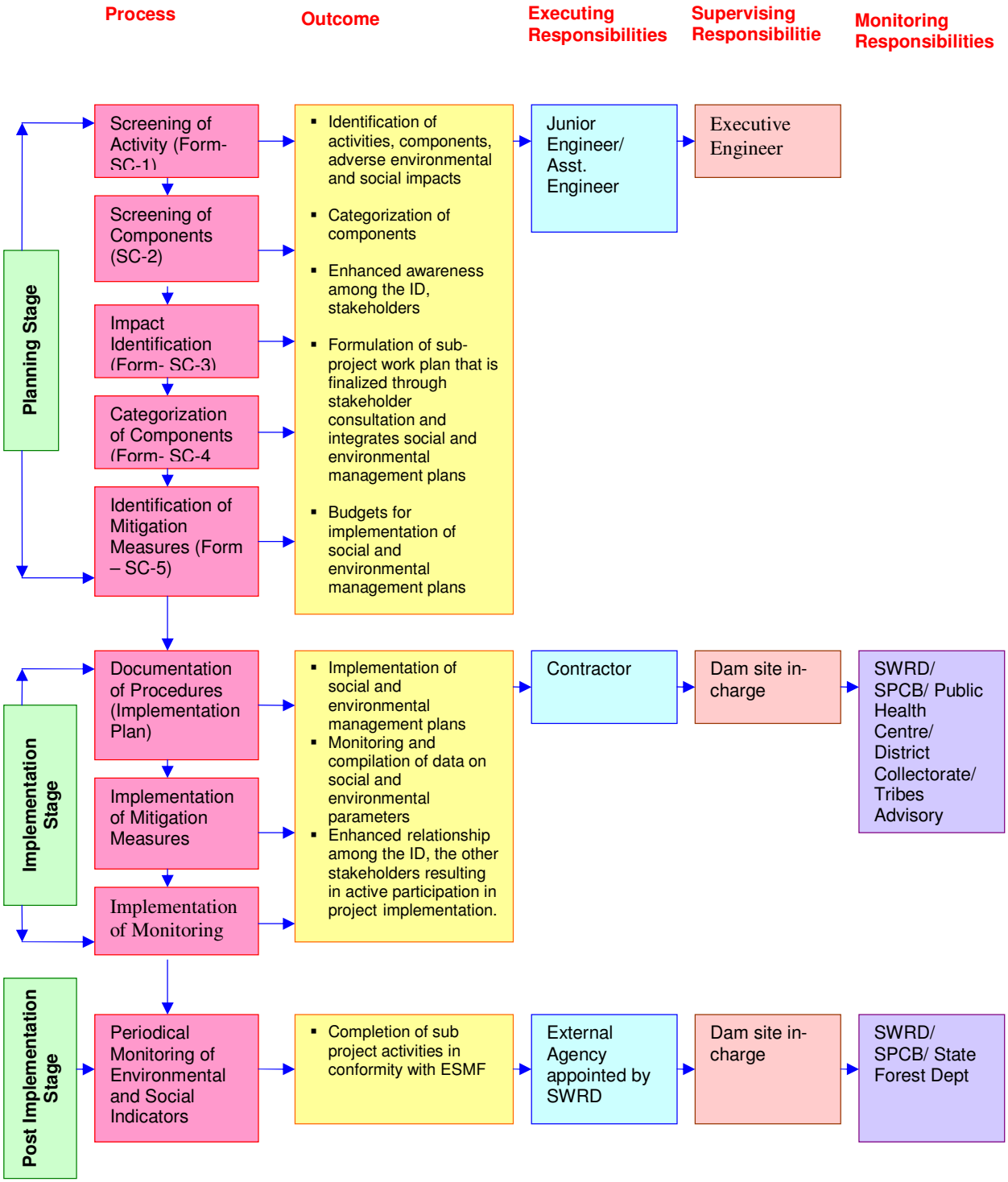
The organizational structure for DRIP consists of a Project Management Unit (PMU) at the Central level (at the Central Water Commission (CWC)), with one State level PMU for each of the 5 participating States. Each of these PMUs will include qualified Environmental and Social Development Specialists. The CPMU will be supported by a multi-disciplinary management and engineering consultant team (the Consultant) that will assist CWC with the overall implementation of the project. The Consultant's team will include environmental and social specialists. The terms of reference include tasks related to environmental and social compliance. Some of the relevant tasks of the Consultant include: provide formal training to concerned staff at state, and central level to ensure that there is full awareness about environmental and social issues and the implementation of the ESMF; provide guidance and support to collect sufficient data at the investigation stage to determine the environmental and social impacts, if any, including whether stand-alone Environmental Assessments (EA) and Environmental Management Plans (EMP) are needed based on the outline provided in the ESMF; set up and monitor a reporting system that will show in a clear and transparent way whether there are any social and environmental issues related to the rehabilitation of the dams and the mitigation actions; provide guidance and support to the implementation of adequate monitoring of social and environmental parameters; and as part of the third-party construction supervision efforts, ensure that actions agreed to minimize environmental impact are being implemented.

A template will be used that will require the concerned State level PMUs during the investigation and preliminary design stage for each dam to provide detailed information on technical, environmental, social, and all implementation-related aspects of each dam. The State level PMU will for each sub-project dam incorporate in the template the essential elements from the environmental and social screening templates

prepared as part of the ESMF (refer to Forms above). The Central PMU, assisted by the Consultant, will carry out a first level screening of each template. The Consultant will develop and maintain a web-based MIS that will capture the information from the templates. The Bank Task Team will receive and review each of the templates as well. Based on the review of the templates, a final categorization of each of the sub-project dams will be made. Those that have no major environmental or social issues can have the designs finalized and be tendered. Only the few where there may be major environmental or social issues will require the preparation of a site specific EA/EMP. This template and the MIS will allow an early identification of those dams where major issues can be expected. There will then be additional supervision efforts for these dams.

Schematic diagram for Execution of ESMF is given below.

It may be mentioned here that though the sub-project activities for the development of this ESMF have been identified based on the analysis of such activities in a large number of dams proposed to be taken up for rehabilitation under the DRIP, **this is a live document which can be improved upon at the sub-project level by the concerned authorities, as and when the need arises.**



ESMF Execution Plan

Note: At central level an experienced environmental / social consultant may be engaged for supervision and monitoring of ESMF implementation in the state on behalf of CWC

In rare cases, development of a resettlement action plan may be called for, including relocation of cultural / common properties of the affected population. Similarly, tribal development plan may have to be prepared if a substantial section of the affected population are tribals.

7.2 Monitoring and Evaluation Framework

Monitoring and evaluation is primarily required to ensure proper and timely implementation of environmental and social mitigation measures identified in the planning stage, based on the ESMF. Monitoring at regular intervals during implementation and for a specified period in the post implementation stages is necessary to identify and implement any change / improvement needed in the execution of the activity or in the mitigation measures.

A monitoring and evaluation cell may be created at State level under the supervision of an official familiar with environmental and social issues of the sub-projects. He may be given suitable training if needed. In specific situations, one may consider appointing external agencies to carry out the monitoring and evaluation activities and report to the supervising official. The indicators to be monitored can be framed from the ESMF taking into consideration the activities involved.

The feedback received from monitoring and evaluation cell will be discussed with the implementing officials and the contractor and corrective actions will be taken, where necessary.

7.2.1 Monitoring Budget

A monitoring budget has been drawn up considering various environmental and social components. This provides cost for different mitigation measures of likely environmental/social impacts at sub-project level. Cost for environmental enhancement measures and monitoring has also been included. It also gives cost for plantation, enhancement of sites, and cost of monitoring.

7.3 Training & Capacity Building

The key to institutional reforms would be well-trained and motivated human resources. Competence levels of the departmental officials and their ability must be assessed and training in new skills provided. Cultural sensitivity, group dynamics, conflict resolution,

leadership and ability to work with user population are as important as the engineering skills which are already in place. This will require the co-option into water resources department of social, gender and environmental subject matter specialists. This would also be an appropriate opportunity for assessing the capabilities of state training institutions, and enhance them if necessary. Enhanced training would also be required for local tribal population and women groups etc. The need and desirability of private sector participation should be assessed. The need for training equipment, computers, and software, training aids must be assessed, and procurement procedures should be initiated.

7.4 Institutional arrangement

Training and Capacity Building Strategy will form an integral part of the sub-project Plan and its implementation will be synchronized with other project interventions at different level. The responsibility of approving Training and Capacity Building Strategy as part of sub-project Plan will be with the PMU. The PMU will ensure that Training and Capacity Building Strategy conform to the agreed strategy of the project.

Inter-sectoral coordination will be ensured at the Government (PMU), IDC and Project level through PMU. At the PMU level, a Project Steering Committee chaired by the Secretary and comprising of Chief Engineers of various IDCs and Project Divisions will provide inter-departmental coordination and strategic directions, decisions and support with a view to ensure timely and successful implementation of all project activities

Training, awareness-raising, and capacity building strategies have been planned and factored into the project budget. The Central Water Commission will provide the necessary centralized support and facilities for the training and capacity building for different state level officers.

8.0 ENVIRONMENT AND SOCIAL MANAGEMENT PLAN

One of the requirement of the present study was to develop a sample environmental and social management plan (ESMP) to serve as a guide for preparation of a project specific ESMP. The sample ESMP is placed at chapter 8 in this report. It covers various aspects to be considered while preparing an ESMP, such as, management of dust and emissions, borrow and quarry areas, solid waste, labour camps, tribal

development, resettlement and rehabilitation. The ESMP also details monitoring requirements, institutional framework, training and capacity building aspects.

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INTRODUCTION

1.1 BACKGROUND

Over the years a large number of dams have been built all over India for development of water resources for irrigation, water supply, power generation and other benefits. Many of these dams are in urgent need of strengthening and rehabilitation to ensure their safety and to improve their performance. With this in view, Dam Safety Assurance and Rehabilitation Project (DSARP) was undertaken by the Central Water Commission (CWC) with the World Bank (WB) assistance in 1991. There were four participating States, namely, Orissa, Rajasthan, Madhya Pradesh and Tamil Nadu. The objectives of DSARP were to:

a) Strengthen the institutional framework for Dam Safety Assurance

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The project ended in 1999, but in view of the benefits obtained, it was decided to extend the dam safety activities to other States having significant number of major dams. DSARP Phase-II was thus conceived which included the States of Andhra Pradesh, Bihar, Gujarat, Karnataka, Kerala, Maharashtra and Uttar Pradesh. The DSARP Phase-II was later revised and updated as Dam Rehabilitation and Improvement Project (DRIP). The project development objective is to improve the safety and operational performance of selected existing dams. The proposed project deals with rehabilitation and modernization of existing dams. The purpose of the works is to prevent that the dams will operate under unsafe conditions due to prevailing safety issues. The project is now expected to be implemented in the following five states: Chhatisgarh, Kerala, Madhya Pradesh, Orissa, and Tamil Nadu.

Management of environmental and social impacts is a very important component of such developmental activities and, rightly therefore, it has been emphasized to take care of environmental and social issues relevant to the projects under DRIP. In this context, CWC in consultation with the World Bank, has decided to undertake environmental and social assessment (ESA) of dams rehabilitation projects in accordance with the relevant national policies and World Bank policies / guidelines.

In order to rationalize and simplify the tasks of environmental and social management of dams rehabilitation, ten representative dams, to be taken up under DRIP, have been identified in the States of Gujarat, Maharashtra, Madhya Pradesh and West Bengal for environmental and social assessment of the project activities proposed under DRIP in each dam and for development of a management plan to mitigate the adverse impacts and enhance the benefits. Based on this study and information available with the CWC on other such project activities, an environmental and social management framework (ESMF) will be developed. The ESMF will identify the environmental and social impacts of each of the relevant rehabilitation activity, the required mitigation measures and the responsible entities for implementation of the mitigation measures and their

monitoring. The ESMF will then be used for screening of other similar projects to segregate them into low, medium and high categories in terms of their potential environmental and social impacts. This will facilitate the concerned departments and agencies to take appropriate management decision for each category of dams.

The Consulting Engineering Services (India) Private Limited, New Delhi, was engaged to conduct the Environmental and Social Assessment Study of the ten dams in the four States and to develop the ESMF. The names and locations of the dams are given in **Table 1.1.**

Table 1.1 : List of Dams taken up for ESA in Four States

Sl. No.	Names of Dams	District	Nearest main town & distance
Gujarat			
1	Dharoi	Mahesana	Kheralu (Approx. 33 km)
2	Kadana	Panchmahals	Godhra (Approx. 71 km)
3	Panam	Panchmahals	Godhra (Approx. 35 km)
Maharashtra			
4	Bhatsa	Thane	Thane (Approx. 70 km)
5	Bhatghar	Pune	Pune (Approx. 60 km)
6	Pawana	Pune	Pune (Approx. 40 km)
Madhya Pradesh			
7	Kolar	Sehore	Bhopal (Approx. 30 km)
8	Mohini Pick-Up Weir	Shivpuri	Gowalior (Approx. 110 km)
West Bengal			
9	Bara Mandira	Burdwan	Asansol (Approx. 25 km)
10	Sali	Bankura	Burdwan (Approx. 85 km)

1.2 STUDY OBJECTIVES & KEY ISSUES

The objectives of this study and the key environmental and social issues involved, as given in the terms of reference (TOR), are listed below:

Objective:

- Developing an appropriate knowledge base on environment and social issues relating to this study
- Consultation with key stakeholders and development of a consultation strategy
- Examine proposed activities and analyze environmental and social development potential positive and negative impacts
- Analyze existing environmental and socio-economic scenario and assess alternatives
- Develop an Environmental and Social Management Framework (ESMF) for the capacity building and physical investments

Key Environmental Issues:

- Institutional capacity to manage environmental issues (knowledge base, skills, training, guidelines, M&E and information system).
- Managing environmental safeguards and opportunities in dam rehabilitation and improvements investments (including dam safety, disaster preparedness

and management, operational rules / decision support systems; protection of any forest and biodiversity impacted during rehabilitation; and impacts of modified operations – e.g. modified reservoir operations, river flow patterns, - on biodiversity and forest resources [including any endangered species], on subsistence and commercial fisheries, and on public health; requirement for any limited catchment management to improve dam safety of performance, etc.)
- Managing environmental safeguards and opportunities in related investments (e.g. in fisheries, hydropower, tourism, etc.)

Key Social Development Issues:

- Institutional capacity to manage social development issues (knowledge base, skills, training, guidelines, M&E and information system).
- Managing social development safeguards and opportunities in dam rehabilitation and improvements investments (including resettlement and rehabilitation, impacts of modified operations on livelihoods of local people with special focus on tribals, women, children, the poor and other vulnerable groups, participation of local stakeholders, grievance redressal, communication strategies, local disaster management preparedness, cultural property protection).
- Managing social safeguards and opportunities in related investments (e.g. in fisheries, hydropower, tourism, etc.)

The TOR detailing scope of services to be provided is given in Annex 1.1.

1.3 STUDY METHODOLOGY

Review of secondary data, feedback from stakeholders and field visits by experts were the basic tools utilized in this study. The methodology adopted in carrying out this study involved the following steps:

- Meeting with officials of Dam Safety Directorate in the Central Water Commission and collection of secondary data / reports related to dam safety and rehabilitation issues. This included activities proposed to be taken up for rehabilitation under the DRIP in the ten dams in the States of Gujarat, Maharashtra, Madhya Pradesh and West Bengal.

- Visits to the ten dam sites for field investigations on environmental and social aspects.

- Discussions with the concerned State Government officials in Gujarat, Maharashtra, Madhya Pradesh and West Bengal on environmental and social implications of dams' rehabilitation. Discussions centered around both potential benefits and adverse impacts. The government officials included officials concerned with the management of dams, as well as, officials of irrigation, power, agriculture, fisheries and tourism departments.

- Public consultations with local villagers on the proposed rehabilitation activities in order to obtain their views with regard to potential benefits and concerns.

- Computation and analysis of data and information collected.

- Development of ESMF and preparation of reports.

1.4 STRUCTURE OF THE REPORT

The report has been presented under the following heads:

Executive Summary

Chapter 1	-	Introduction
Chapter 2	-	Project Description
Chapter 3	-	Institutional and Policy Framework
Chapter 4	-	Environmental and Social Baseline
Chapter 5	-	Scoping and Screening of Impacts
Chapter 6	-	Analysis of Alternatives
Chapter 7	-	Environmental and Social Management Framework
Chapter 8	-	Sample Environmental and Social Management plan

Annexes

CHAPTER 2
PROJECT DESCRIPTION

2.1 PROJECT APPRECIATION

The objective of DRIP is to improve the safety and performance of dams under rehabilitation, through investments on physical, technical and managerial components of dams operation and maintenance including institutional reforms and strengthening of legislative and regulatory measures. The areas of intervention proposed under the project have two main components:

i) Institutional Strengthening

The focus areas under this component are:

- Policy formulation
- Staffing of Dam Safety Directorate with appropriate skills and tools
- Establishment of experts panels with international/national experts in related disciplines at appropriate levels.
- Technical training in hazard / vulnerability assessment, dam break analysis, reservoir conservation techniques, disaster management plan preparation.
- Public awareness campaign, study tours, dam safety courses.

ii) Rehabilitation of Dams and Appurtenances

This component will focus on structural and non-structural measures at the project dams, estimated at around 250 dams, many of which are more than 25 years old. The number of dams proposed for inclusion in the project is based on proposals received from the states. The states have done a review of the status of their dams and have determined those dams that are in need of rehabilitation and improvement in order to guarantee their future safety and operational capacity. The proposed interventions will include such works as: treatment of leakage through masonry and concrete dams and reduction of seepage through earth dams and their foundations; improving dam drainage; improving the ability to withstand higher floods, including additional flood handling facilities, if needed, accompanied by structural strengthening of dams; rehabilitation and improvement of spillways, head regulators, draw-off gates and their operating mechanisms, stilling basins and downstream channels; increasing spillway capacity as required by the results of the hydrological assessments, but only in those cases where this is physically possible and cost effective, otherwise non-structural measures have to be considered; improving approach roads; and improving dam safety instrumentation. The support will also include hydrological assessments, sediment management, and other measures required to improve the safety and operation of the dams and associated appurtenances. In addition, preparation of asset management plans, emergency preparedness plans, emergency warning systems, public awareness, and floodplain mapping will be included.

Institutional Strengthening
This includes:

- Manpower strengthening of State Dam Safety Organisations (SDSO)
- Consultancy Services for Dam Safety Inspections under Phase-II

- Regular Safety Inspection by the Experts
- Training Facilities and Workshop
- Preparation of Emergency Action Plan
- Establishing Technical Library for SDSO
- Development of official and residential infrastructure

Basic Dam Safety Facilities

The basic dam safety facilities include:

- Site Access: It includes upgradation of existing roads and construction of new roads where needed.
- Spillway gate operations: It includes providing on-site diesel generator set for standby power, providing spare hoist motors, lighting to operating areas, etc.
- Measuring Devices: They include V notches, seepage loss recorders, peizometers, raingauge, reservoir level recorders, gauge for measuring inflow, control points to monitor settlements, climate monitoring instrumentation, etc.
- Communication Facilities: This includes providing communication system to officials associated with operations, local warning systems and flood lights for warning.
- Strategic Materials Stock Piles: This includes stocking of stone for wave protection, unfilled sand bags, timber, steel members, rope and floating savers, etc., at vulnerable places at selected dams.
- Income Generating Components like fisheries, tourism and hydro-power development for selected dams

Remedial Works

The strengthening of identified dams is envisaged by:

- Racking, re-pointing, grouting the masonry dam
- Re-sectioning the earthen dams
- Strengthening the existing spillway
- Increasing spillway capacities of some dams
- Other remedial works needed in specified cases

2.2 PROJECT ACTIVITIES OF TEN DAMS

The activities proposed to be taken up in each dam are given below:

Table 2.1 : Activities Proposed in Subproject of Gujarat

S. No.	Activity	Dam		
		Panam	Kadana	Dharoi
1	Hydro meteorological data Acquisition System (Early Flood Forecasting)	√	√	√
2	Mini hydro power station		√	√
3	Flood Protection Network		√	√
4	Strengthening and retrofitting to increase flood and MWL and to comply with earthquake norms	√		√
5	Hydrological Studies			√
6	Retrofitting work in canal and branches			√

Table 2.2 : Activities Proposed in Subproject of Maharashtra

S. No.	Activity	Dam		
		Bhatsa	Pawana	Bhatghar
➢	**Basic Dam Safety Works**			
1	Standby Generator Set	√		
2	Automatic Computerized Control System for spillway radial gate	√		
➢	**Remedial Measures**	√		
1	Foundation drain holes cleaning	√		
2	Vertical porous drains cleaning	√		
3	Cement grouting on upstream face of the dam, 300 m width	√		
4	Repair and replacement of instruments	√		
5	Dam elevator repair	√		
6	Irrigation outlets repair	√		
7	Compound wall construction	√		
8	Provision of gravity drain pipe through the foundation to reduce dewatering cost	√		
➢	**Basic Dam Safety Works**			
1	Flood marking and warning system		√	
2	Approach roads		√	
3	Generator with generator room and cabling		√	
4	Lighting on dam		√	
5	Instruments		√	
6	Wind mill and solar system		√	
➢	**Remedial Measures**			
1	Grouting to stop leakage		√	
2	Dam strengthening		√	
3	Drain holes repair		√	
4	Construction of end sill, parapet wall, guide wall and extension		√	
5	Fencing of compound		√	
6	Increase of height of gate		√	
7	River regradation		√	
➢	**Basic Dam Safety Works**			
1	40 mm bitumen carpet at top and downstream of dam			√
2	Generator for electrification			√
3	Barbed wire fencing of prohibited area			√
4	Instrumentation			√
5	Inspection Boat			√
6	Wind Mill and Solar Power System			√
7	Wireless Set-Up			√
➢	**Remedial Measures**			
1	Deflector bucket construction at central spillway			√

S. No.	Activity	Dam		
		Bhatsa	Pawana	Bhatghar
2	Concreting of central spillway			√
3	Provision of mobile crane track			√
4	Guide wall repair			√
5	Cement pointing upstream face of dam			√
6	Removal of debris			√
7	Provision of new rail track			√
8	Repair of gate bed sluices and irrigation sluices			√

Table 2.3 : Activities Proposed in Subproject of Madhya Pradesh

S. No.	Activity	Dam	
		Kolar	Mohini Pick Up Weir
1	Clearance of spill channel	√	
2	Protection of stream slope	√	
3	Protection of longitudinal and cross drains	√	
4	Modification of spillway radial gates		√
5	Provision of stop gates, downstream apron and low level causeway		√
6	Extension of left guide wall		√

Table 2.4 : Activities Proposed in Subproject of West Bengal

S. No.	Activity	Dam	
		Bara Mandira	Sali
➢	**Basic Dam Safety Works**		
1	Telecommunication	√	√
2	Equipment modernization, such as, piezometers, gauge wells, gauges, reservoir level gauges	√	√
3	Flow measurement	√	√
4	Access roads	√	√
5	Power Back-Up	√	√
6	Instrumentation for monitoring dam performance	√	√
7	Water Quality Measurement	√	√
8	Tourism Development	√	√
9	Illumination of dam for security and aesthetics	√	√
10	Modeling for Dam Break Analysis	√	√
11	Inundation Maps Preparation	√	√
12	Emergency Action Plan	√	√
➢	**Remedial Measures**		
1	Repair of dam structures	√	√
2	Polymer treatment of structural members	√	√
3	RCC work	√	√

S. No.	Activity	Dam	
		Bara Mandira	Sali
4	Slope protection	√	√
5	Repair of bridge components	√	√
6	Gates Repair	√	√
7	Channel Protection Work	√	√
8	Reservoir Desiltation	√	√
9	Auxiliary spillway construction	√	√
10	Improvement of hydropower generation	√	√
11	Provision / repair of gaugeways, catwalks, hoisting facilities	√	√
12	Automation of gates operation	√	√

In addition to the activities of ten dams (sub-projects) listed above DRIP related Activities of some 240 more dams of twelve states, as received from the CWC, were studied. In practically all the dams several activities were found to be similar. An analysis of the activities were undertaken to assess which of them could have potential environmental and/or social impacts requiring suitable mitigation measures during construction and/or operation stages. In the context of DRIP, construction stage signifies execution stage.

Based on the analysis, a list of Activities have been identified where environmental/social impacts need to be addressed. These are given below.

1. Reservoir Desiltation
2. Tourism Development
3. Approach road, dam crest roads, etc. construction / improvement
4. Hydropower Generation
5. Standby Generator
6. River Regradation
7. Flood Protection Network
8. Wind Mill & Solar Power
9. Treatment of leakage through masonry and concrete dams and reduction of seepage through earth dams and their foundations
10. Improving Dam Drainage
11 Structural strengthening of dams to withstand higher earthquake loads
12. Remodeling earth dams to safe, stable cross sections
13. Improving toe drain and seepage measuring devices
14. Improving ability to withstand higher floods including additional flood handling facilities, if needed.
15. Repairs to damaged spillways, stilling basins and downstream channels
16. Improving dam safety instrumentation

17. Improving communications – real-time as much as possible – between dams, upstream rain/river flow gauging stations and with other dams, control offices and civil authorities in flood plains downstream of the dam
18. Flood marking
19. Low voltage electrical supplies in inspection and drainage galleries
20. Improving lighting for external areas of dams
21. Inspection launches provision
22. Rehabilitation / Improvement of Spillway, head regulator and draw-off gates and their operating mechanisms
23. Repair / Modification of Spillway Gates
24. Cleaning of foundation drain & porous drain
25. Repair and cleaning of irrigation outlets

For the development of environmental and social management framework, the activities identified above have been taken into consideration.

CHAPTER 3
INSTITUTIONAL AND POLICY FRAMEWORK

3.1 NATIONAL SCENARIO

Construction of dams and reservoirs require project-specific environmental assessment and environmental management plan (EMP) for mitigation of potential adverse impacts. Though rehabilitation and improvement of existing dams are generally not expected to have serious environmental concerns, it may be worthwhile to have an understanding of the policies and institutional framework which may have a bearing on the activities envisaged under the DRIP. These are briefly described below.

3.1.1 Institutional Framework

The Government of India through specific legislations regulates the environmental management system in India. The Ministries / Statutory Bodies responsible for ensuring environmental compliance by project proponents include:

a) The Ministry of Environment & Forests (MOEF)
b) Central Pollution Control Board (CPCB)
c) State Pollution Control Boards (SPCBs)
d) Ministry / Department of Environment in the States

3.1.2 Policies / Acts / Notifications

a) **Environment Protection Act, 1986**

The Environmental Protection Act 1986 of the Government of India is an umbrella act for the prevention, control and abatement of environmental pollution for the conservation, preservation, protection, enhancement and management of the environment; and for matters incidental to or connected with the foregoing. This act authorizes the central government to intervene directly in order to protect the environment and also allows public interest litigation for the same purpose. In terms of responsibilities, this Act and the associated Rules requires for obtaining environmental clearances for specific type of projects addressed under EIA notification.

b) **EIA Notification**

This is the Indian Government's Guidelines for environmental impact assessment governing all of the development interventions that takes place within the boundaries of India. EIA notification was first issued by Ministry of Environment and Forests (MoEF) in 1994 and later amended in 2002 and in 2006.

Under the latest EIA Notification, 14th September 2006, all projects listed in Schedule-1 of the Notification require prior environmental clearance. The objective of the notification is to formulate a transparent, decentralized and efficient regulatory mechanism to:

- Incorporate necessary environmental safeguards at planning stage
- Involve stakeholders in the public consultation process
- Identify developmental projects based on impact potential instead of the investment criteria

c) **The Forest Conservation Act, 1980**

This Act provides for the conservation of forests and regulating diversion of forestlands for non-forestry purposes. As per the provisions of the Forest (Conservation) Act, 1980 and Forest (Conservation) Rules, 2003, every user agency who wants to use any forest land for non-forestry purposes shall obtain forestry clearance from the MOEF prior to the construction within forest land.

d) **Water (Prevention and Control of Pollution) Act, 1974**

This Act came in force in 1974 for the prevention and control of water pollution and for maintaining or restoring of wholesomeness of water. The Act resulted in the establishment of the Central and State level Pollution Control Boards whose responsibilities include managing water quality and effluent standards, as well as monitoring water quality, prosecuting offenders and issuing licenses for construction and operation of projects in order to ensure compliance of the provisions of the Act by the project proponents.

e) **The Air (Prevention and Control of Pollution) Act, 1981**

This Act provides for the prevention, control and abatement of air pollution. It is triggered by air polluting activity in an area or when emissions of any air pollutants into the atmosphere exceed the standards set by the Central Pollution Control Board.

f) **The National Rehabilitation and Resettlement Policy, 2007**

The National Rehabilitation and Resettlement Policy, 2007 aims to minimize large-scale displacement as far as possible. The objectives of the NRRP are:

- To minimise displacement and to promote as far as possible, non-displacing or least-displacing alternatives
- To ensure adequate rehabilitation package and expeditious implementation of the rehabilitation process with the active participation of the affected families
- To ensure that special care is taken for protecting the rights of the weaker sections of society, especially members of the Scheduled Castes and Scheduled Tribes, and to create obligations on the State for their treatment with concern and sensitivity
- To provide a better standard of living, making concerted efforts for providing sustainable income to the affected families
- To integrate rehabilitation concerns into the development planning and implementation process

- Where displacement is on account of land acquisition, to facilitate harmonious relationship between the requiring body and affected families through mutual cooperation.

The provisions of the NRRP, 2007 provide for the basic minimum requirements, and all projects leading to involuntary displacement of people must address the rehabilitation and resettlement issues comprehensively. The State Governments, Public Sector Undertakings or agencies shall be at liberty to put in place greater benefit levels than those prescribed in the NRRP, 2007. The principles of this policy may also apply to the rehabilitation and resettlement of persons involuntarily displaced permanently due to any other reason.

- Where involuntary displacement of four hundred or more families enmasse in plain areas, or two hundred or more families en masse in tribal or hilly areas, DDP blocks or areas mentioned in the Schedule V or Schedule VI to the Constitution, it must be mandatory to do social impact assessments and provide all required infrastructural facilities and amenities in the resettlement area.
- Where the Scheduled Tribes people are being displaced in sizeable numbers, a well thought out Tribal Development Plan must be put in place.

  The Plan shall also contain a programme for development of alternate fuel, fodder and non-timber forest produce (NTFP) resources on non-forest lands within a period of five years sufficient to meet requirements of tribal communities who are denied access to forests.

- Clear timeframes within which the implementation of the rehabilitation package as well as utilization of the land shall be accomplished.
- An effective monitoring and grievance redressal mechanism must be framed.

While undertaking a social impact assessment, take into consideration the impact that the project will have on public and community properties, assets and infrastructure particularly, roads, public transport, drainage, sanitation, sources of safe drinking water, sources of drinking water for cattle, community ponds, grazing land, plantations; public utilities, such as post offices, fair price shops, etc.; food storage godowns, electricity supply, health care facilities, schools and educational/training facilities, places of worship, land for traditional tribal institutions, burial and cremation grounds, etc.

3.1.3 Dam Safety Act (Draft) 2002

Dam Safety Organisation (DSO) has been created in the CWC, headed by a Chief Engineer who coordinates all dam safety related activities and conducts regular interaction / consultation with the State Dam Safety Organisations of the States in the country.

In keeping with the provisions of the National Water Policy 2002, a draft Dam Safety Act has been prepared by the CWC. This has been approved by the Ministry of Water Resources, Government of India and has been circulated to the States.

The States have responded well to the Draft Act and so far the Government of Bihar has passed the Dam Safety Act 2006 and the same was published in the Bihar Gazette on 4/5/2006. The Government of Andhra Pradesh has adopted a Resolution on 24/3/2007 that the Dam Safety Resolution should be regulated in the State of Andhra Pradesh by Parliament by Law. The Government of West Bengal has also passed a Resolution on 24/7/2007 empowering the Parliament of India to pass the necessary Dam Safety Act.

The Government of Kerala have passed the Kerala Irrigation and Water Conservation Act 2003 which was subsequently amended through the Kerala Irrigation and Water Conservation (Amendment) Act 2006. The States of Madhya Pradesh, Maharashtra, Orissa, Uttar Pradesh are also actively processing the proposal for passing the Resolution in their respective State Assemblies.

Government of India has already initiated action to pass a Central Act on Dam Safety.

3.2 WORLD BANK SAFEGUARD POLICIES

Projects financed with IDA resources normally need to comply with World Bank Operational Policies. The World Bank has Environmental and Social Safeguard Policies to reduce or eliminate the adverse effects of development projects. The safe guard policies of World Bank are provided in the **Table 3.1** below.

Table 3.1: Safeguard Policies of World bank

World Bank Safe Guard Policies	Objective	Applicability
OP / BP 4.01	Environmental Assessment- The objective of this policy is to ensure that Bank financed projects are environmentally sound and sustainable (Refer analysis part in text below for details)	Significant adverse social and environmental impacts are not expected as physical interventions are expected to be in the nature of rehabilitation of existing assets. However, an integrated Environmental and Social Assessment (ESA) with an Environmental Management Plan (EMP) have been developed to manage risk and maximize environmental and social benefits wherever it is applicable. This will be finalized based on earlier work and experiences of DSARP project and consideration of improvement activities proposed under DRIP.
OP/BP 4.04	Natural Habitats-The policy recognizes that the conservation of natural habitats is essential for long-term sustainable development. The Bank, therefore, supports the protection, maintenance and rehabilitation of natural habitats in its project financing, as well as policy dialogue and analytical work. The Bank supports and expects the Borrowers to apply a precautionary approach to natural resources management to	This policy may be triggered by any sub project improvement activity such as fishery, hydro-power or tourism development with the potential to cause significant conversion (loss) or degradation of natural habitats whether directly (through construction) or indirectly (through human activities induced by the project).

World Bank Safe Guard Policies	Objective	Applicability
	ensure environmentally sustainable development	
OP 4.36	Forestry This policy focuses on the management, conservation, and sustainable development of forest ecosystems and resources. It applies to project that may have impacts on (a) health and quality of forests; (b) affect the rights and welfare of people and their level of dependence upon forests and projects that aim to bring about changes in the management, protection or utilization of natural forests or plantations, whether they are publicly, privately or community owned. The Bank does not support the significant conversion or degradation of critical forest areas or related critical natural habitats.	Impact of Rehabilitation activities on Forest areas required to be taken care of.
OP 4.09	Pest Management – The objective of this policy is to promote the use of biological or environmental control methods and to reduce reliance on chemical pesticides.	Pest / Vector management involvement in DRIP is not likely.
OP/BP 4.12	Involuntary Resettlement-The objective of this policy is to avoid or minimize involuntary resettlement where feasible, exploring all viable alternative project designs. Furthermore, it intends to assist displaced person in improving their former living standards; community participation in planning and implementing resettlement; and to provide assistance to affected people, regardless of the legality of title of land	No relocation of people is expected due to this project. However, there may be need for limited land acquisition for some project activity under DRIP. (This policy is triggered not only when physical relocation occurs, but also by any loss of land resulting in: relocation or loss of shelter; loss of assets or access to assets; loss of income sources or means of livelihood, whether or not the affected people must move to another location).
OP 4.10	Indigenous People -This policy aims to protect the dignity, right and cultural uniqueness of indigenous people; to ensure that they do not suffer due to development; that they receive social and economic benefits	This policy may be triggered if there are indigenous people in the project area; when potential adverse impacts on indigenous people are anticipated; and if indigenous people are among the intended beneficiaries.
OP N 11.03	Cultural Property –This policy aims at assisting in the preservation of cultural property, historical, religious and unique natural value-this includes remains left by previous human inhabitants and unique environment features, as well as in the protection and enhancement of cultural properties encountered in Bank-	This policy may be triggered by sub-projects under DRIP in those areas where cultural property, historical, religious and unique natural value-this includes remains left by previous human inhabitants and unique environment features may be affected during

World Bank Safe Guard Policies	Objective	Applicability
	financed project.	rehabilitation work of the sub-projects.
OP/BP 4.37	Safety of Dams-Refer analysis part in text for details.	It is may be applicable to all large Dams; Requires review of current monitoring system of Dam; Upgrading and/or rehabilitation of existing dams proposed under DRIP.
OP/BP 7.50	Projects on International Waters	The activity of the project doesn't allow to trigger this OP.
OP/BP 7.60	Projects in Disputed Areas	The activity of the project doesn't allow to trigger this OP.

World Bank policies and guidelines, pertaining to environmental safeguards that require consideration under this project, as these will most likely to be triggered, are as follows:

- OP/BP 4.01 Environmental Assessment
- OP/BP 4.37 Safety of Dams

OP/BP/GP 4.01 Environmental Assessment:

As per this policy, the project coordinating entity or implementing institution carries out Environmental Assessment (EA) during the preparation of each proposed subproject according to country requirements and the requirements of this policy. The Bank appraises and recommends to strengthen the capabilities of the coordinating entity or the implementing institution to (a) screen subprojects, (b) obtain the necessary expertise to carry out EA, (c) review all findings and results of EA for individual subprojects, (d) ensure implementation of mitigation measures (including, where applicable, an EMP), and (e) monitor environmental conditions during project implementation. If the Bank is not satisfied that adequate capacity exists for carrying out EA, all Category A sub-projects and, as appropriate, Category B sub-projects -including any EA reports are subject to prior review and approval by the Bank.

The purpose of conducting an environmental assessment (EA) is to identify environmental and social consequences of the proposed sub-projects or components, in order to:

- Ensure the identification of potential environmental issues and social concerns early in the implementation of a proposed project to incorporate necessary safeguards in project design in order to prevent potential adverse impacts by determining appropriate mitigation and compensation measures;
- Minimize risks and enhance positive impacts/benefits;
- Avoid delays and extra costs which may subsequently arise due to unanticipated environmental problems;
- Identify the potential for maximizing environmental resources management and socio-economic benefits to local communities within the scope of the sub-project.
- The EA should cover physical-chemical, biological, socio-economic and cultural issues that are likely to arise during upgrading and rehabilitation of

dams with safety risks and appurtenance structures and associated activities as appropriate.

OP 4.01 requires that arrangements be made whereby the project implementing institutions undertake the functions of sub-project screening, EA review and implementation of mitigation and monitoring plans. Therefore the purpose of this document is to outline a framework for environmental assessment and management, giving brief details of potential environmental issues typically associated with upgrading and rehabilitating dams with safety risks and suitable framework on how to prepare Environmental Management Plans (EMP). The ESMF will serve as a template to undertake appropriate environmental analysis and impact assessments of sub-projects, once the dams requiring upgrading and rehabilitation have been identified. This ESMF is being submitted in lieu of a project EA and has formed the basis for appraising the environmental aspects of the project. It will be made available for public review and comment in appropriate locations in accordance with BP 17.50 requirements of disclosure. Detailed EAs for individual subprojects will be carried out (in accordance with the ESMF) by the implementing agencies and will be reviewed and cleared by the designated Project Authority, as applicable (State Dam Safety Organization under present condition), under prevailing national environmental legislation in India and by IDA prior to the approval for disbursement of funds.
World Bank OP 4.01 requires environmental assessment (EA) of projects proposed for Bank financing to help ensure that these projects are environmentally sound and sustainable. EA is a process whose breadth, depth and type of analysis depend on the nature, scale and potential for environmental impacts of the proposed project. Environmental requirements of the World Bank are specified in detail in its Operational Policy (OP) 4.01 and other related OPs. The World Bank environmental requirements are based on a three-part classification system.

- ***Category A***-requires a full Environmental Assessment (EA).
- ***Category* B**-projects require a lesser level of environmental investigation.
- ***Category* C**-projects require no environmental analysis.

A project is classified as Category A if it is likely to have significant adverse environmental impacts that are sensitive, diverse or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. A proposed project is classified as Category B if its potential adverse impacts on human populations or environmentally important areas including wetlands, forests, grasslands and other natural habitats are less adverse than those of Category A projects. These impacts are site specific; few if any are irreversible; and in most cases mitigation measures can be designed more readily than for Category A projects. The scope of an EA for Category B projects may vary from project to project, but it is narrower in scope when compared with Category A projects.

Centre Water Commission has a component that involves Dam Safety Assurance and Operational Efficiency Improvement. While it is anticipated that the project overall is environmentally beneficial since the development objectives of the project is to improve water resource and asset management to ensure public safety, reduce water induced hazards and enhance the effectiveness of water related investments in the country, there is concern that the scale and potential of adverse environmental and social impacts in the event of a dam failure, could be significant, irreversible and unprecedented. Yet, since the objective of the project

is to rehabilitate dams that may pose a safety risk, and proactive measures will be taken to strengthen such dams so that the safety risk is minimized, it is not anticipated that there will be any significant, irreversible and unprecedented adverse environmental impacts due to project financed activities. Therefore, this project has been classified as a Category B project for safeguards purposes. World Bank OP 4.01 is very clear that for all Category A, Category B and Category FI projects proposed for financing under an IDA Credit, the developer must consult project affected groups and local non-governmental organizations (NGOs) about the project environmental and social aspects and take their views into account in the design and implementation. The EA should particularly incorporate such comments to improve social acceptability and environmental sustainability. Such consultations should be initiated as early as possible, in the Project cycle and it is mandatory that consultations are undertaken after the draft EA is prepared. In addition, the developer is expected to consult with stakeholders throughout project implementation as necessary to address EMP related issues that affect them.

The OP 4.01 also highlights the importance of analyzing alternative designs, technologies and operational strategies systematically in terms of their potential environmental impacts in order to select the most environmentally friendly and economically viable option.

OP/BP 4.37 Safety of Dams

The World Bank's safeguard policy on Safety of Dams is based on the principle that, for the life of a dam, the owner (in this case the Government of India) is responsible for ensuring that appropriate measures are taken and sufficient resources are provided for the safety of the dam, irrespective of its funding sources or construction status. Because there are serious consequences if a dam does not function properly or fails. The Bank is concerned about the safety of a new dam, it finances and existing dams on which a Bank financed project is directly dependent. Upgrading and/or rehabilitation of existing dams, as proposed under this project, falls within the policy, thus OP/BP 4.37 is triggered. Under OP/BP 4.37 requires that the dam upgrading be designed and its civil works be supervised by experienced and competent professionals. It also requires that implementing agency adopt and implement certain dam safety measures for the design, bid tendering, construction, operation and maintenance of the dam and associated works.

The safe operation of dams has significant social, economic, and environmental relevance. World Bank has concern to strengthen the institutional, legislative, and regulatory frameworks for dam safety programs.

CHAPTER 4

BASELINE ENVIRONMENTAL AND SOCIAL STATUS

4. A BASELINE ENVIRONMENTAL AND SOCIAL STATUS

A study of the existing environmental and social conditions was carried out for the 10 representative dams in four states Madhya Pradesh, Gujarat, Maharashtra and West Bengal. These are described below. All figures are placed serially at the end of the chapter.

4.A.1 MADHYA PRADESH

Madhya Pradesh is located in the central part of India and is the second largest state with an area of 308,245 km² constituting 9.38% of the geographical area of the country. It lies between latitude 21°17' and 26°52' N and longitude 74°08' and 82°49' E. (**Fig 4.1**). The state can be divided into four physiographic regions; the lowlying area in north and North West of Gwalior, Malwa plateau, Satpura and Vindhyan ranges. The important rivers of the state are Chambal, Betwa, Sone and Narmada. Climate of the state is subtropical with hot dry summer(April-June) followed by monsoon rains (July-September) and a cool and relatively dry winter. The average annual rainfall varies from 800 mm to about 1800 mm, it decreases from south east and east to north west and west.

The state has largest forest area in the country. The recorded forest area is 94,689 km² constituting 31% of the geographical area of the state. The central, eastern and southern parts of the state are rich in forest resources, whereas northern and western parts are deficient. Major forest types of the state are dry thorn, dry and moist deciduous, sugtropical semievergreen and tropical moist evergreen. The important Non Wood Forset Products (NWFP) are Tendu leaves (*Diospyros melanoxylon*) Sal seed (*Shorea robusta*) Harra (*Terminalia chebula*) Chironji (*Buchnania lanzan*) and flowers & seeds of Mahua (*Madhuca indica*). There are 9 National Parks and 25 Wildlife sanctuaries spread over 1.1 million ha. There are five tiger reserves in the state – Kanha, Panna, Bandhavgarh, Pench and Satpura.

Population of Madhya Pradesh is 60.35 million (Census 2001) which constitute 5.87% of the country's population. Out of the total poulation 73.54 % is rural and 26.26 % is urban. The Schedule Tribes accounts for 22.3% of the state. The main tribal groups are Gond, Bhil, Baiga, Kokru, Bhariya, Halba, Kaul,Mariya and Sahariya. Soyabean oil, processing of sugar, cotton textiles, newsprint, pottery, cement, carpets, silk, rayon, jute, glass, steel, and electrical engineering goods are major industries of the state.

Location map of dams in Madhya Pradesh is given as **Fig 4.2**

4.A.1.1 Mohini Pick-Up Weir

The dam is situated on Sind River in Shivpuri District of Madhya Pradesh. It was built in 1977 for irrigation purpose. The right bank canal is used for direct irrigation in the command area. There is a feeder canal which is used for storage at Harshi dam, 6 km downstream and used for irrigation. Layout plan of the dam is given as **Fig 4.3**.

The area has a tropical climate with average rainfall of 875 mm per annum. Maximum temperature in the region goes up to 46° C. The nearest meteorological station is at Shivpuri about 48 km from the dam. It is reported that there were floods in the area in 1984 and 1992 caused by excessive rainfall. Index map of the Project is given as **Fig 4.4**.

The topography of the area is plain with basalt rock underneath and falls in seismic zone–II. There are four main rivers namely Parwati, Sindh, Kuno and Betwa, which pass through the Shivpuri district. The Parwati is a tributary of Sindh River and joins it near Pawaya in Gwalior district. The Sindh River enters from Guna district and flowing north for a while then towards east forms the boundary between Gwalior and Datia districts and finally flows through Bhind to join the Chambal.

View of Mohini Pickup Weir

Forest cover of Shivpuri district is 23.76% covering 2,442 km^2. The catchment area of the dam is 5944 km^2 and has open and moderate forest cover. The flora of the area consist of Khair (*Acacia catechu*), Salai (*Boswellia serrata*), Tendu (*Diospyros tomentosa*), Palas (*Butea monos[erma*), Mahua (*Madhuca indica*), Saja (*Terminalia tomentosa*), Koha (*Terminalia arjuna*), Jamun (*Syzygium cumini*), Dhaman (*Grewia elastica*), Semal (*Bombax ceiba*) and Amaltas(*Cassia fistula*). Plantation was observed near the weir which has been done by Irrigation dept. The distribution of Forest cover of the state and district is given in the table below.

Table 4.1: Distribution of Forest cover in the Sub-project District & State

Place	Geographical Area (km^2)	Very Dense (km^2)	Moderately Dense (km^2)	Open Forest (km^2)	Total Forest (km^2)	Percent (%)
Madhya Pradesh	308,245	4,239	36,843	34,931	76,013	24.66
Shivpuri	10,277	36	1,090	1,316	2,442	23.76

Source: State of Forest Report, Forest Survey of India, 2005

Madhav National Park and Kaera Wildlife sanctuary is located in the district. Tiger (*Panthera tigris*), Panther (*Panthera pardus*), Jackal (*Canis aureus*), Hyena (*Hyaena*

hyaena), Sloth bear (*Melursus ursinus*), Sambhar (*Cervus unicolor*), Wild Bear (*Sus scrofa cristatus*), Fox (*Vulpes benghaleneis*), Chinkara (*Gazella bennetti*), Black buck (*Antelope cervicapra*) and black faced monkey (*Semlipetheous entellus*) are found in the District. Among avifauna Myna, Shikra Hawk, Jungle Crow, Black Crows, Hariyal Green Pigeon, Grey Jungle Fowl, Peacock, Jungle Bush Quail and Bustard Quail are present in the area.
Water quality of the reservoir appears to be good and is used for drinking. Soil type of the area is alluvial and major crops grown are Rice, Jowar, Bajra, Maize, Wheat, Barley, Gram and Tur (Arhar). Sugarcane, Condiments and Spices; Sesamum (til) and Linseed are other crops of the district. Plantations of mango and other fruits are also observed in the district.

There is no industry in the vicinity; agriculture is the main occupation of the local people. About 68 % of the population are literate and about 24 % belong to backward communities. The social setup of district and tehsil in which Mohini Pickup falls is given below.

Table 4.2: Social Status of Subproject State, District and Tehsil

Location	SR (out of 1000)	LR %	SC %	ST %	WPR %	Mn W %	MIW %	NW %
State								
Madhya Pradesh	919	63.7	15.2	20.3	42.7	31.7	11.1	24.5
District								
Sehore	909	63.1	20.5	10.8	41.8	28.6	13.3	17.3
Tehsil								
Narwar	827	68.2	21.4	3.6	50.6	35.8	14.8	13.0

Source: Primary Census Abstract, 2001

Note: **SR** – Sex Ratio, **LR** – Literacy Rate, **SC** – Schedule Caste, **ST** – Schedule Tribe,
WPR – Work Participation Rate, **MnW** – Main Worker, **MIW** – Marginal Worker, **NW** – Non Worker

Shahariya Tribe is reported in disrict Shivpuri. The tribals live in the forests of the valleys of the Sindh river. Agriculture income is marginal but they get substantial additional income from working in the forests and collecting minor forest produce such as honey, edible gums, manufacture of kattha, collection of chironji, tapping salai trees etc.

4.A.1.2Kolar Dam

This dam was built in 1989 on Kolar River in Sehore District of Madhya Pradesh for drinking water supply and irrigation. Sketch of the dam is given in **Fig 4.5**. For drinking purpose, the water is supplied through canal to raw water treatment plant and then sent through pipelines to Bhopal city. Balance water is supplied through barrage, about 30 km downstream from where irrigation canal starts. Water from Kolar dam is used for Irrigation in Nasrullaganj and Budhni Tehsil.

The area comes under tropical climate with average annual rainfall of 1260 mm. The temperature varies from about 8°C. to 42°C. The dam is located in a valley surrounded by hills.

View of Kolar Dam

Topography of Kolar Dam is hilly in the catchment area. Exposed rocks can be seen in the area. The command area is generally plain. It is bounded by Vindhya hills in the north and by Narmada River in the south. The area falls in Deccan trap which consist of basaltic rocks. The Kolar Dam site lies in seismic zone III. Soil of the Kolar dam area is formed from basaltic rocks with medium black colour. Depth of black soil varies from 50 cm to 150 cm. At some places yellowish brown and dark grayish brown soil is found. The texture of soil is generally clayey, soil along streams have loamy texture. The soil is alkaline in nature. Kolar Dam lies in the wheat zone. Rabi crops are main crop grown in the area and consist of wheat, gram etc.

The Kolar River falls in Narmada basin. The main rivers of the district Sehore are Narmada, Parvati, Ajnal, Kolar, Utawali, Seep, Amber, Seewan, Kaliasot, Nevaj and Dudhi Rivers.

The area around Kolar project is densely forested. Teak (*Tectona grandis*) forest is dominant in the area. The main flora consist of Teak *(Tectona grandis)* Sal (*Shorea robusta*), Saja (*Terminalia tomentosa*), Bija (*Pterocarpus marsupium*), Lendia (*Lagerstroemia parviflora*), Haldu (*Adina cardifolia*), Dhaora (*Anogeissus latifolia*), Salai (*Boswelia serrata*) Aonla (*Emblic officinalis*), Amaltas (*Cassia fistula*) and Gamhar (*Gmelina arborea*). The forest cover of the sub project state and district is given in the **Table: 4.3** below.

Table 4.3: Distribution of Forest cover of the Subproject State & District

Place	Geographical Area (km^2)	Very Dense (km^2)	Moderately Dense (km^2)	Open Forest (km^2)	Total Forest (km^2)	Percent (%)
Madhya Pradesh	308,245	4,239	36,843	34,931	76,013	24.66

Place	Geographical Area (km^2)	Very Dense (km^2)	Moderately Dense (km^2)	Open Forest (km^2)	Total Forest (km^2)	Percent (%)
Sehore	6,578	0	756	686	1,444	21.92

Source: State of Forest Report, Forest Survey of India, 2005

There is degradation of the catchment area due to over grazing with consequential siltation of the reservoir. The reservoir is host to important fish species like carps, mrigel and mahaseer.

Total Population of Sehore district is 10,78,972 . The urban population is 1,93,740 and rural is 8,85,172. The social setup of the district and tehsil is given below

Table 4.4: Social Status of Subproject State, District and Tehsil

Location	SR (out of 1000)	LR %	SC %	ST %	WPR %	MnW %	MIW %	NW %
State								
Madhya Pradesh	919	63.7	15.2	20.3	42.7	31.7	11.1	24.5
District								
Sehore	909	63.1	20.5	10.8	41.8	28.6	13.3	17.3
Tehsil								
Ichhawar	911	55.8	19.8	17.9	45.3	27.9	17.4	9.3

Source: Primary Census Abstract, 2001

Note: **SR** – Sex Ratio, **LR** – Literacy Rate, **SC** – Schedule Caste, **ST** – Schedule Tribe,
WPR – Work Participation Rate, **MnW** – Main Worker, **MIW** – Marginal Worker, **NW** – Non Worker

The tribes found in the district are Gond , Bhiala Nad and Korku .

4.A.2 GUJARAT

Gujarat has an area of 196,022 km² which constitutes 5.96% of the geographic area of the country. It is situated on the western coast of the country and lies between latitude 20° 07' to 24° 43' N and longitude 68° 10' to 47° 29' E (Fig **4.6**). The state comprises of three regions viz. The peninsula traditionally known as Saurashtra, which is essentially a hilly tract sprinkled with low hills; Kuchchh on the northwest is barren and contains the famous Rann of Kuchchh, and the mainland extending from the Rann of Kuchchh and the Aravalli hills to the river Damanganga is on the whole a level plain of alluvial soil. The plains of Gujarat are watered by four major rivers - Sabarmati, Mahi, Narmada and Tapti. The average annual rainfall ranges between 800 to 1000 mm and the mean temperature from 25° C to 27.5° C.

The recorded forest area is 18,962 km², which constitutes 9.67% of the geographic area of the State. There are four major forest types found in the state viz. Tropical Moist Deciduous, Tropical Dry Deciduous, Tropical thorn and Littoral & Swamp forests. The forests are mostly distributed in the southern part bear bamboo forests of inferior quality. The main forests formations in the state are of teak, bamboo and mangroves. There are 4 National Parks and 21 wildlife sanctuaries in the state. Gir Forests in Saurashtra are abode of world famous Asiatic Lions.

The total population of the state is 50.67 million (Census 2001). Out of total poulation 62.64% is rural and 37.36% is urban having population density of 258 persons per km². Scheduled Tribes constitute 14.8% of the total population mainly spread over 8 districts of the state. Total livestock population is 21.66 million (Livestock Census 2003). Cotton textiles and non-metallic mineral products are famous industries of Gujarat. Other industries are Chemicals, Petrochemicals, Fertilizers, Engineering, Electronics etc. With the largest petro- chemical complex in the country, Gujarat is a major producer of inorganic chemicals such as soda-ash and caustic soda as well as chemical fertilizers.
Location map of dams in Gujarat is given as **Fig 4.7**.

4.A.2.1 Panam Dam

This is a multi-purpose dam on Panam river in Panchmahal District of Gujarat. The dam is meant for irrigation, water supply, fishery and hydro power and was built in 1999. Sketch of Panam dam given in **Fig 4.8**.

The area experiences semi-arid climate with average annual rainfall of around 700 to 1000 mm. The maximum and minimum temperatures are 44° C. and 11° C. The area is surrounded by hills and underlying rocks mainly quartzite. It falls in seismic zone – III. Geologically the Panchmahal District comprises of Igneous & Metamorphic rocks viz. Phyllites, Quartzites & Schists, which are seen towards the Northern Eastern & Southern part of the district, whereas Granite & Deccan Trap Basalt are exposed in the Central, Western & South- eastern part of the District. Index map is given in **Fig 4.9**.

View of Panam Dam

The soils around Panam Dam area are of coarser texture, usually sandy loam / loamy sand, loam soil, clay-loam and clay. Main crop of the district consist of paddy, wheat, maize, sorghum, pulses and oil seeds.

The rivers flowing through the district are Panam, Banas, Sabarmati, Mahi and Orsang. The total watershed for the region spreads over approximately 56,000 sq km. 30 major and medium size dam reservoirs creating about 5000 million cubic meter of dispersed storages have been constructed. More than 70% of this storage is being used for irrigation in the adjoining downstream region of alluvial plains.

The forest cover of the district is low (7.52%) with no dense forest. The area has degraded open forest area. Major vegetations in the area include Casuarina (*Casuarina cunninghamiana),* Bottlebrush *(Callistemon vimnalis),* Pipal *(Ficus religiosa*), Bargad *(Ficus benghalensi),* Neem *(Azadirachta indica),* Gulmohar *(Delonix regia),* Khajoor *(Phoenix sylvestris*) and Teak *(Tectona grandis)* etc. There is forest in the catchment area and plantation has been done around the reservoir. Distribution of forest cover in the state and district is given below

Table 4.5: Forest cover in the Subproject State & District

Place	Area (km^2)	Very dense forest (km^2)	Moderately dense forest (km^2)	Open Forest (km^2)	Total Forest Area (km^2)	% of Forest Area
Gujarat state	196,022	114	6,024	8,577	14,715	7.52
Panchmahal district	4461	0	180	385	566	12.67

Source: State of Forest Report, Forest Survey of India, 2005

Jambughoda Wildlife Sanctuary is located in Panchmahal District. Spread over 130.38 km^2 it is home to a variety of wild animals including mammals, reptiles and birds. Important fauna includes Sloth bear, Leopard, Jungle Cat, Hyena, Wolf and Barking deer

Water quality of the reservoir appears to be good and is used for drinking purpose. The soil texture of the area is clayey loam and sandy loam. A significant percentage of the population belongs to backward community. Main occupation of the people is agriculture and fishing. Demographic Profiles of state along subproject district and tehsil is given below.

Table 4.6: Social Status of Subproject State, District and Tehsil

Location	SR (out of 1000)	LR %	SC %	ST %	WPR %	MnW %	MlW %	NW %
State								
Gujarat	920	69.1	7.1	14.8	41.9	33.6	8.3	58.1
District								
Panchmahal	938	60.9	4.6	27.5	48.2	30.5	17.8	51.8
Tehsil								

Location	SR (out of 1000)	LR %	SC %	ST %	WPR %	MnW %	MIW %	NW %
Santrampur	958	59.8	3.0	72.1	48.8	31.0	17.8	51.2

Source: Primary Census Abstract, 2001

Note: **SR** – Sex Ratio, **LR** – Literacy Rate, **SC** – Schedule Caste, **ST** – Schedule Tribe,
WPR – Work Participation Rate, **MnW** – Main Worker, **MIW** – Marginal Worker, **NW** – Non Worker

4.A.2.2Kadana Dam


View of Kadana Dam

The dam is situated on the Mahi River in Panchmahal District of Gujarat. Established in 1979, the dam is meant for irrigation and hydro power generation. Sketch of dam given as **Fig 4.10**. Mahi River originates in the Mahi Kanta hills in the Vindhyachal range, in the western part of Madhya Pradesh and enters Rajasthan in Banswara District near Chandangarh. It leaves the Rajasthan at Salakari village and enters Gujarat and falls into bay of Khambat. On an average the river is about 100 - 130 m wide and it flows mostly through rocky terrain. Its banks are steep, though not very high. Rivers Erav, Chap, Nori, Anas, Jakham, Som are major tributaries of river Mahi. However, barring Earu all other rivers converge into Mahi main stream down stream of Mahi Dam. Index map of the dam is given as **Fig 4.11**.

The area has tropical semi-arid climate with annual average rainfall of 700 to 1000 mm. Temperature varies from maximum 44^{o} C. to minimum 11^{o}C. The nearest meteorological station is in Diwada, about 5 km away. The area is surrounded by hills and quartzite is predominant geological rock and comes in seismic zone – III. Geo-hydrologically in Panchmahal district, ground water is available in unconfined aquifer, in secondary porosity like fractures, fissures, cracks and joints in the upper weathered mantle. Abstraction of ground water is from different type of sources like open wells, hand pumps and shallow tube wells. Ground water level goes down in summer and sometimes sources become dry. In general quality of ground water is potable
The district has 12.67 percent forest cover (refer Table 4.5). Major vegetation in the area include Neem (*Azadirachta indica),* Teak *(Tectona grandis),* Babul *(Acacia nilotica),* Aak *(Calotropis procera),* Kejra *(Prosopis spicigera),* Dhak *(Butea monosperma)* and Shisham (*Dalbergia sissoo)*.

The soil is typical sandy loam to clayey loam. Agriculture and fishing are the main occupation of the people. Main crop of the district consist of paddy, wheat, maize, sorghum, pulses and oil seeds.

Majority of the population belong to backward communities. 51.8% of population fall in non worker category and work participation is 48.2%. Panchmahal district has a high Tribal population of 27.5% (social profile of district, refer Table 4.6)

4.A.2.3 Dharoi Dam

The dam is situated on Sabarmati River in Mahesana District of Gujarat. Built in 1978, the dam is meant for drinking water supply and irrigation. Sketch of the dam is given as **Fig 4.12**. The area has typical semi-arid climate with annual average rainfall of about 600 mm and the temperature varies from 10°C in winter to 47° C in summer. The nearest meteorological station is located at Kheroi, about 22 km away.

View of Dharoi Dam

Predominant geological feature includes granite and the area is surrounded by hills. It falls in the seismic zone-IV, which means it is prone to earthquake. Water quality of the reservoir appears to be good and is used for drinking water purpose. The main rivers of the district are Sabarmati, Rupen, Sarawati, Khari and Pushpawati. Index map of the dam is given as **Fig 4.13**.

The district has only 2.58 percent Forest cover. Major vegetation in the area includes Khejri (*Prosopis juliflora),* Neem *(Azadirachta indica)*, Aak *(Calotropis procera),* Sullu *(Euphorbia royleana),* Dudhi *(Euphorbia hirta),* etc.

Table 4.7: Distribution of Forest cover in the Subproject State & District

Place	Area (km^2)	Very dense forest (km^2)	Moderately dense forest (km^2)	Open Forest (km^2)	Total Forest Area (km^2)	% of Forest Area
Gujarat state	196,022	114	6,024	8,577	14,715	7.52
Mehsana district	8540	0	25	195	220	2.58

Source: State of Forest Report, Forest Survey of India, 2005

Thol Wildlife Sanctuary in located in Mehsana district. The sanctuary mainly houses wide variety of waterfowls, the important fauna consist of Trumpeting Crane, Honking Goose, Bar headed goose, Greater and Lesser Flamingo.

The soil quality is alluvial in nature and varies from sandy loam to loam. The main crops are potato, tobacco, cotton, pulses, oilseeds and citrus. Mehsana is largest producer of lemon in Gujarat. Asia's second largest dairy 'Dudh Sagar' is situated in Mehsana. The detail of dairy animals in district is given below.

Table 4.8: Dairy Animals in Mehsana District

S.No	Types	Number
1	Dairy animals	7,32,918
2	Buffaloes	4,78,161
3	Sheep/ Goat	97,467
4	Poultry	55,468

Source; http://www.kvkmehsana.org

Land use is predominantly agriculture and plantation, which is the main occupation of the local people. About 10 % of the population is from backward communities.
Pasture land covers 30,442 ha and total cultivated area is 365,282 ha. Food and agro processing are major investment in the district.

The population of district is 18,37,696 (census 2001). The socio economic profile of the district is given below

Table 4.9: Social Status of Subproject State and District

Location	SR (out of 1000)	LR %	SC %	ST %	WPR	MnW %	MIW %	NW %
State								
Gujarat	920	69.1	7.1	14.8	41.9	33.6	8.3	58.1
District								
Mehsana	927	75.2	8.1	0.5	45.1	36.2	8.9	54.9

Source: Primary Census Abstract, 2001

Note: **SR** – Sex Ratio, **LR** – Literacy Rate, **SC** – Schedule Caste, **ST** – Schedule Tribe,
WPR – Work Participation Rate, **MnW** – Main Worker, **MIW** – Marginal Worker, **NW** – Non Worker

4.A.3 MAHARASHTRA

Maharashtra, the third largest State of the country is located in the western part of India,. It has an area of 30,771 km^2 which is 9.36% of the country's total area. It lies between lat 15°35' and 22°02' N and long 72°36' and 80° 54' E. (Location map **Fig 4.14**). The State has five distinct physiographic regions, namely, Deccan plateau, Central Highlands, Eastern Chhotanagpur Plateau, Western Ghats and Coastal Plains. Fluvial action by the Krishna, Bhima, Godavari, Tapi-Purna and Wardha-Wainganga river system has worked to form broad open river valleys alternating with plateau interfluves.

The State enjoys a tropical monsoon climate. The average annual rainfall of the State ranges between 1,600 mm and 2,000 mm.

The recorded forest area is 61,939 km^2, which is 20.13 % of the State's total geographic area. Major forest types occurring in the State are Tropical Semi Evergreen, Tropical Moist Deciduous, Tropical Dry Deciduous, Tropical Thorn, Subtropical Broadleaved Hill, and Littoral and Swampy Forest. Among the non-wood forest product, bamboo and Tendu leaves constitute the important resource. There are 6 National Parks and 35 Wildlife Sanctuaries. There are 3 Tiger Reserves namely Melghat, Tadoba-Andhari and Pench in the state.

The total population of the State is 96.87 million (Census 2001), which constitutes 9.4% of the country's population. The rural population is 57.6% and urban 42.4%. The Scheduled Tribes constitutes 8.9% of the population. The population density is 314 per km^2. The State has a livestock population of 36.76 million (Livestock Census 2003). It is India's leading industrial state, major industries include chemical and allied products, electrical and non-electrical machinery, textiles, petroleum and allied products. Other important industries include metal products, wine, jewellery, pharmaceuticals, engineering goods, machine tools, steel and iron castings and plastic wares. Food crops include mangoes, grapes, bananas, oranges, rice wheat and pulses. Cash crop includes groundnut, cotton sugarcane, turmeric and tobacco.

The location map of sub projects in Maharashtra is given as **Fig 4.15**

4.A.3.1 Bhatsa Dam

The dam on the river Bhatsa is in Thane District of Maharashtra. It was built in 1969 for drinking water supply, irrigation and hydro power generation. Sketch of the dam is given as **Fig 4.16**.

Thane, the northern-most district of Konkan, lies adjoining the Arabian sea in the north-west of Maharashtra State. Geographically, forming part of the Konkan lowlands, it comprises the wide amphitheatre like basin of the Ulhas and the hillier Vaitarna Valley. The hill ranges in the area are predominantly aligned north-south, and have more or less steep escarpments. The area falls in seismic zone – III. A mild earthquake struck parts of Thane and Mumbai districts, on 16 November 2001 at 01:38 AM local time. It had a magnitude of ML 2.9 and was felt distinctly in parts of the district. Index map of the dam is given as **Fig 4.17**.

View of Bhatsa Dam

This is the highest rainfall area with average annual rainfall is around 2300 mm. Temperature varies from 17° C. in winter to 37° C. In summer Flush flood is common in the catchment area and occurs almost every

year. The two main rivers flowing through the district are the Ulhas and the Vaitarna. The Ulhas originates from the north of Tungarli near Lonavala, flows for a short distance before descending near Bhor ghat. The river has many tributaries; two important of them (within the boundaries of this district) are Barvi and Bhatsa. Vaitarna, the largest of Konkan Rivers rises in the Tryambak hills in Nashik district. The River flows across Shahapur, Vada and Palghar talukas and enter the Arabian Sea. It has also a number of tributaries; the most important of them are Pinjal, Surya, Daherja and Tansa

The Thane forests are one of the valuable and well-preserved forests in Maharashtra. The forest areas occurring in the district do not consist of single block, but are scattered all over the district. They are mainly situated on the steep Western Ghats on the spurs, ridges and outlayers extending from the ghats. More than 90 per cent of the forests of Thane district fall under the type Tropical moist (mixed) deciduous forest. Major vegetation in the area include Teak (*Tectona grandis),* Ain (*Terminalia tomentosa),* Khair (*Acacia catechu),* Hed (*Adina cordifolia),* Kadamb (*Stephegyne parvifolia),* Palas (*Butea frondosa),* Karvi (*Stribilanthus grahamianus),* Dhavada (*Anogeiessus latifolia*) and Savar (*Bombax malabaricum).* The forest cover of the subproject district and state is given below.

Table 4.10: Forest Cover of Subproject District & State

Place	Area (km^2)	Very dense forest (km^2)	Moderately dense forest (km^2)	Open Forest (km^2)	Total Forest Area (km^2)	% of Forest Area
Thane District	9558	0	1230	1627	2857	29.89
Maharashtra	307713	8171	20198	19092	47476	15.43

Source: State of Forest Report, 2005

Plantation species consist of Rain tree (*Samnea saman),* Copper pod (*Peltophorum ferrugimun),* Gulmohar (*Delonix regia)*, Silver Oak (*Greviella robusta),* Asoka (*Polyanthia longifolia),* Sayami cassia (*Cassia siamea),* Neelmohor (*Jacaranda mimosaefolia)* and Cork **(***Millingtonia hortensis)*

The fauna consist of Tiger (*Panthera tigris),* Hyaena (*Hyaena hyaena),* Wild cat (*Felis chaus),* Wild dog (*Cuon alpinus),* Wolf *(Canis lupus),* Sambhar(*Cevrus unicolor),* Spotted Deer (*Axis axis),* Barking Deer (*Muntiacus muntjak),* Monkey (*Macaca mulata)* Peafowl *(Pavo cristatus)* and Grey Jungle fowl *(Gallus sonnerali).*

Among birds, the commonly seen are Red vented bulbul (*Moipastes cafer cafer),* Red whiskered bulbul (*Joacosus fuscicandata),* Spotted babbler (*Pellorneum ruficeps),* Yellow eyed babbler (*Chrysomma, sinensis),* Indian tree pie (*Dendrocitta vagabunda),* Indian Shama(*Kittacincla malabarica*), Black Drongo (*Dicrurus macrocercus),* Tailor bird (*Orthotomus, sutorius guzerata)* and Common Myna (*Acridotheres tristis)*

The soil type is black cotton and has loam texture. There is considerable soil erosion increasing siltation in the reservoir. The important kharif crops of the district are rice, bajra and nachani (finger millet). The pulses like urad, moong and kulith are also grown in this season.

About 85 % of the population in the region live in rural area of which about 37% populations belong to backward communities. There are industries in the region and major occupation of the local population is agriculture, industrial works and white collar jobs. Social status of subproject state, district and tehsil is given below.

Table 4.11: Social Status of Subproject State, District and Tehsil

Location	SR (out of 1000)	LR %	SC %	ST %	WPR	MnW %	MIW %	NW %
State								
Maharashtra	922	76.9	10.2	8.9	42.5	35.9	6.6	57.5
District								
Thane	858	80.7	4.2	14.7	39.1	34.2	4.9	60.9
Tehsil								
Shahapur	945	69.3	4.1	1.9	47.1	36.8	10.3	52.9

Source: Primary Census Abstract, 2001

Note: **SR** – Sex Ratio, **LR** – Literacy Rate, **SC** – Schedule Caste, **ST** – Schedule Tribe,
WPR – Work Participation Rate, **MnW** – Main Worker, **MIW** – Marginal Worker, **NW** – Non Worker

4.A.3.2 Bhatghar Dam

This dam on Yelwandi River is in Pune District of Maharashtra. It is one of the highest dams in India Built in 1969. The dam is 1,625 m long, FRL is 623.28 m and storage capacity, 672.58 million m^3. The dam is used for irrigation, drinking water supply and hydro power generation. Sketch of the dam is given as **Fig 4.18**. The river at the dam site has a catchment area of 336 km^2. Maximum length of the reservoir and the mean depth are 45km and 24.02 m respectively.

View of Bhatgar Dam

Pune district lies in the Western Ghats or Sahyadri mountain range and it extends on to the Deccan Plateau on the west. Pune stands on the leeward side of the Western Ghats. The climate of this district is characterized by high humidity nearly all the year round, an oppressive summer season,

and well-distributed and heavy rainfall during the south-west monsoon season. Average annual rainfall in this area is around 700 mm. Highest temperature of 41° C in summer and the minimum temperature is 8°C is recorded winter. The nearest meteorological station is in Pune, which is 60 km from the dam.

The geological formation consists of recent-shores sand, Pleistocene-laterite and eocene- basalt flows. Basalt flows form the predominant formation capped at a few places by laterite at higher levels and covered by shore sands along the coast. Seismically Pune district lies in the Zone –III, Moderate Hazard Zone

Major rivers of the district are Pushpavati, Krushnavati, Kukadi, Meena, Ghod, Bhima, Bhama, Andhra, Indryani, Pavna, Mula, Mutha, Ambi, Mose, Shivganga, Kanandi, Gunjavni, Velvandi, Neera, Karha etc.

The flora of the area consists of Teak (*Tectona grandis*), Ain (*Terminalia tomentosa*), Khair (*Acacia catechu*), Hed (*Adina cordifolia*), Kadamb (*Stephegyne parvifolia*), Palas (*Butea frondosa*), Karvi (*Stribilanthus grahamianus*), Dhavada (*Anogeiessus latifolia*) and Savar (*Bombax malabaricum*). Plantation species consist of Rain tree (*Samnea saman),* Copper pod (*Peltophorum ferrugimun),* Gulmohar (*Delonix regia)*, Silver oak (*Greviella robusta),* Ashoka (*Polyanthia longifolia),* Sayami Cassia (*Cassia siamea),* Neelmohor (*Jacaranda mimosaefolia)* and Cork (*Millingtonia hortensis).* The distribution of forest cover of district is given in the table below

Table 4.12: Forest Cover of Subproject district

Place	Area (km^2)	Very dense forest (km^2)	Moderately dense forest (km^2)	Open Forest (km^2)	Total Forest Area (km^2)	% of Forest Area
Pune	15643	0	702	659	1361	8.70

Source: State of Forest Report, 2005

The soil of Bhatghar reservoir is sandy and neutral to alkaline in reaction. The soil quality is poor in terms of organic carbon, available phosphorus and available nitrogen There is not much agriculture activity in the area.

The Nira Right Bank Canal system is fed by Bhatghar dam. This canal system provides irrigation facilities to the Malshiras taluka and irrigates about 50,000 acres in the district. The important crops irrigated by this system are sugarcane, cotton and wheat.

Almost 90 % of the population is in the rural area. Backward communities account for about 6 % of the population. There are industries in the region. Majority of the local people are involved in agriculture and / or work in the industries. The Social status of subproject district and tehsil is given below.

Table 4.13: Social Status of Subproject District and Tehsil

Location	SR (out of 1000)	LR %	SC %	ST %	WPR	MnW %	MIW %	NW %
District								
Pune	919	80.5	10.5	3.6	40.8	36.6	11.1	51.3
Tehsil								
Bhor	1011	75.2	4.4	32.9	48.7	37.6	11.1	51.3

Source: Primary Census Abstract, 2001

Note: **SR** – Sex Ratio, **LR** – Literacy Rate, **SC** – Schedule Caste, **ST** – Schedule Tribe,
WPR – Work Participation Rate, **Mn W** – Main Worker, **Ml W** – Marginal Worker, **NW** – Non Worker

4.A.3.3Pawana Dam

This dam of Pawana river was built in 1976 for drinking water supply, irrigation and hydro power generation and is located in Pune District of Maharashtra. Sketch of the dam is given as **Fig 4.19**. Pavana river is a major tributary of Mula Mutha river flowing through Pimpri Chinchwad Muncipal corporation of Pune District. Pimpri Chinchwad is an industrial area having a number of manufacturing industries automobiles, antibiotics, paper, medicine, electrical and nylon and many small scale industries. Index map of the dam is given as **Fig 4.20**.

View of Pawana Dam

Average rainfall is around 700 mm. Highest temperature recorded is 41° C. in summer and the lowest temperature is 8°C in winters. The nearest meteorological station is in Pune city. The area is surrounded by hills and basalt is the major underlying rock. This region falls in seismic zone – III. The soil is typical black cotton with silt loam texture. Lands surrounding the river bed are flooded almost every year during monsoon

The area is hilly and there are forests in the catchment and along the reservoir. In the downstream region, land use pattern is changing, agriculture land is converted to residential and commercial land.

The forest cover of Pune district is low (8.7%) Large variety of flora is found which consist of forest and planted trees. The commonly found trees are Mango (*Mangifera indica*), Jamun (*Syzygium cumini*), Bargad (*Ficus benghalensis*), Gular (*Ficus*

glomerata), Karanj (*Pongamia pinnata*) and Amaltas (*Cassia fistula*) that inhabit most habitat types and localities. Dominant forest species include Teak (*Tectona grandis*), Odina (*Odina wodier*), Hardad (*Terminalia bellerica*), Chironji (*Buchanania lanzan*), Gamhar (*Gmelina arborea*), Cotton tree (*Cochlospermum gossypium*), Kendu (*Diospyros melanoxylon*), Acacia (*Acacia leucophloea*) and Ber(*Zizyphus mauritiana*).
Plantation and habitation dwelling trees are exotic and include Rain tree (*Samnea saman*), Copper pod (*Peltophorum ferruginum*), Gulmohar (*Delonix regia*), Silver Oak (*Grevillea robusta*), Bottle palm (*Roystonea regia*), Asoka (*Polyalthia longifolia*) Fountain tulip (*Spathodea companulata*) Sayami Cassia (*Cassia siamea*) Neelmohor (*Jacaranda mimisaefolia*) and Cork (*Millingtonia hortensis*).

Wildlife consist of Leopard Cat (*Felis bengalensis*), Jungle Cat (*Felis chaus*), Panther (*Panthera pardus*), Chinkara (*Gazella bennetti*), Spotted Deer (*Axis axis*), Grey Musk Shrew(*Suncus murinus*), Bats (*Rousettus leschenauti*), Bonnet monkey (*Macaca radiata*), Hyaena (*Hyaena hyaena*), Jackal (*Caneus aurus*) etc.

Avifauna of the area consist of House Sparrow, Blue Rock Pigeon, Roseringed Parakeet, Common Myna, Jungle Myna, Dusky Crag Martin, House Swift , Barn Swallow, Cliff Swallow, Myna, Indian Robin, Magpie Robin, Warbler , Bulbul, Koel and Crow. Fish species found in the area are - Labeo, Catla, Channa, Puntius, Barilius, Mystus etc.

Three categories of crops are grown in Pune District.
- Kharif Crop (Rice, Bajra, Tur, Moong, Urad, Groundnut, Soyabean)
- Rabi Crop (Jowar, Wheat, Pulses, Sunflower)
- Annual Crop (Sugarcane)

About 58% of the population lives in rural area and more than 12% of the population belong to backward communities. Major occupation of the people in the area is agriculture and industrial works. Social status of subproject district and tehsil is given below.

Table 4.14: Social Status of subproject District and Tehsil

Location	SR (out of 1000)	LR %	SC %	ST %	WPR %	MnW %	MlW %	NW %
District								
Pune	919	80.5	10.5	3.6	40.8	36.6	11.1	51.3
Tehsil								
Mawal	903	76.0	5.3	7.1	41.6	35.5	6.3	58.4

Source: Primary Census Abstract, 2001

Note: **SR** – Sex Ratio, **LR** – Literacy Rate, **SC** – Schedule Caste, **ST** – Schedule Tribe,

WPR – Work Participation Rate, **Mn W** – Main Worker, **Ml W** – Marginal Worker, **NW** – Non Worker

4.A.4 WEST BENGAL

West bengal is located in the eastern part of India, bordering Bangladesh, Nepal & Bhutan. The geographic area of the state is 88,752 km². The state lies between latitude 21°29' and 27°13' N and longitude 85°50" and 89°52' E (location map **Fig 4.21**). The State has two natural divisions: the North Himalayan and the South Alluvial Gangetic Plain. The three main rivers in the northern part of the State namely Teesta, Torsa and Jaldhaka drain into Brahmaputra. The other two important rivers passing through the central part of the State are the Ganges and the Hooghly, which drain into the Bay of Bengal forming the famous delta of Indian Sunderbans - which is one of the largest deltas in the world and home to the Royal Bengal Tiger.

Climate varies from moist tropical in the southeast to dry tropical in the southwest and from subtropical to temperate in the mountains of north. Annual rainfall varies from 900 mm in southwest to about 5000 mm in parts of the north. The temperature range is from sub zero in the hills during the winter to about 46°C in southern parts during the summer.

The recorded forest area is 11,879 km^2, which is 13.38% of the geographic area of the State. Major forest types occurring in the State are Northern Tropical Wet Evergreen Forests, Northern Sub Tropical Semi Evergreen Forests, North India Moist Deciduous Forests, Littoral and Swamp Forests (Mangroves), Northern Tropical Dry Deciduous Forests, Northern Sub Tropical Broad Leaved Wet Hill Forests, Northern Montane Wet Temperate Forests, East Himalayan Moist Temperate Forests and Sub Alpine Forests.

There are 5 National Parks and 15 Wildlife sanctuaries. The state has two Tiger reserves namely Sunderban and Buxa. Two Elephant reserves namely Eastern Duars Elephant reserves and Mayur Jharna are also present in the state.

The population of West Bengal is 80.18 million (*Census 2001*) of which, rural population is 72% and urban 28%. The Scheduled Tribes population in the State is 5.5%. West Bengal has the highest population density (903 persons per km^2) in the country. The livestock population is 41.62 million (*Livestock Census 2003*). West Bengal is well known for its textile industry. Other industries that are located in West Bengal are coal production, automobiles, railway equipment, heavy electrical equipment, industrial machinery, heavy machinery, electric motors, household electrical appliances, paper & paper board industry, leather and heavy organic chemicals industry.

The location map of dams in West Bengal is given as **Fig 4.22**.

4.A.4.1 Sali Dam

The dam is situated at the origin of river Sali in Bankura District of West Bengal. The dam was built in 1978 for irrigation. Sketch of the dam is given as **Fig 4.23**. A drinking water supply scheme is under construction.

The topography of the area is plain. The soil texture is quartzite. Sali Dam is in Zone III (Moderate) of seismic zones of India. The district experience tropical climate with the hottest summer and the coldest winter. The four distinct seasons are:

Summer: March to June, May is the peak of summer season with an average maximum temperature of 43°C

Monsoon: June - September, Annual rainfall varies between 765 and 1607 mm

Post Monsoon: September to Oct

Winter: Nov to Feb, Temperatures during winter fall below 4°C

View of Sali Dam

The flora of Bankura district consist of Sal (*Shorea robusta),* Bahera (*Terminalia bellerica), Kend* (*Torquigener oblongus),* Palash (*Butea frondosa),* Mango (*Mangifera indica),* Jamun (*Syzygium cumini),* Haritaki (*Terminalia chebula),* Sisu (*Dalbergia sissoo),* Neem (*Azadirachta indica),* Siris (*Albizzia lebbeck),* Amlaki (*Embelica officinalis),* Bel (*Aegle marmelos),* Arjun *(Terminalia arjuna) and* Teak (*Tectona grandis*). The distribution of forest cover in project state and district is given below.

Table 4.15: Forest Cover of subproject District and State

Place	Area (km^2)	Very dense forest (km^2)	Moderately dense forest (km^2)	Open Forest (km^2)	Total Forest Area (km^2)	% of Forest Area
Bankura District	6882	100	315	612	1027	14.92
West Bengal	88752	2303	3777	6334	12413	13.99

Source: State of Forest Report, 2005

The fauna of the area comprise of Leopard (*Panthera pardus),* Wolf (*Canis lupus),* Hyaena (*Hyaena hyaena),* Jackal (*Canis aureus),* Wild boars (*Sus scrofa),* Monkey (*Macaca mulata),* Langur (*Presbytis entellus),* Russell's viper (*Daboia resselii)* and Cobra (*Naja naja).* The common avifauna of the area are pea-fowl, jungle-fowl, jungle crow, house crow, treepie, common babbler, common jora, , babul, bluethroat, brown-backed robin, flycatcher, wood shrike, black drongo, tailor bird, streaked fantail warbler, golden oriole, common mayna, pied mayna, white-backed munia, white-throated munia, spitted munia, red munia, yellow-throated sparrow, house sparrow, woodpecker, India cuckoo, pied crested cuckoo , koel, brahminy

kite, pariah kite, sparrow hawk, dove, goose, duck, teal, lapwing, white necked stork and several varieties of egret and heron

The predominant land use is agriculture. This is typical rural area and about 41 % of the population belongs to backward communities. Rice, wheat, corn (maize), and sugarcane are the chief crops. Social status of the region is given in the table below.

Table 4.16: Social Status of Subproject State, District and Tehsil

Location	SR (out of 1000)	LR %	SC %	ST %	WPR %	MnW %	MlW %	NW %
State								
West Bengal	934	68.6	23	5.5	36.8	28.7	8.1	63.2
District								
Bankura	952	63.4	31.2	10.4	44.7	29.6	15.1	55.3
Tehsil								
Gangajalghati	949	60.6	33.6	4.1	40.7	25.8	14.9	59.3

Source: Primary Census Abstract, 2001

Note: **SR** – Sex Ratio, **LR** – Literacy Rate, **SC** – Schedule Caste, **ST** – Schedule Tribe, **WPR** – Work Participation Rate, **MnW** – Main Worker, **MlW** – Marginal Worker, **NW** – Non Worker

4.A.4.2 Bara Mandira Dam

This is a small dam on a stream called Mandira and is situated at Burdwan District of West Bengal. It was built in 1977 for irrigation purpose. Sketch of the dam is given as **Fig 4.24**.

View of Bara Mandira Dam

The average temperature in hot season is 30°C while in the cold season is 20°C, average rainfall is 1500 mm. The cold season starts from the middle of November and continues till end of February. March to May is dry summer intervened by tropical cyclones and storms. June to September is wet summer while October and November is autumn.

The topography of the area is plain and consists of alluvium and rocks of Rajmahal Plateau. The region is extension of coal mines of Jharia. Soil is of reddish colour, medium to coarse in texture, acidic in reaction, low in nitrogen, calcium, phosphate and other plant nutrients. Water holding capacity of this soil increases with depth as well as with the increase of clay portions.

Geological feature of Burdwan district is a transitional zone between the Jharkhand plateau which constitutes a portion of peninsular shield in the west and Ganga-Brahamaputra alluvial plain in the north and east. In general the Jharkhand plateau consists of the meta-sedimentary rocks of precambrian age, Gondwana sedimentary rocks, Rajmahal basalts and upper tertiary sediments. Laterite has developed on these older rocks as well as on early Quaternary sediments. The Bara Mandira Dam falls in Zone II (least of moderate) seismic zone.

Forest areas are interspersed with paddy fields The flora is characterized by species such as Simul (*Bombax ceiba*), Neem (*Azadirachta indica*), Amlaki (*Embilica officinalis*) Narikel (*Cocos nucifera*), Khejur (*Phoenix humilius*), Tal (*Borassus flabellifer*), Bat (*Ficus bengalensis*), Asvattha (*Ficus religiosa*), Palas (*Butea frondosa*) , Krishnachuda (*Caesalpinia pulcherrima*), Am (*Mangifera indica*) Sal (*Shorea robusta*), Palas (*Butea monosperma*), Bans (*Bambusa arundinacea*), Shireesha (*Albizzia lebbek*), Arka (*Calotropis gigantea*), Kend (*Diospyros melanoxylon*), Arjun (*Terminalia arjuna*) and Ashan (*T. tomentosa*). Shrubby species such as Ashsheoda (*Glycosmis pentaphylla*), Rajanigandha (*Polyanthes tuberosa*), Ghentu (*Clerodendron infortunatum*), Kurabaka (*Barleria cristata*), Gulancha (*Tinospora cordifolia*), Tulsi (*Ocimum sanctum*) and *Dumur* (*Ficus hispida*).The distribution of forest cover of the district and state is given in the table below.

Table 4.17: Forest Cover of Subproject District & State

Place	Area (km^2)	Very dense forest (km^2)	Moderately dense forest (km^2)	Open Forest (km^2)	Total Forest Area (km^2)	% of Forest Area
Burdwan district	7024	16	80	143	239	3.4
West Bengal State	88752	2303	3777	6334	12413	13.99

Source: State of Forest Report, 2005

Fauna comprise of Leopard, Wolf, Hyaena, Jackal, Wolf, Wild pig and Monkey. In the hilly areas poisonous snakes are common and include several kinds of cobra, karait and deadly Russell's viper. Other most frequently seen varieties are the Dhamna and various species of harmless grass snakes. The avifauna of the district are pea-fowl, jungle-fowl, jungle crow, treepie, babbler, babul, robin, flycatcher, black drongo, tailor bird, , golden oriole, common mayna, munia, sparrow, woodpecker, cuckoo, koel, parakeet, nilkantha, kingfisher, hornbill, hoopoe, horned owl, spotted eagle, kite,

pariah kite, sparrow hawk, pigeon, dove, goose, duck, teal, lapwing, white necked stork, egret and heron.

Fish species found in the area are Rohu (*Labeo .rohita*), Mrigle (*C. mrigala*), Katla (*Catla catla*), Kharke Bata (*C. reba*), Bhangan Bata (*L. bata*), Shrimps (*Metapeneus spp.*) Maural (*A. mola*), Pabda (*C. pabda*), Tengra (*Mystus spp.*), Bele (*G. gurius*), Chela (*C. bacaila*), Puntis (*Barbus app.*), Boal (*Wallage attu.*), Aid (*Mystus seenghala*), Galda (*Palaomen spp.*), Vacha (*E. vacha*), Chital (*N. chitala*), Pholoi (*N. notopterus*), Khaira (*Gadusia chapra*), Fensa (E. telara), Silon (*S. silondia*), Bhola (*Sciaena coitor*) etc.

Major land use in the area is agriculture. The agricultural production is so high that the district is called the granary of Bengal. Rice, Wheat, Barley, Maize, Gram, Tur, Rape Seed, Mustard, Linseeds, Jute, Sugarcane, Potato, Ginger and Chillies are major agricultural produce. The district has a very good network of Irrigation facilities. The main sources of irrigation are Government canals, tanks, wells and tube wells.

Mining primarily for coal, is another activity in the district. Burdwan is one of the premier districts in India in terms of value of mineral. The Raniganj coalfield was the birth place of the Indian coal industry. Besides coal, important minerals found in the district are iron ores, calcium carbonate, abrasives, silica bricks, moulding sands, glass sands, building materials, manganese, bauxite and laterite. Rice and oilseed milling and hosiery, cutlery and tool manufacturing are the other important industries.

Almost 42 % of the population belongs to backward community. Most of the local people work in agriculture or workers in the industries and coal mines. Socio economic status is given in the table below for subproject district and tehsil.

Table 4.18: Social Status of Subproject District and Tehsil

Location	SR (out of 1000)	LR %	SC %	ST %	WP R %	Mn W %	MI W %	NW %
District								
Burdwan	922	70.2	27.0	6.4	35.5	27.6	8	64.5
Tehsil								
Barabani	911	63.6	29.4	13.9	30.4	21.1	9.3	69.6

Source: Primary Census Abstract, 2001

Note: **SR** – Sex Ratio, **LR** – Literacy Rate, **SC** – Schedule Caste, **ST** – Schedule Tribe,
WPR – Work Participation Rate, **Mn W** – Main Worker, **MI W** – Marginal Worker, **NW** – Non Worker

4.B STAKEHOLDERS AND PUBLIC CONSULTATION

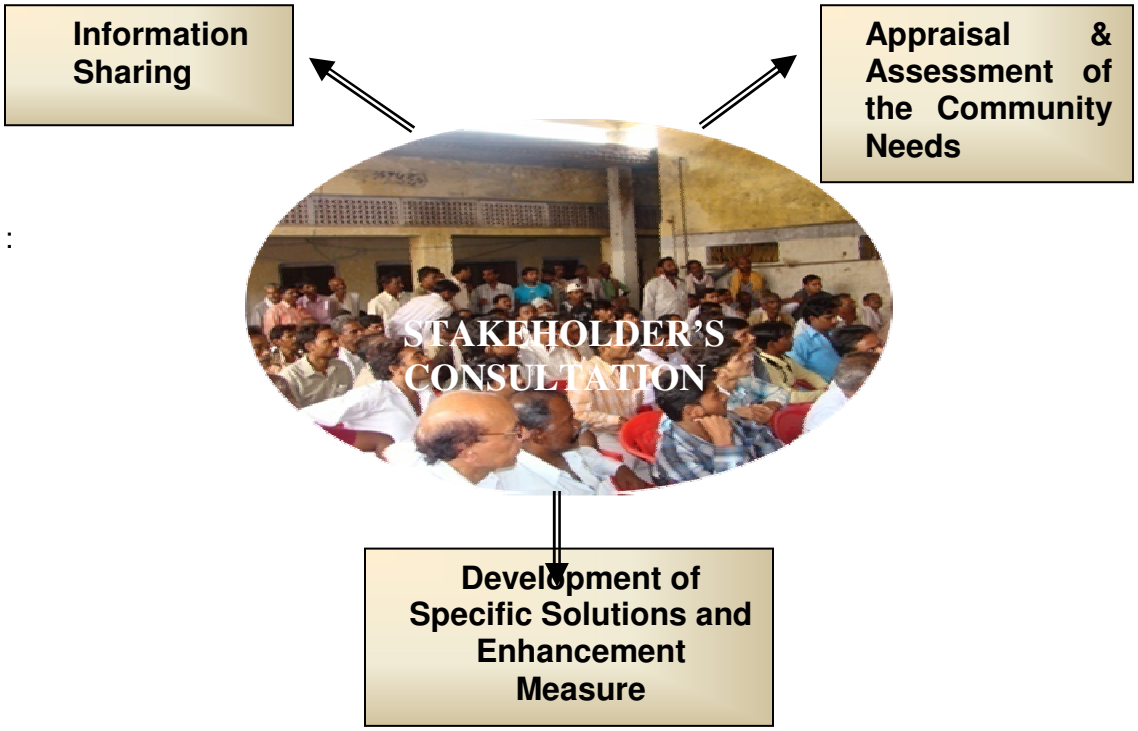
4.B.1 Introduction

Public participation and community consultation has been taken up as an integral part of environmental and social assessment. Public participation has been viewed as a continuous two way process, involving promotion of public understanding of the processes and mechanisms through which developmental problems and needs are investigated and solved. Consultation was used as a tool to inform and educate stakeholders about the proposed action both before and after the development decisions were made. It assisted in identification of the problems associated with the sub project as well as the needs of the population likely to be impacted. This participatory process enabled the participation of the local people in the decision making process. The involvement of the various stakeholders ensured that the affected population and other stakeholders are informed, consulted and allowed to participate at various stages of project preparation

4.B.2 Objective

Stakeholder's consultations in the project area was undertaken with the objectives which may be grouped as given below:

:



Information Sharing

- To promote public awareness about the project.
- To educate the individuals/interested groups about the proposed course of action;
- To solicit the views of affected communities/individuals on environmental components and the significance of impacts;
- To serve as an important tool for collecting information about natural and the human environments, much of which would not be accessible through more traditional approaches of data collection;
- To ensure involvement of local community in the decision making process
- To achieve the basis for an Environment Management Plan for the project, with the incorporation of felt needs views and preferences of the people likely to be impacted.

Appraisal & Assessment

- To inform affected communities about the provision of ESMF, and to settle their felt need with mutual consent and to assist them during relocation of community property, if any
- Deduce information from the people about the local environmental issues and their dependence upon them.
- Collect peoples' perceptions about the project and how the adverse effects of the project may be mitigated.

Devising Specific Solutions

- To solicit the views of affected communities/individuals on environmental and social problems.
- Receive suggestions from the affected communities with regard to the preferences and options about the project in general and avoidance measures, mitigation/compensation measures, and benefits being provided, in particular.
- To ensure lessening of public resistance to change by providing them a platform in the decision making process.

The participation by the local community can influence not only environmental impact of the project area, but also the costs, success and duration of the project itself.

4.B.3 Stakeholders

Stakeholder includes all parties that have direct and indirect interests in the project and its potential impacts on them. The consultation process involved range of formal and informal consultative tools including individual interviews, on-site consultation and meetings with the Stakeholders.

STAKEHOLDERS OF THE PROJECT

- **Central Water Commission**
- **State Water Resources Department**
- **Agriculture Department**
- **Hydro Power Development Agencies**
- **Municipal Development Board**
- **Public Health Department**
- **State Forest Department**
- **Fishery Department**
- **Tourism Department**
- **Water Users Association**
- **People Potentially adversely impacted by the Sub- Project activities**
- **NGO's**

4.B.4 Consultation with Stakeholders

The consultation seeks to gather the views of stakeholders which may be conducive to the sustainable development and long-term competitiveness for the project. Therefore it is of particular interest to this exercise to learn about views on the interaction with stakeholders and to bring them forward in a way that maximizes the benefits of the project and economic operators as a whole.

4.B.5 Consultation at Sub Project Sites

Total 10 public consultation were held in 4 states. For reach dam one consultation was conducted to get an insight about the baseline condition and problems associated with existing dam operation systems and other related issues.

i Madhya Pradesh

There are two subprojects in Madhya Pradesh, Mohini Pickup Weir and Kolar dam. The consultation conducted is presented Damwise.

Public Consultation and Meeting with stakeholders: Mohini Pickup Weir

Consultation with Dam Officials

Consultation at Panghata Village

Place : Narwar
Venue: Guest house and dam surroundings
Date : 12th August, 2007 and 17 th January, 2008

Participants:
Mr. G. S. Shrivastava
Superintending Engineer, Mohini Pickup wire

Mr. P.N. Nayak
Executive Engineer, Gwalior,

Mr. R. K. Shrivastava
Sub Divisional Officer, Mohini Pickup wire , Sub Division Narwar (in August 2007)

Mr. O.P Jain
Sub Divisional Officer, Mohini Pickup wire , Sub Division Narwar (in August 2007)

Mr. R.D.Tyagi
A.En, Mohini Pick Up weir

Mr. D. S. Kushbah
Additional Director Agriculture

Mr. Harpal Singh Sidhu
Director, State Fisheries Dept.

Mr. P. C. Kol
Assistant Director, Shivpuri Division, State Fisheries Dept.
&
Villagers
Panghata village (Downstream)

Issues Discussed:

- Intensity of rainfall and inflow from the upstream.
- Siltation Problem
- Meteorological data recording system
- Catchment treatment
- Livelihood of local people
- Alarm system
- Tourism potential and tourism development
- Revenue generation and sustainability of the dam

Findings of the meetings and consultation:

- The inflow in the dam has decreased.
- Previously siltation rate was quite high but now the siltation has also decreased due to construction of Madikheda dam in the upstream
- No meteorological data recording system present at the dam site. The catchment between the feeder dam Madikheda and Mohini pick up weir has no rain gauge station and water level recording system to combat any emergency situation arises due to sudden cloud burst.
- Grazing predominantly by goats on the dam embankment and peripheral hills have been observed, which degrades the vegetation and leads to soil erosion.
- No catchment treatment program is framed for the area.
- The local residents especially the rehabilitated people have sense of deprivation as livelihood support was extended to them. However, the downstream population is well aware of the water release system and do not feel any fear of flooding due to sudden water release.
- The Alarm system for water release from the dam did not seem well built, as systematic forecasting system is absent. The warning system is predominantly dependant on the mobile service and hence depends on external agency's efficiency. In lack of an internal system for message any emergency consequences may not be fought properly.
- The Mohini Pick Up weir being in close vicinity of Gwalior and being connected well with Shibpuri town has high potential of tourism development. But, the law and order problems and bad road quality put hindrance on the tourism development.
- The dam has started generating funds from the orchard developed at its land, which is a positive sign. Dam authority has also taken initiative to develop the dam site as a tourist place. To promote tourism they have constructed a jetty for boating activity.

Recommendations & Suggestions:

- Adequate amount of water supply is not there to fill the reservoir upto its highest reservoir level in most of the years. Inter basin water transfer of linking of river may solve the problem.
- Adequate number of rainfall monitoring station and proper information system should be developed to assess the inflow from the upstream in advance. Simultaneously proper Alarm system should be developed to minimize the impact of any type of disaster caused by the weir and related activities.
- Hydropower project can be installed for optimum use of resources.

- Weir site can be developed as an ecotourism site. Its panoramic view and advantageous position will help a lot to promote such place. Apart revenue generated from tourism can also be used in dam maintenance.
- Catchment area management plan may be developed to stop the degradation of the catchment area and simultaneously to develop the catchment area.
- Promotion of fishing activities should be taken up within the reservoir. A part of revenue generated from the fishing activity should go to the Water Resource Dept. for maintenance purpose of the weir.
- Training and awareness programme required to make people aware about the various aspects related to the dam and train them for optimum utilization of water.

Meetings with Stakeholders and Public consultation Kolar Dam

Place: Bhopal

Venue: Guest house and dam surroundings

Date: 11th August, 2007 & 15th & 16th January, 2008

Participants:

Mr. J. H. Gandhi

Superintending Engineer, Kolar Project

Mr. Bharat Kandwal

Sub Divisional Engineer, Kolar project

Mr. D. S. Kushbah

Additional Director Agriculture

Mr. Harpal Singh Sidhu

Director, State Fisheries Department

Mr. P. C. Kol

Assistant Director, Shivpuri Division,

State Fisheries Department

Mr. V. Roy,

Dy. Director, Matsya Mahasangh, Bhopal

Mr. S. Chhabaria

Director, Dam Safety Organisation,

Dam Operators

at Kolar dam

And

Villagers at Gularchhabri

Consultation with Dam official

Meeting with local people

Meeting with Director, SDSO

Issues Discussed:

- Intensity of rainfall and inflow from the upstream.
- Flooding problem in the downstream due to uncontrolled release of water from the dam.
- Embankment and carrying capacity of the river in the downstream.
- Structural aspects of the dam.
- Water Quality and Siltation Problem.
- Distribution of water and water resource management.
- Canal system of the dam

- Tourism potential at dam site.
- Hydro electric power generation.
- Land use pattern.
- Nature of the Catchment Area and catchment treatment plan.
- Rainfall monitoring stations and Alarm system.
- Environmentally sensitive areas in and around the dam site.
- Fishing activity within the dam.

Stakeholder's Response:

- Rainfall intensity is moderate in the dam site and in catchment area. Dam does not have sufficient water to supply as per requirement, most of the years it is filled upto 70% of its capacity.
- After construction of the dam till date flood situation has not taken place in the downstream due to sudden release of huge quantity of water from the dam. This dam hardly fills up to its full reservoir capacity so flooding situation is not expected. If flooding occurs there will be negligible loss as in the downstream river is passing through hilly forest area and only three villages are there in the downstream.
- As per discussion held with dam officials no major structural problem was found in this dam.
- According to Engineers and local people present at dam site alternate road is required to connect the villages situated on the opposite side of the dam instead of using dam inspection road. Because frequent heavy vehicular movement may damage the dam structure.
- The alarm siren at the time of water release reaches nearly 3kms, which may not be enough for a higher rate of discharge.
- Siltation is not a serious matter of concern and water quality of the reservoir is good and is used for drinking purpose.
- Dam water is mainly used to meet up the drinking water requirement of the Bhopal city and surrounding area, it also meets up industrial requirement of the city. No major issue was revealed regarding distribution of water for irrigation purpose. The potential command area of the dam is 228,708 ha, out of which at present 102,575 ha is being irrigated. Only one time irrigation is possible using dam water.
- No canal is constructed from this dam. There is a barrage in the downstream from where canal emerges for irrigation purpose. Both the Canals are lined.
- Water distribution system through canal is not proper. There is considerable amount of transmission and evaporation losses from minors and distributaries. Canal water is not distributed properly amongst the farmers.
- This place has a lot of potential which can be developed as a tourist place; Natural Scenic beauty of this place and well connectivity with Bhopal city can play a significant role to develop this place as a well known tourist place.
- There is no Hydropower generation from the dam presently, but a proposal has been made to install a small scale hydropower generation unit in the dam.
- In the downstream of the dam predominant land use is forest land, however, very few agricultural fields and some village settlements are also there.
- Entire catchment area of this reservoir falls within Hilly region and covered by dense forest. No catchment treatment plan is there for improvement of the catchment area.

- Occasional forest fire and grazing of goats at the catchment contributes in degradation of the catchment.
- The Forest department although do not have any definite scheme of catchment treatment, but forest protection committee has been formed to protect the forest.
- Only one rainfall monitoring station is present on the upstream. Hence, any data acquisition system for final inflow measurement is weak and consequently any forecasting procedure for final reservoir inflow is lacking.
- Organized fishing under government led organization Matsya Mahasangh is going on, which involves the local people too. Though the reservoir is a natural habitat of Mahasheer(*Tor tor*) fish, but the major fishing activity is centered to Carp fishing. Water Resources Dept. doesn't receive any revenue from Fisheries department from fishing activity within dam.
- Protected Area – Ratapani Reserve Forest is situated near vicinity of the dam.
- The social rehabilitation activities, as it was done during construction of the dam and as it is planned to be done as per the provisions laid in policy emphasize on the compensation amount and not in making the livelihood sustainable. The rehabilitated people at local villages have grievances against the dam authority regarding the issue.
- The involvement of local people in dam rehabilitation and other work is not yet ensured.

Recommendations & Suggestions:

- The water inflow does not remain adequate every year. Inter basin water transfer by linking of river can solve the problem. However, efforts are being made to transfer some water from the nearby Sip river.
- Optimum number of rainfall monitoring stations and its network may be developed in catchment to assess the inflow from the upstream in advance.
- Proper information dissipation and Alarm system should be developed.
- Alternate road may be constructed to minimize the impact of heavy vehicular movement on the dam inspection road as well as dam structure.
- Hydropower project to be installed for the wise use of resources and better sustainability of the dam may be explored. Local requirements may be considered in the area for direct revenue generation.
- Dam site can be developed as an ecotourism site. Its panoramic view and advantageous position will help a lot to promote such place. Some process of inter-departmental fund transfer may be developed, so that the revenue generated from tourism can be used in dam maintenance.
- Most of the catchment of Kolar dam is forested area, hence comes under jurisdiction of the Forest Department. Interdepartmental co-ordination is necessary to built up with the forest department for catchment treatment. The work force available with that department, in the form of Forest Protection Committee, may be used in catchment management.

- Promotion of fishing activities should be taken up within the reservoir. A part of revenue generated from the fishing activity should go to the Water Resource Dept. for maintenance purpose of the dam.
- Training and awareness programme required to make people aware about the various aspects related to the dam for optimum utilization of water.
- As it seemed during the public meeting at local villages in downstream of the dam that no disaster perception is prevailing in the area. Conscious efforts may be made to draw a disaster preparedness programme and penetrate the same within the local people.

ii ***Gujarat***

There are three subprojects in Gujarat, Panam and Kadana Dam in Panchmahal district and Dharoi Dam in Mehasana district. The public consultation involved discussion with Water Resources Department and Water Users in the area.

Public Consultation and Meeting with Stakeholders: Panam Dam

Place: Godhra
Venue: Dam Site & Downstream Villages
Date: 26th & 28th July 2007
9th January, 2008

Participants:

- **Dr. R C Tank**
  Superintending Engineer
- **Mr. H M Shah**
  Executive Engineer
- **Mr. N D Solanki**
  Executive Engineer
- **Mr. Jitendra D Shukla**
  Dy. Executive Engineer
- **Villagers of Meerpur Village**
- **Villagers of Hareda Village**
- **Villagers of Amaliyat village**

Consultation with Villagers in downstream

Issues Discussed:

- Resettlement and Rehabilitation
- Alarm system
- Rainfall and water gauging stations
- Potential for Tourism
- Fish Production
- Structural aspects of the dam
- Hydro electric power generation
- Catchment Area Treatment

Findings of the meetings and Consultation:

- Intimation is given 3 – 4 hours before the release of water, villagers are informed via siren and telephone and television.
- Catchment has only one river guage station and six rainguage stations situated outside but close to catchment area. The other station which records rainfall is situated in Dharoi colony. The wireless set is in operation only for 5 months (June to November).

- Resettled people in Meerpur and Hareda have been given facilities like school, dispensary, market, community centre etc. apart from land. Also provision for lift irrigation is given. But the major grievance of the locals is that no drinking water is provided and no major benefit is being obtained from the dam in the downstream villages.
- Water quality is monitored by State Pollution Control Board once a year. Drinking water is supplied from the reservoir to Godhra and Shehera city after being treated in a nearby village.
- Water is released for the people of the downstream as per the Riparian Act.
- Original capacity has been reduced by 15-18% due to siltation. Minor leakage which is observed in the spillway of the dam. Also leakage is observed in the overhead aqueduct.
- The 2MW canal bed power house is in use for 3 – 4 months when there is requisite water. During this time it meets the complete requirement for Shehera district.
- There is good potential for tourism, even though tourism development planning is under process and is not yet materialized.
- Fishery is done in the reservoir and there exists a 5 year contract with the Fishery department and the locals. 50% revenue goes to both the Irrigation and the Fishery department.
- In most of the cases, any activities in the catchment is done by the Forest Department, irrigation department remain usually unaware of these. Separate schemes are undertaken in the state programmes for any development in the catchment without consulting the dam authorities.

Recommendations & Suggestions:

- Alarm system can be strengthened as siren reaches only about 2-3 kms, while the remaining villages are informed via telephone and television, which might fail.
- Provision for a 12 – monthly operating wireless river gauging station should be considered. As in case of any untimely inflow of water or flood, there might be dire consequences.
- De-siltation is required urgently as increased siltation rate has already reduced the original capacity of the dam. This study is carried out by Gujarat Engineering Research Institute and the suggestions given by them regarding the structural aspects of the dam should be followed as it is directly proportional to the dam safety.
- Augmentation of hydro power on public private participation is one of the possible improvements.
- Tourism development will be beneficial as it would help in income generation for the locals and resettled people and also help in some revenue generation for the dam.
- As the favorable water quality of the reservoir provides great opportunity for fishery development, it should be more enhanced. The model of public participation in fisheries development has tremendous potential of employment generation and can be replicated with further enhancement measures integrating suitable environmental and social management framework.
- Catchment area treatment may be prioritizedTribal population is present in the catchment area and also the surrounding area. The tribal, if any I the area, may be sensitized regarding the importance of catchment area in relation to the dam, dam surroundings and dam environment. As deficiency is observed in interdepartmental co-ordination, better coordination among the Forest Department and Irrigation Department may be ensured.

Public Consultation and Meetings with Stakeholders: Kadana Dam

Place: Kadana Dam
Venue: Dam Site & Downstream Villages
Date: 26th & 29th July 2007
10th and 11th January, 2008
Participants:

- **P.B. Makwana**
  Ex Engineer
- **G. M Asari**
  Dy. Ex. Engineer
- **V. S. Patel**
  Dy. Ex. Engineer
- **Villagers of Taktajina Pallaya village**
- **Villagers of Kadana Gam village**
- **Villagers of Diwada village**

Consultation with Villagers in downstream

Issues Discussed:

- Resettlement and Rehabilitation
- Alarm system
- Rainfall and water gauging stations
- Potential for Tourism
- Fish Production
- Erosion in Embankment and flooding in downstream
- Structural aspects of the dam
- Hydro electric power generation
- Catchment Area Treatment

Findings of the meeting and consultations:

- Even though various facilities have been given to the people who have been resettled in 27 different sites, they have grievances regarding the compensation
- Sufficient time is given to the villagers before release of water. The Siren is effective for about 2-3km, rest of the people are informed via radio and television
- Interstate information exchange doesn't happen timely, between Mahi Bajaj Sagar dam (Rajasthan) and Kadana Dam (Gujarat)
- This dam has great potential for tourism and has good fish production
- Release of huge quantity of water and flooding in 2006 have caused erosion of canal embankment. Minor leakage observed is to be fixed (as per planning) during summer of 2008.
- Kadana dam presents ideal example of harnessing environmental friendly hydel power despite less availability of water in reservoir by recirculating d/s water with the energy generated during non-peak hour

- No catchment treatment is done / considered after the construction of dam. No plans are devised/ thought about for the protection of catchment area of the dam.

Recommendations & Suggestions:

- Need for a sustainable livelihood maintenance strategy was felt, so that the grievances of the locals are minimized
- A stronger Alarm system may be developed so that need of radio and television can be minimized as the siren and direct telephonic intimation is the best method of informing
- Interstate policies need to be developed for information sharing
- Tourism can be developed, which would also generate a source of income for the locals and generate revenue for the dam
- Gujarat Engineering Research Institute (GERI) does pre and post monsoon visit every year and the suggestions are given regarding the structural aspect of the dams. These suggestions are being implemented.
- Catchment treatment is not prioritized even though it is an important aspect. Inter-departmental communication may be strengthened. Better coordination among the Forest Department and Irrigation Department is likely to facilitate the condition.

Public Consultation and Meetings with Stakeholders: Dharoi Dam

Place: Dharoi
Venue: Dam Site & Downstream Villages
Date: 27th July 2007
8th January, 2008

Participants:

- **Mr. J. G. Choudhury**
  Executive Engineer
- **Mr. B. K. Patel**
  Dy. Executive Engineer
- **Mr. M. M. Patel**
  Dy. Executive Engineer
- **Villagers of Dharoi Village**
- **Villagers of Chandop Village**
- **Villagers of Devdarshan Village**

Consultation with Villagers in downstream

Issues Discussed:

- Alarm system
- Rainfall and water monitoring stations
- Resettlement and Rehabilitation
- Distribution of Water, Water Quality and Siltation Problem
- Hydro electric power generation.
- Tourism potential of the dam site
- Fishing activity.
- Catchment Area

Findings of the meeting and consultations:

- Intimation is given 1 hour before the release of water, villagers are informed via siren and telephone by the collectorate office.
- Catchment has only one river guage station. The other station which records rainfall is situated in Dharoi colony. Half the Catchment of Dharoi Dam is in Rajasthan and timely report of forecasts of rainfall, weather phenomenon etc. from Rajasthan does not reach on time.
- Resettled people have been given facilities like drinking water, school, road electricity apart from land but still have grievances regarding compensation.
- Water quality is monitored by State Pollution Control Board once a year. Drinking water is supplied from the reservoir to Ahmedabad and Gandhinagar city after being treated in Vav village. High Fluoride content in ground water was observed in downstream and command area.

- Water is released for the people of the downstream as per the Riparian Act.
- Live storage values shows high fluctuation due to droughts, poor rainfall etc. The reducing dead storage value indicates that de-siltation of reservoir is required.
- Preliminary hydropower was proposed but due to shortage of water, it is considered to be techno-economically non – feasible.
- There is good potential for tourism, even though boating is restricted in the reservoir. On an average about 300 people visit the dam per day on the way to Ambaji temple in Banaskantha district.
- Fishery is done in the reservoir and tribal cooperatives are formed, the whole activity is being taken care of by the Fishery department. Irrigation department gets royalty.
- The protection of the forest in the catchment is vested on the Forest Department. This forest has tribal population and no industrialization / urbanization has taken place yet. There are no environmentally sensitive areas around the dam.

Recommendations & Suggestions:

- Alarm system needs to be strengthened as siren reaches only about 2-3 kms, while the remaining villages are informed via telephone, which might fail.
- More number of monitoring stations for river gauging, rainfall etc. needs to be established. Interstate matters and policies may be framed in consultation with the Central Govt.
- Desiltation is required as increased siltation rate is likely to reduce the original capacity of the dam. Also it is observed that the initial waters are silty, polluted and manure filled, which is going to the field. This needs to be addressed.
- Augmentation of hydro power on public private participation is one of the possible improvements.
- Tourism development will be beneficial as it would help in income generation for the locals and resettled people and also help in some revenue generation for the dam.
- As the favorable water quality of the reservoir provides great opportunity for fishery development, it should be more promoted. The model of public participation in fisheries development has potential for employment generation and can be replicated with further enhancement measures integrating suitable environmental and social management framework.
- Catchment area treatment may be prioritized. The catchment has forests which are inhabited by tribal population. The tribal may should be sensitized regarding the importance of catchment area in relation to the dam, dam surroundings and dam environment.

iii Maharashtra

There are three subprojects in Maharashtra, Bhatsa dam in Thane district, Bhatghar and Pawana dam in Pune district. The public consultation involved discussion with Water Resources Department and Water Users in the area.

Public Consultation and Meeting with Stakeholders: Bhatsa Dam

Place: Shahapur Taluka, Thane

Venue: Dam site and Downstream villages

Date: 29th &30th January, 2008

Participants:

- **Mr. A.K. Deshai**
  Sub Divisional Engineer
  Bhatsa Dam. Div. 1
- **Mr. S.D. Sinde**
  Assistant Engineer Grade I
  Bhatsa Dam Sub. Div. 1c
- **Mr. Mahindra Patil**
  Assistant Engineer Grade II
  Bhatsa Dam Sub. Div. 1c
- **Local People**
  Mr. Kashinath Dajivide, Mr. Ramesh & Others
  Palovide : Shavli Village

Consultation with Villagers in Downstream

Issues Discussed:

- Intensity of rainfall and inflow from the upstream.
- Flooding problem in the downstream due to uncontrolled release of water from the dam.
- Structural aspects of the dam.
- Water Quality and Siltation Problem.
- Distribution of water.
- Canal system of the dam
- Local people and their livelihood
- Tourism potential at dam site.
- Hydro electric power generation.
- Land use pattern.
- Nature of the Catchment Area and catchment treatment plan.
- Rainfall monitoring stations and Alarm system.
- Environmentally sensitive areas in and around the dam site.

- Fishing activity within the dam.

Major findings of the meetings and consultation:.

- Leakages in masonry work and choking of drains are major problems of the dam. Opening of the Left Bank Canal Is also damaged.
- Major rehabilitation work done by the Dept. Recently
  a. Increase in the height of the dam
  b. Cement grouting of dam top and repair of the Dam road
- Siltation rate is quite high. The catchment area of this dam has a lot of forest cover, but it receives a lot of silt from the catchment during monsoon period. The siltation rate is quite high and it is almost 10 times higher than expectation. Assumed siltation rate was 3.60 Ha Meter / 100Km^2 / Year but the actual rate is 30.20 Ha Meter / 100Km^2 / Year. Domesticated animal grazing and Jhum Cultivation reduce organic materials in the soil making a cut in the water-holding capacity and of the same. Fast developmental activity in the upstream is another reason behind high siltation rate.
- Two canal emerges from this dam viz. Left Bank Canal and Right Bank Canal for meeting the irrigation requirement of the command area, This dam also meets up the drinking water requirement of Mumbai band Thane city.
- Land acquisition for the Bhatsa project was done in late 1960s. Now third generations of rehabilitated families are there. It is difficult to get the proper feedback to evaluate the improvement in livelihood. According to local people they got compensation for their house structures and agricultural land but no further assistance for livelihood has been provided by Govt.
- Local fishermen catching fishes from reservoir which are growing naturally within the reservoir. Fisheries dept. and water resource Dept. both has to take initiative for development of fisheries in a organized way. This can be helpful in both ways for economic and social point of view.
- There are few tribal villages in the downstream of the dam. According to the existing Acts and Policies they should be treated as a vulnerable group and proper rehabilitation and better assistance of livelihood is required for them.
- This place has a lot of potential which can be developed as a tourist place; Natural Scenic beauty of this place and well connectivity with Mumbai city can play a significant role to develop this place as a well known tourist place.
- Establishment of 10 KW Hybrid wind solar system at dam site has been proposed in DRIP.
- Entire catchment area of this reservoir falls within platue region of and mostly covered by Reserve forest. No catchment treatment plan is there for improvement of the catchment area. Forest Dept. and Water resource Dept. have to work together for development and protection of forest land in catchment area.
- No rainfall monitoring station is there in the catchment for measurement of the inflow from the upstream and prior information about inflow .

Recommendations & Suggestions:

- Structural Strengthening of the dam is required from safety point of view and better survival of the dam.

- Adequate number of rainfall monitoring station and proper information system should be developed to assess the inflow from the upstream in advance. Simultaneously proper Alarm system should be developed to minimize the impact of any type of disaster caused by the dam and related activities.
- Catch treatment is very much required to protect the forest and reduce the surface runoff. Improvement of the forest in the catchment area will improve the water quality.
- Proper system should be developed to maintain regulated release of water from the dam which can minimise flooding of areas located on the downstream.
- Strengthening of Alarm system is required for least impact on the downstream people due to flood.
- In the downstream of the dam there are few tribal village. Maharashtra Govt has declared these villages as tribal village so special care should be taken for upliftment of their livelihood as vulnerable group.
- Dam site can be developed as an ecotourism site. Its panoramic view and advantageous position will help a lot to promote such place. A part of revenue generated from tourism activity can also be used in dam maintenance.
- Promotion of fishing activities should be taken up within the reservoir. A part of revenue generated from the fishing activity should go to the Water Resource Dept. for maintenance purpose of the dam.
- Training and awareness programme required to make people aware about the various aspects related to the dam for optimum utilization of water.

Public Consultation & Meeting with Stakeholders: Bhatghar Dam

Place: Bhor Taluka, Pune District

Venue: Dam site and downstream villages

Date: 7th August, 2007 & 25 January 2008

Participants:

- **Mr. Hindurao Tubaram**
  Sub Divisional Engineer
  Nira Irrigation Sub Divission
- **Mr. Y. K. Chougule**
  Sectional Engineer, Bhatghar dam
- **Mr. V. D. Yadav**
  Sub divisional Engineer
  Baramati Irrigation Sub Division
- **Mr. P. R. Kulkarnin**
  Assistant Engineer
  Irrigation Research sub Division,
- **Mr. Gorabh Sawant**
  Sectional Engineer, Indrabati

  And
- **Local Villagers**
  Ms. S.S. Mahangre (Gram Sebak)
  and Others,
  Hartari village

Consultation with Dam officials

Consultation with Villagers in Downstream

Issues Discussed:

- Intensity of rainfall and inflow from the upstream.
- Flooding problem in the downstream due to uncontrolled release of water from the dam.
- Embankment and carrying capacity of the river in the downstream.
- Structural aspects of the dam.
- Water Quality and Siltation Problem.
- Livelihood of the local people
- Distribution of water.
- Canal system of the dam
- Tourism potential at dam site.

- Hydro electric power generation.
- Land use pattern.
- Nature of the Catchment Area and catchment treatment plan.
- Rainfall monitoring stations and Alarm system.
- Environmentally sensitive areas in and around the dam site.
- Fishing activity within the dam.

Major findings of the meetings and consultation:

- Sudden release of water or heavy rainfall causes flood situation in relatively lower areas adjacent to the downstream. Loss of crops, property is a rare. Sometimes bridges in the immediate downstream are getting submerged due to huge release from the dam.
- This is a very old dam established almost 80 years before so technological aspect should be upgraded and strengthening is required for survival of the dam. Old gates needs to be replaced strengthening of the dam is required.
- Previously there was a smaller dam after construction of Bhatghar dam there is gradual deposition of debris between old and new dam.
- No canal is constructed from this dam. There is storage dam in the downstream from where canal is constructed for irrigation purpose. In the immediate downstream there is no canal network. People residing here have sense of deprivation that they are not getting sufficient water to maintain their livelihood.
- In immediate downstream of the dam irrigation facility has bee provided by lift system from the river but it is not adequate to meet the irrigation requirement.
- Water distribution system through canal is not proper. There is considerable amount of transmission and evaporation losses. Seepage problem is also there from the canal. Canal water is not distributed properly amongst the farmers.
- This place has a lot of potential which can be developed as a tourist place; Natural Scenic beauty of this place and well connectivity with Mumbai and Pune city can play a significant role to develop this place as a well known tourist place.
- Entire catchment area of this reservoir falls within Platue region and partially covered by forest. No catchment treatment plan is there for improvement of the catchment area.
- Inadequate number of rainfall monitoring station present on the upstream. Proper measurement of the inflow from the upstream and prior information about receiving of inflow is lacking.
- Fishing activity is carried out in the dam which is through lease system by Fisheries Dept. According to the potential It can be improved upto several times.

Recommendations & Suggestions:

- Structural Strengthening like cement grouting, Cleaning of sluices, Repair of old gates, Extension of guidewalls etc. are very much required. This is a very old dam proper rehabilitation measures need to be taken.
- Proper system should be developed to maintain regulated release of water from the dam which can minimise flooding of areas located on the downstream.
- Adequate number of rainfall monitoring station and proper information system should be developed to assess the inflow from the upstream in advance. Simultaneously

proper Alarm system should be developed to minimize the impact of any type of disaster caused by the dam and related activities.

- Involvement of the local people is very much required in various activities related to the dam. This will facilitate the overall upliftment of the socio-economic condition.
- Dam site can be developed as an ecotourism site. Its panoramic view and advantageous position will help a lot to promote such place. A part of revenue generated from tourism activity can also be used in dam maintenance.
- Catchment area monitoring system and treatment plan should be developed to stop the degradation of the catchment area and simultaneously to develop the catchment area. Forest Dept. and Water resource Dept. have to work together for development and protection of forest land in catchment area.
- Promotion of fishing activities should be taken up within the reservoir. A part of revenue generated from the fishing activity should go to the Water Resource Dept. for maintenance purpose of the dam.
- Training and awareness programme required to make people aware about the various aspects related to the dam for optimum utilization of water.

Public Consultation & Meeting with Stakeholders: Pawana Dam

Place: Pune

Venue: Pawana Dam site and Downstream Villages

Date: 6th August, 2007 & 24 th January 2008

Participants:

- **Mr. Er. Avinash Surve**

  Superintending Engineer
- **Mr. Vijay Ghogore** Executive Engineer, (Pawana Dam)
- **V. G. Page**

  Junior Engineer And
- **Mr. Galial**

  Sub Divisional Engineer
- **Mr. Memane**

  Sectional Engineer
- **Local Villagers & farmers**

  Mr. A.G. Kalekar, Mr. Vitthal Govind Kalekar, Pandu Rao Govind Kalekar, Village Saveti Vashet , Mr. Balu Ramji, **Village Mahagaon**

Consultation with villagers in the downstream

Consultation with the local people in the downstream

Issues Discussed:

- Intensity of rainfall and inflow from the upstream.
- Flooding problem in the downstream due to uncontrolled release of water from the dam.
- Embankment and carrying capacity of the river in the downstream.
- Structural aspects of the dam.
- Water Quality and Siltation Problem.
- Distribution of water.
- Canal system of the dam
- Livelihood of the local people
- Tourism potential at dam site.
- Hydro electric power generation.

- Land use pattern.
- Nature of the Catchment Area and catchment treatment plan.
- Rainfall monitoring stations and Alarm system.
- Environmentally sensitive areas in and around the dam site.
- Fishing activity within the dam.

Major findings of the meetings and consultation:

- River embankment is not so high so carrying capacity of the river is on lower side. Areas surrounding the river bed are often flooded during release of water from dam. Flood situation is restricted within small pockets which are lying adjacent to the river and relatively low land. Flood situation doesn't last for longer period.
- The maximum flood that can pass over the spillway is 44200 cusecs. Normally the bridges in the downstream are under the flood water when the discharge releases 5000 cusecs onwards.
- Consultation with the dam official some major structural problem of the dam has been identified, those are
  a. It is not possible to fill the reservoir upto its FRL due to heavy leakages in the dam
  b. Dam height was increased by 0.5 meter for more storage but height of the parapet wall was not increased subsequently. From safety point of view it is required to increase the parapet wall height.
  c. Increase the height of the sill, and extension of the guidewall is required.
- Siltation rate is very low i.e. less than 5% and Water quality of the reservoir is quite good which is used as a source drinking water.
- People in the downstream have a sense of deprivation. Their grievance is that they are not getting adequate water for irrigation in spite of residing immediate downstream of the dam. Agricultural requirement of water of the local people is fulfilled by lift irrigation from the river but this system is costlier and connections are not adequate to meet the irrigational requirement.
- Consultation with the local people reveals that project affected families received only compensation that time for displacement. Further assistance for better livelihood has not been provided by the Govt. After displacement occupational pattern has changed drastically. Due to scarcity of land and other leagal problem govt. is unable to provide agricultural land to most of the displaced people. Now most of them are maintaining their livelihood as labour in different sectors.
- This place has a lot of potential which can be developed as a tourist place; Natural Scenic beauty of this place and well connectivity with Mumbai and Pune city can play a significant role to develop this place.
- Land use pattern of the downstream is changing drastically due to fast development and extension of the Pune city. Local people are more keen to sell their land at a high price instead of continuing agricultural activity on their land
- Alarm system is not satisfactory. During monsoon, many times it has been found round 'O' clock telephone communication, can't be possible due to higher intensity of rainfall and heavy winds, Thus for 'Alert' communication wireless set from poliece Dept. is requested each year to be installed in colony during monsoon.
- Entire catchment area of this reservoir falls within platue region of Pune district and

mostly covered by forest. No catchment treatment plan is there for protection and improvement of the catchment area.

- No rainfall monitoring station present in the catchment from where rainfall date can be received in advance for better emergency preparedness.
- Fishing activity is carried within the dam facilitated by Fisheries Dept. through lease system. Local people or project affected persons don't have any sort of involvement in fishing activity.

Recommendations & Suggestions:

- Cement grouting and drilling of the dam is very much required to minimize the leakages and fill the dam upto its FRL. It will be helpful from safety point of view also.
- Extension of the guidewall and increase in the height of the sill is required to minimize the flooding effect in the immediate downstream and to protect the scouring of the stilling basin subsequently.
- Proper system should be developed to maintain regulated release of water from the dam which can minimise flooding of areas located towards the downstream.
- Roads and bridges in the downstream are getting submerged during flood situation. Height of the road and bridges in the downstream nee to be increased for uninterrupted communication during flood situation.
- Wireless station need to be established for better emergency preparedness and overall Alarm system should be developed to minimize the impact of any type of disaster caused by the flood.
- Adequate number of rainfall monitoring station and proper information system should be developed to assess the inflow from the upstream in advance.
- Land use in the downstream areas is changing rapidly. Agricultural lands are being converted into residential and commercial uses. To minimize flooding impact and loss of life, the potential hazard zone needs to be designated and taken care of during such development.
- Dam site can be developed as an ecotourism site. Its panoramic view and advantageous position will help a lot to promote such place. Part of the generated revenue from this tourism can also be used in dam maintenance.
- Catchment area monitoring system and treatment plan should be developed to stop the degradation of the catchment area and simultaneously further development of the catchment area. This will be helpful in both ways it will improve the water quality of the reservoir and will generate employment.
- Local people should get priority in use of dam water for their livelihood. Requirement for drinking water and agricultural use has to be fulfilled for their sustained livelihood.
- Promotion of fishing activity within the dam. Policy should be developed to facilitate the displaced people by involving them in the fishing activity within dam. A part of revenue generated from the fishing activity should go to the Water Resource Dept. for maintenance purpose of the dam.

iv West Bengal

There are two projects in West Bengal, Sali Reservoir in Bankura district and Bara Mandira Reservoir in Burdwan district. The public consultation involved discussion with Water Resources Department.

Issues Discussed:

- Data Availability, status of data acquisition and documentation
- Structures affected and/or situated at the potential hazard zones of the dam
- Forecasting and Alarm systems
- Environmental and Social issues and Resettlement and Rehabilitation at dam surrounding
- The dam safety issues related to the dam operation
- Problems regarding the O&M Matters of the dam
- Tourism Potential Around the Dam
  Fishing Potential in the Reservoir .

Findings from the stakeholders Response and public consultation:

- The dam is situated at the origin of Sali river, where three different streams of catchment meet and presently at the downstream the river Sali originates.
- The dam releases water to the d/s almost throughout the year and maintain the environmental flow, even in dry season, on demand from the villagers, water is released to facilitate cattle drinking,
- Three types of irrigation is provided by the dam – irrigation through canal system, Lift irrigation from the reservoir and River lift scheme at kankua village and Flooding through an additional outlet gate.
- Lift irrigation practices utilize even dead storage of the dam.
- The dam is a preferred habitat of waterfowls and has high potential of tourism development
- No Alarm system is present there at the dam site, although every year emergency dam release happens 5 to 7 times, due to sudden inflow.
- Even, the information dissipation system through local administration too has been found ineffective in the D/S during consultation with the villagers.
- No meteorological or any other data acquisition system except the water level gauging is present. The rainfall data is acquired from the raingauge of agriculture department at the nearest dam,
- There are 8 d/s and 3 peripheral villages,
- There is an uncontrolled outlet at FSL which opens at a peripheral village.
- There are areas of the embankment which needs strengthening,
- The spillway gates are operated manually,
- Fishing is not allowed for local people, until and unless there is a lease of fishing,
- Being at the higher side, although the peripheral people do not perceive any threat of flooding, but the residents at the D/S villages are scared of the same.
- High potential of tourism development is there due to the scenic beauty and position of

the dam.

- Index map, DPR, Emergency Action Plan, dam break analysis, O&M Plan etc are not in order, hence it seems difficult to make any rapid action for planning
- WUA in the command in ineffective or absent.
- Any disaster preparedness training has been given neither to dam staffs and nor to local people residing at potentially high risk zone.

Recommendations & Suggestions:

- Electrification of the dam site is necessary for proper operation and maintenance of gates,
- The dam embankment needs to be strengthened and regular inspection of the same is most necessary,
- An well framed Alarm system should be installed for dam release intimation,
- Hydro-meteorological data acquisition system needs to be developed at the dam site,
- Disaster preparedness training should be given to the villages at potential hazard zones including dam peripheral villages and d/s villages,
- Tourism should be developed through a public private participation model in collaboration of irrigation and tourism department.
- The SAE of the dam is posted at Sonamukhi – 55 kms away of the dam site, which weakens the institutional working. This needs strengthening.

Meetings with Stakeholders and Public Consultation: Bara Mandira Reservoir

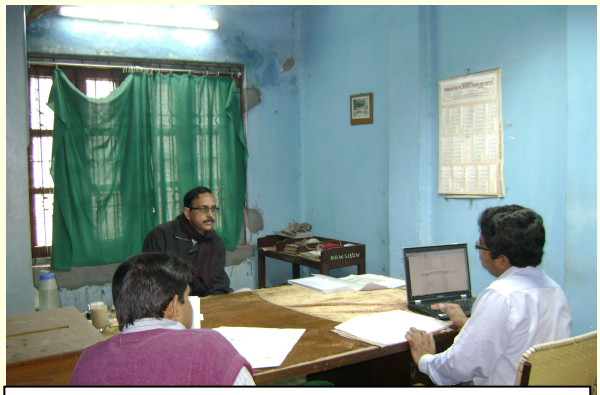
Place: Durgapur and Dam site
Venue: Offices at Durgapur and Bara Mandira Reservoir
Date: 9th August 2007, 20th February, 2008

Participants:

- **Mr. Abani Roy**
  Executive Engineer
- **Mr. Shibojyoti Raja**
  SDO
- **Mr. Sudipto Dutta**
  Sub-Assisstant Engineer
- **Mr. A.K. Gandhi**
  Gauge Operator,
- **Mr. Madhusudan Ghosh &**
  Mr. Narahari Ghosh
  Dam Operator (Khalasi)

- **Villagers**
  Kashkhuli village

- **Villagers**
  Rangabhita tribal village



Meeting with SDO, Baramandira dam

Consultation with SAE,& Dam operator

Public Consultation at Kashkhuli village

Public Consultation at Rangabhita village

Issues Discussed:

- Data availability, status of data acquisition and documentation
- Structures affected and/or situated at the potential hazard zones of the dam
- Forecasting and Alarm systems

- Environmental and Social issues and Resettlement and Rehabilitation at dam surrounding
- The dam safety issues related to the dam operation
- Problems regarding the O&M Matters of the dam
- Tourism Potential and Fishing Potential in the Reservoir and surroundings.

Findings from the stakeholders Response and public consultation:

- The dam has a very short command area no further extension of command is possible,
- The dam have very limited potential hazard zones,
- There are effective fishing practices in the dam reservoir, and the revenue is collected by the water resource department by leasing out the reservoir to fishing cooperative.
- There are peripheral villages at a higher elevation, hence no fear of submergence was observed.
- The spillway do not have any gate, hence the water pass out of the reservoir when ever the level reaches spillway crest level.
- But, not measurement of water release is possible.
- Seepage was found in the countryside of the dam embankment near LBMC.
- There are scouring in the country side of the dam embankment,
- The boulder walls need maintenance,
- High rates of weed growth was found in the embankment in reservoir side,
- Too little staff strength, only two Khalasi (unskilled dam operators) are deployed. The SAE and gauge operator are in charge of another dam called Puin nala.
- No Alarm system available
- No data acquisition and recording system is there,
- No communication system other than personal mobile of the Khalasi,
- Cattle cart movement on the earthen embankment threatening the dam safety is observed,
- No coordination with forest department. Lack of coordination between Forest, Zela Parishad and water resource department is a hurdle before proper tourism development, although the site has high potential for the same,
- The approach road condition is very bad,
- There is no alternative livelihood promotion schemes for the peripheral villages,
- No electrification at the dam,
- The JEN (SAE) of the dam is posted at Durgapur, 80 km from the dam,
- The local PS is situated at a distance of 20 km.
- There is a demand for winter irrigation, which can be done only if the height is enhanced by 2 to 4 ft. this enhancement will lead to inundation of several agricultural fields.
- No document including reservoir contour map, index map, reservoir boundary map, DPR etc is available for the dam, which is a massive constraint for improvement and rehabilitation of the dam.

Recommendations & Suggestions:

- People will benefit if lock gates of 3 feet are installed
- Training should be imparted to people for the formation of Water User's Association.

- The potential of fishery development should be explored as it would help in income generation of the local people.
- The potential of building up tourism around the around the dam sites needs to be examined further

Major Findings of the meetings and consultation:

- The Alarm system for water release from most of the dams did not seem well built, as systematic forecasting system is absent. The warning system is predominantly dependant on the mobile service and hence depends on external agency's efficiency. In lack of an internal system for message any emergency consequences may not be fought properly.
- Organised fisheries can be developed within the reservoir in most of the cases which can be a permanent source of income for the local people.
- Most of the dams having good potential of tourism potential. But, the law and order problems, bad road quality and lack of interest amongst officials and local people put hindrance on the tourism development.
- Siltation rate is quite high in some places. This is affecting the storage capacity and water quality of the reservoir.
- In most of the dams catchment has no rain gauge station and water level recording system to combat any emergency situation arises due to sudden cloud burst.
- Catchment treatment program is mostly lacking for most of the areas.
- In some places local residents especially the rehabilitated people have sense of deprivation as livelihood support was extended to them.
- As per discussion held with dam officials, some major structural problem was found in some of the dam.
- The alarm siren at the time of water release reaches nearly 3kms, which may not be enough for a higher rate of discharge.
- Canal system need to be strengthened in most of the cases for better water distribution system and to minimize the water loss.
- Hydropower generation is a major aspect. Generation of hydropower need to be compulsory for all potential dams.
- Leakages in masonry work and choking of drains are major problems for most of the dam.
- In some places river embankment is not so high so carrying capacity of the river is on lower side. Areas surrounding the river bed are often flooded during release of water from dam. Flood situation is restricted within small pockets which are lying

adjacent to the river and relatively low land. Flood situation doesn't last for longer period.

Recommendations and Suggestions

- Adequate number of rainfall monitoring station and proper information system should be developed to assess the inflow from the upstream in advance. Simultaneously proper Alarm system should be developed to minimize the impact of any type of disaster caused by the weir and related activities.

- Promotion of fishing activities should be taken up within the reservoir. A part of revenue generated from the fishing activity should go to the Water Resource Dept. for maintenance purpose of the dam.

- Dam sites can be developed as an ecotourism site. Apart revenue generated from tourism can also be used in dam maintenance.

- De-siltation is required in some of the dams as increased siltation rate has already reduced the original capacity of the dam. The suggestions given by various experts regarding the structural aspects of the dam should be followed as it is directly proportional to the dam safety.

- Catchment area treatment may be prioritized. The tribal, if any I the area, may be sensitized regarding the importance of catchment area in relation to the dam, dam surroundings and dam environment. As deficiency is observed in interdepartmental co-ordination, better coordination among the Forest Department and Irrigation Department may be ensured.

- Alarm system can be strengthened as siren reaches only about 2-3 kms, while the remaining villages are informed via telephone and television, which might fail.
- Structural Strengthening of the dam is required from safety point of view and better survival of the dam.

- Hydropower project to be installed for the wise use of resources and better sustainability of the dam may be explored. Local requirements may be considered in the area for direct revenue generation.

- Extension of the guidewall and increase in the height of the sill is required to minimize the flooding effect in the immediate downstream and to protect the scouring of the stilling basin subsequently.

4.C Assessment of key environmental and social issues:

A few points that were identified during the environmental and social assessment of the sample of dams are summarized in more detail.

Changes in water allocation upstream and downstream of project dams as a result of the project activities are not expected. The configuration of the dams will not change (no change in dam height, spillway crest level, etc.). Almost all dams do fill up now and spill, and this will continue after the project, but with a safer dam. As there are annual flood events there are limited opportunities to encroach on silted areas within the reservoir. Desilting of reservoir areas will not be a major activity under the project. There are only requests for possible desilting of a few State Electricity Board dams, and these are in remote areas where there is no encroachment.

In the unlikely event that the remedial work on the dam requires land acquisition or resettlement, OP 4.12 on Involuntary Resettlement has been triggered. The ESMF already details the process to be followed for the preparation of a Resettlement Action Plan (RAP) in the event this may be required.

There will be no change in reservoir volume for those dams that do spill already now. For the dams where the reservoir area is at the moment kept below full supply level for safety reasons, the rehabilitation works will allow a complete filing up afterwards, giving a positive impact (more water availability). Negative changes in overall water regime are therefore not expected. O&M manuals will be updated and the water delivery regime will be included.

OP 4.10 on Indigenous Peoples has been triggered to address the eventuality that any sub-project dam is in a tribal area and the DRIP activity affects tribal populations. The ESMF already provides the procedure for preparation of an Indigenous People's Development Plan following all requirements of OP 4.10 that will include a process map for implementation which includes free, prior, and informed consultations with affected communities leading to broad-base community support for the intervention. Significant impact on livelihood systems as a result of the project interventions is not expected, but as needed this will be covered in the Plan.

Although catchment rehabilitation was identified as an issue for some dams, addressing catchment management issues in a holistic way will not be carried out

under the project, as it will involve many institutions, stakeholders, and a set of complex socio-economic issues. The proposed project interventions at the dams do not have any negative impact on the catchment areas, so it will not worsen the situation. If for the sustainability of rehabilitation and improvement of a dam, some catchment area treatment is seen as essential it can become part of the sub-project interventions.

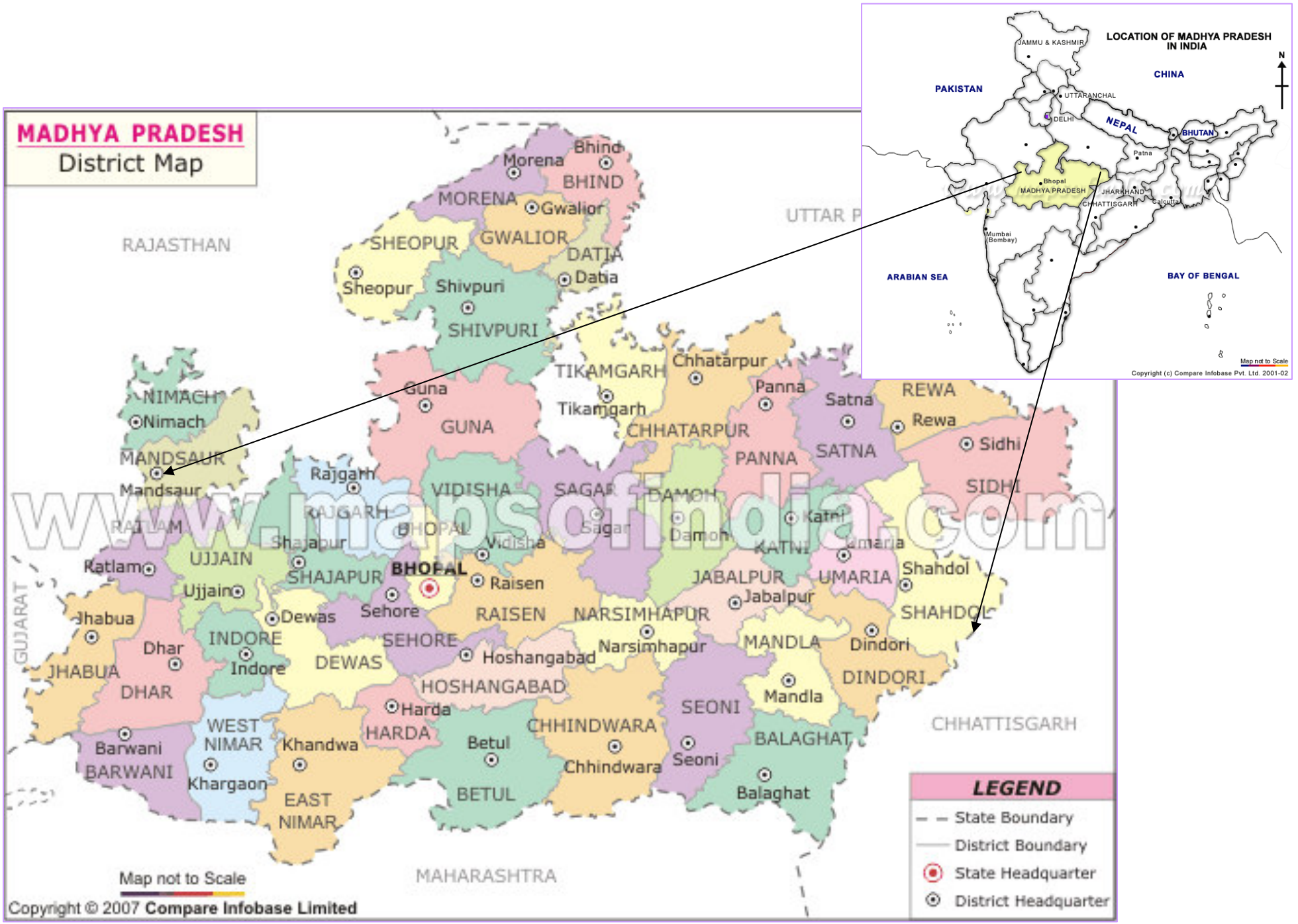


Fig 4.1: Location Map of Madhya Pradesh

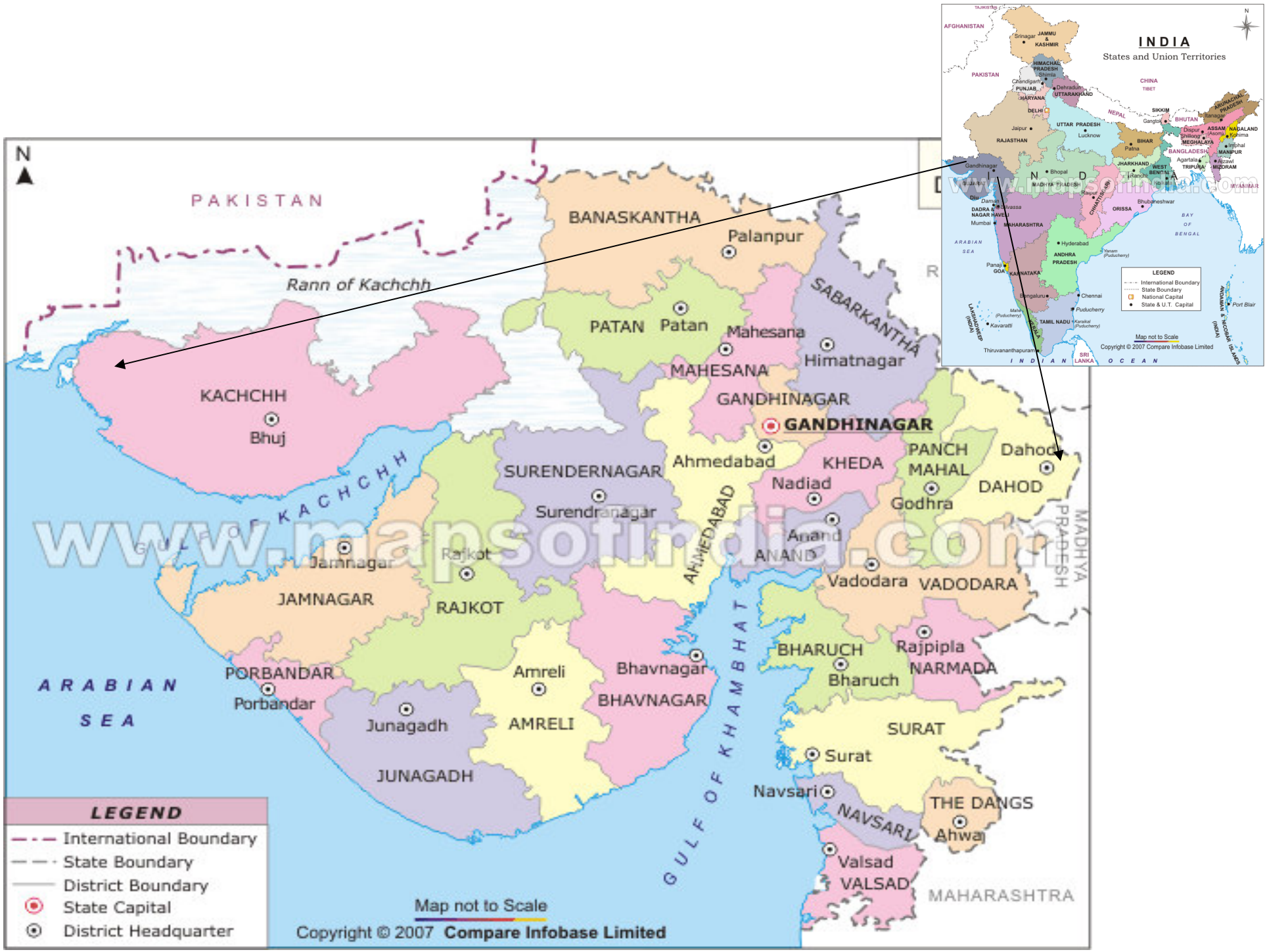


Fig 4.6: Location Map of Gujarat

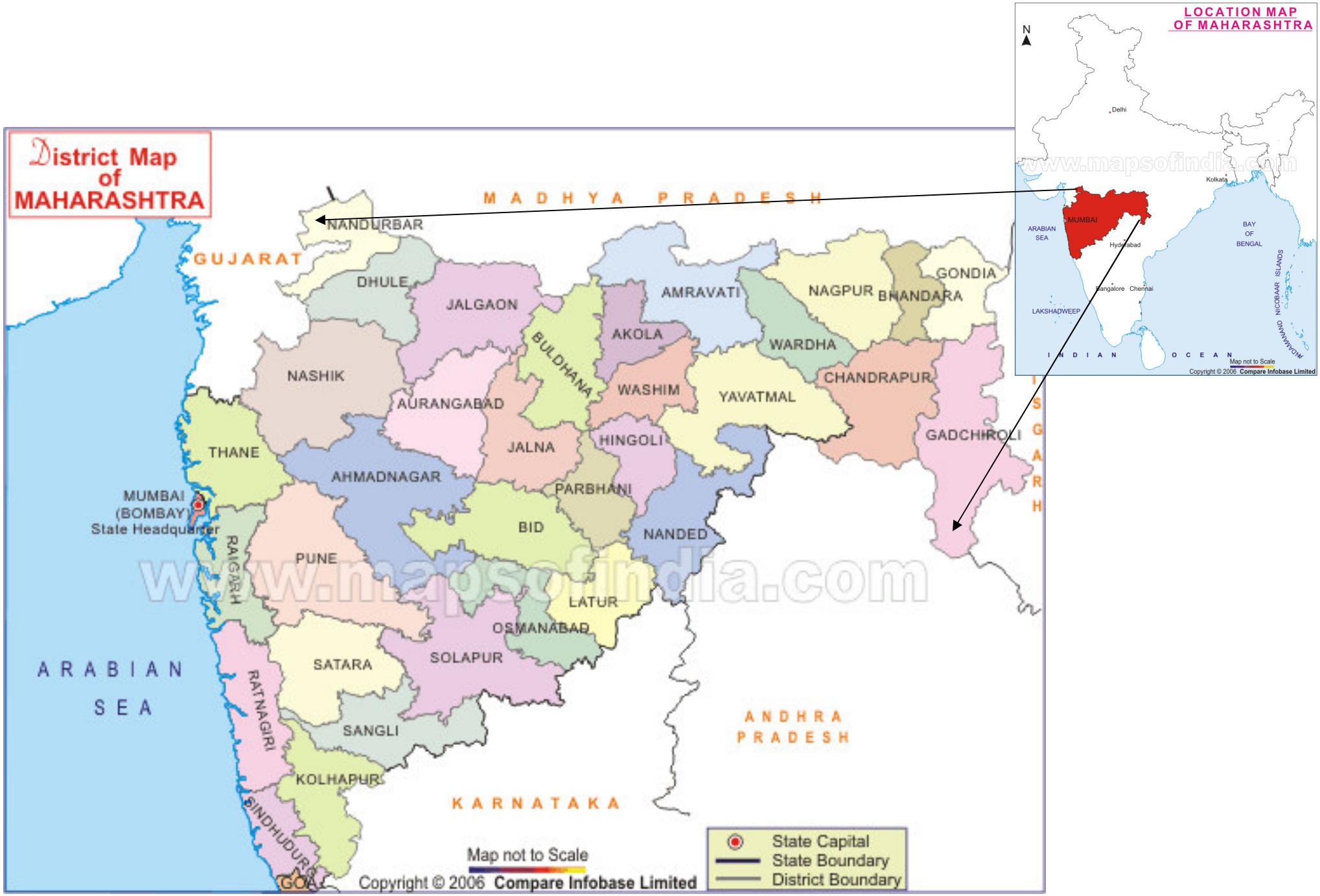


Fig 4.14: Location Map of Maharashtra

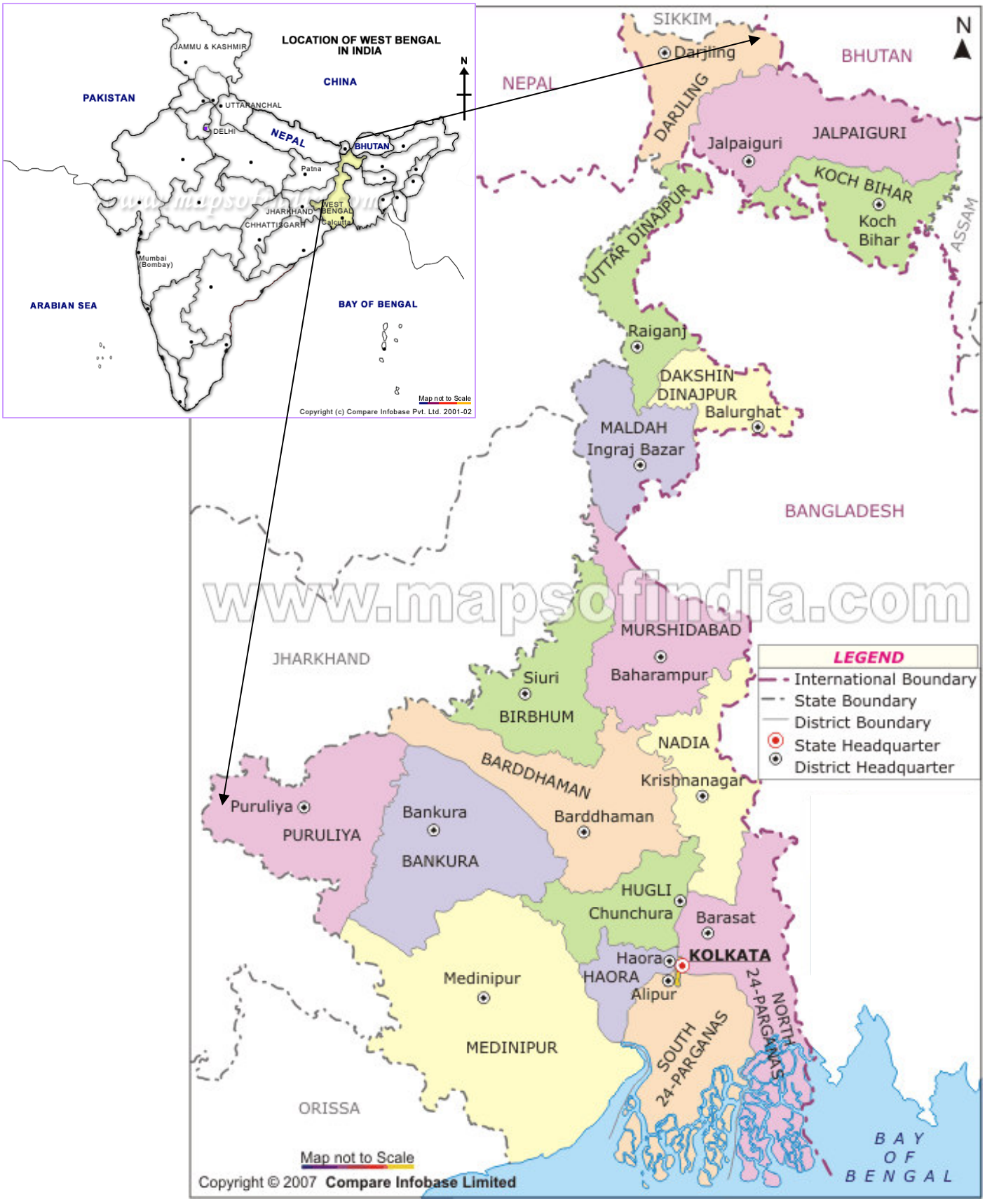


Fig 4.21: Location Map of West Bengal

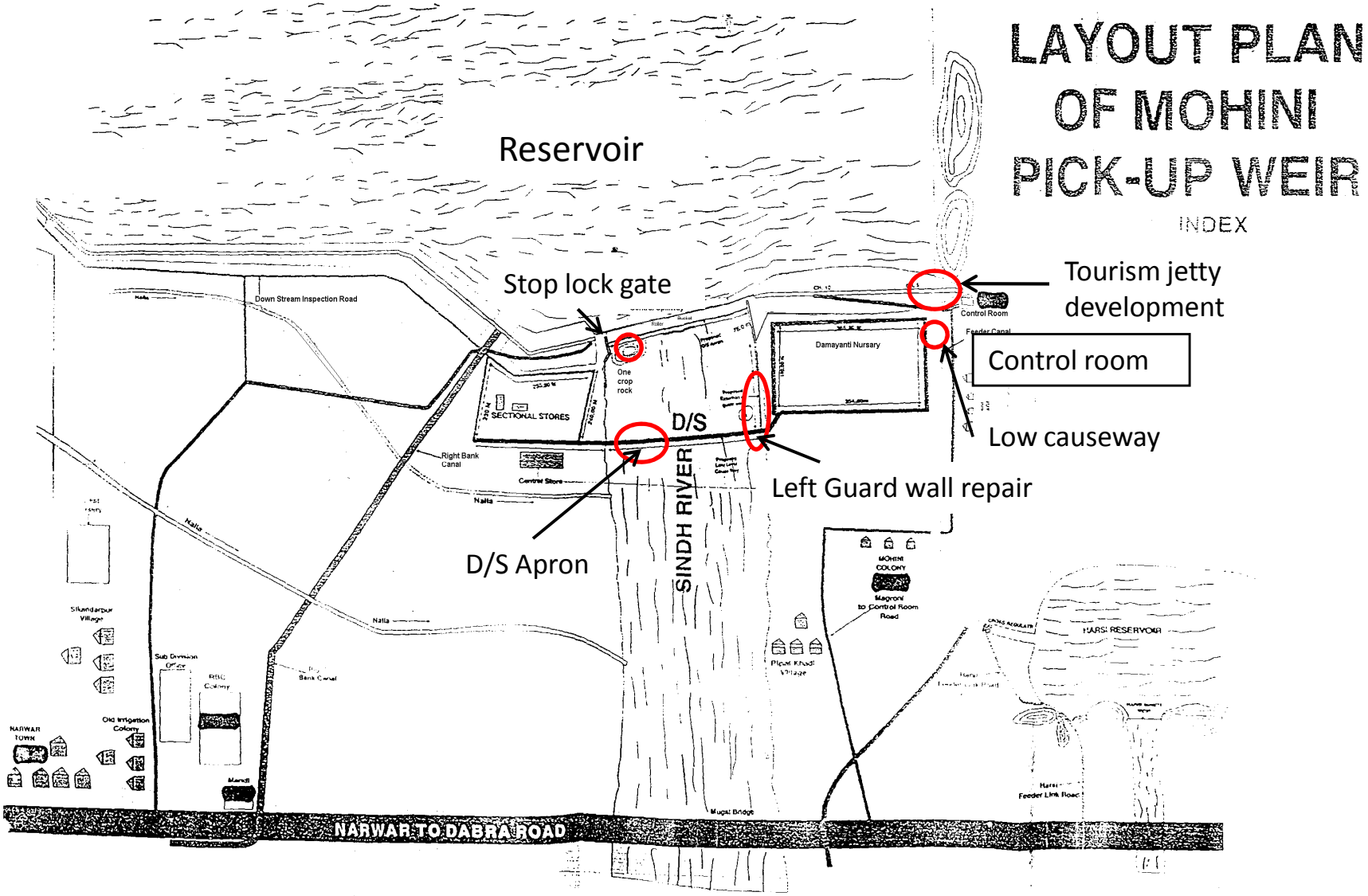


Fig 4.3 Layout Plan of Mohini Pick-up Weir

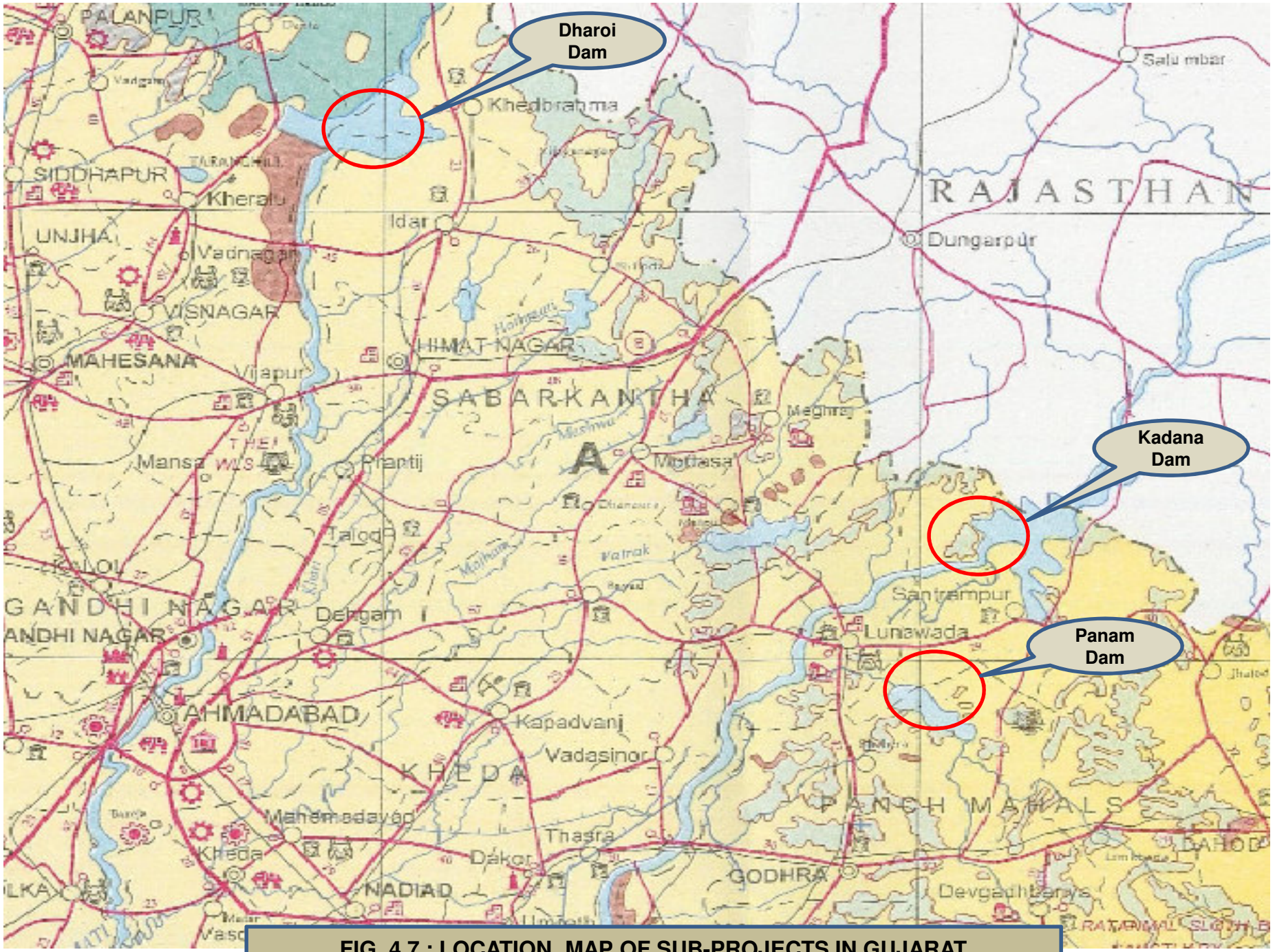


FIG. 4.7 : LOCATION MAP OF SUB-PROJECTS IN GUJARAT

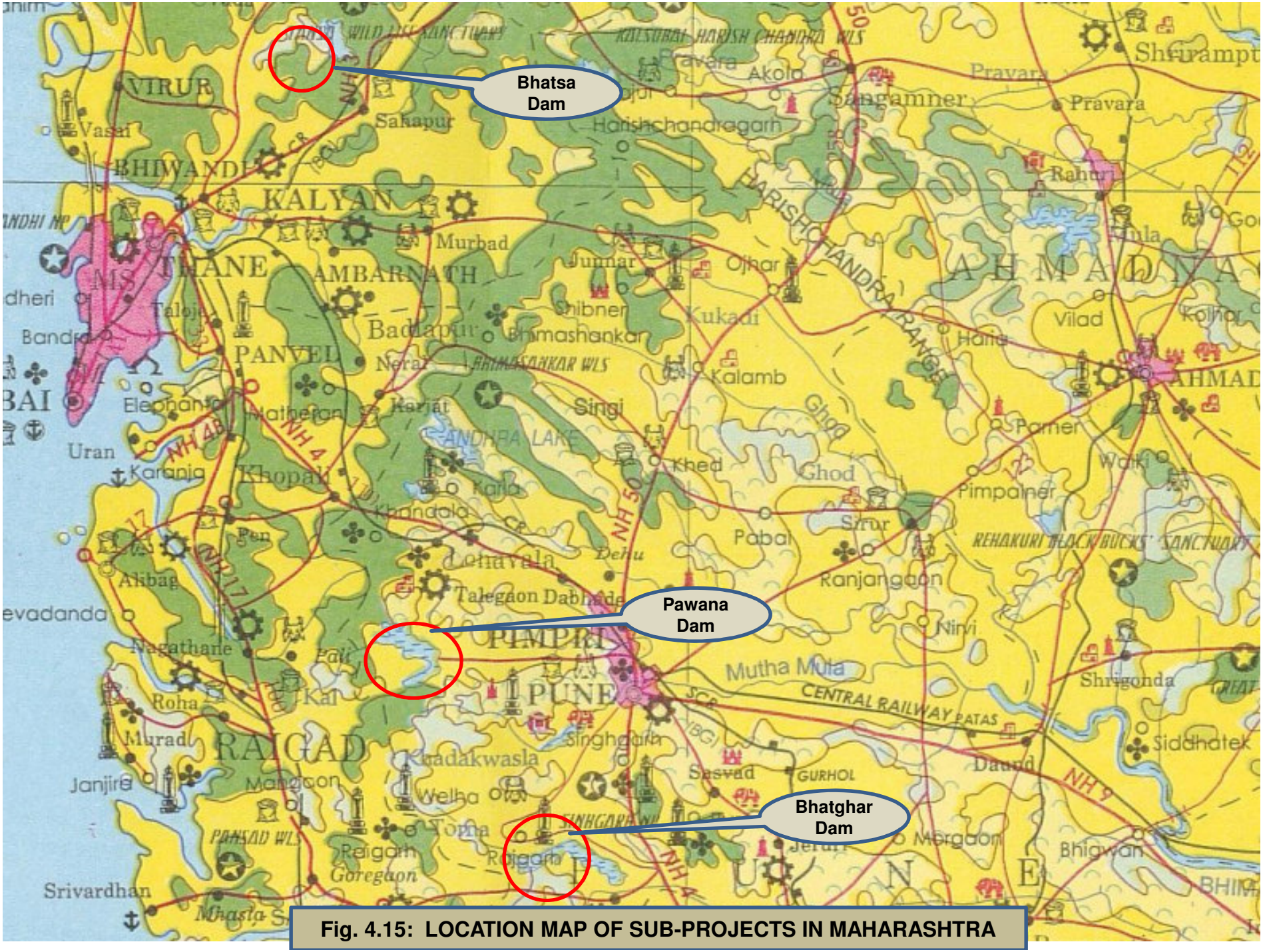


Fig. 4.15: LOCATION MAP OF SUB-PROJECTS IN MAHARASHTRA

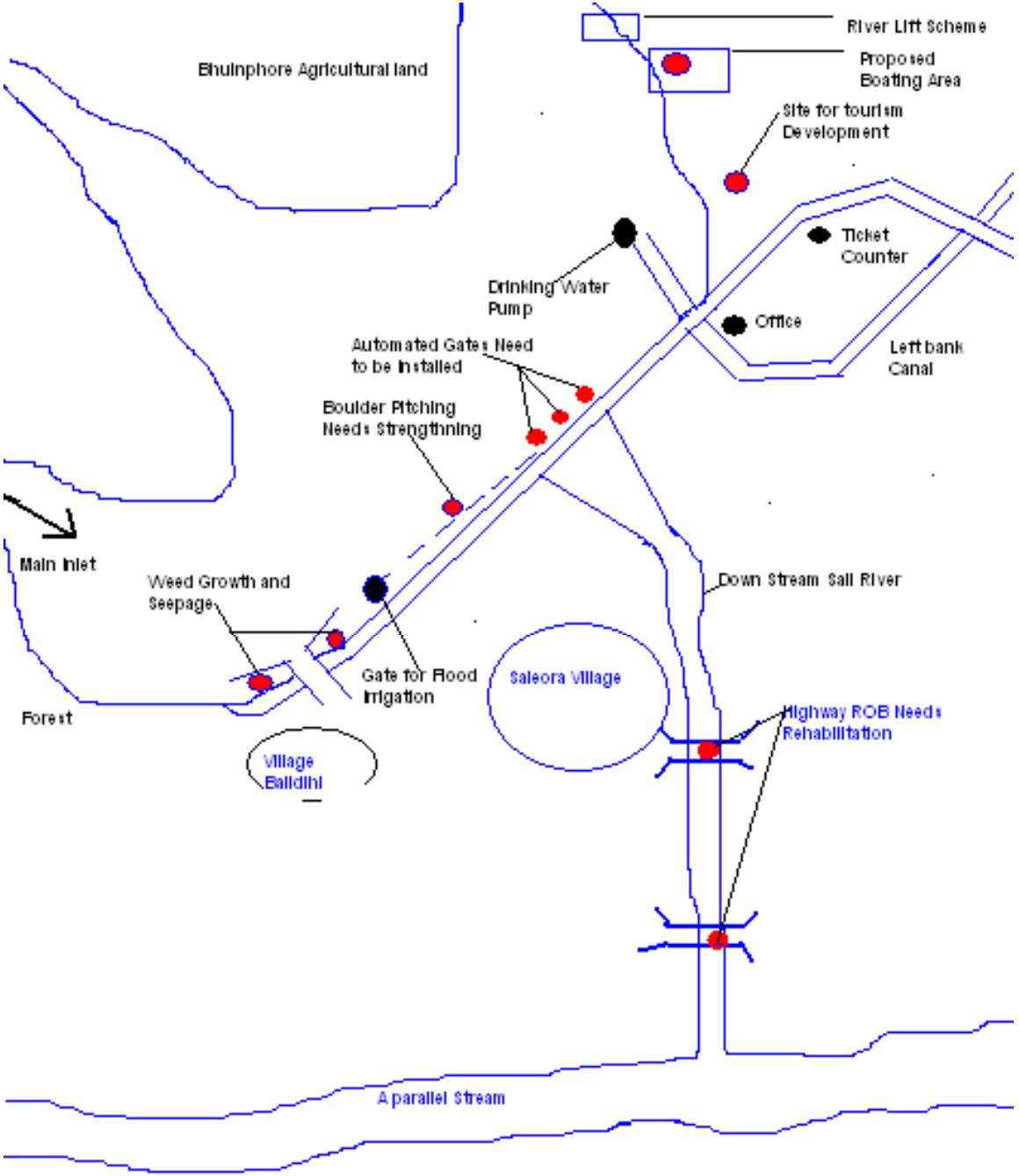
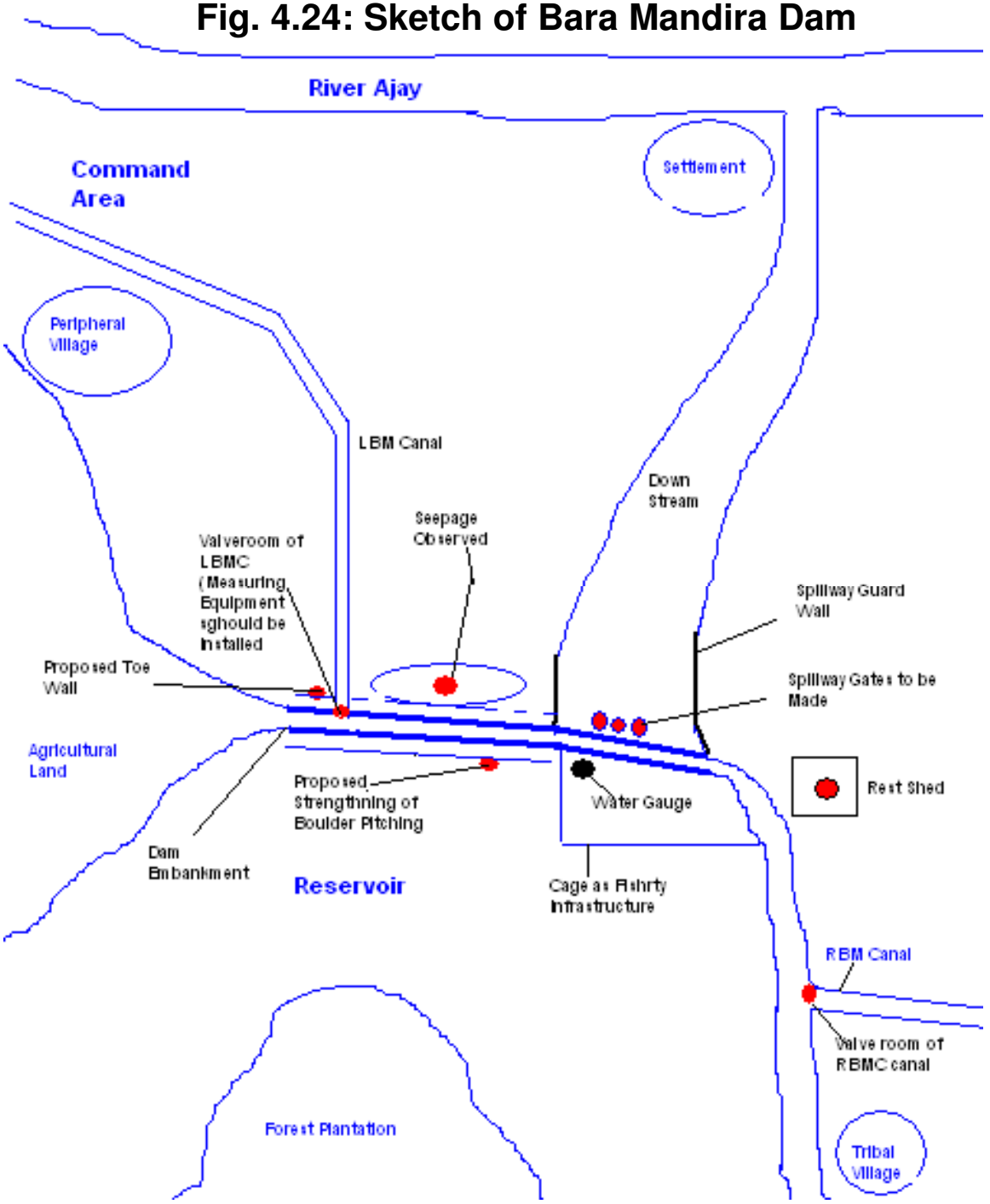


Fig. 4.23: Sketch of Sali Dam

Fig. 4.24: Sketch of Bara Mandira Dam



CHAPTER 5
SCOPING AND SCREENING OF IMPACTS

5.1 INTRODUCTION

In Chapter-2, we have identified and prepared a list of sub-project activities which could be applied to dams rehabilitation projects under DRIP. These activities have been identified based on the rehabilitation proposed for each of the ten dams and on the discussions with the CWC officials, as well as, officials of the concerned State Government Departments.

5.2 SCOPING

A study of the activities was first carried out to identify the component involved for execution of the activities. Only components which have potential environmental/social impacts were identified. In the next stage, the potential environmental/social impacts due to the execution of the components were identified. A summary list of all these are given in table 5.1 below.

Table 5.1: Environmental and Social Components for Scoping

Activities	Components	Impacts
1. Reservoir Desiltation 2. Tourism Development 3. Approach road, dam crest roads, etc. construction / improvement 4. Hydropower Generation 5. Standby Generator 6. River Regradation 7. Flood Protection Network 8. Wind Mill & Solar Power 9. Treatment of leakage through masonry and concrete dams and reduction of seepage through earth dams and their foundations 10. Improving Dam Drainagae 11 Structural strengthening of dams to withstand higher earthquake loads 12. Remodeling earth dams to safe, stable cross sections 13. Improving toe drain and seepage measuring devices 14. Improving ability to withstand higher floods including additional flood handling facilities, if needed. 15. Repairs to damaged spillways, stilling basins and downstream channels 16. Improving dam safety instrumentation 17. Improving communications – real-time as much as possible – between dams, upstream rain/river flow gauging stations and with other dams, control offices and civil authorities in flood plains downstream of the dam 18. Flood marking 19. Low voltage electrical supplies in	1. Acquisition of forest land 2. Borrow materials/ area 3. Quarry materials / area 4. Blasting 5. Dredging/Desiltation 6. Resettlement and Rehabilitation 7. Labour Camps 8. Heavy machinery 9. Hot mix plant 10. Concrete mixture and heavy pumps 11. Material handling and storage 12. Temporary land acquisition 13. Tree felling/ vegetation clearance 14. Haulage of machinery 15. Debris Disposal 16. Transport of materials 17. Small tools and pumps 18. Sheds to keep machines and tools	1. Landscape Degradation 2. Soil Erosion 3. Land Acquisition 4. Air / Noise Pollution 5. Water Pollution (Surface Water) 6. Soil Pollution 7. Impact on flora 8. Habitat Loss Fragmentation 9. Disturbance to Fauna 10. Worker/Local people exposure 11. Trucks Traffic increase 12. Water Delivery Reduction 13. Generation of Excavated material 14. Deterioration of aquatic environment 15. Impact on borrow and quarry areas 16. Generation of debris and quarry material 17. Dam embankment

Activities	Components	Impacts
inspection and drainage galleries 20. Improving lighting for external areas of dams 21. Inspection launches provision 22. Rehabilitation / Improvement of Spillway, head regulator and draw-off gates and their operating mechanisms 23. Repair / Modification of Spillway Gates 24. Cleaning of foundation drain & porous drain 25. Repair and cleaning of irrigation outlets		erosion 18. Impact on local/tribal communities 19. Weed growth 20. Impact on human health specially workers working at construction site 21. Drainage and water logging problem 22. Impact on fisheries and fishermen livelihood

5.2.1 Categorisation of Components

Categorisation of components has been done based on their extent of adverse environmental and social impacts. Based on Potential environmental and social impacts associated with each component, these components have been classified under three categories.

Category A: Components which have major environmental/social impacts and require specific environment management plan (EMP) for implementation of mitigation measures. This EMP is to be incorporated in the bid document and contractor/implementing agencies has to follow this during construction as well as operation.

Category B: Components which have moderate environmental and social impacts and certain precautionary measures have to be followed by the contractor and the project authorities to minimize impacts during construction as well as operation.

Category C: Components which have negligible or nil environmental and social impacts and as such no mitigation measures have been proposed for these activities.

The following table shows components under different categories:

Table 5.2: Categorisation of Components

Category A	Category B	Category C
Acquisition of forest land	Heavy machinery	Small tools and pumps
Borrow materials/ area	Hot mix plant	Sheds to keep machines and tools
Quary materials / area	Concrete mixture and heavy pumps	
Blasting	Material handling and storage	
Dredging/Desilting of reservoir	Temporary land acquisition	
Resettlement And Rehabilitation	Tree felling/ vegetation clearance	
	Haulage of machinery	

	Debris Disposal	
	Transport of materials	
	Labour Camps	

5.3 SCREENING

A screening exercise was next carried out to delineate the potential environmental and social impacts due to the components identified in the screening stage. This has been done both for construction and operation stages. The details are given below in table 5.3.

Table 5.3: Environmental & Social Components for Screening

Impacted Environmental and Social Components		Type of Impact +Ve / -Ve	Remarks
Construction Phase			
S. No			
1.	**Construction Phase** Landscape Degradation	Negative	It is a Direct Short term impact; Irreversible in nature; Severity is low; Insignificant Impact on Livelihood
2.	Soil Erosion	Negative	It is a Direct Short term impact; Water Quality may deteriorate in the immediate downstream due to surface runoff; Severity is low; Insignificant Impact on Livelihood
3.	Land Acquisition	Negative	It is a Direct Short term impact; Reversible in nature; Severity is low; Low Impact on Livelihood may be due to displacement or Acquisition of land.
4.	Air / Noise Pollution	Negative	It is a Direct Short term impact; Reversible in nature; Severity is low; Low impact on local livelihood due to generation of dust, noise and handling of heavy machinery.
5.	Water Pollution (Surface Water)	Negative	It is a Direct Short term impact; Reversible in nature; Severity is low; Low impact on local livelihood due contamination of surface water by surface runoff from the construction site.
6.	Soil Pollution	Negative	It is a Direct Short term impact; Reversible in nature; Severity is low; Insignificant impact on local livelihood.
7.	Disturbance to Fauna	Negative	It is an Indirect Short term impact; Reversible in nature; Severity is low;
8.	Impact on Flora	Negative	It is an Indirect Short term impact; Irreversible in nature; Severity is low;
9.	Habitat Loss Fragmentation	Negative	It is an Indirect Short term impact; Reversible in nature; Severity is low;
10.	Worker/Local people exposure	Negative	It is a Direct short term impact; Reversible in nature; Severity is low; Low impact on local livelihood due to generation of dust, smoke and noise from machinery and vehicles.
11.	Trucks Traffic increase	Negative	It is a Direct short term impact; Reversible in nature; Severity is low; Low impact on local livelihood due to generation of dust, smoke and noise from moving vehicles
12.	Water Delivery	Negative	It is a Direct short term impact; Reversible in

Impacted Environmental and Social Components		Type of Impact +Ve / -Ve	Remarks
Construction Phase			
S. No			
	Reduction Interruption		nature; Severity is low; Low to moderate impact on local livelihood due to reduction or irregular water supply in the downstream during construction phase.
13.	Generation of Excavated material	Negative	It is a Direct short term impact; Reversible in nature; Severity is low; Low impact on local livelihood due to generation of dust and improper handling huge excavated material.
14.	Deterioration to aquatic environment	Negative	It is a Direct short term impact; Severity is low; Low to moderate impact on aquatic life due to reduction or irregular water supply in the downstream during construction phase.
15.	Impact on borrow/quarry areas	Negative	It is a Direct short term impact; Severity is low; with suitable mitigation measures
16.	Generation of Debris / waste materials	Negative	It is a Direct short term impact; Severity is low; with suitable mitigation measures
17.	Dam embankment erosion	Negative	It is a Direct impact; Severity is low; with suitable mitigation measures
18.	Impact on local tribal communities	Negative	Depends on Magnitude and type of activity associated with project.
19.	Weed growth within reservoir	Negative	It is a Direct impact; Severity is low; with suitable mitigation measures
20.	Impact on Human health, especially workers working at construction sites. (Labour Camps)	Negative	It is a Direct short term impact; Severity is low; with suitable mitigation measures
21.	Drainage and water logging problem	Negative	It is a Direct short term impact; Severity is low; with suitable mitigation measures
22.	Impact on fisheries and fishermen livelihood	Negative	Impact can be minimize/neutralize with suitable mitigation measures.
Operation Phase			
1.	Air / Noise Pollution	Negative	It is a Direct long term impact; Irreversible in nature; Severity is low; Insignificant Impact on Livelihood
2.	Water Pollution (Surface Water)	Negative	It is a Direct Short term impact; Water Quality may deteriorate in the immediate downstream due to surface runoff; Severity is low; Insignificant Impact on Livelihood
3.	Soil Pollution	Negative	It is a Direct Short term impact; Reversible in nature; Severity is low; Low Impact on Livelihood
4.	Worker/Local population Exposure	Negative	It is a Direct long term impact; Irreversible in nature; Severity is low; Low impact on local livelihood due to generation of smoke and noise from the generator;

Impacted Environmental and Social Components		Type of Impact +Ve / -Ve	Remarks
Construction Phase			
S. No			
5.	Disturbance to Fauna	Negative	It is an Indirect Short term impact; Reversible in nature; Severity is low;
6.	Increased Traffic	Negative	It is a Direct long term impact; Severity is low; Low Impact on Livelihood. Due to tourism development traffic may increase up to several fold which may lead to more accident and air pollution.

Construction phase interventions, such as improvement of access roads, labor camps, silt disposal, and other ancillary temporary infrastructure may produce impacts on the communities in proximity. The ESMF does provide for addressing construction phase interventions, including how to deal with labor camps. The template discussed below will describe any major issues related to construction phase interventions that are identified at the investigation and pre-design phase. For example, in the rare instance there will be reservoir desilting, the design will have to determine the amount of silt and will have to prepare a specific plan where the silt will be desposited. The ESMF suffices to identify this as an environmental issue to be addressed during design and construction.

There may be some dams which are near protected areas. As a rule, activities inside protected areas, such as borrow pits and building access roads, will not be allowed. Construction management plans will take into account the protected areas. If indeed the rehabilitation and improvement of a specific dam is in the vicinity of a protected area, as identified by the template, it will be ensured that a (partial) EA/EMP will be prepared.

There are readily available, well-developed environmental specifications and it will be ensured that such specifications will indeed be included in the technical specifications of each tender document. The contractor will have to factor costs related to the implementation of environmental mitigation aspects in his bid. Site engineers will be instructed to supervise the compliance with the technical specifications, including the environmental clauses. As part of the third-party construction supervision and quality control, the Consultant will ensure compliance as well.

For some dams the water levels in the reservoir will have to be brought down to facilitate repairs of the upstream face or carry out other works, which may temporarily disrupt release schedules. This is an aspect that will be taken into account during the design phase of the project. The technical guidance is that all alternative technologically and financially viable options which do not require or reduce reservoir draw-down will be taken into account. If it is unavoidable, the needed works will be planned during the period when the reservoir is at its lowest level, which is typically after the Rabi irrigation season and before the monsoons. The disruption to the water users will thus be minimal In the worst case, the project will be ready with a communication strategy to inform the water users about temporary changes in water supply.

CHAPTER 6
ANALYSIS OF ALTERNATIVES

In order to assess alternatives scenarios and to identify the preferred alternative an analysis of the proposed sub-project activities was carried out with regard to their environmental and social implications. The analysis was carried out for three scenarios, namely, no-project scenario, no-component scenario and with component scenario. The findings of the analysis are given in the following **Table: 6.1.**

Table 6.1: Analysis of Alternatives

Sl. No.	Sub-Project Activities	No-Project Scenario	No-Component Scenario	With Component Scenario
1	Reservoir Desiltation	All the activities are envisaged to have some adverse environmental and social impacts of varying degrees. They may be avoided if these are not implemented. If not implemented, dam safety will suffer which may have greater environmental and social risk.	Environmental problems like air and noise pollution will reduce but dam safety aspects will suffer.	Dam safety aspect will improve. Mitigation and enhancement measures will reduce / avoid adverse impacts.
2	Tourism Development		Potential environmental degradation may be avoided. Social benefit in terms of source of income for local people will be lost.	Pollution due to solid waste and wastewater generation. Air and noise pollution due to vehicles. Suitable mitigation measures to be adopted to take care of their adverse impacts.
3	Approach road, dam crest roads, etc. construction / improvement		Though environmental problem will be avoided, problem in dam operation will be there, which is not desirable.	Land acquisition may or may not be there. Impacts on air, noise, vegetation cover, etc., are envisaged. Mitigation measures required.
4	Hydropower Generation		Social benefits will be compromised.	Environmental problems, particularly during implementation. Mitigation measures to be adopted.
5	Standby Generator		Environmental problems like air and noise pollution will reduce but dam safety aspects will suffer.	Dam safety aspect will improve. Mitigation and enhancement measures will reduce / avoid adverse impacts. Fully enclosed generator sets are available for silent operation and practically no air pollution.
6	River Regradation		Environmental problems like air, water and noise pollution will reduce but environmental and	Air, water and noise pollution due to construction, cutting of river bank, dredging etc. Reduction in environmental

Sl. No.	Sub-Project Activities	No-Project Scenario	No-Component Scenario	With Component Scenario
			social risks envisaged if not implemented. In long run survival of the dam may suffer if not implemented.	and social risk factors. Better sustainability of the dam due to uniform inflow of water.
7	Flood Protection Network		Environmental problems like air, water and noise pollution will reduce but environmental and social risks envisaged if not implemented. In long run survival of the dam may be at stake due to reduction in live storage if not implemented.	Air, water and noise pollution due to dredging activity. Water quality will deteriorate during dredging period. Reduction in environmental and social risk factors due to increase in live storage. Better sustainability of the dam.
8	Wind Mill & Solar Power		Advantage of eco-friendly power generation will be lost.	Environmentally and socially beneficial.
9	Treatment of leakae through masonry and concrete dams and reduction of seepage through earth dams and their foundations		Dam Safety aspects will be affected – social and environmental risks may increase.	Short term impacts during construction which could be minimize with suitable mitigation measures
10	Improving Dam Drainage		Water pollution will not occur. Smooth operation of the dam may get affected. Dam safety may suffer	Surface water pollution during cleaning activity. Reduction of risk factor Better dam operation
11	Structural strengthening of dams to withstand higher earthquake loads		Environmental problems like air, water and noise pollution will reduce but environmental and social risks envisaged if not implemented. In long run survival of the dam may suffer if not implemented.	Air, water and noise pollution due to construction and repairing activity. Water quality may deteriorate during construction period. Reduction in environmental and social risk factors. Better sustainability of the dam.

Sl. No.	Sub-Project Activities	No-Project Scenario	No-Component Scenario	With Component Scenario
12	Remodeling earth dams to safe, stable cross sections		Environmental problems like air, water and noise pollution will reduce but environmental and social risks envisaged if not implemented. In long run survival of the dam may suffer if not implemented.	Air, water and noise pollution due to construction and repairing activity. Water quality may deteriorate during construction period. Reduction in environmental and social risk factors. Better sustainability of the dam.
13	Improving toe drain and seepage measuring devices		Water pollution will not occur. Smooth operation of the dam may get affected. Dam safety may suffer	Surface water pollution during improvement activity. Reduction of risk factor Better dam operation
14	Improving ability to withstand higher floods including additional flood handling facilities, if needed.		No Environmental Damage will occur. Dam safety and Social life may be at stake.	Minor Short term environmental impact may take place but risk factor will reduce and better flood handling system will be the outcome.
15	Repairs to damaged spillways, stilling basins and downstream channels		Water pollution will not occur. Smooth operation of the dam may get affected. Dam safety may suffer	Surface water pollution during improvement activity. Reduction of risk factor Better dam operation
16	Improving dam safety instrumentatio n		No Environmental Damage will occur. Dam safety and Social life may be at stake.	Minor Short term environmental impact may take place but risk factor will reduce and better flood handling system will be the outcome.
17	Improving communication s – real-time as much as possible – between dams, upstream rain/river flow gauging stations and with other dams, control offices and civil		No Environmental Damage will occur. Dam safety and Social life may be at stake.	Minor Short term environmental impact may take place but risk factor will reduce and better flood handling system will be the outcome.

Sl. No.	Sub-Project Activities	No-Project Scenario	No-Component Scenario	With Component Scenario
	authorities in flood plains downstream of the dam			
18	Flood marking		No Environmental Damage will occur. Dam safety and Social life may be at stake.	Insignificant/Nil impact on environment. Risk factor will reduce and better flood handling system will be the outcome.
19	Low voltage electrical supplies in inspection and drainage galleries		No Environmental Damage will occur. Safe dam operation may affect	Insignificant/Nil impact on environment. Safer dam operation can be achieved; better aesthetics
20	Improving lighting for external areas of dams		No Environmental Damage will occur. Safe dam operation may affect	Insignificant/Nil impact on environment. Safer dam operation can be achieved; better aesthetics
21	Inspection launches provision		No Environmental Damage will occur. Safe dam operation may affect	Insignificant/Nil impact on environment. Safer dam operation can be achieved; better aesthetics
22	Rehabilitation / Improvement of Spillway, head regulator and draw-off gates and their operating mechanisms		Water pollution will not occur. Smooth operation of the dam may get affected. Dam safety may suffer	Surface water, Air/noise pollution during improvement activity. Reduction of risk factor Better dam operation
23	Repair / Modification of Spillway Gates		Water pollution will not occur. Smooth operation of the dam may get affected. Dam safety may suffer	Surface water, Air/noise pollution during improvement activity. Reduction of risk factor Better dam operation
24	Cleaning of foundation drain & porous drain		Water pollution will not occur. Smooth operation of the dam may get affected. Dam safety may suffer	Surface water pollution during cleaning activity. Reduction of risk factor Better dam operation
25	Repair and cleaning of irrigation outlets		Water pollution will not occur. Smooth operation of the dam may get affected.	Surface water pollution during cleaning activity. Reduction of risk factor Better dam operation

Sl. No.	Sub-Project Activities	No-Project Scenario	No-Component Scenario	With Component Scenario
			Dam safety may suffer	

Based on the analysis, with-component scenario is suggested as the preferred alternative.

CHAPTER 7
ENVIRONMENTAL AND SOCIAL MANAGEMNET FRAMEWORK

7.1 INTRODUCTION

Environmental and Social Management Framework (ESMF) is a tool for use by a project proponent to identify and address the potential environmental and social concerns or impacts of a project right from the planning stage to its implementation and post-implementation operations. The objective of developing ESMF is to mainstream it with other project documents in the planning, execution and post-execution stages in order to ensure that environmental and social concerns are adequately taken care of in all these stages.

Keeping this in view, the present ESMF has been developed for use by the Central Water Commission (CWC), Ministry of Water Resources, Government of India, and the participating States in the country, during rehabilitation and strengthening of dams under the Dams Rehabilitation and Improvement Project (DRIP) with the assistance from the World Bank. The ESMF can be used by the project authorities for incorporation of environmental and social safeguards in the planning, execution and operation stages of each sub-project (dam level) activity. A step-by-step methodology has been provided that can be followed along with engineering and institutional interventions required for the sub-project activities.

In general, the organizational structure for DRIP consists of a Project Management Unit (PMU) at the Central level (at the Central Water Commission (CWC)), with one State level PMU for each of the 5 participating States. Each of these PMUs will include qualified Environmental and Social Development Specialists. The CPMU will be supported by a multi-disciplinary management and engineering consultant team (the Consultant) that will assist CWC with the overall implementation of the project. The Consultant's team will include environmental and social specialists. The terms of reference include tasks related to environmental and social compliance. Some of the relevant tasks of the Consultant include: provide formal training to concerned staff at state, and central level to ensure that there is full awareness about environmental and social issues and the implementation of the ESMF; provide guidance and support to collect sufficient data at the investigation stage to determine the environmental and social impacts, if any, including whether stand-alone Environmental Assessments (EA) and Environmental Management Plans (EMP) are needed based on the outline provided in the ESMF; set up and monitor a reporting system that will show in a clear and transparent way whether there are any social and environmental issues related to the rehabilitation of the dams and the mitigation actions; provide guidance and support to the implementation of adequate monitoring of social and environmental parameters; and as part of the third-party construction supervision efforts, ensure that actions agreed to minimize environmental impact are being implemented.

A template will be used that will require the concerned State level PMUs during the investigation and preliminary design stage for each dam to provide detailed information on technical, environmental, social, and all implementation-related aspects of each dam. Details about the data to be collected and the specific forms to be prepared are

given in the next sections. The State level PMU will for each sub-project dam incorporate in the template the essential elements from the environmental and social screening templates prepared as part of the ESMF. The Central PMU, assisted by the Consultant, will carry out a first level screening of each template. The Consultant will develop and maintain a web-based MIS that will capture the information from the templates. The Bank Task Team will receive and review each of the templates as well. Based on the review of the templates, a final categorization of each of the sub-project dams will be made. Those that have no major environmental or social issues can have the designs finalized and be tendered. Only the few where there may be major environmental or social issues will require the preparation of a site specific EA/EMP. This template and the MIS will allow an early identification of those dams where major issues can be expected. There will then be additional supervision efforts for these dams.

It may be mentioned here that though the sub-project activities for the development of this ESMF have been identified based on the analysis of such activities in a large number of dams proposed to be taken up for rehabilitation under the DRIP, **this is a live document which can be improved upon at the sub-project level by the concerned authorities, as and when the need arises.**

7.2 DEVELOPMENT OF ESMF

The sub-project activities of the ten representative dams selected for the study were analyzed along with inputs from other dams and field visits and a standard list of activities was developed which would be generally applicable to all sub-projects under the DRIP. Care was taken to select only those activities which may have potential environmental and social impact. A scoping exercise was then carried out to select the environmental and social components which might get impacted by these activities. This was followed by a screening exercise for each activity to screen out the environmental and social components which are not impacted upon by the specific activity and retain those which do.

There are **25 sub-project level activities which have been identified** for the development of the ESMF. These have been given in Form SC-1 for the purpose of identifying the activities relevant to a specific sub-project and screening out the other activities. The responsible entity at the dam level will carry out this task.

For the development of the ESMF, it is necessary to identify the potential environmental / social impacts of an activity. In order to do so, the tasks and facilities required to be performed and provided to implement the activity are needed to be identified, as these will help assess the potential impacts due to the activity. **These have been termed as components** of an activity. A list of all possible components have been prepared, which include requirements of labour, machinery, materials, space, etc. For each activity, the components involved can be identified by dam level officials. The list of components for screening purpose is given in **Form SC-2.**

Form SC-3 provides the identified sub-project activities in the first column, the components involved in the second column and potential impacts in the third column. Last two columns refer to implementation phase (I) and post-implementation phase (P).

Based on potential environmental and social impacts associated with each component, these have been categorized as A, B and C.

Category – A : Components which have major environmental / social impacts and require specific environment management plan (EMP) for implementation of mitigation measures. This EMP is to be incorporated in the bid document and contractor / implementing agency has to follow this during implementation, as well as, post-implementation.

Category – B : Components which have moderate environmental and social impacts and certain precautionary measures have to be followed by the contractor and the project authorities to minimize impacts during implementation as well as post-implementation.

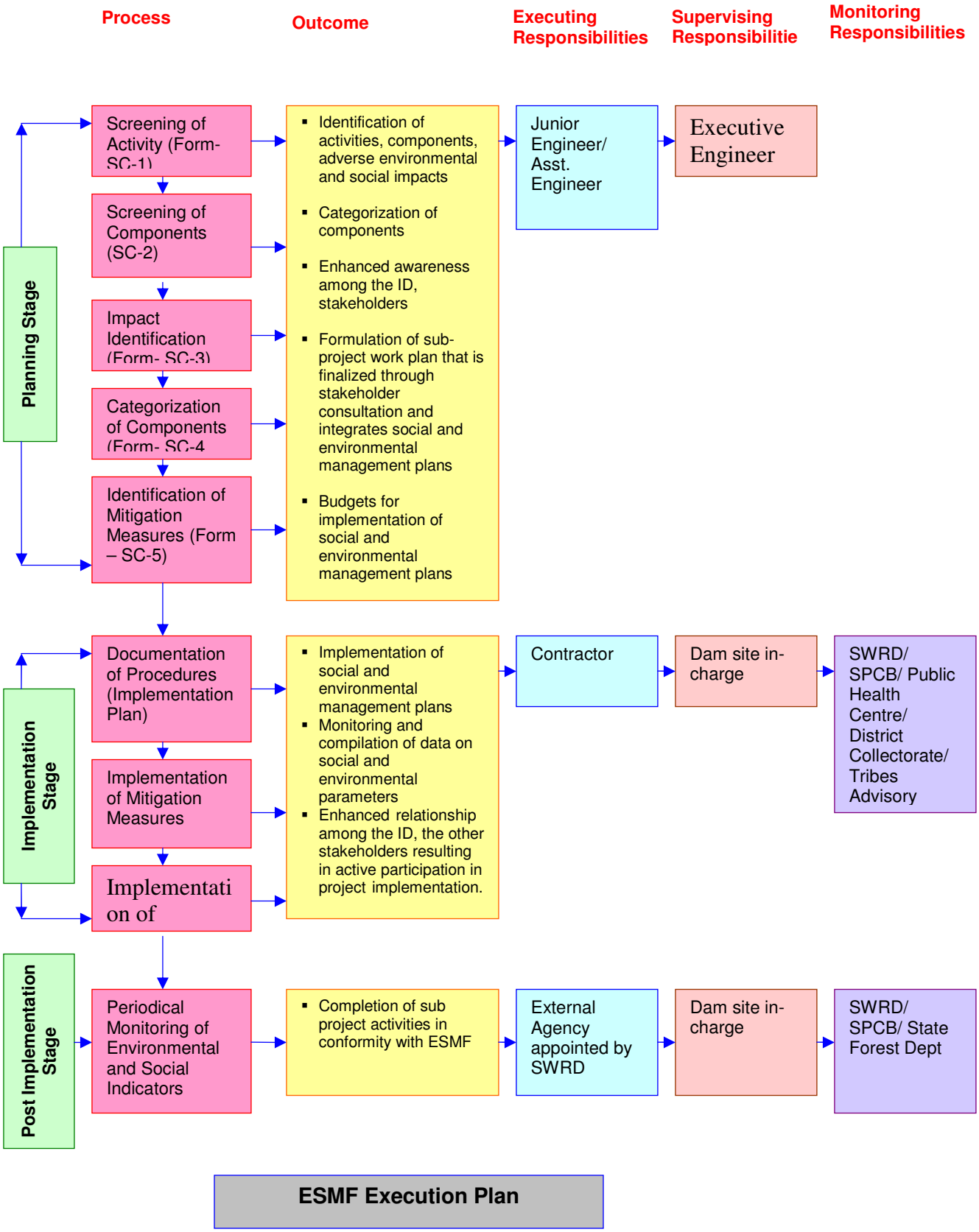
Category – C : Components which have negligible or nil environmental and social impacts and as such, no mitigation measures are proposed for these activities.

Screening and categorization of the components are given in **Form SC-4**, which will enable the project authorities to categorize the components in each activity at sub-project level and take action according to their categorization.

Form SC-5 has been developed to identify mitigation measures for each type of potential environmental and social impacts. For ease of understanding and use, the components identified are given in the first column, corresponding potential impacts are given in the second column and corresponding mitigation measures are provided in the third column. The remaining three columns indicate the entities responsible for execution, supervision and monitoring of the mitigation measures, respectively.

Forms SC-1 to SC-5 have been duly filled up based on the sub-project activities identified and are placed at the end of this chapter for reference and use.

Schematic diagramme for Execution of ESMF is given below:


Process
Outcome
Executing Responsibilities
Supervising Responsibilitie
Monitoring Responsibilities
Planning Stage
Screening of Activity (Form-SC-1)
Screening of Components (SC-2)
Impact Identification (Form- SC-3)
Categorization of Components (Form- SC-4
Identification of Mitigation Measures (Form – SC-5)
Identification of activities, components, adverse environmental and social impacts
Categorization of components
Enhanced awareness among the ID, stakeholders
Formulation of sub-project work plan that is finalized through stakeholder consultation and integrates social and environmental management plans
Budgets for implementation of social and environmental management plans
Junior Engineer/ Asst. Engineer
Executive Engineer
Implementation Stage
Documentation of Procedures (Implementation Plan)
Implementation of Mitigation Measures
Implementation of
Implementation of social and environmental management plans
Monitoring and compilation of data on social and environmental parameters
Enhanced relationship among the ID, the other stakeholders resulting in active participation in project implementation.
Contractor
Dam site in-charge
SWRD/ SPCB/ Public Health Centre/ District Collectorate/ Tribes Advisory
Post Implementation Stage
Periodical Monitoring of Environmental and Social Indicators
Completion of sub project activities in conformity with ESMF
External Agency appointed by SWRD
Dam site in-charge
SWRD/ SPCB/ State Forest Dept
ESMF Execution Plan

Note: At central level consultant may be engaged for supervision and monitoring by CWC

7.3 APPLICATION OF ESMF

The ESMF may be used for sub-projects under the DRIP at the planning, implementation and post implementation phases to identify the environmental and social concerns, as well as, the opportunities to be addressed, so that these could be integrated in the relevant project documents.

There could be location-specific cases where a sub-project activity in isolation or in combination with other activities, may have substantial environmental and / or social impact. As an example, this may be the case with hydro power generation or tourism development. In such an eventuality, full environmental and social assessment may be required. In rare cases, development of a resettlement action plan may also be called for, including relocation of cultural / common properties of the affected population. Similarly, tribal development plan may have to be prepared if a substantial section of the affected population are tribals.

As already mentioned in Section 7.2 above, the forms developed (SC-1 to SC-5) are to be used for application of ESMF in the sub-project activities. The procedure to be followed is described below:

7.3.1 Planning Stage

In the planning stage, following actions are to be taken:

- Screening of sub-project activities by using Form SC-1
- Screening of components associated with each activity using Form SC-2
- Identification of adverse impacts associated with each component using Form SC-3
- Categorisation of components into A, B and C using Form SC-4
- Identification of mitigation measures for the adverse impacts caused by each component, including identification of entities responsible for execution, supervision and monitoring with the help of Form SC-5

Table 7.1: Checklist for Screening and Mitigation

ESMF activities	Who will be involved	Coordinator
1. Screening of sub-project Activities through Screening Format (Form SC-1) 2. Screening of components associated with each activity through Screening Format (Form SC-2) 3. Identification of adverse environmental impacts associated with execution of each component. (Form SC-3) 4. Categorization of components through Screening format (Form SC-4) 5. Suitable mitigation measures for each adverse impact on natural and social environment caused by each	Irrigation Department (ID) and Other Line Dept.	Executive Engineer from ID.

ESMF activities	Who will be involved	Coordinator
component with the help of (Form SC-5).		

Outcomes of Planning Stage

The Outcomes of this stage are:

- Identification of activities
- Identification of components
- Identification adverse environmental and social impacts
- Identification and categorization of components to be undertaken in each sub-project
- Enhanced awareness among the ID, stakeholders resulting in active participation
- Formulation of sub-project work plan that is finalized through stakeholder consultation and integrates social and environmental management plans
- Budgets for implementation of social and environmental management plans

7.3.2 Implementation Stage

The primary tasks in this stage are implementation of proposed social and environmental management plans for sub-project following the checklist shown in **Table 7.2**.

Table 7.2: Checklist for ESMF Activities – Implementation

ESMF Activities	Who will be involved	Co-ordinator
Procurement of documents, procedures followed and contracts awarded & equipment procured	Contractor, Implementation agency	Engineers from Irrigation Department
Implementation of the social and environmental management plans as Proposed in the Mitigation measures and EMP.	Contractor, Implementation agency, Consultants authorized by ID	Engineers from Irrigation Department
Monitoring and evaluation of social and environmental parameters as identified in the Mitigation measures and EMP. Special attention will be paid to ensure that no child labour (as per the GoI) is involved in the construction activities The dam site officials may monitor contract works or authorize the consultants to monitor processes and impacts at sub project level. However the consolidated monitoring and learning (M & L) report will be furnished by EE, In charge of Project to designated project authority i.e. CE, In-charge, and finally to PMU.	Contractor, Implementation agency, Consultants authorized by ID	Engineers from Irrigation Department

Outcomes of Implementation Stage

The outcomes of this stage are:

- Implementation of social and environmental management plans
- Monitoring and compilation of data on social and environmental parameters
- Enhanced relationship among the ID, the other stakeholders resulting in active participation in project implementation.

7.3.3 Post-Implementation Stage

The primary tasks in this stage are to monitor and assess the long-term impacts of the project (through Impact Indicators) and draw lessons from the success and failures, for improvement of subsequent sub-project interventions. Compliance of ESMF provisions has to be ensured through third party monitoring for verification of the sub-project completion report.

The Formats for monitoring the above parameters would be developed by PMU. Validation should be carried out before finalizing.

Outcome of Post Implementation Stage

Completion of sub project activities in conformity with ESMF

The ESMF is a live document which has been developed considering all common major activities associated with sample sub-projects. It can be improved, upgraded or modified at sub-project level as per the site specific requirement and their mitigation measures.

7.4 MONITORING AND EVALUATION FRAMEWORK

Monitoring and evaluation is primarily required to ensure proper and timely implementation of environmental and social mitigation measures identified in the planning stage, based on the ESMF. Monitoring at regular intervals during implementation and for a specified period in the post implementation stages is necessary to identify and implement any change / improvement needed in the execution of the activity or in the mitigation measures.

A monitoring and evaluation cell may be created at State level under the supervision of an official familiar with environmental and social issues of the sub-projects. He may be given suitable training if needed. In specific situations, one may consider appointing external agencies to carry out the monitoring and evaluation activities and report to the supervising official. The indicators to be monitored can be framed from the ESMF taking into consideration the activities involved. A list of indicators for monitoring and evaluation in the implementation and post implementation stages is given in the **table 7.3**.

Table 7.3: Social and Environmental Parameters to be Monitored and Evaluated– Implementation and Post Implementation Phases

Sr No	Environment & Social Parameters	Benchmark Indicators (before Implementation)	Monitoring Agency	Frequency
Implementation Phase				
	Soil Quality	Organic Matter content/ Nutrient Content / Pesticide residue	ID, M&E Agency, CPMU at CWC	Half Yearly
	Surface Water Quality	Salinity, Nutrient content, Pesticide residue, Presence of Industrial Effluents, Pathogens	ID, M&E Agency, CPMU at CWC	Quarterly
	Air Quality	Suspended Particulate Matter (SPM), Respirable Particulate Matter (RPM), Oxides of Sulpher (SO_x), Oxides of Nitrogen (NO_x), Hydrocarbon (HC)	ID, M&E Agency, CPMU at CWC	Quarterly
	Aquatic life	Health of aquatic creatures	ID, M&E Agency, CPMU at CWC	Yearly
	Livelihood	Number of people losing livelihood No. of women/ tribal benefited directly from the project through agriculture activities	ID, M&E Agency, CPMU at CWC	Seasonally
	Scheduled Caste / Tribes	Number of Persons	ID, M&E Agency, CPMU at CWC	Yearly
	Public Health	Incidence & nature of water related diseases	ID	Yearly
	Safety System	Fire, Electricity, Operation of Heavy Mechinary	ID, M&E Agency, CPMU at CWC	Monthly
Post Implementation Phase				
	Soil Quality	Organic Matter content/ Nutrient Content / Pesticide residue	ID, M&E Agency, CPMU at CWC	Half Yearly, after agri seasons
	Surface Water Quality	Salinity, Nutrient content, Pesticide residue, Presence of Industrial Effluents, Pathogens	ID, M&E Agency, CPMU at CWC	Quarterly

Sr No	Environment & Social Parameters	Benchmark Indicators (before Implementation)	Monitoring Agency	Frequency
	Ground water quality	Salinity, Nutrient content, Pesticide residue, Presence of Industrial Effluents, Pathogens	ID, M&E Agency, CPMU at CWC	Quarterly
	Seepage/Leakage	Measure of leakage water	ID, M&E Agency, CPMU at CWC	Quarterly
	Afforestation	Forest cover area / density	ID, M&E Agency, CPMU at CWC	Yearly
	Weed growth	Quantity of weeds per unit area of reservoir bed	ID, M&E Agency, CPMU at CWC	Yearly
	Aquatic life	Health of aquatic creatures	ID, M&E Agency, CPMU at CWC	Yearly
	Livelihood	Number of people losing livelihood No. of women/ tribal benefited directly from the project through agriculture activities	ID, M&E Agency, CPMU at CWC	Seasonally
	Scheduled Caste / Tribes	Number of Persons	ID, M&E Agency, CPMU at CWC	Yearly
	Public Health	Incidence & nature of water related diseases	ID	Yearly
	Safety System	Early Alarm system, Flood Control etc..	ID, M&E Agency, CPMU at CWC	Yearly

Note: The physical and economic conditions are to be monitored in DRIP
External Agencies should be engaged for environmental monitoring
Case Studies shall be undertaken as a method of recording outcome of mitigation measures implemented

The feedback received from monitoring and evaluation cell will be discussed with the implementing officials and the contractor and corrective actions will be taken, where necessary.

7.4.1 Monitoring Budget

A monitoring budget has been drawn up considering various environmental and social components. This provides cost for different mitigation measures of likely environmental/social impacts at sub-project level. Cost for environmental enhancement measures and monitoring has also been included. It also gives cost for plantation, enhancement of sites, and cost of monitoring. The detailed budget is provided In **Table 7.4**

Table: 7.4 Monitoring Budget

COMPONENT	ITEM	UNIT	UNIT COST (Rs.)	QUANTITY
(A) Mitigation Costs				
Air (dust suppression)	Dust Suppression with sprinkling of water, covers of the vehicles transporting construction material	One site per day	2000	Site specific
Water	Oil interceptor at parking of construction vehicle, silt fencing at construction of Bridge site	Number	5000	Site specific
Plantation	Plantation[1] of saplings in fenced block	Number	300	Site specific
	Maintenance for three years per sapling	Number	200	Site specific
Soil erosion control Measure, landscaping etc.	Slope stabilization, turfing etc	Lumpsum	-	Site specific
(B) Monitoring Cost				
Ambient Air quality monitoring (during project implementation)	Ambient air quality monitoring during implementation period	Per sample	2000	Site specific
Surface Water quality monitoring (during implementation)	Surface water quality monitoring during implementation period	Per sample	3000	Site specific
Ambient noise level monitoring (during implementation	Ambient noise level monitoring during implementation period	Per sample	1000	Site specific
Ambient Air quality monitoring (during post implementation)	Ambient air quality monitoring twice a year for three years	Per sample	2000	Site specific
Surface Water quality monitoring (during post implementation)	Surface water quality monitoring twice a year for three years	Per sample	3000	Site specific
Ambient noise level monitoring (during post implementation)	Ambient noise level monitoring twice a year for three years	Per sample	1000	Site specific
(C) Enhancement Cost				
Enhancement Sites	Enhancement of water bodies and dam site	Lumpsum	1000000	--

COMPONENT	ITEM	UNIT	UNIT COST (Rs.)	QUANTITY
Borrow & quarry area rehabilitation	Filling/plantation/ transportation	Lumpsum	200/m^3	--
(**D) R & R Cost**				
Cost of land for construction of house	Upto 250 sq m in urban areas and 150 sq m in rural area	Per Family	50,000	Site specific
Assistance for shifting to the new site	for shifting of the family, building materials, belongings and cattle.	Per Family	10,000	--
Assistance for construction of new House	Const of House at new site	Per House	100,000	--
Cattle shed	Const of cattle shed at new site	Per family	15,000	--
Shops/ artisians	for construction of working shed or shop.	Per person/ shop	25,000	--
Compensation for Cultivable Land	As per market rate varies	Ha	2,00,000	Site specific
Compensation for Standing crops	Cost of crop for minimum	Ha	50,000	--
Miscellaneous	Common facility-drinking water, religious structure	Per village	300000	--
Training	Income Generating Schemes	Per village (Lump Sum)	75,000	--

7.5 GIS BASED SOCIAL AND ENVIRONMENTAL MONITORING AND EVALUATION

The Geographic Information System (GIS) is a technology to integrate different spatial data inputs from variety of data sources like GPS, Total station, existing maps, remotely sensed images and tabular attribute data. These data are integrated and brought to one platform, so as to be made overlayable and give flexibility to undertake spatial analysis and spatial modeling.

Remote Sensing is a multi-disciplinary activity which deals with the inventory, monitoring, evaluation and mapping of terrestrial features through the analysis of remotely collected data obtained by observations from remote platforms like satellite or aircraft. It gives pictorial representation of ground and terrain at variable periodicity, resolution, spectral bands and colour depths. These characteristics can be used to generate temporal (time series) information of the land surface at various levels of details for planning in Pre construction and Implementation stages as well as monitoring and evaluation in the post implementation phase.

GIS and remote sensing are helpful in recording the database in spatial format of pre-implementation phase as well as monitoring and evaluation of the changed

environmental and social scenarios, both adverse and beneficial, over different periods in post implementation phase.

GIS based monitoring and evaluation is, however, practicable and effective in projects having a sizeable project influence area, with pronounced environmental and social impacts and where a large data base is required to be handled. Since this is not the case with the sub-project activities to be taken up under the dams rehabilitation and improvement project (DRIP), it is felt that GIS based monitoring and evaluation of environmental and social management of these activities may not be practicable.

7.6 SOCIAL ISSUES REQUIRE SPECIAL CONSIDERATION

The activities involved under DRIP do not, normally envisage any major social impact in terms of land acquisition, displacement of people, impact on community health, cultural properties or any such other issues. Whatever social impacts have been identified due to the sub- project activities, they have been duly addressed in the ESMF.
However it may be prudent to have a plan in place for social issues generally encountered in development projects so that in case such a situation arises the authorities may take appropriate action. In this context, it is proposed to address issues like Resettlement and Rehabilitation, Tribal Development and Gender Development and prepare an action plan, as detailed in the Annex.

7.7 Training & Capacity Building

The key to institutional reforms would be well-trained and motivated human resources. Competence levels of the departmental officials and their ability must be assessed and training in new skills provided. Cultural sensitivity, group dynamics, conflict resolution, leadership and ability to work with user population are as important as the engineering skills which are already in place. This will require the co-option into water resources department of social, gender and environmental subject matter specialists. This would also be an appropriate opportunity for assessing the capabilities of state training institutions, and enhance them if necessary. Enhanced training would also be required for local tribal population and women groups etc. The need and desirability of private sector participation should be assessed. The need for training equipment, computers, and software, training aids must be assessed, and procurement procedures should be initiated.

7.7.1 Training and Awareness Development

Training is one of the important and effective tools for capacity building, performance enhancement and up gradation of knowledge and skills of the personnel. Organizational motivation and morale as reflected in the attitudes and administrative culture are rendered relevant and sharply focused through effective training programmes.

The staff of the line departments as well as elected representatives of the ID needs to be sensitized regarding the environmental & social issues. Training of the field personnel of ID would be organized by the training cells of the divisional offices under the supervision of Training centre at the sub-project level. The training cell along with the media centre also will undertake the awareness program.

The training and capacity building strategy proposed to be followed for various stakeholders under the project is brought out in **Table 7.5**.

Table 7.5 Training and Capacity Building Strategy

Level	Issues	Strategy	Proposed Action	Duration & Frequency	Responsible Agency	Cost
State level Mgmt. Corporation	• Competence Level of Stakeholders • Group Dynamics • Leadership and Ability to Work • Communication Links	• Capacity-building for social and environmental planning • Skill development to improve social and environmental knowledge base and analytical capacity, through to appropriate modern analytical tools to facilitate informed decision-making • Training in documenting and managing data on natural resources • Monitoring and evaluation of social and environmental parameters	Training programs / workshops / seminars	2 weeks / Annually	-	-
Field level officials from ID & Line Dept.	• Competence Level of Stakeholders • Conflict Resolution • Leadership and Ability to Work • Communication Links	• Social and Environment capacity-building • Identification of environmental and social issues and mitigating measures • Reorientation about improved • Public relation and Reporting skill development • Impact Assessment, Utilization and Monitoring skill development	Seminars workshops	3 days-once at the beginning of the project, and repeated for new staff	-	-
Village Community	• Competence Level of Stakehold	• Awareness about environmental AND Social issues	Meetings/seminars	One or two days / Once at	-	-

Level	Issues	Strategy	Proposed Action	Duration & Frequency	Responsible Agency	Cost
including women and Tribal Population	ers • Cultural Sensitivity • Conflict Resolution • Ability to Work • Communication Links	particularly gender related concerns and their impacts • Addressing environmental issues and mitigating measures • Sustainable use of natural resources • Importance of soil and water conservation. • Importance of sanitation for better environment, health, etc. • Monitoring of environmental and social parameters	addressed by local and environmental specialists	the beginning of the preplanning, planning, implementation and post implementation stage.		

Project Implementation Monitoring Unit (PMU) should undertake a training needs assessment at the earliest and identify target individuals and groups on a detailed level as well as detailed institutional and individual expert resources to undertake training.

*Training Program***:** To achieve the social and environmental objectives and for proper implementation of the project, the persons involved in the implementation of the project need training. Both long term (2 to 3 weeks) and short term (1 week or less) programmes need to be conducted in various subjects. Senior level officers may participate in the short-term programmes in form of seminars, conferences or study tours to within the country or abroad, whereas middle level and junior level officers may participate in the long-term trainings.

7.7.2 Training Needs Assessment

To assess the training needs of professionals / persons involved in the project as suggested in the Recommendations on Institutional Measures, the following particulars of individuals may be collected and compiled;

- Present Age,
- Length of Service already rendered,
- Basic and Professional Qualifications,
- Earlier experience in particular field,
- Training earlier received (both short term and long term)

These may be analysed and compared with responsibilities associated with a proposed position and the gaps assessed.

*Action Plan***:** The precise nature of interventions and the additional activities needed to address any specific problems of stakeholders would be determined when the strategic social and environmental assessment is carried out at individual sub-project level for preparing sub-project plans. All specific measures proposed to develop stakeholders in a sub-project area will form part of the sub-project plan.

*Involvement of Stakeholders***:** The first and foremost in the process of preparing sub-project plan is when the field level officials of ID along with other line departments, start working with the project community. During this process, all functionaries involve themselves at all the stages of planning and implementing project interventions at the sub-project level.

For this purpose, and ID functionaries will undertake an awareness and communication campaign to explain about the participatory nature of project activities and the need to involve all sections of the society in planning and implementing project interventions at the sub-project level. Information, Education and Communication (IEC) campaigns will be designed and tailored to meet socio-cultural situations and will be taken up more intensively to ensure a fair and adequate representation of all stakeholders in the sub-project activities. ID staff will liaise with and mobilize, as required, other government agencies in the area to provide support and dovetail relevant government schemes for the development in sub-project areas and also seek focused attention of staff working with various line departments.

Actions planned for Field ID/ Line Department: At the field level, following actions are envisaged under the Capacity Building Strategy.

- Based on the outcome of Training Needs Assessment Program, the training of the field staff will be undertaken through workshops/ seminars with the assistance of Experts.
- The Duration of these programmes will vary from 3 days to 1 week;
- These training and capacity building programmes should be taken up at the inception of the Project;

7.7.3 Institutional arrangement

Training and Capacity Building Strategy will form an integral part of the sub-project Plan and its implementation will be synchronized with other project interventions at different level. The responsibility of approving Training and Capacity Building Strategy as part of sub-project Plan will be with the PMU. The PMU will ensure that Training and Capacity Building Strategy conform to the agreed strategy of the project.

Inter-sectoral coordination will be ensured at the Government (PMU), IDC and Project level through PMU. At the PMU level, a Project Steering Committee chaired by the Secretary and comprise Chief Engineers of various IDCs and Project Divisions will provide inter-departmental coordination and strategic directions, decisions and support with a view to ensure timely and successful implementation of all project activities

Training, awareness-raising, and capacity building strategies have been planned and factored into the project budget. The Central Water Commission will provide the

necessary centralized support and facilities for the training and capacity building for different state level officers.

7.7.4 TRAINING BUDGET

Budget for the training requirement for institutional strengthening as discussed above has been presented and given in the following **Table: 7.6.**

Table: 7.6 Budget for Training Programme

Component	Item	Unit	Unit cost (Rs.)	Quantity	Total cost (inr)
Training Cost					
Training Programme No. 1	Environmental Awareness and Implementation of ESMF for dam site officials **(Duration 15 days)**				
	A. Providing basic training facilities				
	1. Arrangement of training hall	15 people	2000	30000	30000
	2. Stationary	15 people	100	1500	1500
	3. Other boarding facilities	15 people	200	45000	45000
Total Cost for Tainting Programme No. 1					**76500**
Training Programme No. 2	Environmental Awareness and Implementation of ESMF for state level officials **(Duration 7 days)**				
	A. Providing basic training facilities				
	1. Arrangement of training hall	15 people	2000	14000	14000
	2. Stationary	15 people	200	3000	3000
	3. Other boarding facilities	15 people	300	31500	31500
Total Cost for Tainting Programme No. 2					**48500**
Training Programme No. 3	Environmental Awareness and Implementation of ESMF at dam level for dam site officials **(Duration 5 days)**				
	A. Providing basic training facilities				
	1. Arrangement of training hall	5 people	2000	10000	10000
	2. Stationary	5 people	200	1000	1000
	3. Other boarding facilities	5 people	300	7500	7500
Total Cost for Tainting Programme No. 3					**18500**

Form SC-1: Screening of ESMF Activities

Sl. No	ESMF activity	Put mark if applicable	Responsibility
1.	Reservoir Desiltation		Field Engineer from ID
2.	Tourism Development		
3.	Approach road, dam crest roads, etc. construction / improvement		
4.	Hydropower Generation		
5.	Standby Generator		
6.	River Regradation		
7.	Flood Protection Network		
8.	Wind Mill & Solar Power		
9.	Treatment of leakage through masonry and concrete dams and reduction of seepage through earth dams and their foundations		
10.	Improving Dam Drainage		
11.	Structural strengthening of dams to withstand higher earthquake loads		
12.	Remodeling earth dams to safe, stable cross sections		
13.	Improving toe drain and seepage measuring devices		
14.	Improving ability to withstand higher floods including additional flood handling facilities, if needed.		
15.	Repairs to damaged spillways, stilling basins and downstream channels		
16.	Improving dam safety instrumentation		
17.	Improving communications – real-time as much as possible – between dams, upstream rain/river flow gauging stations and with other dams, control offices and civil authorities in flood plains downstream of the dam		
18.	Flood marking		
19.	Low voltage electrical supplies in inspection and drainage galleries		
20.	Improving lighting for external areas of dams		
21.	Inspection launches provision		
22.	Rehabilitation / Improvement of Spillway, head regulator and draw-off gates and their operating mechanisms		
23.	Repair / Modification of Spillway Gates		
24.	Cleaning of foundation drain & porous drain		
25.	Repair and cleaning of irrigation outlets		

Form SC-2: Screening of components

Sl. No	Components associated with ESMF activity	Put mark if applicable	Responsibility
1.	Acquisition of forest land		Field Engineer from ID
2.	Borrow materials/ area		
3.	Quarry materials / area		
4.	Blasting		
5.	Dredging/Desiltation		
6.	Resettlement and Rehabilitation		
7.	Labour Camps		
8.	Heavy machinery		
9.	Hot mix plant		
10.	Concrete mixture and heavy pumps		
11.	Material handling and storage		
12.	Temporary land acquisition		
13.	Tree felling/ vegetation clearance		
14.	Haulage of machinery		
15.	Debris Disposal		
16.	Transport of materials		
17.	Small tools and pumps		
18.	Sheds to keep machines and tools		

Form- SC-3: Screening of Adverse (Environmental and Social) impacts

Activity		Component	Impact	I	P
1.Reservoir Desiltation		1. Acquisition of for land			
		2. Borrow materials/ area			
		3. Quary materials / area			
		4. Blasting			
	√	5. Dredging/Desiltation	Air / Noise Pollution	√	
			Water Pollution (Surface)	√	
			Soil Pollution	√	
			Trucks Traffic increase	√	
			Worker local People Exposure	√	
			Generation Excavated Material	√	
			Water Delivery reduction, interruption	√	
		6. Resettlement And Rehabilitation			
	√	7. Labour Camps	Worker local People Exposure	√	
			Impact on human health (Labour Camps)	√	
	√	8. Heavy machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		9. Hot mix plant			
		10. Concrete mixture and heavy pumps			
	√	11.Material handling and storage	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		12.Temporary land acquisition			
		13.Tree felling/ vegetation clearance			
	√	14.Haulage of machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	15. Debris Disposal	Air / Noise Pollution	√	
			Water Pollution (Surface)	√	
			Soil Pollution	√	
			Trucks Traffic increase	√	
			Landscape Degradation	√	
	√	16.Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Trucks Traffic increase	√	

Activity	Component		Impact	I	P
	√	17.Small tools and pumps	Air / Noise Pollution	√	
		18.Sheds to keep machines and tools			
2.Tourism Development		1. Acquisition of forest land			
	√	2. Borrow materials/ area	Air / Noise Pollution	√	
			Soil Pollution	√	
			Trucks Traffic increase	√	
			Soil Erosion	√	
			Worker local People Exposure	√	
			Generation Excavated Material	√	
			Landscape Degradation	√	
	√	3. Quary materials / area	Air / Noise Pollution	√	
			Soil Pollution	√	
			Trucks Traffic increase	√	
			Worker local People Exposure	√	
			Generation Excavated Material	√	
			Landscape Degradation	√	
		4. Blasting			
		5. Dredging/Desiltation			
	√	6. Resettlement And Rehabilitation	Land acquisition	√	
			Impact on local and tribal communities	√	
	√	7. Labour Camps	Worker local People Exposure	√	
			Impact on human health (Labour Camps)	√	
	√	8. Heavy machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	9. Hot mix plant	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	10.Concrete mixture and heavy pumps	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	11.Material handling and storage	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	12.Temporary land acquisition	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People	√	

Activity	Component		Impact	I	P
			Exposure		
	√	13.Tree felling/ vegetation clearance	Landscape Degradation	√	
			Impact on flora	√	
			Soil Erosion	√	
	√	14.Haulage of machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	15. Debris Disposal	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
			Landscape Degradation	√	
			Water Pollution (Surface)	√	
	√	16.Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	17.Small tools and pumps	Air / Noise Pollution	√	
	√	18.Sheds to keep machines and tools	Air / Noise Pollution	√	
3. Approach road, dam crest roads, etc. construction / improvement	√	1. Acquisition of forest land	Impact on flora	√	
			Disturbance to Fauna	√	
			Habitat loss fragmentation	√	
			Landscape Degradation	√	
			Impact on flora	√	
			Soil Erosion	√	
	√	2. Borrow materials/ area	Air / Noise Pollution	√	
			Soil Pollution	√	
			Trucks Traffic increase	√	
			Soil Erosion	√	
			Worker local People Exposure	√	
			Generation Excavated Material	√	
			Landscape Degradation	√	
	√	3. Quary materials / area	Air / Noise Pollution	√	
			Soil Pollution	√	
			Trucks Traffic increase	√	
			Worker local People Exposure	√	
			Generation Excavated Material	√	
			Landscape Degradation	√	
	√	4. Blasting	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
			Landscape Degradation	√	
			Generation of Debris	√	
		5. Dredging/Desiltation			

Activity	Component		Impact	I	P
	√	6. Resettlement And Rehabilitation	Land acquisition	√	
			Impact on local and tribal communities	√	
	√	7. Labour Camps	Worker local People Exposure	√	
			Impact on human health (Labour Camps)	√	
	√	8. Heavy machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	9. Hot mix plant	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	10.Concrete mixture and heavy pumps	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	11.Material handling and storage	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	12.Temporary land acquisition	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	13.Tree felling/ vegetation clearance	Landscape Degradation	√	
			Impact on flora	√	
			Soil Erosion	√	
	√	14.Haulage of machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	15. Debris Disposal	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
			Landscape Degradation	√	
			Water Pollution (Surface)	√	
	√	16.Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	17.Small tools and pumps	Air / Noise Pollution	√	
	√	18.Sheds to keep machines and tools	Air / Noise Pollution	√	
4. Hydropower Generation	√	1. Acquisition of forest land	Impact on flora	√	
			Disturbance to Fauna	√	
			Habitat loss fragmentation	√	
			Landscape Degradation	√	

Activity	Component		Impact	I	P
			Impact on flora	√	
			Soil Erosion	√	
	√	2. Borrow materials/ area	Air / Noise Pollution	√	
			Soil Pollution	√	
			Trucks Traffic increase	√	
			Soil Erosion	√	
			Worker local People Exposure	√	
			Generation Excavated Material	√	
			Landscape Degradation	√	
	√	3. Quary materials / area	Air / Noise Pollution	√	
			Soil Pollution	√	
			Trucks Traffic increase	√	
			Worker local People Exposure	√	
			Generation Excavated Material	√	
			Landscape Degradation	√	
		4. Blasting	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
			Landscape Degradation	√	
			Generation of Debris	√	
		5. Dredging/Desiltation			
	√	6. Resettlement And Rehabilitation	Land acquisition	√	
			Impact on local and tribal communities	√	
	√	7. Labour Camps	Worker local People Exposure	√	
			Impact on human health (Labour Camps)	√	
	√	8. Heavy machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		9. Hot mix plant			
	√	10.Concrete mixture and heavy pumps	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	11.Material handling and storage	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	12.Temporary land acquisition	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	13.Tree felling/ vegetation	Landscape Degradation	√	

Activity		Component	Impact	I	P
		clearance	Impact on flora	√	
			Soil Erosion	√	
	√	14.Haulage of machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	15. Debris Disposal	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
			Landscape Degradation	√	
			Water Pollution (Surface)	√	
	√	16.Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	17.Small tools and pumps	Air / Noise Pollution	√	
	√	18.Sheds to keep machines and tools	Air / Noise Pollution	√	
5. Standby generator		1. Acquisition of forest land			
		2. Borrow materials/ area			
		3. Quary materials / area			
		4. Blasting			
		5. Dredging/Desiltation			
		6. Resettlement And Rehabilitation			
		7. Labour Camps			
	√	8. Heavy machinery	Air / Noise Pollution	√	√
			Soil Pollution	√	
			Worker local People Exposure	√	
		9. Hot mix plant			
		10.Concrete mixture and heavy pumps			
		11.Material handling and storage			
		12.Temporary land acquisition			
		13.Tree felling/ vegetation clearance			
	√	14.Haulage of machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		15. Debris Disposal			

Activity		Component	Impact	I	P
		16.Transport of materials			
	√	17.Small tools and pumps	Air / Noise Pollution	√	
	√	18.Sheds to keep machines and tools	Air / Noise Pollution	√	
6. River Regradation		1. Acquisition of forest land			
		2. Borrow materials/ area			
		3. Quary materials / area			
	√	4. Blasting	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
			Landscape Degradation	√	
			Generation of Debris	√	
		5. Dredging/Desiltation	Air / Noise Pollution	√	
			Water Pollution (Surface)	√	
			Soil Pollution	√	
			Trucks Traffic increase	√	
			Worker local People Exposure	√	
			Generation Excavated Material	√	
			Water Delivery reduction, interruption	√	
		6. Resettlement And Rehabilitation			
	√	7. Labour Camps	Worker local People Exposure	√	
			Impact on human health (Labour Camps)	√	
	√	8. Heavy machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		9. Hot mix plant			
	√	10.Concrete mixture and heavy pumps	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	11.Material handling and storage	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		12.Temporary land acquisition			
		13.Tree felling/ vegetation clearance			
	√	14.Haulage of machinery	Air / Noise Pollution	√	
			Soil Pollution	√	

Activity	Component		Impact	I	P
			Worker local People Exposure	√	
	√	15. Debris Disposal	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
			Landscape Degradation	√	
			Water Pollution (Surface)	√	
	√	16.Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	17.Small tools and pumps	Air / Noise Pollution	√	
	√	18.Sheds to keep machines and tools	Air / Noise Pollution	√	
7. Flood Protection Network		1. Acquisition of forest land			
		2. Borrow materials/ area			
		3. Quary materials / area			
		4. Blasting			
		5. Dredging/Desiltation			
		6. Resettlement And Rehabilitation			
		7. Labour Camps			
		8. Heavy machinery			
		9. Hot mix plant			
		10.Concrete mixture and heavy pumps			
		11.Material handling and storage			
		12.Temporary land acquisition			
		13.Tree felling/ vegetation clearance			
		14.Haulage of machinery			
		15. Debris Disposal			
	√	16.Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	17.Small tools and pumps	Air / Noise Pollution	√	
	√	18.Sheds to keep machines and tools	Air / Noise Pollution	√	
8. Wind mill, Solar power		1. Acquisition of forest land			
		2. Borrow materials/ area			
		3. Quary materials / area			
		4. Blasting			
		5. Dredging/Desiltation			

Activity	Component		Impact	I	P
		6. Resettlement And Rehabilitation			
	√	7. Labour Camps	Worker local People Exposure	√	
			Impact on human health (Labour Camps)	√	
	√	8. Heavy machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		9. Hot mix plant			
	√	10.Concrete mixture and heavy pumps	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	11.Material handling and storage	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		12.Temporary land acquisition			
	√	13.Tree felling/ vegetation clearance	Landscape Degradation	√	
			Impact on flora	√	
			Soil Erosion	√	
	√	14.Haulage of machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	15. Debris Disposal	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
			Landscape Degradation	√	
			Water Pollution (Surface)	√	
	√	16.Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	17.Small tools and pumps	Air / Noise Pollution	√	
	√	18.Sheds to keep machines and tools	Air / Noise Pollution	√	
9. Treatment of leakage through masonry and concrete dams and reduction of seepage through earth dams and their foundations		1. Acquisition of forest land			
		2. Borrow materials/ area			
		3. Quary materials / area			
		4. Blasting			
		5. Dredging/Desiltation			
		6. Resettlement And Rehabilitation			
	√	7. Labour Camps	Worker local People Exposure	√	

Activity		Component	Impact	I	P
			Impact on human health (Labour Camps)	√	
	√	8. Heavy machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	9. Hot mix plant	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	10. Concrete mixture and heavy pumps	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	11. Material handling and storage	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		12. Temporary land acquisition			
		13. Tree felling/ vegetation clearance			
	√	14. Haulage of machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	15. Debris Disposal	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
			Landscape Degradation	√	
			Water Pollution (Surface)	√	
	√	16. Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	17. Small tools and pumps	Air / Noise Pollution	√	
	√	18. Sheds to keep machines and tools	Air / Noise Pollution	√	
10. Improving Dam Drainagae		1. Acquisition of forest land			
		2. Borrow materials/ area			
		3. Quary materials / area			
		4. Blasting			
		5. Dredging/Desiltation			
		6. Resettlement And Rehabilitation			
	√	7. Labour Camps	Worker local People Exposure	√	
			Impact on human health (Labour Camps)	√	

Activity	Component		Impact	I	P
	√	8. Heavy machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		9. Hot mix plant			
	√	10.Concrete mixture and heavy pumps	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	11.Material handling and storage	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		12.Temporary land acquisition			
		13.Tree felling/ vegetation clearance			
	√	14.Haulage of machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	15. Debris Disposal	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
			Landscape Degradation	√	
			Water Pollution (Surface)	√	
	√	16.Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	17.Small tools and pumps	Air / Noise Pollution	√	
	√	18.Sheds to keep machines and tools	Air / Noise Pollution	√	
11. Structural strengthening of dams to withstand higher earthquake loads		1. Acquisition of forest land			
	√	2. Borrow materials/ area	Air / Noise Pollution	√	
			Soil Pollution	√	
			Trucks Traffic increase	√	
			Soil Erosion	√	
			Worker local People Exposure	√	
			Generation Excavated Material	√	
			Landscape Degradation	√	
	√	3. Quary materials / area	Air / Noise Pollution	√	
			Soil Pollution	√	
			Trucks Traffic increase	√	
			Worker local People Exposure	√	
			Generation Excavated Material	√	

Activity	Component		Impact	I	P
			Landscape Degradation	√	
		4. Blasting			
		5. Dredging/Desiltation			
		6. Resettlement And Rehabilitation			
	√	7. Labour Camps	Worker local People Exposure	√	
			Impact on human health (Labour Camps)	√	
	√	8. Heavy machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		9. Hot mix plant			
	√	10.Concrete mixture and heavy pumps	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	11.Material handling and storage	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		12.Temporary land acquisition			
		13.Tree felling/ vegetation clearance			
	√	14.Haulage of machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		15. Debris Disposal			
	√	16.Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	17.Small tools and pumps	Air / Noise Pollution	√	
	√	18.Sheds to keep machines and tools	Air / Noise Pollution	√	
12. Remodeling earth dams to safe, stable cross sections		1. Acquisition of forest land			
	√	2. Borrow materials/ area	Air / Noise Pollution	√	
			Soil Pollution	√	
			Trucks Traffic increase	√	
			Soil Erosion	√	
			Worker local People Exposure	√	
			Generation Excavated Material	√	
			Landscape Degradation	√	
	√	3. Quary materials / area	Air / Noise Pollution	√	

Activity	Component		Impact	I	P
			Soil Pollution	√	
			Trucks Traffic increase	√	
			Worker local People Exposure	√	
			Generation Excavated Material	√	
			Landscape Degradation	√	
		4. Blasting			
		5. Dredging/Desiltation			
		6. Resettlement And Rehabilitation	Land acquisition Impact on local and tribal communities		
	√	7. Labour Camps	Worker local People Exposure	√	
			Impact on human health (Labour Camps)	√	
	√	8. Heavy machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		9. Hot mix plant			
	√	10.Concrete mixture and heavy pumps	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	11.Material handling and storage	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		12.Temporary land acquisition			
		13.Tree felling/ vegetation clearance			
	√	14.Haulage of machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		15. Debris Disposal			
	√	16.Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	17.Small tools and pumps	Air / Noise Pollution	√	
	√	18.Sheds to keep machines and tools	Air / Noise Pollution	√	
13. Improving toe drain and seepage measuring devices		1. Acquisition of forest land			
		2. Borrow materials/ area			
		3. Quary materials / area			
		4. Blasting			
		5. Dredging/Desiltation			

Activity		Component	Impact	I	P
		6. Resettlement And Rehabilitation			
		7. Labour Camps			
		8. Heavy machinery			
		9. Hot mix plant			
	√	10.Concrete mixture and heavy pumps	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	11.Material handling and storage	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		12.Temporary land acquisition			
		13.Tree felling/ vegetation clearance			
	√	14.Haulage of machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	15. Debris Disposal	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
			Landscape Degradation	√	
			Water Pollution (Surface)	√	
	√	16.Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	17.Small tools and pumps	Air / Noise Pollution	√	
	√	18.Sheds to keep machines and tools	Air / Noise Pollution	√	
14. Improving ability to withstand higher floods including additional flood handling facilities, if needed.		10. Acquisition of forest land			
		11. Borrow materials/ area			
		12. Quary materials / area			
		13. Blasting			
		14. Dredging/Desiltation			
		15. Resettlement And Rehabilitation			
		16. Labour Camps			
		17. Heavy machinery			
		18. Hot mix plant			
		10.Concrete mixture and heavy pumps			

Activity		Component	Impact	I	P
	√	11.Material handling and storage	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		12.Temporary land acquisition			
		13.Tree felling/ vegetation clearance			
		14.Haulage of machinery			
		15. Debris Disposal			
	√	16.Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	17.Small tools and pumps	Air / Noise Pollution	√	
	√	18.Sheds to keep machines and tools	Air / Noise Pollution	√	
15. Repairs to damaged spillways, stilling basins and downstream channels	√	1. Acquisition of forest land			
		2. Borrow materials/ area			
	√	3. Quary materials / area	Air / Noise Pollution	√	
			Soil Pollution	√	
			Trucks Traffic increase	√	
			Worker local People Exposure	√	
			Generation Excavated Material	√	
			Landscape Degradation	√	
		4. Blasting			
		5. Dredging/Desiltation			
		6. Resettlement And Rehabilitation			
	√	7. Labour Camps	Worker local People Exposure	√	
			Impact on human health (Labour Camps)	√	
	√	8. Heavy machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		9. Hot mix plant			
	√	10.Concrete mixture and heavy pumps	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	11.Material handling and storage	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	

Activity	Component		Impact	I	P
		12.Temporary land acquisition			
		13.Tree felling/ vegetation clearance			
	√	14.Haulage of machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	15. Debris Disposal	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
			Landscape Degradation	√	
			Water Pollution (Surface)	√	
	√	16.Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	17.Small tools and pumps	Air / Noise Pollution	√	
	√	18.Sheds to keep machines and tools	Air / Noise Pollution	√	
16. Improving dam safety instrumentation		1. Acquisition of forest land			
		2. Borrow materials/ area			
		3. Quary materials / area			
		4. Blasting			
		5. Dredging/Desiltation			
		6. Resettlement And Rehabilitation			
		7. Labour Camps			
		8. Heavy machinery			
		9. Hot mix plant			
		10. Concrete mixture and heavy pumps			
	√	11. Material handling and storage	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		12. Temporary land acquisition			
		13. Tree felling/ vegetation clearance			
		14. Haulage of machinery			
		15. Debris Disposal			
	√	16. Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	

Activity	Component		Impact	I	P
	√	17. Small tools and pumps	Air / Noise Pollution	√	
	√	18. Sheds to keep machines and tools	Air / Noise Pollution	√	
17. Improving communications – real-time as much as possible – between dams, upstream rain/river flow gauging stations and with other dams, control offices and civil authorities in flood plains downstream of the dam		1. Acquisition of forest land			
		2. Borrow materials/ area			
		3. Quary materials / area			
		4. Blasting			
		5. Dredging/Desiltation			
		6. Resettlement And 7. Rehabilitation			
		8. Labour Camps			
		9. Heavy machinery			
		10. Hot mix plant			
		11. Concrete mixture and heavy pumps			
	√	12. Material handling and storage	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		13. Temporary land acquisition			
		14. Tree felling/ vegetation clearance			
		15. Haulage of machinery			
		16. Debris Disposal			
	√	17. Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	18. Small tools and pumps	Air / Noise Pollution	√	
	√	19. Sheds to keep machines and tools	Air / Noise Pollution	√	
18. Flood marking		1. Acquisition of forest land			
		2. Borrow materials/ area			
		3. Quary materials / area			
		4. Blasting			
		5. Dredging/Desiltation			
		6. Resettlement And 7. Rehabilitation			
		8. Labour Camps			
		9. Heavy machinery			
		10. Hot mix plant			

Activity	Component		Impact	I	P
		11. Concrete mixture and heavy pumps			
		12. Material handling and storage			
		13. Temporary land acquisition			
		14. Tree felling/ vegetation clearance			
		15. Haulage of machinery			
		16. Debris Disposal			
		17. Transport of materials			
	√	18. Small tools and pumps	Air / Noise Pollution	√	
	√	19. Sheds to keep machines and tools	Air / Noise Pollution	√	
19. Low voltage electrical supplies in inspection and drainage galleries		1. Acquisition of forest land			
		2. Borrow materials/ area			
		3. Quary materials / area			
		4. Blasting			
		5. Dredging/Desiltation			
		6. Resettlement And Rehabilitation			
		7. Labour Camps			
		8. Heavy machinery			
		9. Hot mix plant			
		10. Concrete mixture and heavy pumps			
		11. Material handling and storage			
		12. Temporary land acquisition			
		13. Tree felling/ vegetation clearance			
		14. Haulage of machinery			
		15. Debris Disposal			
	√	16. Transport of materials	Air / Noise Pollution	√	
	√	17. Small tools and pumps	Air / Noise Pollution	√	
	√	18. Sheds to keep machines and tools	Air / Noise Pollution	√	
20. Improving lighting for external areas		1. Acquisition of forest land			
		2. Borrow materials/ area			
		3. Quary materials / area			

Activity		Component	Impact	I	P
of dams		4. Blasting			
		5. Dredging/Desiltation			
		6. Resettlement And Rehabilitation			
		7. Labour Camps			
		8. Heavy machinery			
		9. Hot mix plant			
		10. Concrete mixture and heavy pumps			
		11. Material handling and storage			
		12. Temporary land acquisition			
		13. Tree felling/ vegetation clearance			
		14. Haulage of machinery			
		15. Debris Disposal			
	√	16. Transport of materials	Air / Noise Pollution	√	
	√	17. Small tools and pumps	Air / Noise Pollution	√	
	√	18. Sheds to keep machines and tools	Air / Noise Pollution	√	
21. Inspection launches provision		1. Acquisition of forest land			
		2. Borrow materials/ area			
		3. Quary materials / area			
		4. Blasting			
		5. Dredging/Desiltation			
		6. Resettlement And Rehabilitation			
		7. Labour Camps			
		8. Heavy machinery			
		9. Hot mix plant			
		10. Concrete mixture and heavy pumps			
		11. Material handling and storage			
		12. Temporary land acquisition			
		13. Tree felling/ vegetation clearance			

Activity		Component	Impact	I	P
		14. Haulage of machinery			
		15. Debris Disposal			
	√	16. Transport of materials	Air / Noise Pollution	√	
	√	17. Small tools and pumps	Air / Noise Pollution	√	
	√	18. Sheds to keep machines and tools	Air / Noise Pollution	√	
22. Rehabilitation / Improvement of Spillway, head regulator and draw-off gates and their operating mechanisms		1. Acquisition of forest land			
		2. Borrow materials/ area			
		3. Quary materials / area			
		4. Blasting			
		5. Dredging/Desiltation			
		6. Resettlement And Rehabilitation			
	√	7. Labour Camps	Worker local People Exposure	√	
			Impact on human health (Labour Camps)	√	
	√	8. Heavy machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		9. Hot mix plant			
	√	10. Concrete mixture and heavy pumps	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	11. Material handling and storage	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		12. Temporary land acquisition			
		13. Tree felling/ vegetation clearance			
	√	14. Haulage of machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	15. Debris Disposal	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
			Landscape Degradation	√	
			Water Pollution (Surface)	√	
	√	16. Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	

Activity		Component	Impact	I	P
	√	17. Small tools and pumps	Air / Noise Pollution	√	
	√	18. Sheds to keep machines and tools	Air / Noise Pollution	√	
23. Repair / Modification of Spillway Gates		1. Acquisition of forest land			
		2. Borrow materials/ area			
		3. Quary materials / area			
		4. Blasting			
		5. Dredging/Desiltation			
		6. Resettlement And Rehabilitation			
	√	7. Labour Camps	Worker local People Exposure	√	
			Impact on human health (Labour Camps)	√	
	√	8. Heavy machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		9. Hot mix plant			
	√	10. Concrete mixture and heavy pumps	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	11. Material handling and storage	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		12. Temporary land acquisition			
		13. Tree felling/ vegetation clearance			
	√	14. Haulage of machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	15. Debris Disposal	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
			Landscape Degradation	√	
			Water Pollution (Surface)	√	
	√	16. Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	17. Small tools and pumps	Air / Noise Pollution	√	
	√	18. Sheds to keep machines and tools	Air / Noise Pollution	√	
24. Cleaning of		1. Acquisition of forest land			

Activity		Component	Impact	I	P
foundation drain & porous drain		2. Borrow materials/ area			
		3. Quary materials / area			
		4. Blasting			
		5. Dredging/Desiltation			
		6. Resettlement And Rehabilitation			
	√	7. Labour Camps	Worker local People Exposure	√	
			Impact on human health (Labour Camps)	√	
	√	8. Heavy machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		9. Hot mix plant			
	√	10. Concrete mixture and heavy pumps	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	11. Material handling and storage	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		12. Temporary land acquisition			
		13. Tree felling/ vegetation clearance			
	√	14. Haulage of machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	15. Debris Disposal	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
			Landscape Degradation	√	
			Water Pollution (Surface)	√	
	√	16. Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	17. Small tools and pumps	Air / Noise Pollution	√	
	√	18. Sheds to keep machines and tools	Air / Noise Pollution	√	
25. Repair and Clearing of irrigation outlets		1. Acquisition of forest land			
		2. Borrow materials/ area			
		3. Quary materials / area			
		4. Blasting			

Activity	Component		Impact	I	P
		5. Dredging/Desiltation			
		6. Resettlement And Rehabilitation			
	√	7. Labour Camps	Worker local People Exposure	√	
			Impact on human health (Labour Camps)	√	
	√	8. Heavy machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		9. Hot mix plant			
	√	10. Concrete mixture and heavy pumps	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	11. Material handling and storage	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
		12. Temporary land acquisition			
		13. Tree felling/ vegetation clearance			
	√	14. Haulage of machinery	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	15. Debris Disposal	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
			Landscape Degradation	√	
			Water Pollution (Surface)	√	
	√	16. Transport of materials	Air / Noise Pollution	√	
			Soil Pollution	√	
			Worker local People Exposure	√	
	√	17. Small tools and pumps	Air / Noise Pollution	√	
	√	18. Sheds to keep machines and tools	Air / Noise Pollution	√	

I : Implementation Phase

P : Post implementation Phase

Form SC-4: Screening and Categorisation of Components

Sl. No	Environmental and Social Components	A	B	C
1.	Acquisition of forest land	√		
2.	Borrow materials/ area	√		
3.	Quary materials / area	√		
4.	Blasting	√		
5.	Dredging/Desilting of reservoir	√		
6.	Resettlement And Rehabilitation	√		
7.	Labour Camps	√		
8.	Heavy machinery		√	
9.	Hot mix plant		√	
10.	Concrete mixture and heavy pumps		√	
11.	Material handling and storage		√	
12.	Temporary land acquisition		√	
13.	Tree felling/ vegetation clearance		√	
14.	Haulage of machinery		√	
15.	Debris Disposal		√	
16.	Transport of materials		√	
17.	Small tools and pumps			√
18.	Sheds to keep machines and tools			√

Form SC - 5: Screening format for identification of suitable mitigation measures

Sl. No	Components	Potential Impacts	Mitigation Measures	Executing Responsibilities	Supervising Responsibilities	Monitoring Responsibilities
Implementation Phase						
1.	Dredging /Desiltation	Air / Noise Pollution	▪ Air pollution control measure like water sprinkling ▪ Limit hours of operation in populated areas ▪ Use of barriers to reduce exposure ▪ Plants, machinery and equipment may be handled so as to minimize generation of dust. ▪ All crusher used in construction should confirm to relative dust emission devises ▪ Low emission construction equipment, vehicles and generator sets may be used ▪ Air quality monitoring may be conducted at construction sites.	Contractor	Dam site in-charge	SWRD/ SPCB
		Water Pollution (Surface Water)	▪ Dump solid waste in specified place to minimize contamination of water ▪ Dump wastewater in authorized locations and after treatment	Contractor	Dam site in-charge	SWRD/ SPCB
		Soil Pollution	▪ Collection and recycling of lubricants ▪ Measures to prevent accidental spills	Contractor	Dam site in-charge	SWRD/ SPCB
		Trucks Traffic increase	▪ Avoid traffic in populated areas as much as possible ▪ Install speed breaker and signages near settlements ▪ Roadside plantation	Contractor	Dam site in-charge	SWRD/ SPCB
		Worker/Local people exposure	▪ Locate handling sites away from populated areas ▪ Follow proper operation and handling measures to minimize exposure ▪ Provide prior warning /signals for blasting ▪ Provide sirens in vehicles to avoid any collision with human/animals ▪ Organise awareness programs on environmental resource management ▪ Organise Health camps ▪ Child labour must be strictly prohibited ▪ Provide signages near	Contractor	Dam site in-charge	SWRD/ SPCB

Sl. No	Components	Potential Impacts	Mitigation Measures	Executing Responsibilities	Supervising Responsibilities	Monitoring Responsibilities
			construction sites and approach roads			
		Generation of Excavated material	▪ Remove dredged material as soon as possible from river side ▪ Dumping of dredging material only in designated place by the engineers to minimize impact on environment	Contractor	Dam site in-charge	SWRD/ SPCB
		Water Delivery Reduction Interruption	▪ Arrange alternate source of water to fulfill basic needs	Contractor	Dam site in-charge	SWRD/ SPCB
2.	Labour Camps	Worker/Local people exposure	▪ Locate handling sites away from populated areas ▪ Follow proper operation and handling measures to minimize exposure ▪ Provide prior warning /signals for blasting ▪ Provide sirens in vehicles to avoid any collision with human/animals ▪ Organise awareness programs on environmental resource management ▪ Organise Health camps ▪ Child labour must be strictly prohibited ▪ Provide signages near construction sites and approach roads	Contractor	Dam site in-charge	SWRD
		Impact on Human health, especially workers working at construction sites (Labour Camps)	▪ Routine medical check up of Field staff and labours ▪ Provision of potable drinking water at site ▪ Provision of proper sewage and waste disposal system. Sanitation facilities have to be provided at the camp sites. ▪ Awareness program on HIV aids and other communicable disease may be provided to the work force. ▪ First aid facilities to be provided at the construction camps. Any case of disease outbreak may be immediately subjected to medical treatment. Mosquito repellant to be provided to the labors such as odomas, coil and sprays. The camps may maintain cleanliness and hygienic condition. ▪ Proper ventilation may be provided in labour camps	Contractor	Dam site in-charge	SWRD/ Public Health Centre

Sl. No	Components	Potential Impacts	Mitigation Measures	Executing Responsibilities	Supervising Responsibilities	Monitoring Responsibilities
			▪ Sufficient fuel may be provided to the work force at campsite. Alternate arrangement for fuel such as provision of LPG, Kerosene etc. to be provided to the camp ▪ Head phones, ear plugs to be provided to the workers at construction site. ▪ All workers employed on mixing of asphaltic material, cement, lime mortars, concrete etc. may be provided with protective footwear and protective goggles. Workers involved in welding work may be provided with welder's protective eye shields ▪ Adequate precaution must be taken to prevent danger from electrical equipments			
3.	Heavy Machinery	Air / Noise Pollution	▪ Air pollution control measure like water sprinkling ▪ Limit hours of operation in populated areas ▪ Use of barriers to reduce exposure ▪ Plants, machinery and equipment may be handled so as to minimize generation of dust. ▪ All crusher used in construction should confirm to relative dust emission devises ▪ Low emission construction equipment, vehicles and generator sets may be used ▪ Air quality monitoring may be conducted at construction sites.	Contractor	Dam site in-charge	SWRD/ Public Health Centre
		Soil Pollution	▪ Collection and recycling of lubricants ▪ Measures to prevent accidental spills	Contractor	Dam site in-charge	SWRD/ Public Health Centre
		Worker/Local people exposure	▪ Locate handling sites away from populated areas ▪ Follow proper operation and handling measures to minimize exposure ▪ Provide prior warning /signals for blasting ▪ Provide sirens in vehicles to avoid any collision with human/animals ▪ Organise awareness programs on	Contractor	Dam site in-charge	SWRD/ Public Health Centre

Sl. No	Components	Potential Impacts	Mitigation Measures	Executing Responsibilities	Supervising Responsibilities	Monitoring Responsibilities
			environmental resource management ▪ Organise Health camps ▪ Child labour must be strictly prohibited ▪ Provide signages near construction sites and approach roads			
4.	Material Handling And Storage	Air / Noise Pollution	▪ Air pollution control measure like water sprinkling ▪ Limit hours of operation in populated areas ▪ Use of barriers to reduce exposure ▪ Plants, machinery and equipment may be handled so as to minimize generation of dust. ▪ All crusher used in construction should confirm to relative dust emission devises ▪ Low emission construction equipment, vehicles and generator sets may be used ▪ Air quality monitoring may be conducted at construction sites.	Contractor	Dam site in-charge	SWRD/ Public Health Centre
		Soil Pollution	▪ Collection and recycling of lubricants ▪ Measures to prevent accidental spills	Contractor	Dam site in-charge	SWRD/ Public Health Centre
		Worker/Local people exposure	▪ Locate handling sites away from populated areas ▪ Follow proper operation and handling measures to minimize exposure ▪ Provide prior warning /signals for blasting ▪ Provide sirens in vehicles to avoid any collision with human/animals ▪ Organise awareness programs on environmental resource management ▪ Organise Health camps ▪ Child labour must be strictly prohibited ▪ Provide signages near construction sites and approach roads	Contractor	Dam site in-charge	SWRD/ Public Health Centre
5.	Haulage of	Air / Noise Pollution	▪ Air pollution control measure like water sprinkling	Contractor	Dam site in-charge	SWRD/ Public

Sl. No	Components	Potential Impacts	Mitigation Measures	Executing Responsibilities	Supervising Responsibilities	Monitoring Responsibilities
	Mechinery		▪ Limit hours of operation in populated areas ▪ Use of barriers to reduce exposure ▪ Plants, machinery and equipment may be handled so as to minimize generation of dust. ▪ All crusher used in construction should confirm to relative dust emission devises ▪ Low emission construction equipment, vehicles and generator sets may be used ▪ Air quality monitoring may be conducted at construction sites.			Health Centre
		Soil Pollution	▪ Collection and recycling of lubricants ▪ Measures to prevent accidental spills	Contractor	Dam site in-charge	SWRD/ Public Health Centre
		Worker/Local people exposure	▪ Locate handling sites away from populated areas ▪ Follow proper operation and handling measures to minimize exposure ▪ Provide prior warning /signals for blasting ▪ Provide sirens in vehicles to avoid any collision with human/animals ▪ Organise awareness programs on environmental resource management ▪ Organise Health camps ▪ Child labour must be strictly prohibited ▪ Provide signages near construction sites and approach roads	Contractor	Dam site in-charge	SWRD/ Public Health Centre
6.	Debris Disposal	Air / Noise Pollution	▪ Air pollution control measure like water sprinkling ▪ Limit hours of operation in populated areas ▪ Use of barriers to reduce exposure ▪ Plants, machinery and equipment may be handled so as to minimize generation of dust. ▪ All crusher used in construction should confirm to relative dust emission devises ▪ Low emission construction	Contractor	Dam site in-charge	SWRD/ SPCB

Sl. No	Components	Potential Impacts	Mitigation Measures	Executing Responsibilities	Supervising Responsibilities	Monitoring Responsibilities
			equipment, vehicles and generator sets may be used ▪ Air quality monitoring may be conducted at construction sites.			
		Water Pollution (Surface Water)	▪ Dump solid waste in specified place to minimize contamination of water ▪ Dump wastewater in authorized locations and after treatment	Contractor	Dam site in-charge	SWRD/ SPCB
		Soil Pollution	▪ Collection and recycling of lubricants ▪ Measures to prevent accidental spills	Contractor	Dam site in-charge	SWRD/ SPCB
		Trucks Traffic increase	▪ Avoid traffic in populated areas as much as possible ▪ Install speed breaker and signages near settlements ▪ Roadside plantation	Contractor	Dam site in-charge	SWRD
		Landscape Degradation	▪ It is a direct, short term impact; Irreversible in nature; Severity is low; Insignificant Impact on Livelihood ▪ Carry plantation work on open sites ▪ Do not dump waste along settlement or access route ▪ Frame Muck disposal program ▪ Frame quarry & borrow area rehabilitation program ▪ Develop green belts along approach road ▪ On completion of the works all the temporary structures may be cleared away, all rubbish disposed, excreta and disposal pits or trenches filled in and effectively sealed off and the whole site	Dam Site In-charge	State Water Resource Dept. (SWRD)	State Water Resource Dept. (SWRD)
7.	Transport of Materials	Air / Noise Pollution	▪ Air pollution control measure like water sprinkling ▪ Limit hours of operation in populated areas ▪ Use of barriers to reduce exposure ▪ Plants, machinery and equipment may be handled so as to minimize generation of dust. ▪ All crusher used in construction should confirm to relative dust	Contractor	Dam site in-charge	SWRD/ Public Health Centre

Sl. No	Components	Potential Impacts	Mitigation Measures	Executing Responsibilities	Supervising Responsibilities	Monitoring Responsibilities
			emission devises ▪ Low emission construction equipment, vehicles and generator sets may be used ▪ Air quality monitoring may be conducted at construction sites.			
		Soil Pollution	▪ Collection and recycling of lubricants ▪ Measures to prevent accidental spills	Contractor	Dam site in-charge	SWRD/ Public Health Centre
		Trucks Traffic increase	▪ Avoid traffic in populated areas as much as possible ▪ Install speed breaker and signages near settlements ▪ Roadside plantation	Contractor	Dam site in-charge	SWRD/ SPCB
8.	Small Tools and Pumps	Air / Noise Pollution	▪ Air pollution control measure like water sprinkling ▪ Limit hours of operation in populated areas ▪ Use of barriers to reduce exposure ▪ Plants, machinery and equipment may be handled so as to minimize generation of dust. ▪ All crusher used in construction should confirm to relative dust emission devises ▪ Low emission construction equipment, vehicles and generator sets may be used ▪ Air quality monitoring may be conducted at construction sites.	Contractor	Dam site in-charge	SWRD/ Public Health Centre
9.	Borrow Materials/ Area	Air / Noise Pollution	▪ Air pollution control measure like water sprinkling ▪ Limit hours of operation in populated areas ▪ Use of barriers to reduce exposure ▪ Plants, machinery and equipment may be handled so as to minimize generation of dust. ▪ All crusher used in construction should confirm to relative dust emission devises ▪ Low emission construction equipment, vehicles and generator sets may be used ▪ Air quality monitoring may be conducted at construction sites.	Contractor	Dam site in-charge	SWRD/ Public Health Centre

Sl. No	Components	Potential Impacts	Mitigation Measures	Executing Responsibilities	Supervising Responsibilities	Monitoring Responsibilities
		Soil Pollution	▪ Collection and recycling of lubricants ▪ Measures to prevent accidental spills	Contractor	Dam site in-charge	SWRD/ Public Health Centre
		Trucks Traffic increase	▪ Avoid traffic in populated areas as much as possible ▪ Install speed breaker and signages near settlements ▪ Roadside plantation	Contractor	Dam site in-charge	SWRD/ SPCB
		Soil Erosion	▪ Limitation of earth moving to dry periods ▪ Protection of vulnerable areas with mulch ▪ Protection of drainage channels with beams, straw or fabric barriers ▪ Installation of sedimentation basins ▪ Seeding or planting of erodible surfaces as soon as possible	Contractor	Dam site in-charge	SWRD
		Worker/Local people exposure	▪ Locate handling sites away from populated areas ▪ Follow proper operation and handling measures to minimize exposure ▪ Provide prior warning /signals for blasting ▪ Provide sirens in vehicles to avoid any collision with human/animals ▪ Organise awareness programs on environmental resource management ▪ Organise Health camps ▪ Child labour must be strictly prohibited ▪ Provide signages near construction sites and approach roads	Contractor	Dam site in-charge	SWRD/ SPCB
		Generation of Excavated material	▪ Remove dredged material as soon as possible from river side ▪ Dumping of dredging material only in designated place by the engineers to minimize impact on environment	Contractor	Dam site in-charge	SWRD/ SPCB
		Landscape Degradation	▪ It is a direct, short term impact; Irreversible in nature; Severity is low; Insignificant Impact on	Dam Site In-charge	State Water Resource	State Water Resource

Sl. No	Components	Potential Impacts	Mitigation Measures	Executing Responsibilities	Supervising Responsibilities	Monitoring Responsibilities
			Livelihood ▪ Carry plantation work on open sites ▪ Do not dump waste along settlement or access route ▪ Frame Muck disposal program ▪ Frame quarry & borrow area rehabilitation program ▪ Develop green belts along approach road ▪ On completion of the works all the temporary structures may be cleared away, all rubbish disposed, excreta and disposal pits or trenches filled in and effectively sealed off and the whole site		Dept. (SWRD)	Dept. (SWRD)
10.	Quary Materials/ Area	Air / Noise Pollution	▪ Air pollution control measure like water sprinkling ▪ Limit hours of operation in populated areas ▪ Use of barriers to reduce exposure ▪ Plants, machinery and equipment may be handled so as to minimize generation of dust. ▪ All crusher used in construction should confirm to relative dust emission devises ▪ Low emission construction equipment, vehicles and generator sets may be used ▪ Air quality monitoring may be conducted at construction sites.	Contractor	Dam site in-charge	SWRD/ Public Health Centre
		Soil Pollution	▪ Collection and recycling of lubricants ▪ Measures to prevent accidental spills	Contractor	Dam site in-charge	SWRD/ Public Health Centre
		Trucks Traffic increase	▪ Avoid traffic in populated areas as much as possible ▪ Install speed breaker and signages near settlements ▪ Roadside plantation	Contractor	Dam site in-charge	SWRD/ SPCB
		Worker/Local people exposure	▪ Locate handling sites away from populated areas ▪ Follow proper operation and handling measures to minimize exposure ▪ Provide prior warning /signals for	Contractor	Dam site in-charge	SWRD/ SPCB

Sl. No	Components	Potential Impacts	Mitigation Measures	Executing Responsibilities	Supervising Responsibilities	Monitoring Responsibilities
			blasting ▪ Provide sirens in vehicles to avoid any collision with human/animals ▪ Organise awareness programs on environmental resource management ▪ Organise Health camps ▪ Child labour must be strictly prohibited ▪ Provide signages near construction sites and approach roads			
		Generation of Excavated material	▪ Remove dredged material as soon as possible from river side ▪ Dumping of dredging material only in designated place by the engineers to minimize impact on environment	Contractor	Dam site in-charge	SWRD/ SPCB
		Landscape Degradation	▪ It is a direct, short term impact; Irreversible in nature; Severity is low; Insignificant Impact on Livelihood ▪ Carry plantation work on open sites ▪ Do not dump waste along settlement or access route ▪ Frame Muck disposal program ▪ Frame quarry & borrow area rehabilitation program ▪ Develop green belts along approach road ▪ On completion of the works all the temporary structures may be cleared away, all rubbish disposed, excreta and disposal pits or trenches filled in and effectively sealed off and the whole site	Dam Site In-charge	State Water Resource Dept. (SWRD)	State Water Resource Dept. (SWRD)
11.	Resettlement & Rehabilitation	Land Acquisition	▪ Follow National R&R Policy 2007. ▪ The compensation award shall be declared before displacement of the affected families. Full payment of compensation as well as adequate progress in resettlement shall be ensured. ▪ The compensation award shall take into account the market value of the property being acquired, including the location-wise minimum price per unit area	Contractor	Dam site in-charge	SWRD / District Collectorate

Sl. No	Components	Potential Impacts	Mitigation Measures	Executing Responsibilities	Supervising Responsibilities	Monitoring Responsibilities
			fixed (or to be fixed) by the respective State Government. ▪ Conversion to the intended category of use of the land being acquired (for example, from agricultural to non-agricultural) shall be taken into account in advance of the acquisition, and the compensation award shall be determined as per the intended land use category. ▪ The rehabilitation and resettlement benefits shall be extended to all the affected families. ▪ Any affected family owning house and whose house has been acquired or lost, may be allotted free of cost house site ▪ The land or house allotted to the affected families may be in the joint names of wife and husband of the affected family. ▪ Each affected below poverty line family which is without homestead land and has been residing in the affected area and which has been involuntarily displaced from such area, shall be entitled to a house. ▪ In case of involuntary displacement infrastructural facilities and amenities shall be provided in the resettlement area .Facilities and amenities shall, inter alia, include roads, public transport, drainage, sanitation, safe drinking water, drinking water for cattle, community, ponds, grazing land, land for fodder, plantation (social forestry or agroforestry), Fair Price shops, panchayatghars, Cooperative Societies, Post Offices, seed-cum-fertilizer storage, irrigation, electricity, health centres, child" and mother supplemental nutritional services, children's playground, community centres, schools, institutional arrangements for trainiqg, places of worship, land for traditional tribal institutions, burial/cremation grounds, and security arrangements.			

Sl. No	Components	Potential Impacts	Mitigation Measures	Executing Responsibilities	Supervising Responsibilities	Monitoring Responsibilities
		Impact on local/ tribal communities	▪ States policy for tribal community has to be followed if livelihood is going to be affected. ▪ Tribal Development Plan shall be prepared, laying down the detailed procedure for settling land rights The Plan shall contain a programme for development of alternate fuel, fodder and non-timber forest produce (NTFP) resources on non-forest lands ▪ In cases of involuntary displacement of two hundred or more Scheduled Tribes families from the Scheduled Areas, the concerned Tribes Advisory Councils (TACs) may be consulted. ▪ Each affected family that is displaced and has cattle, shall get financial assistance for construction of cattle shed. ▪ Each affected family that is displaced must be provided with a one-time financial assistance of such amount as the appropriate but not less than ten thousand rupees, for shifting of the family, building materials, belongings and cattle. ▪ Each affected person who is a rural artisan, small trader or self-employed person and who has been displaced shall be provided a one-time financial assistance. ▪ Preference to the affected families – at least one person per nuclear family - in providing employment in the project ▪ The affected persons shall be offered the necessary training facilities for development of entrepreneurship, technical and professional skills for self employment. ▪ Offer scholarships and other skill development opportunities to the eligible persons from the affected families	Contractor	Dam site in-charge	SWRD/ District Collectorate/ Tribes Advisory Council
12.	Labour Camps	Worker/Local people exposure	▪ Locate handling sites away from populated areas ▪ Follow proper operation and	Contractor	Dam site in-charge	SWRD/ SPCB

Sl. No	Components	Potential Impacts	Mitigation Measures	Executing Responsibilities	Supervising Responsibilities	Monitoring Responsibilities
			handling measures to minimize exposure ▪ Provide prior warning /signals for blasting ▪ Provide sirens in vehicles to avoid any collision with human/animals ▪ Organise awareness programs on environmental resource management ▪ Organise Health camps ▪ Child labour must be strictly prohibited ▪ Provide signages near construction sites and approach roads			
		Impact on Human health, especially workers working at construction sites (Labour Camps)	▪ Routine medical check up of Field staff and labours ▪ Provision of potable drinking water at site ▪ Provision of proper sewage and waste disposal system. Sanitation facilities have to be provided at the camp sites. ▪ Awareness program on HIV aids and other communicable disease may be provided to the work force. ▪ First aid facilities to be provided at the construction camps. Any case of disease outbreak may be immediately subjected to medical treatment. Mosquito repellant to be provided to the labors such as odomas, coil and sprays. The camps may maintain cleanliness and hygienic condition. ▪ Proper ventilation may be provided in labour camps ▪ Sufficient fuel may be provided to the work force at campsite. Alternate arrangement for fuel such as provision of LPG, Kerosene etc. to be provided to the camp ▪ Head phones, ear plugs to be provided to the workers at construction site. ▪ All workers employed on mixing of asphaltic material, cement, lime mortars, concrete etc. may be provided with protective footwear and protective goggles. Workers involved in welding work may be provided with welder's protective	Contractor	Dam site in-charge	SWRD/ Public Health Centre

Sl. No	Components	Potential Impacts	Mitigation Measures	Executing Responsibilities	Supervising Responsibilities	Monitoring Responsibilities
			eye shields ▪ Adequate precaution must be taken to prevent danger from electrical equipments			
13.	Hot Mix Plant	Air / Noise Pollution	▪ Air pollution control measure like water sprinkling ▪ Limit hours of operation in populated areas ▪ Use of barriers to reduce exposure ▪ Plants, machinery and equipment may be handled so as to minimize generation of dust. ▪ All crusher used in construction should confirm to relative dust emission devises ▪ Low emission construction equipment, vehicles and generator sets may be used ▪ Air quality monitoring may be conducted at construction sites. ▪	Contractor	Dam site in-charge	SWRD/ Public Health Centre
		Soil Pollution	▪ Collection and recycling of lubricants ▪ Measures to prevent accidental spills	Contractor	Dam site in-charge	SWRD/ Public Health Centre
		Worker/Local people exposure	▪ Locate handling sites away from populated areas ▪ Follow proper operation and handling measures to minimize exposure ▪ Provide prior warning /signals for blasting ▪ Provide sirens in vehicles to avoid any collision with human/animals ▪ Organise awareness programs on environmental resource management ▪ Organise Health camps ▪ Child labour must be strictly prohibited ▪ Provide signages near construction sites and approach roads	Contractor	Dam site in-charge	SWRD/ SPCB
14.	Concrete Mixture and Heavy Pumps	Air / Noise Pollution	▪ Air pollution control measure like water sprinkling ▪ Limit hours of operation in populated areas ▪ Use of barriers to reduce exposure	Contractor	Dam site in-charge	SWRD/ Public Health Centre

Sl. No	Components	Potential Impacts	Mitigation Measures	Executing Responsibilities	Supervising Responsibilities	Monitoring Responsibilities
			▪ Plants, machinery and equipment may be handled so as to minimize generation of dust. ▪ All crusher used in construction should confirm to relative dust emission devises ▪ Low emission construction equipment, vehicles and generator sets may be used ▪ Air quality monitoring may be conducted at construction sites.			
		Soil Pollution	▪ Collection and recycling of lubricants ▪ Measures to prevent accidental spills	Contractor	Dam site in-charge	SWRD/ Public Health Centre
		Worker/Local people exposure	▪ Locate handling sites away from populated areas ▪ Follow proper operation and handling measures to minimize exposure ▪ Provide prior warning /signals for blasting ▪ Provide sirens in vehicles to avoid any collision with human/animals ▪ Organise awareness programs on environmental resource management ▪ Organise Health camps ▪ Child labour must be strictly prohibited ▪ Provide signages near construction sites and approach roads	Contractor	Dam site in-charge	SWRD/ SPCB
15.	Temporary Land Acquisition	Air / Noise Pollution	▪ Air pollution control measure like water sprinkling ▪ Limit hours of operation in populated areas ▪ Use of barriers to reduce exposure ▪ Plants, machinery and equipment may be handled so as to minimize generation of dust. ▪ All crusher used in construction should confirm to relative dust emission devises ▪ Low emission construction equipment, vehicles and generator sets may be used ▪ Air quality monitoring may be conducted at construction sites.	Contractor	Dam site in-charge	SWRD/ Public Health Centre

Sl. No	Components	Potential Impacts	Mitigation Measures	Executing Responsibilities	Supervising Responsibilities	Monitoring Responsibilities
		Soil Pollution	▪ Collection and recycling of lubricants ▪ Measures to prevent accidental spills	Contractor	Dam site in-charge	SWRD/ Public Health Centre
		Worker/Local people exposure	▪ Locate handling sites away from populated areas ▪ Follow proper operation and handling measures to minimize exposure ▪ Provide prior warning /signals for blasting ▪ Provide sirens in vehicles to avoid any collision with human/animals ▪ Organise awareness programs on environmental resource management ▪ Organise Health camps ▪ Child labour must be strictly prohibited ▪ Provide signages near construction sites and approach roads	Contractor	Dam site in-charge	SWRD/ SPCB
16.	Tree Felling, Vegetation Clearance	Landscape Degradation	▪ It is a direct, short term impact; Irreversible in nature; Severity is low; Insignificant Impact on Livelihood ▪ Carry plantation work on open sites ▪ Do not dump waste along settlement or access route ▪ Frame Muck disposal program ▪ Frame quarry & borrow area rehabilitation program ▪ Develop green belts along approach road ▪ On completion of the works all the temporary structures may be cleared away, all rubbish disposed, excreta and disposal pits or trenches filled in and effectively sealed off and the whole site	Dam Site In-charge	State Water Resource Dept. (SWRD)	State Water Resource Dept. (SWRD)
		Impact on Flora	▪ Frame compensatory afforestation plan ▪ If any rare and endangered species present in the area frame conservation plan for the species ▪ Encourage farming of medicinal plants found in the area	Contractor	Dam site in-charge	SWRD/ State Forest Dept

Sl. No	Components	Potential Impacts	Mitigation Measures	Executing Responsibilities	Supervising Responsibilities	Monitoring Responsibilities
			▪ Distribute fruit plants grown in the region ▪ Plantation with native species along dam periphery, approach road and colony area ▪ Protection/fencing of planted area, provision of guard for three year ▪ Location of camp away from forest area.			
		Soil Erosion	▪ Limitation of earth moving to dry periods ▪ Protection of vulnerable areas with mulch ▪ Protection of drainage channels with beams, straw or fabric barriers ▪ Installation of sedimentation basins ▪ Seeding or planting of erodible surfaces as soon as possible	Contractor	Dam site in-charge	SWRD
17.	Sheds to keep Machines amd Tools	Air / Noise Pollution	▪ Air pollution control measure like water sprinkling ▪ Limit hours of operation in populated areas ▪ Use of barriers to reduce exposure ▪ Plants, machinery and equipment may be handled so as to minimize generation of dust. ▪ All crusher used in construction should confirm to relative dust emission devises ▪ Low emission construction equipment, vehicles and generator sets may be used ▪ Air quality monitoring may be conducted at construction sites.	Contractor	Dam site in-charge	SWRD/ SPCB
18.	Blasting	Air / Noise Pollution	▪ Air pollution control measure like water sprinkling ▪ Limit hours of operation in populated areas ▪ Use of barriers to reduce exposure ▪ Plants, machinery and equipment may be handled so as to minimize generation of dust. ▪ All crusher used in construction should confirm to relative dust emission devises ▪ Low emission construction	Contractor	Dam site in-charge	SWRD/ Public Health Centre

Sl. No	Components	Potential Impacts	Mitigation Measures	Executing Responsibilities	Supervising Responsibilities	Monitoring Responsibilities
			equipment, vehicles and generator sets may be used ▪ Air quality monitoring may be conducted at construction sites.			
		Soil Pollution	▪ Collection and recycling of lubricants ▪ Measures to prevent accidental spills	Contractor	Dam site in-charge	SWRD/ Public Health Centre
		Worker/Local people exposure	▪ Locate handling sites away from populated areas ▪ Follow proper operation and handling measures to minimize exposure ▪ Provide prior warning /signals for blasting ▪ Provide sirens in vehicles to avoid any collision with human/animals ▪ Organise awareness programs on environmental resource management ▪ Organise Health camps ▪ Child labour must be strictly prohibited ▪ Provide signages near construction sites and approach roads	Contractor	Dam site in-charge	SWRD/ SPCB
		Landscape Degradation	▪ It is a direct, short term impact; Irreversible in nature; Severity is low; Insignificant Impact on Livelihood ▪ Carry plantation work on open sites ▪ Do not dump waste along settlement or access route ▪ Frame Muck disposal program ▪ Frame quarry & borrow area rehabilitation program ▪ Develop green belts along approach road ▪ On completion of the works all the temporary structures may be cleared away, all rubbish disposed, excreta and disposal pits or trenches filled in and effectively sealed off and the whole site	Dam Site In-charge	State Water Resource Dept. (SWRD)	State Water Resource Dept. (SWRD)
		Generation of Debris / waste	▪ Identification of debris disposal site to minimize the impact on environment and local people.	Contractor	Dam site in-charge	SWRD

Sl. No	Components	Potential Impacts	Mitigation Measures	Executing Responsibilities	Supervising Responsibilities	Monitoring Responsibilities
		materials	▪ Debris disposal site should be located at least 500m away from any human settlement and prior NoC has to be obtained from the State Pollution Control Board before duping debris on the identified site. ▪ Debris can be used as filling material or river embankment protection material.			
Post Implementation Phase						
1.	Increased Traffic/ Operation of Heavy Machinery for Regular Maintenance etc.	Air / Noise Pollution	▪ Specific air and noise pollution control measure to minimize impact on environment. ▪ Periodic air quality monitoring	External Agency appointed by SWRD	Dam site in-charge	SWRD/ SPCB
		Water Pollution (Surface Water)	▪ Control oil spillage ▪ Setup a covered place for operation and handling of oil to stop contamination ▪ Periodic water quality monitoring	External Agency appointed by SWRD	Dam site in-charge	SWRD / SPCB
		Soil Pollution	▪ Control oil spillage ▪ Setup a covered place for operation and handling of oil to stop contamination ▪ Soil quality testing at least once a year	External Agency appointed by SWRD	Dam site in-charge	SWRD / SPCB
		Worker/Local population Exposure	▪ Arrange mask for generator operator ▪ Use modern device to reduce smoke generation	External Agency appointed by SWRD	Dam site in-charge	SWRD
		Disturbance to Fauna	▪ Fencing is required on the both side of the road to avoid accident in forest area ▪ Use of sign boards on the road side to avoid accident	External Agency appointed by SWRD	Dam site in-charge	SWRD/ State Forest Dept
		Increased Traffic	▪ Avoid traffic in populated areas as much as possible ▪ Follow precautionary measures to avoid accident ▪ Install speed breakers and signages near settlement	External Agency appointed by SWRD	Dam site in-charge	SWRD

Annex - 7

7.1 Resettlement & Rehabilitation

A **Resettlement Policy Framework (RPF)** is required when the extent of resettlement cannot be known at appraisal stage. RPF is prepared in accordance with World Bank guidelines as set out in their OP 4.12 and in compliance with National Rehabilitation Policy -2007 and Land Acquisition Act as amended in 1984. This policy provides any situation that may arise where need for temporary or permanent land acquisition is inevitable, resettlement and compensation activities for the lost land should be conceived and executed in sustainable manner. The RPF is intended for use as practical tool, to guide the preparation of Resettlement Action Plan (RAP), depending upon the scale and severity of impacts. More precisely, it has been prepared as instrument to be used to deal with issues like Involuntary Resettlement, Indigenous People and Gender issues.
Involuntary resettlement arising from projects often gives rise to severe economic and social hardships. The hardships stem from the following reasons among others:

a) Disruption of production and income generating systems;
b) Affected persons' skills being rendered inapplicable in new environments;
c) Weakening of community and social fabric and networks;
d) Dispersion of kin groups;
e) Loss of cultural identity and traditional authority;

The target of the RPF is to ensure the Project Affected Persons (PAPs) to get the compensation for their loss, offer them the resettlement measures, and help them to improve or at least restore their levels of living and income after the project impact. It is intended to safeguard the interests of the population impacted by the project, especially the poor and vulnerable.
The objective of Bank's Policy is to ensure that throughout its life, the project fully complies with the principle that any involuntary loss of assets or relocation of economic activities or residence, are minimized and fully compensated, and that adequate procedures exist for prior consultation of all affected persons, assessment of losses and entitlements, handling complaints and disputes, and monitoring the outcomes. In particular it provides that the outcomes conform to the principles of full and prior compensation for any lost assets and full restoration of standards of living that are directly and adversely affected. The policy also applies to those who lack legal or formal ownership of affected assets and are entitled to fair compensation and all other forms of assistance (housing, social services etc.)

This policy provides for any situation that may arise where the need for temporary or permanent land becomes apparent at the stage of project selection or technical design , or where execution of physical works result in the disturbance of occupants or users

The policy addresses the following specific issues.

1. Involuntary resettlement and land acquisition will be avoided where feasible, or minimized, by exploring all viable alternatives.

2. Where involuntary resettlement and land acquisition is unavoidable, resettlement and compensation activities will be conceived. They will be meaningfully consulted and will have opportunities to participate in planning and implementing resettlement and compensation programs
3. Affected persons will be assisted to improve their livelihood and standards of living or at least to restore them prior to the beginning of the project.

7.1.1 Principles

The R&R policy is based on the principle that the population affected by the project will be assisted to improve their former living standards. The policy emphasizes that involuntary resettlement will be avoided or minimized where possible by exploring other alternative project designs. Where displacement is unavoidable, people losing assets, livelihood or other resources shall be assisted in improving their former living standards.

The policy document describes the details of entitlements and type of assistance to be extended to the affected persons, which will become the basis for preparing the bound Resettlement Action Plan (RAP). The RAP contains the implementation details on how to ensure that principles and provisions of this policy can be implemented.

The policy identifies categories of expected project impacts, including loss of property and assets, loss of livelihood, and other social and economic impacts on groups and communities. All people, households and groups adversely affected by the project would be registered and support will be given in accordance with these policy provisions

7.1.2 Impacts and entitlements

The policy addresses the direct and the indirect impacts of project construction and operation on affected persons, families, households and communities. The most direct and immediate impacts are those associated with project construction, mainly land acquisition. Other losses include loss of shelter, and other assets within the project's impact. Mitigation is provided through compensation and assistance to project-affected persons, families and households. These social units are entitled to compensation and assistance on the basis of the policy framework adopted by the project. The policy provides mitigation for:

- Loss of assets, including land and house or work place;
- Loss of livelihood or income opportunities; and others

Loss of assets and livelihood are impact categories that represent direct project impacts on an identified population. The people likely to be affected are required to be surveyed and registered, and project monitoring and evaluation will compare long-term impact against baseline socio-economic data.

7.1.3 Eligibility

Project Affected Family /Person are all landowners and others who have lost or will lose assets or lose the benefit or the use of assets resulting from the project, whatever the

extent of loss. Loss of Assets includes the loss of land use, structure, crops, or a combination of these.

7.1.4 Definitions

Cut-off date

Cut-off date shall be the following:

I. In the cases of land acquisition affecting legal titleholders, the cut-off date would be the date of issuing the notice u/s 4 of the Land Acquisition Act, 1894 amended in 1984.

II. In cases where people lack title, the cut-off-date shall be the date of start of the Census survey undertaken by the project authority.

Project Affected Person

Affected persons are those who stand to lose all or part of their physical and non physical assets including homes, productive land, community resources, commercial properties; livelihood; and socio-cultural network.

Project Displaced person

A displaced person is a person who is compelled to change his/her place of residence and/or work place or place of business, due to the project.

Definition of Family

a) A "Family" shall mean karta, spouse (Husband/Wife), and all dependents, including minor children
b) In a household every son or unmarried daughter who has attained the age of 18 years on or before the cut-off-date will be treated as separate family, if not covered under (a) but affected due to project in the form of loss of livelihood.
c) Every divorced, widowed, or separated daughter living separately or with the family on or before the cut-off-date will be treated as separate family.

Share cropper

Those who have formally or informally come to an agreement with private property owner to cultivate the land.

Encroacher

A person, who has trespassed Govt. land, adjacent to his/her own land or asset, to which he/she is not entitled, and deriving his/her livelihood prior to the cut-off date. If

such a person is vulnerable, he/she would be entitled to assistance as per the provisions in the policy.

Squatter

Squatter is a person who has settled on publicly owned land without permission and has been occupying publicly owned building without authority prior to the cut-off date.

Income

Income of a PAP shall mean the amount of income as shown in his Income Tax Return prior to the cut-off date. In absence of such a return, his income shall be calculated by an objective assessment applying the same method as adopted by the Govt. agencies for identifying Below Poverty Line (B.P.L.) families. The certificate of B.P.L. from the block / Tehsil will be used for identifying the B.P.L.

Vulnerable Person

Unless otherwise specifically mentioned in this document, a person who has been designated under 'Below Poverty Line' category as identified by the concerned State Govt**.** level will be considered a vulnerable person. Disadvantaged persons belonging to SC, ST, disabled, handicapped, orphans, destitute persons and woman heading the household are also recognized as vulnerable person.

7.1.5 Objectives of R&R Framework:

- The objective of this R&R framework is to avoid or minimize the potential adverse impacts of proposed project interventions resulting in displacement (physical or economic or both) of people in the project area.

- Where displacement (physical, economic or both) is inevitable due to technical reasons of the project design, the objective is to minimize the hardship to the affected families, enhance, or at least restore their livelihood opportunities.

7.1.6 Resettlement Plans

RAP Process will follow the project cycle stages. All sub projects shall be screened for their likely adverse impacts, in the Planning Stage. The format for screening involuntary resettlement issues has been provided in **Annex 7.1.** If the issues related to resettlement are triggered, the RAP will have to be prepared for the concerned scheme / sub project. Such a plan shall be prepared at the Planning and Design Stage of the project preparation, wherein the physical intervention / measures shall be planned and designed.

A Resettlement Plan (RP) or an Abbreviated RP is prepared at the time, when it is inevitable that activities require land and people or their economic activities will be affected or damage to their property is expected. The plan is based on up-to-date and reliable information about (a) the proposed resettlement and its impacts on the displaced persons or adversely affected groups, and (b) the legal issues involved in

resettlement. The rule for determining whether project or sub project will require RP or an abbreviated RP depends to large extent upon number of PAPs likely to be affected.

A. Abbreviated Resettlement Plan Procedures

For projects where impacts on the entire displaced population are minor, or less than 200 people are likely to be affected (e.g., not requiring changes in occupation or relocation of residence). Under such circumstances, an abbreviated resettlement plan will be prepared for each sub-project. The abbreviated resettlement plans should briefly present:

a) The project activity necessitating acquisition of land or any other assets, and the nature and extent of that acquisition, including sketch maps;
b) An officially certified enumeration of all the persons affected (including those without legal rights) and the types of impact (Census);
c) A description of compensation and entitlements according to the different categories of impacts and a corresponding table of compensation entitlements and the nature and bases of compensation rates;
d) Consultation with displaced people about acceptable choices and alternatives;
e) Institutional responsibility for the implementation and the procedures for grievance redress;
f) Arrangements for monitoring and evaluation of resettlement and/or compensatory measures;
g) The timetable for implementation of the action; and
h) Verification that resources for compensation are available.

The abbreviated plan (except for the amounts of monetary awards) shall be made publicly available in local language, and other media as appropriate, and in locations accessible to the affected people, subsequent to its approval by the Bank. The Bank will make it available in the Infoshop.
In the event that any project activity is to affect more than 200 persons, a full Resettlement Action Plan (RAP) must be formulated in conformity with Bank policy.

B. Full Resettlement Action Plan (RAP) Procedures

In cases where a sub-project would incur involuntary resettlement or other significant or large-scale impacts, a full Resettlement Action Plan will be prepared for that individual sub-project. The full RAP requires more in-depth studies than the abbreviated resettlement action plan, including socio-economic and other supporting studies (please refer to the OP/BP 4.12 for full details and requirements of the full RAP).

The socio-economic study is conducted by **a qualified social scientist** that examines the nature of the impacts; the socio-economic and cultural setting, local organizations, and social risks, as well as the indicators that would ensure that the project affected people at minimum regain their former quality of life or preferably are enabled to improve it. The socio-economic studies cover the following:

a) The results of the census including current occupants of the affected areas to establish the baseline for eligibility criteria and to prevent subsequent inflows of people and claims;

b) Description of the affected households (taking into account the directly affected area as well as downstream impacts in the case of dams) including information about livelihoods and production and labour systems, standards of living and an analysis of their legal rights and informal entitlements and any issues of potential conflict;
c) Statement of the magnitude of the expected loss (total or partial) of assets and the extent of physical or economic displacement;
d) Information about especially poor or vulnerable groups for whom special provisions should be designed; and
e) Provisions to update information about displacement, livelihoods and standards of living before, during and after displacement.

7.1.7 Categories of Project Affected Persons (PAPs)

PAPs eligible for support may be classified in one of the following three groups:

- Those who have formal, legal rights to land (including customary and traditional rights recognized under the laws of the country),
- Those who do not have formal legal rights to land at the time the census begins but have a claim to such land or assets--provided that such claims are recognized under the laws of the country or become recognized through a process identified in the resettlement plan,
- Those who have no recognizable legal right or claim to the land they are occupying.

7.1.8 Resettlement Action Plan Contents

The contents of the Resettlement Plan to be prepared for individual sub projects consistent with the Resettlement Framework are as below:

- Baseline census and socio-economic survey information;
- Specific compensation rates and standards;
- Policy entitlements related to any additional impacts identified through the census or survey.
- Description of resettlement sites and programs for improvement or restoration of livelihoods and standards of living;
- Implementation schedule for resettlement activities; and
- Detailed cost estimate.

7.1.9 Implementation Procedures

Implementation procedures for resettlement and rehabilitation entails the income restoration activities, institutional arrangements, implementation schedule, resettlement sites, grievance redressal mechanism, costs and budget and monitoring and evaluation of the resettlement components.

7.1.10 Organizational Support

RAP will form an integral part of the sub-project Plan and its implementation will be synchronized with other project interventions at sub-project level, both at the state level

(in the Project Management Unit) and sub project level and the Social Development Specialists will be responsible for guiding and supervising the preparation and implementation of resettlement plans. The responsibility of approving RAP as part of sub-project Plan will be with the PMU. The social development specialist with both PMU and PIU will ensure that RAP conforms to the agreed R&R Entitlement Framework of the project. At the sub-project level involving RAP, the concerned official of I.D. will be assigned the responsibility of implementing RAP.

7.1.11Funding for RAP Activities

All the cost of resettlement activities will be met from the sub-project cost. Detailed R&R cost estimates will be developed based on the proposed mitigation measures proposed and will be included in the project cost at the sub-project level.

7.1.12Time Frame

This will be guided by the project appraisal schedule and coverage of the information on project affected households, its adequacy and sufficiency, impacts due to project and proposed remedial measures and feasible implementation arrangements proposed for R&R implementation in RAP.

7.1.13Documentation

Documentation of the following information should be ensured:

- Database on project affected households, land acquisition, community assets, religious structures and public utilities.
- Documentation of community consultation and focus group discussion and information disclosure requirement.

7.2 GENDER DEVELOPMENT AND STRETEGY

In general, women are excluded or benefited in a limited way and quite often are marginalized due to development projects. Very few attempts have been made to mainstream gender concerns into the project planning and implementation. Thus, there is an ardent need for providing social justice and reduce marginalization of women and empower them to draw maximum benefits from development projects. Thus, incorporating gender and other social issues in the development projects helps to improve project performance and facilitate achievement of the Bank's goal of poverty reduction.

In most rural societies, poor women are more disadvantaged than poor men, first, because women in general usually have less power, access, and control over resources than men, and second, because men have more prominent public roles. For these reasons, it is easy to overlook the importance of involving women in water projects/programs at all levels, unless a special focus on women is included. A gender approach highlights such differences and changes. Social factors underlie and support gender-based disparities. These factors include:

- Institutional arrangements that create and reinforce gender-based constraints or, conversely, foster an environment in which gender disparities can be reduced
- The formal legal system that reinforces customs and practice giving women inferior legal status
- Socio-cultural attitudes and ethnic and class/caste-based obligations that determine men's and women's roles, responsibilities, and decision making functions
- Religious beliefs and practices that limit women's mobility, social contact, access to resources, and the types of activities they can pursue.

7.2.1 Policy Provisions

The Government of India, through the 73rd and 74th Constitutional amendments, took a historic and landmark decision to provide one-third reservation for women at all levels in urban and rural bodies. This policy aims at eliminating violence against women, ensuring equality, improving status of women, increased participation of women in local self –government and enhancing participation in Government activities and programs. This policy envisages women focused planning and on the lines of Tribal Sub-plan for tribal areas, 'Women Component Plan' needs to be prepared which will include initiatives and funding for women's development programs under various sectors. Policy accords highest priority on promotion of self-help groups and micro-credit activities for women.

7.2.2 World Bank Approach

The World Bank's approach to promoting gender equality makes all staff responsible for ensuring that the Bank's work is responsive to the differing needs, constraints and interests of males and females in client countries. World Bank attention to gender equality issues began in the 1970s, but the Bank's emphasis on this issue has increased markedly since the Fourth World Conference on Women held in Beijing in 1995. Gender equality is now a core element of the Bank's strategy to reduce poverty. There is a clear understanding that until women and men have equal capacities, opportunities and voice, the ambitious poverty-reduction agenda set out in the Millennium Declaration, and the specific goals attached to it, will be difficult to achieve.

7.2.3 Strategy for Addressing Gender Issues

The right approach would be to focus on specific issues that relate to the project so as to ensure that the women of the project areas get benefits from the project activities. This would require gender specific activities to alleviate the existing differential access to project benefits and to ensure that women become real partners of proposed development activities. The approach, therefore, is to formulate specific project interventions focusing on women issues and at the same time concerted efforts would be required to dovetail existing relevant government programs for the socio-economic benefit of women members. Following this approach, gender development strategy is proposed **(Table 7.5).**

Table 7.5 Gender Development Strategy

Issues	Strategies	Proposed activities	Responsibilities
Poor leadership qualities	- Training in leadership & organizational development	- Work with women groups to communicate the goals, strategies and plans of the project. - Explain project activities and benefits. - Design and organize specific capacity building programs for women groups	Social Development Specialist, Project staff
Joblessness and wage disparity	- Ensure employment to women in project construction activities - Ensure equal wages for equal work	- Identify women interested in construction activities and provide employment on preferential basis - Monitor that women get same wages as that of male members for the same type of involvement in construction activities - sensitize contractors on women issues	Social Development Specialist, Project staff
Access to market	Ensure that women get a fair price for the produce	- Provide market information - Encourage SHGs to take up marketing - Identify and select educated young women who after undergoing training on marketing aspects will help local women in marketing	Social Development Specialist, Project staff
Access to development programs and credit	Extend support to access development programs and institutional credit	- Provide information on various development programs implemented in the area - Help the eligible families to complete formalities - Ensure that the benefits received are productively used	Social Development Specialist, Project staff
Access to common properties for fuel and fodder	- Plant fuel/fodder species in the fore shore and canal bunds	- Plant fuel and fodder tree species under the environmental management plan	Social Development Specialist, Project staff

Issues	Strategies	Proposed activities	Responsibilities
Low literacy	- promote functional literacy	- Integrate with mass education and total literacy programs - Customize training programs to meet the needs of illiterate and neo-literate women groups	Social Development Specialist, Project staff
Inadequate awareness on health and sanitation	- promote health awareness - increase access to health and sanitation facilities	- Organize health campaigns, health camps (general and referral) in association with line departments and local medical institutions - Promote nutritional gardens with the support of line departments. Distribute seed material kit and saplings	Social Development Specialist, Project staff

7.2.4 Gender Action Plan through the Project Cycle

Involvement of women groups in the identification of impacts and opportunities through sub-project activities shall form the basis for preparation of gender sensitive sub-project activities. The procedure to be followed and process and outcome are presented in the following matrix (Table 7.6):

Table 7.6 Activities of Gender Action Plan through Project Cycle

Sub-Project Stages	Procedures	Process & Outcome	Responsibility
Planning Stage	Identify gender concerns/issues in relation to the project activities through PRA exercises	List issues	Social Development Specialist, Project staff
	Organize women stakeholders meeting to inform about the project activities and benefits sensitize and discuss the preliminary findings	Number of consultations held	Social Development Specialist, Project staff
	Sensitize other stakeholders on gender concerns/issues	Number of meetings held	Social Development Specialist, Project staff

Sub-Project Stages	Procedures	Process & Outcome	Responsibility
	Identify key areas of constraints that may be improved through the project	List areas of constraints - Number of consultations & signed minutes	Social Development Specialist, Project staff
	Incorporate and highlight the issues	List of issues mentioned (Gender Expert,/ PMU)	Social Development Specialist, Project staff
	Involve women in Joint Walkthrough, Consultations and PRA exercises and identify possible impacts and opportunities	List of issues identified on sub-project map Identification of activities to be included in Sub-Project Gender Action Plan	Social Development Specialist, Project staff
	Consultations for fine tuning the proposals of Sub-Project Gender Action Plan	Number of meetings & signed minutes	Social Development Specialist, Project staff
Implementation Stage	Implementation of provisions of sub-project plan addressing gender concerns Implementation of GAP	• Progress in the implementation • Measures undertaken as per Checklist for both the Sub-Project as well as Gender Action Plan.	Social Development Specialist, Project staff, PMU and external M&E agency
Post Implementation Stage	Continuation of activities initiated under the project	Changes in the Economic and social conditions as highlighted in Impact Indicators of Post Implementation Stage	Social Development Specialist, Project staff, PMU and external M&E agency

7.2.5 Monitoring of Gender Action Plan

The indicators, frequency and agency recommended for monitoring are presented in **Table 7.7.**

Table 7.7 Monitoring of Gender Action Plan

Aspects	Indicators	Frequency	Who will monitor
Economic	• Wage employment gained (no. of days of employment availed, wages earned) • Changes in occupation profile • Reduction in no. of days of migration • Income earned – contribution to household income • Changes in time spent on different activities • Women taking up self employment activities (no of women and income earned) • Level of skill improved (no. of women trained)	- Planning Stage for the base line data -During implementation at half yearly interval	Internal monitoring by PMU
Social	• Representation in various committees and groups. (no. of members) • Representation in various committees and groups. (No. of women holding specific posts). • no. of SHGs formed /strengthened • no. of SHGs taking up small work contracts (no. and value of contracts)- no. of women/SHGs taking up marketing of farm produce	Planning Stage for the base line data - at half yearly interval during project implementation	Internal monitoring by PMU

7.2.6 Implementation Arrangements

The preparation, implementation and monitoring of Gender Action Plan (GAP) is the responsibility of the project functionaries. The Social Development specialist, at the PMU level will facilitate and supervise this process of preparation and implementation of Action Plan. All efforts will be made to coordinate and work with all relevant line departments (specifically the Departments of Women and Child Development, and Rural Development) to help dovetailing with their development programs for the socio-economic development of women.

Activities under gender action program should necessarily have effective participation, cooperation and involvement of most of the project level officials to prepare and execute suitable action plans. In case of any grievances regarding the gender action plan the local women may approach the distributory / Project Committee at PMU level.

7.3 Tribal Development

It is required to assess the potential and adverse impacts on tribal community due to the development measures and to mitigate them at par with others. In the Indian context, indigenous people are categorized as tribals who often become vulnerable in development projects not only because their cultural autonomy is undermined as a consequence of the project outcomes, but also because they endure specific disadvantages in terms of social indicators of quality of life, economic status, and usually as subjects of social exclusion. Consequently, they are unable to participate in the development process on an equal footing with the rest in the community, nor able to reap a fair share of the benefits of developmental projects. Therefore the study also attempts to identify issues that may constraint their participation in the project and suggest measures to enhance their involvement and enable them to access project benefits at par with others.

7.3.1 Legal Policies and Provisions for Tribals

Article 366(25) refers to STs as those communities who are scheduled in accordance with Article 342 of the Constitution. According to Article 342 of the Constitution, STs are the tribes or tribal communities or part of or groups within these tribes and tribal communities which have been declared as such by the President through a public notification. Identification of tribes is a State subject. Thus, classification of a tribe would depend on the status of that tribe in the respective State.

The Constitution through several Articles has provided for the socio-economic development and empowerment of Scheduled Tribes. But there has been no National Policy, which could have helped translate the constitutional provisions into a reality. Five principles spelt out in 1952, known as Nehruvian Panchasheel, have been guiding the administration of tribal affairs. They are:

1. Tribals should be allowed to develop according to their own genius
2. Tribals' rights in land and forest should be respected
3. Tribal teams should be trained to undertake administration and development without too many outsiders being inducted
4. Tribal development should be undertaken without disturbing tribal social and cultural institutions
5. The index of tribal development should be the quality of their life and not the money spent

The Ministry of Tribal Affairs is now coming out with the draft National Policy-2004 on Tribals. Based on the feedback from tribal leaders, the concerned States, individuals, organizations in the public and the private sectors, and NGOs, the Ministry will finalize the policy.

The National Policy recognizes that a majority of Scheduled Tribes continue to live below the poverty line, have poor literacy rates, suffer from malnutrition and diseases are vulnerable to displacement. It also acknowledges that Scheduled Tribes in general are repositories of indigenous knowledge and wisdom in certain aspects.

The National Policy aims at addressing each of these problems in a concrete way. It also lists out measures to be taken to preserve and promote tribals' cultural heritage.

7.3.2 Approach to IPDP Preparation

An Indigenous People Development Framework (IPDF) is a policy and procedural framework for Indigenous People Development Plans (IPDPs) that are developed for projects and that are to be approved during Project implementation. Further, an IPDF sets out the indigenous people's policy together with the screening and planning procedures.

Operational Policy OP 4.10 - Indigenous Peoples (World Bank, 2005) – underscores the need for Borrowers and Bank staff to identify indigenous peoples, consult with them, ensure that they participate in, and benefit from Bank-funded operations in a culturally appropriate way - and that adverse impacts on them are avoided, or where not feasible, minimized or mitigated.

7.3.3 Strategy for Tribal Development

The project would focus on issues that are directly related to the tribals' involvement in project activities and accessing project benefits. Thus the bottom line is to ensure equitable opportunities for tribals to get project benefits. The main objective of a tribal development strategy would be therefore, to ensure that the tribals are actively involved with the project activities and they have access to project benefits at par with the rest of the community. The strategy also aims at minimizing any negative impacts like creating further sources of social and economic imbalances between communities. The specific objectives of the strategy **(Table 7.8)** are:

- To ensure project benefits are accessible to the Tribal living in the project areas.
- To enable the tribals to participate in the community institutions with better capacity in decision making process.

Table 7.8 Tribal Development Strategy and Responsibilities

Issue	Strategies	Proposed activities	Responsibilities	Possible linkages
Lack of participation	- Educate tribals and involve them in project related activities - Insist on required quorum in meetings - encourage free discussion & consider issues raised by tribal - IEC strategy to focus on tribal issues.	- Frequent meetings, periodical review & interactions with tribal groups - Organize training on leadership; - Focused group discussion on tribal issues/ rights - Document proceedings of the meetings - Sub-project to reflect tribal issues - Use of folk art forms, mass media - Strengthen eco clubs in schools in tribal areas - Frequent meetings with tribal groups - apply PRA technique.	Consultant / Social Development Specialist	Public Relation Dept.

Issue	Strategies	Proposed activities	Responsibilities	Possible linkages
Poor leadership qualities	- IEC focused on the tribal rights and roles in various committees - Training in leadership & organizational development	- Work with ST groups to communicate the goals, strategies and plans the project. - Ensure adequate representation for ST members in various committee - Design and organize specific capacity building programs for tribal groups	Social Development Specialist	
High incidence of joblessness	- Employment in project construction activities and O&M work on preferential basis	- Identify those dependent on wage employment and ensure that contractors during project construction and O&M activities	Social Development Specialist	Rural Dept./ Women and Child Welfare Dept./ Banks
Low literacy	- Promote functional literacy	- Integrate with mass education and total literacy programs - Farm extension programs to include audio-visual aids and participatory learning methods. - Customize training programs to meet the needs of illiterate and neo-literate ST communities	Social Development Specialist	Education Dept./ TDD
Inadequate awareness on health and sanitation	- Promote health awareness - Increase access to health and sanitation facilities	- Organize health campaigns, health camps (general and referral) in association with line departments and local medical institutions - Promote nutritional gardens with the support of line departments. Distribute seed material kit and saplings.	Social Development Specialist	Public Health Engineering Department (PHED)

7.3.4 Indigenous People Development Framework (IPDF)

The precise nature of interventions and the additional activities needed to address any specific problems of tribals would be determined when the strategic social assessment is carried out at individual sub-project level for preparing sub-project plans. All specific measures proposed to develop tribal people in a sub-project area will form part of the sub-project plan.

7.3.5 Steps for Formulating IPDF

The IPDF seeks to ensure that IPs are informed, consulted, and mobilized to participate in the sub-projects during IPDP preparation. Their participation can either provide them

benefits with more certainty, or protect them from any potential adverse impacts of the sub-project. The main features of IPDP will be a preliminary screening process, a social impact assessment to determine the degree and nature of impact of each sub-project, and an action plan developed, if warranted. Consultations with and participation of IP communities, their leaders, and local government representatives will be an integral part of the overall IPDP.

A. Preliminary Screening

The Social, Resettlement and Rehabilitation Expert will study all IP communities and villages within and in the vicinity of the proposed sub-project area. The PIUs/PMU will arrange public meetings at IP communities to provide information regarding the proposed sub-project. During these meetings, community leaders and other participants will be given an opportunity to present their views and concerns.

An initial screening will check for the following:

- Name(s) of IP community group(s) in the area;
- Total number of IP community groups in the area;
- Percentage of IP community population in the area compared with the total population; and
- Number and percentage of IP households to be affected by the sub-project site.

An IP assessment checklist will be prepared. If the results of the preliminary screening (reviewed with assistance from the project consultants) show that there are IP households in the proposed sub-project area, a social impact assessment (SIA) will be conducted to capture IP issues and development opportunities that exist in the area. Indigenous People Impact categorization form has been provided in **Annex 7.2.**

B. Social Impact Assessment

The policy on indigenous people ensures that the process of initial social assessment includes specific consideration of indigenous peoples as a potentially affected population. If the initial social assessment identifies indigenous peoples specifically as a significantly and adversely affected population, or vulnerable to being so affected, it is required that an indigenous peoples plan acceptable to World Bank is prepared by the project proponent. The SIA will gather relevant information on demographic data; social, cultural, and economic situation; and both positive and negative social, cultural and economic impacts.

Information will be gathered through separate group meetings within the IP community, including IP leaders; group of IP men and women, especially those who live in the zone of influence of the proposed sub-project. Discussions will focus on positive and negative impacts of the sub-project as well as recommendations on the design of the sub-project. The Social, Resettlement and Rehabilitation Expert will prepare the SIA and the PMU will be responsible for analyzing the SIA and for leading the development of an action plan with the support of IP community leaders. If the SIA indicates that the potential impact of the proposed sub-project will be significantly adverse—threatening the cultural practices and IP sources of livelihood, or that the IP community rejects the sub-project

works—the PMU will consider other design options to minimize such adverse impacts. If IP communities support the sub-project an IPDP will be formulated.

C. Benefits Sharing and Mitigation Measures

Where impacts on indigenous households are potentially positive, measures will be undertaken to ensure that benefits are equally shared. This will be through ensuring indigenous peoples as stakeholders take part during all stages of the Project. Where impacts are potentially negative, all affected indigenous households will be provided with assistance, which would help them to improve their living standards without exposing their communities to disintegration. As vulnerable groups, they are entitled to receive special assistance not only to restore and improve their income and livelihood, but also to maintain their distinct cultural identity.

As indigenous peoples, they are likely to have traditional land rights; these will be honored and the absence of land titles will not be a bar for receiving compensation and alternate land. Their compensation entitlements will be the same that are listed in the approved Resettlement Framework (RF) of the Project. The RF defines IPs as vulnerable people/ households.

If the sub-project impacts are not significant, and if they could be addressed by resettlement plans that will be prepared according to the agreed RF, 'specific actions' could be built into resettlement plans to safeguard their entitlements. This decision will depend on the severity of impacts on them. Such 'specific actions' are outlined in the RF.

D. Monitoring

Monitoring and Evaluation (M&E) help ameliorate problems faced by project implementing agencies and develop solutions without delay. IPDP includes a set of monitoring indicators, for periodic assessment of planned activities, which will be reviewed during IPDP implementation. The PIU will periodically report the assessment under these indicators and reports will be sent to the PMU. The PMU after initial check will send these reports to World Bank for final evaluation.

7.3.6 Involvement of Tribal Groups

The affected IPs will be informed and consulted in preparing IPDP. Their participation in planning will enable them to benefit from the project and to protect them from any potential adverse impacts of the project. The IPDP prepared in consultation with affected IPs will be translated into local language of IPs and made available to them before implementation of the project. The PMU will ensure that adequate funds will be made available for consultation and facilitation.

Involvement of IPs / indigenous groups in problem identification and design of solutions has to be ensured through the entire cycle of project interventions. **Table 7.9** presents the activities to be undertaken by the implementation agency to ensure inclusion of indigenous issues in the main project.

Table 7.9: Activities and Indicators of IPs' Involvement Issues

Project Stage	Procedures	Process and outcome Indicator	Remarks
Planning Stage	- Identify locations of dominant indigenous population in the sub-project sites. - Sensitization and consultation through focus group discussions with indigenous communities - Identification of environmental and social issues of indigenous population and possible impacts as a result of the project	- IP Screening checklist (Annex(7.2) - List of all indigenous communities in the project areas - Documentation on number of discussions and minutes of the meetings - Documentation of the issues	To be carried out by PMU
Design Stage	- Consultation to establish existing concerns related to: 1. Land availability and tenure 2. Access to urban infrastructure facilities 3. Representation in Community Based Developments 4. Existing Government schemes 5. Dependency on Cultural Property Resources (CPRs) - Discussion on possible intervention measures , through the project their likely impacts and safeguard measures (mitigation and monitoring) to be incorporated into the project activities 1. Loss of agricultural and homestead land 2. Loss of structure and immovable assets 3. Loss of livelihood 4. Loss of CPR Consultation with	-Justification for preparing IPDP -List spatial and non spatial issues -List of safeguard measures -Enlistment of project impacts	

Project Stage	Procedures	Process and outcome Indicator	Remarks
	indigenous group for further suggestions	-List of safeguards measures into Draft Plan	
Implementation Stage	- Participatory approach to be taken up to involve IPs in finalizing projects, - Resettlement Action Plan/IPDP etc. - Disbursement of entitlements as per the RP/IPDP/Framework - Implementation of safeguards measures as per IPDP /Framework proposals	-Measures to be taken in complying with the frameworks prepared for resettlement and IPDP. - Measures undertaken as suggested in RP/IPDP/Framework - Measures undertaken as suggested in RP/IPDP/Framework	To be carried out by PIU
Post Implementation Stage	- Evaluation of success of programs and safeguard measures undertaken - Follow up activities based on lesson learnt	- Indicators developed for evaluation of project impacts - Listing of modified programs to be implemented for uplifting affected indigenous communities	Consultant engaged for impact evaluation study will do that after project completion

Electronic version of the IPDP will be placed in the official website of the PMU / State Government and the official website of World Bank after approval of the IPDP by Government and World Bank. Hard copies of the IPDP will be accessible to citizens and kept in the town library, PMU and office of the municipal/line agencies. The information of the IPDP including entitlements for IPs and implementation arrangements will be presented in the form of a brochure that will be circulated among the indigenous APs. Posters designed to mass campaign the basic tenets of the IPDP will be displayed at suitable locations for generating mass awareness.

7.3.7 Institutional arrangement

IPDP will form an integral part of the sub-project level and its implementation will be synchronized with other project interventions at Sub-project level. The responsibility of

approving IPDP as part of sub-project Plan will be with the PMU organization. The social development specialist with PMU will ensure that IPDPs conform to the agreed Tribal Development (TD) strategy of the project.

At all the sub project level for all major activities which has significant adverse effect on tribal population, there will be a designated person to be responsible for TD activities who will ensure that IPDPs prepared at the sub-project level are in accordance with the agreed TD strategy of the project. Allocation of funds for TD at sub-project level will be in proportion to the tribal membership.

Strategy for implementing TD component under the DRIP is to work in close association with the existing TD agencies duly supplementing their efforts with Project initiatives. The Project will facilitate ongoing welfare measures for the over all upliftment of tribal communities in irrigation areas covered under the project. This will require the project functionaries to work in close coordination with the functionaries of the above agencies and ensure proper linkages with government schemes for the over all socio-economic development of tribal communities. Any direct investment from the Project will be with an aim to help tribals access project benefits at par with others.

In order to have focused attention on tribal development under the project, a Social Development Specialist within the Social and Environmental cell at the PMU will coordinate with the relevant government departments and agencies. This Unit will also be responsible to monitor the preparation and implementation of IPDPs at the individual sub-project level. At the sub-project level, preparation and implementation of IPDPs will be the responsibility of the designated Social Development Specialist. Where ever suitable are available, they will be engaged to facilitate the preparation and implementation of IPDP.

Annex 7.1: INVOLUNTARY RESETTLEMENT CATEGORIZATION

Screening Questions for Resettlement Categorization

Country/ Project Title:

Probable Involuntary Resettlement Effects*	Yes	No	Not Known	Possible	Remarks
Will the project include any physical construction work?					
Does the project include upgrading or rehabilitation of existing physical facilities?					
Are any project effects likely lead to loss of housing, other assets, resource use or incomes/livelihoods?					
Is land acquisition likely to be necessary?					
Is the site for land acquisition known?					
Is the ownership status and current usage of the land known?					
Will easements be utilized within an existing Right of Way?					
Are there any non-titled people who live or earn their livelihood at the site or within the Right of Way?					
Will there be loss of housing?					
Will there be loss of agricultural plots?					
Will there be losses of crops, trees, and fixed assets?					
Will there be loss of businesses or enterprises?					
Will there be loss of incomes and livelihoods?					
Will people lose access to facilities, services, or natural resources?					
Will any social or economic activities be affected by land use-related changes?					
If involuntary resettlement impacts are expected:					
• Are local laws and regulations compatible with World Bank's Involuntary Resettlement policy?					
• Will coordination between government agencies be required to deal with land acquisition?					
• Are there sufficient skilled staff in the Executing Agency for resettlement planning and implementation?					
• Are training and capacity-building interventions required prior to resettlement planning and implementation?					

*Whenever possible, consider also any future subprojects or investments.

Information on Affected Persons:

Any estimate of the likely number of households that will be affected by the Project?

[ ] **No** [ ] **Yes If yes, approximately how many? .**

Are any of them poor, female-heads of households, or vulnerable to poverty risks?

[ ] No **[ ]** Yes If yes, please briefly describe their situation.

Are any APs from indigenous or ethnic minority groups? If yes, please explain?

Additional Information Requirements for Private Sector projects:

[ ] **Resettlement and land acquisition completed**

[ ] **Resettlement to be completed**

[ ] Project entails risk by association (e.g associated facilities are part of the project but not funded by the proponent)

[ ] **PSOD is lending to a Financial Intermediariy**

[ ] **The project is an Equity Investment**

[ ] The project is a Partial Credit /Political Risk Guarantee

[ ] Others, please describe_____

Annex 7.2: Indigenous Peoples Impact Categorization Form

A. Project Data

Country/ Project Title:

B. Identification of indigenous peoples in project area

Impact on indigenous peoples (IPs)/ ethnic minority(EM)	Not known	Yes	No	Remarks or identified problems, if any
Are there IPs or EM groups present in project locations?				
Do they maintain distinctive customs or economic activities that may make them vulnerable to hardship?				
Will the project restrict their economic and social activity and make them particularly vulnerable in the context of project?				
Will the project change their socioeconomic and cultural integrity?				
Will the project disrupt their community life?				
Will the project positively affect their health, education, livelihood or social security status?				
Will the project alter or undermine the recognition of their knowledge, preclude customary behaviors or undermine customary institutions?				
In case no disruption of indigenous community life as a whole, will there be loss of housing, strip of land, crops, trees and other fixed assets owned or controlled by individual indigenous households?				

C. Anticipated project impacts on indigenous peoples

Project activity and output	Anticipated positive effect	Anticipated negative effect

D. Decision on Categorization

After reviewing the answer above, the Mission Leader and Social Development Specialist agree that the project:

☐ Should be categorized as an A project, an Indigenous Peoples Development Plan (IPDP) is required or, for sector/FI projects, an Indigenous Peoples Development Framework (IPDF) is required

☐ Should be categorized as a B project, a specific action favorable to indigenous peoples/ethnic minority is required and addressed through a specific provision in RRP and in related plans such as a Resettlement Action Plan, a Gender Action Plan or a general Community Participatory Plan

☐ Should be categorized as a C project, no IPDP/IPDF or specific action required

CHAPTER 8
SAMPLE ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

8.1 INTRODUCTION

Environmental Management Plan is an action plan to mitigate and offset the potential adverse environmental impacts and enhance the positive impacts. It consists of mitigation, monitoring and institutional measures to be taken up. Environmental management is based on the potential impacts assessed for the subproject.

Following activities require attention during preparation of EMP:
- Environmental policy and legal requirements
- Significant Environmental Impacts identified in EIA
- Technological aspects and best practices
- Budget for environmental management measures

The construction agency is required to comply with the laws with respect to environment protection, pollution prevention, forest conservation, resettlement and safety and any other applicable law. Control of pollution during implementation phase is of considerable importance. The Environmental management plan is an executable part of Project and should be provided to construction site in charge.

8.2 MANAGEMENT PLANS

The management plans to be followed at construction site are described below.

8.2.1 Grouting Works Management Plan

- The wastewater from grouting operations such as sediment laden waters from drilling operations, cement inclusive wastewater and wastewater with additives must be cleaned by settlement pond to prevent water pollution.
- Water contaminated by concrete should not be discharged over land and not allowed to flow into the river.
- Material safety data sheets (MSDS) for the materials to be used in grouting mixture must be obtained from the manufacturing company and prescribed precautions must be followed.
- When grouting works are interrupted for long, it will be necessary to wash the grouting lines. Wastewater from washing of the pipes must be directed through chutes to settling ponds in the grouting manufacturing facilities.
- Precautions must be taken to avoid spilling of concrete additives.

8.2.2 Emission and Dust Management Plan

Fugitive dust from site works and emission from vehicles and plants (eg crushing and concrete batching) have the potential to affect the air quality. The contractor must implement prevention method to control dust resulting from construction related activities including quarry sites, crushing and concrete batching plants, engineering

structures such as road construction, embankment and haulage material and construction camps.

- The asphalt plant used for access road construction must be equipped with dust collectors
- Water sprinklers must be used to reduce particulate matter emission.
- Speed limit must be maintained by the trucks and dumpers
- The machinery and vehicles must be inspected with regard to their exhaust system and emission level
- Vehicles carrying fine materials such as cement, soil etc must be covered
- Central or State Pollution Control Board norms for emissions must be complied with.

8.2.3 Borrow & Quarry Area Management Plan

An appropriate Borrow & Quarry Area Management Plan must be formulated to control degradation of the surrounding landscape due to the excavation work.

- Borrowing of earth must be carried out upto depth of 150cm from existing ground level.
- Top soil (20cm) from all areas must be preserved in stockpiles and utilized for redevelopment of borrow / quarry areas. Measures must be taken to control erosion of preserved top soil.
- Borrow pit should be developed as far as possible from the river side, where the inner edge of any borrow pit should be not less than 15m away from the toe bank. Borrowing of earth shall not be carried out on productive land in the event of such an occasion, contractor has to obtain permission of the engineer incharge.
- Borrow or quarry areas must be opened after taking permission from the local administrative bodies like Village Panchayats, Collector and State Pollution Control Boards etc.
- Reclamation of borrow & quarry area should be mandatory and must be included in the agreement made with the Construction Contractor
  - The pits formed should be backfilled by construction waste and site should be stabilized.
  - May be developed as ponds and used for aquaculture as per local requirement.
  - Landscaping of borrow area may be done and grasses, shrubs & tree species may be planted around the reclaimed area. Ornamental plants may be planted on the access route.

8.2.4 Solid Waste Management Plan

Solid waste generated from construction activities comprise of wood, reinforcement steel left over, pipes, bolt, nails, concrete bricks, electrical cutting, equipment parts etc. Domestic waste include food containers such beverage can, coffee /tea cups wrapping papers, plastic, left over food, glass etc.

- Construction work must be carried in such a way that minimum or no solid waste is generated at construction site.
- Adequate number of dustbin/ container must be provided
- Solid waste must be collected and disposed properly in compliance with hazardous waste management act.

- Domestic waste must be collected separately. Toxic waste (oil, solvents, paints, acids, additives) should not be collected with solid waste.
- Hazardous material product storage must be regularly monitored for leak and repair as necessary.
- Project personnel must be trained on collection and disposal method for different waste.
- It must be ensured that domestic and collection waste is collected and disposed at designated disposal areas.
- Illegal dumping at construction waste at site, camp area or into river will not be allowed

8.2.5 Construction / Labour Camp Management

- During implementation phase large numbers of labor population is likely to influx in the project area. A proper Construction Camp Development Plan has to be formulated to control degradation of the surrounding landscape due to the location of the proposed construction camp. The Contractor must provide, erect and maintain necessary living condition and ancillary facilities tat the camp and all this must be included in contract document provided to the Contractor.
- Sufficient supply of potable water may be provided at camps and working sites. If the drinking water is obtained from the intermittent public water supply then storage tanks must be provided.
- Adequate washing and bathing facility must be provided in clean and drained condition.
- Adequate sanitary facilities may be provided within camp. The place must be cleaned daily and kept in strict sanitary condition. Separate latrine must be provided for women. Adequate supply of water must be provided.
- Collection of domestic waste and its disposal may be carried out.
- The contractor must ensure that there is proper drainage system to avoid creation of stagnant water bodies.
- Periodic health check ups may be conducted. These activities may be provided in consultation with State Public Health Department.
- At every Camp first aid facility may be provided, ambulance must be provided to take injured or ill person to the nearest hospital.
- Adequate supply of fuel in the form of kerosene or LPG may be provided to construction labours to avoid felling of trees for cooking and other household activities. No open fires may be allowed in camps.
- The sites should be secured by fencing and proper lighting
- Construction camps may be located away from forest areas, settlements, cultural heritage & historical sites and water bodies & dry river beds
- It should be ensured by the construction contractor that area of the construction camp be cleared of the debris and other wastes deposited on completion of construction. The land should be restored back to its original form and condition as it was prior to the establishment of the construction camps.

8.2.6 Biodiversity Aspect

- If the subproject activity involves acquisition of forest land or cutting of trees compensatory afforestation plan may be formulated.

- Felling of trees must be undertaken only after obtaining clearance from the Forest Dept.
- The forest land likely to be acquired must be compensated by providing value trees as per Net Present Value (NPV).
- Compensation may be provided for plantation of trees. At least double number of trees may be planted in lieu of trees felled for the project. If barren land is not available with the forest Dept. for compensatory afforestation in that case double amount degraded forest land can be chosen for compensatory afforestation.
- Based on climatic & edaphic site-specific conditions species must be selected by Forest Department for afforestation. However, preference of local communities as regard the choice of species must be given.
- If any rare, endangered or threatened species is found, detailed study of the habitat must be taken and conservation plan must be formulated.
- Labour camps and office site may be located outside & away from Forest areas.
- Poaching must be strictly banned in the Forest area. It may be ensured by the Contractor that no hunting or fishing is practiced at the site by any of the worker.
- Awareness program on Wildlife Conservation may be provided to the work force. Forest Act and Wildlife Act may be strictly adhered to.

Green Belt Development

Green belt development may be undertaken to enhance esthetic and ecological value. Plantation may be undertaken to augment air quality, vegetation and aesthetic value of the area. Social forestry may be practiced for success of the plantation. Local people can be involved in plantation and maintenance of plantation.

Table 8.1: Plant Species suggested near Water Logging Areas & Water Bodies

S. No.	Scientific name	Vernacular name
1.	*Salix tetrasperma*	Jalmala
2.	*Terminalia belerica*	Bahera
3.	*Terminalia arjuna*	Arjun
4.	*Albizzia lebbek*	Siris
5.	*Acer oblongum*	Pangoi
6.	*Casuarina equisetifolia*	Suru
7.	*Acacia catechu*	Khair
8.	*Eucalyptus sps.*	Safeda
9.	*Dendrocalamus strictus*	Bans
10.	*Bambusa arundinacea*	Kanta-Bans

Grass species such as *Arundo donax* and *Vitivier,* are also suggested for water logged areas.

Table 8.2: Plant Species suggested near Settlements

S. No.	Scientific Name	Common Name
1.	*Cassia fistula*	Amaltas
2.	*Dalbergia sissoo*	Shisham
3.	*Pongamia pinnata*	Karanj
4.	*Saraca indica*	Ashoka
5.	*Delonix regia*	Gulmohar
6.	*Azadirachta indica*	Neem

S. No.	Scientific Name	Common Name
7.	*Bauhinia variegata*	Kachnar
8.	*Melia azederach*	Bakain, Dhenk
9.	*Acacia nilotica*	Babul
10.	*Acacia catechu*	Khair
11.	*Millingtonia hortensis*	Aakash Neem
12.	*Callistemon citrinus*	Bottle brush

Besides the above mentioned plants fruit bearing trees may be also planted. The plantation must have provision for maintenance for at least three years. Survey of survival of the trees may be conducted periodically.

8.2.7 Tribal Development Plan

Rehabilitation and resettlement benefits for project affected families belonging to the scheduled tribes and Scheduled castes:

- In case of a project involving land acquisition on behalf of a requiring body which involves involuntary displacement of two hundred or more Scheduled Tribes families, a Tribal Development Plan shall be prepared, in such form as may be prescribed, laying down the detailed procedure for settling land rights due but not settled and restoring titles of tribals on alienated land by undertaking a special drive together with land acquisition. The Plan shall 'also contain a programme for development of alternate fuel, fodder and non-timber forest produce (NTFP) resources on non-forest lands within a period of five years sufficient to meet requirements of tribal communities who are denied access to forests.

- The concerned *gram sabha* or the *panchayats* at the appropriate level in the Scheduled Areas under Schedule V of. the Constitution or as the case may be, Councils in the Schedule VI Areas shall be consulted in all cases of land acquisition. Further, in cases of involuntary displacement of two hundred or more Scheduled Tribes families from the Scheduled Areas, the concerned Tribals Advisory Councils (TACs) may also be consulted.

- Each affected family of Scheduled Tribe shall be given' preference in allotment of land-for-land, if Government land is available in the resettlement area."

- In case of land being acquired from members of the Scheduled Tribes, at least one-third of the compensation amount due shall be paid to the affected families at the outset as first installment and the rest at the time of taking over the possession of the land.

- In case of a project involving land acquisition on behalf of a requiring b6dy, each Scheduled Tribe affected family shall get an additional one-time financial assistance equivalent to five hundred days minimum agricultural wages for loss of customary rights or usages of forest produce.

- The Scheduled Tribes affected families will be re-settled, as far as possible, in the same Schedule Area in a compact block, so that they can retain their ethnic, linguistic and cultural identity.

- The resettlement areas predominantly inhabited by the Scheduled Tribes shall get land free of cost for community and religious gatherings, to the extent decided by the appropriate Government.

- In case of a project involving land acquisition on behalf of a requiring body, the Scheduled Tribes affected families resettled out of the district will get twenty-five per cent.

- Any alienation of tribal lands in violation of the laws and regulations for the time being in force shall be treated, as null and void. In the case of acquisition of such lands, the rehabilitation and resettlement benefits would be available to the original tribal land-owners.

- In the case of irrigation or hydel projects, the affected Scheduled Tribes, 'other ,traditional forest dwellers and the Scheduled Castes families having fishing rights in a river or pond or dam in the affected area shall be given fishing rights in the reservoir area of the irrigation or hydel projects.

- The Scheduled Tribes and Scheduled Castes affected families enjoying reservation benefits in the affected area shall be entitled to get the reservation benefits at the resettlement area(s).

- The affected Scheduled Tribes families, who were in possession of forest lands in the affected area prior to the 13thday of December, 2005, shall also be eligible for the rehabilitation and resettlement benefits under this policy.

No Such Activities under proposed DRIP are likely to involve displacement of tribal community for which Tribal Development Plan is need to be followed. If few families are going to be displaced in that case proper mitigative measures need to be followed to minimize the impact of the project on the displaced people.

8.2.8 Impact on Archaeological, Historical, Religious Structures

While undertaking a social impact assessment, the appropriate Government shall, *inter alia* ,take into consideration the impact that the project will have on public and community properties, assets and infrastructure; particularly, 'roads, public transport, drainage, sanitation, sources of safe drinking water, sources of drinking water for cattle, community ponds, grazing land, plantations; public tilities, such as post offices, fair price shops, etc.; food storage godowns, ectricity supply, health care facities, schools and educational/training facilities, places of worship, land for traditional tribal institutions, burial and cremation grounds, etc. (National R&R Policy 2007).

- This policy addresses physical cultural resources, which are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, historical, rchitectural, religious, aesthetic, or other cultural significance.

- Physical cultural resources may be located in urban or rural settings, and may be above or below ground, or under water. Their cultural interest may be at the local, provincial or national level, or within the international community.

- Preparation of a physical cultural resources management plan that includes (a) measures to avoid or mitigate any adverse impacts on physical cultural esources; (b) provisions for managing chance finds; (c) any necessary easures for strengthening institutional capacity for the management of physical cultural resources; and (d) a monitoring system to track the progress of these activities.

- If relocation of such structure is required for any proposed DRIP activity then public consultation should be conducted with the local people in presence of project authority and members of the local governing body. Accordingly decision should be made and relocation of structure should be done before commencement of proposed project construction work.

- Separate Budget should be allocated for rehabilitation of such structures.

8.2.9 Rehabilitation and Resettlement Plan

The procedure mentioned in chapter 6 of National R&R policy 2007, shall be followed for declaration of the affected area, carrying out survey and census of affected persons, assessment of government land available and land to be arranged for rehabilitation and resettlement, declaration of the resettlement area or areas, preparation of the draft rehabilitation and resettlement scheme or plan and its final publication.

Where the appropriate Government is of the opinion that there is likely to be involuntary displacement of four hundred or more families *encase* in plain areas, or two hundred or more families *en masse* in tribal or hilly areas, DDP blocks or areas mentioned in the Schedule V or Schedule VI to the Constitution due to acquisition of land for any project or due to any other reason, it shall, declare, by notification in the Official Gazette, area of villages or localities as an affected area. The procedure mentioned in chapter 6 shall be followed for declaration of the' affected area, carrying out survey and census of affected persons, assessment of government land available and land to be arranged for rehabilitation and resettlement, declaration of the resettlement area or areas, preparation of the draft rehabilitation and resettlement scheme or plan and its final publication.

No Such Activities under proposed DRIP are likely to involve displacement of local community for which Rehabilitation and Resettlement plan need to be developed. If few families are going to be displaced in that case proper mitigative measures need to be followed to minimize the impact of the project on the displaced people.

8.2.10 Rehabilitation and Resettlement Benefits for the Affected Families

- The rehabilitation and resettlement benefits shall be extended to all the affected families who are eligible as affected families on the date of publication of the declaration under paragraph 6.1 of National R&R Policy 2007, and any division of assets in the family after the said date may not be taken into account.

- Any affected family owning house and whose house has been acquired or lost, may be allotted free of cost house site to the extent of actual loss of area of the acquired house but not more than two hundred and fifty square metre of land in rural areas, or one hundred and fifty square metre of land in urban areas, as the case may be, for each nuclear family:
  Provided that, in urban areas, a house of up to one hundred square metre carpet area may be provided in lieu thereof. Such house, if necessary, may be offered in a multi-storied building complex.

- Each affected below poverty line family which is without homestead land and which has been residing in the affected area continuously for a period of not less than three years preceding the date of declaration of the affected area and which has been involuntarily displaced from such area, shall be entitled to a house of minimum one hundred square metre carpet area in rural areas, or fifty square metre carpet area in urban areas (which may be offered, where applicable, in a multi-storied building complex), as the case may be, in the resettlement area:

  Provided that any such affected family. which opts not to take the house offered, shall get a suitable one-time financial assistance for l10use construction, and the amount shall not be less than what is given under any programme of house construction by the Government of India.

  - Each affected family owning agricultural land in the affected area and whose entire land has been acquired or lost, may be allotted in the name of the *khatedar(s)*in the affected family, agricultural land or cultivable wasteland to the extent of actual land loss by the *khatedar(s)*in the affected family subject to a maximum of 9ne hectare of irrigated land or two hectares of un-irrigated land or cultivable "wasteland, if Government land is available in the resettlement area. This benefit shall also be available to the affected families who have, as a consequence of the acquisition" or loss of land, been reduced to the status of marginal farmers.

  - In the case of irrigation or hydel projects, the affected families shall be given preference in allotment of land-for-land in the command area of the project, to the extent possible. Such la6ds may be consolidated, and plots of suitable sizes allotted to the affected families who could be settled there in groups. In case a family cannot be given land in the command area of the project or the family opts not to take land there, such a family may be given monetary compensation on replacement cost. basis for their lands lost, for purchase of suitable land elsewhere.

- In the case of irrigation or hydel projects, the. State Governments may formulate suitable schemes for providing land to the affected families in the command areas of the projects by way of pooling of the lands. that may be available or, otherwise, could be made available in the command areas of such projects.

- In the case of irrigation or hydel projects, fishing .rights in the reservoirs shall be given to the affected families, if such rights were enjoyed by them in the affected area;
  In other cases also, unless there are special reasons, fishing rights shall be given preferentially to the affected families.

- In case of a project involving land acquisition on behalf of a requiring body, the stamp duty and other fees payable for registration of the land or house allotted to the affected families shall be borne .by the requiring body.

- The land or house allotted to the affected families under this policy shall be free from all encumbrances.

- The land or house allotted to the affected families under this policy may be in the joint names of wife and husband of the affected family.

- In case of allotment of wasteland or degraded land in lieu of the acquired land, each *khatedar* in the affected family shall get a one-time "financial assistance of such amount as the appropriate Government may decide but not less than fifteen thousand rupees per hectare for land development.

- In case of allotment of agricultural land in lieu of the acquired land, each *khatedar* in the affected family shall get a one-time financial assistance of such amount as the appropriate Government may decide but not less than ten thousand rupees, for agricultural production.

- Each affected family that is. displaced and has cattle, shall get financial assistance of such amount as the appropriate Government may decide but not less than fifteen thousand rupees, for construction of cattle shed.

- Each affected family that is displaced shall get a one-time financial assistance of such amount as the appropriate Government may decide but not less than ten thousand rupees, for shifting of the family, building materials, belongings and cattle.

- Each affected person who is a rural artisan, small trader or self-employed person and who has been displaced shall get a one-time financial assistance of such amount as the appropriate Government may decide but not less than twenty-five thousand rupees, for construction of working shed or shop.

  - In case of a project involving land acquisition on behalf of a requiring body,

  the requiring body shall give preference to the affected families –

- ✓ at least one person per nuclear family - in providing employment in the project, subject to the availability of vacancies and suitability of the affected person for the employment;
- ✓ wherever necessary, the requiring body shall arrange for training of the affected persons, so as to enable such persons to take on suitable jobs; .
- ✓ Requiring body shall offer scholarships and other skill development opportunities to the eligible persons from the affected families as per the criteria as may be fixed by the appropriate
- ✓ Government;
- ✓ the requiring body shall give preference to the affected persons or their groups or operatives in the allotment of outsourced contracts, shops or other economic opportunities coming up in or around the project site; and
- ✓ the requiring body shall give preference to willing landless labourers and unemployed affected persons while engaging labour in the project during the implementation phase.

➢ The affected persons shall be offered the necessary training facilities for development of entrepreneurship, technical and professional skills for self employment.

- In case of a project involving land acquisition on behalf of a requiring body, the affected families who have not been provided agricultural land or employment shall be entitled to. a rehabilitation grant equivalent to seven hundred fifty days minimum agricultural wages or such other higher amount as may be prescribed by the appropriate Government:
- Provided that, if the requiring body is a company authorised to issue shares and debentures, such affected families shall be given the option of taking up to twenty per cent. of their rehabilitation grant amount in the form of shares or debentures of the requiring body, in such manner as may be prescribed:
- Provided further that the appropriate Government may, at its discretion, raise this proportion up to fifty per cent. of the rehabilitation grant amount.

- In cases where the acquisition of agricultural land or involuntary displacement takes place on account of land development projects, in lieu of land-for-land or employment, such affected families would .be given site(s) or apartment(s) within the development project, in proportion to the land lost, but subject to such limits as may be defined by the appropriate Government.

- In case of a project involving land acquisition on behalf of a requiring body, each affected family which is involuntarily displaced shall get a monthly subsistence allowance equivalent to twenty-five days minimum agricultural wages per month for a period of one year from the date of displacement.

- The project authorities shall, at their cost, arrange for annuity policies that will pay a pension for life to the vulnerable affected persons as indicated at paragraph 6.4(v), of such amount as may be prescribed by the appropriate Government subject to a minimum of five hundred rupees per month.

- If land is acquired in cases of urgency, such as under section 17 of the Land aquisition Act, 1894 or similar provision of any other Act of the Union or a State for the time being in force, each affected family which is displaced shall be. provided with transit and temporary accommodation, pending rehabilitation and resettlement scheme or plan, in addition to the monthly subsistence allowance and other rehabilitation and resettlement benefits due to them under this policy.

- In case of linear acquisitions, in projects relating to railway lines, highways, transmission lines, laying of pipelines and other such projects wherein only a narrow stretch of land is acquired for the purpose of the project or is utilised for right of way, each *khatedar*in the affected family shall be offered by the requiring body an ex-gratia payment of such amount as the appropriate Government may decide. but not less than twenty thousand rupees, ,in addition to the compensation or any other benefits due under the Act or programme or scheme under which the land, house or other property is acquired:
- Provided that, if as a result of such land acquisition, the land-holder becomes landless or is reduced to the status of a "small" or "marginal" farmer, other rehabilitation and resettlement benefits available under this policy shall also be extended to such affected family.

- The affected families may be given the option to take a lump-sum amount in lieu of one or more of the benefits specified in paragraphs 7.2 to 7.19, the amount being determined by the appropriate Government after consultation with the requiring body.

8.2.11 Public Health and Safety

- All machines & equipments used in the construction must conform to relevant Indian Standard (IS) Codes, must be free from defects, in good working condition, regularly inspected and properly maintained as per provisions.
- Safety goggles, helmets, earplugs and masks etc. must be provided to the workers.
- All workers employed on mixing of asphaltic material, cement, lime mortars, concrete etc. may be provided with protective footwear and protective goggles. Workers involved in welding work may be provided with welder's protective eye shields.
- No men below age of 18 years or women should not be employed on the work of painting with products containing lead in any form. Face mask may be supplied to for use to the workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scrapped.
- Measures must be taken to prevent fire, flood etc.
- Necessary steps must be taken to prompt first aid treatment of all injuries likely to sustain during the course of work.
- Anti malarial instructions, including filling up of borrow pits and cleaning of the site.
- On completion of the works all the temporary structures must be cleared away, all rubbish disposed, excreta and disposal pits or trenches filled in and effectively sealed off and the whole of the site left clean and tidy.

- All the construction workers should be provided training to handle potential occupational hazards which include the following:
  - Environmental Awareness program
  - Engineering controls, work practices and protective equipment
  - Handling of raw and processed material
  - Emergency response

8.2.12 Gender Issues

It has been observed that during implementation of rehabilitation and resettlement procedure women are most vulnerable and suffer most due to this process. Before commencement of project activity or resettlement and rehabilitation process project authority should ensure that proper and adequate care has taken to minimize adverse impacts on women. Care should be taken and the following issues should be addressed to minimize discrepancies amongst men and women during R&R process.

- Separate action plan should be formulated for those households headed by women.
- Pay parity must be maintained while providing employment opportunities to the displaced people. This should be ensured by the employer who should also undertake regular inspection/checks for proper implementation of the process.
- According to the R&R policy if there is scope for providing employment to women then it should be implemented properly.
- Proper Training programme must be a part of the Rehabilitation and Resettlement procedure for women for better sustainability of livelihood.
- As special case relaxation of work hours should be there for working women having small children.

8.2.13 Environmental Management Responsibilities

Table 8.3 presents summary of Environmental Management Plan with the objective of minimization of adverse environmental impacts. The table covers all possible environmental issues involved and necessary mitigation measures and responsible Agency.

Table 8.3: Environmental Management Plan & Responsibilities

S. No	Environmental Issue	Actions to be Taken	Implementation Agency	Supervision Agency
Implementation Phase				
1.	Air Quality	▪ Adequate dust suppression measures such as regular water sprinkling on construction sites, haul & unpaved roads particularly near habitation must be undertaken to control fugitive dust ▪ Trucks carrying soil, sand and stone may be duly covered to avoid spilling. ▪ Low emission construction equipment, vehicles and generator	Construction Contractor	Environmental incharge, Project Authority

S. No	Environmental Issue	Actions to be Taken	Implementation Agency	Supervision Agency
		sets may be used ▪ Plants, machinery and equipment should be handled so as to minimize generation of dust. ▪ All crusher used in construction should confirm to relative dust emission devises ▪ Air quality monitoring may be conducted at construction sites.		
2.	Noise & Vibration	▪ Modern technologies producing low noise may be used during construction. ▪ Construction equipment's and vehicles must be in good working condition, properly lubricated and maintained to keep noise within permissible limit as prescribed by CPCB. ▪ Head phones, ear plugs to be provided to the workers at construction site. ▪ All vehicles, equipment and machinery used in construction should be fitted by exhaust silencers, mufflers or acoustic cover. ▪ Noise level monitoring must conducted during implementation phase.	Construction Contractor	Environmental incharge, Project Authority
3.	Water Quality	▪ Silt fencing may be provided avoid spillage of construction material. ▪ Discharge of waste from construction/ labour camp into water bodies may be strictly prohibited. ▪ Construction methodologies with minimum or no impact on water quality may be adopted, disposal of construction wastes at designated sites and adequate drainage system may be provided. ▪ Project design may take care of irrigational canal and proper measures may be provided so that irrigation setup is not disturbed ▪ Construction activity may be prohibited during rainy season. ▪ Water quality monitoring may be conducted during construction phase.	Construction Contractor	Environmental incharge, Project Authority

S. No	Environmental Issue	Actions to be Taken	Implementation Agency	Supervision Agency
4.	Soil conservation	▪ Suitable protection measures consisting of bio-engineering techniques such as plantation of grasses and shrubs & check dams, may be provided to control erosion. ▪ Borrow areas may be finalized in concern with ecological sensitivity of the area. Agriculture land may not be used as borrow areas. Priority may be given to degraded area for excavation of borrow material. Rehabilitation of borrow area may be taken under the project. Top soil removed from may be stored separately in bunded areas and utilized during plantation or refilling of excavated area. ▪ Construction work may be avoided during rainy season to evade erosion and spreading of loose material.	Construction Contractor	Environmental incharge, Project Authority
5.	Solid Waste	▪ Construction work must be carried in such a way that minimum or no solid waste is generated at construction site. ▪ Adequate number of dustbin/ container must be provided ▪ Solid waste must be collected and disposed properly in compliance with hazardous waste management act. ▪ Domestic waste must be collected separately. Toxic waste (oil, solvents, paints, acids, additives) should not be collected with solid waste. ▪ Project personnel must be trained on collection and disposal method for different waste. ▪ It must be ensured that domestic and collection waste is collected and disposed at designated disposal areas. ▪ Illegal dumping at construction site, camp area or into river will not be allowed	Construction Contractor	Environmental incharge, Project Authority
6.	Flora	▪ If any forest area is diverted then Forest clearance may be obtained as per Forest Conservation Act 1980 ▪ Efforts must done to protect trees of the are. ▪ Labour Camps and office site may	Construction Contractor	Forest Dept/ Environmental incharge, Project Authority

S. No	Environmental Issue	Actions to be Taken	Implementation Agency	Supervision Agency
		be located outside & away from Forest areas. ▪ Plantation must be undertaken in surroundings of the dam to enhance esthetic and ecological value. ▪ Social forestry may be practiced for success of the plantation.		
7.	Fauna	▪ Poaching must be strictly banned in the area. It may be ensured by the Contractor that no hunting is practiced at the site. All site personnel must be are aware of the location, value and sensitivity of the wildlife resources ▪ Awareness program on Environment and Wildlife Conservation may be provided to the work force. Forest Act and Wildlife Act may be strictly adhered to.	Construction Contractor	Forest Dept/ Environmental incharge, Project Authority
8.	Safety measures	▪ Warning and safety signs must be provided all around the sites ▪ An ambulance must be provided which is ready to mobilize, on site for 24 hrs for emergency situation ▪ First aid facility must be available at site ▪ Extra precaution must be taken while working with flammable material. Flammable liquid leaks and spills must be cleaned immediately. ▪ Adequate Fire extinguishers must be provided at site and workshop. All workers must know the use of extinguisher. ▪ Emergency preparedness plan must be formulated	Construction Contractor	Environmental incharge, Project Authority
9.	Livelihood and Public Health	▪ Safety instruction may be provided at the work site. Near school, market place and residential area sign board providing warning sign and danger marks may be installed. ▪ In settlement area embankment may be provided. ▪ Light may be provided throughout the stretch at crossing points of Roads and Railway Lines. Road & Railway safety norms may be followed to prevent any mis-happening. Diversion path may be provided at the crossings during construction. ▪ Labour working at forest site may not	Construction Contractor	Environmental incharge, Project Authority

S. No	Environmental Issue	Actions to be Taken	Implementation Agency	Supervision Agency
		be allowed to carry any arms and ammunition to avoid harm to wildlife. ▪ Open fire shall be strictly prohibited; any incidence of fire may be immediately reported to the Forest Deptt. ▪ Borrow area which fall on the way of settlement may be fenced, reclamation of borrow areas may be undertaken by filling it by construction material and covering with top soil and planting trees. Landscaping of the borrow area can be also undertaken as per the site condition. ▪ At barrage sites extra precaution may be taken to avoid any mis-happening ▪ Construction vehicles may be provided with siren to alert the workforce and wildlife, if any. ▪ Child labour may be strictly prohibited at work site. ▪ Labour camp may not be settled near river/streams or dry beds. ▪ First Aid facility may be provided at the construction site. Ambulance may be provided at the camp site and any accident taking place may be immediately referred to the nearest hospital. ▪ The work force at site may be provided with safety measures such as helmet, gloves, jacket, boots, ear plugs etc. ▪ Environmental awareness training may be provided to the Contractor staff and labour force. ▪ Work may be planned and scheduled to limit damage to sensitive ecosystem.		
10.	Aquatic Life	▪ Detailed study is required to assess the impact on Aquatic life is required.	Construction Contractor	Environmental incharge, Project Authority
11.	Solid Waste	▪ Debris generated due to the dismantling of the existing structure shall be suitably reused in the proposed construction, subject to the suitability of the material and the approval of the Engineer, as follows:	Construction Contractor	Environmental incharge, Project Authority

S. No	Environmental Issue	Actions to be Taken	Implementation Agency	Supervision Agency
		▪ Unutilisable debris material shall be suitably disposed off by the concessionaire, either for the filling up of borrow areas created for the project or at pre designated dump locations, subject to the approval of the Engineer. ▪ All arrangements for transportation during construction including provision, maintenence, dismantling and clearing debris, where necessary will be considered incidental to the work and should be planned and implemented by the contractor as approved and directed by the Engineer. ▪ Bentonite slurry or similar debris generated from pile driving or other construction activities shall be disposed such that it does not flow into the surface water bodies or form mud puddles in the area.		
12.	Schedule Caste/ Schedule Tribe	▪ Schedule Caste/ Schedule Tribe Should be involved in project related activity and decision making processes. ▪ Schedule Caste/ Schedule Tribe should have equal rights as per GOI rules and notification.	Construction Contractor	Environmental incharge, Project Authority
13.	Traffic Control and Safety	▪ The Concessionaire shall take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, marketing, flags, lights and flagman as may be required by the Traffic Engineer for the information and protection of traffic approaching or passing through the section of the highway under improvement ▪ All signs barricades, pavement markings shall be as per the MoST specification. Before taking up construction on any section of the highway, a traffic control plan shall be devised to the satisfaction of the	Construction Contractor	Dam Level Authority Environmental in-charge

S. No	Environmental Issue	Actions to be Taken	Implementation Agency	Supervision Agency
		Engineer.		
14.	Risk of Hazardous Activity	▪ Workers employed will be provided with protective foot wear and goggles, stone breakers will be provided with protective goggles and clothing as advised by the Project Safety Officer. Use of any herbicide another toxic chemicals shall be in accordance with manufacturers instructions.	Construction Contractor	Dam Level Authority Environmental in-charge
Post Implementation Phase				
1.	Maintenance Plantation	▪ Provision for maintenance of plantation must be made for at least three years. ▪ Plantation may be taken to replace dead sapling. Survey of survival of plants may be taken periodically. Species of local importance must be planted.	Dam Level Authority Environmental in-charge	Forest Dept
3	Water distribution	▪ Prioritization of water distribution for drinking, irrigation and other purpose	Dam Level Authority Environmental incharge	State Water Resources Dept.(SWRD) District Administration
3	Safety System	▪ Proper communication network system in the catchment dam site and command area. ▪ Awareness program for the stakeholders ▪ Emergency Action Plan ▪ Pre monsoon inspection report	Dam Level Authority Environmental inharge	SWRD
4.	Soil Quality	▪ Flooding may cause water logging in some low lying areas, plantation may be done in these area with species such as Eucalyptus and Bamboo and grass species of *Arundo donax, Vitivier, Pandanus* etc are suggested. ▪ Awareness program on soil conservation may be held.		
5.	Surface Water Quality	▪ Contingency plans to be in place for cleaning up of spills of oil, fuel and toxic chemicals	Dam Level Authority Environmental inharge	SWRD
6.	Aquatic Life	▪ Detailed study is required to assess the impact on Aquatic life is required.	Dam Level Authority Environmental inharge	SWRD
7.	Livelihood	▪ Monitoring System should be established to assess the change in livelihood of the local people	Dam Level Authority Environmental	SWRD

S. No	Environmental Issue	Actions to be Taken	Implementation Agency	Supervision Agency
		especially impacted by the project.	inharge	
8.	Schedule Caste/ Schedule Tribe	▪ Monitoring System should be established to assess the change in livelihood of the local schedule caste / schedule tribe communities especially impacted by the project.	Dam Level Authority Environmental inharge	SWRD
9.	Public Health	▪ Malaria awareness program may be held in the Project Area. ▪ The reservoir and associated water bodies may be maintained and cleaned to avoid mosquito breeding. ▪ Adequate supplies of medicine to the public health centre may be ensured, occurrence of water borne diseases and malaria may be monitored in the project area for atleast 5 years.	Dam Level Authority Environmental inharge	SWRD

8.3 ENVIRONMENTAL MONITORING

Environmental monitoring is essential to monitor the changes in environmental aspects due to the project activities. The aim of monitoring is to provide information that will aid impact management and to achieve a better understanding of cause-effect relationships to improve EIA prediction and mitigation methods. Monitoring should be conducted during implementation and post implementation phase. During implementation phase monitoring includes:

i. Monitoring of environmental aspects such as water, air, noise, soil and plantation program.
ii. Monitoring of implementation of mitigation measures suggested in EMP

An Environmental Management Action Plan (EMAP) for compliance must be prepared.
The Environmental incharge should be appointed to conduct on-site verification and should provide documentary proof on mitigation measures taken. Environmental Monitoring Framework is given in the table below.

Table 8.4 : Environmental Monitoring Framework

S. No	Environmental Indicators	Parameter	Standards	Implementation	Supervision
	Implementation Phase				
1	Air Quality	SPM, RPM, CO, NOx, SOx	CPCB Standards	Construction Contractor	Environmental incharge, Project Authority
2	Surface Water Quality	pH, DO, BOD, TDS, Total Coliform, Oil & Grease, Phenols Pb,	CPCB Standards	Construction Contractor	Environmental incharge, Project Authority

S. No	Environmental Indicators	Parameter	Standards	Implementation	Supervision
		Zn Hg Cl, Fe, Na			
3	Sediment Quality	Physical, chemical & heavy metals	Pre and post monsoon	Construction Contractor	Environmental incharge, Project Authority
4	Noise	Noise level on dB(A) scale	CPCB Standards	Construction Contractor	Environmental incharge, Project Authority
	Post Implementation Phase				
1.	Meteorology	Temperature, humidity, rainfall, wind speed and direction	Daily / Hourly throughout the year	Environmental incharge Dam Level Authority	SWRD
2.	Surface Water Quality	pH, DO, BOD, TDS, Total Coliform, Oil & Grease, Phenols Pb, Zn Hg Cl, Fe, Na	CPCB Standards	Environmental incharge Dam Level Authority	SWRD
3.	Aquatic ecology	Primary productivity, density & diversity of plankton, invertebrates and fish fauna	Pre-monsoon & Post-monsoon	Environmental incharge Dam Level Authority	SWRD
4.	Plantation	Survival Rate	Periodically	Environmental incharge Dam Level Authority	SWRD / Forest Dept

8.4 INSTITUTIONAL FRAMEWORK

For sucessful implementation of EMP Instituional setup play vital role. The Implementation of EMP must start from the smallest unit that is at dam level and further move upward at divisional and state level. The Dam level authority must coordinate all issues in the catchment and command area with the concerned dept. An Environmental incharge must be appointed for implementation of EMP.

Environmental Awareness and Training

For implementation of EMP awareness on environmental issues is indispensable. It is required to communicate and work with community and understanding the socio-political dynamics prevalent in the region. During implementation phase training/awareness program should be organized for Project Implementation Unit (PIU) Staff and the Construction Contractor. Some of the Training programs that can be taken for proper understanding of environment and its application is given below

Table 8.5: Proposed Training Modules

Subject	Target Group	Method
Environmental Awareness ➢ Environmental Impact Assessment Methods and Process ➢ Environmental Regulations, Acts & Legislation	Senior level Engineers involved in planning. All Staff at Dam site Environmental in-charge	Workshops and Lectures
Environmental Management Plan ➢ Mitigation and Enhancement Measures ➢ Monitoring & Evaluation ➢ Environmental Budget	Dam Level Authority All Field Engineers Environmental incharge	Workshops and Lectures
Environmentally Sound Construction Practice ➢ Clean Construction Technology ➢ Waste Minimization and Management ➢ Storage and maintenance of equipments ➢ Control on Soil Erosion ➢ Transplantation and Plantation ➢ Construction Camp Management ➢ Safety Practices	All Field Engineers Dam Level Authority Environmental incharge	Workshops and Lectures
Participatory Irrigation Management ➢ Formation of WUA ➢ Water Conservation Techniques ➢ Record Keeping	All Field Engineers Environmental incharge WUA	Workshops and Lectures Site Visit

All the specification provided in the EMP must form part of contract document given to the contractor during implementation and separate bill of quantity must be allotted for the implementation of the same.

8.5 Institutional Capacity Building

To strengthen the capacity of the implementing agency it is proposed to upgrade the institutional capabilities and augment the skills of the existing personnel. Details of such measures are presented below:

Water Resources Department

The two main core functions of the water resources department will be planning and management of water resources and related issues. Water resource department will be maintaining and managing operation and distribution system, the responsibilities of the department will be included:

- Regulation of water entitlement
- Checking of maintenance of the distribution system
- Technical authority for water resources sector
- Design, research, and training
- Co-ordination with other water-related departments

Management of Water Resources

Regular monitoring and management of the available water resources through annual audits of water account for the various schemes is one of the major responsibilities of water resources Dept. It is also department's responsibility to identify discrepancies as well as the scope for improvement in making best use of surface water resources.

Capacity Building

The reorientation of stakeholders can be achieved only by human resource development. The improvement of the conceptual, technical, social skills and capabilities of various state officials is critically important, for enabling them to perform their expected roles.

Institutional up-gradation

For effective use of ESMF to address the environmental and social issues in the dams' rehabilitation and improvement project, institutional strengthening would be required at following levels:

Dam Sites Officials

Select officials at junior levels may be trained in the environmental and social assessment related to project activities. This will involve understanding of baseline environmental and social conditions, analysis and assessment of project impacts on environmental and social components; segregating of significant impacts; identifying mitigation and enhancement measures and development of an environmental and social management plan.

Dam Authority at State Level

Suitable person or persons may be identified at a comparatively senior level who may be exposed to an awareness training programme for understanding and appreciation of the relevance and importance of environmental and social issues in general, as well as, specific to the dam related activities. The objective would be to develop an understanding of sustainable development and the consequences of non-sustainable development.

They will also be exposed to the objectives and application of ESMF to enable them to supervise the ESMF activities at the dams level effectively.

Dam Authority at Central Level

Suitable senior level official may be identified to look after the ESMF application and implementation at dams in various States. The State level authority in each State would periodically send reports on the ESMF implementations to the official concerned for his review and instructions, where needed. The senior officials would also be given exposures to environmental and social issues of projects, similar to those given to the officials at the State level.

It is proposed to set up specialized committees and cells to undertake environmental and social mainstreaming at different levels of the State water sector, as indicated in Table 8.6.

Table 8.6 Institutional Arrangements for Mainstreaming of Environmental and Social Issues

Level	Entity	Specialized Committee / Cell / Position	Responsibilities
State	State Water Resources Department	State Social and Environmental Steering Committee State Social Empowerment Committee Inter-departmental Co-ordination committee	Assessment of Social, Environmental Situation Co-ordinate water sector activities Co-ordination between line agencies Develop & implementation of planning and allocation mechanisms at inter sectoral & inter basins level Monitoring socio environmental aspects Monitoring and management of revenue generation through tariffs
Project	Circle and Divisional Office	Project Monitoring Unit Environmental Coordinator Sociologist Grievance Redress Unit Media Cell	Co-ordination & Monitoring of project implementation Mainstreaming of Environmental & Social aspects into project implementation Grievance Redress between stakeholders Information dissemination
Sub-Project	Sub Divisional Office (at dam site)	Project Implementation Team Quality Control Unit	Project Implementation Quality control during implementation

8.5.1 Institutional Structure for Social and Environmental Cell

It is recommended that a Social and Environmental Monitoring Cell be created, with officials at the sub-project level and the State Government level. The Officer of the rank of Deputy Secretary needs to be entrusted with this job at the State Government level, who would look at the policy issues based on the feedback from the sub-projects. The environmental and social monitoring cells should have subject specialists having suitable experience in handling issues relevant to water resources sector in general. The recommended structure is depicted in the schematic presented below.