

DRAFT FINAL REPORT

**WORLD BANK ASSISTED INTEGRATED COASTAL ZONE MANAGEMENT PROJECT
ENVIRONMENTAL AND SOCIAL ASSESSMENT**



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By



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CHAPTER 1

INTRODUCTION

The coastal zones all over the world are regions of very high biological productivity, has an important component of the global life system. Coastal ecosystems harbour wealth of species and genetic diversity, store and cycle nutrients, filter pollutants and help to protect shorelines from erosion and storms. Marine ecosystems play a vital role in regulating climate as they are a major carbon sink and oxygen source. Environmental resources are also a critical part of the livelihoods of large populations. Therefore, a threat to these resources, due to environmental changes, also threatens people's security. The coastal zone of the world is under increasing stress due to development of industries, trade and commerce, tourism and resultant human population growth and migration, and deteriorating water quality. The industrial development along the coast has also resulted in the degradation of coastal ecosystems and diminishing living resources. More than half the population lives within 60 km of the coast and is projected to rise to almost three quarters by 2020 (Anon, 1992). Additionally, episodic events, such as cyclones, floods etc., pose serious threat to human life and property in the coastal zone. Human activities also induce certain changes or accelerate the process of change.

India has a coastline of about 7500 kms of which the mainland accounts for 5,400 kms, Lakshadweep coasts extend to 132 kms and Andaman & Nicobar Islands have a coastline of about 1,900 kms. The coast also includes 77 cities, including some of the largest and most dense urban agglomerations – Mumbai, Kolkata, Chennai, Kochi and Visakhapatnam. Nearly 250 million people live within 50km of the coastline. The coastal environment of India plays a vital role in the nation's economy by virtue of its resources, productive habitats and rich biodiversity. The coast line is endowed with a wide range of coastal ecosystems like mangroves, coral reefs, sea grasses, salt marshes, sand dunes, estuaries, lagoons and natural habitats. The coastal activities such as fishing ports and shipping harbours, aquaculture, agriculture, tourism, oil and mineral exploitation contribute about 10% of the national GDP. Goldman Sachs in its recent publication, Jim O'Neill and Tushar Poddar; Global Economics Paper No: 169; June 16, 2008 (Ref) has mentioned environmental quality improvement as one of the ten priorities for India for achieving its 2050 potential. The Integrated Coastal Zone Management (ICZM) approach is a step forward for a rational and scientific approach for sustainable development of the coastal areas of India.

Historically, the Indian coastal land had been important foci of one or other type of investment and development, like shipping, surface transport, fisheries, agriculture, aqua-culture, mining, recreation and shore protection for enabling better livelihood and wellness of members of the immediate community. Even after independence, this investment and 'development' model of the coastal land continued to reign in the minds of visualizers and designers of projects in the state governments, who did not take cognizance of the response of the natural and/or physical system at the site and environs of investment/project. The constantly increasing anthropogenic pressures along the coastal habitats further make them vulnerable to damage and destruction. The coastal environments are also particularly vulnerable to global climatic changes especially global warming and its consequences such as changes in rainfall pattern, storm frequency and sea level rise.

1.1 Project Background

The approach for managing India's coastal zone, presently, is purely regulatory under the CRZ Notification issued in 1991 promulgated under the Environment (Protection) Act of 1986. This was the first major

legislation that was aimed at regulating various coastal activities and protecting the coastal environment. The CRZ Notification declared areas 500 m landward of the HTL as CRZ and restrictions were imposed on the setting up and expansion of industries. This approach does not provide room to balance coastal zone conservation and necessary economic growth in the area or seek convergence with other development activities. Increasing developmental pressure during the last decade led to violations of legal provisions and the economic sector simultaneously demanded for rationalizing the present regulatory measures. Perceiving the continuing difficulties posed by the Notification in its effective implementation for the sustainable development of coastal regions as well as conservation of coastal resources, the Ministry of Environment and Forests (MoEF), Government of India constituted an Expert Committee in 2004 under the Chairmanship of Prof. M. S. Swaminathan, with experts in the areas of environmental law, marine biodiversity, marine geology, environmental economics, socio-economics, remote sensing, coastal engineering, urban planning, and marine fisheries to carry out a comprehensive review of the said Notification including all its amendments in the light of findings and recommendations of previous committees, judicial pronouncements, representations of various stakeholders, and suggest suitable amendments, if necessary, to make the coastal regulatory framework consistent with well established scientific principles of Integrated Coastal Zone Management.

The Swaminathan Committee submitted its report in February 2005. The major recommendation was the implementation of an integrated coastal zone management approach. The Committee also recommended a number of reforms to facilitate conservation of ecosystems in the coastal zone, and at the same time promoting economic development and poverty reduction in the coastal areas. To support the implementation of integrated coastal zone management approaches, the Committee also recommended that the Government of India should strengthen the technical and human resource capacity in the country. The MoEF is now mandated to implement the recommendations of the Swaminathan Committee to achieve the objectives of integrated coastal zone management in the coastal areas of India.

The abundant coastal and offshore marine ecosystems include some 6,740km² of mangroves, including part of the Sundarbans and the Bhitarkanika, which are among the largest mangroves in the world. There are major stocks of corals, fish, marine mammals, reptiles and turtles, sea grass meadows, and abundant sea weeds. Most of the oil and gas reserves in India lie in the coastal and shallow offshore areas. Thirty-five per cent of the coastal stretch is laden with substantial placer mineral and heavy metal deposits. Offshore wind, tidal and wave energy potential is huge. Tourism, cultural and archaeological sites, some with national and international significances are in the coasts. A very significant share of India's economic infrastructure, including maritime facilities, petroleum industries, and import-based industries is located in the coastal zone, as there are 197 major or minor ports, 308 large-scale industrial units, and 77 coastal cities. Coastal fishing, employs a million people full time, and the post-harvest fisheries sector employs another 1.2 million people in 3,638 fishing villages and 2,251 fish landing centers (ref).

Despite the ecological richness and the contribution to national economy, very little is systematically known about the total economic value of the coastal and marine resources of India. Moreover, rapid urban-industrialization, maritime transport, marine fishing, tourism, coastal and sea bed mining, offshore oil and natural gas production, aquaculture, and the recent setting up of special economic zones have led to a very significant increase in demand for infrastructure, resulting in exploitation of coastal natural resources. About 34% of mangroves of India were destroyed in the last 40 years; 66% of the coral areas are threatened; marine fish stocks are declining; and aquarium fish, sea cucumbers are fast disappearing (ref). Such depletion and degradation, unless arrested, will impact the livelihood, health and well being of the coastal population; affecting in turn prospects for sustained economic growth.

Indian coast is subject to severe weather events, including the cases of 2004 Tsunami, several super-cyclones, and an average of nine cyclones per year, inflicting severe damage to lives and properties of coastal communities. Resilience of the rural coastal communities to extreme weather variability had been low, mostly because of impoverishment. In recent years, the accelerated erosion of coastal land is affecting agriculture and built habitats, while income from traditional fishing is reducing due to environmental degradation and over-extraction. Climate change aggravates the risks to coastal communities and infrastructure.

Studies have been pointed out significant acceleration in sea level, increase in the frequency and intensity of extreme weather events, mean climate variables, and changes in biophysical and human systems. A one-meter sea level rise would flood nearly 6,000 km² in India, potentially triggering significant population movements among the 63 million people in low elevation areas, the low resilience poorer communities among them being the most vulnerable (ref). Climate change will also impact the large infrastructure investments in the ports, industries and other facilities.

Diverse stakes increasingly compete for coastal and marine resources. Rapid economic growth in recent years has propelled newer and larger investments in coastal zones, with more ports set up to act as gateways to the hinterland economy. Together with real estate growth in larger urban areas and unplanned tourism activities, these necessitate considerable increase in basic infrastructure to support the fast-growing rural, semi-urban and urban population in coastal zones. Further, the numerous unplanned but competitive economic activities have resulted in conflicts among stakeholders; misuse, abuse and overuse of resources; and degradation of ecosystems with some pockets of coastal landscapes entirely destroyed by commercial aquaculture.

Plethora of fragmented policies and incomplete institutional framework are unable to ensure balanced development. The management regime for coastal and marine areas of the country suffers from the lack of an integrated and coordinated decision-making system. This is reflected in a multiplicity of institutional, legal and economic planning frameworks, all narrow and sector driven. Consequently, sectoral activities and interventions in coastal and marine areas work in isolation from each other, at times with conflicting objectives and outputs. At the same time stakeholder interests are diverse and competitive, partly due to the lack of participatory planning and management process. Investments in large and small economic infrastructure - all critical components of national goals for growth and poverty reduction - take place without systematic analyses of long term effects. The overall policy and plan responses are further crippled by lack of knowledge on coastal resources, processes, impact analyses and management options.

The present project implemented through World Bank funding will support capacity building for implementation of the ICZM at the national and three state levels as pilot project. The project, and the reforms it supports, will play a vital role in reducing vulnerabilities of coastal population to current variability and disasters. The project will specifically contribute to meeting the seventh millennium development goal on environmental sustainability.

1.2 Brief Description of the Project

The overall objective of the project is to support the Government of India and selected states in developing and implementing an improved strategic management approach for India's coastal zones to preserve the long-term productivity of this highly-populated region for continued sustainable development and economic growth. This objective will be achieved through specific project components both at national and state level. The four components are (i) national ICZM capacity building (ii) piloting ICZM approaches in Gujarat (iii) piloting ICZM approaches in Orissa and (iv) piloting ICZM approaches in West Bengal.

1.2.1 Component - National ICZM Capacity Building

The national level component will have the following sub components or activities,

- Mapping, delineation and demarcation of the hazard lines, and delineation of coastal sediment cells along the entire mainland coast of India;
- Mapping, delineation and demarcation, of the ecologically sensitive areas (ESAs), along the entire mainland coast of India;
- Capacity building of the MoEF as the secretariat for the National Coastal Zone Management Authority (NCZMA), and nation-wide training program for integrated coastal zone management; and
- Setting up and operationalization of the new National Centre for Sustainable Coastal Zone Management.

Mapping, delineation and demarcation of hazard line is needed to define the boundaries of the coastal zone in mainland India (which in turn will establish planning boundaries of the state/local ICZM plans) and to incorporate the effects of recurrent coastal hazards including the potential incremental effects induced by climate change (most notably sea level rise) on contents of such ICZM plans. The hazard line for the mainland coast of India will be mapped and delineated as the landward composite of the coastal 100 year flood lines (which includes sea level rise impacts), and the 100 year predicted erosion lines. Once the hazard line is delineated, ground markers will be constructed to minimize the limitation of non-conformity between local revenue maps and the standard topographic maps. The publicly disseminated maps and the ground markers will obliterate the need for each developer and stakeholder to invest in physical surveys and interpretation, each time a need for decision regarding applicability of coastal regulations arises. Mapping and delineation of coastal sediment cells and sub-cells are required to determine the lateral boundaries of individual ICZM plans. Preparation of state/local level ICZM plan is contingent upon delineation of the hazard line and the coastal sediment cells or sub-cells. Mapping, delineation and demarcation, as required, of the ecologically sensitive areas is important to define these areas which would be conserved based on the overall principles of ecological security and precautionary approaches to intergenerational resources. These ESAs will include the current PAs (national parks, wildlife sanctuaries) and unprotected ecosystems and habitats such as mangroves, coral reefs, sea grass and sea weed beds, littoral forests, sea beaches, sand dunes, rocky cliffs, mud flats, lagoons, salt marshes, estuaries, habitats of critical species such as the olive ridley turtles and the horse-shoe crab. Contiguous areas containing these ESAs within the coastal management zone will be designated as CRZ-I and MoEF will assume the conservation responsibilities for these areas.

Under capacity building, a National Centre for Sustainable Coastal Zone Management (NCSCZM) will be set up and operationalized. The vision of NCSCZM is to promote sustainable coasts through increased partnerships, conservation, research and knowledge for benefit and well being of current and future generations. Hence the role of the Centre will be to support integrated management of coastal and marine environment for livelihood security, sustainable development, and hazard risk management by enhancing knowledge, research and advisory support, partnerships and network and relevant community interface. In order to achieve the vision the Centre will have research objective, social objective, knowledge objectives and policy objectives. The envisaged institution will have the following divisions such as geospatial sciences, integrated social sciences and economics, coastal impact assessment, conservation of coastal and marine resources, knowledge, governance, policy and futuristic research. This institution proposed to

establish in two phases, will be developed as a central repository of information and knowledge on ICZM practices in India and elsewhere; partner with similar national and international institutes; analyze the successes and failures in ICZM and develop suitable applications in Indian contexts; promote technically sound and practical management approaches to ICZM; evaluate and monitor implementation of the ICZM approaches, programs and projects; advise the governments and other stakeholders on policy, legal and scientific matters related to ICZM; serve as an interface between coastal communities, experts and governments; and will promote applied research, education and awareness with respect to ICZM including ecological literacy. To achieve these objectives, the proposed NCSCZM will be established as an autonomous institution, with an aim to become a world-class institution for integrated coastal and marine area management, as well with adequate human resources, facilities, and assured long-term funding.

The success of the project will largely depend on developing and strengthening the capacity of MoEF and the relevant state-level institutions to adopt and practice ICZM approaches. At the national level, specific support will be provided for MoEF's medium-term capacity building plan, and training of coastal zone managers from all coastal states and union territories. This component will also support project management, which will include staffing and operation of the National Project Management Unit (NPMU); establishment of adequate financial and procurement management systems; implementation of communication plan and RTI related activities; implementation of governance and accountability actions; M&E and third party audits; coordination meetings with states and other stakeholder engagement; and special evaluation studies. It is envisaged that the NPMU, which is being set up as an autonomous society will be transformed during the project implementation period into the Coastal Zone Management Division of MoEF, as per the MoEF capacity building plan. Most of the systems set up for project management, will be incorporated into the medium-term capacity building plan.

The other three components of the ICZMP are state wise and MoEF has identified Gujarat in west coast and Orissa and West Bengal in East coast for the pilot implementation of project activities including preparation of ICZM plan (Fig. 1.1)

1.2.2 Component - ICZM approaches in Gujarat

This component will support capacity building of the state level agencies and institutions, including preparation of an ICZM plan for the coastal sediment cell which includes the Gulf of Kachchh, and priority investments. Together with the ICZM plan, these address the major coastal zone management issues in the Gulf of Kachchh in particular and the entire coastal and marine areas of Gujarat in general. The Gulf of Kachchh contains two of the world's largest refineries; two major ports and several smaller facilities accounting for 70% of India's import of crude oil; largest of India's salt industries; industrial and urban centres; India's first marine national park; significant remnants of coral reefs of the country, which altogether highlights the economical and ecological importance of the area. Unless managed through an integrated process, the ecological values will not be sustained, and the resource dependent economic activities will be severely affected.

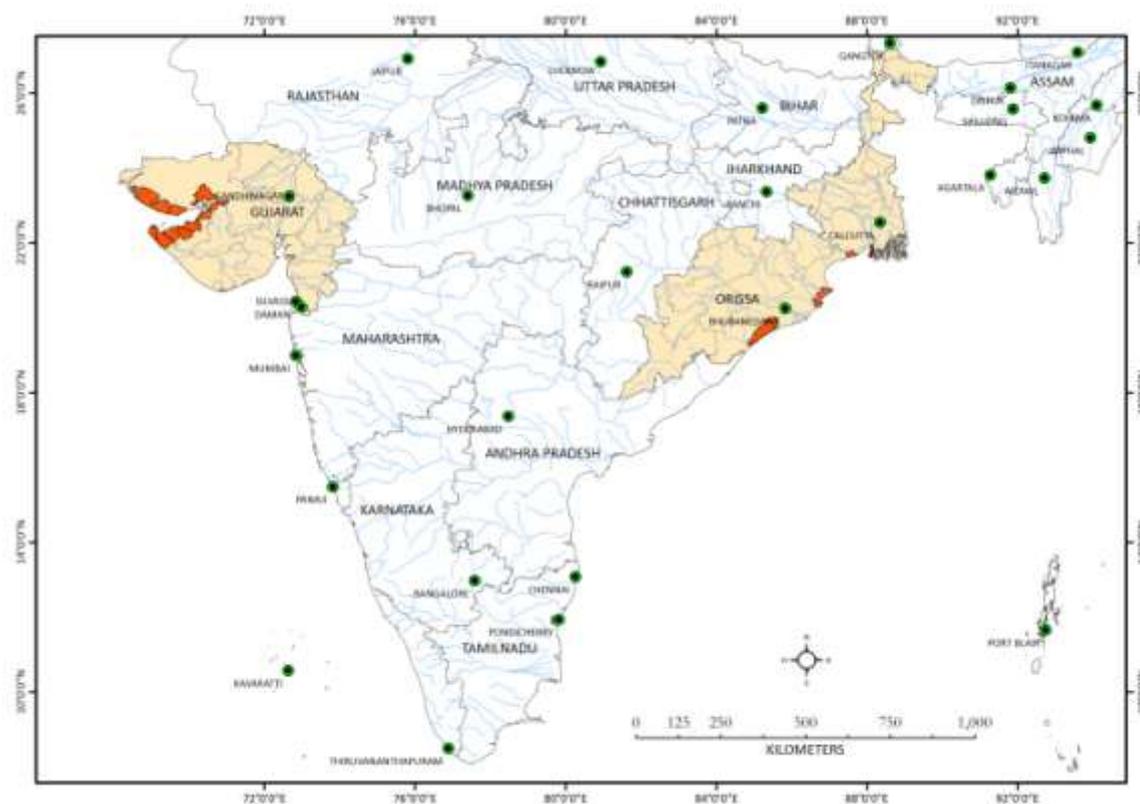


Fig. 1.1: States selected for preparation ICZM plan and implementation of pilot projects

Supporting preparation and adoption of an ICZM Plan for the Gulf of Kachchh: The plan is designed as a process of regular revolving stakeholder dialogue, supported by technical and data inputs. Understanding will need to be improved of the natural coastal and marine processes, resource endowments, potential coastal hazards and risks to coastal communities, assessment of the current and cumulative pressures on the coastal and marine resources, and valuation of the traditional and current resource use and dependence among the stakeholders. Stakeholder analyses and consultations will be used to identify stakeholder's requirements, priorities, concern and conflicts, development risks and opportunities. The content of the plan will depend upon stakeholder agreements, subject to the limitation that any plan proposal will not affect, directly or indirectly, the ESAs (as determined by the ESA mapping under the national component), or violate the guiding principles set out in the Swaminathan Committee Report. The ICZM plan will include the implementation arrangements, M&E and plan review mechanisms, detailed proposals for financing implementation including resource generation by implementation of the plan itself, and all relevant social and environmental mitigation measures.

To complement ICZM plan preparation, will support capacity building of the Department of Forest and Environment (which is the secretariat for the Gujarat SCZMA), Gujarat State Pollution Control Board (for monitoring and enforcing pollution control in the coastal areas), Gujarat Environment and Ecology Research Foundation (for developing relevant research capacity in coastal ecology, and for developing suitable techniques for transplantation and regeneration of coral reefs), and the Bhaskaracharya Institute of Space Applications and Geo-Informatics (for preparing GIS-enabled mapping and decision support tools for the coastal areas).

This component would also support priority investments in Gujarat, all located in the Gulf of Kachchh, to complement the ICZM plan and capacity building sub-components, and would include the following:

(i) Conservation and protection of coastal resources

- Mangrove plantation,
- Coral reef regeneration
- Coastal shelterbelt plantation, and
- A marine aquarium at Dwarka, through a private-public-partnership model

(ii) Environment and pollution management

- Completing the environmental sanitation of Jamnagar City, to prevent further degradation of the coral reefs.

(iii) Livelihood security of coastal communities

- Livelihood improvement activities in the non-forest villages of the coast, and
- Ecotourism and related livelihood improvement activities for villages within the protected areas.

Project Management support will include staffing and operation of the State Project Management Unit (SPMU), and other project management activities similar to the support to NPMU. Additional support will be towards establishing a grievance registration and redressal system; quality assurance consultancies; and social audits. The SPMU will be transformed during the project implementation period into the Coastal Zone Management Division of the DoFE, as per the state capacity building plan, and most of the project management support will contribute to building the medium-term capacity building plan.

1.2.3 Component - ICZM approaches in Orissa

This component will include capacity building of the state level agencies and institutions, preparation of an ICZM plan for the coastal sediment cells i.e., the stretches of Paradip-Dhamra and Gopalpur-Chilika, a regional coastal process study, and priority investments. The content of the ICZM plan and the plan process that will be supported is similar to those described under ICZM plan preparation in Gujarat.

The project will support capacity building of the DoFE (which is the secretariat for the Orissa SCZMA), Orissa State Pollution Control Board (for monitoring and enforcing pollution control in the coastal areas), and the Chilika Development Authority (for species and wetland research).

The priority investments in Orissa are concentrated in two reaches of (i) Gopalpur-Chilika and (ii) Paradip-Dhamra. These coastal stretches are known for their significant ecological values and economic activities – Chilika lake, one of the largest brackish water lake in the world; the Bhitarkanika, which is the second largest mangrove ecosystem in Asia; the most significant nesting site of olive ridley turtles; the large vulnerable population dependent on coastal resources; and the recent and proposed expansion of economic infrastructure such as ports. These investments will include the following:

(i) Conservation and protection of coastal resources

- Protection of olive ridley turtle and other aquatic wildlife,
- Mangrove plantation,
- Conservation of archaeological heritage, which serve as cyclone shelters at times of distress, and
- A pilot work in shoreline protection for village Pentha.

(ii) Environment and pollution management

- Environmental sanitation of the coastal town of Paradip to reduce pollution load at the coastal stretches known for nesting habitats.

(iii) Livelihood security of coastal communities

- Livelihood improvement support in 60 fishing villages in the periphery of the Chilika lake and the Gahirmatha Wildlife Sanctuary to develop allied farming activities,
- Support to fishing communities in developing small-scale tourism activities,
- Support to fishing communities in developing small-scale industrial and marketing activities, such as coir-making, and
- Provision of cyclone shelters in the thirteen coastal villages where cyclone shelters are not available at present.

Project management support will be similar to the support to Gujarat described earlier, and with the same intention to contribute to Orissa's medium-term ICZM capacity building plan

1.2.4 Component - ICZM approaches in West Bengal

In West Bengal, the project will support capacity building of the state level agencies and institutions, including preparation of an ICZM plan for the coastal sediment cells which include the coastal areas of West Bengal, and priority investments. The content of the ICZM plan and the plan process will be similar to those described under component two and three for Gujarat and Orissa. However, all the three coastal sectors in the State (Sundarban, Haldia, and Digha-Shankarpur) will be covered in the plan, provided if the initial coastal geomorphological studies determine that all the three sectors are located within one coastal sediment cell.

A capacity-building sub-component will support the DoFE (which is the secretariat for the West Bengal SCZMA), West Bengal State Biodiversity Board (for research, monitoring and protection and/or conservation of the biodiversity resources), the Kolkata University (for research and inventory of invertebrates), and the Institute of Environmental Studies and Wetland Management (for geomorphologic and wetland research, and for supporting completion of a Sundarban Resources Interpretation Centre through an NGO).

Similar to Gujarat and Orissa, the priority investments in West Bengal will complement the ICZM plan and the capacity building sub-components to address the major coastal zone management issues in the two targeted coastal stretches of (i) Digha-Shankarpur, and (ii) Sagar Island in the Sundarban. These stretches are experiencing highest rates of coastal erosion in recent years, hence significant coastal resources, and livelihood is threatened. The priority investments will include the following:

(i) Conservation and protection of coastal resources

- Mangrove plantation,
- A pilot work in shoreline protection for Digha beach, based on the learning from previous protection works,
- A pilot work in shoreline protection for the southern end of Sagar Island, and
- Rehabilitation of the marine aquarium at Digha.

(ii) Environment and pollution management

- Completing the sewerage system and environmental sanitation of Digha to prevent flow of sewage onto the sandy beach,
- Cleaning and environmental improvement of the Digha beach, and solid waste management in Digha,
- Improvement of the fish auction centre at Digha, and
- Distribution of grid electricity in Sagar Island to replace diesel generator and prevent soil and water pollution.

(iii) Livelihood security of coastal communities: These activities will be implemented in Sagar Island and will include:

- Improvement in fishery based livelihood systems, and
- Support to CBO coordinated livelihood improvement and market access, afforestation-based livelihood improvement, as well as promotion of local small-scale tourism and ecotourism activities.

Project management support is similar to the states of Gujarat and Orissa described for components two and three with the same intention to contribute to medium term ICZM capacity building plan of West Bengal.

1.3 Objective of the Environmental and Social Assessment

The importance of preserving and protecting natural coastal and marine ecosystems for human well-being has now been globally recognized and a series of environment related projects have been implemented over the years to conserve and restore these systems to near natural conditions. Management of coastal resources and ecosystems is now entering a new phase based on advanced knowledge and world experience. It is important to ensure that corrective and improved steps are incorporated during future planning and implementation of coastal conservation projects. In this regard, to aid the implementation of the ICZM Project in India, the Ministry of Environment and Forest (MoEF) and The World Bank has identified the need for an Environmental and Social Assessment of the entire project covering the national and the state components. The MoEF has entrusted this study to the Centre for Environment and Development (CED).

The specific objectives of the Study are:

- To identify potential environmental and social risks arising from the project's support to the proposed ICZM framework in India, and the capacity building initiatives at the national and state levels. The study will recommend ways in which such risks could be mitigated or managed by the project (including summarizing the recommendations of the other relevant studies), in turn inform the project design in incorporating these mitigation or management measures;
- To appraise the national and state projects reports, and stakeholder concerns, and recommend measures to inform and mainstream environmental and social impact management measures in the draft terms of reference for preparing ICZM Plans in the three states;
- To review the environmental and social assessments for each of the state level priority investments; identify the gaps, if any, and support the states to complete the same as relevant.

1.4 Scope of the Present Study

The main aspect of the study is to conduct a social and environmental impact assessment of all the components, sub components and activities envisaged in the ICZM project. In order to make assessment, the overall contexts at environmental, social and policy level will be narrated critically appraised both at national and pilot implementing states. The study will also identify issues about coordination and/or conflict among the various implementation agencies that may result in environmental or social impacts in the context of the project. The outcome of the consultations by various other agencies (both national and state) conducted for the project will also be analysed and ascertained. The experience of implementing CRZ notification (1991) since inception will be analysed and carefully examined in the context of the ICZM project.

The study will identify the potential environmental or social risks/impacts that may occur due to hazard line mapping and mapping and delineation of Ecologically Sensitive Areas (ESA). Consultants will describe how these risks/impacts are already addressed by the design of the project, and what implementation arrangements have been made in the project, if lacking, the same will be suggested. With respect to NCSCZM and national level capacity building, the project report of the NCSCZM will be carefully examined for the institutional design, objective and role of the Centre and will be appraised. The activities mentioned against national level capacity building will also be scrutinised.

Regarding the state level components,

(i) the draft ToR for the preparation of ICZM plan for the piloting states will be examined to determine whether the factors such as contexts, conflicts, community dependence, etc are adequately incorporated in the content and the process (participatory/consultative) of preparation of the plan. Necessary recommendations will be provided if the draft ToR fails to address the above mentioned factors.

(ii) the DPRs prepared for the priority investments in the states of Gujarat, Orissa and West Bengal will be appraised in the context (environmental and social analyses and assessments) of this study. The DPR preparation process will also be examined to ascertain whether the agencies have conducted enough consultations with all the stakeholders who are directly or indirectly affected by the priority investments. The adequacy of planning site specific issue based mitigatory measures in the DPR for any social or environmental impact that may arise during the implementation of the activities will be carefully scrutinised and necessary suggestions will be made. The possibility of involuntary resettlement due to the project activities or due to direct consequences of the project will be examined and in the event, an entitlement framework (which should fulfil the requirements of the national policies) and resettlement action plans will be prepared to incorporate in the DPRs by the relevant agencies. The compliance and adequacy of regulatory framework, at national, state and local level, will be examined in the context of World Bank operational policies and determine if additional work is required to fulfil the them. The communication strategy including the disclosure mechanism prepared for the project will be reviewed and necessary recommendations will be made.

Based on the above process consolidated Environmental and Social Assessment Report for the project will be prepared. The structure of the report will be as per the Annex I of the World Bank Operational Policy 4.01. In addition, a separate chapter should summarize all the consultation processes, carried out by the MoEF, state governments, or the state implementing agencies, or their consultants; as well as carried out by CED. A separate report as brief executive summary of the consolidated environmental and social assessment will also be prepared.

1.5 Methodology Adopted for Achieving Objectives

The following activities were undertaken:

- Collected all the available DPRs and SPRs and other reports of the studies given under ICZM project from the MoEF and World Bank;
- An initial analysis of the DPRs and SPRs were made and prepared an outline of the activities to be undertaken for the analysis;
- Conducted field visits to Orissa (2nd week of January, 2009 and 3rd week of February and May, 2009; West Bengal (3rd week of January and 18th-20th June, 2009) and Gujarat (3rd week of February, 2009);

- Consulted the senior officials of the state project preparation cell and other relevant departments (implementing agencies) and discussed the details of the environmental and social assessment studies carried out for the preparation of DPR;
- Collected relevant additional documents from various departments and agencies;
- Visited the priority investment project sites and collected relevant information regarding the environmental and social issues to be addressed in the project by interacting with major stakeholders;
- Collected relevant study reports from various institution regarding coastal zone management;
- Conducted a detailed analysis of the entire data and reports collected from the states;
- Conducted consultation meetings with experts from the MoEF and World Bank.

The component wise activities undertaken are detailed below:

1.5.1 Overall context of Integrated Coastal Zone Management in India

- Collected the environmental and social baseline information on the coastline of India. Reports and other published information were perused to identify the management and conservation issues persist in the coastal region. The documents related to various policy initiatives and regulations, were collected and analyzed to see the compliance of project activities.
- The strength and weakness of the current coastal zone management policies, practices and programs were critically assessed and major issues leading to environmental degradation and other impacts were identified through a consultation process with experts and decision-makers.
- The need to adopt ICZM approaches and details of the process of ICZM approaches was prepared by taking clue from the various national level studies and by the three pilot ICZM project states and consulting the state level ICZM project authorities.
- An analysis of various stakeholder consultations with respect to ICZM approaches was done, covering national level consultations by CEE, state level project consultations by participating states of ICZMP, MoEF consultations, consultations by the project's Communication Consultants and others held within the states specifically for this project.
- The possible alternatives considered at the policy and project levels by the ICZM project states to assess the environmental and social impacts of the programs and the institutional arrangements for conflict resolution were analysed by going through the project documents, stakeholder consultations and discussions with various officials.
- Considering the major beneficiary of the ICZM project as the coastal communities including traditional dwellers and the marginalized communities especially tribal's, the project team consulted with experts and various stakeholders in the three ICZM project states and assessed the process of benefit sharing from the ICZM project within the marginalised local coastal community.
- Critical assessment of the process of benefit sharing suggested in the ICZM project reports of the three states was undertaken. Procedures for involvement of stakeholders in relevant

decision making process were discussed during the consultation with experts and decision-makers.

1.5.2 Hazard Mapping and Mapping of Environmentally Sensitive Areas

- Based on the methods and tools for mapping and demarcation of hazard lines (collected from the ICZM Project Aide Memoire dated 26.06.2008), the project team analyzed the potential environmental and social risks with regard to various factors like:
 - a. Potential for displacement of people if any
 - b. Potential effect on land values
 - c. Effects on coastal fisher people and any other vulnerable community or groups (specifically any tribal communities or groups)
 - d. Impacts on the socio-cultural settings
 - e. Effect on land use and land use change
 - f. Degradation of coastal and marine ecological resources
 - g. Effect on local economic development, etc.
- Analyzed the report on Methodology for Mapping and Delineation of ESAs and conducted a review on how the identification and mapping of ESAs will take care of some of the risks in the CRZ approach.

1.5.3 National Level Capacity Building and NCSCZM

- The report on NCSCZM will be perused to elicit the design of the institution, objective and mandate of the Centre to cater the need of successful implementation ICZM project. The capacity building support required at national and state level from the NCSCZM for the implementation of ICZM project will specifically looked into. The training need assessment carried out at different level will also be carefully analysed so that any gap in this activity could be pointed out to incorporate in the ICZMP. The disclosure mechanism suggested in the communication strategy will also critically reviewed.

1.5.4 Preparation of ICZM plans

- The ICZM plan for the pilot implementing states will be prepared based on ToR which is yet to finalise. However with the available information and exposure of the team members to the coastal stretches where ICZM plans have to be prepared, necessary suggestions will be provided.

1.5.5 Priority Investments in Orissa, Gujarat and West Bengal

- The DPRs received from different project offices (both national and state level) were carefully studied. Although they lack environmental and social assessments, based on the activities suggested under each priority investments projects and field visits, necessary suggestions were provided to all states with regard to the methodology for preparing the environmental and social assessment reports, and including the same in the respective DPRs. Additionally, an environmental management plan with mitigation measures, strategy for implementation and monitoring, capacity building and plans for budget allocation were prepared and suggested to incorporate in the DPRs.

1.6 Report Structure

- Chapter 2 provides a review of legal, regulatory, policy and institutional framework existing at the national, state and regional levels in the country and its compliance with ICZM project and suggestions for further policy framework support in the context of the project.
- Chapter 3 and 4 presents the baseline environmental and social conditions of the coastal areas of India and in the three pilot investments states and specific stretches of intervention
- Chapter 5 describes the finding of the various consultations conducted at national and state level in lieu of the project and its effectiveness in understanding the concept of the ICZM.
- Chapter 6 presents the outcomes of the analysis of alternatives reviewed for different sub components and activities at various stages of the project formulation
- Chapter 7 presents the anticipated impacts along with the key environmental and social issues and mitigation measures proposed for the project components both national and state level.
- Chapter 8 provides details of the environmental and social management plan, followed by a monitoring plan and institutional mechanism and budget estimates for the implementation of EMP.

CHAPTER 2

POLICY, REGULATION AND INSTITUTIONAL FRAMEWORK

Environment Policies and Regulations in India, attempt to address coastal issues through the use of coastal zoning in order to spatially separate incompatible uses and protect fragile environment / ecosystems. The most significant Indian policies that would apply to the coastal development-environment interface are those contained in the Indian Constitution and the international agreements that India is a party. Additionally, there are policies and plans for sectoral development, and environmental policies and legislation to protect the environment from further degradation.

This chapter is particularly relevant that the implementation of the project components, sub components and activities will reveal the obligation and compliance of the country with respect to the adopted national and international policy frame work for the sustainable management of resources. In general the project is not violating any of the policies adopted by the national government and also fall-in-line with its commitment towards ecological and social security that the country is bound to provide constitutionally. Hence a review and analysis of the policies with respect to the project is being attempted here.

2.1 Constitutional provisions

India has, what is popularly termed three tiers of government, within a structure of cooperative federalism. The first tier is the central government, the second is the state government, and the third is the village level, known as the panchayat system. India's Constitution clearly explains the responsibilities between the central and state governments. Part XI of the Constitution governs the administrative and legislative relation between the centre and the states. Article 246 divides all subject areas of legislation into three categories – Union, State and Concurrent. When a central law conflicts with a state law in a concurrent subject, the former prevails. The aspects related to coastal and marine environmental protection under Union, State and Concurrent lists are given below:

Union / Central List

- Entering agreements with foreign countries and implementation of treaties, agreements and conventions with foreign countries
- Shipping and navigation on inland waterways
- Maritime shipping and navigation, including shipping and navigation on tidal waters
- Regulation and development of inter-state rivers and river valleys
- Fishing and fisheries beyond territorial waters
- Environment protection and management

State List

- Public health and sanitation, hospitals and dispensaries
- Land
- Fisheries
- Water

Concurrent List

- Shipping and navigation on inland waterways with mechanically propelled vessels
- Factories

The subsequent sections of the report provide an overview with reference to coastal area controls, though the details may vary among states. The coastal governance in India has diverse institutional arrangements for decision-making for development and ensuring safeguards for the environment which occur at three levels of government: national, state, and local. Development activities are coordinated by the respective ministries, depending on whether the subject is within the central or state list. The two main nodal bodies for decision-making related to impacts of activities, potential or actual, in coastal areas and the seas and oceans are the MoEF and the MoES. Numerous other agencies operate at the other two tiers of government: as detailed in subsequent sections.

2.2 International conventions and treaties signed by India

India is signatory to various international conventions and treaties related to environmental protection and has also taken numerous initiatives towards implementation. Table 2.1 depicts the key international conventions and treaties on the subject signed by India.

Table 2.1: Key International conventions and treaties on environment signed by India

Convention	Effective	Year Signed and Enforced
Convention Relative to the Preservation of Fauna and Flora in their Natural State	1936	1939
International Plant Protection Convention (1951)	1952	1952
International Convention for the Prevention of Pollution of the Sea by Oil (1954)	1974	1974
The Antarctic Treaty (Washington, 1959)	1998	1983
Ramsar Convention on Wetlands of International Importance (Ramsar, 1971)	1982	1971
Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972)	1978	1977
Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington, 1973)	1976	1974
Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 1979)	1982	1979
Convention on the Conservation of Antarctic Marine Living Resources (Canberra, 1980)	1985	1980
United Nations Convention on the Law of the Sea (Montego Bay, 1982)	1995	1982
Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel, 1989)	1992	1990
Protocol on Environmental Protection to the Antarctica Treaty (Madrid, 1991)	1998	1992, 1996
United Nations Framework Convention on Climate Change (Rio de Janeiro, 1992)	1994	1993
Convention on Biological Diversity (Rio de Janeiro, 1992)	1994	1992
Agreement relating to the Implementation of Part XI of the UNCLOS 1982 (1994)	1996	1995
Protocol to the United Nations Convention on Climate Change (Kyoto, 1997)	2005	1997

Source: <http://www.biodiv.be/links/lnk-world/int-conv>
http://en.wikipedia.org/wiki/List_of_treaties

A brief on some major treaties and conventions is presented in the subsequent sections of the chapter.

Convention on Civil Liability for Oil Pollution Damages (CLC 1969)

The Civil Liability Convention was adopted to ensure that adequate compensation is available to persons who suffer oil pollution damage resulting from maritime casualties involving oil-carrying ships. The Convention places the liability for such damage on the owner of the ship from which the polluting oil escaped or was discharged. The Convention requires ships covered by it to maintain insurance or other financial security in sums equivalent to the owner's total liability for one incident. The Convention applies to all seagoing vessels actually carrying oil in bulk as cargo, but only ships carrying more than 2,000 tons of oil are required to maintain insurance in respect of oil pollution damage.

Although the ICZM project does not have any component or subcomponent or activities directly related to this Convention the oil pollution especially in the Gujarat coast (Gulf of Kachchh) may be looked in this context. The large scale shipping of oil through Gujarat coast for the national interest is continued to grow. Hence the pollution monitoring activities suggested in the project is a compliance towards this Convention.

Ramsar Convention, 1971

The Convention on Wetlands, signed in Ramsar 1971, is one of the oldest intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. There are presently 159 Contracting Parties to the Convention. As a part of the conservation strategy a data book called Montreux Record is kept of all those wetlands that require international help for conservation. The inclusion of a site in this list makes it eligible for a global package for conservation related activities. It also enjoins the Parties to the Convention to formulate and implement their planning so as to promote the conservation of listed wetlands and as far as possible, the wise use of wetlands in their territory (Article 3.1).

The project has many activities related to wetlands such as planting of mangroves, conservation of turtle in the Orissa coast, crab fattening, etc. All these activities comply with the objectives of the convention and would help in strengthening the initiatives taken by the country as a Party to Ramasar Convention.

London Dumping Convention 1972 (Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972)

The Convention has a global character, and contributes to the international control and prevention of marine pollution. It prohibits the dumping of certain hazardous materials into the sea / oceans, requires a prior special permit for the dumping of a number of other identified materials and a prior general permit for other wastes or matter.

Although direct dumping of large scale waste in the marine environment is not dealt in this project, the discharge of effluents from factories and sewage from urban areas is being addressed through activities such as pollution monitoring and sewage/solid waste treatment plants in all the piloting states.

MARPOL 73/78

It is one of the important international marine environmental conventions promoted by International Maritime Organization (IMO), designed to minimize pollution of the seas including dumping, oil and exhaust pollution. The objective of the Convention is to reduce the volumes of harmful materials entering the world's ocean and the marine environment. Ships have traditionally discharged all of their waste into the sea. It includes oils, chemicals, plastics and other materials which may float, are non biodegradable, are extremely persistent and deteriorate very slowly. Huge volumes of these materials can be found on the world's shorelines. To date, most of the industrialized countries have both signed and ratified the Convention. However, less developed countries have been slow to sign the Convention partly because of lack of appreciation of the potential benefits to their own country and fear of costs associated with the need to re-fit

their national fleet to conform to the and to provide waste reception facilities in their ports and harbors. The countries most likely to benefit from the MARPOL 73/78 Convention are those whose economies are closely linked to tourism. The protection and sustainability of their marine environment is essential to preserve irreplaceable natural resources.

The priority investments such as capacity building and pollution monitoring in the pilot implementing states by the respective pollution control board is related to this Convention.

Ocean Policy Statement, 1982

Sets out the basic principles through which the development of ocean is to be carried out. The Ocean Policy Statement is primarily aimed at utilization of marine living and nonliving resources for societal benefits in a sustainable manner.

Salient features of the Policy Statement and thrust areas include:

- Exploratory survey, assessment and sustainable utilization/harnessing of the ocean resources including living, non-living and renewable sources of ocean energy.
- Technological advances geared to the utilization and preservation of the marine environment.
- Development of technology relating to instrumentation, diving systems, position fixing, materials development, oceanic data collecting devices, submersibles, etc.
- Developmental activities related to integrated coastal and marine area management, coastal community development, etc., with direct application to the welfare of the society.
- Establishment of an ocean related information system using indigenous and foreign sources; International co-operation in Ocean Science and Technology.
- Development of technologies relating to seabed mining, extractive metallurgy and conducting Environmental Impact Assessment studies.
- Contribution towards front ranking research in polar sciences.
- Basic and applied research in Ocean Science and Technology, Human Resource Management, creation of Centres of Excellence in academic institutions and public awareness on the potential and uses of ocean.

Almost all the activities mentioned in the state components of the project are directly related to this policy statement. The activities aiming to improve the livelihood opportunities of the coastal communities through sustainable utilization of coastal and marine resources and conservation of coastal and marine ecosystem is complying to this policy statement as the country is a signatory to it.

Convention on Migratory Species of Wild Animals 1983

The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or Bonn Convention) aims to conserve terrestrial, marine and avian migratory species throughout their range. It is an intergovernmental treaty, concluded under the aegis of the United Nations Environment Programme, concerned with the conservation of wildlife and habitats on a global scale. The Convention gives protection to many species of crocodiles, sharks, turtles etc.

Although there are no activities directly related to migratory species in the project, the conservation of habitat and ecosystem in the coastal and marine area and various research programme envisaged in the

state components which aims to enhance the knowledge and capacity of implementing agencies on coastal resources would be considered as an adherence and compliance to this convention.

Rio Declaration, 1992

The Rio Declaration is an outcome of the meeting held in 1992, i.e. the United Nations Conference on Environment and Development (UNCED). It contains 27 Principles to guide activities in relation to the environment of nations and individuals. The Declaration represents a series of compromises between developed and developing countries and a balance between the objectives of environmental protection and economic development. The Declaration provides a benchmark to measure future developments and provides a basis for defining sustainable development and its application. It is an attempt to achieve an acceptable balance between environment and development. The Rio Declaration also took note of the relationship between environmental protection and free trade obligations, the development of national and international law regarding liability and compensation for the victims of pollution and other environmental damage, the need to eradicate poverty and decrease disparities in standards of living, and the reduction and elimination of unsustainable patterns of production and consumption. The Declaration supports the full participation of women, youth, and indigenous people and their communities and recognizes that war is inherently destructive of sustainable development, etc.

Agenda 21

Adopted at the 1992 UNCED, Agenda 21 is another important non binding instrument and action plan for sustainable development. It provides mechanisms in the form of policies, plans, programme, and guidelines for national governments to implement the principles contained in the Rio Declaration. Agenda 21 comprises 40 chapters focusing on major issues like poverty, sustainable agriculture, desertification, land degradation, hazardous wastes, atmosphere, fresh water, toxic chemicals, biological diversity, etc. These various chapters are categorized under four sections:

- Social and Economic Dimensions,
- Conservation and Management of Resources for Development,
- Strengthening the Role of Major Groups and
- Means of Implementation.

Under Agenda 21, provisions were adopted for decision making on natural resources management to be decentralized to the community level, giving rural populations and indigenous peoples land titles or other land rights and expanding services such as credit and agricultural extension for rural communities. The chapter on major groups calls on governments to adopt national strategies for eliminating the obstacles to women's full participation in sustainable development by the year 2000.

Convention on Biological Diversity, 1992

The Convention on Biological Diversity, known informally as the Biodiversity Convention, is an international treaty that was adopted in Rio de Janeiro in June 1992. The Convention has three main goals:

- Conservation of biological diversity;
- Sustainable use of its components; and
- Fair and equitable sharing of benefits arising from genetic resources.

The convention recognized for the first time in international law that the conservation of biological diversity is "a common concern of humankind" and is an integral part of the development process. The agreement covers all ecosystems, species, and genetic resources. It links traditional conservation efforts to the economic goal using biological resources sustainably. It sets principles for the fair and equitable sharing of the benefits arising from the use of genetic resources, notably those destined for commercial use. It also

covers the rapidly expanding field of biotechnology through its Cartagena Protocol on bio safety, addressing technology development and transfer, benefit-sharing and bio safety issues. Importantly, the Convention is legally binding; countries that join it ('Parties') are obliged to implement its provisions.

Almost all the project activities both in the national and state components and the process of consultation adopted for project formulation including ICZM plan is strengthening the compliance of the country towards Agenda 21 and Rio Declaration and convention on Biological Diversity Act, 1992. The project is not only addressing the conservation aspect but also given equal or more importance to the livelihood opportunities of the coastal communities to address the local economic development. The women empowerment through capacity building and income generating activities proposed in the state components of the project is not only praise worthy but in the interest of the Declaration.

CITES (1973)

CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments which aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. CITES was drafted as a result of a resolution adopted in 1963 at a meeting of members of IUCN (The World Conservation Union) and finally agreed at a meeting of representatives of 80 countries in Washington DC. on 3rd March 1973, and on 1 July 1975 CITES entered in force. CITES works by subjecting international trade in specimens of selected species to certain controls wherein all import, export, re-export and introduction of species covered by the Convention has to be authorized through a licensing system. The species covered by CITES are listed in three Appendices, according to the degree of protection they need.

- Appendix I includes species threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances.
- Appendix II includes species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival.
- Appendix III contains species that are protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade.

Roughly 5000 species of animals and 28000 species of plants are protected by CITES against over-exploitation through international trade.

Many species covered under the state components of the project especially on coral reefs would be adhering and compiling the Convention. The capacity building intended to provide during the project implementation would also help in increasing the awareness of different stakeholders about CITES.

Basel Convention, 1992

The convention contains specific provisions for the monitoring of hazardous wastes. A number of articles in the convention oblige parties to take appropriate measures to implement and enforce its provisions, including measures to prevent and punish conduct in contravention of the convention.

The activities mentioned in the state level components especially pollution monitoring and abatement through liquid and solid waste treatment system is in compliance of the Convention. The legal initiatives such as Environmental (Protection) Act and many subsidiary notifications (e.g., CRZ) and constitution of institutional mechanism to implement and enforce rules pertaining under EPA indicate the conformity of the country towards the convention.

Commission on Sustainable Development, 1993

The Commission on Sustainable Development (CSD) was set up in 1993 under ECOSOC, UN for the purpose of review of progress of implementation of the Agenda 21. Ministry of External Affairs is the political focal point while MoEF the technical focal point for the CSD matters and implementation of Agenda 21.

The institutional mechanism proposed as part of the ICZM Project ensures different tier institutions and authorities such as NCZMA and SCZMA to ensure sustainable utilization of resources. It also suggest local level institutional framework for implementation which is a compliance to CSD

UN Convention on the Law of Seas (UNCLOS), 1994

UNCLOS, also called the Law of the Sea Convention or the Law of the Sea Treaty, is the international agreement that resulted from the third United Nations Conference on the Law of the Sea (UNCLOS III), which took place from 1973 through 1982. The Law of the Sea Convention defines the rights and responsibilities of nations in their use of the world's oceans, establishing guidelines for businesses, the environment, and the management of marine natural resources. The Convention, concluded in 1982, replaced four 1958 treaties. UNCLOS came into force in 1994. To date, 158 countries and the European Community have joined in the Convention. However, it is now regarded as a codification of the customary international law on the issue.

The ICZM project comprehensively addresses the sustainable utilization of marine and coastal resources and conservation of the same for posterity. All the activities in the project would help in strengthening the compliance of the country towards the convention.

Kyoto Protocol, 1997

The Kyoto Protocol was adopted by the third Conference of Parties (COP – 3) of the UNFCCC on 11 December, 1997 in Kyoto, Japan and entered into force on 16 February, 2005 with the ratification by Russia on November 18, 2004. The Kyoto Protocol sets legally binding targets for industrialised countries to reduce their greenhouse gas emissions (5.2%) to a level equivalent to year 1990 by the target year 2012. The goal is to lower overall emissions of six greenhouse gases – carbon dioxide, methane, nitrous oxide, sulphur hexafluoride, hydro fluorocarbons and per fluorocarbons. Developing countries like Brazil, China and India have ratified the protocol.

The project and its various components though are not directly aiming to address reduction of green house gases, certain activities such as hazard zone mapping, construction of cyclone shelters in the coastal region are related to climate change. This indicates adherence of the Government towards Kyoto Protocol.

2.3 National Policies related to Coastal Areas and Marine Areas

National Wildlife Action Plan, 1983

Adopted in 1983 for the first time, the plan outlines the strategies and action points for wildlife conservation. The wildlife action plan was revised in 1988 after the formulation of the National Forest Policy.

The national wildlife action plan is very categorical with respect to strengthening PA management (both marine and non marine), conservation of biological diversity especially critical species, participation people in the planning etc. The activities such as mapping of ecologically sensitive areas, inclusion of marine PAs and ESAs, restoration of mangroves, research programme on corals, Olive ridley turtles, mangroves, etc aiming to enhance the knowledge and capacity of the institutional mechanism set aside for implementation.

National Water Policy, 1987, 2002

The first National Water Policy (NWP) introduced in 1987 after the unprecedented drought signifying the start of the process intended to improve the management of nation's water resources. The National Water Policy was revised in 2002, recognizing that water resources development should be planned for hydrological units, or watersheds. There are currently no national water policy provisions that introduce water demand management among various use sectors.

The NWP (2002) also encouraged the participation of private sector as a potential partner for water resources development and management. But a suitable working model has not yet developed for either a public-private partnership or a private agency taking over the public managed system. The water allocation priorities as set by the National Water Policy are:

- Drinking Water
- Irrigation
- Hydro Power
- Ecology
- Agro Industries and Non Agricultural Industries
- Navigation and Other Uses

The National Water Policy has provisions wherein the priorities can be modified for any region specific considerations. While planning and development of various projects, the National Water Policy lays stress on regions inhabited by disadvantaged groups / tribal areas and other weaker sections of the society.

The national water policy reaffirms to maintain the quality of surface and ground water and states the control of pollution and periodical monitoring of water quality, which is found to be included in the state components is an adherence of national water policy.

National Forest Policy, 1988

The Government of India in the erstwhile Ministry of Food and Agriculture enunciated a Forest Policy to be followed in the management of State Forests in the country. The principal aim of Forest Policy is to ensure environmental stability and maintenance of ecological balance including atmospheric equilibrium which is vital for sustenance of all life forms, human, animals and plants. The derivation of direct economic benefit must be subordinated to this principal aim.

The project has been formulated under the overarching principle of the Policy and hence its primary aim is to ensure environment stability and maintenance of ecological balance. The conservation efforts proposed in the project with respect to the mangrove ecosystem and capacity building activities on coastal and marine system may be seen as part of the implications of the Policy.

Deep Sea Fishing Policy, 1991

The New Deep Sea Fishing Policy announced in March, 1991 became fully effective during the year 1992-93. A number of vessels under Joint Venture, Test Fishing and Leasing were permitted and some vessels

started operating from 1993 onwards. However, in the wake of agitation by traditional fishermen groups, a committee was constituted to review the deep sea fishing policy. The Government has decided to accept the recommendations of the Review Committee in principle. It has also been decided to rescind the New Deep Sea Fishing Policy of 1991 whereas the charter policies are already being phased out. The Ministry has initiated action for formulation of a New Deep Sea Fishing Policy and a legislation to regulate operations of Indian fishing vessels in the Indian EEZ in consultation with Maritime States/UTs. With a view to achieving an integrated development of the Deep Sea Fishing Sector, the Ministry implemented the various schemes relating to infrastructure development.

The project supports the local fishermen for improving their livelihood and income generating activities through different state components, although the issue of deep sea fishing may not come under the purview of this project.

National Conservation Strategy and Policy Statement on Environment and Development, 1992

Policy formulated in response to the need for laying down the guidelines that will help to weave environmental considerations into the fabric of national life and development process. The major objectives of the policy with respect to marine and coastal zones are:

- Ensure that the environment and productivity of coastal areas and marine ecosystems are protected;
- Conserve and nurture the biological diversity, gene pool and other resources through environmentally sustainable development and management of ecosystems, with special emphasis on our mountain, marine and coastal, desert, wetlands, riverine and island ecosystems; and,
- Protect the scenic landscapes, areas of geomorphological significance, unique and representative biomes and ecosystems and wildlife habitats, heritage sites/structures and areas of cultural heritage importance.

Almost all the components and subcomponents of the project are being addressed the National Conservation Strategy. The national components such as ESA mapping and various state components on mangroves, coral reefs, shore protection, monitoring of coastal and marine ecosystem for pollution, solid and sewage treatment system in the coastal stretches of the pilot implementing states are well acknowledging the abovementioned strategy and policy.

Policy Statement on Abatement of Pollution, 1992

This policy attempts to harmonize economic development and environmental imperatives using a variety of regulatory instruments, fiscal incentives and educational and outreach methods to promote the application of the best technologies to reduce pollution. The policy elements seek to shift emphasis from defining objectives for each problem area towards actual implementation, but the focus is on the long term. The emphasis is on increased use of regulations and an increase in the development and application of financial incentives.

The state components of the project entitled to combat pollution in the coastal areas through interventions such as setting up of sewage and solid waste treatment system and monitoring infrastructures such as modern labs would definitely a strengthening action towards this policy.

National Tourism Policy 1998

The mission is to promote sustainable tourism as a means of economic growth and social integration and to promote the image of India abroad as a country with a glorious past, a vibrant present and a bright future. Policies to achieve this will be evolved around six broad areas such as welcome, information, facilitation, safety, cooperation and Infrastructure development. Conservation of heritage, natural environments, etc. and development and promotion of tourist products would also be given importance. The objectives of tourism development are to foster understanding between people, to create employment opportunities and bring about socio-economic benefits to the community, particularly in the interior and remote areas and to strive towards balanced and sustainable development and preserve, enrich and promote India's cultural heritage. One of the major objectives is the preservation and protection of natural resources and environment to achieve sustainable development.

The above objectives and mission will be achieved through

- The Government will make necessary linkages and synergies in the policies and programs of all concerned Departments/agencies by establishing effective co-ordination mechanisms at Central, State and District levels.
- It will be the policy of government to encourage people's participation in tourism development including Panchayati Raj institutions, local bodies, Co-operatives, non-governmental organisations and enterprising local youth to create public awareness and to achieve a wider spread of tourist facilities.
- The policy encourages partnership between the public and the private sectors for the sustained growth of tourism.
- Ensure intergovernmental linkages, co-ordination in tourism management and promotion.
- Ensure the role of private sector in tourism development both in core as well as non core activities such as luggage transportation, cleanliness and maintenance, vehicle parking facilities, etc
- Encourage voluntary agencies and volunteers have to contribute their expertise and understanding of local ethos to supplement the efforts of other sectors to provide the human touch to tourism and foster local initiatives.

The project which has got many activities related to tourism in the coastal area in fact reflects the national tourism policy. The mission, objectives and principles of the tourism policy has been well acknowledged in the tourism and livelihood activities designed in the project sub components. The role of private and other line department has also been stressed in the priority investments and other subcomponents.

National Agricultural Policy, 2000

The National Policy on Agriculture seeks to actualise the vast untapped growth potential of Indian agriculture, strengthen rural infrastructure to support faster agricultural development, promote value addition, accelerate the growth of agro-business, create employment in rural areas, secure a fair standard of living for the farmers and agricultural workers and their families, discourage migration to urban areas and face the challenges arising out of economic liberalization and globalisation. The policy seeks to promote technically sound, economically viable, environmentally non-degrading, and socially acceptable use of country's natural resources - land, water and genetic endowment to promote sustainable development of agriculture.

Although the project activities are not directly related to agriculture some of the activities such as shore protection in Orissa and West Bengal would help in promoting agriculture production.

National Population Policy, 2000

The Policy provide for a framework for advancing goals and prioritizing strategies during the next decade to meet the reproductive and child health needs of the people of India and achieve net replacement levels which is otherwise called Reduced Total Fertility (TFR) by 2010. It highlights that India's annual increase in population of 15.5 million is large enough to neutralize efforts to conserve the resource endowment and environment.

The policy does not have much implication towards the Project.

Marine Fishing Policy 2004

The theme of comprehensive marine fishing policy is enshrined in the National Agriculture Policy promulgated by the Government. The present policy the Government seeks to bring the traditional and coastal fishermen also in to the focus together with stakeholders in the deep-sea sector so as to achieve harmonized development of marine fishery both in the territorial and extra territorial waters of our country. The policy objectives are: (i) to augment marine fish production of the country up to the sustainable level in a responsible manner so as to boost export of sea food from the country and also to increase per capita fish protein intake of the masses, (ii) to ensure socio-economic security of the artisanal fishermen whose livelihood solely depends on this vocation. (iii) to ensure sustainable development of marine fisheries with due concern for ecological integrity and biodiversity.

The sub components related to livelihood improvement and additional infrastructures for the fishing community to market their produces and value addition facilities envisaged in the project would in accordance with the above mentioned policy.

National Environment Policy 2006 (NEP)

The National Environment Policy stresses the need for an approach to coastal environmental regulation in a more holistic manner and preparation of ICZM plans. In addition to that NEP also recognizes the need for technical and financial resource support for the states in preparation of ICZM plans. NEP suggests on the need to decentralize, to the extent possible, the clearance of specific projects to State level environmental authorities, exempting activities, which do not cause significant environmental impacts, and are consistent with approved ICZM plans. NEP suggests the following actions to be taken up:

- Mainstream the sustainable management of mangroves into the forestry sector regulatory regime, ensuring that they continue to provide livelihoods to local communities
- Disseminate available techniques for regeneration of coral reefs, and support activities based on application of such techniques
- Explicitly consider sea-level rise and vulnerability of coastal areas to climate change and geological events, in coastal management plans, as well as infrastructure planning and construction norms
- Adopt a comprehensive approach to Integrated Coastal Management by addressing linkages between coastal areas, wetlands, and river systems, in relevant policies, regulation, and programs
- Develop a strategy for strengthening regulation, and addressing impacts, of ship-breaking activities on human health, and coastal and near marine resources

The present project has been promulgated in the context of National Environmental Policy which also aims for the conservation and sustainable utilization of coastal and marine resources.

National Rehabilitation and Resettlement Policy, 2007

This policy strikes a balance between the need of land for developmental activities and protecting the interests of land owners and others. The benefits under the new policy are available to all project affected

persons and families whose land, property or livelihood is adversely affected by land acquisition, involuntary displacement due to natural calamities, etc. The NRRP represents a significant milestone in the development of a systematic approach to addressing resettlement. The policy establishes a framework for extending additional assistance to Project-Affected Families (PAPs), over and above the compensation for affected assets provided under the Land Acquisition Act. While the policy has a number of useful features based on established good practice, some key gaps remain between the NRRP and the World Bank approaches and standards for involuntary resettlement.

The key point of divergence between the National Policy and the World Bank approach to resettlement issues is a government focus on compensation versus donor concerns for sustainable restoration of incomes of PAPs, (or in the case of the very poor, improvement of incomes). The NRRP is using a legal framework driven by a concern to compensate for lost assets while the two funding agencies, as development institutions, approach resettlement as a development matter, and strive to reinstate or improve the income base of PAPs.

One way of rectifying this fundamental divergence is to supplement compensation for lost assets with existing government development programs or projects to improve income and living standards for all categories (owners, squatters, tenants, etc.), of PAP as is being followed in the project.

The NRRP contains a number of provisions that will help improve planning, implementation, and monitoring of involuntary resettlement in development projects. Key strengths of the policy include:

- (i) Sound provisions related to consultations with APs and disclosure of relevant information to them at various stages of resettlement planning;
- (ii) Recognition, in the preamble to the policy, that APs without legal rights also need to be assisted, although detailed provisions on how this would be put into practice are absent;
- (iii) Treatment of adult sons and daughters as separate families (and therefore, eligible for economic rehabilitation), which is a significantly higher standard than donor resettlement policy requirements;
- (iv) Provisions allowing for purchase of privately owned land through open-market transactions for the resettlement of project-affected people;
- (v) Provisions clarifying that the cost of resettlement needs to be included in the project cost;
- (vi) Recognition of the need to prepare resettlement plans that are disclosed to the APs in draft form, and reviewed and approved by competent authorities; and
- (vii) An attempt to define and set up an institutional framework, at the central and the state level, for planning, implementing, and monitoring resettlement.

The components of the project do not require any involuntary rehabilitation and resettlement of affected people. None of the filed interventions require displacement of people and all the activities are being carried out in the government land. Even if the resettlement is required in one or two occasions the concerned stakeholders has given their consent to the project component. If at all any issue arises the government should adopt the national policy and World Bank's policy for the same. Hence it may be seen that the project is in accordance with the NRRP.

2.4 Legal and Regulatory Framework

Following are the key legislative provisions applicable to the coastal areas in India as outlined in the Indian constitution.

Land Acquisition Act, 1894

Expropriation of and compensation for land, houses, and other immovable assets are carried out under the Land Acquisition (Amendment) Act, 1984. The Act deals with compulsory acquisition of private land for public purpose. The procedures set out include:

- (i) Preliminary Notification (Section 4);
- (ii) Declaration of Notification (Section 6);
- (iii) Notice to Persons Interested (Section 9);
- (iv) Enquiry and Award (Section 11);
- (v) Possession (Section 16) and
- (vi) Emergency Clause (Section 17)

Land Acquisition Process as per the Land Acquisition Act is given in Table 2.2. Under the Land Acquisition Act, 1894, before amendment, compensation for land and houses was paid at the market value of the assets on the date of preliminary notification.. The amount of the award was determined by a land acquisition officer, but could be appealed to a civil court. The 1984 amendment to the Land Acquisition Act addressed the matter of compensation and delays in payment. As regards, the level of compensation, the rate of solatium was increased from 15% to 30%. For delays, the amendment requires that:

- (i) A time of 1 year was fixed for completing all formalities between the issuance of Section 4 and Section 6; and
- (ii) The compensation award must be determined within 2 years of the issuing of section 6 notification. Interest is payable at a rate of 12% per year from the date of preliminary notification to the date of dispossession. These changes apply to cases before the civil courts even for awards made before the enactment of the amendments

Table 2.2: Land Acquisition Process as per the Land Acquisition Act

Legal Provisions	Actions
Section 4	The requiring agency prepares draft, Ministry of Law verifies it, then it is printed and proofread. Published in official gazette and two local newspapers; notice is posted in the locality concerned. No further land sales, transfers, or subdivisions after notice are allowed. A land acquisition officer (LAO) is appointed to survey the land. Notices under Section 4(1) are issued to individual owners and interested parties (1 month).
Declaration of Public Purpose	Government certifies that land is required for a public purpose. Declaration is published. Collector/Deputy Commissioner receives order from Revenue Department, state government. Land appraisal begins (2 weeks to 1 month).
Section 5(a), Enquiry	Enquire objections to land acquisition. Landowners and interested parties appear before LAO. Revenue Commissioner calls for comments of acquiring agency if objections are raised (1–3 months).
Section 6	State government issues notices. LAO serves individual notice on all interested parties of government's intention to take possession of land. Time and place set for claims to LAO. Public notice given. Collector or LAO investigates claims (12 months).
Section 9	LAO conducts on-site inquiry regarding area of land acquisition and compensation payable. LAO determines compensation (12 months).

Sections 11 and 12	<p>Declaration of final award by collector/commissioner/state government after inquiry of total valuation.</p> <p>Notice of awards given to interested parties for payment of compensation. Government can take possession of land and hand over to implementing agency (14 months).</p>
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The Land Acquisition Act as amended does not contain any provision specifically dealing with resettlement (including that related to income restoration aspects).

- (i) It does not allow for compensation (except for houses) for landless laborers, artisans, and those sharing the use of land but without legal rights to it;
- (ii) The method of valuation of land considers only the market price of land at the date of notification under Section 4(1) but ignores any increase in the value of land at a subsequent date. Compensating for actual market value of land, which will entitle the owner to buy similar replacement land in adjacent areas, is not practicable under the framework of the Land Acquisition Act;
- (iii) The Act computes the value of land through the sales statistics method, leading to undervaluation of land. Buyers deliberately undervalue their land in sales transactions to reduce registration fees. This leads to a large number of court cases resulting in further delays and harassment both to landowners and the LAO/project authority (PA);
- (iv) The Act does not specify any compensation for deprivation of common property resources, especially loss of customary rights to land and forests, which forms an integral part of tribal livelihoods; and
- (v) The acquisition process takes too long and is incompatible with infrastructure project construction schedules.

Proposed Land Acquisition and Rehabilitation & Resettlement Bills

The R&R Bill, which is designed to give a statutory status to the National R&R Policy, 2007 and the new land acquisition bills are still under the consideration of Government of India. The proposed bills, allow states to acquire 30% of land for private developers provided they have acquired the remaining 70% for setting up industrial and SEZ projects. Thus, the state would come into picture only after the private company concerned has acquired 30% of the land.

The R&R bill makes it mandatory for parties concerned to get a social impact assessment prepared by independent multi-disciplinary expert group in cases where 400 or more families are displaced in plain areas and 200 or more families in tribal and hilly areas. More details of the bills are yet to come.

Indian Fisheries Act, 1897

The Indian Fisheries Act establishes two sets of penal offences whereby the government can sue any person who uses dynamite or other explosive substance in any way (whether coastal or inland) with intent to catch or destroy any fish or poisonous fish in order to kill.

Marine Fishing Regulation Act, 1978

A model act that provide guideline to the states in India for enacting laws meant for protection of marine fisheries by regulating fishing in the territorial waters. The measures include regulation of mesh size and gear, reservation of zones for various fishing sectors and also declaration of closed seasons.

Indian Ports Act, 1908

The Indian Ports Act provides enactment relating to ports and port charges and rules for safety of shipping and conservation of ports.

Major Port Trust Act, 1963

The Act makes provisions for the constitution of port authorities for certain major ports in India and to vest the administration, control and management of such ports in such authorities and for matters connected therewith.

Merchant Shipping Act, 1958

The Merchant Shipping Act aims to deal with waste arising from ships along the coastal areas within a specified radius.

Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act, 1976

The Act describes the various zones such as territorial waters, EEZ, continental shelf etc.

Coast Guard Act, 1950

The Act provides provisions for levying heavy penalties for the pollution of port waters. Coast guard under the Ministry of Defence is responsible for combating marine pollution.

Wildlife Protection Act, 1972 (amended in 2001)

The Wildlife Protection Act, Rules 1973 and subsequent amendments provide for the protection of birds and animals and for all matters that are connected to it whether it be their habitat or the waterhole or the forests that sustain them. The 2001 amendment of the act included several species of fish, corals, sea cucumbers and sea shells in Schedule I and III. The Whale Shark placed in schedule I. The project sub components such as biodiversity based livelihoods proposed in the Component (3- Orissa) in the Bitarkanika WLS is evoke the some of the sections of W (P) A.

Forest Conservation Act, 1980 (amended in 1988)

The act deals with mainly to provide regulatory framework for the protection of the forest areas, resources, diversion of forestry land for non-forestry reasons. The act is particularly important for the project, when any of the non forestry activities are proposed in the notified forest area. In such cases clearances and EIA clearance either at state or national level are required depending on the proposed budget.

Biological Diversity Act 2002

The Biological Diversity Act is an act to provide for the conservation of biological diversity, sustainable use of its components, and fair and equitable sharing of the benefits arising out of the use of biological resources and knowledge associated with it.

Environment (Protection) Act, 1986

The Environment (Protection) Act authorizes the central government to protect and improve environmental quality, control and reduce pollution from all sources, and prohibit or restrict the setting and /or operation of any industrial facility on environmental grounds. The Environment (Protection) Rules lay down procedures for setting standards of emission or discharge of environmental pollutants. Almost all the components proposed in the project are inclined to EPA.

National Environment Tribunal Act, 1995

The National Environmental Tribunal Act, 1995 has been created to award compensation for damages to persons, property, and the environment arising from any activity involving hazardous substances {Hazardous substances means any substance or preparation which is defined as hazardous substance in the Environment (Protection) Act, 1986, (29 of 1986) and exceeding such quantity as specified by the Central Government under the Public Liability Insurance Act, 1991; (6 of 1991)}. The act shall be applicable in the coastal areas of India wherein hazardous substances are being shipped/ transported at ports or any other damages occurring due to the hazardous substances in the coastal areas.

The National Environmental Appellate Authority Act, 1995

Addresses appeals with respect to restrictions of areas in which classes of industries etc are carried out or prescribed subject to certain safeguards under the EPA. The objective is to bring in transparency and accountability and to ensure the smooth and expeditious implementation of developmental schemes and projects

Water (Prevention and Control of Pollution) Act, 1974

The Water (Prevention and Control of Pollution) Act establishes an institutional structure for preventing and abating water pollution. It establishes standards for water quality and effluent. Polluting industries must seek permission to discharge waste into effluent bodies. The CPCB (Central Pollution Control Board) was constituted under this act.

Air (Prevention and Control of Pollution) Act, 1981

The Air (Prevention and Control of Pollution) Act provides for the control and abatement of air pollution. It entrusts the power of enforcing this act to the CPCB.

Hazardous Wastes (Management and Handling) Rules, 1989

The objective of Hazardous Waste (Management and Handling) Rules is to control the generation, collection, treatment, import, storage, and handling of hazardous waste.

The components and subcomponents of the project implementing in the states and national level are in accordance to all the above mentioned acts and rules. The compliance and adherence of the acts could have been seen in all the project components. The activities will help in strengthening the enforcement of the above mentioned acts and rules.

Coastal Regulation Zone (CRZ) Notification 1991

The Coastal Regulation Zone Notification issued in 1991 was the first major legislation that was aimed at regulating various coastal activities and protecting the coastal environment. Several issues related to coastal management were addressed by various Ministries and Departments of State and Central Governments. However, all these management initiatives concentrated on specific issues such as coastal erosion, coastal pollution, ports and harbours, etc. The CRZ Notification was introduced with three main principles:

- It is necessary to arrive at a balance between development needs and protection of natural resources

- Certain activities are harmful for both coastal communities and their environment, and these should be prohibited or regulated
- If coastal ecosystems are sustainably managed, then the livelihoods of millions will be protected and their survival guaranteed.

Issued under the EPA, 1986, coastal stretches have been defined in CRZ and restrictions have been imposed on industries, operations and processes within the CRZ. For regulating development activities, the coastal stretches within 500 meters of High Tide Line on the landward side are classified into four categories, namely:

- CRZ-I: (i) Areas that are ecologically sensitive and important, such as national parks/marine parks, sanctuaries, reserve forests, wildlife habitats, mangroves, coral reefs, areas close to breeding and spawning grounds of fish and other marine life, areas of outstanding natural beauty /historically/heritage areas, areas rich in genetic diversity, areas likely to be inundated due to rise in sea level consequent upon global warming and such other areas, and (ii) Area between low tide line and the high tide line.
- CRZ-II: The areas that have already been developed upto or close to the shoreline. For this purpose, “developed area” is referred to as that area within the municipal limits or in other legally designated urban areas which are already substantially built up and which have been provided with drainage and approach roads and other infrastructural facilities, such as water supply and sewerage mains.
- CRZ-III: Areas that are relatively undisturbed and those which do not belong to either CRZ-I or CRZ-II. These will include coastal zone in the rural areas (developed and undeveloped) and also areas within Municipal limits or in other legally designated urban areas which are not substantially built up.
- CRZ-IV: Coastal stretches in the Andaman & Nicobar, Lakshadweep and small islands, except those designated as CRZ-I, CRZ-II or CRZ-III.

Amendments to CRZ Notification (1991)

During these years of implementation of CRZ, the MoEF has been receiving several representations/ suggestions from various stakeholders, including NGOs requesting to amend the notification for permitting certain activities. Taking into consideration these request/representations, Ministry has constituted committees consisting of experts to look into the specific issues raised by Central government, State governments, Local communities, CBOs and NGOs. The major committees and their recommendations are given below (Table 2.3).

Table 2.3: Summary of the recommendations by various Committees

Sl. No.	Issues	Recommendations	Action: MoEF
I. Shri B.B. Vohra Committee – Issues relating to tourism			
1.	Depth of the No Development Zone (Hotel Industry will Require 20-30 kms of coastline).	FHI- To reduce the No Development Zone (NDZ) in identified Areas NGO-concerns of SLR, ecology. Reduction of No Development Zone based on the region specific features with Environmental Impact Assessment.	Amended on 18th August, 1994. Reduced NDZ along the tidal water bodies to 50meters uniformly. Permitted construction in NDZ quashed by supreme Court in 1996
2.	High Tide Line demarcation	Not defined clearly. MoEF to define and decide the agency for demarcation	Amended on 8th August, 1994 & 2000. 7 agencies authorized – NHO, Centre

Sl. No.	Issues	Recommendations	Action: MoEF
			for Earth Science Studies, IRS Anna University- Space Application Centre, National Institute of Oceanography, IWED, and NIOT Guidelines issued.
3.	Depth of NDZ along tidal water bodies.. to identify the issues	Ministry of Environment & Forests to decide	Amended on 8th August, 1994 & 21st May, 2002. Up to the point of tidal influence i.e., 5 PPT during summer
4.	Ground water drawl in NDZ (Hotel asso, to draw by mechanical pumps in NDZ)	No change to be made; only manual extraction in 200-500meters	
5.	Land use in NDZ	Landscaping can be done in NDZ by dressing of sand dunes, live fencing along the resorts and permitted playfields but not swimming pools	Amended on 8th August, No flattering of sand dunes
6.	Height and FSI ...issue?	No change. Basement based on the NOC from Ground water board. Ground + one	No Change
7.	Corridors between hotels...issue?	Gap of 6 mts instead of 20 meters	No Change
8.	Highly Unhygienic conditions prevailing	To improve enforcement	No action
II. Fr. Saldanha committee (1) –to advise on with drawl of ground water and extraction of sand in A&D Islands			
1.	Availability of water is the issue over drawl of water, scarcity of water or indiscriminate withdrawal of water?	Water supply is less acute. Large scale ground water not permitted. Alternative sources to be studied	Amended on 31.1.97 Permitting manual drawl of ground water meters. in 50-200
2.	Sand from Coastal Regulation Zone Area.. same as above	Sand in Coastal Regulation Zone can be mined for a short period for 1 or 2 yrs only. Alternate sources to study.	In CRZ area on yearly basis
III. Fr. Saldanha committee -(2) – to examine specific issues relating CRZ			
1.	Criteria to reduce CRZ along tidal water bodies	Can be reduced if – Areas falls in CRZ-II, Population density is more than 400 persons /km 1/3rd area of panchayat is built up, Area of the barrier island is less than 1000 meters, Area elevated more than 100 meters.	Draft amendment 11th January 2002 but not finalized in view of large number of objections from NGOs from Bombay
2.	Criteria for construction of dwelling within 200 mts in CRZ-III	Dwelling of fisherman and bonafied traditional settlers subject to – Where the area is protected. Landward side of existing building. Constructions permitted up to 4.5 mt. with 100 sq.mts plinth.	-do-
IV. Prof. N. Balakrishnan Nair committee – on issues relating to Kerala			
1.	Setback of 500 mts - Notification does not taken into account the unique features of coastal areas and is not detrimental to development on long run. Untenable and unjustified.	A multi- disciplinary committee to be constituted.	No action
2.	Delineation of CRZ-II To include census towns and panchayat	No action proposed	No action

Sl. No.	Issues	Recommendations	Action: MoEF
3.	Extent of CRZ inland in case of tidal water bodies	No action proposed	No action
4.	Operation of ports and harbors	No action proposed	No action
5.	Port related industries recognized the need to permit port related industries.	No action proposed in absence of concrete suggestions	No action
6.	Handling, storage & distribution at ports.	To permit handling of substances as mentioned in 2(ii)	Amended on 9.7.1997 Permitting 13POL products. The list was provided by Ministry of Petroleum & gas
7.	Powers to be delegated for reclamation	Not agreed	No action
8.	Already approved projects land reclamation to be permitted	No comments	Amended on 9.7.1997 Reclamation for construction, modernization & expansion of ports.
9.	Non polluting industries to be included	Multi - disciplinary Committee to be assigned to permit industries with the additional environmental safeguards and pollution control measures.	No action
10.	Bunding for Aquaculture	No comments	No action
11.	Relaxation for tourism area	To be studied by multidisciplinary Committee.	No Action
12.	Construction of houses in 200-500 mts	To permit Construction	Fr. Saldanha committee constituted to frame criteria for such constructions.
13.	Draw of ground water	Manual Drawing of ground water in 200 mts	Permitting manual drawl of ground water in 50-200 mts for the entire country.
14.	Fish processing units to be permitted	To permit for modernizing and to equip effluent treatment plants	Amended on 9.7.1997
15.	Setback as 50 mts along tidal water bodies.	To reduce to 50 mts due the unique conditions of Kerala	No action
V. The D.M. Sukthankar Committee (1)- Recommendations on Mumbai			
1.	To increase FSI for the SRD	To permit increase in FSI for such Schemes	No action in view of the Judgment of High Court of Mumbai
2.	To increase FSI for the Dilapidated str. MoEF has issued a clarification the FSI shall be as on 19.2.1991	To permit FSI for such schemes	No action taken in view of the Judgment of High Court of Mumbai.
3.	To permit TDR in CRZ area	To permit TDR generated in CRZ within CRZ	No action
4.	Violation of CRZ by Construction of Navi Mumbai by destruction of mangroves.	To permit Navi Mumbai as there is the need of counter magnet townships.	No action
5.	To permit dumping of solid waste	Not recommended	Supreme court directed Govt. of Maharashtra to relocate landfill sites
6.	Constructions within inter tidal areas	To permit where already construction carried out	No action since CRZ to be amended.
7.	To permit Govt. housing schemes already initiated prior to	Recommended	Amended on 21st May,2002

Sl. No.	Issues	Recommendations	Action: MoEF
	19.2.1991		
8	Missing link roads in CRZ-I areas to be permitted	Recommended	No action

Based on the above recommendations MoEF had amended the CRZ Notification, 1991 as per the provisions laid down in the Environment (P) Act, 1986. Altogether 19 amendments (Anon, 2005; Dasgupta, 2008; 2008; <http://www.indlaw.com/actionaid/?Guid=917b78e6-bdf7-4822-a77a-3db95d5c4e89>) were made and some of the amendments are:

- S.O.595(E), dated 18th August, 1994 – Relaxed Coastal Regulation Zone area to 50 mts along the tidal influenced water bodies. This was based on B. B. Vohra Committees report. However, the Supreme Court in the Writ Petition 664 of 1993 quashed the above amendment.
- S.O.73(E), dated 31st January, 1997 – Permitted mining of sand and drawal of groundwater in the Coastal Regulation Zone area in Andaman and Nicobar.
- S.O.494(E), dated 9th July, 1997 – Permitted reclamation within port limits, constructions for operation expansion and modernization of ports. Development of public utilities within Sunderbans areas and storage of 13 POL products within port limits.
- S.O.730(E), dated 4th August, 2000 – Permitted storage of LNG in the inter –tidal area and exploration and extraction of oil and gas in Coastal Regulation Zone areas
- S.O.329(E), dated 12th April, 2001 – Permitting setting up of projects and Department of Atomic Energy, Pipelines and conveying systems in Coastal Regulation Zone areas.
- S.O.550 (E), dated 21st May, 2002 – Permitted non polluting industries in the field of IT and other service industries in the Coastal Regulation Zone area of special economic zones. Housing schemes of State Urban development Authorities initiated prior to 19.2.1991 was also permitted.
- S.O.110(E), dated 19th October, 2002 – Permitted non conventional energy facilities, desalination plans, air strips in Coastal Regulation Zone of A&N and a Lakshadweep. Storage of non-hazardous cargo such as edible oil, fertilizer and food grain was also permitted.
- S.O.460(E), dated 22nd April, 2003 – Project costing more than 5 crores requires clearance from Ministry of Environment and Forests.
- S.O.636(E), dated 30th May, 2003 – Permitted construction of embarkation facilities for Lakshadweep in Coastal Regulation Zone –I areas.
- S.O.725(E), dated 24th June, 2003 – Permitted construction of trans -harbour sea links passing through Coastal Regulation Zone –I areas.
- S.O.838(E), dated 24th July, 2003 – Relaxed No Development Zone to 50 mts from 200 mts from HTL in A&N and Lakshadweep for promoting tourism based on Integrated Coastal Zone Management study.

Violations to CRZ Notification (1991)

The violations of the CRZ area include destruction of CRZ-I areas such as mangroves, coral reefs, breeding sites of endangered species, etc., Illegal constructions coming up in No Development Zones of CRZ-III, construction in CRZ-II areas without adhering to the norms laid down in the Notification and constructions within CRZ-I areas are some of the major violations of the Notification (Anon 2005). The State Governments have insufficient infrastructures facilities to take action against such violations. Further there is lack of will of the concerned and inadequate enforcement machinery (Anon 2005). This is one of the reasons for the high number of Cases pending in various Courts in the States and Supreme Court.

Maharashtra, for instance, in its CZMP devised in 1995, failed to designate mangrove areas as CRZ-I. It also wrongly classified no-development areas with a view to developing them in future. Even after the



Coastal Task Force pointed out irregularities in the Maharashtra CZMP, the state government rejected its suggestions and submitted a new plan that clearly violated the regulations laid down by the MoEF. The plan failed to designate huge tracts of mangroves in Mumbai and New Mumbai, limiting them to only 100 hectares, in an attempt to regularise ongoing, illegal construction in the Bandra-Kurla commercial complex, co-operative housing complexes in Versova and a road in New Mumbai, all of which lie in CRZ-I designated areas ([http://www.indlaw.com/actionaid/? Guid=917b78e6-bdf7-4822-a77a-3db95d5c4e89](http://www.indlaw.com/actionaid/?Guid=917b78e6-bdf7-4822-a77a-3db95d5c4e89)).

In none of the states has the HTL demarcation exercise been done at the ground level. The MoEF directed the Tamil Nadu Government to delineate LTL, HTL, 200 meters, 500 meters lines and other relevant lines in respect of creeks, backwaters and rivers affected by tidal action so that distances can be measured, whenever required. The demarcation of the HTL has only taken place on the ground level for the stretch between Chennai city and Mahabalipuram. For the remaining 920 odd kilometers of coastline in the State, the HTL and other lines remain unmarked at the ground level. The MoEF has directed reclassification in certain areas of Tamil Nadu and the Tamil Nadu State Government is in the process of doing so.



A number of violators of the regulation were taken to court and many of them were found to be guilty and their constructions face demolition orders. Notable among these are multinational power giants - Enron in Mumbai, Maharashtra and Cogentrix in Dakshina Kannada, Karnataka (<http://www.indlaw.com/actionaid/?Guid=917b78e6-bdf7-4822-a77a-3db95d5c4e89>).

There were lots of procedural gaps also in the case of CRZ notification. For instances none of the states government has submitted Coastal Zone Management Plan in the stipulated period of 1 year in 1992. Then Apex Court intervened to direct them to submit the same in 1996. Henceforth though submitted, MoEF has given only conditional approval and asked to re-submit revised CZMPs. And till date no revised CZMPs were submitted (Dasgupta 2008).

In order to address the issue of violations, a comprehensive review of different provisions of the original notification (in the light of findings and recommendations of all the previous Committees, judicial pronouncements, representations of various stake holders) and suggest suitable amendments to make the regulatory framework consistent with well-established scientific principles of coastal zone management, M.S. Swaminathan Committee was constituted. The Committee submitted their recommendations in 2005 and the main guiding principles of the recommendations were,

- (1) Ecological and cultural security, livelihood security and national security should be the cornerstones of an integrated coastal zone management policy
- (2) The coastal zone will include an area from territorial limits (12 nautical miles), including its sea-bed to the administrative boundaries or the biological boundaries demarcated on the landward side of the sea coast. The coastal zone management will also include the inland tidal water bodies influenced by tidal action and the land area along such water bodies. This area should be taken up for an integrated, cohesive, multi-disciplinary and multi-sectoral coastal area management and regulatory system.
- (3) Regulation, education and social mobilization should be the three major components of a participatory and sustainable Coastal Zone Management strategy. Panchayat Raj institutions in coastal areas should be fully involved in the educational and social mobilization programs.
- (4) The protection and sustainable development of the marine and coastal environment and its resources should be in conformity with international law, as laid down in 1982 UNCLOS, as well as with the suggestions contained in Chapter 17 of Agenda 21. The Draft National Environment Policy of India also contains useful guidelines. Every effort should be made towards ensuring an Integrated Marine and Coastal Area Management (IMCAM) as prescribed in the 1995 Jakarta Mandate under the 1992 Convention on Biological Diversity.
- (5) Coastal regulation needs to be based on sound, scientific and ecological principles and should safeguard both natural and cultural heritage. Heritage sites need particular care and should be conserved in their pristine purity. These include buildings, artifacts, precincts of spiritual, historical, aesthetic, architectural or areas of environmental significance such as richness of biodiversity and scenic beauty. Bird sanctuaries and parks and breeding grounds of migratory birds should be protected.
- (6) The precautionary approach should be used where there are potential threats of serious or irreversible damage to ecologically fragile critical coastal systems and to living aquatic resources. Scientific uncertainty should not be used as an excuse for the unsustainable exploitation of coastal resources – both living and non-living as well as to prevent environmental degradation, injustice and harm.
- (7) Significant or irreversible risks and harm to human health and life, critical coastal systems and resources including cultural and architectural heritage would be considered unacceptable. Ecological economics should underpin economic activities, so that present day interests and future prospects are not antagonistic. Significant biological, cultural and natural assets should be considered incomparable, invaluable and irreplaceable and should receive overriding priority in the allocation of resources for coastal area protection and conservation.
- (8) Coastal policy and regulations should be guided by the principles of gender and social equity as well as intra-generational and inter-generational equity, (i.e., the interests of future generations). They should be based on Mahatma Gandhi's dictum, "Nature provides for everyone's needs, but not for everyone's greed." All stakeholders should be involved in decision-making. Precious biological wealth, coming under Marine Biosphere Reserves, should be managed in a Trusteeship mode, with all the stakeholders protecting the unique natural wealth of biosphere reserves as Trustees and not as owners. A case study should be made on how the Gulf of Mannar Biosphere Trust is functioning, so that the Trusteeship pattern of sustainable management by the principal stakeholders can be replicated.

- (9) Coastal protection and bio-resources conservation policies should be guided by techno economic efficiency, the precautionary approach, 'polluter-pays' principle(s) and 'public trust' doctrine. There should be strict liability on the part of those engaged in hazardous or inherently dangerous coastal activities, including the liability to compensate the victims of all human made hazards such as marine pollution and fish contamination. They should also bear the cost of restoring the coastal environmental degradation. The onus of proof in such cases should be on the developer/industrialist for demonstrating that their "development" activities are environmentally benign.
- (10) The principles contained in the Biodiversity Act (2002), should be applied to coastal bio-resources management. This will involve concurrent attention to conservation, sustainable use and equitable sharing of benefits. To address the issue of pressures on marine and coastal ecosystems, as defined in the Johannesburg Plan of Implementation (Part IV) adopted at the 2002 World Summit on Sustainable Development, every effort should be made to promote sustainable fisheries, prevent loss of biological diversity, prevent all forms of marine pollution and ensure that coastal area development and urbanization are eco-friendly.
- (11) The regeneration of mangrove wetlands, coral reefs and sea grass beds as well as the promotion of coastal forestry and agro-forestry will confer both short and long term ecological and livelihood benefits. Carbon sequestration through coastal bio-shields will make an important contribution to promoting a balance between carbon emission and absorption, in addition to offering protection during coastal storms and calamities like Tsunami. An important lesson taught by the tsunami disaster is that the rehabilitation of degraded mangrove forests and the raising of coastal plantations of *Salicornia*, *Casuarina* and appropriate species of halophytes will represent a "win-win" situation both for nature and coastal human habitations. No further time should be lost in initiating a national coastal bio-shield movement along the coasts of the mainland of India as well as islands. This can be a priority task under the National Rural Employment Guarantee and Food for Work Programs.
- (12) The severe loss of life and livelihoods as well as property caused by Tsunami in Andaman & Nicobar Islands and in the coastal regions of Tamil Nadu, Kerala, Andhra Pradesh and Pondicherry teaches us that short term commercial interests should not be allowed to undermine the ecological security of our coastal areas. Human memory tends to be short and neglecting the lessons of Tsunami will be equivalent to writing off the future of coastal communities.

On the basis of these guiding principles, recommendations were formulated by the Swaminathan Committee which led to the formulation of the draft Coastal Zone Management Notification, (CMZ) 2008 as mentioned below:

Draft CMZ Notification, 2008

The objective of the CMZ is protection and sustainable development of the coastal stretches and marine environment through sustainable coastal zone management practices based on sound scientific principles taking into account the vulnerability of the coast to natural hazards, sustainable livelihood security for local communities, and conservation of ecologically and culturally significant coastal resources. For the purposes of management and regulation, the coastal zone shall be divided into four categories, namely:-

- Coastal Management Zone - I (CMZ -I) shall consist of areas designated as Ecologically Sensitive Areas (ESA),
- Coastal Management Zone - II (CMZ - II) shall consist of areas, other than CMZ - I and coastal waters, identified as "Areas of Particular Concern (APC)" such as economically important areas,

high population density areas, and culturally and, or strategically important areas. The administrative boundaries of these “Areas of Particular Concern” would be boundaries of CMZ - II.

- Coastal Management Zone -III (CMZ - III) shall consist of all other open areas including coastal waters and tidal influenced inland water bodies, that is, all areas excluding those classified as CMZ - I, II and IV.
- Coastal Management Zone -IV (CMZ - IV) shall consist of island territories of Andaman and Nicobar, Lakshadweep, and other offshore islands.

In respect of the islands in coastal backwaters areas which are not included in CMZ - I or CMZ - II, such areas may be included in CMZ - IV at the option of the Local Authority; otherwise they would be included in CMZ - III. Once exercised, the option of the Local Authority would not be subject to change.

The notification proposes setting up of a National Board for Sustainable Coastal Zone Management; shall have the mandate to provide policy advice to the Central Government on matters relating to coastal zone management, but shall not undertake regulatory functions. The National and State or Union territory Coastal Zone Management Authorities will be set up under the Environment (Protection) Act, 1986, shall be the Coastal Zone Management Authorities.

One of the major steps regarding the delineation of these zone are mapping of setback line at cadastral scale in place of 500 m limit suggested in the CRZ. For this purpose, the Central Government shall issue detailed technical guidelines, and the delineation to be carried out by the competent and established scientific institutions specializing in earth surveys and mapping. Till the setback line under each local authority as per these technical guidelines is notified by the Central Government the provisions of the Coastal Regulation Zone Notification, 1991 shall prevail.

Current status of the Coastal Management Zone (CMZ) Notification, 2008

The Ministry received large number of suggestions and objections to the draft CMZ Notification. In order to examine these suggestions and objections the Ministry constituted a four-Member Expert Committee under the Chairmanship of Prof. M. S. Swaminathan on 15.6.2009. The Committee deliberated on four options : (a) to continue with the existing CRZ Notification, 1991; (b) to incorporate suggestions and objections and to issue a revised CMZ Notification, 2008; (c) to let the CMZ Notification, 2008 lapse and to incorporate certain suggested improvements in the existing CRZ Notification, 1991 for better coastal management; or (d) to let the CMZ Notification, 2008 lapse, but issue an altogether new notification integrating the key features of CRZ 1991 and CMZ 2008. After detailed deliberations the Committee was unanimous in its decision on selecting the third option. Further the Committee exacerbated that coastal areas are the habitats of fishing communities who are in danger both from conservation and development. With this perspective, future policies for coastal area management must reverse these trends and find approaches to conserve and protect vulnerable ecosystems and secure livelihoods and habitats of its people (Anon, 2009). The Expert Committee submitted its report on 16.7.2009 which was accepted by the Ministry. Therefore, the draft CMZ notification stands lapsed as on 22.7.2009. The MoEF has already initiated to have necessary consultations with various stakeholders including fisher folk and civil society to seek their comments for strengthening the CRZ Notification, 1991. A detailed plan for the consultation is being prepared. In the meantime, the existing CRZ Notification, 1991 continues to be in force in its existing form.

Critical appraisal on CRZ in the context of ICZM

In the context of the above descriptions it may be ideal to have a revisit of the whole incidents in the context of incoming ICZM project. According to the Indian states the major reasons for the failure of implementation of CRZ since its inception in 1991 were

- Lack of adequate infrastructure and funding
- Lack of maps in implementing scales and MoEF's support (majority of the states does not have maps indicating CRZ-I to IV at cadastral scale)
- No clarity of demarcation of HTL and LTL given by MoEF; the states interpreted these lines according to their needs and no agreement on satisfactory definition on coastal zone.
- Pressure of urbanisation
- Need of expansion of economic activities
- Ambiguities allowed to prevail in the Notification: No attempt undertaken to clarify through amendments also (For e.g. key terms like local inhabitants and traditional rights and customary uses; guidelines to location of construction has been restricted to buildings but no clarity in other types of construction;
- Uniform regulations for diverse coastal environment. The coastal stretches of the country is not uniform, (for e.g. the tidal flood plains of Gujarat goes as inward as few kilometres whereas in Kerala it is few meters) where as the stipulations mentioned in the Notifications are common and applicable to all states equally.
- The enormous amount of private investment in the coastal region and the notification treated this as common property resources (Fro e.g. majority of the mangrove forests and investments in such area in the coastal area of Kerala are private properties)
- The paucity of institutional mechanism and enforcement. As per the Supreme Court's Order in W.P. No.664 of 1993, the MoEF has constituted the NCZMA and SCZMA for enforcement and monitoring of the CRZ Notification. These Authorities have been delegated powers under Section 5 of the E(P)A, 1986 for taking punitive action against the violations. Further, the State Environment Departments, which also are responsible for enforcing the Notification.
- Lack of proper communication strategy to explain and disclose the CRZ notification and its technical aspects.

Some of the activities taken in the new ICZM project for strengthening the CRZ notification are mapping of hazard line, ecologically sensitive areas, coastal sediment cells, etc. But at the same time the pressure for urbanisation, need for intensive economic activities, infrastructures, etc still remain the same in the coastal area which is not adequately addressed in the new project or in the existing notification. So we may have to presume that most of the reasons mentioned above for the failure of the implementation of the CRZ still persist. In the pilot stage, the project also supporting only three states leaving 6 more states and 4 UTs hence the integrated management for the coastal environment of the country is far below to reality. Some scenarios like, what benefit it would give if pollution of coastal environment from only three states has been controlled and other states are unabated? The rationale for the selection of stretches where already stringent laws (Wildlife Protection Act, Forest Conservation Act, etc) are being implemented (wildlife divisions, sanctuaries, national parks, tiger reserves, etc in all the three states)? Because if the enforcement agencies present in these areas so far could not control the threats with the help of national and state level enforcement mechanism how ICZM project is going to address these issues? Moreover during the study on management effectiveness of the coastal projects, it is the lack of coordination among various line departments and public consultation that affected most of the project implementation rather than financial shortcomings except the coastal protection measures. Hence one of the aspects for the implementation that

could possibly overcome these shortcomings is through crafting appropriate institutional mechanism. The institutional mechanism (the document available with the aide memoirs was not legitimate) suggested at state level may help only in disbursing the project fund and collecting the reports. The review and correction mechanism needed at the every stage of the project with accountability is not reflected in the suggested institutional framework. The institutional structure still lacks community organiser or microfinance expert when we have community based project components which necessitate consultation process for strengthening the implementation. Such lacuna in the institutional mechanism and absence of proposal for micro level (ward/village/panchayat/district, etc) institutions for the implementation of project activities may hamper the components from achieving desired output. The State level agency will be appropriate for project monitoring till it ends, but the sustainability of the components depends on grassroots level institutions.

The CRZ was based on only three principles where as the CMZ was deliberated on 12 guiding principles which presumed to be more scientific and progressive, but failed to capitalise in the minds of people. This may be due to the lack of a proper communication strategy including disclosure mechanism. The consultations conducted as part of CMZ notification at various coastal states clearly indicated that the doubts and concerns raised by the different stakeholders regarding the technical aspects of the notification were barely answered. It would have been ideal if the members of the Committee who drafted these principles were made available at certain stage for clarification on CMZ and CRZ. At least in future such measures may be taken by the implementing agency. Hence the communication officer suggested in the organisational capacity may be function as a public relation officer too. The procurement may be drafted accordingly.

There was enormous ambiguity on maps related to CRZ delineation in the past. The recommendation made by the communication strategy study for the present project also did not make any such issue specific communication action plan in their strategy. There should be clear consultation and agreement between stakeholders with respect to the maps prepared on hazard line and coastal sediment cell. This should have been achieved through ward or village level interaction in the coastal grama panchayat in addition to the disclosure at website and public places.

The issues such as pressure on urbanisation, development, special economic zones, etc still persists in the coastal areas of the country. Although mapping of hazard line and ESAs would bring more clarity to the notification, the enforcement mechanism (Department of Environment in respective states at state level with no subordinate offices at district and lower level) available in the country for implementing CRZ may not be sufficient enough to curb the violations that could possibly occur. It would be ideal to have enforcement mechanisms at coastal sediment cell level for better implementation of the CRZ. This could also be achieved through drafting appropriate MoU between local panchayat and DoE which could stipulate punitive measures on local panchayat if violations found to occur.

There should have been a **“Coastal and Marine Literacy Campaign”** component with well developed action plans at national level to create awareness among people in all the coastal states and UTs.

Environment Impact Assessment Notification, 2006

The objective of the notification and subsequent amendments is to protect and conserve the environment through regulation of the new developments taking place via ensuring environmental compliance causing least / negligible adverse impacts on the environment. Although EIA has been made mandatory for all the investment and development projects in the coasts, the implementation of Environment Management Plan seems to be overlooked. This is evident from the pollution level in the coastal waters of the country

(Mohandas *et al*, 2000). The present project address these issues in three states are praiseworthy. However the monitoring in three states alone will not be sufficient enough to control the pollution level in aqua-environment. Moreover the enforcement level (currently with State Pollution Control Boards) may be strengthened with wider network of enforcement agencies in the country to achieve the objectives of the project. Otherwise the pollution monitoring exercise will end up with collection of data alone.

Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006

The recently enacted landmark legislation, that recognizes and vests forest rights and occupation in forest land on forest dwelling Scheduled Tribes and other traditional forest dwellers who have been residing in such forests for generations but whose rights could not be recorded. It also provides for a framework for recording forest rights. The recognized rights under the Act include the responsibility and authority for sustainable use, conservation of biodiversity, and maintenance of ecological balance, thereby strengthening the conservation regimes of the forests while ensuring livelihoods and food security. Forest rights include the community rights of use or entitlements for natural products such as fish. The Rules under the Act make provisions for the inclusion of traditional fishing grounds as evidence for determination of forest rights. These could be of importance to the fishing communities living in the Sundarbans Tiger Reserve area in West Bengal.

The Model Town and Country Planning Act, 1960

A model act to provide for the regulation of planned growth of land use and development and for making and execution of town planning schemes in the Country. The act provides conditions favourable for planning and re planning of the urban and rural areas with a view to providing full civic and social amenities, to stop uncontrolled development, to preserve and improve existing facilities and amenities, to direct the future growth of development with a view of ensuring desirable standards for environmental health and hygiene. Based on the Model Town and Country Planning Act, each state has formulated their state specific acts.

2.5 Role and responsibilities related to legal and regulatory framework

Environmental regulation is seen to play different roles during different phases of a country's development. Initially, environmental regulation serves a reactive purpose – as a means of cleaning up after the new technologies and the new industries. During this initial phase of development it is often seen that growth is accompanied by increasing environmental degradation, and it is often assumed to be the case that environmental degradation is the obvious and unavoidable outcome from a process of economic growth. In the next phase of economic development, it is realised that a more active approach to regulation is important for providing public goods in a period of economic growth. In this era, it is crucial to focus on environmental governance – giving effect to various mechanisms for registering demand, for monitoring performance and enforcing standards. These are all the means available for ensuring that society is able to compete against nascent industries in the allocation of environmental resources.

Environmental law enforcement, being a highly specialized area of implementation, entrusted to different agencies under different laws, presents a none-too-happy-a-picture in India. Lack or inadequacy of skill; less than satisfactory infrastructural facilities; poor and unimaginative understanding of the law ; jurisdictional conflicts and lack of coordination, among different agencies of implementation, appear to contribute to poor and ineffective implementation of the laws. Ability of some of the more resourceful industries in either camouflaging their violations and non-compliance and in exerting undue pressure on the enforcement agencies, also has contributed to the inefficiency of the enforcement apparatus

A plethora of authorities enforce different aspects of environmental laws. While, the pollution-related laws are primarily enforced by the Pollution Control Boards and the forest-related laws by the Forest and Wildlife Authorities, the management of other aspects of environment are entrusted to a variety of agencies, to function in a cooperative way. The Rules under the Environment (Protection) Act, 1986, require a number of agencies of State that include, the Revenue, Transport, Local Self-Government and Industry, besides the Pollution Control Boards to work in unison to achieve the desired results. One of the rules of interpretation of statutes insists that whenever a number of statutes deal with the same subject matter, they ought to be harmonious construed as to ensure that each one would complement and strengthen the other and avoid any kind of overlaps in jurisdiction.

A summary of various acts and enforcing agencies at various levels is provided in Table 2.4.

Table 2.4: Acts and Enforcing Agencies at various levels

Acts / legislative Provisions	Enforcing Agency / Implementing Agency		
	National Level	State level	Local Level
Indian Fisheries Act		Department of Fisheries	District fisheries offices
Marine Fishing Regulation Act		Department of Fisheries	District fisheries offices
Indian Ports Act		Department of Ports / Maritime Board	Regional offices
Major Port Trust Act	Board of Trustees, TAMP (Tariff Authority for Major Ports)		
Merchant Shipping Act	Directorate General of Shipping, National Shipping Board		
Maritime Zones of India Act	Coast Guard	Regional Headquarters	District headquarters
Coast Guard Act	Coast Guard	Regional Headquarters	District headquarters
Environment (protection) Act	Ministry of Environment and Forests through various other related departments	State Government through various departments	
Water (Prevention and Control of Pollution) Act	Central Pollution Control Board	State Pollution Control Board	District Offices
Air (prevention and control of pollution) Act	Central Pollution Control Board	State Pollution Control Board	District Offices
EIA Notification	Impact Assessment Agency	Impact Assessment Agency	
Hazardous Wastes (Management and Handling) Rules	Central Pollution Control Board	State Pollution Control Board Port Authority	
CRZ Notification	National Coastal Zone Management Authority	State Coastal Zone Management Authority	Coastal District Level Committee
National Environment Tribunal Act	National Environment Tribunal		
Wildlife Protection Act		Department of Forest	
Biological Diversity Act	National Biodiversity	State Biodiversity	Biodiversity Management

Acts / legislative Provisions	Enforcing Agency / Implementing Agency		
	National Level	State level	Local Level
	Authority	Boards	Committees

The legislative provisions under various Ministries, (applicable to coastal areas) is provided in Figure 2.1.

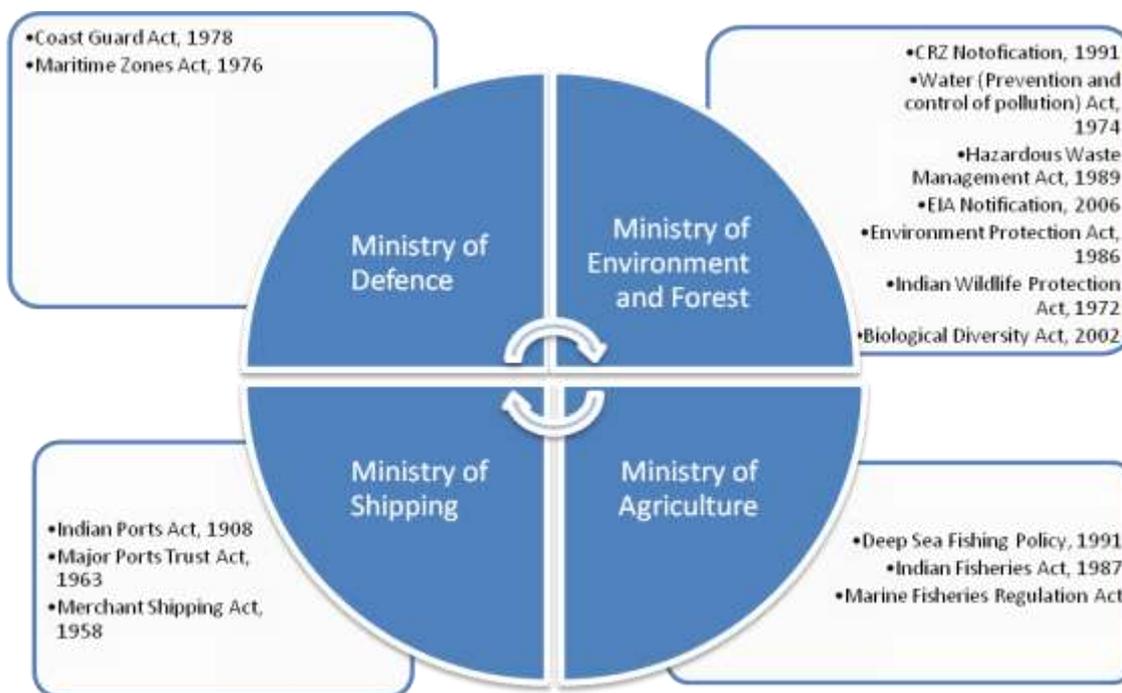


Fig. 2.1: Legislative provisions under various Ministries (Applicable to coastal areas)

2.6 State specific Acts / Regulations applicable to the Project

The project is focused in the three Indian states of Gujarat, Orissa and West Bengal. This section briefly narrates the state-wise acts and regulations applicable to the project. This would help in understanding the adequacy of the legal provisions for the successful implementation of different sub components of the project and also bring out the gaps if any in the legal and policy framework with respect to the ICZMP.

Gujarat Fisheries Act, 2003

The objective of the Act is to provide for protection, conservation and development of fisheries in inland and territorial waters of the state of Gujarat and for regulation of fishing in the inland and territorial waters along the coast line of the state and for matters connected therewith or incidental thereto.

The major components of the act include:

1. No person shall use any dynamite or other explosive substance in any water with intent thereby to catch or destroy the fish therein.
2. No person shall put any poison, lime or noxious materials into any water with intent thereby to catch or destroy any fish therein.
3. No person shall introduce any exotic fish in any water with intent thereby to destroy any fish therein.
4. The State Government may, by notification in the Official Gazette, make rules for any water other than private waters for all or any of the following matters, namely:

- a) Prohibiting or regulating:
 - (i) The erection or use of fishing gear,
 - (ii) The construction of weirs, dam and bunds,
 - (iii) The release of any industrial waste sewage or effluent to the inland waters which may harmful to species of fish or the food of fish,
 - b) Regulating the dimension and the kind of nets to be used and the mode of using them,
 - c) Prohibiting all fishing in the specified waters for a period not exceeding two years,
 - d) Prohibiting the use of any gun, spear, arrow or the like in any water, with the intent thereby to take or destroy any of the fish therein,
 - e) Prohibiting introduction of any kind of fish which may be harmful to species of fish, without obtaining prior permission,
 - f) Regulating any fishery in inland waters,
 - g) To lease out public water resource for a specified period and to charge fees for such lease,
 - h) Regulating the standard of sale of fish spawn, fry, fingerling and yearling,
 - i) Prohibiting the fishing and marketing of the fish during closed season.
5. The State Government may, by notification in the Official Gazette, apply such rules or any of them to any private water with the consent in writing, of the owner thereof and of all persons having for the time being any inclusive right of fishery therein.
6. The State Government may, having regard to the matters referred to in sub-section (2), by notification in the Official Gazette regulate, restrict or prohibit in any specified area,
- a) The fishing by such class or classes of fishing vessels and for such period as may be specified in the notification,
 - b) The catching of such species of fish and for such person may be specified in the notification,
 - c) The use of such fishing gears as may be specified in the notification,
 - d) The mariculture,
 - e) The collection of biological specimen, and
 - f) The number of fishing vessels which may be used for fishing.
7. The State Government may, by order, constitute Fisheries Terminal Authority for such area as may be specified in the order to develop, maintain, manage and administer the fisheries harbour, fish landing jetties including any wharf, pier, dock and other landing place and their adjoining areas set apart by the Authority for repair yards, fuel and ice supply installation, auction hall, fish processing plants, godowns and fish markets.

There are no state components directly related to the above mentioned act under ICZM project, however the proposed socio economic activities related to coastal and marine resources and coral conservation efforts comply the prevailing act.

Orissa Marine Fishing Regulations Act (OMFRA) and Rules 1982:

Under the OMFRA rules, mechanized fishing is prohibited within 5 km from the coast. Mechanized vessels within 15m length are permitted beyond 5 km from the shore; whereas the vessels above 15m in length are permitted beyond 10 km from the coast for fishing. These regulations have been formulated keeping in view, that the turtles migrating towards the Orissa coast, normally move in the waters up-to 5 km. The

vessels above 15m in length are not permitted as most use trawl or gill net in which the turtles get strangled during their movement and die.

Under the OMFRA, marine fishing has been prohibited in specified turtle congregation areas namely, Devi river mouth, Rushikulya river mouth and Dhamara river mouth by all the mechanized vessels within 20 km radius from the coast. Details of prohibited areas are:

- Gahirmatha Marine Wild Life Sanctuary in Kendrapara District with total area of 1435 sq.km comprising of a core and buffer zone. The core area of Gahirmatha extends 10 kms from the coast line in to the sea up-to 20 km radius.
- 20 km radius sea area from Jatadhari river mouth to Devi river mouth.
- 20 km radius sea area from Chilika mouth (Magarmukha) to Rushikulya river mouth.
- Use of Turtle Excluder Devices (TED) has been made mandatory in all the operating trawlers.

The project components related to crab fattening, turtle conservation, etc are in accordance with the law.

The Orissa Prevention of Land Encroachment (OPLE) Act 1954

The Act deals with cases of encroachment upon the government land. The provisions of the act are helpful in preventing encroachment of buffer areas of the forest or coastal zone which are needed for several conservation related activities.

The Orissa State R & R Policy

In order to ensure sustained development through a participatory and transparent process, the Government of Orissa has framed a comprehensive resettlement and rehabilitation policy in May, 2006. Basic objectives of the policy are:

- (i) To avoid displacement where possible and minimize it, exercising available options otherwise.
- (ii) To facilitate resettlement/ rehabilitation process:
 - a. Recognizing voices of the displaced communities (emphasizing the needs of the indigenous communities and vulnerable sections); and
 - b. Ensuring environmental sustainability through participatory and transparent process;
- (iii) To help guiding the process of developing institutional mechanisms for implementation, monitoring, conflict resolution and grievance redressal.

The salient features of the policy are:

- (i) An initial Survey and Identification of Displaced Families will be completed in 2months
- (ii) For the purpose of R & R benefits under this Policy, Development Projects are classified into the following types:
 - a. Industrial Projects;
 - b. Mining Projects;
 - c. Irrigation Projects, National Parks and Sanctuaries
 - d. Urban Projects and Linear Projects like roads and railways, power lines; and
 - e. Any other Projects.
- (iii) Procedure prescribed by Government shall be followed in acquiring land and other property and for payment of compensation / award.

- (iv) Based on the list approved by Government and option of displaced families, Resettlement and Rehabilitation Plan shall be prepared by the Collector for resettlement and rehabilitation after due consultation with displaced communities in the manner determined by the Government. Such plan should address the specific needs of the women, vulnerable groups and indigenous communities.
- (v) Rehabilitation Assistance will be specific to the 'type' of project as mentioned at Para. 5 above, because of difference in nature of projects, their source(s) of funding and magnitude of displacement / impact.

Government of Orissa has been pursuing various development initiatives to improve the quality of lives. Ensuring social justice being one of the major cornerstones of development, the Government always proactively tries to make sure people's participation in development process. In spite of Government's intention to bring development to the people, development interventions do at times create undesirable consequences. Displacement due to large development projects is one such phenomenon. Government of Orissa has been responding to this problem through various projects specific Resettlement and Rehabilitation Policies and Plans. The current intervention of policy formulation has actually taken note of the lessons learnt through these past policies, which essentially reflects Government's genuine spirit of learning and retrospection. The present policy draws its strength from experiences from the implementation of past policies, best practices in other States and Orissa Government's Industrial Policy Resolution, 2001. Consultation with various direct and indirect stakeholders including civil society of the State has been conducted, and the views of the academicians and specialists in the field of resettlement and rehabilitation have been considered as a part of democratic response of the Government in Policy formulation. Limitations of the past policies have been acknowledged and analyzed and a flexible framework has been attempted, which nonetheless demonstrates the dynamism of the Government. Unlike many other policies, there is a strong focus on the modalities of implementation of this Policy that makes it a vibrant instrument to promote sustainable development in the State.

The implementation of some of the components envisaged in the project component such as setting up of solid waste management facility at Paradwip Municipality, construction of coastal barriers at Pentha to check erosion might evoke R & R policy. However the state ICZM planning team and other Project Implementing Agencies had conducted series of consultation with people to win their confidence and goodwill to support the project.

West Bengal Marine Fishing Regulations Act, 1993 and Rules 1995

This Act consists of 25 sections divided into 5 Chapters: (i) Preliminary; (ii) Regulation of fishing; (iii) Management and Control of fishing harbours and fish landing centres; (iv) Penalties; (v) Miscellaneous. It governs fishing operations of the coastline of West Bengal. In order to carry out fishing operations, fishing vessels shall obtain both a licence and registration. The State Government may regulate, restrict or prohibit acts specified in section 4. Section 7 concerns the licensing of fishing vessels, whereas section 9 provides for the registration of fishing vessels. The State may declare fishing harbours and fish landing centres under section 14 and places such harbours and centres under government control. Regulation making powers of the Government are outlined in section 25.

According to Notification No. 3210-Fish/C-V/1A-2/90 Pt.I of 17 November 2000, the Governor has specified that "the period commencing from the month of July in a year till the end of the month of February of the next year during which the provisions of section 6 of the said Act shall not apply to any fishing vessel which was being used for fishing immediately before the commencement of the said Act".

The West Bengal Marine Fishing Regulations Rules regulate fishing operations in the territorial waters of West Bengal. The Rules consist of 8 Chapters divided into 14 rules, and of 5 Schedules. Chapter II deals with the registration of fishing vessels. In order to carry out fishing operations, fishing vessels are to obtain a licence as provided in Chapter III. Territorial waters of West Bengal shall be divided into 4 fishing zones in order to regulate fishing by different classes of fishing vessels are provided in Chapter IV. Chapter V outlines powers of authorized officers and regulates seizure of catch and the impounding of vessels. The Director of Fisheries shall act as the adjudicating officer in all matters pertaining to any action taken by the authorized officer (Chapter VI). Chapter VII provides for the appointment of the appellate authority and Chapter VIII contains provisions of miscellaneous nature.

Although there are no components directly related to fishing in different zones of the state, the value addition activities envisaged in the project with respect to fish auctioning and processing will be benefited by these acts and rules.

2.7 Regulatory Compliance for Project Activities

The regulatory clearance requirements for project activities in the three priority investments states are given in table 2.5. (given separately)

2.8 Current Institutional arrangements for implementation of Coastal Zone regulation

The enforcement of the CRZ notification in India is as follows:

- MoEF is responsible for the implementation and enforcement of the CRZ Notification, 1991. All powers under Environment (Protection) Act, 1986 rest with MoEF for implementing the notification.
- The NCZMA which is being constituted under the Environment (Protection) Act, 1986 is for enforcement and monitoring of the CRZ Notification. The NCZMA consists of 13 Members which include Ex-officio Members from various Ministries/Departments and Experts in the area of coastal and marine management. All the reclassification proposals which pertain to reclassification of the CRZ area have to be referred to the NCZMA through the respective State Coastal Zone Management Authorities. The steps involved for reclassification proposal is listed in the notification constituting the SCZMA and the NCZMA.
- State/UT CZMA have been empowered with necessary provisions of the Environment (Protection) Act, 1986 to take action against the violations. Further, the State/UT CZMAs examine the reclassification proposals referred to them by the respective State/UT Governments. The reclassification proposals recommended by the State/UT CZMAs are forwarded to the NCZMA for their recommendations, who in turn submit their recommendations to MoEF who is a Competent Authority for approving the reclassification proposals.

Roles and Responsibilities of key Sectoral Agencies / Institutions / Authorities at the national level for enforcement of coastal management related regulation and legislation are mentioned in table 2.6.

Table 2.6: Roles and Responsibilities of various agencies for enforcement of regulation and legislation related to coastal zone management

Ministry / Sectoral Agencies /Institutions	Roles and Responsibilities
Ministry of Environment and Forest& departments at state/district levels	Implementation of CRZ notification, EIA Notification and E(P) Act
Ministry of Earth Sciences	Forecasting the monsoons and other weather/climate parameters, ocean state, earthquakes, tsunamis and other

Ministry / Sectoral Agencies /Institutions	Roles and Responsibilities
	phenomena related to earth systems
Ministry of Agriculture	Fisheries management, coastal aquaculture
Ministry of Defense (Coast Guard)	Oil pollution, poaching
Pollution Control Board	Coastal pollution
Ministry of Commerce	Marine products development, special economic zones
Ministry of Surface Transport	Ports and harbours
Ministry of Tourism	Tourism development
Ministry of Rural Development	Program implementation for poverty alleviation, employment generation, infrastructure development and social security
Ministry of Tribal Affairs	Integrated socio-economic development of the most under-privileged sections (ST's)
Ministry of Urban Development	Town and country planning
Ministry of Industries	Setting up of units in Coastal areas
Ministry of Mines	Coastal and offshore mining
Ministry of Home	Disaster management
Ministry of Petroleum and Natural Gas	Exploration and exploitation of oil and natural gas
Ministry of Chemicals and Fertilizers	Storage of chemicals and fertilizers in the port areas
State / Union Territory Environment	Coast and marine management department under water act, air act
Institutions / NGO's	Support research and development activities in coastal area management and resource
International Donor Agencies currently funding projects/development in coastal areas	Financial and technical assistance on projects / tasks which are normally not considered as part of the regular mandate of the authorities

2.8.1 National Coastal Management Authority (NCZMA)

The **NCZMA** has the power to take various measures for protecting and improving the quality of the coastal environment and preventing, abating and controlling environmental pollution in coastal areas. The functions of the NCZMA are:

- Coordination of actions by the State Coastal Zone Management Authorities and the Union Territory Coastal Zone Management Authorities under the said Act and the rules made thereunder, or under any other law which is relatable to the objects or the said Act
- Examination of the proposals for changes and modifications in classification of Coastal Zone areas and in the Coastal Zone Management Plans received from the State Coastal Zone Management Authorities and the Union Territory Coastal Zone Management Authorities and making specific recommendations to the Central Government thereof
- Review of cases involving violations of the provisions of the said Act and the rules made thereunder, or under any other law which is relatable to the objects of the said Act and, if found necessary, issue directions under section 5 of the said Act provide technical assistance
- Review of cases under (iii) (a) either suo-moto, or on the basis of complaint made by an individual or a representative body, or an organization functioning in the field of environment
- File complaints, under section 19 of the said Act in cases of non-compliance of the directions

- To take action under section 10 of the said Act to verify the facts concerning the issues arising from sub-paragraphs (i), (ii) and (iii) of paragraph 11
- The Authority shall provide technical assistance and guidance to the concerned State Government, Union Territory Governments/Administrations, the State Coastal Zone Management Authorities, the Union Territory Coastal Zone Management Authorities, and other institutions/ organizations as may be found necessary, in matters relating to the protection and improvement of the coastal environment
- The Authority shall examine and accord its approval to area specific management plans, Integrated Coastal Zone Management Plans and modifications thereof submitted by the State Coastal Zone Management Authorities and Union Territory Coastal Zone Management Authorities
- The Authority may advise the Central Government on policy, planning, research and development, setting up of Centres of Excellence and funding, in matters relating to Coastal Regulation Zone Management
- The Authority shall deal with all environmental issues relating to Coastal Regulation Zone which may be referred to it by the Central Government
- The Authority shall furnish report of its activities and the activities of the State Coastal Zone Management Authorities and Union Territory Coastal Zone Management Authorities at least once in six months to the Central Government
- Any matter specifically not falling within the scope and jurisdiction of the Authority as so re-constituted shall be dealt with by the statutory authorities concerned

2.8.2 State Coastal Management Authority (SCZMA)

Based on the CRZ notification in 1991, the state Government constitutes Coastal Zone Management Authority (SCZMA). The Principal Secretary, Forest & Environment is the Chairman of this Authority and Director-Environment is the Member Secretary. Main role of the SCZMA is to approve developmental projects like ports, and other infrastructure related development works to comply with CRZ laws and also to regulate probable environmental impacts on the coastal areas of the state.

The SCZMA is designated as having the power to take various measures for protecting and improving the quality of the coastal environment and preventing, abating and controlling environmental pollution in areas of the respective State/UT. These include:

- Examination of proposals for changes/ modifications in classification of Coastal Regulation Zone areas and in the Coastal Zone Management Plan (CZMP) received from the State Government and
- Making specific recommendations to the National Coastal Zone Management Authority
- Inquiry into cases of alleged violation of the provisions of the said Act
- Identify ecological sensitive areas
- Identify areas vulnerable to erosion/degradation in the CRZ and
- Formulate area specific plans for their management etc.

2.8.3 District Coastal Management Authority (DCZMA)

The State/ Union Territory Government constitutes the District Coastal Zone Management Authorities (DCZMA) with Collector of the District as its Chairman, to monitor, enforce and implement the provisions of Coastal Regulation Zone at the district level. Proposals seeking clearance under Coastal Regulation Zone Notification are first scrutinized by the District Coastal Management Authority and then submitted to State Coastal Zone Management Authority (SCZMA). The DCZMA assists the State Coastal Zone Management

Authority in discharging the expected duties apart from attending to the local issues concerned with the Coastal Regulation Zones.

2.9 Applicable World Bank Policies

The World Bank's Environmental and Social safeguard policies is a cornerstone of its support to sustainable poverty reduction. The objective of these policies is to prevent and mitigate undue harm to people and the environment in the development process. These policies provide guidelines for the identification, preparation, and implementation of programs and projects. The following policies were examined for its relevance to the ICZM – India project and its various sub components. The policies identified as applicable are indicated in table 2.7.

Table 2.7: World Bank Policies applicable to coastal management

SAFEGUARD POLICIES	YES	NO
Environmental Assessment (OP/BP 4.01)	X	
Natural Habitats (OP/BP 4.04)	X	
Forests (OP/BP 4.36)		X
Pest Management (OP 4.09)		X
Physical Cultural Resources (OP/BP 4.11)	X	
Indigenous Peoples (OP/BP 4.10)	X	
Involuntary Resettlement (OP/BP 4.12)	X	
Safety of Dams (OP/BP 4.37)		X
Projects on International Waterways (OP/BP 7.50)		X
Projects in Disputed Areas (OP/BP 7.60)		X

Of the above mentioned Operational Policies, Safeguard policies relating to Pest Management, Safety of Dams, International Waterways and Disputed areas are not applicable to the project, therefore were not examined in detail.

2.9.1 Environmental Assessment (OP 4.01)

General: Environmental Assessment is used in the World Bank to identify, avoid, and mitigate the potential negative environmental impacts associated with Bank lending operations early in the project cycle. EA takes into account the natural environment (air, water, and land), human health and safety; social aspects (involuntary resettlement, indigenous peoples, and physical cultural resources) and trans-boundary and global environmental aspects. EA's should include analysis of alternative designs and sites, or consideration of "no option" requiring public consultation and information disclosure should be done throughout the project cycle. In World Bank operations, the purpose of Environmental Assessment is to improve decision making, to ensure that project options under consideration are sound and sustainable, and that potentially affected people have been properly consulted and their concerns addressed. The World Bank's environmental assessment policy and recommended processing are described in Operational Policy (OP) /Bank Procedure (BP) 4.01: Environmental Assessment.

Applicability to Project: The economic resilience of marine ecosystems has been subjected to great pressure through over-extraction of resources, enhanced pollution, and physical alterations in coastal ecosystems. For example, mangroves have been exploited for timber, fuel wood, and other purposes. Mangroves and coastal forests have declined in both area and composition as a result of over-harvesting

for fuel-wood, construction materials and fodder. Shrimp aquaculture has, between 1991-2000AD, accounted for about 80% of the conversion of mangrove land, and 10-12 million litres/day of wastewater discharge to the sea. There is ample evidence that fish stocks are declining, and endangered or commercially important marine species such as food fish, aquarium fish, sea cucumbers and corals are fast disappearing. The major problems in coastal fisheries are overfishing, habitat destruction and degradation, pollution, post-harvest damages due to lack of infrastructure, fishing during monsoon, and conflicts among mechanized and traditional sectors. Sixty-one per cent of the coral reef areas in India are under threat due to causes such as coral mining, fishing with explosives, sedimentation, oil pollution, removal of reef organisms, anchoring, harbour construction and removal of coral for curio trade. The cities and towns located in the coastal areas of the country generate 5560 million litres of wastewater per day, of which only 9% is treated before being released to the coastal waters. Agricultural run-off laden with excessive chemicals and pesticides is huge, but its incidence has not been estimated yet. A variety of industries, including shrimp farming, tanneries, slaughterhouses and other chemical processes, contribute solid waste and wastewaters to the environment, often without adequate or any treatment. A large proportion of all industrial units in India (small, medium or large) are located along the coast, including most of the petrochemical complexes and thermal power plants. While coasts serve as a natural location for such industries, poor infrastructure, acute concentration, and lack of integrated planning have resulted in a threat to the environment. MoEF has identified 30 industrial hotspots along the coast, which include Mumbai, Trombay, Okha, Mangalore, Chennai, Tuticorin, Paradip and Visakhapatnam.

Degradation of coastal ecosystems in India is rooted in systemic and institutional insufficiency, typified by (i) a fragmented, uncoordinated and often conflicting sectoral planning and management in marine and coastal areas; (ii) lack of integrated planning of economic infrastructure; (iii) lack of livelihood improvement options for local communities; (iv) lack of adequate resources for conservation of ecologically sensitive areas; and (v) lack of adequate capacity, skill and knowledge for managing coastal and marine resources in a sustainable manner. These gaps and failures are expected to be accentuated by climate change induced risks. Sea level rise will potentially affect the coastal zone in multiple ways, including the inundation and displacement of wetlands and lowlands, coastal erosion, increased coastal storm floods, increased salinity in estuaries and freshwater aquifers, alteration of tidal ranges, as well as changes in sediment and nutrient transport. The ecological stability of the remaining mangroves and coral reefs would be at risk. Climate change has the potential to exacerbate water resource stresses all over the Indian coasts, affecting agriculture through declining production, as well as through reductions in arable land area and food supplies for fish. The most vulnerable communities will include those having maximum exposure to these stresses, as well as those with the least capacity to respond and ability to recover. These physical changes will take place in abrupt, nonlinear ways as thresholds are crossed. The least resilient communities for example, those dependent on subsistence fishing, will be the first to experience "tipping points" in their life systems; they will have little choice but to abandon their homes and search for better prospects elsewhere.

This project is essentially designed to address the aforementioned environmental (and social) issues, by supporting the Gol's program on ICZM. In that sense, overall, the environmental impacts of the project are expected to be positive, beneficial, and aimed at long term sustainability.

However, at a local and transient scale, the activities proposed under the project may result in damage to environmental resources, unless carefully planned. Therefore, during design of the project, adequate attention was placed on avoidance and mitigation of any potentially damaging environmental affects.

The environmental and social assessment for the project was undertaken at two levels. At a more macro level, the Gol proposed (as per the NEP, 2006) a program to shift to adopting ICZM approaches from the

current partially effective regulatory regime. Although the project has not in itself caused a change in the policy or regulation, it does support implementation of any changed policy and regulation. Therefore, at a macro level, the EA/SA carried out a regulatory impact assessment. The assessment clearly delineated the possible risks from the change in regulation, and whether the risks will be adequately mitigated and managed by the changed policy and regulations. The major issue is if by accepting decentralized planning and management of coastal zones, the currently protected ecologically sensitive areas would be exposed to exploitation. However, the proposed changes in policy and regulations do not dilute the current protection regime, but strengthen it. The project will support identification and delineation of all ecologically sensitive areas (many of which are not protected currently), and zoning these areas to be protected by MoEF. The ICZM approach will also facilitate investment in financing conservation of the ecologically sensitive areas, a major benefit over the current state of regulatory protection only. Another apparent issue is whether integrated management will result in loss of traditional and customary access to coastal and marine resources for the vulnerable coastal communities that are dependent on such resources (or whether these communities or their access will be displaced/ captured by the elite). As per the GoI policy, one of the three prime objectives of ICZM plans will be to ensure that livelihood of the coastal communities is secured. This project will support preparation of ICZM plans for four coastal stretches – Gulf of Kachchh, Gopalpur-Chilika, Paradip-Dhamra, and West Bengal coast. The ICZM plan processes will be designed as fully participatory processes, with identification and involvement of all stakeholder groups, especially vulnerable communities dependent on coastal and marine resources. This would ensure that the concerns related to equitable share and protection of traditional access to coastal and marine resources will be adequately incorporated in the ICZM plans and decision-making processes. The process of preparation of the ICZM plans in the project, and lessons learnt will serve as the basis for preparation of ICZM plans for all coastal areas in India in the future.

At a micro level, the project design and the EA/SA examined the potentially adverse impacts the project can have at local and site levels, and proposed avoidance, mitigation and management measures. The project is also financing several capacity building and priority investments towards protection and conservation of coastal areas in the specific areas for which ICZM plans will be prepared. The potentially direct environmental issues identified in these areas include (i) effect on small local natural habitats from mangrove and shelterbelt plantation, (ii) introduction of alien species from plantation activities; (iii) impediment to site level natural drainage created by small infrastructure works, such as cyclone shelters; (iv) conversion of grazing and pasture land for plantation or for small infrastructure works such as laboratories at remote places. Each of these direct impacts has been avoided by careful project design. A second set of potentially direct impacts include (i) unplanned and uncontrolled disposal of construction debris; (ii) unplanned disposal of solid wastes; (iii) soil and water pollution from implementation and operation of planned activities such as eco-tourism or alternative livelihood works; (iv) tree felling and land clearance for small facilities such as cyclone shelters, laboratory buildings, new national institute; (v) noise pollution and local oil spill from patrolling boats, and (vi) lack of workers' safety. Each of the activities financed by the project is providing for adequate mitigation and management measures for such direct impacts – for example by ensuring sufficient provision for water supply, sanitation, sewage treatment, planned debris disposal etc. The project may also have indirect impacts on the environment such as (i) impacts on neighbouring natural habitats, or edge deterioration of protected forests, (ii) impacts from entry level activities in villages where community mobilization is planned for mangrove and shelterbelt plantation or other ecological conservation works, (iii) soil pollution and offensive smell around the planned sewage treatment plans, (iv) impacts on avifauna from beach illumination, (v) instability of neighbouring coastline from the pilot coastal protection works, and (vi) accelerated environmental deterioration at the source of

construction materials. Each activity is being carefully examined and designed, and site selection has been done carefully to avoid these potentially indirect impacts. In cases where the possibilities of such indirect impacts cannot be fully discounted (.e.g. as related to sourcing of construction materials), management actions are proposed in the EMP as well as part of the implementation requirements of the activities. At a cumulative level, the impacts are beneficial, and the ICZM plan process will ensure that these beneficial impacts are enhanced. The avoidance, mitigation and management measures are being incorporated in the bidding documents, as required.

2.9.2 Involuntary Resettlement (OP 4.12)

General: The Bank's Operational Policy 4.12: Involuntary Resettlement is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts. It promotes participation of displaced people in resettlement planning and implementation, and its key economic objective is to assist displaced persons in their efforts to improve or at least restore their incomes and standards of living after displacement. The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to Bank appraisal of proposed projects.

Applicability to project: The project design has ensured that potential of involuntary resettlement is absolutely minimized. However, there remain four cases of potential displacement from assets and livelihood.

First, the project will support mangrove and shelterbelt plantation on 20,245 hectares in Gujarat, Orissa and West Bengal, all of which are forest or revenue land. [In Orissa, plantations are proposed on 105 hectare of private land with consent of landowners and no land will be acquired.] Site verification has been conducted for 15,500ha of revenue and forest land; and no squatter or encroachment has been identified. Nonetheless future chance finds of squatters and encroachments cannot be ruled out; and if discovered, any such squatter or encroacher will qualify for resettlement assistance.

Second, at Village Pentha (Orissa) and at Sagar Island (West Bengal) the project supports restoration and augmentation of coastal protection works that have been severely breached. These existing embankments were constructed on land donated by the community or individuals. However, these voluntary donations were not clearly documented. Approximately 30ha of additional land will also be donated for augmentation of the coastal protection works. Unless clearly documented, there may be potential claims and reputational risks.

Third, in Sagar Island in West Bengal the project will finance construction of distribution system for grid power. The project financed distribution system has a direct linkage with the construction of the transmission system, which will be solely financed by the state government (GoWB). As part of the transmission system, for a step-down transformer, private land was acquired by the GoWB, and fully compensated, as per prevailing land acquisition laws. The people from whom land was acquired are equivalent to project affected people, in retrospect, and will be eligible for applicable resettlement assistance.

Fourth, at Digha beach (West Bengal), in-situ improvement and restoration of 1,480 vendors operating on the sandy beach itself (commercial squatters and footloose kiosks) is proposed. The in-situ restoration by accommodating all the vendors in organized shopping spaces and shopping arcades is being planned in full consultation and consensus with the vendors. Before initiating implementation of the related activities, formal agreement with each vendor will be signed. However, when the shops and shopping spaces are

allocated, a possibility of disagreement with a few cannot be ruled out. For the vendors who potentially disagree for the in-situ restoration, a future option of resettlement assistance will be needed. In order to resolve such disagreement and prepare an amicable resettlement plan, an institutional mechanism should be constituted. This committee may have members from elected representatives, representatives from vendor's association, members of local administrative authority (Digha-Sankarpur Development Authority), State Coastal Zone Management Authority, community organiser, etc.

To take care of each of these chance cases, the project will prepare an entitlement framework, consistent with the National Resettlement and Rehabilitation Policy (NRRP 2007) and the Bank's OP 4.12. As the number of attributable cases is not known, notional numbers will be used to define a resettlement and rehabilitation budget, which will be updated as these chances cases are discovered during the implementation period.

The project will also finance preparation of ICZM plans for the Gulf of Kachchh (Gujarat), Paradip-Dhamra and Gopalpur-Chilika coastal stretches in Orissa, and the West Bengal coasts. Each of these plans will be prepared at a regional plan scale. It is unlikely that the planning exercise will be able to identify directly attributable cases of involuntary resettlement. However, the plan process will include an examination of the final plan for its consistency with the OP 4.12, the applicable national policy and legislation on displacement from or loss of access to traditional and customary rights and assets; as well as with the objective of ICZM plans (the primary objective of which is protection of life and property of vulnerable coastal communities).

2.9.3 Indigenous Peoples (OP 4.10)

General: The World Bank Policy on indigenous peoples, OP/BP 4.10, Indigenous Peoples, 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.

Applicability to project: The project does not have any direct adverse impact (such as displacement from land or livelihood) on the Scheduled Tribe population. The benefits of the project, such as improved livelihood support, will be targeted towards all vulnerable groups, including Scheduled Tribes (in all but two *blocks* where the project finances priority investments, the scheduled tribe population is less than 1% of total population; in the aforesaid two *blocks* Scheduled Tribes contribute to roughly 18% and 5% of total block population). Beneficiary selection will be guided by pre-determined criteria, such as inclusion of vulnerable groups. To ensure transparency, the criteria used will be publicly disclosed using local vernacular media and bulletin boards. In addition, the project's communication plan will include specific provisions to communicate with all vulnerable sections of coastal communities, including the Scheduled Tribes. Stakeholder consultations in villages during project preparation included discussions with all vulnerable groups. Consultation is expected to continue as an integral part of the ICZM planning process, wherein all vulnerable communities will be specifically identified so that they can be involved in planning and decision making.

2.9.4 Cultural Property (OP 4.11)

General: The World Bank Policy OP / BP 4.11 defines Physical cultural resources as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, 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.

The Bank assists countries to avoid or mitigate adverse impacts on physical cultural resources from development projects that it finances. The impacts on physical cultural resources resulting from project activities, including mitigating measures, may not contravene either the borrower's national legislation, or its obligations under relevant international environmental treaties and agreements. The borrower addresses impacts on physical cultural resources in projects proposed for Bank financing, as an integral part of the environmental assessment (EA) process.

Applicability to Project: The project does not have any direct adverse impact on any known physical cultural property. The project does not involve excavation works, or polluting activities that might potentially impact chance finds. The project in fact supports conservation, renovation and restoration of seven dilapidated cultural properties (although none of these are listed as national heritage). These include five ancient temples, one cemetery and a small fort. The objective of financing conservation of these properties derives its bases from their historical recognition as shelters during cyclones, apart from their being of significant architectural and cultural value. All architectural conservation and restoration works will be undertaken by specialized supervisors and craftsmen. The policy is triggered to ensure that the architectural conservation and restoration works are undertaken at the best professional standards, and are duly supervised.

The project also supports renovation and restoration of a marine aquarium at Digha (West Bengal), and a new Oceanarium-cum-Research Centre at Dwarka (Gujarat). Both of these investments are designed to preserve the natural heritage of local coastal areas, and have the potential to be converted into natural heritage tourism sites. The Digha beach (and the casuarina plantation on the sandy beach) in West Bengal is also a part of common folklore. In addition to the activities listed here, the project will ensure that cultural values are preserved while planning and implementing all project financed activities through a variety of measures included in the design of these activities.

2.9.5 Natural Habitat (OP 4.04)

General: The policy implementation ensures that Bank-supported development projects give proper consideration to the conservation of natural habitats, in order to safeguard their unique biodiversity and ensure the sustainability of the environmental services and products which natural habitats provide to human society. This policy is applicable when a project (including any subproject under a sector investment or financial intermediary loan) 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).

Applicability to project: The policy has been triggered as a precautionary measure although the project does not affect any natural habitat; nor does it envisage any conversion of protected natural habitats. The project, in fact, helps protection and conservation of natural habitats by (i) identification and delineation of natural habitats which are currently not protected, and (ii) facilitation of resources for conservation (in the medium and long term) of all ecologically sensitive areas, whether currently protected or not. Further, the project preparation has facilitated definition of criteria and methodology to determine ecological richness of habitats which are outside the currently protected areas, through analytical works and building consensus among a large number of experts and academia. This is already seen to be a contribution to management processes which ignore relatively small natural habitats outside the protected areas.

2.9.6 Forest Policy (OP 4.36)

General: The implementation of the policy ensures that envisaged forest sector activities and other Bank sponsored interventions which have the potential to impact significantly upon forested areas:

- Do not encroach upon significant natural forest areas that serve important social, environmental or local economic purposes
- Do not compromise the rights of local communities to continue their traditional use of forests in a sustainable fashion
- In the case of primary tropical moist forest, do not finance commercial logging operations, nor the purchase of equipment for this purpose.

This policy is applicable wherein any of the project components by any proposal finance commercial logging operations / equipment, no government commitment for sustainable forest management, proposed activity in forest areas of high ecological value or proposed plantations.

Applicability to Project: The project does not include any logging, and does not impact the health of any forest. All possibilities of edge deterioration have been carefully examined and avoided. The project also does not restrict traditional access of communities to minor forest produce. The forest policy emphasizes the participatory approach in management of forest resources. The involvement of joint forest management committees, self help groups and other such micro level institutions in the planting and management of mangrove forests and shelterbelt along the coastal stretch would enhance and encourage the implementation of forest policy. The assets created through participatory management could be shared among beneficiaries identified during the consultation process. Hence the subcomponents and activities mentioned in the project are not contradicting the national forest policy.

2.9.7 Safety of Dams (OP/BP 4.37)

The project does not finance any dam. The coastal protection works proposed (village Pentha in Orissa, Sagar Island in West Bengal) are less than 6m in height, and use flexible geosynthetic tubes for prevention of coastal erosion complemented by soft plantation works. These protective structures are not impounding any amount of water but only restricting the flow during high waves towards land. These are designed, and will be supervised during construction by experienced specialists (engineers from departments of irrigation and the Indian Institute of Technology, Chennai). The embankments suggested in Sagar Island, are saline embankments and circuit embankments, constructed over the last 200 years or so, and are mostly earthen and un-engineered. These embankments breach quite often and result in damage to lives and property. At one level, these issues will be at the core of the ICZM plan preparation process. At another level, a proposed Bank-financed project on national cyclone risk mitigation, which includes the three states of West Bengal, Gujarat and Orissa, is also addressing issues related to structural strengthening of the saline and circuit embankments.

2.9.8 Pest Management (OP 4.09)

The project does not involve, nor does it promote use of chemical or synthetic pesticides or fertilizers. The raising of mangrove and shelterbelt plantations does not involve any pest management as they are not being considered as a commercial forest plantation such as teak or eucalyptus, etc. Hence this policy does not evoke.

2.9.9 Projects on International Waterways (OP/BP 7.50)

The project state of West Bengal is situated within the Transboundary of Ganga-Meghna-Brahmaputra basin, but none of the project activities have any impact on water flow or water quality of the Transboundary Rivers. (The piloting states may be requested to provide a map with locations of priority investments)

2.9.10 Projects in Disputed Areas (OP/BP 7.60)

No part of the coastal areas or the territorial waters of India is disputed.

Table 2.5: Regulatory compliance for project activities

Regulatory compliance for the project activities (Y=yes; P-possible; Outside I - within 500m HTL but landward of existing road; Outside II-beyond 500m of HTL)		Regulatory objective explained by design									EIA clearance required		Location of Activity						CRZ Clearance required							
Compon ent	Sub component	Activities	Regulatory objective explained by design									State	National	CRZ-I	CRZ-II	CRZ-III	CRZ-IV	Outside I	Outside II	CRZ-I	CRZ-II	CRZ-III	CRZ-IV	Outside I	Outside II	
			EPA	WPA	BDA	W(PCP)A	HW(MH)R	F(C)A	GFA	NBC																
National (1)	Capacity building	Hazard line mapping	Y	-	-	-	-	-	-	-	-	-	-	P	P	P		P	P	-	-	-		-	-	
		Coastal sediment cell mapping	Y	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-
		ESA mapping	Y	Y	Y	-	-	Y	-	-	-	-	-	P	-	-		-	-	-	-	-		-	-	
		National Centre for Sustainable Coastal Zone Management MoEF capacity building	Y	-	-	-	-	-	-	Y	-	-	-	-	-	-		-	-	-	-	-		-	-	
	Project Management	NPMU	Y	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-	
Gujarat State Components (2)	Capacity building	ICZM planning for Gulf of Kachchh	Y	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-		
		Strengthening pollution monitoring capacity	Y	-	-	Y	Y	-	-	-	-	-	-	-	-	Y		-	-	-	-	-		-	-	
		Studies on shoreline changes	Y	Y	-	-	-	Y	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-	
	Support Investment (A)	Applied research on coral plantation techniques	Y	-	Y	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-	
		Coral reef regeneration	Y	Y	Y	-	-	-	-	-	-	-	-	Y	-	-		-	-	-	-	-		-	-	
		Mangrove & shelterbelt plantation	Y	Y	Y	-	-	Y	-	-	-	-	-	Y	Y	Y		-	-	-	-	-		-	-	
		Mangrove plantation in revenue land	Y	Y	Y	-	-	Y	-	-	-	-	-	Y	Y	-		-	-	-	-	-		-	-	
	Support Investment (B)	Marine aquarium & research centre	Y	Y	Y	-	-	Y	Y	-	-	-	-	-	-	-		-	Y	-	-	-		-	-	
		Environmental sanitation of Jamnagar city	Y	Y	Y	Y	Y	-	-	Y	Y	-	-	Y	-	-		Y	Y	-	-	-		-	-	
		Ecotourism & entry level activities	Y	Y	Y	Y	-	Y	-	-	-	-	-	-	-	Y		Y	Y	-	-	Y		Y	Y	
Orissa State Components (3)	Capacity building	Improved livelihood of coastal communities		Y	Y	-	-	Y	Y	-	-	-	-	-	Y		Y	Y	-	-	Y		Y	Y		
		ICZM planning for Paradip-Dhamra & Chilika-Gopalpur	Y	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-	
		Species and wetland research		Y	Y	-	-	Y	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-	
	Support Investment (A)	Regional coastal process studies		Y	Y	-	-	Y	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-	
		Strengthening pollution monitoring capacity	Y	-	-	Y	-	-	Y	-	-	-	-	-	-	-		-	Y	-	-	-		-	-	
	Support Investment (B)	Shoreline protection at Pentha Village	Y	-	Y	-	-	Y	-	Y	-	-	-	Y	-	-		-	-	Y	-	-		-	-	
		Protection of Olive ridley turtle & other aquatic life (crocodile hatchery)		Y	Y	-	-	Y	-	-	-	-	-	-	Y	Y		-	Y	-	-	-		-	-	
Support Investment (B)	Conservation of cultural assets	Y	-	-	-	-	-	-	-	-	-	-	Y	Y	Y		-	-	-	-	-		-	-		
	Mangrove and shelterbelt plantation		Y	Y	-	-	Y	-	-	-	-	-	Y	Y	Y		-	-	-	-	-		-	-		
Support Investment (B)	Pollution abatement at Paradip	Y	-	-	Y	Y	Y	-	Y	Y	-	-	-	-	-		-	Y	-	-	-		-	-		

Regulatory compliance for the project activities (Y=yes; P-possible; Outside I - within 500m HTL but landward of existing road; Outside II-beyond 500m of HTL)

EIA clearance required

Location of Activity

CRZ Clearance required

Compon ent	Sub component	Activities	Regulatory objective explained by design							EIA clearance required							Location of Activity						CRZ Clearance required					
										State	National	CRZ-I	CRZ-II	CRZ-III	CRZ-IV	Outside I	Outside II	CRZ-I	CRZ-II	CRZ-III	CRZ-IV	Outside I	Outside II					
			EPA	WPA	BDA	W(PCP)A	HW(MH)R	F(C)A	GFA	NBC																		
West Bengal State Component (4)	Support Investment (C)	Fishery based livelihood improvement	Y	Y	Y	Y	Y	Y	-	-	-	-	-	Y		-	Y	-	-	-		-	-		-	-		
		Coir based livelihood improvement	Y	-	-	Y	-	Y	-	-	-	-	-	Y		-	Y	-	-	-		-	-		-	-		
		Ecotourism based livelihood improvement	Y	Y	Y	Y	-	Y	-	Y	-	-	-	Y		-	Y	-	-	-		-	-		-	-		
		Biodiversity based livelihood improvement	Y	Y	Y	Y	-	Y	-	-	-	-	-	Y		-	Y	-	-	-		-	-		-	-		
		Multi-purpose cyclone shelters	Y	Y	Y	-	-	-	-	Y	-	-	-	P		P	P	-	-	-		-	-		-	-		
	Capacity building	ICZM Planning for West Bengal coast	Y	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-		-	-		
		Capacity building for coastal wetland management	Y	Y	Y	-	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-		-	-		
		Capacity building for marine science studies	Y	Y	Y	-	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-		-	-		
		Conservation documentation centre		Y	Y	-	-	Y	-	-	-	-	-	-		-	-	-	-	-		-	-		-	-		
	Support Investment (A)	Coastal bioshield	Y	Y	Y	-	-	-	Y	-	Y	-	Y	Y	Y		-	-	-	-	-		-	-		-	-	
		Shoreline protection at Digha Sankarpur	Y	Y	-	-	-	-	Y	-	Y	-	-	-		-	-	Y	-	-		-	-		-	-		
		Improvement of marine aquarium	Y	-	Y	-	-	-	-	-	Y	-	-	-		-	Y	-	-	-		-	-		-	-		
	Support Investment (B)	Environmental improvement and site clean up at Digha	Y	-	-	-	-	-	-	Y	Y	-	Y	-	-		Y	-	-	-		-	-		-	-		
		Solid waste management - Digha	Y	-	-	Y	Y	Y	-	Y	-	-	Y	-		Y	Y	-	-	-		-	-		-	-		
		Environmental Sanitation , Digha	Y	-	-	Y	Y	-	-	Y	-	-	-	Y		Y	Y	-	-	-		-	-		-	-		
		Fish Auction Centre	Y	-	Y	-	-	-	-	Y	-	-	-	-		-	Y	-	-	-		-	-		-	-		
	Support Investment (C)	Distribution of grid based electricity at Sagar Island	Y	-	-	-	-	-	Y	Y	-	-	-	Y		Y	Y	-	-	-		-	-		-	-		
		Fisheries Improvement in Sagar Island	Y	-	-	-	-	-	Y	-	-	-	-	-		Y	Y	-	-	-		-	-		-	-		
		Livelihood Improvement in Sagar	Y	-	-	-	-	-	Y	-	-	-	-	Y		Y	Y	-	-	-		-	-		-	-		
		Afforestation based livelihood improvement , Sagar	Y	Y	Y	-	-	Y	-	-	-	-	Y	-	Y		Y	Y	-	-	-		-	-		-	-	
Ecotourism development, Sagar		Y	-	Y	-	-	Y	-	Y	-	-	Y	-	Y		Y	Y	-	-	-		-	-		-	-		
		Multi-purpose cyclone shelters	Y	Y	Y	-	-	Y	Y	-	-	-	P		P	P	-	-	-		-	-		-	-			

* BDA: Biodiversity Act, 2002; CRZ: Coastal Regulation Zone Notification, 1991; CZA: Central Zoo Authority; EPA: Environmental Protection Act, 1986; FCA: Forest Conservation Act, 1980; GFA: Gujarat Fisheries Act, 2003; HW(MH)R: Hazardous Waste (Managing and Handling) Rules, 1989; IFA: Indian Fisheries Act, 1897; NBC: National Building Code, 2005; W(PCP)A: Water (Prevention and Control of Pollution) Act, 1974; W(P)A: Wildlife (Protection) Act, 1972

CHAPTER 3

ENVIRONMENTAL BASELINE STATUS

India has a coastline of about 7500km of which the mainland accounts for 5,400 kms, Lakshadweep coast extend to 132km and Andaman & Nicobar Islands have a coastline of about 1,900 kms. Coastal environment of India plays a vital role in nation's economy by virtue of the resources, productive habitats and rich biodiversity. Significant activities in the coastal areas such as include fishing, ports, shipping harbors, aquaculture, agriculture, tourism, oil and mineral exploitation, etc. The coastal activities contribute about 10% of the national GDP in India. This chapter describes about the environmental or ecological richness and significance of the coastal area.

The coastal areas of the country experience tropical climate and are having a diverse geological geomorphologic set up which, favours a multitude of coastal and offshore marine ecosystems. The coastal areas are assuming greater importance in recent years, owing to increasing human population, urbanization and accelerated developmental activities. The sub section below provides an insight to the physiographic characteristics of the coastal areas of India broadly divided into eastern coast, western coast and the islands.

Climatic zones of India

India is home to an extraordinary variety of climatic regions, ranging from tropical to temperate and alpine in the Himalayan area, where elevated regions receive winter snowfall. The nation's climate is strongly influenced by the Himalayas and the Thar Desert and marine environment of the subcontinent. The Himalayas, along with the Hindu Kush mountains in Pakistan, prevent cold Central Asian katabatic winds from blowing in, keeping the bulk of the Indian subcontinent warmer than most locations at similar latitudes. Simultaneously, the Thar Desert plays a role in attracting moisture-laden southwest summer monsoon winds, between June and October, which provide the majority of India's rainfall. Groupings are assigned codes (refer attached map below) according to the Köppen climate classification system.

In India, tropical wet and dry climate is more common. Significantly drier than tropical wet zones, it prevails over most of peninsular India except for a semi-arid rain shadow leeward side of the Western Ghats. Winter and early summer are long, dry periods with temperatures averaging above 18°C. The states of West Bengal and Orissa experience tropical wet and dry weather conditions whereas the state of Gujarat experiences semi arid to arid climate. The humid tropical wet monsoon climate is experienced in the southwestern lands along the Malabar Coast and southern Assam. The island territories of India, Lakshadweep and the Andaman and Nicobar, also subject to this climate. Characterized by moderate to high year-round temperatures and rainfall above 2,000mm per year this regions is responsible for the extremely diverse tropical wet forests of the country. Most rainfall occurs between May and November, and December to April is the driest months.

Most of western Rajasthan and northern parts of Gujarat state experiences an arid climatic regime. Cloudbursts are responsible for region's annual precipitation, which totals less than 300 millimeters (12 in). Such bursts happen when monsoon winds sweep into the region during July, August, and September.

Atmospheric moisture is largely prevented from precipitating due to continuous downdrafts and other factors. The summer months of May and June are exceptionally hot; mean monthly temperatures in the region hover around 35°C, with daily maxima occasionally topping 50°C. During winters, temperatures in some areas can drop below freezing due to waves of cold air from Central Asia. Figure 3.7 shows the various climatic zones of India.

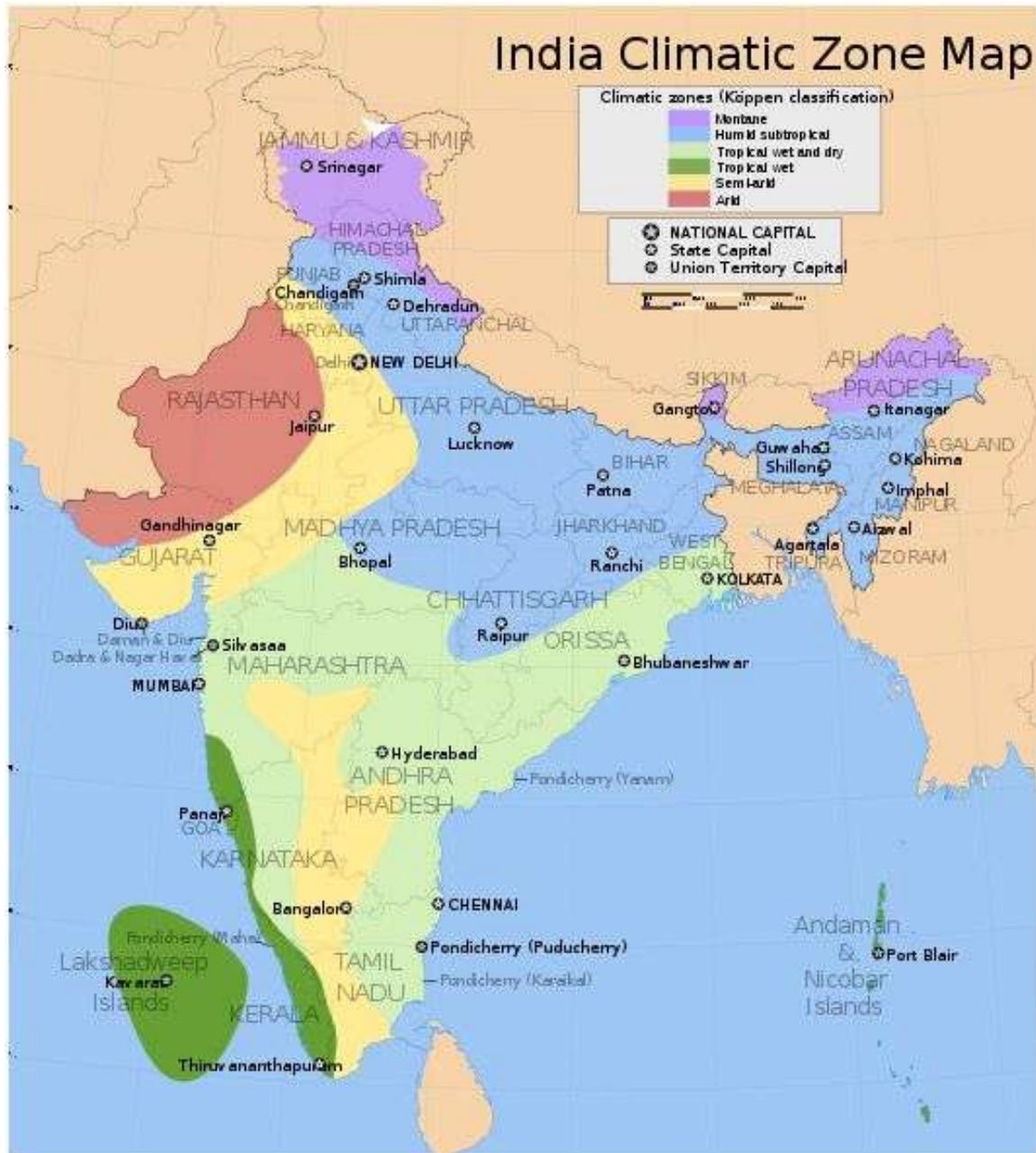


Fig. 3.1: Climatic Zones of India

The southwest monsoon, a four-month period, is the most productive season of the country. Monsoon rains impact the health of the Indian economy; as Indian agriculture employs 600 million people and composes 20% of the national GDP, good monsoons correlate with a booming economy.

3.1 Coastal and Marine Resources

The coast areas of the country is endowed with a wide range of coastal ecosystems like mangroves, coral reefs, sea grasses, salt marshes, sand dunes, estuaries, lagoons and natural habitats. This richness in habitat and ecosystems provide enormous opportunities for economic activities which makes the coastal environment one of the critical areas of the country.

3.1.1 Coastal Areas in India

The table 3.1 compares the key coastline statistics of India with the world and Asia to better illustrate the study area for the ICZM project.

Table 3.1: Coastal Statistics of India and World

Coastal Characteristics	India	Asia (Excl. Middle East)	World
Length of Coastline (Km)	17,181*	2,88,459	16,34,701
Percentage of population within 1000 km of the Coast	26	----	39
Area of continental shelf (Km ²)	3,72,424	55,14,288	2,42,85,959
Territorial sea (upto 12 nautical miles) (Km ²)	1,93,834	57,30,868	1,88,16,919
Claimed exclusive economic zone (Km ²)	21,03,415	1,18,44,193	10,21,08,403

(Source URL: http://www.earthtrends.org/pdf_library/country_profiles/coa_cou_356.pdf)

(*- the reference makes it clear that the figure should be interpreted as approximation and further clarified that the figure may differ from other published sources. However it is being stated that his data for the coastline of the country is incorrect according to many other sources)

Coastal areas in India today are facing environmental degradation due to increasing anthropogenic pressures and scarce natural resources. The various economic activities coupled with natural calamities leads to environmental pollution, coastline erosion/accretion, floods, salt water intrusion, ground water depletion, loss of biodiversity, alteration of habitat, etc. The following describes the different coastal stretches of the country.

Western Coast

The western coast of India comprises of Gujarat, Maharashtra, Goa, Karnataka, Kerala, Daman & Diu and small stretch of Pondicherry (Mahe). The Rann of Kachchh, the Gulf of Kachchh, the Saurashtra Coast, the Gulf of Khambat and the South Gujarat Coast are the five coastal regions of Gujarat which cover an area of about 28,500 km². The Rann of Kachchh comprises the Great Rann and the Little Rann, which remain saline desert for the greater part of the year. The Great Rann of Kachchh lies along the border of Pakistan and the Little Rann of Kachchh between the two Peninsulas. The area of the lower Indus deltaic plain situated on the west of the Great Rann of Kachchh is characterised by the tidal creeks (e.g. Kori creek) and mangroves. In the Gulf of Kachchh shoreline has extensive mudflats and is highly intended with a number of cliffed rocky islands. It is fringed by coral reefs at many places. Mangroves, salt marshes, dunes and salt pans are common. The Saurashtra coast is less intended, but has numerous cliffs, islands, tidal flats, estuaries and embayment. Dunes (near Mahuva), sandy beaches, spits, bars, bays, marshes and estuaries predominate this region. The south Gujarat coast is comparatively uniform and is broken by few indentations. Series of estuaries, creeks, mudflats and marsh vegetations are present. This region has extensive creek systems which are flanked by mudflats, mangroves and saltpans. Numerous islands both barrier and offshore, isolated cliffs and sandy beaches are seen.

The area farther south, especially the stretch from Daman to Goa (known as the Konkan coast), is indented with flooded valleys extending inland into narrow riverine plains. These plains are dominated by low-level

lateritic plateaus and are marked by alternating headlands and bays, the latter often sheltering crescent-shaped beaches. From Goa south to Cape Comorin (the southernmost tip of India) is the Malabar coastal

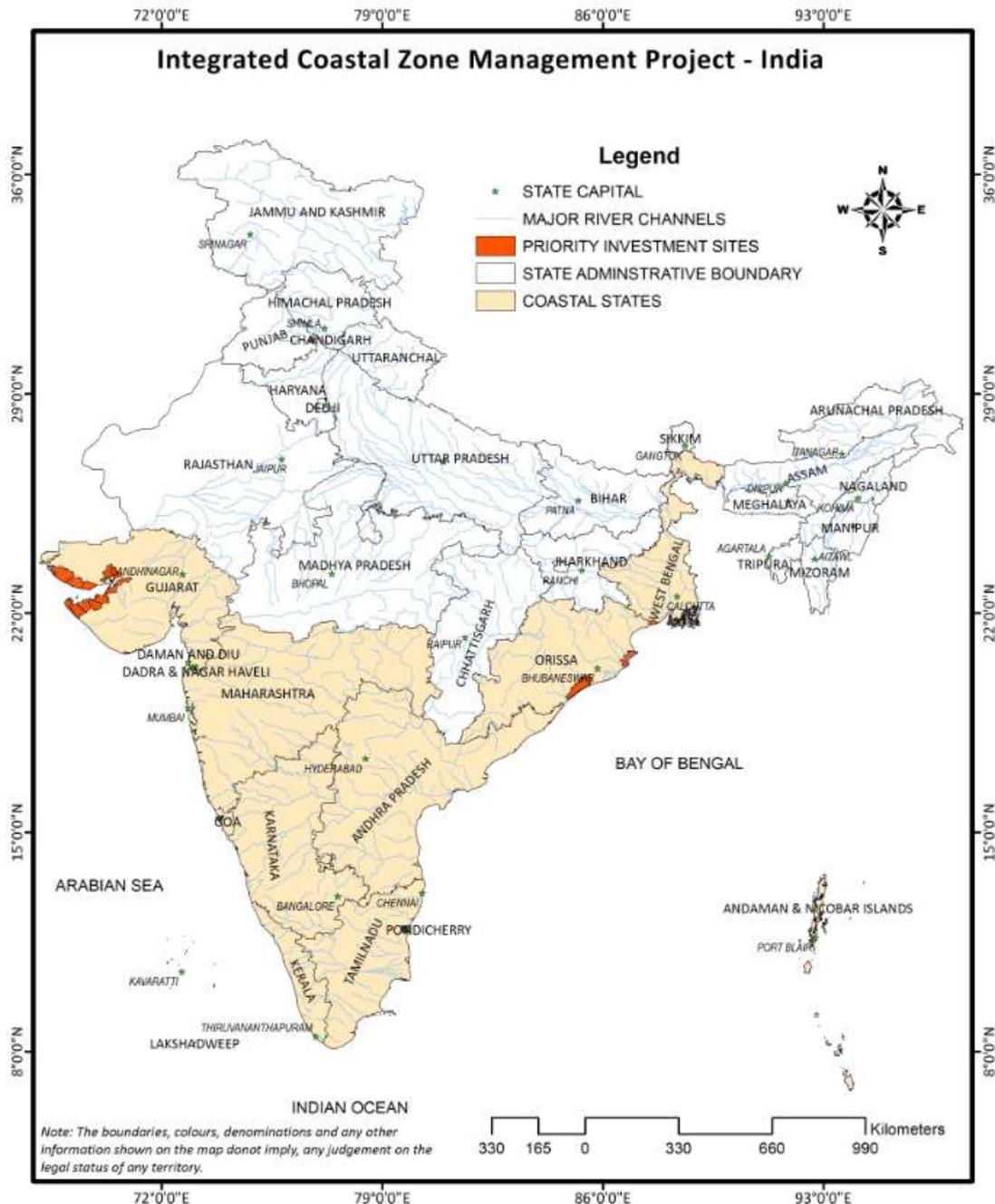


Figure 3.2: Map showing study area

plain, which was formed by the deposition of sediment along the shoreline. This plain varying between width of 25 to 100 km is characterized by lagoons and brackish, navigable backwater channels.

The southern Maharashtra and Goa coasts are characterized by pocket beaches flanked by raised platform, rocky cliffs and promontories, estuaries, bays and mangroves. Mudflats are found mainly along estuaries, bays and creeks. The Marmagao bay flanked by Mandovi and Zuari estuaries is the largest estuarine system on this part of the coast. Beaches in Goa are long, linear and wide and are flanked by headlands (promontories). These beaches are extensively used for recreation.

The coastal zone of Karnataka is narrow except around estuaries. Headlands and pocket beaches characterize the northern coast (Ankola -Karwar) and long linear beaches are seen on the southern coast. Spits, estuaries, mudflats, shallow lagoons, islands and few patches of mangroves are also seen.

On contrast to the Mangalore coast, Kerala coast is described as a submergent coast. Lateritic cliffs, rocky promontories, offshore stalks, long beaches, estuaries, lagoons, spits and bars are characteristics of Kerala coast. The sand ridges, extensive lagoons and barrier islands are indicative of a dynamic coast with transgression and regression in the recent geological past. The central Kerala coast around Kochi is of recent origin. There are about 700 land-locked islands (including barrier islands) in Kerala. The mud banks of Kerala are unique transient near shore features appearing during monsoon. Though, there are 41 rivers bringing enormous quantity of sediments, deltas are not formed due to the high energy condition of the coast. Cochin-Vembanad is one of the largest estuarine systems in the country. The Kerala coast is left with just 17km² of mangroves (Basha, 1992).

Eastern Coast

The eastern coast of India comprising of a total length of 2630 km, falling under 4 states and 1 Union Territory i.e. West Bengal, Orissa, Andhra Pradesh, Tamil Nadu and Pondicherry. The predominantly deltaic eastern coastal plain is an area of deep sedimentation. Over most of its length it is considerably wider than the the western coast. The major deltas, from south to north, are of the Kaveri, the Krishna-Godavari, the Mahanadi, and the Ganges-Brahmaputra rivers. The last of these is some 300 km wide, but only about one-third of it is within India. Traversed by innumerable distributaries, the Ganges delta is a poorly-drained region, and the western part within Indian Territory has become moribund because of shifts in the drainage channels of the Ganges. Tidal incursions extend far inland, and any small temporary rise in sea level could submerge areas from the head of the Bay of Bengal. The eastern coastal plain includes several lagoons, the largest of which Pulicat and Chilika lakes, have resulted from sediment being deposited along the shoreline

The Tamil Nadu (including Pondicherry) coast is straight and narrow without much indentation except at Vedaranyam. Fringing and patch reefs are present near Rameswaram and Gulf of Mannar. Pichavaram, Vedaranyam and Point Calimere have well developed mangrove systems. In Tamil Nadu about 46 rivers drain into Bay of Bengal forming several estuaries adjoining coastal lagoons. The other landforms of the Tamil Nadu coast are rocky outcrops of Kanyakumari, mudflats, beaches, spits, coastal dunes and strand features.

The Coastline of Andhra Pradesh is long with indentations only in the extreme south (in the saltwater lagoon of Pulicat Lake) and between the Godavari and Krishna deltas (which are growing outwards). North of Godavari delta is rocky, south of Krishna delta is sandy and in between the interdelta is vegetated with mangroves. The residual hills and ridges of the north are common here. The deltaic coast comprises of bays, creeks, extensive tidal mudflats, spits, bars, mangrove swamps, marshes, ridge and swale areas and coastal alluvial plains. The Kolleru Lake is situated in the interdelta. The Pulicat Lake has extensive tidal flat and 12 km long spit, where Sriharikotta is situated. These coasts are frequently affected by cyclones.

The Orissa coast is mainly depositional in nature formed by the Mahanadi and the Brahmani-Baitarani deltas. It is exposed to severe cyclones (latest in October, 1999). The Chilika lagoon is the largest natural water body of the Indian coast. The major mangrove areas are Bhitarkanika and Hatmundia (190km²). Mudflats, spits, bars, beach ridges, creeks, estuaries, lagoons, flood plains, paleomudflats, coastal dunes, salt pans and paleochannels are observed along the Orissa coast.

The West Bengal coast represents a typical deltaic strip with almost a flat terrain. The Hoogly and its distributaries form the most conspicuous drainage network and form an estuarine system. The Sundarbans with coverage of about 1,430 km², is one of the largest single block of the halophytic mangrove systems of the world. The major geomorphic features are mudflats, bars, shoals, beach ridges, estuaries, extensive network of creeks, paleomudflats, coastal dunes, large number of islands like Sagar and salt pans.

Islands

In addition to the main land coastal areas, India has two major island groups., the Lakshadweep and Andmana & Nicobar. The Lakshadweep has got about 36 islands (11 are inhabited), a number of sunken banks, open reefs and sand banks in Lakshadweep Islands, situated in the Arabian Sea. These coral islands are 3-9 metres above Mean Sea Level (MSL), have an area of 32 km² and all of them have well developed coral reefs. The Andaman and Nicobar islands in the Bay of Bengal have about 572 islands (<http://www.and.nic.in/Know%20Andaman/Intro1.htm>). These islands are volcanic in origin and emerged part of a mountain chain. The coastline has coral reefs, sandy beaches, lagoons, mangroves, creeks, bays, cliffs, saline areas and forestland.

The coastline of the country marks the seaward limit of a hinterland with visibly and understandably varied geomorphologic makeup, lithological composition and structural framework, which is modified by processes of sub aerial erosion and neo-tectonic movements. Rocks of nearly all geological ages (i.e., Pre-Cambrian to Quaternary), deformation episodes, and macro- and micro-structural make up, are exposed in this coastal land. As a consequence, this tract exhibits a range of morphological features, whose response to modern shore processes like wave activity (of seasonally varying energies), tide movements (of variable ranges between say <1.0 m in south to values, like 11.0m in NW and 4.0 m in higher northern latitudes NE,) and storm surges (hitting the coast line and people by surprise) are equally variably felt. This Indian coastal land is also part of the pathway for nearly 100 large and small rivers entering the adjacent seas. The variable neo tectonic, non-uniform coastal land geology and beach processes and differing shoreline responses to wave and tide activity, unequal river sizes and discharges have in combination contributed to present day appearance and processes of coastal landform or morphological elements. Detailed investigations on the coastal land revealed positive relief features like large and small river deltas, modern and paleo-mudflats, strand plains, dune fields etc. In addition, the low coastal land of India is also home to a large number of coastal wetlands and ecosystems like mangroves, grass and reef tracts, salt marshes and lagoon systems, some of which are accredited heritage (treasures) sites approved by the Ramsar Bureau.

3.1.2 Coastal Ecosystems / Habitats

The coastal areas of the country support varied ecosystems and habitats as described in subsequent sections of the report. The coastal ecosystem are divided by their physical characteristics, and include a wide array of near shore terrestrial (*dunes, cliffs, rocky and sandy shores, coastal habitats, urban, industrial and agricultural landscapes*), intertidal (*estuaries, deltas, lagoons, mangrove forests, mudflats, salt marshes, salt pans, other coastal wetlands, ports and marinas, aquaculture beds*), benthic (*forests, sea grass beds, coral reefs, and soft bottom environments above the continental shelf, artificial reefs and structures*), and pelagic marine environments (*Open waters above the continental shelf, freestanding fish farms: e.g. plankton blooms*). Such diverse habitats often co-exist and are dynamic, therefore, are difficult to identify exact locations, extent and delineate clear boundaries between them.

Coastal and marine systems constituted by mosaic of natural ecosystems provide numerous goods and services to humans as depicted in table 3.2.

Coastal wetlands:

Along the Indian coastline, the brackishwater areas including marshes, backwaters, mangroves, inter- and sub-tidal measure about 14,16,300 hectares. These areas act as feeding and nursery grounds for a variety of commercially important fish, prawn and crabs, inland transportation, fishing etc.

Table 3.2: Relative significance of goods and services across Coastal & Marine Ecosystem

Goods & Services	Estuaries & Marsh	Mangrove	Lagoons & Salt Ponds	Intertidal	Rock & Shell Reefs	Sea Grass	Coral Reefs
Food	+++	++	+	++	++	+	++
Fibre, Timber, Fuel	+++	++++	++				
Medicines	+	+	+				+
Biodiversity	+++	+++	++	++++	++++	++	++++
Biological Regulation	+++	++++	++	+	+		++
Freshwater storage & Retention	+		+				
Biochemical	+	+					+
Nutrient Cycling & Fertility	+++	+++	++	+	+		+++
Hydrological	+		+				
Atmospheric & Climate regulation	+++	+++	++	+	+	+	++
Disease control	+++	+++	+++	++	+	+	+
Waste processing	++++	++++	+++		+	++	+
Flood/ storm protection	++	+++	+	+	++	++	++++
Erosion Control	++	++++	+			+	+
Cultural & amenity	++++	+	+++	++++	++	++	++++
Recreational	++++	+	+	++++			++++
Aesthetics	+++	+	+++	+++			++++

Source: Millennium Ecosystem Assessment (2005)

Mangroves

Mangroves are specialized ecosystems formed by a variety of salt-tolerant species growing in the intertidal areas and estuary mouths in tropical and subtropical regions of the world. The ecosystem has developed a set of physiological adaptations such as Pneumatophores to overcome problems of salinity and frequent tidal inundations. The ecosystem is also considered as most productive and diverse providing significant functions in the coastal zones as buffer against erosion and storm surges. The carbon fixed in mangroves is highly important in the coastal food webs and the litter from mangroves and the subsequent formation of detritus and its tidal export have also profound effect on promoting biodiversity richness.

It is estimated that in India a total of 4461km² of mangrove forests exists, which is 0.14% of the country's total geographic area (Kathiresan and Qasim, 2005). It account for about 5% of the world's mangrove vegetation. The major locations of mangrove forests in the country are deltas of river Ganges, Mahanadi, Godavari, Krishna and Cauvery as well as on the Andaman and Nicobar islands. Nearly 57% of the mangroves are found along the east coast. The Sundarbans is the largest mangrove forest in the world, located in the Ganges delta in Bangladesh and India. The National Remote Sensing Centre (NRSC), Hyderabad, recorded a decline of 59.18 sq.km of mangrove between 1972 – 75 and 1980 – 82 (Anon, 1983). According to the Government of India report (GoI, 1987), India lost 40% of its mangrove area during the last century.

The very dense mangroves comprise 1147 km² (25.8% of mangrove cover); moderately dense mangrove is 1,629 sq.km (36.6%) while open mangrove covers an area of 1,669 sq.km (37.6%) (Anon, 2005). Compared to 2003 assessment, there has been a marginal decrease in mangrove cover of the country mainly because of Tsunami which hit Andaman & Nicobar Islands on 26th Dec 2004. Gujarat has shown an increase in the mangrove cover largely due to plantations and protection measures. Table 3.3 presents a temporal assessment of the mangrove cover in the coastal states and UT of India.

This unique ecosystem harbours wide variety of plant species and associated fauna. In India about 60 species in 36 genera and 17 families constitute "true mangroves" (Ananda Rao, et al, 1998). The number of true mangrove species in the West Coast and East Coast vary considerably. In the West Coast a maximum of 18 species have been reported so far (SoE Report, Kerala, 2007) and the remaining species are from East Coast and Andaman Islands. Regionally, even in the West Coast, the state of Gujarat is very characteristic with mangrove vegetation due to its proximity to arid and semi-arid conditions. Some of the dominant species of mangroves include *Avicennia marina*, *A. officinalis*, *A. Alba*, *Bruguiera cylindrica*, *B. parviflora* *Kandelia candel*, *Rhizophora apiculata*, *R. lamarckii*, *R. mucronata*, *Sonneratia Alba*, *S. apetala*, etc. Besides mangroves, there are mangrove associates and many other plant and animal species.

Table 3.3: State/UT wise Mangrove area (sq.km)

Sl. No	State/ UT	Assessment Year									
		1987	1989	1991	1993	1995	1997	1999	2001	2003	2005
1.	Andhra Pradesh	495	405	399	378	383	383	397	333	329	329
2.	Goa	0	3	3	3	3	5	5	5	16	16
3.	Gujarat	427	412	397	419	689	901	1031	911	916	936
4.	Karnataka	0	0	0	0	2	3	3	2	3	3
5.	Maharashtra	140	114	113	155	155	124	108	118	158	158
6.	Orissa	199	192	195	195	195	211	215	219	203	203
7.	Tamil Nadu	23	47	47	21	21	21	21	23	35	35
8.	West Bengal*	2076	2109	2119	2119	2119	2123	2125	2,081	2120	2118
9.	Andaman Nicobar	686	973	971	966	966	966	966	789	658	637
10.	Pondicherry	0	0	0	0	0	0	0	1	1	1
11.	Kerala	0	0	0	0	0	0	0	0	8	8
12.	Daman Diu	0	0	0	0	0	0	0	0	1	1
Total		4046	4255	4244	4256	4533	4737	4871	4482	4448	4445

* As per the West Bengal forest department, mangrove area in Sundarban is 4,200 Km² (approximately) which is almost double the area estimates by FSI. This is mainly because West Bengal forest department includes the area of water body also besides mangroves vegetation. But for change detection, it is prudent not to include water area.

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

Mangrove fauna is generally represented by aquatic, semi-aquatic and terrestrial communities adapted to stress conditions. They support a wide variety of animals such as molluscs, arthropods, nematods, insects, and butterflies to mammals, birds, reptiles, amphibians and fishes. Mangroves also function as nurseries of a large variety of marine fish and shellfish. Mangrove forests mainly function as spawning, breeding and grounds for near shore estuarine organisms like fishes, crabs, prawns, molluscs, etc. Some of the common and economically important species are *Mugil cephalus*, *Hilsa ilisha*, *Lates calcarifer*, *Scylla serata*, *Meretrix casta*, *Crassostrea grephoides*, and *Penaeus* spp.

Apart from the captive and culture fisheries, mangroves are also important as "coastal stabilizers" and "shelter belt areas". These formations protect the coasts and the landward areas from erosion and cyclonic destructions to some extent. In addition to providing habitat for large group of living organisms, it also protects the coast from natural calamities and hazards such as flooding, erosion, storm surges, etc. The rich biota also provides resources to support the livelihood of the people. The aesthetic value attributed to this unique ecosystem enhances the opportunities for one of the major economic activities in the coastal region, tourism. Yet, this repository of natural wealth is one of the most threatened ecosystems of the world. The indiscriminate utilization of resources, reclamation for development activities, pollution from industrial effluents, dumping of wastes, etc., has led to destruction of mangroves in the recent past.

Coral Reefs

Coral reefs are shallow water tropical marine ecosystems which are characterized by remarkably high biomass production and a rich faunal and floral diversity. Corals require certain conditions to occur and can flourish only in relatively shallow waters, exposed to direct sunlight, with optimum temperature of 23-25°C and free from suspended sediments. The structure of a reef is formed by the calcareous skeleton that houses corals, a type of soft-bodied, radial symmetrical, marine invertebrates of the Phylum Coelenterate.

Individuals of a colony are called polyps or hydroids. Millions of coral skeletons cemented together over a period of millions of years give rise to Reefs. Reefs can vary enormously in structure and complexity and can be broadly classified into three major types:

- **Fringing reefs:** reefs that grow close to the shore and extend out into the sea like a submerged platform.
- **Barrier reef:** reefs separated from the land by wide expanses of water and follow the coastline.
- **Atolls:** a roughly circular ring of reefs surrounding a lagoon, a low lying



Figure 3.3: Distribution of Coral Reefs in India

island, common in the Indian and South Pacific oceans.

The total coral reef area in India is 5,790 sq.km , distributed between four major regions: the Lakshadweep, Gulf of Mannar, Andaman and Nicobar Islands, and Gulf of Kachchh. Reef structure and species diversity vary considerably between the areas due to differences in the reef extent and geo-environmental conditions. Out of three major reef types, the Indian coastal waters supported only Atoll and Fringing types. While the Lakshadweep reefs are atolls, the others are fringing reefs. Patchy coral is present in the inter-tidal areas of the central west coast of the country.

In India, a total of 206 coral species have been reported (Arthur, 2000). Among the coral region of the country, Gulf of Kachchh has reported minimum number of species (i.e. 36 species) and Andaman Islands reported the maximum (i.e. 134 species) with other areas falling in between species richness. The coral species of Gulf of Kachchh are of the massive form and conspicuous with the absence of branching corals like *Acropora*, *Pocillopora*, *Stylophora* and *Seritopora*. In Lakshadweep, the atolls are surrounded by prolific reefs and the commonest are *Acropora* spp., *Porites* spp., *Diploastrea*, *Heliopora*, *Goniastrea retiformis* and *Lobophyllia corymbosa*.

Coral reefs are among the ocean's most complex, biologically diverse and beautiful marine ecosystems that provides sheltering place and feeding ground for multitudes of organisms such as algae, fish, lobsters, crabs, etc. Because of their high rates of calcification, they play an important role in the global calcium cycle fixing about half of all the calcium entering the sea into calcium carbonate (Fujita, et al., 1992). The Coral reef resources are a cornerstone of the economy, tourism, fisheries, and traditional cultures. The biological and mineral resources present in the coral ecosystem makes this as an important centre of economic activity which also accelerates the degradation of this beautiful submarine ecosystem. The major anthropogenic threats include dredging of sand for the cement industry and, growing urbanization and industrialization (e.g., Gujarat), tourism, sport fishing, collection for commercial purpose as handicrafts (e.g., Lakshadweep and Andaman Islands and Gulf of Mannar), massive siltation due to deforestation (e.g., Andaman) etc. The mass bleaching occurred during 1998 (Arthur, 2000) and 2002 (Kumaraguru *et al*, 2003) due to *El Nino* has reported considerable extent of damage to live coral resources of the country.

Coral reefs provide a wide range of commercial and non-commercial benefits to human society. Many of these benefits, or "ecosystem goods and services," are of high value and critical importance to local and national economies as depicted in table 3.4. Due to the importance of coral reefs to local communities and the increasing level of natural and anthropogenic impacts upon them, accurate monitoring and assessment of reef condition is necessary to allow the management and sustainable use of these resources.

Table 3.4: Goods and services provided by coral reefs

Provisioning Services	Regulating Services	Cultural Services	Supporting Services
(Products obtained from ecosystems) <ul style="list-style-type: none"> • Food (fish and shellfish) • Genetic resources • Natural medicines and pharmaceuticals • Ornamental resources • Building materials 	(Benefits obtained from regulation of ecosystem processes) <ul style="list-style-type: none"> • Erosion control • Storm protection 	(Nonmaterial benefits obtained from ecosystems) <ul style="list-style-type: none"> • Spiritual and religious values • Knowledge systems / educational values • Inspiration • Aesthetic values • Social traditions • Sense of place • Recreation & ecotourism 	(Natural processes that maintain the other services) <ul style="list-style-type: none"> • Sand formation • Primary production

Source: MEA (2003)

Sea grass beds

The Sea grass beds are shallow marine habitat where there is undergrowth of sea grass present. They provide an important feeding ground for number of marine species including turtles and dugongs and spawning and nursery for many species. Sea grass beds are stabilizing the coastal sediment, substrate and provide vital oxygen to surrounding water masses. Sea grass herbivore is a highly important link in the food chain, with hundreds of species feeding on it. It was estimated that 1m of sea grass can generate up to 10 liters of oxygen per day. The members of the sea grass are represented by four families; Posidoniaceae, Zosteraceae, Hydrocharitaceae, or Cymodoceaceae. The functional role of this ecosystem sometimes interpreted as 'ecosystem engineers' because they partly create their own habitat: the leaves slow down water-currents increasing sedimentation, and the sea grass roots and rhizomes stabilize the seabed. Their importance for associated species is mainly due to provision of shelter and for their extraordinarily high rate of primary production. As a result, sea grasses provide coastal zones with a number of ecosystem goods and ecosystem services, for instance fishing grounds, wave protection, and protection against coastal erosion.

The major sea grass meadows in India exist along the southeast coast (Gulf of Mannar and Palk Bay) and in the lagoons of Islands from Lakshadweep (Arabian Sea) and Andaman and Nicobar Islands (Bay of Bengal). The flora comprises 14 species and is dominated by *Cymodocea rotundata*, *Thalassia hemprichii*, and *Halophila beccarii* of which 13 species occur in the Gulf of Mannar (Thangaradjou, et al, 1998) and 7 species are found in the Lakshadweep Islands (Anon., 2002). The major anthropogenic threats to this ecosystem are construction of ports, breakwaters and harbours, dumping of urban and industrial wastes, pollution, aquaculture, eutrophication, siltation, dredging, anchoring, etc.

Sea weed beds

Seaweeds refer to any large marine benthic algae that are multicellular, macrothallic, and thus differentiated from most algae that are of microscopic size. They belong to the groups of red algae, green algae, and brown algae and most commonly found in the littoral zone. Many of the rocky beaches, mudflats, estuaries, coral reefs and lagoons of this zone along the Indian coast provide ideal habitats for the growth of seaweeds. In India although sea weeds are found to occur in all the coastal area some kind of precinct was reported for seaweed vegetation at regions along the east coast, viz. Mahabalipuram, Visakhapatnam, the west coast, like Okha, Diu etc (Subba Rao and Mantri, 2006)

The Seaweed flora of India is highly diversified and comprises mostly of tropical species, but boreal, temperate and subtropical elements have also been reported. In total 770 species of Indian seaweeds have been reported which includes 184 species of green, 166 species of brown and 420 species of red algae (Sahoo, 2001). The Southern Coast of India bears luxuriant growth of seaweeds. More than 200 species of seaweeds have been found in this area.

The present uses of seaweeds are as human foods, cosmetics, fertilizers, and for the extraction of industrial gums and chemicals (agar) and they have the potential to be used as a source of long- and short-chain chemicals with medicinal and industrial uses. In India, agar resources, as annual yield of dry sea weeds of Chilika Lake have been estimated to be about 4.06 - 5.08 metric tons, of Cape Comorin about one metric ton, and of the Pamban area as estimated about seven metric tons. Other large quantities are in Kathiawar peninsula and estuaries, the resources of the Andamans are believed to be considerable. The multiple and conflicting uses of seaweed habitats, dredging, illegal exploitation of seaweeds are some of the threats to this habitat in India.

Mud Banks

Coastal waters of the southwest coast of India draw special attention because of the occurrence of mud banks at certain locations during southwest monsoon period. This unique phenomenon is of interest not only to the fishing communities and marine biologists, but also to physical and chemical oceanographers as well as geoscientists. The huge fisheries potential that exist in the Mud Banks make this as an important centre of economic activity for a short span of time. This phenomenon occur in the near shore shallow water about 10 m deep, appears only in the segment between Thrikunnapuzha and Kozhikode (distance = 270 km) in the state of Kerala. Individual banks extend over an area of 25 sq.km or more (Nair, 1976). They are characterized by rapidly accumulating fine-grained silty clay sediments, high organic matter, oxygen deficient bottom waters, and dense mud suspensions.

The muds are thixotropic, and the sedimentary environment suggests conditions suitable for gas generation within the sediments. Another important attribute is that Mud Banks are migratory in nature, i.e., these migrate up coast or down coast, in that they do not recur in the same spot or sector year after year. The Mud Bank phenomenon has been attributed to mundane geological phenomenon like submarine spring sapping and the sea bottom sediment stirring monsoon wave climate. The migratory nature of Mud Banks obviously reflects the link between availability of suitable bottom mud (sediment) and wave climate- the latter however is a trans-Lakshadweep sea phenomenon. The nutrient that surfaces due to upwelling caused by the wave activity attracts marine life of sorts to this region creating a transient but rich fishing ground.

Mud Flats

Mudflats are wide expanse of fine grained soft mud along the shore and are coastal wetlands that form when mud is deposited by the tides or rivers, sea and oceans. They are found in sheltered areas such as bays, lagoons, and estuaries. Mudflats may be viewed geologically as exposed layers of bay mud, resulting from deposition of estuarine silts, clays and marine animal detritus. These Mudflats may be further classified based on their relation with tidal condition viz., (i) High-tide, (ii) Inter-tidal slopes and (iii) Sub-tidal zones.

Open Mudflats in the intertidal regions support rich growth of algae belonging to the genera Ulva, Enteromorpha and Chaetomorpha and number of Cyanophycean members. Economically important algae like *Monostroma* sp., *Gracilaria verrucosa* thrive (Jagtap, 1985) well in the highly saline swamps towards mouth of the estuaries and backwaters. Among angiosperms the marshy regions of low salinity towards upstream regions of the estuaries found to be dominated by members of Cyperaceae. Patches of *Porteresia coarctata* commonly found in the marsh regions of medium salinity (18-30 ppt) along the estuaries. It has been observed (Jagtap, 1985, Untawale and Jagtap, 1992) that, *Porteresia coarctata*, a gramineae member, a seagrass *Halophila beccarii* and mangrove species like *Sonneratia alba* and *Excoecaria agallocha*, act as pioneer species, during succession process. Spectral signature from the Mudflat algae particularly Enteromorpha, Chaetomorpha as well as other marsh vegetation of obligate halophytes and grasses are likely to be accounted for mangroves.

Mudflats are characterized by high biological productivity supporting an abundance of invertebrates, such as lugworms, sand mason worms and bivalves. These habitats are important breeding sites for wading birds and winter feeding areas for wildfowl, including teal and redshank. They also provide sheltered nursery sites for several species of fish. The maintenance of mudflats is important in preventing coastal erosion. However, mudflats in the country are under threat from predicted sea level rises, land reclamation for development, agriculture, dredging, and chemical pollution.

The predominant mudflats are seen along the East Coast especially in the deltas of Cauvery, Mahanadi and Hoogli (Sundarban). The descending Western Ghats and the impediment caused by the construction of barriers across the rivers in the Ghats may be ascribed to the less formation of Mud flats in the West Coast.

Beaches

Beaches are relatively level land areas which are contiguous with the water and are directly affected by marine waters even to the point of origination. It usually consists of loose particles which are often composed of sand, gravel, shingle, pebbles, or cobble. The particles of the Beach sometimes contain biological origins, such as shell fragments or coralline algae fragments. Waves, wind, tide and geological material are the principal factors involved in the formation of Beaches. Usually Beaches are dominated with sand particles, but muddy shores are also not rare. On sandy shores, a strong backwash distributes sand more evenly, thus creating a flatter slope. Muddy shores occur where the energy of coastal currents and wave action is minimal, allowing fine particles of silt to settle to the bottom. The result is an accumulation of mud on the shores of protected bays and mouths of coastal streams and rivers. Most muddy beaches occur in estuarine areas.

Beaches not only provide habitat for numerous species of plants and animals, they also serve as breeding grounds for many species that are not residential to the beach. The nesting grounds of turtles (Olive Ridley, Green Leather Back, etc) are widely reported from both West and East Coast of the country. In fact, the beaches of Orissa are one of the largest Olive Ridley turtle breeding ground in the world (Pandav and Choudhury, 2000). Beach vegetation is generally scanty and the one which is reported are members of the Convolvulaceae, Leguminosae, and a few Poaceae (Untawale and Nair, 1974). It may be because of the absence of solid structures to which plants may attach and siltation of beaches.

Sand Dunes

Sand Dunes develop behind large sandy beaches which dry out at low tide allowing sand grains to be blown landward. Coastal sand dunes develop where there is an adequate supply of sand (sediment within the size range 0.625 to 2.0 mm) in the intertidal zone and where onshore winds are prevalent. The most common sand dunes are bay dunes, where a limited sand supply is trapped between two headlands; spit dunes, which form as sandy promontories at the mouths of estuaries; and hind shore dunes, which occur in the most exposed locations where large quantities of sand are driven some distance inland, over a low-lying hinterland (Anon., 2005).

Coastal sand dunes are natural structures which protect the coastal environment by absorbing energy from wind, tide and wave action. Despite geographical differences, sand dunes have been considered as a specific ecosystem due to several common environmental features. Sand Dunes do not offer a good habitat for plants to establish, however a number of species are observed to be common on the backshores. The coastal sand dune stabilizing plants in the tropical regions are the members of Asteraceae, Convolvulaceae, Poaceae and Leguminosae. A survey conducted on the sand dunes of Karnataka coast revealed the existence of 13 legume species among these; *Canavalia rosea* was most frequent followed by *Canavalia cathartica* and *Crotalaria verrucosa*. All the legumes possess profuse and active nodules on the dunes surveyed (Arun *et al* 2001). *Derris triflorum*, an inhabitant of mangroves, was also found on the sand dunes at different locations. The established seedlings of indigenous trees, *viz. Tamarindus indica*, *Pongamia pinnata* and *Erythrina indica* are also seen at many locations suggesting their ability to grow on the sand dunes. Other species such as *Ipomea pescaprae*, *Spinifix squarrosus*, *S. littoreus*, *Vitex negundo*, *Launea pinnatifida*, *Anacardium occidentale*, *Pandanus* and *Opuntia* spp are frequent in the coastal sand dunes. A

few plants of branched palm *Hypnae indica* occurred in the backshore regions along, the Miramar beach at Goa only (Jagtap *et al*, 2001). The tender pods of *Canavalia rosea* and *C. cathartica* which are present in the sand dune vegetation serve as vegetable for the coastal dwellers (Arun *et al* 2001). Latex of *Launaea sarmentosa* is commonly used by fishermen to heal skin injury caused by fish spines while fishing. The animals associated with dune vegetation include rabbits, birds, small reptiles, insects and nematodes. The major threats to the sand dunes of the country are road construction, dumping of granite boulders as a measure of erosion prevention, sand extraction, recreation activities, removal of vegetative matter for fuel and removal of shell.

Littoral Forest

The forests types of India described by Champion and Seth included a distinct sub-type of moist tropical forests by name 'littoral and swamp forests'. While swamp forests include mangroves and freshwater swamps as found in the Western Ghats, littoral forests occur all round the coast wherever a fair width of sandy beach occurs. The littoral forest plant community is known to include species such as *Manilkara littoralis*, *M. hexandra*, *Morinda* sp., *Erythrina* sp., *Calophyllum inophyllum*, *Cordia* sp., *Barringtonia acutangula*, *Thespesia populnea*, *Hibiscus tiliaceus*, *Pandanus* sp., *Ipomoea pes-caprae*, *Mucuna gigantea*, *Pongamia pinnata*, *Vitex negundo*, *Saccharum spontaneum*, *Borassus flabellifer* and *Phoenix* sp.

Littoral forests of the climax kind are still found in the Andaman and Nicobar Islands. These forests are characterized by tall emergent trees that are often deciduous. Littoral forests with emergent trees occurred along the east coast of southern India. These presumably have been lost long ago in history due to their timber value (especially for boat-building). In the absence of these tall littoral forests, we presently find a second growth of evergreen under storey trees and shrubs distributed patchily along the coasts (Ranjit Daniels *et al* 2007). The importance of coastal or littoral forests were recognized more than ever during the post Tsunami period because of their ability in reducing the wave energy as a permeable barrier.

Rocky Shores

A rocky shore is an intertidal area on seacoasts where solid rock predominates. Their character depends on the prevailing rock types and their profile is usually related to strata formation. Rocky shores are biologically rich environments, and make the ideal natural laboratory for studying intertidal ecology and other biological processes. They are the coastal habitats with the most abundant shore life. The upper beach zone is frequently very dry, limiting inhabitants to species which can tolerate a dry environment. The intertidal zones are a narrow area, between mean low and high tide that experiences uninterrupted covering and exposure by tidal action. One of the major characteristics of this zone is the occurrence of tidal pools which harbor separate communities that can be considered sub-zones within the intertidal zone. The rocky shores are predominantly distributed in the West Coast of India. These rocks are steep and lateritic in nature. The shore may be formed wholly of the silt covered rocks or may be covered with an extensive sand belt. This can be seen in Gujarat where the sand itself is largely calcareous owing to the presence of small shell fragments or bed rock of limestones. Much of the west coast of peninsular India consists of fairly steep rocky shores formed of igneous rocks with varying gradients and subject to the full range of the tides. The major vegetation in the rocky shores is sea weeds such as *Ulva* sp, *Polysiphonia* sp, *Gracilaria verucosa*, *Enteromorpha* sp, and *Cladophora* sp (Krishnamurthy and Subbaramaih, 1972). Rocky shores are rich in invertebrate fauna and provide a multiple range of habitats for a variety of organisms belonging to almost all invertebrate phyla. Marine molluscs constitute an important and one of the two dominant phyla of the rocky intertidal coast. The major threats to this ecosystem are uncontrolled development activities for tourism, ports, harbours and jetties, mining of limestone (Gujarat), etc.

Lagoons

A Lagoon is a body of comparatively shallow salt or brackish water separated from the deeper sea by a shallow or exposed sandbank, coral reef, or similar feature. Thus, the enclosed body of water behind a barrier reef or barrier island or enclosed by an atoll reef is called lagoon. Some of the famous lagoons in India are the Chilika in Orissa, Pulikat in Andhra Pradesh and Vembanad in Kerala.

The former two are connected to the Bay of Bengal and the later with Arabian Sea through a narrow channel. Lagoons support a wide variety of flora and fauna and perform numerous ecological functions. Lagoons are extremely productive ecosystem due to high nutrient input from the surrounding terrestrial drainages as well as nutrient cycling. The associated marshes and semi-aquatic system also support the floral and faunal assemblage that enhances the productivity of the ecosystem. The algal flora is mostly composed of either floating or mud inhabiting forms which have the capacity to withstand wide range of salinity. *Enteromorpha prolifera*, *Cladophora* sp. among the green algae; forms like *Rosenvingea intricate* among the brown algae; *Gracilaria verrucosa* *Hypnea nigrescens*, *Spyridia filamentosa*, and *Polysiphora* spp among the red algae are typical members of the community (Krishnamurthy, 1954).

Estuaries

An estuary is that portion of a coastal stream influenced by the tide of the marine waters into which it flows and within which the seawater is measurably diluted with freshwater derived from land drainage. The unique physical and chemical attributes of estuaries relate primarily to the large volumes of fresh water and sediments delivered to the sea by rivers. The mixing zone for fresh water and seawater within the estuary can be exceptionally complex, affected by the volume and rate of discharge of fresh water from the river, the amount and grain size of sediments in the river, the topography of the coastline, the tidal range, and the strength and direction of prevailing wind and waves. These areas are rich in aquatic life, some species of which are important food organisms for anadromous fish species, which use these areas for feeding, rearing, and migration. The Sundarban delta and associated estuarine system is the largest in this regard.

Estuarine ecosystem is essential for the survival of many species which include birds, mammals, fish, and other vertebrate and invertebrate fauna. Many species of shell fishes and fishes use the sheltered water of the estuaries as places to spawn (as they are called "nurseries of the sea"). The vegetation of the estuaries is predominantly mangrove in nature, but salt marshes and species other than mangroves are also spotted in this critical habitat. Phytoplankton of the estuarine community includes Bacillariophyceae, Cyanophyceae, Chlorophyceae, and Chrysophyceae (Madhystha *et al*, 1990). An estuarine area left untouched by man is rare since historically they have been the sites for major cities and port developments. Because of their importance in the food chain and their natural beauty, the limited estuarine areas require careful attention in the planning function.

Salt Marshes

Salt Marshes are coastal wetlands rich in marine life including a variety of plants: rushes, sedges, and grasses. A salt marsh is a type of marsh that occurs in the zone between low and high tides. A distinctive feature of salt marshes is the color - the plants are with various shades of gray, brown, and green. Animals can hide from predators in marsh vegetation, because the shallow brackish area physically excludes larger fish. Many marine fish species spend the early part of their lives protected in salt marshes. Algae form an important food source in salt marshes. Many of the halophytic plants such as cord grass are not grazed at all by higher animals but die off and decompose to become food for micro-organisms, which in turn become food for fish and birds. These plants have extensive root systems which enable them to withstand brief

storm surges, buffering the impact on upland areas. Tidal creeks meander through the marshes transporting valuable nutrients as well as pollutants from upland development. Salt marshes can absorb, or trap, some of these pollutants, reducing the pollutant load entering into estuaries. Salt marshes also prevent sediments from washing offshore, often creating more land on which they grow.

Creeks

Creek is a small narrow bay or arm of the sea longer than it is wide and narrower and extending farther into the land than a cove, a recess in the shore of the sea, or of a river. It is hydrologically connected to a waterway above and below the site or is connected to a spring, headwaters, lake, estuary, or bay. A Saline Creek is the portion of a stream that is affected by the flow of ocean tides. Thus, this portion of the stream has variable salinity and electrical conductivity over the tidal cycle. Due to the temporal variability of water quality parameters within the tidally influenced zone, there are unique biota associated with tidal creeks. Creeks may often dry to a muddy channel with little or no flow at low tide, but often with significant depth of water at high tide. Saline creeks are found dispersed all along the Indian coast. Most of the creeks in the country are reported from the north western part of the coast and the predominant vegetation is mangroves. Freshwater creeks composed of a variety of plants including suspended micro algae, floating plants, bushes, reeds and other emergent plants including trees. These plants provide critical habitat for a range of invertebrates and fish and provide food for in-stream communities. Freshwater creeks play an important role often acting as natural flood retention basins, buffering flood flows and regulating the discharge of freshwater into estuaries. They also play an important role in removing nutrients and improving downstream water quality and stabilize banks. Fresh water fish communities are typically highly habitat specific. Many species are dependent upon seasonal changes in the environment, such as floods to stimulate spawning and to re-colonizes distant areas. A number of species of freshwater fishes undertake seasonal migrations between fresh waters and the sea.

Other Flora and Fauna

The coastal and offshore environment of India supports rich biodiversity. Bacteria, fungi, and zooplankton species are abundant. Benthic fauna consists of ptychaeta (62%), crustaceans (20%), and molluscs (18%). 2546 species of fish belonging to 969 genera, 254 families and 40 orders were recorded (Venkataraman and Wafar, 2005). Over 630 species of marine algae have been reported. The annual production of seaweed is estimated at 70,000 tonnes (<http://www.envfor.nic.in/divisions/ic/wssd/doc2/ch11.html>). The few economically important species of algae such as *Gracilaria edulia* can be cultivated on a large scale. Sea grass flora is dominated by *Thalassia hemprichii* and *Cymodocea sp.* The total standing crop is estimated to be 7000–8000 tonnes (<http://www.envfor.nic.in/divisions/ic/wssd/doc2/ch11.html>).

8 species of marine mammals, 5 species of marine turtles, 1 species of hemichordate, 3 species of cephalochordate, 6 species of echinoderms, 2 species of Xiphosurans, 15 species of molluscs, 10 species of crab and 1 species each of Echiuroid and Brachipod are included in the endangered category of IUCN (IUCN, 2008).

3.1.3 Species Richness in various Bio-geographic Zones

Species richness is considered based on the number of species in a given area of ecosystem. The actual number of species present in a habitat are being considered here as a measure of species richness. The species richness of selected habitat/ecosystems with respect to the coastal land region is given below (Table 3.5). While for other ecosystems/habitats such as estuaries, lagoons, mud flats, saltmarshes, sand

dunes, rocky shores, littoral forests and creeks no specific species assemblage could be ascertained in this study.

Table 3.5: Indicative Data on Land Region wise Species Richness of selected Coastal Habitats

Sl. No	Biogeographic Zone	Biotic Provinces	Land Regions	Coastal length (km)	Species Richness				
					Mangroves	Coral reefs	Salt marshes	Sea grass	
1	Desert	Kachchh	Bhuj	284.6	13	36	10 (6*)	2 (1*)	
2	Semi arid	Gujarat-	Kathiawar	673.1	13	36	10 (6*)	2 (1*)	
3		Rajaputar	Khambhat	315.5	13		10 (6*)	2 (1*)	
4	Coast	West coast	Konkan North	328.3	13		10 (6*)	2 (1*)	
5			Konkan South	367.4	13		10 (6*)	2 (1*)	
6			North Kanara	111.5	13		10 (6*)	2 (1*)	
7			South Kanara	121.7	13		10 (6*)	2 (1*)	
8			Malabar North	263	15		10 (6*)	2 (1*)	
9			Malabar South	467.9	15		10 (6*)	2 (1*)	
10			East coast	Palar-Ponnaiyar	363.1	23	92	11 (6*)	11 (1*)
11				Delta	173.4	23 (1**)		11 (6*)	11 (1*)
12				Southern Plain	234.4	23		11 (6*)	11 (1*)
13		Vishakhapatnam		212.9	23		11 (6*)	11 (1*)	
14		Krishna-Godavari Delta		354.9	23		11 (6*)	11 (1*)	
15		Pennar(Nellore)		317.9	23		11 (6*)	11 (1*)	
16		Chilika		142.1	23		11 (6*)	11 (1*)	
17		Mahanadi Plain		276.9	23 (1**)		11 (6*)	11 (1*)	
18		Balasore Plain		87.5	23		11 ((6*)	11 (1*)	
19		Midnapur Upland		6.6	23		11 (6*)	11 (1*)	
20		Delta Proper		218.5	26		11 (6*)	11 (1*)	
21		Minicoy Islands		26.5	13	78	10 (6*)	2 (1*)	
22		Laccadive Islands		130.4	13	78	10 ((6*)	2 (1*)	
23		Amindivi Islands		73.1	13	78	10 (6*)	2 (1*)	
24		Islands	Andaman Islands	Andaman Island	896.3	27	134		7
25				Nicobar Island	466.9	27	134		7

*Endangered species **Endemic species

Source: Kathiresan and Qasim (2005); State of Environment Report, Kerala (2007)

3.1.4 Marine Protected Areas (National parks and Sanctuaries) in India

India has a network of 611 PAs, including 96 national parks, 510 wildlife sanctuaries, three conservation reserves, and two community reserves, covering a total of 155,978.05 km², or approximately 4.75 per cent of the geographical area of the country, including both terrestrial and marine ecosystems. Besides these, the GOI has also declared 14 biosphere reserves under the UNESCO-MAB program, which are also part of the PA network.

According to the GOI's third national report to the CBD, in 2006, there are 31 MCPAs, 18 of which are fully under the marine environment, whereas the other 13 are partly also on land (fig.3.4 & table 3.6). Besides these, there are another 100 PAs that have terrestrial or freshwater ecosystems that border with seawater or partly contain coastal and marine environment (SCBD, 2006).



Fig. 3.4: Marine Protected Areas of India

(Source: Rajagoplan, R. 2008)

These PAs have been notified either as national parks or wildlife sanctuaries, mainly under the Wildlife Protection Act. These 38 MCPAs cover an area of 6,271.21 sq km, or 4 per cent of the total area under protection.

Table 3.6: List of Marine and Coastal Protected Areas in India

No	Name	State	Year of Est.	Total Area (in Sq. Km)	Biotic Zone
1.	Gulf of Mannar (marine) NP & BR	TN	1986	560.00	8B
2.	Sundarbans NP (TR & BR)	WB	1984	3915.00	8B
3.	Bhitarkanika NP & WLS	OR	1988 & 1974	817.00	8B
4.	Gulf of Kachchh NP & WLS	GU	1980	457.03	8A
5.	Rani Jhansi (marine) NP	AN	1996	256.14	10A
6.	Mahatma Gandhi NP	AN	1983	281.50	10A
7.	North Button NP	AN	1987	0.44	10A
8.	Middle Button NP	AN	1987	0.64	10A
9.	South Button NP	AN	1987	0.03	10A
10.	Malvan WLS	MH	1987	29.12	8A
11.	Sajnekhali WLS	WB	1976	362.04	8B
12.	Lothian WLS	WB	1976	38	8B
13.	Haliday WLS	WB	1976	5.95	8B
14.	Gahirmatha (marine) WLS	OR	1997	1435.00	8B
15.	Nalaban (Chilika) WLS	OR	1987	15.53	8B
16.	Coringa WLS	AP	1978	235.70	8B
17.	Pulicat WLS	AP	1976	500.00	8B
18.	Krishna WLS	AP	1999	194.81	8B
19.	Point Calimere WLS	TN	1967	17.26	8B
20.	Pulicat WLS	TN	1980	153.67	8B
21.	Lohabarrack WLS	AN	1987	100.00	10A
22.	North Reef Island WLS	AN	1987	3.48	10A
23.	South Reef Island WLS	AN	1987	1.17	10A
24.	Cuthbert Bay WLS	AN	1987	5.82	10A
25.	Cingue WLS	AN	1987	9.51	10A
26.	Galathea WLS	NI	1997	11.44	10B
27.	Parkinson Island WLS	AN	1987	0.34	10A
28.	Mangroves Island WLS	AN	1987	0.39	10A
29.	Blister Island WLS	AN	1987	0.26	10A
30.	Sandy Island WLS	AN	1987	0.26	10A
31.	Pitti	LK	2000	0.01	10B

State: TN – Tamil Nadu; AP – Andhra Pradesh; OR – Orissa; WB – West Bengal; GU – Gujarat; MH – Maharashtra; AN – Andaman and Nicobar; NI – Nicobar; LK – Lakshadweep **Legal Status:** NP – National Park; WLS – Wild Life Sanctuary; BR – Biosphere Reserve; TR – Tiger Reserve

source: Singh, H.S. 2003; Rajagopalan, R. 2008)

A recent MoEF press release noted, however, that there are only five designated MPAs in the country, namely, the GOMNP (Tamil Nadu), the Gulf of Kutch (Kachchh) Marine National Park and the Gulf of Kutch Marine Sanctuary (Gujarat), the Mahatma Gandhi Marine National Park (Andaman and Nicobar islands) and the Gahirmatha Sanctuary (Orissa)

The oldest MCPA in India is the Point Calimere Wildlife Sanctuary—an intertidal mud flat bed to protect migratory bird species—declared in 1967, before the enactment of the WLPA. The Sundarbans Tiger Reserve, declared in 1973 under the WLPA, was the first MCPA declared as a tiger reserve. It can be observed that there are more PAs on the east coast of India, while only four PAs have been declared on the west coast to date.

Brief Description of MCPAs in the states of Gujarat, Orissa and West Bengal

Gulf of Kachchh NP & WLS

The GoK is quite diverse in their ecological systems, especially the coral reefs and mangroves, and thus form critical habitats for rich diversity in flora and fauna. Realizing the conservation significance of the coral

reefs and mangroves, the state government declared quite a large area of the southern part of the Gulf as Protected Area. Interestingly, the 162.89 km² area of MNP is actually distributed amongst 37 islands and their coasts whereas, the 295.03 km² are of Marine Sanctuary cover sub-tidal areas around 5 islands and inter-tidal zone from Navlakhi to Okha. Out of total 42 islands in MNPS, 20 islands have mangroves and 33 support coral reefs (fig.3.5)

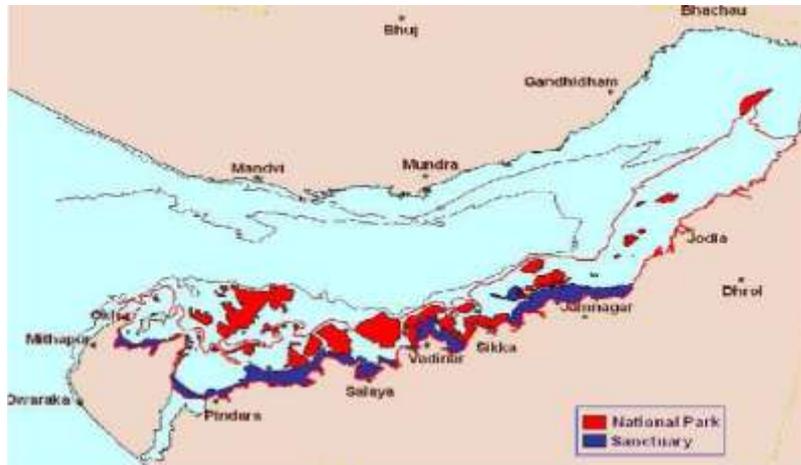


Fig 3.5: Location of MNP & WLS in Gulf of Kachchh

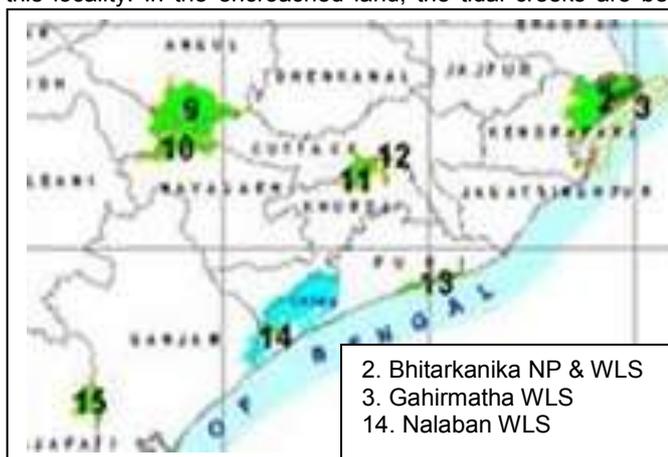
The GoK abounds in marine wealth and is considered as one of the biologically richest marine habitat along the west coast of India. It is endowed with a great diversity of natural ecosystems, of which the major systems are salt pans, intertidal zones, marine algae (seaweeds), sea grass and sand dunes, mangroves, coral reefs, creeks and open ocean.

Natural and anthropogenic factors pose severe threats to the marine ecosystems of GoK. The major industries located around GoK include cement, chemicals, petroleum and oil refineries, ship breaking industries, power plants, fertilizer, fishing etc. The increasing effluent waste discharged into the marine environment poses a serious threat to the marine flora and fauna. Due to major refineries established on coastline especially that of GoK the ship and heavy vessel traffic has also increased in the gulf. Apart from this, establishment of cross-country pipelines may also cause disturbances particularly at the time of their establishment. The increasing ports and jetties are also causes of serious concern for the conservation of marine life. Accidental oil spills from various vessels ferrying in GoK is a matter of serious concern as it may also be a potential threat to the coastal flora and fauna.

Bhitarkanika NP & WLS

Located in Kendrapara District of Orissa, the PA encompasses with an area of 145 km² of the Bhitarkanika Mangroves, a mangrove swamp which lies in the river delta of the Brahmani, Baitarani, and Dhamara rivers. The national park is surrounded by the Bhitarkanika Wildlife Sanctuary. Gahirmatha Beach lies to the east, and separates the mangroves from the Bay of Bengal (Fig 3.6). The area supports rich biodiversity including mangroves and mangrove associates (71 species), largest population of estuarine crocodiles (1358 as per 2004 census), the rare white crocodile (Sankhua), largest Indian lizards (water monitor), poisonous and non-poisonous snakes like king cobra and python, varieties of resident and migratory birds (217 species) and number of mammalian species (spotted deer, sambar, wild boar, fishing cat, jungle cat, otter etc.) In comparison to the national status, the composition of vertebrate fauna / species of Bhitarkanika represents 8% mammals, 17.70% birds, 9.40% reptiles and 2.5 % amphibians.

Encroachment of forestland by the migratory people and conversion of the same into homestead and agriculture land are the main problem in this locality. In the encroached land, the tidal creeks are being blocked by earthen bunds, which prevents the natural tidal flow and gradually perish the ecological integrity of the area. Aquaculture is another major threat in the area since they discharge the untreated effluents from the farm to nearby rivers and creeks and thereby affecting the aquatic fauna and the mangroves. Fishing through obstructing the migratory routes of fishes and crocodiles also identified as management issue in the area. Grazing is another (an estimated 70,000 cattle) serious issue encountered in the PA.



Gahirmatha Wildlife Sanctuary

The Gahirmatha Wildlife Sanctuary, located on the east coast of India in the State of Orissa, was designated in 1997, to protect

Fig. 3.6 Location of MCPAs in Orissa

turtle-breeding and nesting grounds. The present sanctuary boundary extends into the territorial waters, covering an area of 1,450 km², the largest marine area covered by any of the MCPAs in India. It has been created to protect the endangered olive ridley sea turtles, dolphins and other marine flora and fauna. While the turtle-nesting grounds on the beach were earlier part of the Bhitarkanika National Park, the sanctuary was designated especially to include the territorial sea component in 1997. The sanctuary which is in contiguous with the Bhitarkaniaka PA also experiences similar kind of management problems.

Nalaban Wildlife Sanctuary

The Nalaban Sanctuary is a part of the Chilika lagoon (15.53 km²), the vast picturesque watery expanse over the districts of Puri, Ganjam and Khurda. The lagoon, where it is easy to observe the Irrawady Dolphin, is famous for attracting 94 species of migratory birds, and is a "Ramsar site". It is studded with small fascinating islands and sandy beaches interspersed with casuarina groves along the Bay of Bengal. The PA part of Chilika Lake is threatened by siltation, eutrophication, change in salinity regime, proliferation of freshwater weed, increased aquaculture activities, changes in species composition, depletion of bio-resources, and decrease in fish population etc.

Sundarbans NP & TR, Sajnekhali WLS, Lothian WLS and Haliday Island WLS

Sundarbans, a National Park, Tiger Reserve, UNESCO World Heritage Site and a Biosphere Reserve located in the Sundarbans delta in Indian state of West Bengal is world famous for the largest patch of mangrove forest in the country (Fig 3.7). This littoral forest is the only ecological habitat of the tiger of its kind not only in India but also in the world, except in Bangladesh. This dense mangrove forests is home for many residential and migratory species of birds, reptiles, fishes, etc. The mangrove forest is the most diverse halophyte vegetation of the country with around 30 species of true mangroves. It is one of the

largest reserves of the Bengal tiger. Some of the characteristic species are fishing cat, spotted deer, wild boar, Gangetic dolphin, water monitor, estuarine crocodile, river terrapin, olive ridley turtle, ground turtle, hawksbill turtle, king crab (horseshoe) etc.

The other three WLSs such as Sajnekhali, Lothian and Haliday Island are part of Sundarban Biosphere Reserve and the ecological, biological and social characteristics are same as Sundarban Tiger Reserve or NP. The most distinguishing feature of the Sajnekhali WLS is the seven colourful species of Kingfisher, White bellied Sea Eagle, Plovers, Lap-Wings, Curlews, Whimbrels, Sandpipers and occasional Pelican.

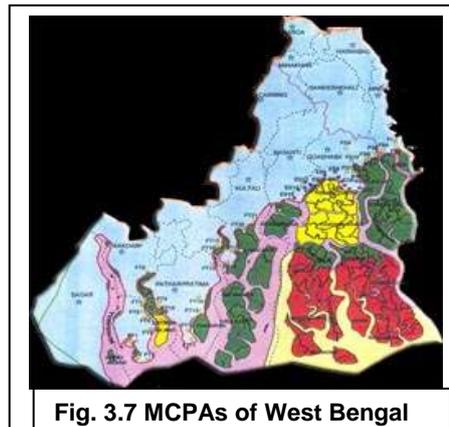


Fig. 3.7 MCPAs of West Bengal

The mangrove zone, because of its difficult geographic situation, crisscrossed by network of turbulent streams, with long stretch of international border (Bangladesh) and fishing for thousands of trawlers and mechanised boats, is vulnerable to various threats like poaching of animals and pilferage of woods. Compared to the size of this protected area and the proportion of problems encountered here, logistic support in terms of staff, infrastructure facilities and funds is inadequate. Man-Tiger conflict is another serious management issue in the PA. This happens as a result of either an attack on the villagers entering the forest or by the tiger straying into human habitation. The other management issues of this congregation of PAs are reduced flow of sweet water into Sundarban mangrove system, extension of non-forestry land use, demand for small timber and fuel wood for local consumption, uncontrolled collection of prawn seedlings, chemical pollution through marine paints and hydrocarbons and long international border along the eastern boundary of Indian Sundarban.

The 1999 Orissa cyclone was considered as one of the deadliest Indian Ocean tropical cyclone. The cyclone dumped heavy torrential rain over southeast India, causing record breaking flooding in the low-lying areas. The storm surge of approximately 8 meters struck the coast of Orissa, traveling up to 20 km inland. 17,110 km² of crops were destroyed, and an additional 90 million trees were either uprooted or had snapped. Approximately 275,000 homes were destroyed, leaving 1.67 million people homeless. A total of 9,803 people officially died from the storm. The damage across fourteen districts in India resulted from the storm was approximately \$4.5 billion (1999 USD, \$5.1 billion 2005 USD).

3.2 Coastal Hazards

India with its vast coastline is often struck by natural events like cyclones and the resultant coastal storm surges. The coastal hazards include cyclones, storm surges, Tsunami, erosion, etc.

3.2.1 Cyclones and Storm Surge

The probability of cyclone strike in the east coast of the country is much higher than the western coast. Along the western coast the cyclone strikes are mainly in the states of Gujarat and northern Maharashtra. Out of the storms that develop in the Bay of Bengal, over 58 percent approach or cross the east coast in October and November.

Cyclones affect both the Bay of Bengal and the Arabian Sea. They are rare in Bay of Bengal from January to March. Isolated ones forming in the south Bay of Bengal move northwest and hit Tamil Nadu and Sri

		1891 – 1989			1891 – 1989
Kerala	Thiruvananthapuram	1	W. Bengal	24 Parganas	23
	Ernakulam	1		Midnapure	12
	Malappuram	1		Balasore	19
	Kozhikode	2		Cuttack	17
			Orissa	Puri	10
				Ganjam	7
				Srikakulam	14
				Vizag	8
			Andhra Pradesh	E. Godavari	8
Karnataka	Cannanore	1		Krishna Guntur	
	S.Kanara	2		Nellore	
Gujarat	Baroach	1	Tamil Nadu	Chingleput	15
	Bhavnagar	2		S. Arcot	5
	Junagad	10		Tanjore	13
	Jamnagar	3		Ramnathpuram	3
	Kutch	3		Tirunelveli	2

Table 3.9: Major cyclones that have occurred in the past in the states of Gujarat, Orissa and West Bengal

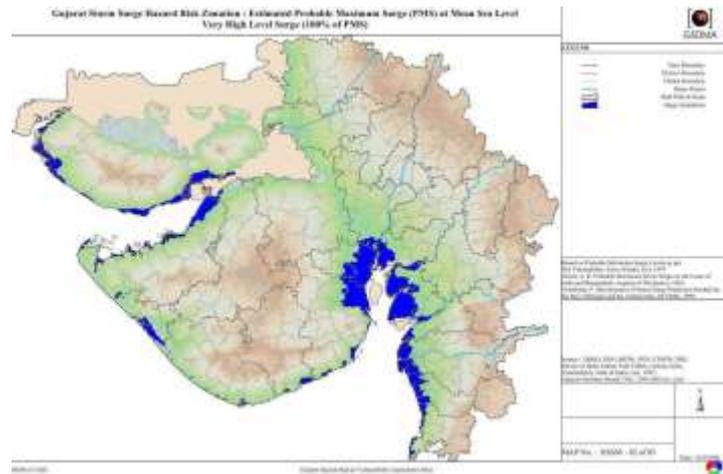
State	Period / Areas Impacted	Adverse Impacts
Gujarat	June, 1998	1261 casualties, 2.57 Lakh houses damaged.
Orissa	Sept, 1985	84 people and 2600 cattle lost life. Land of 4.0 hac damaged.
	June, 1989	61 people and 27,000 cattle lost life, 145,000 houses, communication disrupted.
	Oct, 1999	10,086 casualties, 21.6 Lakh houses damaged
West Bengal	Oct.1847	75,000 people and 6000 cattle killed Damage to property and communication system.
	Oct, 1874	80,000 people killed heavy loss to property and communication disrupted.
	Sept, 1976	10 people and 40,000 cattle lost life. Damage to property including communication
	April, 1993	Over 100 casualties, communication system including road disrupted and damaged.
	Nov, 1994	More than a thousand houses damaged in 26 villages damage to lake and fisheries, disrupted all communication.

Strom Surge

Storm surge heights depend on the intensity of the cyclone, i.e., very high-pressure gradient and consequent very strong winds and the topography of seabed near the point where a cyclone crosses the coast. Sea level also rises due to astronomical high tide. Elevation of the total sea level increases when peak surge occurs at the time of high tide.

Vulnerability to storm surges is not uniform along Indian coasts. The following stretches of the east coast of India are most vulnerable to high surges

- i) North Orissa and West Bengal coasts.
- ii) Andhra Pradesh coast between Ongole and Machilipatnam.
- iii) Tamil Nadu coast, south of Nagapatnam.



The West coast of India is less vulnerable to storm surges than the east coast of India in terms of both the height as well as frequency of occurrence.

However, the following segments are vulnerable to significant surges:

- i) Maharashtra coast, north of Harnai and adjoining south Gujarat coast and the coastal belt around the Gulf of Bombay.
- ii) The coastal belt around the Gulf of Kutch. The maps above depict the vulnerability of the Gujarat coast to cyclone and storm surge hazards. The focus of the project is in the Gulf of Kutch areas under the present project.

3.2.2 Tsunami

Tsunamis are an ever-present threat to lives and property along the coasts of most of the world's oceans. In the vicinity of India, there are two tsunami zones, Andaman-Sumatra trench and the Makran coast. The 2004 Indian Ocean Tsunami was one of the most devastating disasters in modern history. The earthquake, which triggered the waves, was the second largest earthquake ever recorded on a seismograph.

The 2004 Indian Ocean earthquake was an undersea earthquake that occurred on December 24, 2004, with an epicentre off the west coast of Sumatra, Indonesia. The earthquake was caused by subduction and triggered a series of devastating tsunamis along the coasts of most landmasses bordering the Indian Ocean, killing more than 225,000 people in eleven countries, and inundating coastal communities with waves up to 30 meters high. It was one of the deadliest natural disasters in history. Beyond the heavy toll on human lives, the Indian Ocean earthquake has caused an enormous environmental impact that will affect the region for many years to come. It has been reported that severe damage has been inflicted on ecosystems such as mangroves, coral reefs, forests, coastal wetlands, vegetation, sand dunes and rock formations, animal and plant biodiversity and groundwater.

3.2.3 Erosion

Wave and tidal activities modify the coastal features and environment. These physical processes make the coast a dynamic entity. The intensity of these processes varies from place to place. Attempts to stabilize it at one location often aggravate problems at adjoining locations. Considering the high property values, efforts to stabilize the coast and protect its features are important. The process of stabilization of the coast is very expensive and usually provides an illusory and temporary solution. Hurricanes and other coastal storms have caused enormous damage, especially along the eastern coast of the states of Tamil Nadu, Andhra Pradesh, Orissa and West Bengal. These storms strike periodically and randomly. Coastal flooding and coastal erosion are serious forms of damage. Past erosion rates do not necessarily continue, and

patterns change with the configuration and profile of beaches. Rates of change are highest during severe storm events.

3.3 Climate Change Impacts

The impacts of climate change—along with the side-by-side destruction of ecosystems associated with the relentless industrialization of the land and oceans—will transform forever its physical and biological properties. Indeed, in the context of India, climate change is not only an environmental threat faced by the region but also the likely cause of extraordinary social and economic problems in the course of this century. While it is virtually impossible to forecast physical impacts of climate change with great accuracy given the vast uncertainties in input parameters, there are several added difficulties in predicting impacts.

The IPCC (2007) report gives alarming scenarios on the potential sea level rise; it is expected to rise by at least 40 cm by 2100, inundating vast areas on the Asian coastline. In terms of direct impacts, this is very likely to lead to a rapid increase in hazard exposure due to increased coastal flooding, wave and storm surges and erosion, particularly if population and economic activities continue to be concentrated in coastal areas. The rise in sea level impacts coastal community by many ways directly and indirectly. It will force coastal community to move inland, increase coastal erosion, salt-water intrusion, and render agricultural land infertile. India with its extensive low-lying areas just above the sea level, are likely to be hard hit. In addition to sea level rise, increase in sea temperature will intensify the coral bleaching. It may also cause migration of species towards polar region and increase in algal blooming.

A one meter sea level rise would result in nearly 6000 square kilometers in India alone being flooded, including parts of major cities such as Mumbai, Calcutta and Chennai. Sea level rise will affect the coastal zone in multiple ways, including the inundation and displacement of wetlands and lowlands, coastal erosion, increased coastal storm flooding and salinization.

The impacts will vary by location depending upon the coastal morphology and the extent of human modification. Rapid urbanization has led to the enlargement of natural coastal inlets and dredging of waterways for navigation, port facilities and pipelines, all of which exacerbate saltwater intrusion into surface and ground waters. Thus, built-up areas are more vulnerable than those protected by mangroves, and deltas, low-lying coastal plains, coral islands, beaches and barrier islands. Degradation of coastal ecosystems by human activity will generally aggravate the problems caused by sea level rise, increasing shoreline retreat and coastal flooding in cities. Moreover, protection by dikes needs to consider not just the extent of average sea level rise but also the effect of more frequent and intense storm surges. Protection from sea level rise using engineering solutions is not a viable option, especially for increases greater than a few tens of centimeters. One study estimated that the minimum cost of protection against 1 meter sea level rise would be about \$500,000 per km, but even then about 20-50% of vulnerable population would not be protected (Tol, R. 2002).

How much sea level rise is likely to take place in the course of this century is still in question. Several scientists have challenged the IPCC's projections of about a half-meter of sea level rise by the end of the century as an underestimate on account of its omission of any effect of ice-sheet dynamics. More realistic assessments, which take into account current understandings of business as usual conditions, suggest therefore that a 3-5 meter rise in sea levels is not out of the question with a 4-5 degree rise in average global temperatures, which will hasten the break-up of ice sheets in Greenland and Antarctica. Such an increase, as we shall see, will almost entirely engulf densely populated regions all along the South Asian coast line (James Hansen (2007), Director of the NASA Godard Institute for Space Studies)

The south-west monsoon is one of the most significant weather events in the world and delivers about 90% of the annual rainfall for the region. The onset, duration, spatial extent and total precipitation of the monsoon are all critical factors in determining the health of India's agricultural sector, which continues to play a dominant role in the country's economy. According to one estimate, 45 percent of the variation in India's gross domestic product over the last 50 years can be explained by the fluctuations in rainfall (FAO 2006). Of greatest concern is the possibility that the monsoon may shift its pattern abruptly and substantially, because of broader changes induced by global warming.

As per estimates nearly 60 million people currently live in the area of Low Elevation Coastal Zone (LECZ), which comprises the coastal region that is within 10 meters above average sea levels. The estimated area is 81,805 sq kms with an estimated population of 63,188,208 (urban-31,515,286) persons. A spatial representation of the scenario is presented in a map to understand the impacts of climate change (Fig.3.5).

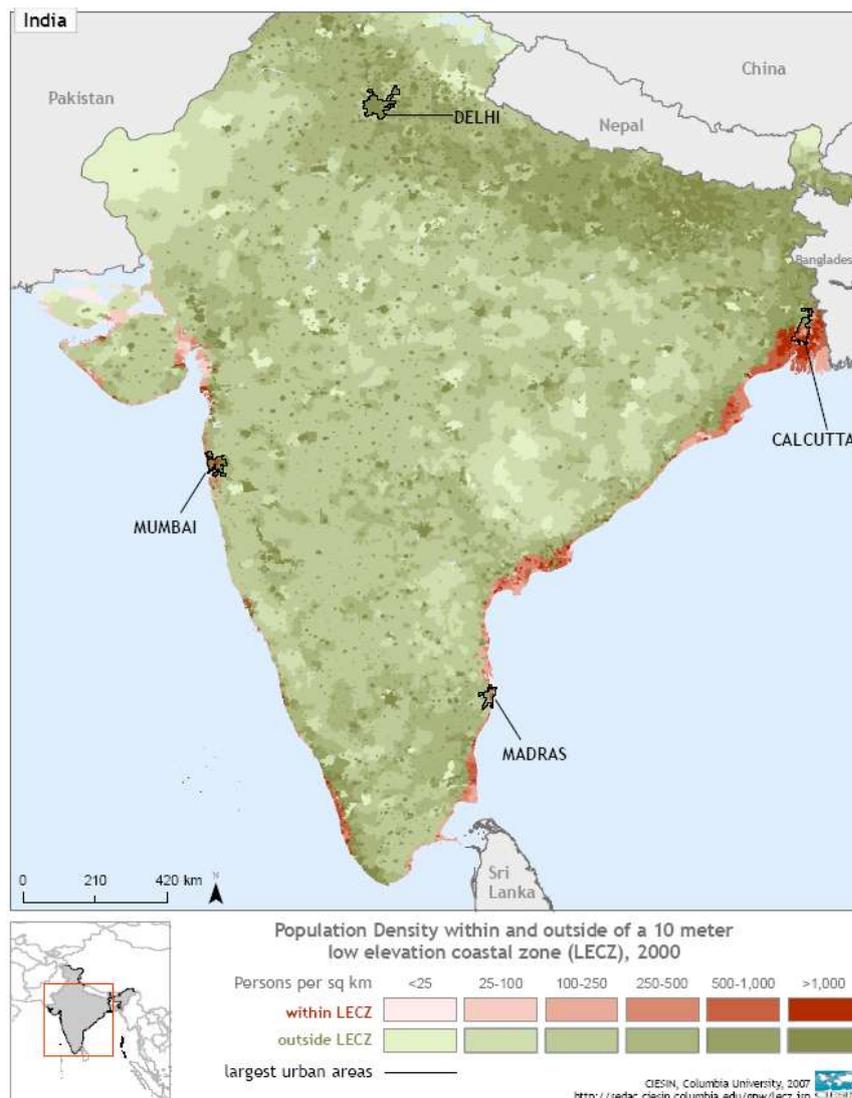


Fig. 3.5: Spatial representation of climate change vulnerability

The most vulnerable communities will include those having maximum exposure to the stresses as well as those with the least capacity to respond and ability to recover.

3.4 Water / Hydrological Aspects

India's coastline has been undergoing physical changes throughout the geological past; although the last tectonic phase in the Indian peninsula has been one of the general emergences, the present coastal geomorphology of India has evolved largely in the background of the post-glacial transgression over the pre-existing topography of the shore, coast and offshore zones. The Holocene sea fluctuated in the course of the last 6,000 years and the marked regression is indicated between 3,000 to 5,000 years B.C. There are more than 100 rivers, which bring large quantities of sediments to the coast. The mightier ones are the Ganges, Brahmaputra, Krishna, Godavari and Cauvery on the east coast and Narmada and Tapti on the north-west coast. The continental shelf is narrow along the east coast. The Fig. 3.6 shows the major river basins and the coastal water quality monitoring.

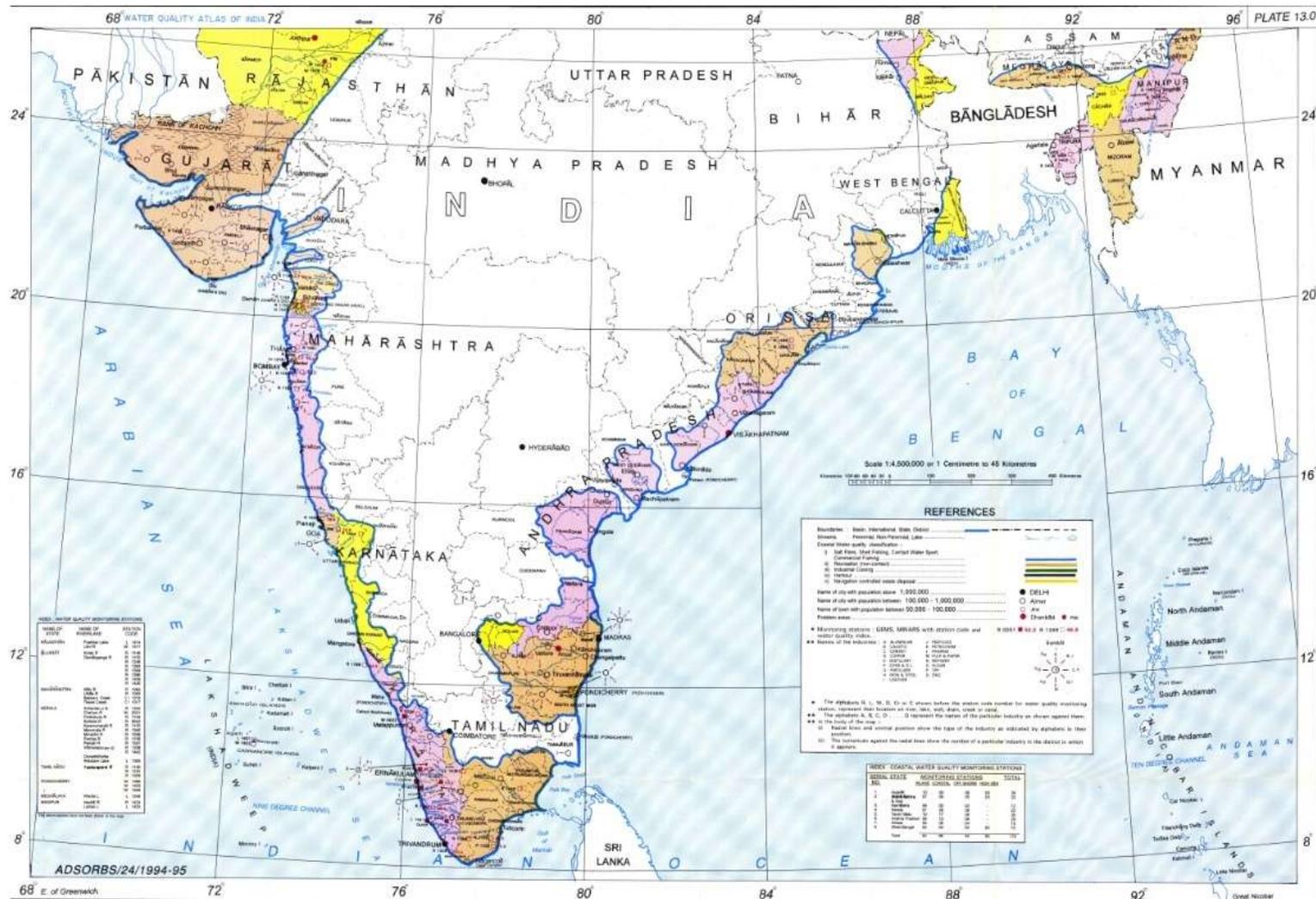


Fig. 3.6: Major river basins and the coastal water quality monitoring (Source: Water Quality Atlas of India, CPCB).

3.5 Coastal Land Regions

The Biogeographic classification (Rodgers *et al* 2000) of showing different zones is shown in figure 3.8. These zone has been divided into 25 Land Regions (Singh 1971) that constitute the coasts and islands of the country as detailed in table 3.10.

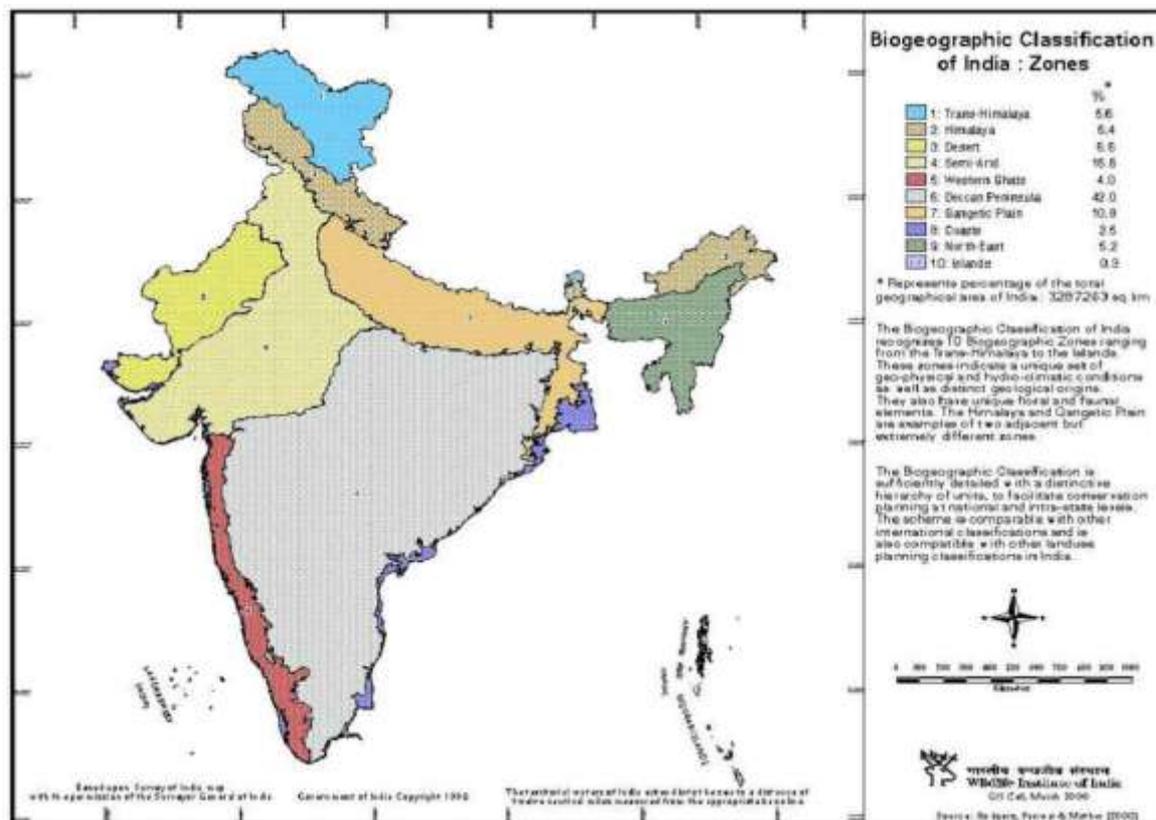


Fig. 3.8: Biogeographic Zones of India

Table 3.10: Coastal Land Regions of India

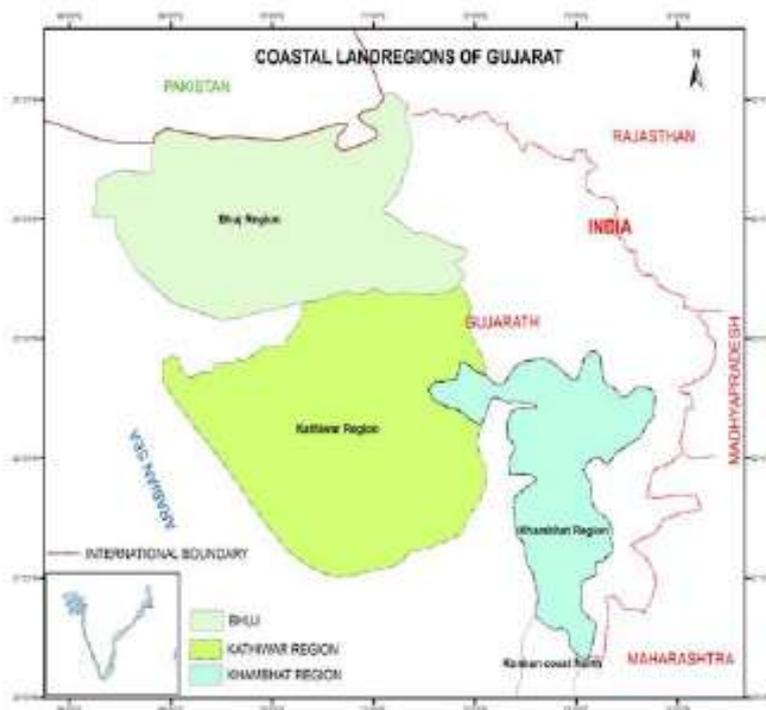
Biogeographic Zones (Rodgers <i>et al</i> , 2000)	Biotic Provinces (Rodgers <i>et al</i> , 2000)	Land Regions (Singh, 1971)
Desert	Kuchchh	Bhuj Region
Semi arid	Gujarat-Rajaputar	Kathiwar Region
		Khambhat Region
Coast	West Coast	Konkan Coast North
		Konkan Coast South
		North Kanara
		South Kanara
		Malabar Coast North
		Malabar Coast South
		East Coast
	Delta Region	
	Southern Plain	
	Vishakhapatnam Region	
	Krishna-Godavari Delta	
	Pennar (Nellore) Region	
	Balasore Plain	

Biogeographic Zones (Rodgers <i>et al</i> , 2000)	Biotic Provinces (Rodgers <i>et al</i> , 2000)	Land Regions (Singh, 1971)
		Mahanadi Plain
		Chilika Region
		Midnapur Upland
		Delta Proper
	Lakshadweep	Minicoy Islands
		Laccadive Islands
Islands	Andaman Islands	Andaman Islands
		Nicobar Islands

A brief description of the Coastal Land Region is given below:

Bhuj Region (68° 13'- 71° 55' E; 23° 9'- 25° 3' N): The Bhuj Region includes two sub regions, Rann and Kachchh. The emergence of land with the retreat of sea has resulted into Rann, a huge stretch of naked tidal mud flats, isolated saline flecks and dead creeks bounded by salt. The Kachchh has extended its northern bounds by engulfing the Rann. The Gulf of Kachchh separates the two peninsulas from it. The highland core is engirdled with coastal alluvium and milliolites. It is composed of disintegrated sandstones with intrusive and interbedded basalts, skirted with fluvial and Aeolian deposits. The relief attains greatest elevation in the northern part of the Pachham Island. The hill patches appear in the Rann indicating dissection of the discontinuous anticline. The Rann forms a gigantic terrain composed of muds forming monotonous flats broken by dead

creeks. Irregular salt skeletons stud the mud flats. Dendritic rills although modified by earthquakes run as patchy veins of the Ranns. The little Rann is united with rivers draining the north eastern part of the State. The Rann and Little Rann contain the desert and sandy soils, mostly saline. The Kachchh proper has medium black soil in its central part. The Alluvial sandy soils stretch on flanks reaching the Rann and the Gulf of Kachchh. The Rann is almost barren where as Kachchh has sparse thorny vegetation. The rich deposits of minerals make this region as economically important in the country which is evidenced from the many ports and harbours in the area.



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Kathiawar Region (68° 55'- 72° 4' E; 21° 0'- 23° 27' N): The coastal stretch of the Kathiawar Region is covered with sands and alluvium, which unites with the highlands. The peninsular configuration modifies the climate and conspicuously in a semi- arid condition influenced by monsoonal flows. The variability of annual average rainfall is 35% in the east to 65% in the west. As a result, littoral forests, though

discontinues, forms a significant segment in the Junagarh district. Limestone mining is an important activity in the region.

Khambhat Region (71° 32'-73° 46'E; 20° 20'- 22° 54'N): This eastern region of Gujarat is characteristically different from other two regions from its wetness. More rainfall and presence of perennial rivers makes this region significantly important from the rest of the coastal stretch of Gujarat. It is a depositional plain drained by the river Narmada, Tapi, Ambika, etc., which forms the estuaries and cause floods. Deep black soil occurs in the west while coastal alluvium is confined to the eastern section. Sandy loam prevails in the Baroda area.

North Kanara (73° 48'- 74° 25' E; 13° 59'-15° 10' N): It is narrower with lowlands forming small pockets in the lower courses of the stream such as Kalinadi, Sharavati, etc. and conical gneissic hills reaching the coast south of Karwar. Spits, estuaries, mudflats, shallow lagoons, islands and patches of mangroves are seen along the coast.

South Kanara (74° 16'-75° 24' E; 12° 30'-14° 1'N): This region is characterized by long linear sandy beaches and loamy soils, makes one of the important centres of economic activity in the state of Karnataka. This region is comparatively broader and the width reaches to 70 km at Mangalore in the Netravathi valley. Spits, estuaries, mudflats, shallow lagoons, and patches of mangroves habitats are prevalent in the land region.

North Konkan (72° 24'-73° 23' E; 18°21'-20° 42' N): North with metropolitan Bombay and its most natural harbour. The coastal lowlands are wider here and widest near Mumbai. The Land Region is characterized by sandy spits intruding into mudflats and wider creeks close to the sea and by low coastal ranges separated by longitudinal valleys away from coast. Moreover, the north Konkan is actively linked with the vast hinterlands through the Thalghat and Bhorghat gaps. It has got two sub-regions, viz., Mahim and Bombay-Kalyan. The Mahim sub-region looks like tail like extension of the other sub -region.

South Konkan (72° 39'-73° 58' E; 14° 59'-18° 26' N): This region represented by rocky and rugged with lofty hills and elevated plateaux dissected by narrow creeks and streams close to the coast. The three sub-regions of south Konkan are Mahad, Ratnagiri and Goa. Among this Goa sub-region become unique with deltaic condition in the whole of the Western Ghats. The Marmagoa bay flanked by Mandovi and Zuari estuaries is the largest estuarine system on this part of the coast. Beaches in Goa are long, linear and wide are flanked by headlands (promontories) and are extensively used for recreation. Ratnagiri is important on account of large scale fishing and coastal trades.

North Malabar (74° 37'-76° 40' E; 10° 28'-12° 48' N): The Malabar coast is a distinct physical entity with its lateritic cliffs, rocky promontories, offshore stalks, long beaches, estuaries with lush mangroves, lagoons, spits and bars. The narrower northern region (except near Palakkad gap area) is called North Malabar which is characterized by the absence of Kayals. The maximum extent is found in the valleys of Beypore and Ponnani. Sand Dunes which are locally called Teris are common in the area. The presence of Barrier Island in the Kannur district is a unique land form of this Land Region. Though, there are many rivers bringing enormous quantity of sediments, deltas are not formed due to the high energy condition of the coast.

South Malabar (75° 48'-77° 36' E; 7° 49'-10° 36' N): This comparatively broader southern part of the Kerala coast is described as a submergent coast. Lateritic cliffs, rocky promontories, offshore stalks, long beaches, estuaries, lagoons, spits and bars are characteristics of Kerala coast. There are about 600 land-locked islands (including barrier islands) in the southern Malabar region. The Kayals are formed during the

Pleistocene period and they form the centres of recreation in the modern era. The seasonal mudbanks of Kerala, a unique transient near shore feature, appearing during monsoon, are more prominent in the south Malabar region. Though, there are many large and medium size rivers bringing huge quantity of sediments, deltas are not formed due to the high energy condition of the coast. Though the Kerala coast is described as a mangrove forest in the resourced history, it is left with just 17 sq. kms of mangroves restricted mainly at Kannur and Ernakulam.

Palar-Ponnaiyar Plain (78° 5'-80° 24' E; 11° 2'-13° 34' N): This northern part of Tamil Nadu is composed by Chengelpet, S. Arcot, N. Arcot and Tiruchirapalli districts. The region is traversed by many rivers such as Arni, Kortalaiyar, Adayar, Cooum, Palar, Ponnaiyar, and Vellar. The mud flats, beaches, mangroves, spits and dunes are distributed along this region. Other than Tamil Nadu the parts of Pondicherry also falls in the region. The economic activities through industrial and agricultural activities spread out in the area makes this region important from development aspect. Pichavaram, the largest and best patches of mangrove vegetation in the peninsular region is in this Land Region.

Delta Region (78° 13'-79° 59' E; 10° 3'-11° 17' N): South of the above Land Region is characterized by the presence of River Cauvery and its deltaic region. The confluence of Amaravati and Cauvery is narrow and well defined by gradually rising interfluvial tracts to the north and south. It splits up into distributaries east of Tiruchirappalli forming an extensive delta which is largely agricultural. This region can be sub-divided into Cauvery Valley and Cauvery Delta.

Southern Vaigai -Tambaparani Region (77° 18'-79° 13' E; 7° 53'-10° 35' N): Probably this region may have the widest beaches and unique habitats in the East Coast of the Peninsula. The fringing and patch reefs are present at Rameswaram and Gulf of Mannar. Point Calimere has well developed mangrove systems and known for its unique biological wealth. The other landforms of the region are rock outcrops, mudflats, beaches, spits, coastal dunes and strand features.

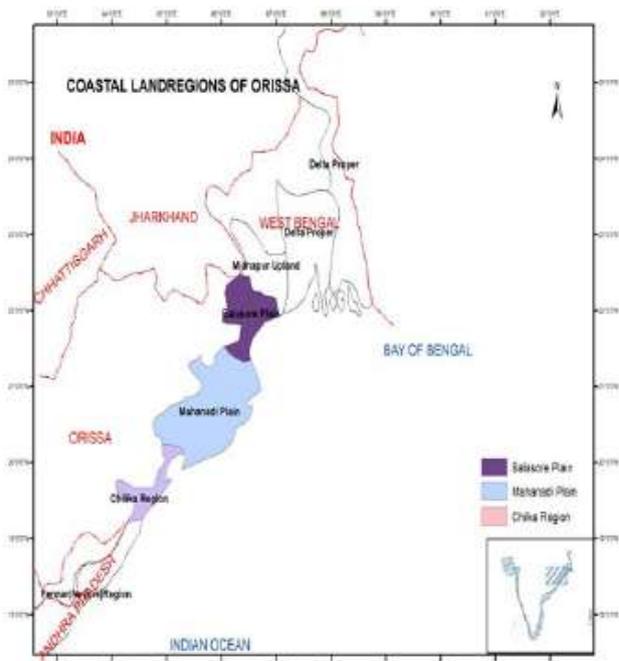
Nellore Region (79° 17'-80° 17' E; 13° 0'-16° 2' N): It is the transition between Tamil Nadu and Andhra Pradesh. The most important coastal feature is the great salt water lagoons of Pulicat, the second largest in the East Coast. The presence of Gypsum and laterite makes its strong presence in the region. The presence of Pulicat Lake and other associated habitats make the region significant on account of bird diversity and other faunal and floral groups.

Krishna-Godavari Delta (79° 38'-82° 16' E; 15° 27'-17° 42' N): This twin delta region includes the low lands of Vijayawada, and Pollavaram. These lowlands are vulnerable to cyclones and floods and form the vast expanse of rice fields and called the Granary of the South. Between the two delta lies the Elluru region where Kolleru Lake occupies a depression cut off from the sea by siltation and serves as a good fishing ground. North of Godavari delta is rocky, south of Krishna delta is a sandy and in between the inter-delta is vegetated with mangroves. The residual hills and ridges of the north are common here. The deltaic coast comprises of bays, creeks, extensive tidal mudflats, spits, bars, mangrove swamps, marshes, ridge and swale areas and coastal alluvial plains. The deltaic and southern coasts are rich in agriculture and aquaculture production.

Vishakhapatanam Region (82° 3'-84° 33' E; 17° 9'-19° 15' N): The northern most coastal area of the State Andhra Pradesh is well known for the Port and associated economic activities since time immemorial. The lowland narrow down to 19 km under Mahendragiri but on either side of this, are embayments of the Rushikulya and Vamsadhara. The black soil of the valley grades upwards to red soils. There are numerous

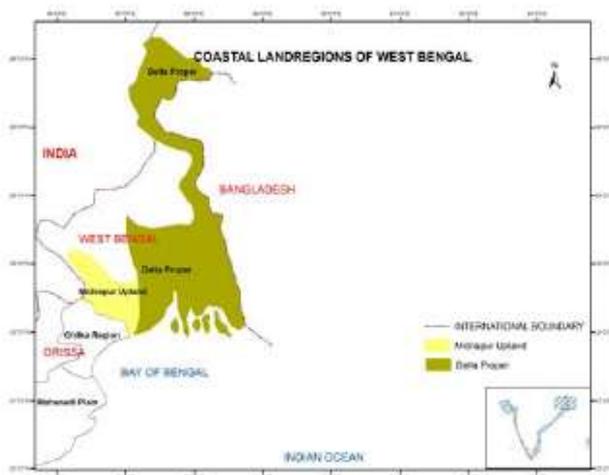
gneissic outcrops. Vishakhapatanam lies between the Kalina ridge and Yaroda, the later running into the Dolphin's Nose which shelters the harbour.

Chilika Region (84° 4'- 85° 18' E; 19° 13'-20° 14' N): This region is characterized by the largest natural water body of the Indian coast and its environs. It is completely cut off from the northern coastal plains of Orissa by the lake and spurs of the Eastern Ghats. It is built up by the fluvial deposits of the Rushikulya. Unlike Mahanadi Delta, there are no well developed fan like delta, it is level flat plans and back bays or well developed lagoons. The undulating topography has limited the irrigation to favoured tracts. The region is known for supporting good population of Irrawady Dolphins and large array of avifauna including migratory birds. The region has got two parts, the Chilika plain and Berhampur Plain, the town in the later sub region controls most of the activities in the region.



Mahanadi Delta (84° 43'-86° 43' E; 19° 55'-21° 32' N): It is composed of the deltas of the Salandi, Baitarani, and Brahmani in the north and Mahanadi in the south. Delta is widest in this region. The actual delta growth, the presence of back bay at Aul and Kendrapara and the lakes like Sai and Sonang in the Puri coast are some of the peculiarities which differentiate it from other portions of the coast. The presence of an extensive irrigated area and insulation from annual inundation by a well developed embankments lead to a maximum pressure of population and high yield in the area. The presence of tidal forests (mangroves) in the estuaries, recent fluvial deposits in the lower reaches and the older alluvium are noticeable. The port of Paradeep and Dhamra are located in this deltaic region. It is equally worth mentioning the pilgrim centres such as Puri and Konark in the region as its cultural and aesthetic important places. The region is exposed for severe cyclones. Mudflats, spits, bars, beach ridges, creeks, estuaries, lagoons, flood plains, paleomudflats, coastal dunes, salt pans and paleochannels are observed along the coastal region.

Balasore Region (86° 0'-87° 02' E; 21° 19'-22° 29' N): It comprises of the flood plains and delta of Subarnarekha and Bodhabalanga rivers and roughly covers the whole of Balasore. This is narrow in extent and bears evidence of marine transgression as shown by marine deposits. Lack of active developments and fan shaped deltas on the river mouths differentiate it from the rest of the coastal plains of Orissa. It is one of the worst flood and drought affected areas of the State. The floods inundate the lower plains of the delta and the region also



lies in the direct path of the cyclones from the Bay of Bengal.

Midnapur Upland (86° 9'-87° 12' E; 21° 55'-23° 12' N): This is part of a matured delta in an area of choked rivers lying to the west of Bhagirathi river and present in the East Medinipur District of West Bengal. Since the region is largely represented by dune system, fishing activity is prominent in the area. Sea erosion is severely affected this part of the delta. Vegetation is sparse and dominated with casuarina plantation. The southern part of this plain (Digha and Sankarpur) is being used for recreation purpose also.

Delta proper (87° 7'-88° 44' E; 21° 57'-26° 19' N): This represents a typical deltaic strip with almost a flat terrain. The Hoogly and its distributaries form the most conspicuous drainage system. The major attraction of this region is the Sundarbans, with coverage of about 1,430 sq. km, is one of the largest single block of the halophytic mangrove systems of the world. The geomorphic features includes mudflats, bars, shoals, beach ridges, estuaries, extensive network of creeks, paleomudflats, coastal dunes and large number of islands (e.g Sagar).

Lakshadweep (Minocoy, Laccadive and Amnidivi)Islands: Although literally means hundred thousand islands, there are only about 36 islands (11 inhabited), number of sunken banks, open reefs and sand banks currently seen in this region. The absence of hills and streams make a unique geomorphology to these islands. Corals and lagoons are integral part of all Lakshadweep islands. In general, lagoons are in the western slopes and relatively steep slopes mark the eastern side. The western arc of the reef is prominent with coral rocks. In general these islands are of coral origin which developed around volcanic peaks. It is presumed that, they first rose to the surface in the form of shallow oval basins and that under the protection of the reef, the eastern rim gradually developed towards the centre, forming the islands. This process of development towards the centre of the lagoon is still going on in some of the islands while in Androth, it is practically finished and no lagoon is left. The islands rise no more than 5 m above the sea and vary in size and measure from barely a metre to 10 km across. The northern most group is called Amnidivi Islands, southern most Minicoy and in between is Laccadive Islands. The Minicoy is the largest and most advanced Island with an area of 4.53 sq.km, representing 1/10th of the total land area of the inhabited islands. Beneath a thin layer of vegetal humus, there is fine coral sand extending at the surface of all the islands. Below this comes a compact crust of fine conglomerate that looks like coarse oolitic limestone with embedded bits of shell. Beneath the crust of the coral stone, there is another layer of fine sand. Coral stone being easy to cut and hard when exposed to air, serves as a good building material.

The Andaman and Nicobar Islands: These islands are young fold mountains which are continuation of the Arakanyoma. Structurally these two major groups are separated by deep sea. The Andaman group islands comprise of 204 islands, the major among is the Great and Little Andaman. These islands spread over an area of 6682 sq.km and look like succession of dome shaped forest covered hill ranges running parallel to each other from north to south. Saddle Peak (700 m) is the highest peak in the Island. The predominant rock formations are conglomerates and sandstones. Along the sea coast, the soil is sandy and contains shingles, old corals, etc. It is extremely porous. There are two volcanic islands, Barren and Narcondam in the Andamans. Mangroves and other littoral forests are present along the sea coast.

The Nicobar group of islands is about 125 km apart from the Andaman group. The existence of this fracture indicates that the two groups are the results of two distinct geological events. Some of the islands in the Nicobar group such as Chowra, Pulo Milo, etc are essentially coral where as others such as Katchall, Nancowry and Great Nicobar are hilly. The sandstones and shales of the southern islands are akin to the Port Blair series of Andamans. Other than corals, these islands have sandy beaches, lagoons, mangroves,

creeks, bays, cliffs, saline areas and forestland. The southern most island, Indira Point, is the country's southern most latitudinal point. An active volcanic island is observed in Nicobar group of islands.

3.6 Coastal and Marine Pollution

It has been found that the sea beyond 2 km all along the coast except in Bombay is clean. In case of Bombay, the sea beyond 5 km is clean. The inland port/creek waters of Veraval (Gujarat) and Bombay were identified as areas of concern. The major sources of pollution are:

3.6.1 Sewage Disposal

Demographic pressure in the urban cities and towns has resulted in the production of enormous amounts of domestic waste materials. The domestic sewage contributes to the largest amount of waste reaching the marine environment. These materials reach the marine environment either directly or indirectly through rivers, creeks, bays, etc. The municipal wastewater constitutes the largest single source of coastal marine pollution. 87 cities and towns located in the coastal areas of the country generate 5560.99 mld of wastewater, which is almost 80% of their total water supply (<http://cpcbenvvis.nic.in/newsletter/sewagepollution/ch3-0205.htm>). This quantity is almost 33.37 % of the total quantity of the wastewater generated by 644 class I cities and class II towns in the entire country. The volume of wastewater has increased over two and a half times than the quantity generated two decades ago. Out of this only 78% is collected, while during 1978 the collection was only 46%. About 58.50% of this is generated from the west coast. The state of Maharashtra contributes about 45% of the total wastewater generated by the coastal cities and towns, while West Bengal comes second, contributing about 26%. Thus Maharashtra, West Bengal and Tamil Nadu generate almost 80% of the wastewater among the coastal states and union territories. Out of 5560.99 mld of wastewater generated only 521.51 mld receives various levels of treatment before letting out to the coastal waters (<http://cpcbenvvis.nic.in/newsletter/sewagepollution/ch3-0205.htm>). Out of the total wastewater generated, 90.62% find its destination into the coastal waters without any treatment. The coastal waters of Maharashtra state receive maximum quantity of untreated municipal wastewater, to the tune of 2382.64 mld followed by the coastal waters of West Bengal, 1466.08 mld from their respective cities and towns. These wastes predominantly contain degradable organic matter which utilizes enormous amount of oxygen from seawater for its oxidation. The low oxygenated seawater leads to decrease of population of flora and fauna.

3.6.2 Industrial Waste Disposal

India is one of rapidly industrializing nations in the world. Major industrial cities and towns of the country such as Surat, Bombay, Cochin, Madras, Visakhapatnam and Calcutta are situated on or near the coastline. The total quantity of wastes discharged by these industries is estimated to be 13,500 MLD of which 8000 MLD are partially/fully treated and balance 5,500 MLD are not treated (Anon, 2003-04). While the major industries discharge treated effluents into the sea, numerous small and medium scale industries discharge the untreated effluents into the adjoining wastewater canals, municipal drains, creeks, etc.

3.6.3 Agriculture Wastes Disposal

India being an agricultural country uses large quantities of fertilizers and pesticides to sustain its agricultural production. This is essential in order to meet the food requirements of its population. The run-off from the agricultural fields reaches the rivers. Since the riverine flow is very much less during the dry period, the chemical elements present in the run-off undergo biogeochemical changes in the riverine environment itself with minimum input into the sea.

3.7 Threats related to Developmental activities

The coastal engineering studies have revealed that the construction of breakwaters alter the sediment transport mechanism in the coastal areas, thereby causing erosion and accretion, depending on the direction of the littoral drift. Such impacts have already been noticed due to construction of port at Chennai, Paradeep, etc. It has been found that due to the establishment of Chennai port, an accretion of 75 acres occurred in the last 60 years south of the port as well as severe erosion in the north resulting in the loss of 83 acres of land (<http://www.globaloceans.org/icm/profiles/india/india.html>).

Serious coastal erosion problems are also experienced in the western part of India due to intense monsoonal activity. In the state of Karnataka, nearly 0.2 metric ton of sand material is lost per year due to monsoons and resultant sand drift. The cyclonic weather which is common along the East coast (175 cyclones in the last 100 years along the east coast; only 31 in the west coast during the same period) severe erosion problems reported between Point Calimere and Visakhapatnam. The navigational channel from Bay of Bengal to the Hooghly estuary (Calcutta and Haldia are two inland major ports in India) is causing severe erosion problems in Sagar & Niachara islands.

3.7.1 Sea-based activities causing environmental disturbances and pollution

Oil pollution is one of the major sources of pollution from the sea-based activities. India imports nearly 30 metric tons of petroleum products every year through its major ports located at Kandla, Bombay, Cochin, Madras and Calcutta. India also produces oil through its inshore and offshore oil fields. The total quantity of oil produced from the offshore wells of ONGC along the Western coast of India is approximately 30 million tons per day. This oil is transported mainly through the pipelines and the oil tankers. Additionally, approximately 30 million tons of crude oil imported from foreign countries is being handled at major ports and the total quantity of petroleum products handled in major ports is about 50 million tons per year and is likely to increase in future. This crude oil is carried by tankers and ships which number more than 1,600 per year. The Shipping Corporation of India (SCI) also operates more than 24 crude carriers which carry imported oil to the major ports of the country.

The western part of the Indian Exclusive Economic Zone, i.e. Arabian Sea adjoining peninsular India, forms the main international tanker route for oil tankers originating from the Persian Gulf. It has been estimated that some 330 million tons of crude oil is transported annually along this route, involving approximately 2,500 laden tankers. The preferred route is through the channel between the Maldives and Lakshadweep Islands, during the Southwest monsoon (May to September), and north of Lakshadweep following the 200-m depth curve west of Mangalore, at other times. Considering the large volume of oil transported and high rate of tanker movement the probability of major tanker accidents is high. The last major accident in the area occurred in January 1993 when two tons of oil spilled in the Nicobar Sea.

3.7.2 Radioactive and Thermal Wastes

Although power generation is mostly thermal in India, nuclear power is also being generated. So far no serious harm has been reported from these sources, but fly ash from thermal power plants invariably creates environmental problems. Radioactive wastes from nuclear power plants are normally disposed of according to strict international conventions. However, their heat generation poses several problems. Nuclear power plants normally release 50% of their generated heat to the coastal marine environment.

3.7.3 Algal blooms

As per the available data, none of the pilot investment states are infected with algal boom. Recent studies undertaken by National Institute of Oceanography, India have identified few locations along the Indian coasts infected by algal boom as depicted in a table 3.11.

Table 3.11: Major Algal Bloom areas of India

YEAR	LOCATION	CAUSATIVE SPECIES	CONSEQUENCES
1981	Tamil Nadu	-	Paralytic shelfish poisoning (PSP), 85 hospitalised, 3 died due to the consumption of bloom affected mussel <i>Meretrix casta</i>
1983	Mangalore, Karnataka	-	Paralytic shell poisoning (PSP)
1996	Mangalore, Karnataka	<i>Gymnodinium catenatum</i>	-
1997	Kerala	-	PSP in 3 villages of Kerala, 3 died, over 500 hospitalised following consumption of mussel <i>Perna indica</i>
2001	Goa	<i>Cochlodinium polykrikoides</i>	A toxic algal bloom in Goa waters by hitherto unreported dinoflagellate <i>Cochlodinium polykrikoides</i> , fish mortality observed, cause not identified
2004	Kerala	-	A bloom in 3-4 villages along Kerala coast, 200 hospitalised, large fish kills reported

Source: Bhat (2005)

3.7.4 Oil Spills

Significant amounts of oil and oil by-products are released into the environment, mainly due to oil production, transportation and use affecting adversely marine and coastal environment. Although major oil spills constitute an estimated two-percent of the total marine pollution, they cause severe damage to coastal environmental and serious degradation of the aesthetic of shoreline.

3.8 Priority Investment States

3.8.1 Gujarat State and Priority Stretches

The State is situated on the west coast of India between 20-6' N to 24-42' N north latitude and 68-10'E to 74-28'E east longitude. It is bounded by the Arabian Sea in the West, by the States of Rajasthan in the North and North-East, by Madhya Pradesh in the East and by Maharashtra in the South and South East as shown in figure 3.9. The State has an international boundary and has a common border with Pakistan at the north-western fringe. The two deserts, one north of Kachchh and the other between Kachchh and the mainland Gujarat are saline.

The State has a long coast-line of about 1600 kms and is the longest among all States of country. For the purpose of administration, Gujarat State at present comprises of 25 districts, sub-divided into 226 talukas, having 18618 villages and 242 towns. Gujarat has geographical area of 1.96 lakh km². and accounts for 6.19 percent of the total area of the country. The Gujarat coast extends from Western Ghats in Valsad to Kori creek and the coast of Kachchh in north. The area of continental shelf of the state is 1,65,000 km². The Gulf of Kachchh and the Gulf of Khambhat are the two Gulfs in Gujarat out of the three Gulfs in the country. Extent of the inter-tidal and high tidal mudflats in the Gulf of Kachchh, the Gulf of Khambhat, the Bhal region and the Rann of Kachchh is exceptionally large. Mudflats, mangroves, marsh vegetation, coral reefs and saltpans cover a major part of the coastal wetland. Geo-morphological and climatic variation is very high on the Gujarat Coast. Rainfall varies from an average high of 2500 mm in the south to only 300 mm in

geographically isolated. Many islands in the Gulf support fringing reefs. At present, coral reef area is estimated to be about 460 km².

The major focal area for the project is Gulf of Kutch (GoK) in the state of Gujarat. In all, 160 coastal villages spread over three districts are selected under the project. The Gulf of Kachchh, from Okha to Navalakhi (22°15' to 23°40' N and 68°20' to 70°40'E) occupies an area of 7350 km² with a seawater volume of 220,000 million m³. It is 170 km long from Okha to inner Gulf and is 75 km wide at its mouth (fig. 3.10). The mean depth of Gulf is 25m, which varies from 10 m at the head to 60 m in the outer regions. The gulf is characterized by numerous hydrographic irregularities like pinnacles, as much as 10 m high. Its conical structure leads to elevated tidal levels especially in the inner Gulf and the high tidal flux covers vast low-laying areas of about 1500 km² comprising a network of creeks, estuaries and mud flats in the interior regions. All along the coast very few rivers drain into the Gulf and they carry only a small quantity of freshwater, except during the monsoon. The Gulf abounds in marine wealth and is known for its rich marine biodiversity. The Gulf of Kachchh environment covers 42 islands; some of them are ecologically fragile because they support coral reefs, mangroves, mudflats and associated flora and fauna. Due to this bio-richness, southern Coast of Gulf from Okha to Jodia has been declared as a Marine Sanctuary and Marine National Park.

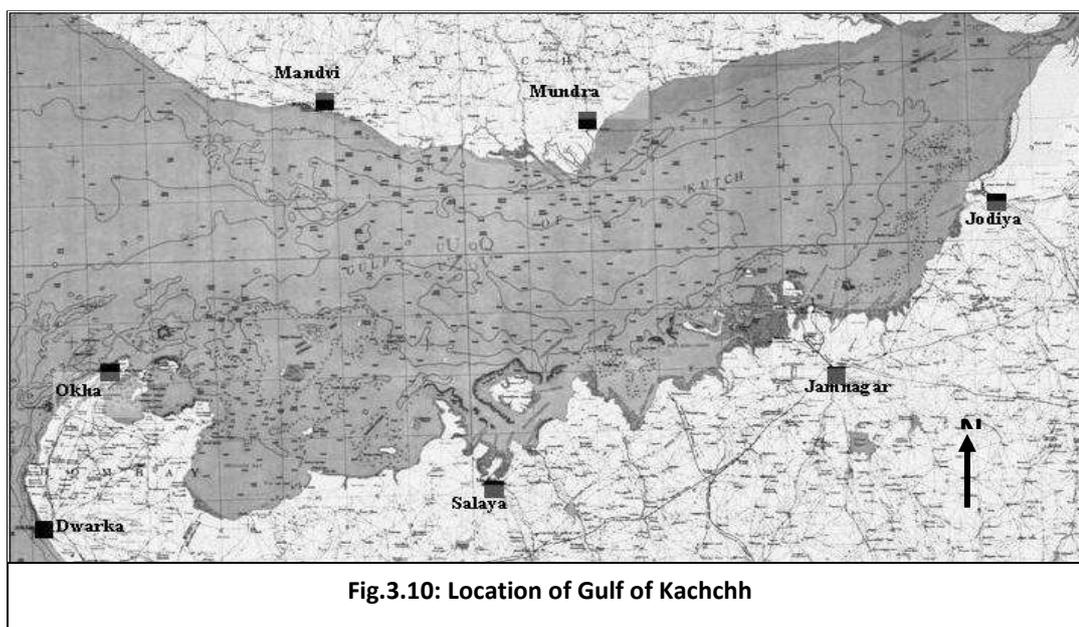


Fig.3.10: Location of Gulf of Kachchh

The GoK encompasses an area of about 7350 km² and a volume of about 220,000 Mm³. The Gulf consists of a vast complex of marshlands crisscrossed by numerous creeks. The intertidal region is sandy and muddy or rocky. Geo-physical parameters (table 3.12) suggest that Gulf of Kachchh is quite different in many aspects compared to Gulf of Khambhat.

Table 3.12: Geo-physical parameters of GoK

Parameters	Gulf of Kachchh	Gulf of Khambhat
Area (km ²)	7350	3120
Depth (m)	20 – 60	15 – 45
Depth Mean (m)	30	20
Volume (Mm ³)	220,000	62400
River Runoff (Mm ³ /year) (R)	140	38000
Rainfall (Mm ³ /year) (P)	3087	3500

Evaporation (Mm³/year) (E)	7350	1560
Water Balance (R+P-E)	Negative	Positive
Turnover Time (days)	8 – 51 (Decreasing upstream)	4 - 15 (Increasing upstream)
Tides (m)	Northern Side: 3-8 Southern side: 3-5 (increasing upstream)	Western side: 3-12 Eastern Side: 6- 10 (increasing upstream)
Tidal Span (km)	Northern Side: 0.5 - 2 Southern Side: 1 - >5 (increasing upstream)	Western side: 1.5 -5 Eastern Side: 2 - 8 (increasing upstream)

Source: Sen Gupta & Deshmukh (2000)

The coastal configuration of Gulf of Kachchh is very irregular with numerous shoals and creeks along with shallow islands like Pirotan, Dide, Dhani, Bet Shankhondar, Paga, Munde, Narara and Boria reefs, many of which have live corals. Both the northern and southern coasts play the unique role in the coastal processes of this area. The inter-tidal region is sandy, muddy and clayey. The Gulf coast can be classified into three broad segments i.e. open coast, kori creek to Jakhau and inner northern coast and southern coast. The Kori creek-Jakhau to Chachhi is the open coast dominated by mud flats while inner northern coast is having sandy and silty beaches in various pockets. The beach sands are calcareous and dominated by bio-clasts. Southern coast reflects the rocky shore, vast tidal flats, numerous channels, shoals and submerged islands, sand bars, coral reefs and mangroves.

Tides & Current

Tides in the Gulf of Kachchh are of mixed, predominantly semi-diurnal type with a large diurnal inequality. The tidal front enters the Gulf from the west and due to shallow inner regions and narrowing cross-

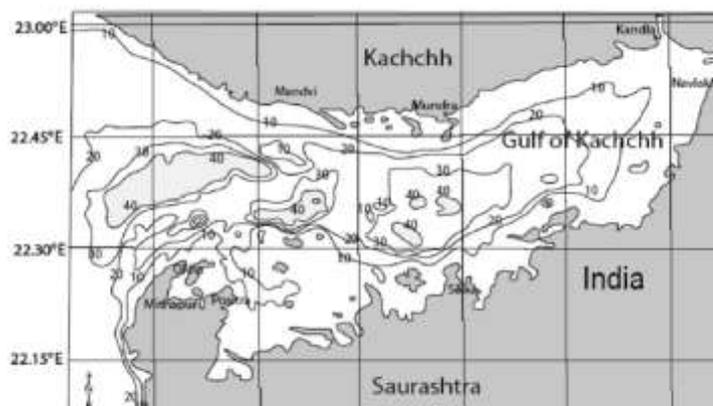


Fig. 3.11: Bathymetry map of GoK

section, the tidal amplitude increases considerably, upstream of Vadinar. Thus, while westerly most location of Okha recorded the lowest tide of 3.47 m, Navlakhi in the eastern most location recorded tide as high as 7.21 m. The shape and orientation of the coast, bathymetry, and funnel shaped geometry are the main reasons for amplification of tides from west to east. The high tidal influx covers the low-lying areas over 1500 km² of creeks, marshy tidal flats, sandy beaches and rocky outcrops. Due to high tidal ranges in the inner regions, the vast mudflats and coastal low lands, which get submerged during high tide, are fully exposed during low tide.

Due to increasing tidal amplitude, the inter-tidal expanse along the shores of the Gulf increases upstream. It increases from 0.5 to 2 km from Jakhau to Kandla in the northern part of Gulf and from around 1 km at Okha to over 5 km at Jodiya in the southern side of the Gulf (Table 3.13). In addition to this, the tidal currents in Gulf are fairly strong and bimodal in nature creating oscillatory motions. Such motions restrict the flushing of Gulf, and thus the residence time is quite long.

Table 3.13: Tidal amplitude at different locations of GoK

Site	MHWS	MHWN	MLWN	MLWS	MSL
Okha	3.47	2.96	1.20	0.41	2.00

Vadinar	5.30	4.30	1.70	0.70	3.00
Sikka	5.38	4.35	1.74	0.71	3.04
Mundra	5.50	5.00	2.00	1.20	3.40
Rozi	5.87	5.40	1.89	1.00	3.60
Kandla	6.66	5.17	1.81	0.78	3.90
Navlakhi	7.21	6.16	2.14	0.78	4.20

Sedimentation

Sedimentation is a very important physical characteristic of tropical coastal system and controlled by major rivers. Accordingly, the river Indus, located further north of the GoK, is the single largest source of sediment for the Arabian sea and also the Gulf of Kachchh (Hashimi et al. 1978, Nair et al. 1982, Chauhan et al. 2006). The Central Water Commission estimated that, for the year 1984, the river discharges about 0.45×10^{12} kg of sediment annually (Chandramohan et al. 2001). Further, based on the 22 years data (1956-1978), Chandramohan et al (2001) estimated deposition of about 0.3×10^{10} m³ sediment in the GoK, caused a reduction in water depth of about 0.54 m, i.e. 0.025 m per year. The above figure is quite comparable with other sites in Indian coastal areas (Table 3.14). During recent years, however, it has been reported that the sediment outflow from River Indus has reduced from 400 million tons per year in 19th Century to the recent 40 million tons per year, because of the construction of several dams and reservoirs across the river (Milliman et al. 1984).

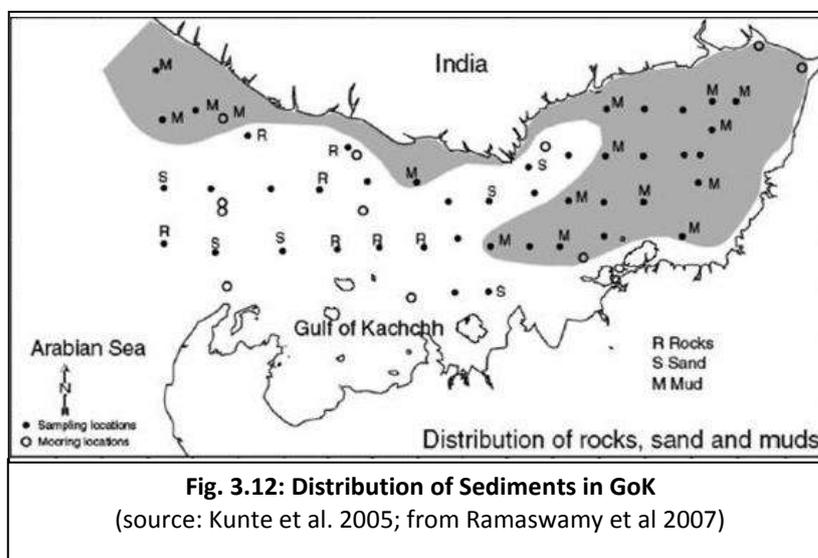


Table 3.14: Sedimentation in different sites of Indian Coast

Location	Period	Area (km ²)	Volume of sediment (x 10 ¹⁰ m ³)	Avg. Depth of Accumulation per year (m)
Gulf of Kachchh	22 (1956-1978)	11,385	0.30	0.025
Gulf of Khambhat	45 (1934-1979)	11,180	0.53	0.030
Gulf of Mannar	75 (1906-1981)	261	0.02	0.001
Palk Bay	51 (1931-1982)	12,285	0.30	0.006
Sandheads	104 (1878-1982)	13,433	0.30	0.003

Source: Chandramohan et al. (2001)

Interestingly, while the northern and eastern part of the Gulf received most of the sediments, the southern portion of Gulf is devoid of sediments (Kunte et al., 2005) because of the existence of a dynamic barrier caused by the high velocity tidal stream flowing through the central channel of the Gulf (Hashimi et al. 1978, Nair et al. 1982a, Chauhan 1994).

The adjacent landmass of Kachchh and Saurashtra contain rich sediments due to weathering of Deccan Trap material (Patel 1987) but contribute little to the Gulf due to lack of any major river and also limited run-off. Furthermore, nearshore shallow regions between Okha and Sikka recorded low suspended solids (15-40 mg/l) whereas the inner Gulf areas witnessed markedly higher values, often in excess of 100 mg/l.

The spatial distribution of sediment in the GoK, effectively determined the settings of different coastal resources, mainly the coral reefs and mangroves. Devoid of coral reefs in the northern side of the Gulf and better growth towards the central and southern part of Gulf, had clear relationship with the sedimentation dynamics.

Sea water salinity & Temperature

With high tidal range, negligible land run-off and irregular topography, the waters in GoK are vertically homogeneous in terms of salinity and temperature. In the Gulf region, the evaporation exceeds precipitation leading to markedly higher salinity than that of the typical seawater. This is particularly evident in the inner part of Gulf where salinities as high as 40 ppt. Release of high saline brine waters from adjoining salt pans further enhance the salinity in the inner Gulf. The salinity near the mouth of the Gulf is comparatively lower (around 35 ppt) than that of head region. Therefore, there is a gradient of salinity exist in the Gulf. It may be the reason for the distribution of better coral reefs towards the western side of the Gulf.

Hydrochemically, the Gulf shows properties typical of a shallow semi enclosed sea in an arid region with little or no freshwater input. The annual variation of water temperature is between 24 and 30°C though localized higher temperatures upto 35°C can result in isolated water pools formed in shallow intertidal depressions during low tide.

Key Habitats & Biological Resources

The GoK abounds in marine wealth and is considered as one of the biologically richest marine habitat along the west coast of India. It is endowed with a great diversity of natural habitats and ecosystems. It is important to reiterate that the GoK had quite distinct physical characteristics in its northern and southern sides. Thus, one of the most striking features of the southern side of the GoK is the presence of many islands with coral reefs and mangroves.

Mangroves

Mangroves are an extremely important component of the coastal marine environment, both in an ecological sense as well as in economical terms. The area under mangrove cover along the Gujarat coast is the second largest in India, next to the Sundarbans. However, within Gujarat coast, they are found mostly in the GoK region, specifically in parts of Kachchh, Jamnagar and Rajkot Districts. Accordingly, in these districts, total notified mangrove forest areas include 665.93, 581.8 and 77.7 km² area, respectively. However, according to FSI, the actual mangrove cover in these districts is quite low (Table 3.15).

The mangroves are located mostly in Kori Creek area of Kachchh and in and around various islands near the Jamnagar coasts. Some of the well known islands supporting mangroves include Pirotan, Kalubhar, Munde Ka bet, Narara, Bhaider etc. Although, *Avicennia marina* is the most dominating species of mangrove in these islands, four more associated species are also reported. While, majority of mangroves

adjoining mainland areas are quite stunted and poor in growth, mainly due to exposure to various level of anthropogenic pressures, the mangroves along the islands and inaccessible creeks like Kori creek in Kachchh, are quite healthy in their structure.

Table 3.15: Mangrove Area (km²) in GoK

District	1991	1993	1995	1997	1999	2001
Jamnagar	118	118	118	118	140	142
Kachchh	239	242	536	836	854	706
Rajkot	0	0	0	0	0	1
Total GoK	357	360	654	954	994	848

Source: FSI Reports

Coral Reefs

Coral reef needs specific geo-physical-chemical requirements for their growth and development. Thus, they need relatively warm, clear and quite water for optimal growth. The distribution of coral reefs at any given point in time is determined by various limiting factors. The most significant of these are water temperature, depth and light intensity, movement of water (current), substratum, salinity, water turbulence, and sedimentation. The optimum temperature for the growth of coral reefs is 25-30°C. At temperature below 15°C, the coral growth gets restricted or ceased, while, sea-water temperature above 36°C causes their bleaching.

Because of the above environmental requirements, coral reefs are mostly located in tropical waters. The GoK and Mithapur and Dwarka are the only areas in Gujarat where coral reefs exist. As a matter of fact, at a global level, the coral reefs in GoK are found at the northern most limits but for the northern portions of the Red Sea. The reefs are found patchily and, as discussed earlier, located towards the southern side of the Gulf and thus concentrated in Jamnagar district. The most northerly patches of coral reefs are found at Mungra reef. The age of coral reefs in GoK vary from 5240 years B.P. at Salaya to approximately 45,000 years B.P. at Okha. Based on the existing classifications most of these reefs are grouped as types. However, solitary and soft corals are also reported near Mundra, mandvi and Kandla in Kachchh (Deshmukh et al. 2000) and in the Arabian sea along the Saurashtra coast (Raghunathan et al. 2004). According to satellite imagery based assessment, coral reefs in GoK occupies an area of about 460 km².

3.8.2 Orissa and the Priority Coastal Stretches

Orissa extends from 17° 49' N to 22° 34'N latitude and from 81° 24' – 87° 29'E longitude on the eastern coast of India. It is bound by the states of West Bengal on the northeast, Jharkhand on the north and Chhattisgarh on the west, Andhra Pradesh on the south & Bay of Bengal on the east as shown in figure 3.13.

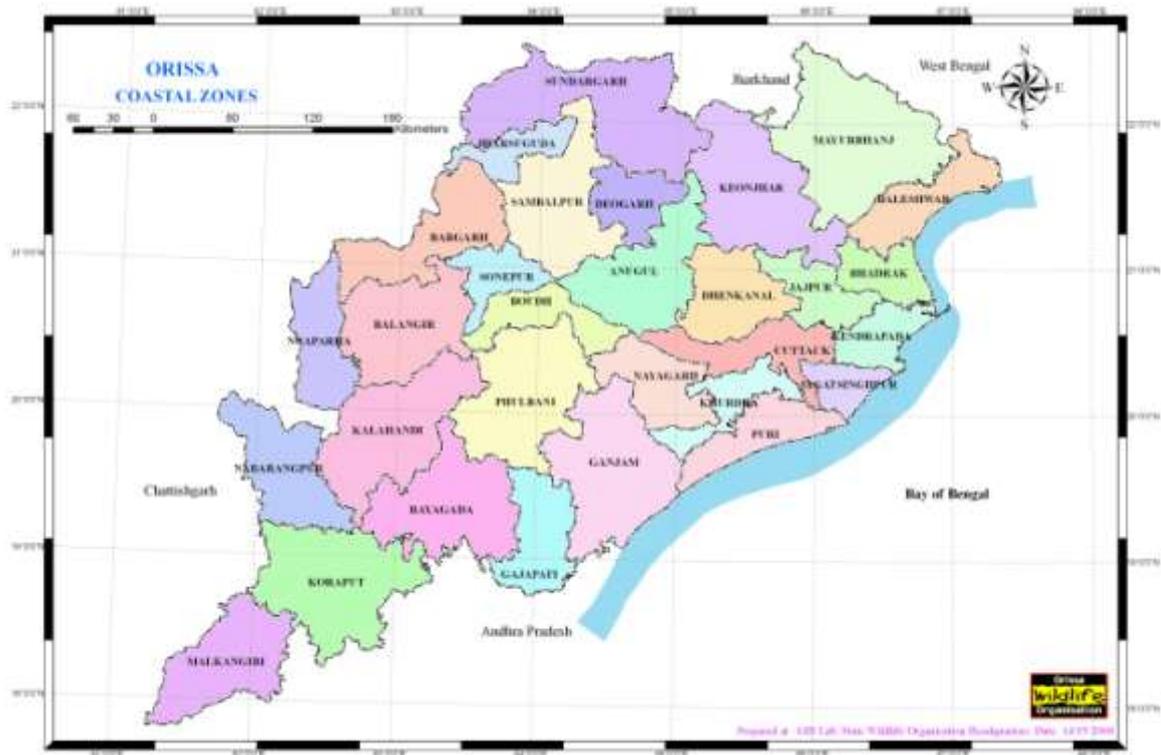


Fig. 3.14: Administrative map of Orissa state

But at present the six coastal districts such as Balasore, Bhadrak, Kendrapara, Jagatsinghpur, Puri and Ganjam support 36% of total population and 43% of urban population. Thus, the rapid growth of population along the coastal districts of Orissa has degraded the coastal ecosystems and has changed the coastal land use pattern significantly.

As per the State Forest Report - 2005, mangroves in Orissa are spread over an area of 203 km² of the coast. Kendrapara district has maximum of mangrove cover in the state (175 km²), followed by Bhadrak district (20 km²), Jagatsinghpur district (4 km²) and Balasore district (4 km²).

The major river deltas are: Subarnarekha, Budhabalanga, Baitarani, Bramhani, Dhamara, Mahanadi, Devi, Keluni, Rushikulya and Bahuda which have mangroves (fig.3.15). The Bhitarkanika Wildlife Sanctuary/National Park in Bramhani-Baitarani deltaic area has the largest extent of mangrove (50 km²) patches available in Orissa. Mangroves in other areas are mostly degraded by a variety of factors, the most significant of which has been conversion to brackish water fishponds. The diverse climatic conditions of Bhitarkanika mangrove wetland provide ideal habitat to a variety of invertebrate and vertebrate fauna (lizards, snakes, saltwater crocodiles, varieties of waterfowl, mammalian species etc.). It is one of the best reptile refuges in the world. Besides, it provides an ideal habitat to the largest population of saltwater crocodiles, *Crocodylus porosus* including the partial white crocodiles in India. Bhitarkanika mangrove wetland has been declared as one of the Ramsar sites on 19th Aug.2002

It has been observed that mangrove vegetation in Orissa reduced from 234 km² to 199.19 km² during 1975 to 1993. All total 65 species of mangroves and mangrove associated occur in Orissa coast. The rich species diversity is mainly attributed to the estuarine environment created by the fresh water inflow from river Mahanadi, Brahmani and Baitarani, and the high tidal amplitude ranging between 2.8 m to 4.5 m. It has

been reported that among the mangrove species 3 has become extinct, one endangered, 4 vulnerable, and 3 threatened along the Orissa coast.



Fig. 3.15: Mangrove forests in Orissa state

The orientation of the coastline and huge littoral drift does not support natural harbor in Orissa (Fig 3.16). Paradeep is the only natural harbor provides berthing facilities to ships of more than 60,000 GRT (Gross Registered Tonnage). Mainly minerals, coal and metallurgical products are exported through Paradeep port.



Fig. 3.16: Tidal Rivers of Orissa Coast

3.8.3 West Bengal and Priority Coastal Stretches

The coastal environment of the State is distributed into three districts such as 24 Pargana (North), 24 Pargana (South) and East Medinipur. The West Bengal coast represents a typical deltaic strip with almost a flat terrain as shown in a map below (Fig 3.17). The Hoogly and its distributaries form the most conspicuous drainage and estuarine system. The Sundarbans with coverage of about 2100 km² is one of the largest single block of the halophytic vegetation of the world. The major geomorphic features are mudflats, bars, shoals, beach ridges, estuaries, extensive network of creeks, paleo mudflats, coastal dunes, large number of islands like Sagar and salt pans.

The length of the coastline in West Bengal is 220 km stretching from LTL to 500 m (as CRZ) inland and up to the landward extension of the successive series of older sand dune stretching up to coast canal in the western part; and LTL to Dampier-Hodges line, which serves as the boundary of the Sundarbans Biosphere Reserve. The coastal zone supports an approximate population of 7 million.

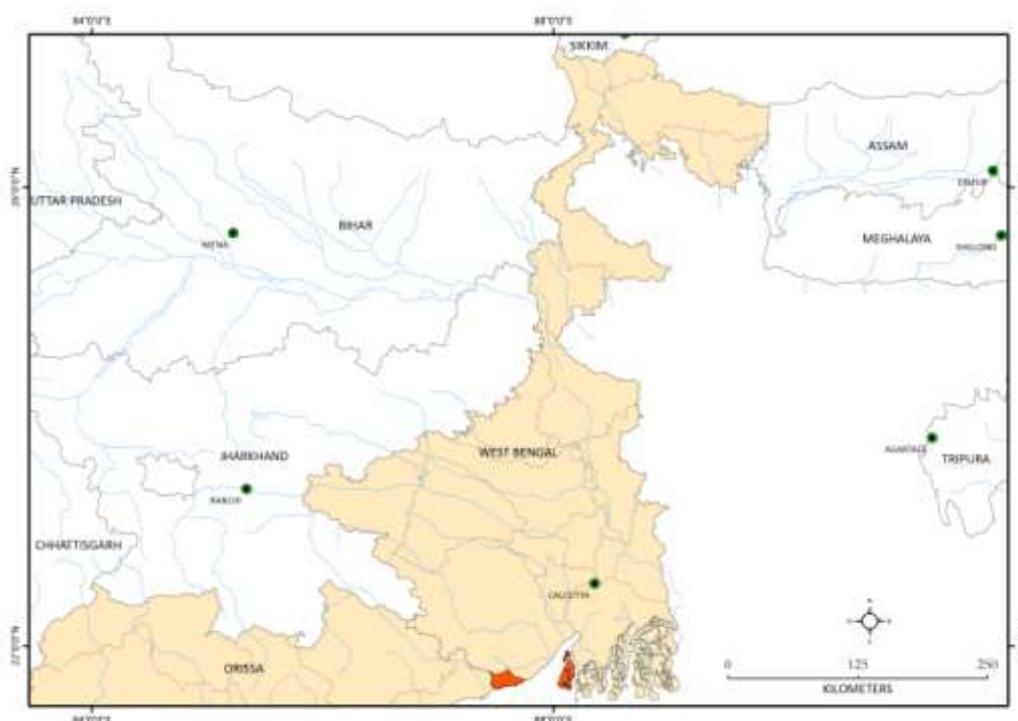


Fig. 3.17: Priority Areas in West Bengal Coast

Based on tidal amplitude only, West Bengal coast can be sub-divided into two different coastal environments namely

- The macro tidal (tidal range > 4 m) Hugli estuarine plain characterized by a network of creeks encompassing the islands with spectacular mangrove vegetation and off-shore linear tidal shoals from Sagar Island to the border of Bangladesh to the east. Very little is known about near shore wave dynamics and sediment movement pattern excepting that the off-shore areas are characterized by shore normal tidal ridges and channels with a deep sea canyon 'swatch of no ground' east of the ridge-channel system.
- Meso tidal (tidal range 2 – 4 m) Medinipur (Digha-Sankarpur-Junput) coastal plain to the west of the Hugli estuary with rows of sandy dunes separated by clayey tidal flats from Sagar Island to Orissa border to the west. The wave environment of the Kanthi coast is dominated by wind driven waves coming from SE. Wave height in the open sea is below 1 m which increases substantially as the waves move over sloping near shore sea bottom (the bathymetric contours are mostly shore

parallel) at a small angle to the coast line. The predominant direction of littoral drift is from west to east although a mild littoral drift from east to west during winter months has been recorded. The volume of sediment carried by the long shore drift is of the order of $455,000 \text{ cm}^3$ per month during the monsoon.

This contrasting physical nature of the West Bengal is also reflected in the coastal vegetation. The dominant flora of Sundarban is the mangrove. A succession of plant growth depending on the relative height of the land and consequent period of inundation by tidal water could be seen. Floating seeds and seedlings of mangrove plants are arrested in grassland and are anchored and germinate there. These seedling plants ultimately develop into dense mangrove forests. The common species are *Avicennia*, *Sonneratia*, *Rhizophora*, *Ceriops* and *Bruguiera* on these intertidal landforms. *Ceriops*, *Phoenix*, *Xylocarpeus* and *Nypa* grow on the upper intertidal levels to form ridge forests.

The coastal flora along the sea front of western coast consists of a narrow belt of ubiquitous *casuarina*. Coastal flora of special interest in the western part is found in the mini estuaries of Digha-Sankarpur area. The eastern extension of the Subarnarekha estuary has given rise to regeneration of *Avicennia* within the Talseri area of Digha. Further east, the Digha-Mohona was once a mangrove reserve now converted into a large aquaculture area. Even then the remnant mangrove species of *Avicennia marina*, *A. alba*, *E. coecaria agallocha*, *Clerodendron inerme* and *Acanthus illicifolius* are common. Salt marshes like *Saeu maritime*, *Salicornia brachiata*, *Heliotropium currasivicum* are also found in the area. Another small estuary to the east is Jaldra creek where salt marshes and sedges (*Fimbristylis spp* and *Cyperus spp*) dominate. As such the coastal area in the western is unprotected by any dense vegetation of mangrove or plants

Sundarban deltaic region (26000 km^2), located in the estuarine section of the Ganga-Brahmaputra river system at the mouth of the Bay of Bengal, is a fragile and unusual eco-system spread over West Bengal, India (9630 km^2) and Bangladesh (16400 km^2). The region is the largest protruding delta in the world and harbours the largest chunk of mangrove vegetation ($10,000 \text{ km}^2$), out of which 4264 km^2 lies in the state of West Bengal and the rest in Bangladesh. It is also the only mangrove forest in the world and home to varieties of flora (61 mangrove species) and fauna (600 species). Sagar Island is one of the islands of 106 islands as shown in the figure 3.18

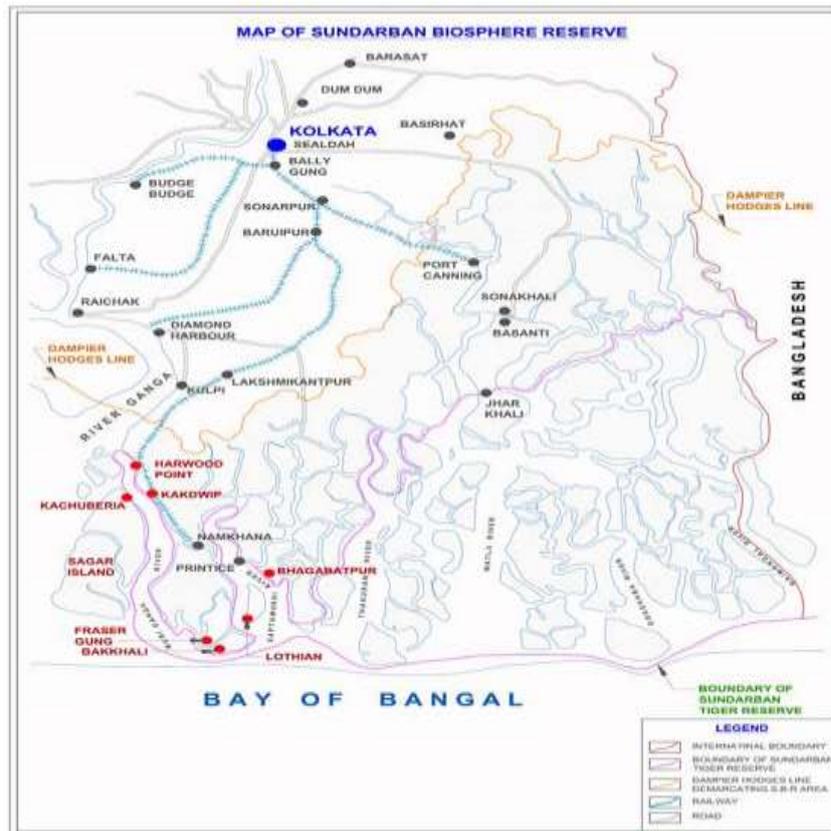


Fig. 3.18: Sunderban Biosphere Reserve

The major focal area of the proposed project is the Digha Shankarpur stretch and Sagar Island. Sagar, a CD block of South 24-Parganas district in West Bengal, lies in the Indian part of Sundarban which was declared as Sundarban Biosphere Reserve (SBR) in 1989 by MoEF and also recognized as a Global Biosphere Reserve in 2001 by the UNESCO.

Sagar Island is very much prone to cyclonic storms originating from the Bay of Bengal. Earthen embankments encircling the Island are highly vulnerable to the upsurge and flash floods especially during high tide.

The Digha - Sankarpur area in the western part of West Bengal coast is presently vulnerable to coastal erosion in stretches, inundation of coastal areas due to periodic storm and tidal surges and extensive damages to property due to seasonal high velocity winds, storms and cyclones.

CHAPTER 4

SOCIAL AND ECONOMIC BASELINE STATUS

4.1 Coastal Areas of India and Three Pilot States

India's coastline of about 7500 km, is the sum of main land coastline (= 5400 km) and the island coastlines (viz., Andaman is with 1900 km and Lakshadweep Is with 132 km). The coastal regions of India are spread over 9 states and four union territories, viz., Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Orissa, West Bengal and Lakshadweep, Andaman & Nicobar Islands, Pondicherry and Daman and Diu.

4.2 Socio-economic Status

4.2.1 Coastal areas in India

Social status: The coastal states accounts for 42.5% of the total area of the country. According to the 2001 census, the coastal states have 49.09 billion people who are approximately 47% of the total population spread across 100.23 million households. The average household size is about five members. The male constitutes 51% of the total population and thus the sex ratio as per 2001 Census is 930 which is slightly better than 1991 (855) but lower than the 961 as recorded in 1981 Census. The population density as per 2001 Census has increased to 697 persons per km² as against 451 in 1981 and 567 in 1991. Literacy rate in the coastal states is 74.01% which varies from 57.6 in Dadra and Nagar Haveli to 82% in Goa. However, there is a huge gap between the male (82.48%) and female (64.65%) literacy rate. Of the total coastal population, 77% comes under the category of general population. The scheduled castes accounts for 15% and tribes are 7.8%. The proportion of scheduled caste population to the total population is highest in West Bengal (23%) followed by Karnataka, Andhra Pradesh, Pondicherry and Orissa (16% each), Maharashtra and Kerala (10% each). In Goa and Dadra and Nagar Haveli, scheduled castes are less than 2% of the total population. No scheduled caste population has been recorded in the union territories of Andaman and Nicobar Islands and Lakshadweep. The proportion of scheduled tribes to the total population as per 2001 census is highest in Lakshadweep (94%) followed by Dadra and Nagar Haveli (62%), Orissa (22%) and Gujarat (15%). The scheduled tribe population is less than 10% of the total population in rest of the coastal states. No tribal population was recorded in Pondicherry and Goa.

Economic status: The economic indicators shows that about 40% of the total coastal population comes under the category of workers of which four fifths are main workers and one fifth are marginal workers. The gender differentiation indicates that about 26% of the total main workers and 61% of the marginal workers are female. The work participation rate recorded in 2001 census is 40.19% which is slightly higher than the 38.25% recorded in 1991 census. Approximately 29% of the total workers are agriculture labourers; 24% are cultivators; 4% are household industry workers and over two fifths are other workers including non-agriculture labourers. The gender segregated data shows that approximately 50% of the agriculture labourers; one third of the cultivators; over 55% of the household industry workers and one fifth of the other workers are female. On the economic front, coastal states are better than the non coastal states is evident from the fact that 16% of the total households in coastal areas are below poverty line as compared to 30% of the non-coastal states.

4.2.2 Gujarat

Social status: About 549 villages with the total population of more than 30 million are situated along the Gujarat coast. Totally 12 districts have coastal border in varying lengths. There are 35 Talukas whose part of the land touches the seawater. According to the 2001 census, the coastal districts of Gujarat accounts for 30 million people who are approximately three fifth of the total population of the state spread across 5.8 million households. The average household size is just above five members. Though Ahmadabad accounts for just 6% of the total area of the coastal districts, it has approximately one fifth of the total coastal population followed by Surat (16%) and Rajkot (11%). Kachchh district which accounts for 35% of the total coastal area in Gujarat, has just 5% of the total coastal population. There has been a steady increase in the population density. As per 2001 census, the population density has increased to 359 persons per km² as against 242 in 1981 and 291 in 1991. The district wise variation shows that population density is highest in Ahmadabad (719 persons per km²) followed by Surat (652) and Anand (631). The density is lowest in Kachch (35 persons per km²). As per 2001 census, the female constitutes 48% of the total population. The sex ratio in 2001 has gone up to 929 from 909 recorded in 1991, which is slightly better than the state figure of 920.

Literacy rate in the coastal districts is 70.55% which varies from 59.8 in Kachchh to 79.8% in Ahmadabad. However, there is a huge gap between the male (79.95%) and female (60.51%) literacy rate.

Of the total coastal population in Gujarat, little over four fifths come under the category of general population and rest is scheduled population. The scheduled castes accounts for 7% and tribes are 12% of the total population. The proportion of scheduled caste population to the total population is highest in Kachchh (12%) followed by Ahmadabad (11%), Junagarh (10%) and Jamnagar and Amreli (8% each). In Bharuch, Surat, Navsari and Valsad, the scheduled castes are less than 5% of the total population. The proportion of scheduled tribes to the total population as per 2001 census is highest in Valsad (55%) followed by Navsari (48%), Bharuch (32%), Surat (28%) and kachch (8%). The scheduled tribe population is less than 1% of the total population in rest of the districts.

Economic status: The economic indicators show that about 40% of the total coastal population comes under the category of workers of which approximately 85% are main workers and approximately 15% are marginal workers. The gender differentiation indicates that about 18% of the total main workers and 75% of the marginal workers are female. The work participation rate recorded in 2001 census is 38 % which is slightly higher than the 35% recorded in 1991 Census. The district wise break up shows that work participation rate highest in Valsad (46%) followed by Navsari (44%), Surat and Amreli (43% each), Anand and Bharuch (42% each), and Porbandar (41%). The work participation rate is lowest in Ahmadabad at 35%.

Among the workers, approximately 22% of the total workers are agriculture labourers; 21% are cultivators; 3% are household industry workers and 54% are other workers. The gender segregated data shows that about half of the agriculture labourers; over one third of the cultivators; over two fifths of the household industry workers and 15% of the other workers are female. Surat has the highest number of agriculture labourers (18%) followed by Anand (11%) and Junagadh (10%). Porbandar (2%) has the least number of agriculture labourers. Junagarh has the highest number of cultivators (15%) followed by Rajkot (14%), Surat and Jamnagar (10% each). Navsari, Ahmadabad and Kachch have less than 5% each of the total

cultivators. Household industries are more in Ahmadabad as 19% of the total household industry workers are in Ahmadabad, followed by Surat (17%), Bhavnagar (15%) and Kachch (10%).

4.2.3 Orissa

Social status: According to the 2001 census, the coastal districts of Orissa accounts for 12.7 million people who are approximately 35% of the total population of the state spread across 2.5 million households. The average household size is five members. The population distribution shows that Ganjam districts which covers about 28% of the total area of the coastal districts, accounts for 25% of the total coastal population followed by Baleshwar which covers 13% of the total area and accounts for 16% of the total population and Puri which accounts for 12% of the total population and also covers 12% of the total area. Over the past two decades, there has been a significant increase in the population density. As per 2001 census, the population density has increased to 474 persons per km² as against 331 in 1981 and 403 in 1991. The district wise variation in 2001 census shows that population density is highest in Khorda (667 persons per km²) followed by Jagatsinghpur (634) and Baleshwar and Bhadrak (532 persons per km² each). The density is lowest in Ganjam (385 persons per km²). As per 2001 Census, the female constitutes almost half of the total population. The sex ratio in 2001 has gone up to 975 from 918 recorded in 1991, which is slightly better than the state figure of 972. The district wise variation shows that sex ratio is highest in Kendrapada (1014) followed by Ganjam (998), Bhadrak (974) and Puri (968).

Literacy rate in the coastal districts is 70.01% which varies from 61% in Ganjam to 80% in Khorda. However, there is significant gap between the male (79.95%) and female (60.51%) literacy rate. The female literacy rate was found to be highest in Khorda (70%) followed by Jagatsinghpur (69%), Puri and Kendrapara (67% each).

Of the total coastal population in Gujarat, little over three fourth come under the category of general population and rest is scheduled population. The scheduled castes accounts for 18% and tribes are 6% of the total population. The proportion of scheduled caste population to the total population is highest in Bhadrak (22%) followed by Jagatsinghpur and Kendrapada (21% each), Baleshwar and Ganjam (19% each). The proportion of scheduled tribes to the total population as per 2001 census is highest in Baleshwar (11%) followed by Khorda (5%) and Ganjam (3%). In rest of the districts tribal population is less than 1% of the total population.

Economic status: The economic indicators show that about 34% of the total coastal population comes under the category of workers of which 73% are main workers and approximately 27% are marginal workers. The gender differentiation indicates that about 26% of the total main workers and 53% of the marginal workers are female. The work participation rate recorded in 2001 census is 38 % which is slightly higher than the 36% recorded in 1991 census. The district wise break up shows that work participation rate highest in Ganjam (41%) followed by Baleshwar (32%), Jagatsinghpur and Khorda (31% each) and Kendrapada and Puri (30% each).

Among the workers, approximately 31% of the total workers are agriculture labourers; 29% are cultivators; 3% are household industry workers and 24% are other workers. The gender segregated data shows that about 40% of the agriculture labourers; 15% of the cultivators; 41% of the household industry workers and 16% of the other workers are female. Ganjam has the highest number of agriculture labourers (38%), cultivators (25%), household industry workers (36%) and other workers (27%). Distribution of agriculture labourers show that Ganjam is followed by Baleshwar (16%), Bhadrak and Puri (8% each). Among the

number of cultivators, Ganjam is followed by Baleshwar (17%), Kendrapada (13%), Bhadrak and Puri (12%). For the household industry workers Ganjam is followed by Baleshwar (17%), Khorda (12%) and Puri (10%). Distribution of workers in other sector shows that Ganjam is followed by Khorda (24%), Baleshwar (12%) and Puri (10%).

4.2.4 West Bengal

Social status: According to the 2001 census, the coastal districts of West Bengal accounts for 25.4 million people who are approximately 32% of the total population of the state spread across 5 million households in three coastal districts. The three districts are North and South 24 Pargana and Medinipur. The average household size is little over five members. The average household size is highest in Medinipur (5.3) followed by South 24 Pargana (5.2) and North 24 Pargana (4.9 members). The distribution of population across districts shows that approximately 38% of the total coastal population is in Medinipur district which covers about 50% of the total area of the coastal districts. The North 24 Pargana district though accounts for 35% of the total coastal population, covers only 15% of the total coastal area. As a result, population density is highest in North 24 pargana district and there has been a significant increase in the population density over the last three decades. As per 2001 census, the population density has increased to 1186 persons per km² from 757 as recorded in 1981 and 982 in 1991. The district wise variation in 2001 census shows that population density is highest in North 24 Pargana (2182 persons per km²) followed by South 24 Pargana (693) and Medinipur (683 persons per km² each). As per 2001 census, female constitutes 48% of the total population. The sex ratio in 2001 has gone down to 939 from 945 recorded in 1991, which is slightly better than the state figure of 934. The district wise variation shows that sex ratio is highest in Medinipur (955) followed by South 24 Pargana (937).

Literacy rate in the coastal districts is 74.13% which is a remarkable jump from 63.73 recorded in 1991. The literacy rate in the coastal area is much higher than the state figure of 69%. The district wise variation shows that literacy rate is highest in North 24 Pargana (78%) followed by Medinipur (75%).

Of the total coastal population in West Bengal, little less than three fourth come under the category of general population and rest is scheduled population. The scheduled castes accounts for 22% and tribes are 4% of the total population. The proportion of scheduled caste population to the total population is highest in South 24 Pargana (32%) followed by North 24 Pargana (21%). The proportion of scheduled tribes to the total population as per 2001 census is highest in Medinipur (8%) followed by North 24 Pargana (2%).

Economic status: The economic indicators show that about 35% of the total coastal population comes under the category of workers of which 76% are main workers and 24% are marginal workers. The gender differentiation indicates that just 13% of the total main workers are female whereas 50% of the marginal workers are female. The work participation rate recorded in 2001 census is 35 % which is slightly higher than the 31% recorded in 1991 Census. The district wise break up shows that work participation rate highest in Medinipur (39%) followed by North 24 Pargana (32%).

Among the workers, 24% of the total workers are agriculture labourers; 19% are cultivators and 6% are household industry workers. More than half of the total workers comes under the category of other workers. The gender segregated data shows that involvement of women in agriculture related activities is less as compared to non-agriculture related activities. According to 2001 census, 27% of the agriculture labourers; 18% of the cultivators; 55% of the household industry workers and 51% of the other workers are female. District wise distribution of workers shows that Medinipur has the highest number of agriculture labourers

(55%) followed by South 24 Pargana (27%). Similarly, the highest number of cultivators (72%); and household industry workers (51%) are in Medinipur. Number of workers under the category of other workers is more in North 24 Pargana (47%) followed by Medinipur (27%).

4.3 Tribal population in Coastal Areas

4.3.1 Coastal areas in India

According to the 2001 census, India has 84.3 million tribals, comprising 8.4 percent of the total population of the country. Nearly 45 percent of them live in coastal states with the maximum concentration in Orissa (which accounts for 10.3 percent of Scheduled Tribes (STs) in India), followed by Maharashtra (9.5 percent), Gujarat (8.7 %), West Bengal (6.2 %), Andhra Pradesh (5.9 %), Karnataka (4.1 %), Kerala (0.6 %) and Tamil Nadu (0.4 %). The remaining 54 percent of STs live in inland states, a majority of them concentrated in the states of Madhya Pradesh, Rajasthan, Chattisgarh and Jharkhand.

There is no clear evidence to suggest that tribal groups in coastal states do better on the whole than their peers in inland states. Tribal groups in the coastal state of Orissa for instance, record the highest poverty rates with the tribal population in the state registering a head count ratio (percentage of population below the poverty line) of 75 percent in 2004-05 (fig. 4.1). What is clear is the disparity between tribal groups and the rest of the population in coastal areas, as indicated by the larger gap in poverty levels between STs and other population. In Chattisgarh and Jharkhand for example, the tribals seem as impoverished as the entire population, recording a poverty headcount of 53-54 percent compared to an overall poverty headcount of 41-42 percent. In contrast, the tribals in Orissa or Maharashtra record much higher levels of poverty (75 percent and 54 percent) than the average (47 percent and 31 percent respectively), suggesting that although fewer in number in coastal states, the Adivasis perhaps are among the most impoverished groups in these states.

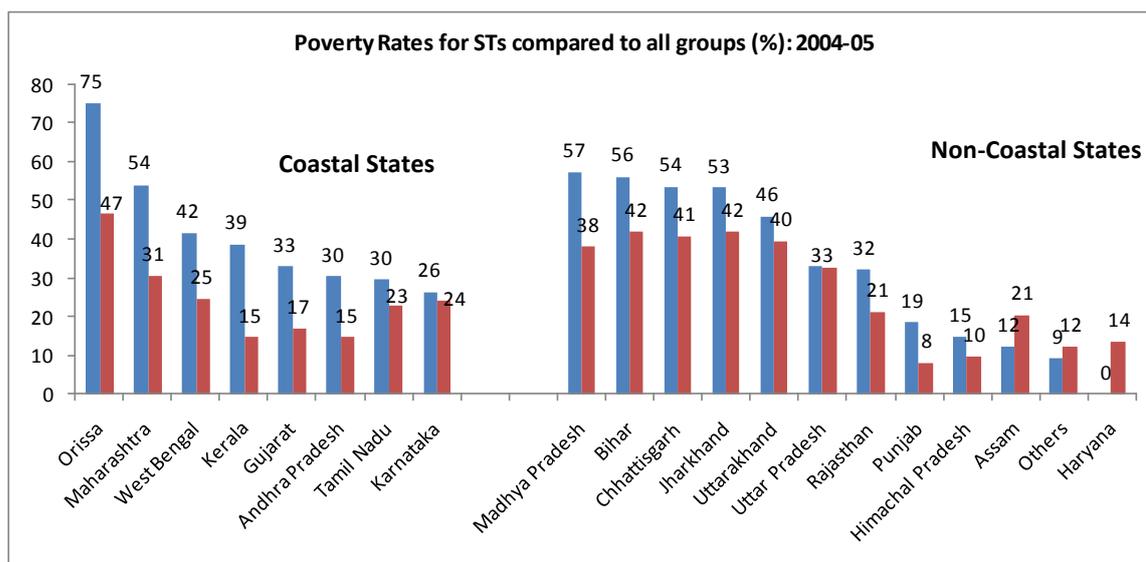


Fig. 4.1: Poverty Rates of STs compared to all groups (%) – 2004-05

However, more tribals in coastal states tend to be literate (fig.4.2), though their literacy levels remain universally lower when compared to their respective state average.

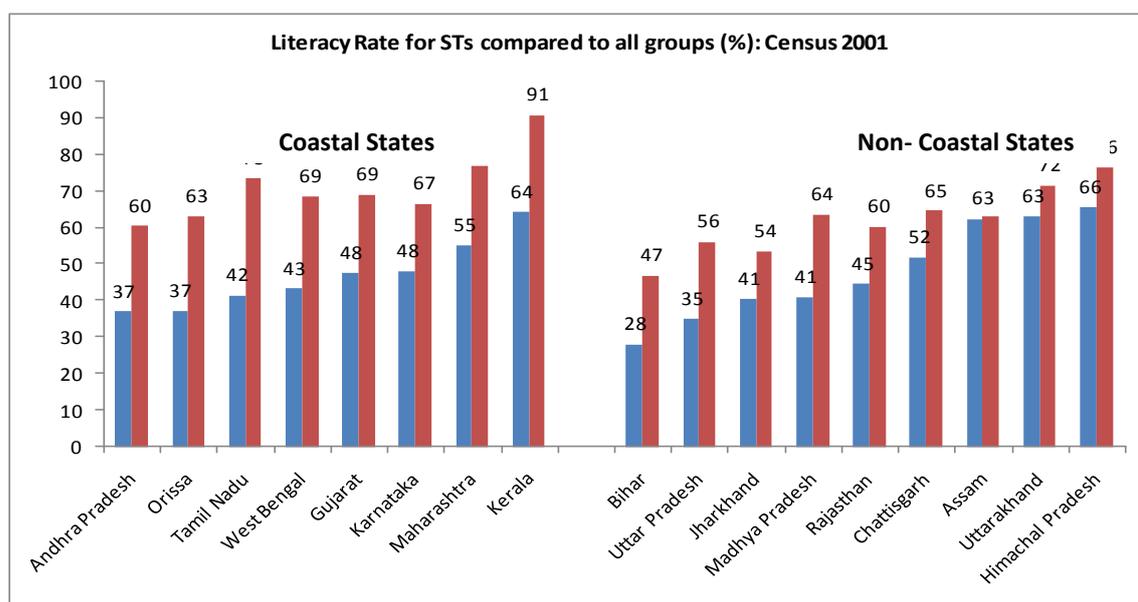


Fig. 4.2: Literacy Rates of STs compared to all groups (%) – Census 2001

While the picture on the state of tribals in coastal states compared to their peers in inland states remains largely muddy, it is imperative to note that most tribals (even within coastal states) tend to inhabit hilly, interior forest areas rather than coastal stretches, depending on natural resources such as non-timber forest products (NTFPs) for a livelihood. In Orissa for instance, it is estimated that about three fourth of the tribal population is concentrated in 10 interior districts. Poverty rates among tribals living in these interior rural areas are higher than poverty rates among those living in coastal regions (92 percent in the Southern interior region of Orissa compared to 67 percent in the Coastal region) (Table 4.1).

Table 4.1: Poverty Headcount Index in Regions of Orissa, by Social Group, 1999–2000

Region	Rural				Urban			
	Scheduled tribes	Scheduled castes	Other	All	Scheduled tribes	Scheduled castes	Other	All
Coastal	66.6	42.2	24.3	31.7	63.5	75.7	34.3	41
Southern	92.4	88.9	77.7	87.1	72.3	85.0	24.6	43
Northern	61.7	57.2	34.7	49.8	54.4	63.1	37.8	46
Orissa	73.1	52.3	33.3	48.0	59.4	72.0	34.2	43

Source: National Sample Survey Data, as calculated by A. Dubey and referenced in De Haan (2005) (Quoted in World Bank, 2006)

4.3.2 Gujarat

Nearly 9 percent of Scheduled Tribes in India live in the coastal state of Gujarat. Within Gujarat, tribal groups comprise 14.8 percent of the total population of the state. There are 29 notified tribes in the state. The Bhils with a population of 340,000 represent the majority of the total ST population of the state (46%). The Dubla (8%), Dhodia (7.9%), Rathawa (7.2%) and Naikda (5.3%) are the other major ST groups, each

having a sizable population. Along with the Bhils, they constitute about 74.3 per cent of the state's total ST population. Gamit, Kokna, Chaudhri, Varli, and Dhanka account for 3-4 per cent each of state's ST population, with the Patelias and Kolis making up the rest (about 2%).

Population Size and Distribution: On average, coastal districts in Gujarat record a lower concentration of scheduled tribes than the non-coastal districts. Among coastal districts, Valsad and Navsari record high tribal concentrations, with nearly half of the total population of the district(s) comprising of tribal groups. Among mainland districts in Gujarat, the Dangs has the highest share of STs, who comprise nearly 94 percent of the district population. Kachchh and Jamnagar – the two project districts – have relatively marginal tribal presence, with more tribals in Kachchh than in Jamnagar (see Table 4.2).

Table 4.2: District Wise ST Population (Census 2001)

Coastal Districts		Non-Coastal Districts	
Districts	% of STs to total population of district	Districts	% of STs to total population of district
Valsad	54.8	The Dangs	93.8
Navsari	48.1	Narmada	78.1
Bharuch	32.4	Dohad	72.3
Surat	28.2	Panchmahals	27.5
Kachchh	8.2	Vadodara	26.6
Porbandar	1.2	Sabarkantha	20.2
Anand	1.2	Banaskantha	8.2
Ahmadabad	1	Kheda	1.6
Junagadh	0.8	Gandhinagar	1.3
Jamnagar	0.5	Patan	1.1
Rajkot	0.4	Surendranagar	0.9
Bhavnagar	0.3	Mehsana	0.5
Amreli	0.2		
Gujarat Total: 14.8% of the state population			

Work Participation Rate and Category of Workers: According to the 2001 Census, nearly 52 percent of the ST population in Gujarat participates in the workforce, which is slightly more than the aggregate national figure for the STs (49 percent). Of these, participation by men and women is nearly equal (56 percent and 48 percent respectively). Nearly 70 percent of those who work classify as main workers, while the remaining 30 percent classify as marginal workers. Of the 12 major tribal groups in the state, the highest workforce participation rate recorded is for the Gamits (58.3 percent) and the lowest is among the Kolis (41 percent overall and 31 percent for Koli women).

As regard the category of workers, 42 percent of the ST main workers in Gujarat work as cultivators, with another 36 percent engaged as agricultural laborers. In other words, a majority of the ST main workers in Gujarat (78 percent) are involved in the agricultural sector. Of these, the Rathawas record the highest participation as cultivators (68 percent), followed closely by the Patelias (65 percent) and the Koknas (61 percent). In contrast, the Koli and Bhil communities in Kachchh are known to choose mostly non-farm activities like salt making, transport and newly emerging occupations like coal-making that help them eke out a living (Coal-making as an occupation is one of the major sources of income for the Koli community. All family members in a traditional Koli family contribute in cutting wood, collecting it, and transporting to the site where the process of firing is done. Usually women are involved in cutting the wood and transporting to the site. Men set the fire and keep watch on the process, which takes about 24 hours to convert into coal. The left outs of the burning process are usually used as organic fertilizer for crops).

Literacy and Education Level: Nearly 48 per cent of STs in Gujarat are literate, at par with the national average for STs (47%). The male and female literacy rates at 59.2 percent and 36 per cent respectively indicate that women are lagging behind male counterparts. Of the twelve major STs, the Dhodia tribes with 75.9 percent literacy are ahead of others. Their female literacy rate is 66.5 per cent and male 85.3%. The most dismal position is that of the Kolis – only 26.3 per cent of their population was literate in 2001; the picture is more depressing for females (12.8%) – see Table 4.3. In the age group of 5-14 years too, the Kolis do worst, recording the lowest fraction attending schools of other educational institutions (33.4 percent).

Table 4. 3: Literacy Rate (7 years and above) among major STs (Census 2001)

Name of the Scheduled Tribe	Literacy Rate (in %)		
	Total	Male	Female
Dhodia	75.9	85.3	66.5
Patelia	62.5	78.5	45.9
Chaudhri	62.4	71.3	53.4
Dhanka	52.9	66.7	38.1
Gamit	52.9	61.7	44.2
Kokna	51.5	62.6	40.3
Dubla	47.8	56.8	38.7
Bhil	44.3	56.9	31.3
Rathawa	36.8	50.2	22.8
Naikda	35.6	45.6	25.2
Varli	32.1	42.1	22.2
Koli	26.3	38.4	12.8
All Scheduled Tribes in Gujarat	47.7	59.2	36.0

Sex ratio: The sex ratio of the tribal population in Gujarat is 974 females per 1000 males (according to the 2001 census), which is close to the national average for all STs (978). However, there is considerable heterogeneity in the ratio from one tribal group to another. For instance, while the Chaudhris (996), Kokna (990), Dhodia (989) and Dubla (983) record sex ratios that are above the state average for STs, the sex ratio among the Kolis is very low at 921. In sum, while the Kolis that inhabit Kachchh and other areas in Gujarat, comprise a very small proportion of all STs in the state (less than 2 percent), they are among the most deprived of all tribal groups. The Bhils do relatively better, but only modestly.

4.3.3 Orissa

Population size and distribution: Orissa houses nearly 10 percent of all Scheduled Tribes in India. In fact, of the 533 tribes recognized by the Government of India, 62 of them (or 12%) are located in the state of Orissa (<http://www.tribal.nic.in/index1.html>). According to the 2001 census, Scheduled Tribes constitute about 22 percent of the total population of the state. Yet, as indicated in section 4.3, the highest poverty rates recorded for tribal groups across India are in Orissa (75 percent according to the 2004-05 NSS survey). What is more worrisome is an *increase* in poverty levels among STs from 71 percent in 1993-94 (the previous NSS round) to 75 percent in 2004-05. Tribals in rural areas in Orissa seem particularly worse off, with poverty levels among the group declining at a slower pace (13 percent) during 1983-2005 compared to a decline of 44 percent for other groups (non SCs and STs).

Out of the 62 tribes in Orissa, the Khonds are the most populous tribe with a population of 1.4 million constituting 17.1 percent of the total ST population in the state. Gonds, the second largest tribe, have a 9.6 per cent share in the total ST population. Six other tribes namely, Santal, Kolha, Munda, Saora, Shabar and Bhattada along with the Khonds and Gonds constitute 64.1 per cent of the total ST population of Orissa. The Bhumij, Bhuiya, Oraon, Paroja together form another 18.1 per cent. Five other categories including Bhumia, Binjhal, Koya contribute 9 percent, while the remaining (45 nos.) tribes along with the generic tribes constitute the residual 8.8 per cent of the total ST population of the state.

The district wise distribution of tribal groups shows that most tribals are concentrated in inland districts of the state. Among the non-coastal districts, Malkangiri has the highest proportion of STs (57.4 percent), followed by Mayurbhanj (56.6 percent), Rayagada (55.8 percent), Nabarangapur (55 percent) and Kandhamal (52 percent) (Table 4.4).

Table 4.4: District wise ST Population (Census 2001)

Coastal Districts		Non-Coastal Districts	
Districts	% of STs to total population of district	Districts	% of STs to total population of district
Gajapati	50.8	Malkangiri	57.4
Baleshwar	11.3	Mayurbhanj	56.6
Khordha	5.2	Rayagada	55.8
Ganjam	2.9	Nabarangapur	55.0
Bhadrak	1.9	Kandhamal	52.0
Jagatsinghapur	0.8	Sundargarh	50.2
Kendrapara	0.5	Koraput	49.6
Puri	0.3	Keonjhar	44.5
Orissa Total: 22.1% of the state population		Nuapada	34.7
		Sambalpur	34.5
		Debagarh	33.6
		Jharsuguda	31.3
		Kalahandi	28.7
		Balangir	20.6
		Bargarh	19.4
		Dhenkanal	12.8
		Baudh	12.5
		Anugul	11.7
		Sonapur	9.8
		Jajpur	7.8
		Nayagarh	5.9
		Cuttack	3.6

Among coastal districts, only Gajapati has a major tribal presence, with nearly 51 percent. By groups, most Khonds are concentrated in Kandhamal district (93.3 percent of the tribal population in the district), followed by Nayagarh (76.9 percent), Baudh (76.4 percent), and Rayagada (71.1 percent). The Gonds are mostly concentrated in Nabarangapur, followed by Nuapada, where as the Santhals and the Kolhas are primarily concentrated in Mayurbhanj district. The other four major tribal groups – Munda, Saora, Shabar and Bhattada – are primarily found in Sundargarh, Bargarh, Gajapati and Nabarangapur districts respectively.

The project districts (Ganjam, Kendrapara and Puri) however have very marginal tribal presence (0.3 to 3 percent of the district population), with most tribals concentrated in a few villages.

Work Participation Rate and Category of Workers: The workforce participate rate among STs in Orissa equals the participation rate of all STs at the national level (49 percent). Of the state's tribal workforce, 57.4 percent are main workers and this proportion is much below the national average recorded for all STs (69

percent). There is also considerable heterogeneity among tribal groups in the level of workforce participation recorded. For instance, the Khonds, the Gonds, Shabars, Saoras and the Bhattodas record a higher workforce participation rate than that of the state as well as the national average for all STs (49 percent).

Agricultural laborers constitute the highest proportion (47 percent) of workers among the tribal workforce. This is higher than the national average of agricultural laborers (37 percent). On the other hand, fewer STs work as cultivators (33 percent) compared to the national average (44.7 percent). Other workers constitute 15 percent of the tribal workforce in the state – numbers that are at par with the national average (16.3 percent), whereas workers engaged in the household industry constitute 4.8 percent (2.7 percent higher than the national average). In sum, it seems that more STs in Orissa are engaged as agricultural laborers or in households trades and fewer are cultivators than their peers in other parts of the country. More Bhattodas, Shabars and Saoras are engaged as agricultural laborers, while the Khonds and the Gonds are the dominant categories among cultivators.

Literacy and Education Level: The overall literacy rate for STs in Orissa increased from 22.3 percent in 1991 to 37.4 percent in 2001. Despite this improvement, the literacy levels for tribals in the state remained considerably below the national average for STs (47 percent). As expected, there were gender differences with nearly half of the ST men in Orissa being literate (51.5 percent) compared to only 23.4 percent literacy levels among tribal women in 2001. Among the numerically major tribes, the Gonds had the highest percentage of literates (47 percent) followed by the Saoras, Santalas, Mundas and Shabars (35.4 percent each). Gond women also registered the highest levels of female literacy (31 percent compared to the state average for tribal women of 23.4 percent).

Among tribal literates, 44.7 percent were either without any educational level or had attained education below primary level. The proportion of literates who had attained education up to primary and middle levels constituted 28.7 percent and 13.7 percent respectively. Literates, who were educated up to secondary/higher secondary etc., had a share of 11 percent only. Further, out of total 2.14 million tribal children in the age group 5 -14 years, only 1 million attended school in 2001, constituting 45.8 per cent. Alarmingly, as many as 1.2 million children in the corresponding age group did not go to school. Among the major tribes, the Gonds and Saoras had more than half of the total children in the corresponding age group attending school; this proportion was above 40 per cent among Khond, Munda, Shabar and Santal communities.

Sex ratio: According to the 2001 census, the overall sex ratio of the ST population in Orissa was 1003. This shows the preponderance of females and is higher than the national average (978) for all STs. At individual tribe level, except for the Santals, all the major tribes of the state had an overall sex ratio higher than that of the national average. Females outnumbered men among the Khond, Shabar, Saora and Gond tribes.

4.3.4 West Bengal

Population size and distribution: Scheduled Tribes constitute about 5.5 percent of the total population of West Bengal. Among the major tribal groups, the Santals represent more than half of the ST population in the state (51.8 percent), and are followed by the Oraons (14 percent), the Mundas (7.8 percent), the Bhumij (7.6 percent) and the Koras (3.2 percent). The Lodha, Mahali, Bhutia, Bedia, and Savar are the remaining tribal groups, having population of one per cent or more. The rest of the STs are very small in population size.

More tribals in the state inhabit inland districts as evident from district population shares in table 4.5. The coastal districts – particularly the project districts (South 24 Parganas and Purba Medinipur) – have very marginal tribal presence (1.2 percent and 0.6 percent of the district population respectively).

Table 4.5: District Wise ST Population (Census 2001)

Coastal Districts		Non-Coastal Districts	
Districts	% of STs to total population of district	Districts	% of STs to total population of district
North Twenty Four Parganas	2.2	Jalpaiguri	18.9
South Twenty Four Parganas	1.2	Puruliya	18.3
Purba Medinipur	0.6	Dakshin Dinajpur	16.1
West Bengal Total: 5.5% of the state population		Paschim Medinipur	14.9
		Darjeeling	12.7
		Bankura	10.4
		Malda	7.0
		Birbhum	6.7
		Bardhaman	6.4
		Uttar Dinajpur	5.1
		Hugli	4.2
		Nadia	2.5
		Murshidabad	1.3
		Kooch Bihar	0.6
	Haora	0.5	
	Kolkata	0.2	

Work Participation Rate and Category of Workers: According to the 2001 census, nearly half of the ST population in West Bengal participates in the workforce, which is close to the aggregate national average of workforce participation for STs (49 percent). Of the total workers, nearly 66 percent are classified as main workers, while the remaining 34 percent classify as marginal workers. Workforce participation among tribal women is slightly lower than that of tribal men (43.7 percent compared to 53.8 percent). Gender disparity however is stark in the classification of main workers: only half of the women who work classify as main workers, compared to 78.3 percent of men who work. Among the major STs, the Savar group records the highest workforce participation rate at 53.4 percent. Workforce participation is the lowest among the Bhutias. Category wise, of the total ST main workers, 23.7 percent work as cultivators, while 45 percent work as agricultural laborers.

Literacy and Education Level: About 43 percent of STs in West Bengal are literate, which is lower than the national average (47 percent; Source: Census of India, 2001). The male literacy rate of 57.4 percent and female of 29.2 percent, show a gender disparity in literacy. Of the ten major STs, the Bhutias with 72.6 per cent overall literacy (80.2 percent male and 65.2 percent female literacy respectively), are well ahead of the others. The Savars are at the other extreme with only 26.3 percent overall literacy levels and even lower female literacy rates (16 percent).

Tribal children in the age group of 5-14 years did relatively better than their peers in Orissa – about 51.7 percent attended school in 2001, but were worse off than tribal children in Gujarat, where 57 percent of the corresponding age group were in school. Here too, the Bhutias did better (77 percent) and the Savars did

the worst (35.5 percent). However, only 8.4 percent of total literates among STs were educated above matriculation.

Sex ratio: The sex ratio among tribals in West Bengal is estimated at 982 females per 1000 males (Census 2001). This is higher than the national average for STs (978). Here too, different tribal groups record different outcomes. For instance, the sex ratio among the Bhutias is the highest among all major tribal groups in the state (999 females per 1000 males). In contrast, the lowest sex ratio is recorded for the Bedia tribe (962). Interestingly, the Bedia do much better on child sex ratios than the Bhutias, with the latter recording a far lower child sex ratio (951). This suggests that Bhuita women, once they survive, have a good chance of doing better than women from other tribal communities in the state.

4.4 Scheduled Caste Population in Coastal Areas

The scheduled castes (SC) constitute about 16.25% of the total population of the country (Census, 2001). Among the states and UTs Punjab records the highest (28.9%) and Mizoram the lowest (0.03%) population of SCs in India. Andaman & Nicobar and Lakshadweep Islands did not record any SC population as per 2001 Census. Among the coastal states and UTs, West Bengal records the highest percentage (23.2) and Daman & Diu the lowest (Table 4.6).

Table 4.6: SC population in the coastal states and UTs of the country with their percentage to total population

S.N	State/UTs	SC population	Percentage of SC population to total population
1	Andra Pradesh	12339496	16.19
2	Andaman and Nicobar Islands	0	0.00
3	Daman & Diu	4838	3.06
4	Goa	23791	1.77
5	Gujarat	3592715	7.09
6	Karnataka	8563930	16.20
7	Kerala	3123941	9.81
8	Lakshadweep	0	0.00
9	Maharashtra	9881656	10.20
10	Orissa	6082063	16.53
11	Pondicherry	157771	16.192
12	Tamil Nadu	11857504	19.00
13	West Bengal	18452555	23.02
	India	166635700	16.20

The National Sample Survey Organisation (NSSO) report for 2004-05 says 36.8 percent Scheduled Castes in rural areas and 39.9 percent in urban areas are in the below poverty line (BPL) category. The poverty line is currently pegged at the monthly per capita expenditure of Rs.327.56 in rural areas, and Rs.454.11 in urban areas.

Among the total SC population, only 39.1% engages one or other kind of works in which 51% is contributed by male and 36.6 is represented by female. The percentage of main workers in the work force of SC includes only 30.4, in which 45.7 is by male and only 17% is contributed by female. Whereas among the marginal worker force the female outnumbered the male (11% over 6.6%).

4.4.1 Gujarat

Population: Size & Distribution

The total population of Gujarat in 2001 Census has been 50,671,017. Of this 3,592,715 persons are Scheduled Castes (SCs) constituting 7.1 per cent of the total population of the state. The state has registered 17.4 per cent decadal growth of SC population in 1991-2001. As regards percentage distribution of the total SC population, Ahmadabad has recorded the highest (17.3%), followed by Banas Kantha (7.6%), Rajkot (6.8%), Junagadh (6.6%), Vadodara (5.7%), and Kachchh (5.2%) districts. Other districts account for one per cent or less proportion (Table 4.7).

There are thirty (30) notified Scheduled Castes, and all have been enumerated at 2001 Census. The Mahyavansi has the highest population (43.2%) out of the total SC population of the state. Bhambi (29%), Bhangi (11.3%), Meghval (4.9%), Senva (3%), Garoda (1.9%), and Nadia (1.3%) along with Mahyavansi together constitute 94.6 per cent of the total SCs. The rest of the SCs have small population. Gujarat is one of the few states having high urban concentration of SC population. In 2001 Census, 39.3 per cent of the total SC population has been registered in urban areas. Individual Scheduled Caste wise, highest 53.6 per cent urban population has been recorded among Nadia closely followed by Bhangi with 53.1 per cent. On the contrary, Senva (82.8%) are predominantly found in rural areas.

Table 4.7 : Percentage of district wise scheduled castes population (Census, 2001)

Coastal Districts		Non-Coastal Districts	
Districts	% of SCs to total population of district	Districts	% of SCs to total population of district
Valsad	2.6	The Dangs	0.5
Navsari	3.2	Narmada	2.0
Bharuch	4.5	Dohad	2.0
Surat	3.4	Panchmahals	4.6
Kachchh	11.7%	Vadodara	5.6
Porbandar	9.0	Sabarkantha	8.3
Anand	5.3	Banaskantha	10.8%
Ahmadabad	10.7%	Kheda	5.2
Junagadh	9.6	Gandhinagar	8.7
Jamnagar	8.1	Patan	9.9
Rajkot	7.7	Surendranagar	11%
Bhavnagar	5.8	Mehsana	8.1
Amreli	8.3		
Gujarat Total: 14.8% of the state population			

Literacy & Educational Level

According to 2001 Census, in Gujarat 70.5 per cent of the SC population is literate. This is higher than the aggregated national figure for SCs (54.7%). The gender gap in literacy among SCs is conspicuous with male and female literacy of 82.6 and 57.6 per cent respectively (Table 4.8).

Table 4.8 : Literacy rate (above 7 years age) among major SCs

Name of the Scheduled	Literacy Rate (in %)
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Caste	Total	Male	Female
Mahyavansi	73.9	85.3	61.6
Bhambi	69.7	82.1	56.6
Bhangi	58.1	73.5	41.8
Meghval	58.1	73.5	41.8
Senva	65.3	77.9	51.7
Garoda	82.4	94.2	69.8
Nadia	67.3	78.9	55.2
All Scheduled Castes	70.5	82.6	57.6

Of the seven major SCs, Garoda with 82.4 per cent literacy rate, are not only on top but also well above the state average. Mahyavansi comes next with 73.9 per cent literacy. On the other hand Meghval is at the bottom of the list having only 58.1 per cent of their population as literate. The gender gap in literacy is very conspicuous among Meghval. The male and female literacy rate at 73.5 per cent and 41.8 per cent respectively show that Meghval females are lagging behind their male counterparts by 31.7 percentage points. According to the 2001 Census, three fourth of SCs (74.8%) in the age group 5-14 years have been recorded as to be attending school or any other educational institutions. As regard the individual SCs, Garoda has recorded the highest school attending population (5-14 years) of 80.9 per cent, closely followed by Mahyavansi (78.3%), Bhambi (76.2%), and Senva (73.3%). On the other hand this proportion is lower among Meghval (66.4%), Bhangi (66.5%), and Nadia (69.5%). In terms of the achievement in level of education, only 4.2 per cent of the SC literates in Gujarat have recorded educational level 'graduation' and above. Individual SC wise, Garoda with 5.6 per cent and Mahyavansi with 5.5 per cent are on top in this respect. On the other hand, Bhangi are at the bottom with just one per cent of their total literates having graduation and above level of education.

Work Participation Rate (WPR)

The percentage of SC workers to total population (WPR) is 39.6 per cent, which is slightly lower than the aggregated figure for all SCs at national level (40.4%). Of the total workers 79.7 per cent have been recorded as main workers and 20.3 per cent as marginal workers. The female WPR is only 27 per cent, which is lower than their male counterparts (51.3%). The overwhelming workers among males are main workers (91.6%). Senva has recorded the highest WPR at 45.6 per cent, while Garoda has recorded the lowest (34.5%). Female WPR is also quite low at just 19.9 per cent among Senva.

Of the total main workers among SCs, 32.1 per cent have been recorded as agricultural laborers and only 10.8 per cent as cultivators. Of the seven major SCs, Bhambi have recorded the highest 15.1 per cent cultivators, while Bhangi have recorded the lowest 3.4 per cent cultivators. Nadia (4.6%), Garoda (5%), and Senva (9.9%) have also recorded low involvement in cultivation works, as main workers. It is significant that Senva have recorded the highest 54.7 per cent agricultural labourers.

Sex Ratio

The sex ratio of total SC population in the state is 925, which is below national average (936) for all SCs. Quite lower sex ratio has been recorded among Senva (916) and Mahyavansi (919). The child sex ratio (0-6 age group) for SCs in the state is, however, alarmingly low (885). Of the seven major SCs, Garoda has

recorded the lowest child sex ratio (864). However, Nadia (946), Meghval (925), and Bhangji (900) have recorded comparatively higher child sex ratio than the state average.

4.4.2 Orissa

Population size and Distribution

The Scheduled Caste (SC) population of the State of Orissa, as per 2001 census is 6,082,063. This constitutes 16.5 percent of the total population of the State. The State holds 11th and 12th rank among all the States and UTs in terms of the SC population and the proportion of SC population to the total population of the State respectively. The decennial growth of SC population has been 18.6 per cent, which is 2.3 per cent higher than the overall growth of the total population (16.3 per cent). The SC are predominantly rural with 88.4 per cent residing in villages. Among the districts, the SCs have the highest concentration in Sonapur district with a share of 23.6 per cent to the total population, followed by Jajapur (23 per cent) and Baudh (21.9 per cent) districts (Table 4.9). Gajapati district has the lowest proportion of the SC population (7.5 per cent).

Table 4.9 : District wise % of SC population in Orisaa (Census, 2001)

Coastal Districts		Non-Coastal Districts	
Districts	% of SCs to total population of district	Districts	% of SCs to total population of district
Gajapati	7.50	Malkangiri	21.35
Balasore	18.84	Mayurbhanj	7.68
Khordha	13.54	Rayagada	13.92
Ganjam	18.57	Nabarangapur	14.10
Bhadrak	21.50	Kandhamal	16.89
Jagatsinghapur	21.05	Sundargarh	8.62
Kendrapara	20.52	Koraput	13.03
Puri	18.23	Keonjhar	11.62
		Nuapada	13.62
		Sambalpur	17.04
		Debagarh	15.37
		Jharsuguda	17.07
		Kalahandi	16.67
		Balangir	16.92
		Bargarh	19.37
		Dhenkanal	18.49
		Baudh	21.88
		Anugul	17.20
		Sonapur	23.62
		Jajpur	22.99
		Nayagarh	14.04
		Cuttack	19.08
Orissa Total: 16.53% of the state population			

The State has a total of ninety-three (93) SCs, but ninety one (91) have recorded their population at 2001 census. Out of this, Pan is the most populous caste having a number of 1,078,523 (17.7%) of the total SC population. Dewar is the second largest SC having a number of 648,937. Five other SCs in the descending order are Dom, Dhoba, Ganda, Kandra and Bauri. Along with Pan and Dewar, the seven SCs constitute 72.6 per cent of the total SC population. Ghasi, Namasudra, Chamar, Gokha and Haddi have a population

ranging from 105,722 to 209,701. Together, they form 13 per cent. Six SCs, namely Tiar, Patial, Tanla etc. having population ranging from 49,675 to 98,885 constitute another 6.6 per cent of the total SC population. Remaining 73 SCs along with generic castes constitute the residual 7.9 per cent of total SC population of the State. As many as thirty two (32) SCs have population below 1000. Of them, eight castes namely Pamidi, Musahar, Godagali etc. are very small having population less than 100.

District wise distribution of the individual SC population shows that Pan have the maximum population in Jajapur district followed by Kendujhar and Dhenkanal but they constitute the highest proportion (77.9 %) of the total SC population in Kandhamal district. Dewar have the highest population in Cuttack followed by Ganjam and Khorda districts. Other five major groups Dom, Dhoba, Ganda, Kandra and Bauri are primarily concentrated in Kalahandi, Ganjam, Balangir, Kendrapara and Ganjam districts respectively.

Literacy & Educational Level

The overall literacy rate of the SCs is 55.5 per cent at 2001 census, showing an improvement from that (36.8 %) recorded at 1991 census. This figure is marginally higher than the national average of 54.7 per cent aggregated for all SCs. Male literacy has increased from 52.4 per cent to 70.5 per cent while female literacy has gone up from 20.7 per cent to 40.3 per cent during 1991-2001. Among the numerically larger castes, Dewar and Dhoba have more than 50 per cent female literacy followed by Kandra (46.5 %). Dom have shown the lowest female literacy (24.9 %) (Table 4.10).

Table 4.10: Literacy rate (above 7 years age) among major SCs

Name of the Scheduled Caste	Literacy Rate (in %)		
	Total	Male	Female
Dewar	58.95	66.3	51.6
Dhoba	57.85	65	50.7
Kandra	53.9	61.3	46.5
Pan	47.7	55.4	39.5
Ganda	47.7	55.6	39.8
Bauri	41.85	50.2	33.5
Dom	32.15	39.4	24.9
All SCs	47.9	55.5	40.3

Among SC literates, 40.1 % are either without any educational level or have attained education below primary level. The proportion of literates who have attained education up to primary and middle levels constitute 30.1 % and 14.4 % respectively. Literates who are educated up to matric / higher secondary constitute 12.6 % only. This implies that every 8th SC literate is matriculate. Graduates & above are 2.3 % while non-technical & technical diploma holders constitute less than half per cent (0.4 %) only. Among numerically larger groups, Dhoba have the highest proportion of matriculates, followed by Dewar and Kandra etc. Bauri have the lowest proportion of matriculates. The data on the education levels attained by all SCs shows that the drop-out rate is high after middle level as the percentage of middle level literate is almost half of the primary level literates and declines sharply from the higher secondary level onwards. Similar trend has been shown by the major SCs in the attainment of levels of education. Out of the total 14.9 lakh SC children in the age group 5 -14 years, only 9.2 lakh children attend school, constituting 61.3

per cent. As many as 5.8 lakh children in the corresponding age group do not go to school. Among the major SCs, Dhoba have the highest proportion of school going children (70.2 %); this proportion is above 60 per cent among Dewar, Ganda, Kandra and Pan.

Work Participation Rate (WPR)

The Work Participation Rate (WPR) of the SC population is 39.3 per cent which is marginally lower than that of total SCs at the national level (40.4 %). This figure is same as that recorded at the 1991 census. While there has been an increase in female WPR from 23.4 per cent to 26.2 %, male WPR (52.2 per cent) has declined by 2.5 % during 1991-2001. Among the total workers, 64.8 per cent are main workers, which is below the national average recorded for all SCs (73 %). At the level of the individual caste, Dom, Ganda, and Bauri have registered WPR higher than that of the state as well as national averages. Agricultural Labourers constitute the highest proportion (45.7 %) among all SCs workers, which is almost equal to that of the national average (45.6 %). Persons working as Other Workers constitute 30.2 per cent which is approximately the same if compared to the national average of 30.5 per cent. Cultivators account for 18.2 per cent which is at par with the national average of 20 per cent whereas workers engaged in Household Industry (HHI) constitute 6 % and this figure is significantly higher than that of all SCs at the national level (3.9 %). Among the major castes, Dhoba, Dewar, Kandra and Dom have every 5th worker a cultivator. 'Agricultural Labourers' constitute 61 per cent of the total workers of Bauri, followed by Pan, Ganda, Kandra who have more than half of the total workers are 'Agricultural Labourers'. Dewar have the highest proportion of 'Other Workers' followed by Dhoba (39.9 %) and Kandra (26.4 %).

Sex Ratio

The over all sex ratio of the SC population in Orissa is 979 females per 1000 males which is higher than the national average of 936 for the total SC population. At individual level, seven major castes have registered the over all sex ratio higher than the national average with Dom having a preponderance of females, their sex ratio being 1007. The sex ratio among SCs, in the age group 0-6 years (958) is higher than that of the SCs at the national level. Among the larger groups, Dom have the highest (972) and Dewar the lowest (943) child sex ratio. All of the major castes have returned child sex ratio higher than that of the national average.

4.4.3 West Bengal

Population: Size & Distribution

The total population of West Bengal at 2001 Census has been 80,176,197. Of these 18,452,555 persons are Scheduled Castes (SCs), constituting 23 per cent of the total population of the state. The state has registered 14.8 per cent decadal growth of SC population in 1991-2001. There are fifty nine (59) notified SCs, and all have been enumerated in 2001 Census. The Rajbanshi and Namasudra having more than 32 lakhs population each constitute 35.8 per cent of the total SC population of the state. Bagdi, Pod, Bauri and Chamar each have more than 10 lakhs population. They along with Rajbanshi and Namasudra together constitute 73.9 per cent of the total SCs. The Jalia Kaibartta, Hari, Dhoba, Sunri (excluding Saha), Dom, Lohar, Mal, Kaora, and Tiyaar have sizeable population. The rest of the SCs have a comparatively smaller population.

Among the districts North Twenty Four Pargana, South Twenty Four Pargana and Barddhaman districts account for one third of the total SC population of the state. Majority of SCs are living in rural areas (84.1 per cent) (Table 4.11). Individual SC wise, the highest 98 per cent rural population has been recorded among Bhogta, followed by Paliya (97.4 per cent), Koch (97.2 per cent) and Chaupal (97 per cent). Contrary to the overall situation of the state, Halalkhor (90.9 per cent), Khatik (87.9 per cent), and Pasi (81 per cent) are predominantly urban by their residence.

Table 4.11: District wise % of SC population in West Bengal (Census, 2001)

Coastal Districts		Non-Coastal Districts	
Districts	% of SCs to total population of district	Districts	% of SCs to total population of district
Medinipur	16.4	Bankura	31.2
North 24-Parganas	20.6	Barddhaman	27.0
South 24-Parganas	32.1	Dakshin Dinajpur	28.8
West Bengal 23.0%		Darjiling	16.1
		Haora	15.4
		Hugli	23.6
		Jalpaiguri	36.7
		Koch Bihar	50.1
		Kolkata	6.0
		Malda	16.8
		Murshidabad	12.0
		Nadia	29.7
		Puruliya	18.3
	Utar Dinajpur		

Literacy & Educational Level

Among all SCs, 59 per cent of the population is literate, which is higher than the aggregated national average for SCs (54.7 per cent). The gender gap in literacy among SCs is quite conspicuous with male and female literacy rates of 70.5 per cent and 46.9 per cent per cent respectively (Table 4.12). The Sunri (excluding Saha) with 82.5 per cent literacy is on top of the list. Other SCs who have recorded literacy rate higher than the state average for SCs are Dhoba (73.9 per cent), Pod (72.1 per cent), Namasudra (71.9 per cent), Jalia Kaibartta (64.9 per cent), Tiyar (62.1 per cent), and Rajbangshi (60.1 per cent). Bauri have the lowest literacy rate (37.5 per cent)

Table 4.12: Literacy Rate among Sixteen Major SCs

Name of the Scheduled Caste	Literacy Rate (in %)		
	Total	Male	Female
Rajbangshi	60.1	72.3	47.3
Namasudra	71.9	80.6	62.8
Bagdi	47.7	60.4	34.8
Pod	72.1	83.5	59.9
Bauri	37.5	51.8	22.7
Chamar	47.0	58.6	34.1
Jalia Kaibartta	64.9	74.4	54.8
Hari	49.5	61.6	36.8

Dhoba	73.9	83.5	63.6
Sunri (excluding Saha)	82.5	92.7	71.4
Dom	46.0	58.9	32.6
Jhalo Malo	60.3	68.4	51.7
Lohar	46.5	61.1	31.3
Mal	39.6	51.9	26.8
Kaora	53.0	64.9	40.6
Tiyar	62.1	73.5	50.1
All Scheduled Castes	59.0	70.5	46.9

The gender gap in literacy has been noted among the major SCs. It is high (29 %) among Lohar and Bauri, and it is comparatively small (16 %) among Namasudra and Jhalo Malo. A total of 63.3 per cent of SCs in age group 5-14 years has been attending any educational institutions. Of the sixteen major SCs, Sunri (excluding Saha) is on top having 79.9 per cent population attending any educational institutions, whereas Bauri is at the bottom with merely 45.1 per cent. As regards the level of education, 11.6 per cent of total SCs in West Bengal are having educational level above matriculation. The Sunri (excluding Saha) with 29.3 per cent is well ahead of other SCs. On the other hand Bauri (4.7 %) and Bagdi (4.9 %) have recorded below five per cent of their total literates having this level of education.

Work Participation Rate (WPR)

The percentage of SC workers to total population (WPR) is 38.8 per cent, which is lower than the aggregated figure for SCs at the national level (40.4 per cent). Of the total workers, 74 per cent have been recorded as main workers and 26 per cent as marginal workers. The female WPR has been 22.3 per cent only, which is quite low when compared with male (54.4 per cent). The overwhelming workers among males are main workers (84.8 per cent), while the ratio of main and marginal workers among female is evenly poised. The Khairia has recorded the highest WPR of 50.5 per cent. On the other hand the Pasi has recorded the lowest WPR of 29.4 per cent among the major SCs. Of the total SC main workers, 31.9 per cent has been recorded as agricultural laborers and 20.3 per cent as cultivators. Almost a third of their total main workers among Paliya (38.9 per cent), Rajbanshi (35.1 per cent), Sunri (excluding Saha) (33.3 per cent), and Kadar (29.7 per cent) have been returned as cultivators. On the other hand Dosadh (2.6 per cent), Turi (4.8 per cent), Dom (5.7 per cent), Kaora (5.9 per cent) are the non-cultivating SCs who have recorded less than six percent of their total main workers as cultivators.

Sex Ratio

The sex ratio of the total SC population is 949, which is higher than the national average (936) for all SCs. Of the sixteen major SCs, the sex ratio among Bagdi (978), Bauri (973), Kaora (963), Hari (963), Mal (962), Dom (959), Lohar (959), and Jalia Kaibartta (951) is above the state average for all SCs. It is lower than the state average among the remaining seven major SCs; the lowest has been among the Chamar (911). The child sex ratio (0-6 age group) of 958 for SCs in the state is higher than the national average for the same category (938). Jalia Kaibartta (954), Sunri (excluding Saha) (951), Tiyar (951), Hari (948), Pod (947), and Dhoba (942) have recorded lower child sex ratio as compared to the state average (958).

4.5 Poverty in the Coastal Areas: A profile & Analysis

The *Integrated Coastal Zone Management (ICZM)* project aims to support the GoI and selected states to develop and implement an improved strategic and integrated management approach for India's coastal zones. A key component of the project is to undertake pilot activities in three coastal states – Gujarat, Orissa and West Bengal. In West Bengal for instance, two pilot investments are contemplated: (a) ecological restoration, protection against coastal erosion, beach cleaning, sewage treatment, and provision of amenities, all with close livelihood linkages in villages along Digha-Shankarpur; and (b) provision of grid power, tourism development and local livelihood activities such as those related to eco-tourism in Sagar Island in the Sundarbans. Lessons from such demonstration investments will subsequently be documented for scaling-up in the future.

While some pilot investments will be undertaken in pre-selected sites (e.g. villages along Digha beach), in yet others there was room for selection of villages/sites based on criteria like poverty levels. For instance, in Gujarat the pilot activities will include plantation and conservation of mangroves along the Gulf of Kachchh. The Bank project team proposed therefore that the headcount ratio (i.e. proportion of people below poverty line) or some other proxy for poverty be used to select districts, blocks and villages for the mangrove plantation (or other pilot investments where selection is possible). Using poverty as a criterion for selection serves two purposes.

First, it increases the potential impact of the project in reaching out to poorer areas. One of the key objectives of the Swaminathan Committee Report (the recommendations of which the project proposes to implement) is to facilitate conservation of ecosystems in the coastal zone, promoting simultaneously economic development and poverty reduction in coastal areas. The project's potential impact on poverty reduction is likely to increase if selection is set up in a manner that relatively poorer areas are identified to begin with.

Second, targeting of pilot investments is a possible leakage point, as sites may be selected to appease political patronage. Application of a pre-determined, well-documented criterion (e.g. poverty) that all stakeholders are aware of can help reduce such leakages, if not completely eliminate them.

This part of the document methodology that was shared with state project management units (SPMUs) for selection (or ratification) of districts, blocks and villages chosen for the pilot investments, using poverty as a criterion. It did not guarantee selection of "all" the poorest sites in a coastal stretch. As mentioned above, some villages were pre-selected based on client need and priority (e.g. ecological restoration of villages along Digha beach). However, the methodology helped in ratifying such choices, as well as in setting up priorities for selection.

A broad profile of poverty and human development in coastal states in India is provided first. A comparison is made with land locked states along several indicators – growth rates; poverty levels etc. – using secondary data. While coastal states on the whole tend to do better on most indicators, not all regions within them do well. There is a need therefore to look at more disaggregated data. Then it provides details on the methodology that guided selection of project districts, blocks and villages. Section III lists the project sites that were proposed to SPMUs based on the methodology described.

4.5.1 The Coastal Dividend

India's coastline is 7,517 kilometers long of which 5,423 kilometers belong to peninsular India, and 2,094 kilometers to the Andaman, Nicobar, and Lakshadweep Islands (Kumar et al., 2006). A very significant share

of India's economic infrastructure, including maritime facilities, petroleum industries, and import-based industries is located in the coastal zone, as are some of its important trade centers including Mumbai, Kolkata, Surat, and Vishakhapatnam.

Coastal states, in general, by virtue of access to more economic (ports etc) and natural resources, are known to be richer than their counterparts in the mainland. Analysis of different indicators – income, growth rates, poverty levels etc – suggests that the coastal dividend holds true to an extent for India. It is estimated that most coastal states in India (not including Union Territories) had an average income per capita between 2000 and 2003 that was higher than the average for India (fig. 4.3). Only the coastal state of Orissa was below the national average of Rs. 16,072 income per capita (horizontal line in figure 4.3). In contrast, nearly all land-locked states except Punjab, Haryana and Himachal Pradesh were below this average. States along the coastline also grew faster in the 1990s than land-locked states (at an average of 6.4 percent compared to 5 percent for the latter (fig.4.4).

By 2000-01, coastal states had a lower share of agricultural workers in the population than mainland states (41 percent compared to 61 percent), had better road density i.e. length of roads per hundred square kilometers (144 vs 65) and had higher credit available per capita – approximately Rs. 8400 compared to Rs. 2400 for land-locked states (World Bank, 2008).

Perhaps because of the coastal dividend, states along the coastline in India also recorded relatively lower poverty levels than those in the mainland. Figure 4.4 and 4.5 gives headcount ratios i.e. the percentage of population below the official poverty line in major coastal and non-coastal states in 1993-94 and 2004-05 (*The Indian Government and the Planning Commission of India specifies poverty thresholds that are different for different sectors (rural/urban) and states i.e. there is no single poverty line that is applicable nationally. The lines are revised every five years or so by the Planning Commission based on the consumer price index (CPI). The two CPIs used are the Consumer Price Index for Industrial Workers (CPIIW) and the Consumer Price Index for Agricultural Laborers (CPIAL). Reweighted versions of each are used to update the urban and rural poverty lines. For purposes of measuring poverty for our analysis, we use the latest official poverty line, whatever that be for urban/rural nationally or urban/rural areas within a particular state).*

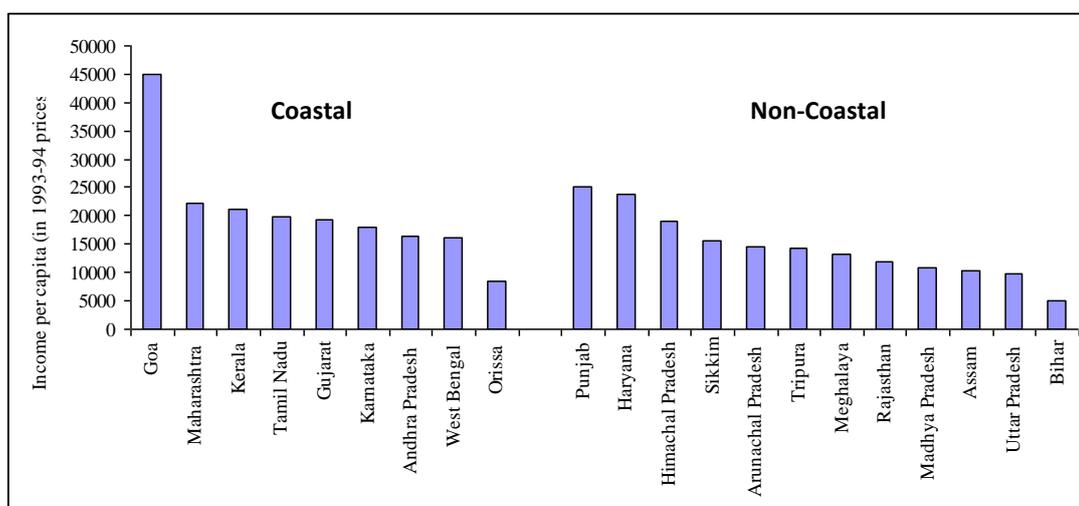


Fig. 4.3: Comparison of per capita income in coastal and non-coastal states between 2000 and 2003
 (Source: World Bank, 2008. *Accelerating Growth and Development in the Lagging Regions of India*
 Notes: Income per Capita (estimated at 1993-94 prices), average of 2000/01-02/03)

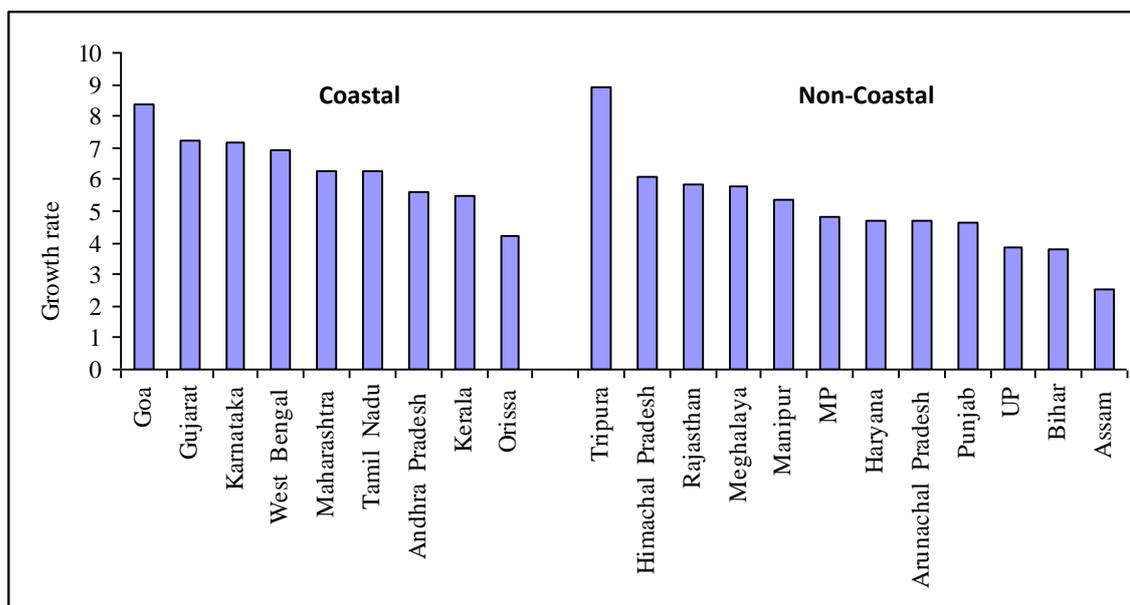


Fig. 4.4: Comparison of growth in GSDP in coastal and non-coastal states in the 1990s
 (Source: www.indiastat.com, - Selected state-wise trend growth rate of GSDP (1990-91 to 2001-02) at constant (1993-94) prices)

The figure leads us to three interesting observations. First, with the exception of Orissa, West Bengal and Maharashtra, coastal states in 1993-94 registered poverty levels that were lower than the national average (35.8 percent of population) – identified by the horizontal line in the figure. In contrast, poverty levels in many more inland states were greater than this average. More than half the population in states like Jharkhand and Bihar, for instance, was below the poverty threshold in 1993-94. Second, while headcount poverty in India as a whole reduced considerably from 35.8 percent in 1993-94 to 27.5 percent in 2004-5, more inland states perhaps of their initial disadvantage were still relatively poorer in 2004-05 when compared to their coastal counterparts. Third, there were variations in the measure of success in reducing poverty even within coastal states. West Bengal for instance registered a relatively faster decline in poverty (a 12 percentage point reduction compared to an 8 percentage point reduction in the national average), so much so that headcount poverty in the state in 2004-05 (24.7 percent) became lower than the national average (27.5 percent).

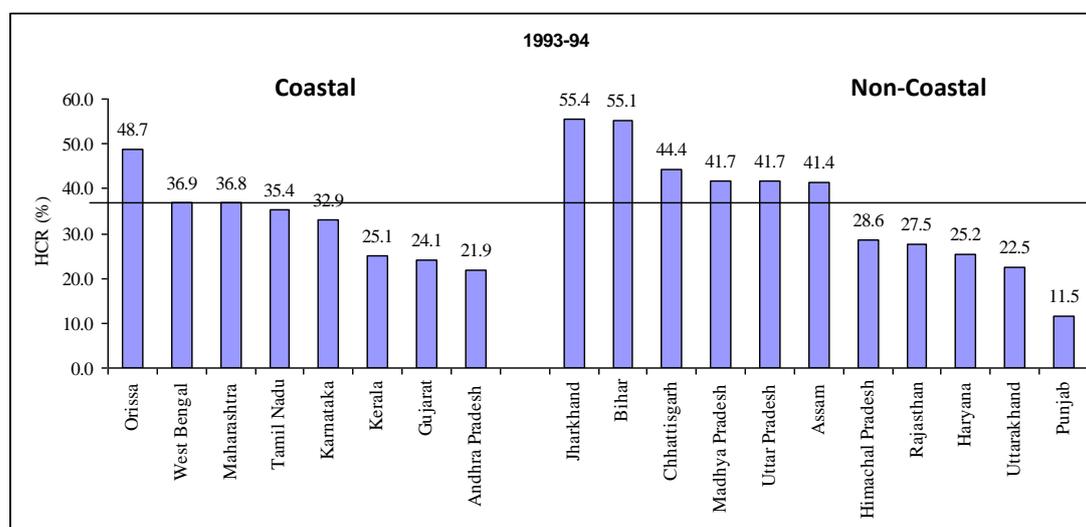


Fig. 4.5: Comparison of Head of account Ratio in coastal and non-coastal states (1993-94) -Source:
Estimates based on 'Consumption Expenditure Survey' (CES) of respective NSS rounds.

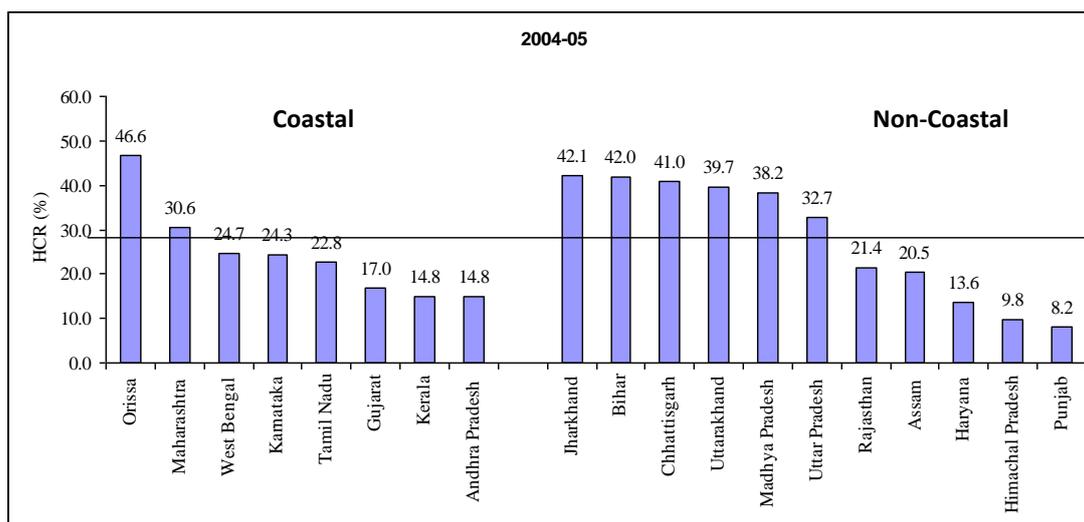


Fig. 4.6: Comparison of Head of account Ratio in coastal and non-coastal states (2004-05) -Source:
Estimates based on 'Consumption Expenditure Survey' (CES) of respective NSS rounds.

Despite better income and lower poverty, the gap between coastal and inland states on indicators of human development was only marginal. In 2001, the former recorded an average human development index (HDI- an index combining normalized measures of life expectancy, literacy, educational attainment, and GDP per capita for countries worldwide) of 0.49 compared to an average HDI of 0.42 in non-coastal states (National Human Development Report 2001 and www.indiastat.com). While Kerala ranked first among the 13 states ranked in 2001, Andhra Pradesh and Orissa pulled down the coastal average with a rank of 10 and 11 respectively.

Admittedly a coastline offers geographic advantages. But the hypothesis that all coastal regions in India do uniformly better than non-coastal regions can be rejected for the following reasons. First, Orissa is a clear exception to the rule. Despite having a long coastline and being abundantly rich in natural resources, the state is among the poorest in India. Second, coastal states do not necessarily rank high on human development, despite ranking high on income and other economic indicators. Third, not all districts, blocks and villages or population groups *within* coastal states do well. Some are relatively poorer than the state average.

Co-inhabiting richer industrial clusters like Mumbai and other coastal cities, for instance, are a large number of coastal villages that depend on fishing for their livelihood. It is estimated that about 6.7 million people in India depend on fishing for a livelihood, of which about 2 million depend on marine fishing (GoI, 2001). While there is no comprehensive poverty data available on coastal fishing communities in India, scattered evidence in the literature suggests that such communities, in general, are extremely poor, have lower levels of literacy, a lower sex ratio, and poorer conditions of housing, as compared to state and national averages (IFAD, 2003). Coastal families are characterized by large numbers and poor quality of life. Even small children participate in income generating activities, and it is argued that with decline in resource base, the coastal poor feel a need to have large families that can extract enough for survival (Sharma, 1997). The FAO notes: "In purely income terms, small-scale fishers may often compare favorably with small scale

farmers or agricultural laborers. But in terms of educational, health and nutritional status, participation in political decision-making, and vulnerability, small-scale fishers and fishing communities often appear to rank lowest in society” (FAO, 2001).

Other studies such as that of Kurien (2000), find that Christian and Muslim fishing communities along the Kerala coast are poorer on several indicators (including human development indicators) than the state average. Research undertaken by the M.S. Swaminathan Research Foundation in coastal villages in Andhra Pradesh reports that a majority of households spend up to 90 percent of their earnings on food alone, indicating high levels of poverty (MSSRF, 1998).

In a sense, coastal communities suffer from “ecological poverty” making the need for an integrated approach to coastal management all the more critical. They usually live in remote and dense pockets, with little access to education and health service. (As per 2001 census, on average, nearly 1232 people lived per square kilometer of coastal districts in India in 2001, in comparison to the average of 697 people in coastal states and 313 people all-India, making them the most densely populated coastal regions of the world). . A majority of them depend on fishing and allied activities to earn their livelihood and therefore try and live close to the sea, open to natural elements like cyclones, tidal waves and most recently tsunamis. And when these disasters strike, it is the poor who are most affected. A study on the impact of the Orissa cyclone showed for example that the poor had the least ability to cope with environmental shocks as they had fewer assets (most had lost their boats and nets in the cyclone) and still fewer options of earning an income elsewhere (Praxis, 2002). Poor fishermen and fisherwomen in coastal villages also face pressures of displacement from industry, tourism, development of ports and urban growth. Nayak (1997) documents the experience of a fishing village in Orissa that was displaced twice: once to make way for a port at Paradip and then to make way for a university. Finally, the marine resources they rely on are fast dwindling in the face of destructive fishing practices, unplanned tourist development, intensive coastal aquaculture, chemical pollution from land and sea, illegal and unregulated fishing and impact of climate change.

Clearly there are variations in outcomes at the sub-state level and the conjecture that coastal states in India do better universally is not the end of the story. Section III digs deeper into disaggregated poverty data for the three pilot states – Gujarat, Orissa and West Bengal. It illustrates the wide variation in poverty and human indicators within these states. In doing so, it focuses specifically on districts pre-identified by the project for pilot livelihood activities. Finally, and on the basis of a selection of indicators, Section III tries to identify “**pockets of poverty**” in districts where the project proposes to undertake pilot activities, so project impact is maximized. However, we first discuss the indicators used to do so and their data sources.

4.5.2 Method used for poverty analysis

Preliminary analysis of coastal states suggests that two of the three project states (Orissa and West Bengal) are the poorest from among other coastal states. However, as stressed above, we did expect to find pockets of poverty even within the three states, including Gujarat which is a relatively richer state. The attempt then was one of identifying coastal districts, blocks and villages within the three states that were relatively poorer compared to the state average.

Several indicators can be used to do so. The most commonly used is the headcount ratio that accounts for the proportion of people that fall below a mandated, predetermined official poverty line. However, poverty is not merely poverty of consumption but is multidimensional. Poor people not only lack income, but lack resources and access to resources like education, health, land, justice, credit, and social and political

institutions. To identify backward districts in each state, we followed the methodology adopted by Debroy and Bandhari (2003). The authors use six indicators of deprivation to identify the most backward districts in India. The indicators include:

1. **Poverty headcount ratio (HCR):** The HCR is a measure of the percentage of population living below the poverty line specified by the Planning Commission, Government of India in 1979 at 1973-74 prices (*The poverty line is the cost of a bundle of commodities that can provide a little over 2400 kilo calories to an average Indian living in rural areas. The average food requirement is a little lower at 2100 kilo calories in urban India*). The HCR data is based on the information on household expenditure collected by the National Sample Survey Organization (NSS) through a representative survey of approximately 12,000 households across India in 1999-00.
2. **Hunger/food sufficiency:** estimates the proportion of households that do not have sufficient food for all members in some parts of the year using NSS data for 1999-00
3. **Infant Mortality Rate (IMR):** is computed as the ratio of deaths of children under one year of age to the total number of live births in the same year (Source: Sample Registration System)
4. **Immunization rate:** is the percentage of children getting complete immunization (Source: National Commission on Population, NCP, District Wise Indicators, 2001)
5. **Literacy rate:** measures the percentage of those aged 7 years and above who are literate (Source: Census 2001)
6. **Gross enrollment ratio (elementary level):** refers to the ratio of number of children enrolled at the elementary level (Class I-VIII) to the population of 6-14 year olds (Source: : Selected Educational Statistics, 2001)

We used these six indicators to sort districts in each of three selected states. To do so, we adopted two methods. First, we identified the districts that were in the bottom most quartile (bottom 25 percent) on a given measure. This is an *absolute* benchmark. However, most “coastal” districts did not fall into this bottom-most category. We then used *relative* benchmarks, comparing indicators for coastal districts against the state average and the average specifically for coastal districts within the state. In other words, we ascertained whether coastal districts were backward or not relative to other districts or the state.

After identification of districts, we moved on to constructing a poverty profile of coastal blocks and villages within the selected districts. Unfortunately, there is no recent, comprehensive data on poverty and human development at administrative levels lower than the district. The latest NSS round (2004-05) tracks the incidence of poverty only for a sample of households. Use of NSS data therefore does not assure that all indicators for our target blocks and villages along the coast will be covered. The next best source of comprehensive data is the data from the 2001 census. However, the census data does not include direct measures of poverty like the headcount ratio. The following 12 indicators were used instead as proxies for poverty at the block level:

1. Proportion of ST population to total population
2. Literacy rate
3. Marginal workers as % of total workers
4. Sex ratio (0-6 years) females per 1000 males
5. Percentage of households with no assets

6. Percentage of households cooking in the open
7. Percentage of households with drinking water source outside premises
8. Percentage of households using cow dung cakes as fuel for cooking
9. Percentage of households using crop residue as fuel for cooking
10. Percentage of households using firewood as fuel for cooking
11. Percentage of households within no drainage in the house
12. Percentage of households with no latrine within the house

Once data on the above indicators was obtained on all coastal blocks in the selected states (Gujarat, Orissa and West Bengal), they were divided into terciles with the aim of identifying blocks in the bottom tercile or bottom 33% of all coastal blocks on each indicator. This addressed the issue of *scale* i.e. if we were to include all blocks below the median (bottom 50 percent), more blocks would be classified as backward. However, if we were to consider only those blocks that ranked in the bottom tercile in *all 12 indicators* as backward, we would have ended up with very few blocks. Thus blocks that ranked in the bottom 33% in at least 5 of the 12 indicators were classified as poor blocks. Of course, some coastal blocks did even worse. For example Lakhpat in the district of Kachch in Gujarat was in the bottom 33% of all coastal blocks in Gujarat on 7 indicators.

The next step was to identify poor coastal villages from among the selected blocks. This proved to be tricky. While census data is available at the village level, it is hard to determine which villages are located along the coast. District level maps can be used for this purpose. The project team therefore shared the methodology with state level teams who had easier access to such data. Once the identification of coastal villages is complete, they can be ranked similarly along the following 9 indicators to select the relatively poorer ones among them. Coastal villages in the selected blocks can be divided into terciles and then selected if they feature in the bottom tercile in at least 4 of the 9 indicators.

1. Percentage of households with no assets owned
2. Percentage of households cooking in open
3. Percentage of households using cow dung cakes as fuel for cooking
4. Percentage of households using crop residue as fuel for cooking
5. Percentage of households with no latrine in the house
6. Percentage of households with no drainage in the house
7. Percentage of households with drinking water source outside premises
8. Percentage of households with no source of lighting
9. Percentage of households with mud, wood or bamboo as material for roof

The next section presents our findings. The ranking exercise is discussed separately for each state, as are its implications for project design and targeting in each.

4.5.3 Findings of Poverty Analysis

National level

Using the Debroy and Bhandari (2003) methodology, we found that coastal districts on average outperformed non-coastal districts across the coastal states (West Bengal., Orissa, Gujarat, Daman and Diu, Dadra, Maharashtra, A.P., Karnataka, Goa, Laskhadweep, Andaman and Nicobar, Kerela, Tamil Nadu, Pondicherry). Table 4.13 lists the district averages for 14 coastal states for the six indicators chosen:

Table 4.13: Coastal and non-coastal districts data on human development indicators

Districts	HCR	% of hungry households	IMR	% of children getting complete immunization	Literacy rate	Gross Enrollment ratio (elementary)
Coastal Districts' Average	15.9	1.9	52.0	76.2	75.7	81.0
Non- Coastal Districts' Average	30.1	3.2	69.7	71.4	66.4	84.5

Source: Debroy and Bhandari (2003)

However, as discussed earlier, even among coastal districts in the three selected states, some were relatively worse-off.

Gujarat

Gujarat was created out of the 17 northern districts of the former State of Bombay. These districts were further subdivided later on. As of 2001, there were 25 administrative districts in the state (Census 2001). Of these 13 are coastal districts and include the districts of Kachchh, Rajkot, Jamnagar, Porbandar, Junagadh, Amreli, Bhavnagar, Ahmadabad, Anand, Bharuch, Surat, Navsari and Valsad. Gujarat has a long coastline of about 1600 kilometers, one of the longest in the country

The Gujarat coast is endowed with a variety of eco-systems including mangroves, sea weeds, coral reefs, salt marshes, marine life and wetlands. It is also a center of economic activities including ports, shipping and trade, ship building and ship breaking, fisheries and aquaculture, salt production, mining industries, tourism, navy and defense. It is estimated that on average a port exists for every 40 km of the seacoast in Gujarat (Gujarat State HDR). The coastal districts, particularly in Kuchch and Saurashtra (Rajkot, Jamnagar, Porbandar, Junagadh, Amreli and Bhavnagar) account for about 48 percent of industrial investment in the state in 1996 (Gujarat State HDR).

However the pressure of industrial activity, together with the density of population has created severe environmental challenges in this zone. It is estimated that 41 per cent of the coastal population in Gujarat lives in urban centers as against 36 per cent for the state. Most industries along the coast discharge their solid and liquid waste into the sea. Pipelines carrying industrial waste from inland areas to the coast, compound pollution levels. Add to this, government promoted irrigation that relies on groundwater resources and which overtime has led to a lowering of the water table and growth of seawater ingress, resulting in salinization and deterioration in the quality of groundwater. Together these pressures have led to degradation of land, destruction of coastal ecosystems like mangroves, coastal erosion and degradation of coastal seawater. Problems of drinking water in coastal areas are common causing diseases like fluorosis, and dysentery.

The state government is cognizant of such problems and has taken the lead in the country in preparation of a Coastal Zone Management Plan (CZMP) and a Coastal Zone Management Information System (CZMIS) tracking weather and environment related information through a geographic information system (GIS).

Proposed project sites: It has been proposed that project activities under the ICZM focus on the southern coast of the Gulf of Kachchh, which presents a range of pollution-related challenges, due to concomitant presence of oil based industries, marine parks, fishing activities, urban areas (Jamnagar), etc. The pilot

activities include conservation and restoration of mangroves, including a few particularly relevant ones as a natural protection to valuable economic infrastructure.

Table 4.14 summarizes the district level data on our chosen six indicators in Gujarat. As evident from the table, the average coastal district was better than those in the worst quartile in every indicator.

Table 4.14: District level data on poverty for six indicators

	HCR	% of hungry households	IMR	% of children getting complete immunization	Literacy rate	Gross Enrollment ratio (elementary)
Worst quartile	28.2-36.5	2.1-2.8	74 -80	20.9-34.8	45.6 -54.2	10.5- 32.9
State Average	13.6	0.5	69	58.5	67.1	65.4
Coastal Districts' Average	8.7	0.6	64	62.3	70.5	61.8
Non- Coastal Districts' Average	19.3	0.3	74	54.3	63.8	69.3

Source: Debroy and Bhandari (2003)

However, there were a few exceptions. The coastal district of Surat for instance recorded a high proportion of hungry households (2.8 percent), falling in the worst quartile of districts in the state on this indicator. The gross enrollment ratio in Surat was also very low (25.7 percent). Likewise, Anand, Kutch and Ahmadabad, all coastal districts, recorded relatively high infant mortality levels (80, 77 and 80 per 1000 live births respectively). The coastal districts of Porbandar and Junagadh were low on gross enrollment (10.5 percent in each); and Amreli, also along the coast, had a relatively higher proportion of hungry households (2.4 percent). Coastal areas in Gujarat are not immune to food insecurity. In a survey of over a 1000 households in two blocks in the coastal district of Rajkot, Chakravarty and Dand (2006) find that only 15 percent of the sampled households were food secure for all 12 months.

In general though, Kachch and Jamnagar (the coastal districts chosen for the project) performed relatively well, both against the state average and average for coastal districts using the selected indicators. As noted earlier, Kachch did worse only on the infant mortality rate. Jamnagar did not feature in the worst quartile on any indicator. Only on one indicator of education i.e. literacy was it relatively worse off compared to the state average (63.2 percent compared to the state average of 67.1 percent).

The block level analysis however suggested that there were pockets of poverty even within Kachch and Jamnagar. Lakhpat, Bachau and Abdasa, all coastal blocks in Kachch, ranked in the bottom 33% on at least 5 of the 12 indicators from the census data (see Table 4.15, the numbers in parentheses give the number of indicators on which the block ranked in the bottom 33 percent). Similarly, Khambalia and Kalyanpur were relatively poorer coastal blocks in Jamnagar. In contrast, none of the coastal blocks in Navsari, Porbandar and Surat ranked poor by this method (i.e. the block featuring in the bottom tercile in at least 5 indicators). This despite Surat having a relatively high proportion of hungry households suggesting that poverty in Surat was mostly concentrated in the inland blocks.

Table 4.15: Pockets of Poverty in Coastal districts in Gujarat

District	Poor blocks (poor on x of the 12 indicators)
Kachch	Lakhpat (7 indicators), Bhachau (6), Abdasa (6)
Ahmadabad	Dhandhuka (6)

Rajkot	Maliya (5)
Jamnagar	Khambhalia (5), Kalyanpur (5)
Junagadh	Sutrapada (5), Kodinar (5), Una (5)
Amreli	Jafrabad (7), Rajula (5)
Bhavnagar	Talaja (6), Mahuva (6)
Anand	Borsad (7), Anklav (7)
Bharuch	Jambusar (5), Vagra (5), Hansot (7)
Valsad	Umbergaon (6)

Source: Census (2001)

Orissa

Located on India's eastern coast, between West Bengal and Andhra Pradesh, Orissa is placed strategically with a 480 km long coastline facing East Asia. Of its 30 districts, seven lie along the coast and include Balasore, Bhadrak, Kendrapara, Jagatsinghapur, Puri, Khorda and Ganjam. This geographic advantage, together with the fact that it also has nearly a quarter of India's mineral wealth, gives the state substantial growth potential.

Yet, Orissa remains among the poorest of India's major states, an exception to the otherwise robust finding in the growth literature that coastal countries (states) tend to grow faster than land-locked ones (World Bank 2008, also see figure 3). Poverty rates in Orissa remain almost twice as high as rates in the rest of India varying from 87 percent in the Southern interior region to 50 percent in the Northern interior region to 32 percent in the Coastal region (Table 4.16). Although Scheduled Tribes represent about 22 percent of the population of Orissa, they constitute more than 40 percent of the poor. Economic growth also lagged behind the all-India average during the 1990s, with the interior lagging further behind the coastal districts.

Table 4.16: Poverty Headcount Index in Regions of Orissa, by Social Group, 1999–2000

Region	Rural				Urban			
	Scheduled tribes	Scheduled castes	Other	All	Scheduled tribes	Scheduled castes	Other	All
Coastal	66.6	42.2	24.3	31.7	63.5	75.7	34.3	41
Southern	92.4	88.9	77.7	87.1	72.3	85.0	24.6	43
Northern	61.7	57.2	34.7	49.8	54.4	63.1	37.8	46
Orissa	73.1	52.3	33.3	48.0	59.4	72.0	34.2	43

Source: National Sample Survey Data, as calculated by A. Dubey and referenced in De Haan (2005) (Cited in World Bank, 2006)

On indicators of human development too, most of the districts in Southern Orissa fared poorly on the HDI as of 2001. The districts in the North and North-east, which are rich in mineral resources, tended to have relatively high per-capita income, but performed a little below the Coastal districts in HDI. However, most coastal districts performed well on human development indicators.

Between 1993-94 and 2004-05 however, poverty rates in Orissa declined marginally from 49 percent to 47 percent (for the latest poverty estimates and details of its estimation, see Government of India Press Information Bureau: <http://planningcommission.nic.in/news/prmar07.pdf>). Poverty estimates based on a

uniform recall period suggest that poverty rates have fallen from 36 percent in 1993-94 to 27.5 in 2004) The latest NSS data (2004-05) also suggested that real per capita expenditure in the Southern Region increased between 2000 and 2005, closing to a certain extent the gap with the coastal regions.

Proposed project sites: In Orissa, the project team has proposed that pilot initiatives focus on the Bhitarkanika sanctuary in the coastal district of Kendrapara and the Chilika Lake bordering the coastal districts of Puri, Khorda and Ganjam. Both are wetlands designated as Ramsar sites.

Bhitarkanika is the second largest mangrove forest in the country, next only to the Sunderbans of West Bengal. The sanctuary spreads over 650 square kilometers with a forest cover of 380 square kilometers, of which mangroves cover 115 square kilometers. The mangrove habitat acts as a nursery ground for many fish and shellfish species of commercial importance. A range of port developments are taking place here, potentially threatening the fragile ecosystem. In addition, there is rising competition between local people's natural resource dependent livelihood needs and major economic growth initiatives.

Chilika is a large coastal lagoon spread over approximately 800 square kilometers. It covers around 132 fishing villages with nearly 125,000 fisherfolk depending on it for their livelihood (DoF, 2002). In 2001, Orissa was estimated to have a total of 589 marine and 3289 inland fishing villages (Source: Handbook on Fisheries Statistics (2000-1). It also serves as habitat for millions of migratory and shore birds and marine, brackish and freshwater species. The lagoon area however has been shrinking over time from 824 square kilometers in 1972-73 to 790 square kilometers in 2001 and salinity levels have increased with weeds and aquaculture activities.

Poverty profile: The district level findings using the six indicators described in the methodology corroborate with those in the literature i.e. coastal districts in Orissa tend to do much better than their inland counterparts. Table 4.17 summarizes the district level data for Orissa on our chosen six indicators.

Table 4.17: District level data on poverty for six indicators

	HCR	% of hungry households	IMR	% of children getting complete immunization	Literacy rate	Gross Enrollment ratio (elementary)
Worst quartile	65.5-80.1	18.6-24.8	117-125	28.1-48.1	31.3-43.5	9.7-32.3
State Average	49.0	7.9	100	59.5	60.7	85.9
Coastal Districts' Average	33.8	4.4	92	55.0	70.7	80.1
Non- Coastal Districts' Average	54.5	9.2	103	61.1	57.1	88.1

Source: Debroy and Bhandari (2003)

On average, coastal districts performed better on most indicators except two – the percentage of children getting complete immunization and the gross enrollment ratio. Five of the seven coastal districts (Baleshwar, Bhadrak, Kendrapara, Jagatsinghapur and Ganjam) scored lower than the state average on the immunization indicator, Ganjam even falling in the lowest quartile with a proportion of only 37.5 percent children immunized. Of these, Kendrapara, Jagatsinghapur and Ganjam also did worse than the state average enrollment ratio. The worst off district however seemed to be Jagatsinghapur which in addition to

low enrollment and immunization ratios; also recorded relatively high levels of hunger (10.9 percent compared to the state average of 7.9 percent).

At the block level too, six of the seven districts featured coastal blocks that ranked in the bottom 33% on at least 5 of our selected 12 indicators from the census data (table 4.18). The Bhitarkanika sanctuary for instance fell in one such block – Rajnagar in Kendrapara. Chilika on the other hand is bordered by blocks like Balugaon in Khorda and Rambha and Khalikote in Ganjam, which were also classified poor by this method. No coastal block in Jagatsinghapur by contrast ranked poor by this criterion, implying that poverty in the district was mainly concentrated in the inland blocks.

Table 4.18: Pockets of Poverty in Coastal districts in Orissa

District	Poor blocks (poor on x of the 12 indicators)
Baleswar	Singla (5), Basta (5)
Bhadrak	Bansada (5), Naikanidhi (6), Basudebpur (5)
Kendrapara	Rajkanika (5), Rajnagar (6)
Khorda	Balugaon (5)
Puri	Bhramagiri (5), Krushna Prasad (5)
Ganjam	Khalikote (6), Rambha (7), Chhatrapur (5), Golanthara (7)

Source: Census (2001) and author calculations

West Bengal

West Bengal is one of India's most densely populated states with nearly 82 million residents or about 7.8 percent of India's total population (Source: Census 2001). The state ranked behind only Gujarat and Karnataka among the major Indian states on growth recorded in GSDP in the 1990s. Although poverty declined significantly during this period, it declined less rapidly than in the rest of the country as a whole, despite this being a period of very high economic growth.

Three of West Bengal's 18 districts lie along the coast. They include the North and South 24 Parganas and Medinipur. Per capita income levels in all three ranked below the average for West Bengal, which was estimated to be approximately Rs. 16000 in 2000-01 (in 1993-94 prices). Of the three, South 24 Parganas fared the worst ranking 14 among the 18 states on per capita income. The district also ranked 14 on rural monthly per capita consumption in the year 2000 (Chaudhuri et al 2003, using NSS data, 55th round, 1999-00). Further, only half of the fully covered habitations in the district had access to drinking water in 2001 – far lower than the state average of 83.2 percent. On most indicators of human development however (HDI, literacy, gender development index etc), the three districts mirrored the state averages at the turn of the century (DPD, West Bengal 2004).

Proposed project sites: In West Bengal, two pilot investments are contemplated: (a) integrated restoration of Digha Beach in the district of Medinipur, and (b) improved livelihoods on a select number of islands such as the Sagar island in the Sundarbans, combined with medium- to long-term Sundarban coastal zone ecosystem studies that would lay the foundations for a future strategic state program. This would include support to developing medium and small-scale coastal tourism facilities and networks, with linkages to improve the economic earning opportunities of the poor.

The Sundarbans is located at the mouth of the Bay of Bengal, in the South 24 Parganas. It is the largest mangrove forest in the world spread over nearly 10,000 square kilometers, 4264 square kilometers of which

lies in West Bengal (the remaining area falls under Bangladesh). While the forests act as natural fish nurseries, they also house a large diversity of flora and fauna systems, including many endangered species such as the Royal Bengal tiger and the Gangetic dolphin. The human settlements in the Sundarbans are protected by embankments which are known to collapse given frequent tides in the region. Infrastructure is poor with only 42 km of railway line and around 300 km of metalled roads, half of which is inaccessible in the monsoons (DPD, West Bengal 2004). It is estimated that three in every four villages in Sundarbans has no access to electricity. Basic health services, while available, are considered to be of poor quality (ADB 2003).

The population in Sundarbans is heterogeneous with a mix of migrants from the East. In 2001, the Sundarbans were estimated to house 3.8 million people across 19 administrative blocks with an average household size of 7 persons. Studies estimate that the population in Sundarbans will increase to about 4.5 million people by 2012. Population pressures have reduced the per capita availability of land in the region. Further, only two-fifth of the agricultural land is multi-cropped. While 85 percent of the population depends on agriculture, it only absorbs 10-12 percent of the labor supply, leading to serious underemployment. Most inhabitants therefore (about 2 million) depend on natural resources for a living. Activities like shrimp farming post larva provide extra cash income and earn about five times more revenue per capita than rice farming. Most households therefore send their women and children to work in pisciculture that includes activities like water shrimp farming and cultivating prawn seeds with adverse ecological effects. It is estimated that about 171 villages of the Sundarbans have fishing as their predominant livelihood. Most fishermen and fisherwomen are SCs/STs, live below the official poverty line, with few working alternatives in the off-season. Much of the fishing is done on a small scale, by poor fisherfolk. Furthermore, since the work requires standing in water for several hours at end, skin diseases risks of bites and other health hazards are common. Prior research work on the Sundarbans estimates poverty levels to be around 40 percent of the population. The quality of housing too is generally considered poor. Ninety percent of houses are non-permanent, kutcha type and vulnerable to natural disasters (ADB 2003).

Given the extent of dependence of the population on natural resources, future activities in the Sundarbans would need to maintain a balance between enhancing development, while not threatening the ecosystem which is already at threat from overexploitation of marine resources and activities like eco-tourism and offshore drilling for oil in the region.

Sagar Island is an island in the Sundarbans, located in its extreme south. It is the largest island of the Bay of Bengal and is estimated to have 44 villages with a total population of approximately 155,000 people and an average family size of 7-8 members (Mondal 2003). Gangasagar, the largest village in Sagar (Saha 1999), is a center for Hindu pilgrimage as it is the point at which the Ganges, a holy river in Hindu mythology, meets the sea. Each year, on the day when the Ganges is believed to have come to the island, Gangasagar hosts a mela (large fair). The fair is visited by Hindu pilgrims from all over India who assemble on the island to take a bath in the holy river which is said to rid them of all their sins. While this makes Gangasagar a center for tourism (albeit for only a few days during the year), a majority of households in Sagar island as a whole (about 94 %) remain engaged in agriculture as farmers or agricultural laborers. Only a minority is engaged in the pursuit of non-agricultural activities like trade and business (Mondal 2003).

Poverty profile: Except for the gross enrollment ratio, coastal districts in West Bengal did better than inland ones on all other Debroy and Bhandari (2003) indicators (Table 4.19). Among coastal districts however, the

South 24 Parganas (Sagar Island, Sundarbans) and Medinipur (Digha Shankarpur) emerged relatively poorer than the North 24 Parganas. The South 24 Parganas had more households hungry compared to the state average (13.7 percent compared to 9.7 percent) and Medinipur did worse than the state average on health indicators. Poverty headcounts in both districts while better than the state average, were worse compared to the other coastal district i.e. North 24 Parganas. Medinipur has a head count ratio of 23.8 percent and South 24 Parganas had an HCR of 24.9 percent. In contrast, only 13.8 percent of the population in the North 24 Parganas was below the poverty line in 1999-00.

Table 4.19: District level data on poverty for six indicators

	HCR	% of hungry households	IMR	% of children getting complete immunization	Literacy rate	Gross Enrollment ratio (elementary)
Worst quartile	51.1-66.7	17.3-21.9	58-62	28.5-42.1	48.6-56.8	63.9-72.9
State Average	31.7	9.7	56	53.3	66.7	84.9
Coastal Districts' Average	20.8	7.9	51	57.0	74.6	82.1
Non- Coastal Districts' Average	33.9	10.1	57	52.5	65.1	85.5

Source: Debroy and Bhandari (2003)

Table 4.20 lists the relatively poorer coastal blocks in the three districts. It is imperative to note here that SCs who are known to be poorer on most indicators, comprise nearly 40 percent of the population in the Sundarbans and are concentrated in the Kultali and Basanti blocks. STs which comprise 7 percent of the population are concentrated in Sandeshkhali

Table 4.20: Pockets of Poverty in Coastal districts in West Bengal

District	Poor blocks (poor on x of the 12 indicators)
North 24 Parganas	Sandeskhali-II (7)
Medinipur	Khejuri-II (5)
South 24 Parganas	Canning-II (6), Kulpi (5), Jaynagar-I (5), Kultali (5), Basanti (6), Sagar (5)

Source: Census (2001) and author calculations

4.6 Gender Issues in the Coastal Areas

Prior research indicates that women play important roles in the use, traditional management and conservation of coastal zones. Around 80 percent of women in the working age group in coastal communities in India are engaged in small-time, retail fishing and similar vocations. Yet they exercise little control over household resources (MSSRF 1999) and face considerable occupational health hazards (gynecological and skin diseases, snake and shark bites to name a few). Moreover, a woman's stepping out to work to undertake a 'polluting' activity like fishing, is often perceived as an indicator of her low status and poverty, inviting much social derision from her community (Rubinoff 1999). It has been recognized therefore that any ecosystem conservation or livelihood initiative developed as part of the ICZM project should address and integrate such gender issues and inequalities.

Mainstreaming gender equity and empowerment is already a focus area in the ICZM project preparation. Based on borrower commitment, pilot investments have been identified in the three states and activities are being integrated under each proposed investment to address women's needs. For instance, among the priority investments contemplated in West Bengal and Orissa, efforts are being made to advance opportunities for fisherwomen to market their wares (raw fish, more value added products like fish pickles or traditional handicrafts) in areas where relevant forward linkages for marketing exist. In another priority investment in West Bengal, which intends to improve the income of the local fisherpersons by upgrading a fish auction centre so as to enable benchmarking the fish products at international standards, prominent spaces will be allocated to fisher women and fisherwomen groups. In Gujarat, a number of women-led community based organizations will undertake and manage investments on redevelopment and conservation of mangroves along the Gulf of Kutch. Similar implementation arrangements are under discussion for regeneration of mangroves in Orissa and West Bengal. Further, in each of the states, where the Bank will finance preparation of integrated coastal zone management plans, women stakeholders will be involved in the planning and decision-making processes as distinct stakeholder groups.

In addition to the above project activities, the Bank task team is also conducting in-house analysis of existing data sets (National Sample Survey 2004-05; National Family and Health Survey 2005-06) to develop a comprehensive profile of employment, and human development outcomes for women in the three pilot states. Findings from the profile, including on indicators such as women's employment, their education and aspirations for work are expected to influence the implementation of priority investments further.

Finally and as indicated earlier, project preparation has already mainstreamed a few "gendered" actions. For instance, the proposal to reserve spaces for fisherwomen in improved markets and fish auction centers in West Bengal was borne out of the reported obstacles they face to sell their produce (Consultation with NGOs working in the area reveal how the best located shops are usually usurped by men or wives of those in dominant positions).

However, occupational hazards are larger than these known set of occupation barriers, and may differ from one context to another and from one occupation to another. A more rigorous evaluation is needed if additional actions are to be taken during project implementation.

The Bank is undertaking additional research to fill this gap. The research program called "*Women at Sea: Augmenting Gender Focus in Coastal Zone Management in India*" will help identify livelihood challenges and opportunities for further empowerment of women that can be addressed during the implementation of the proposed ICZM project. In particular, the program will have the following three components:

- (1) A study on the occupational hazards women face while working in the fishing sector or as agricultural piece rate workers and how these can be addressed;
- (2) A study on changes in household dynamics due to shift in occupational patterns among men in fishing communities and its implications for participation of women in the decision-making and management of the project; and
- (3) An age-skill enterprise study on women in coastal communities in the Gulf of Kachchh to gather evidence on how women from different age-cohorts can be targeted to create a pool of potential leaders who can take project interventions (e.g. mangrove plantations) forward even after the project draws to a close.

Findings from the three components are expected to help address gender inequalities in coastal communities at all phases of the project, specifically at the time of implementation and community engagement.

4.7 Coast Based Economic Activities

4.7.1 Coastal Areas in India

The coastal environment of India plays a critical role in the economy of the nation by virtue of its diverse resources and ecosystems such as sand dunes, mangroves, coral reefs, salt marshes, estuaries, lagoons, etc. The coastal ecosystem that occupies only a marginal portion of the country's territory is home to a disproportionately large section of the population. Settlements of nearly 10 million fisher folk are concentrated in these areas, as they mainly depend on coastal resources and the sea for their survival. Fisheries in the Indian marine environment comprise 15 pelagic and the same number of demersal fisheries. India is a major seafood exporting country. The annual export of fisheries is 0.4 million tonnes (mt) worth Rs 47,000 million (Pandian, 1999). Marine fishery exports in 2000 were 421,075 metric tonnes valued at Rs 63,965 million. The Indian marine production increased from 0.534 mt in 1950-51 to 2.576 mt in 1992-93. However, the growth of Indian marine fisheries has become sluggish in recent years (Acharya and Thakur, 1999) and reached a plateau at around 2.8 million tonnes by 1995-96 (MoA, 1996). While the inland sector contributed increasingly (6.2% annually since 1980-81) to the growth of fish production in India (5.21% annually since 1980-81), the growth in marine food production decreased to 2.5 % during 1990-99 from 3.73 % during 1980-90 (Krishnan Birthal, Pounusamy et al-2000). The potential harvestable yield of marine fish stock in the Indian EEZ is estimated to be 3.9 million tonnes (Devaraj and Vivekanandan, 1999; Somvanshi, 1999). About 1 million people in 3651 villages of India situated along the coast are employed in marine capture fisheries. Indian fishery also supports several ancillary activities such as boat building, processing plants, retail trades, etc. All these features make this an important sector from both, the economic and the social viewpoint. It is not only the aesthetic value that this ecosystem has to offer which drives people to crowd themselves in these narrow stretches, but the extremely productive lands, both primary production and the major spawning grounds and fish nurseries.

Right from the early days, the Indian Coastal Zone had been important foci of one or other type of investment and development, like shipping, surface transport, fisheries, agriculture, aqua-culture, mining, recreation and shore protection for enabling better livelihood and wellness of members of the immediate community. Even after independence, this investment and 'development' model of the coastal land continued to reign in the minds of visualizers and designers of projects in the state governments, who did not take cognizance of the response of the natural and/or physical system at the site and environs of investments /projects. India's coastal resource complexes were traditionally characterized by a continuum of 'common property resources' or 'commons' that stretched from the shores to the seas. The continuum aided the existence of sustainable livelihood systems for local communities.

4.7.2 The Gujarat Coast

About 549 villages with the total population of more than one million are situated along the Gujarat coast. Totally 12 districts have coastal border in varying lengths. There are 35 Talukas whose part of the land touches the seawater. This coast yields the highest fish catch in the country. Gulf of Katchch is designated as the National Marine Park and Sanctuary. The coast is also known for its mineral resources and oil

terminals. Gujarat has emerged as the biggest producer of marine fish in India by contributing more than one-fifth of the national marine fish production. Presently, the total marine catch exceeds 70,000 tonnes. The state also accounts for over two-thirds of the salt production of the country. In addition, a significant number of cattle herd owner, some of whom are nomadic, also depend on the coastal resources, the coastal pastures and mangroves in particular. A large number of other marginalized communities also depend on coastal resources such as the common lands along the coast. The livelihoods of the marginalized communities in these coastal regions are dependent on the ecological resources.

The coastal area has attracted many industrial investments like salt pans, mineral industries, cement and soda ash industries etc. Gujarat has about 90% of the country's salt production, 70% of the soda ash production and a high fish harvest. A very large percentage of oil import also is attracted through Gujarat ports. Gujarat is one of the most industrialized states in India. The major industries located in the coastal regions include cement, chemicals, petroleum and oil refineries, ship breaking industries, power plants, fertilizer, fishing etc. Some of the major refineries are established on coastline of Gulf of Kachchh because of several ports and jetties those have been constructed on the coastline of Gujarat. The coastline is a perennial source of recreational activities.

4.7.3 The Orissa Coast

Marine fishery in Orissa is one of the important resources, which contribute significantly the sustenance of more than 0.5 million-fisherman populations living in 329 fishing villages. While the continental shelf along the Orissa encompasses an area of 24,000 km² up to 200m depth, fishing is mostly confined to 0 – 50m depth with an area of 15,470 km². The Maximum sustainable yield is 1.6 MT and the capture varied from 1.1 to 1.2 MT in the years 2001-2005. There are about 62 fish landing centers along the coast. The marine fish catch in the state has shown remarkable variability during the period 1985 to 2001. The fish catch has shown a steady enhancement from 1985 onwards to reach the peak during 1997-1998 (156.081 tonnes). It is well known that tropical coastal cyclones and floods create turbulence and high turbidity in the shallow coastal waters and affect the behaviour of fish and their availability to fishing gear, resulting in great variation in catch. It has been reported that for quite a few days after October 29, 1999 Super Cyclone of Orissa, shrimp catches were good (500 Kg/day by a trawler) in Chilika and later declined to 250 Kg/day. Except for such sporadic events it is difficult to establish relationship between environmental changes and fish catch variability along Orissa coast.

Orissa occupies fourth place in brackish water shrimp farming, area wise and third in production wise, amongst the coastal states of the country. As per the CRZ Notification, 1991, brackish water shrimp culture is not permitted in Chilika lagoon, mangrove habitat, wildlife sanctuaries, National Parks, Sea Turtle (Olive Riddley) nesting grounds and other eco-sensitive coastal areas. The shrimp culture adopted by the farmers in Orissa ranges from traditional to improved traditional within CRZ and modified extensive shrimp aquaculture outside the CRZ. Among seven coastal districts, modified extensive shrimp culture is practiced in Balasore and Bhadrak districts mostly outside the CRZ, where as four coastal districts namely, Kenderapara, Jagatsingpur, Puri and Ganjam account for 88.76% of traditional/improved traditional shrimp farming within CRZ.

Coastal tourism is an important economic sector of Orissa. Majority of the coastal cities like Chilika, Puri, Konark and Gopalpur are tourist attractions in the coastal area. Orissa coast is also known for mineral resources. Indian Rare Earths Ltd. has its unit at Chatrapur in Ganjam district. Paradweep port is the only

port in Orissa. Mainly mineral resources are exported from this port. Paradweep has developed into a port town with a number of industrial investments in the area.

4.7.4 The West Bengal Coast

The coastal zone of West Bengal supports about two third of the population particularly within the central and western sector. Since the eastern coast is almost mangrove forest , population is very less in this area. The total population in the coastal zone will be around 4 millions of which more than 50% belongs to scheduled caste and scheduled tribe. The area in the central section is the most populated area which includes series of townships from the mouth of river Hoogly to the Kulpi town. Haldia is one of the rapidly developing industrial towns in the coastal area of the State. The western sector consists of coastal plains with the major activity of tourism. Aquaculture along with agriculture is the predominant activity in the entire coastal area.

Agriculture land along West Bengal coast is available over 405,000 ha, out of which 33,000 ha have been utilized so far. It is a predominant activity in the western sector. In the eastern sector, the reclaimed lands are now supporting single-crop agriculture with low productivity. Irrigation is a problem due to highly saline creek waters. Some winter irrigation is carried out by storing rainwater in shallow channels. Water melons and green chillies are good winter crops in the eastern zone. Coconuts plantations have been raised throughout the reclaimed inter tidal zones of the Sundarbans as well as on the Digha coastal plain. Fishing and aquaculture marks another major activity in the entire West Bengal Coast. About 35000 ha of coastal area have been used for aquaculture purpose in the State. The innumerable ponds and lakes dotted along the coastal area also act as a hub for fishing activities. In West Bengal, there are 200 semi-intensive and intensive aquaculture farms which are using chemicals, fertilizers and ground water. Coastal capture fishing in West Bengal is traditionally carried out without any systematically managed fishery practices. There is a fishing harbour at Sankarpur on the eastern side of the Subarnarekha river. The tiger prawn seed collection from Sundarban has been recorded as 540 million per year. In the eastern sector, collection of post-larval tiger prawns is a family occupation for 40,000 people, contributing an estimated 540 million post-larvae prawn per year. Other economic activities in coastal land include honey collection, wood cutting, etc. 500 quintals of honey and 30 quintals of wax are being collected every year by people. Salt pan activity in Dadnapatra area is traditionally carried out in an area of over 2861 ha. Brickfields are also mushrooming along the river and backwater courses.

Tourism is another major activity in the coastal area of the State. The serene beaches of Digha, Sankarpur, Bakkhali etc, and the lush and vast span of mangrove vegetation with the highest order predator presence makes the area attractive to tourists since time immemorial. The Lothian Island Sanctuary (Bhagatpur Crocodile farm) attracts around 30,000 tourists while Sundarban Tiger Reserve gets about 50,000 tourists per year. Digha beach alone attracts around 1.5 lakh tourists per year. The Sagar Island in the Sundarban region is a well known pilgrim centre too (Kapilmuni temple). Every year roughly one million people visit this coastal temple. Thousands of people are visiting the Sundarban Tiger Reserve and associated wildlife sanctuaries every year.

CHAPTER 5

SUMMARY OF STAKEHOLDER CONSULTATION

The subsequent sections of the chapter outline the various consultations processes undertaken before suitable additions / amendments may be made taking into account the new challenges likely to arise due to the growing pressure of population on the coastal resources and biodiversity. These involve consultations undertaken at the policy level by MoEF and other formulated committees, consultations for the Draft CMZ Notification 2008 by various NGO's / stakeholders and MoEF & its appointed organizations. The key findings / concerns raised by the stakeholders during various consultations are elaborated.

The latter sections of the chapter summarize the consultations conducted in the three pilot states of priority investment i.e. Gujarat, Orissa and West Bengal during the Environmental and Social Assessment Study for the project.

5.1 Consultations undertaken for revision of CRZ and formulation of CMZ Policy – Swaminathan Committee

The report of M. S. Swaminathan committee stated that the guidelines for integrated coastal zone management plan proposed by them were evolved from widespread consultations with various stakeholders and in-depth discussions. However, the details of consultations were not provided in the report except the suggestions by NGOs. The suggestions are:

- Most of the NGOs are of the opinion that the CRZ Notification has been relaxed time and again. They have raised the issue with the Ministry stating that the CRZ Notification has been amended about 17 times and in each amendment relaxations have been made for taking up developmental activities which are contrary to the principle of Environment (Protection) Act, 1986 and the objective of the CRZ Notification.
- The NGOs have indicated that stringent enforcement mechanism should be put in place for implementing the notification.
- The CZMPs should be prepared and put on the website and other public domain for transparency in implementing the notification.
- The livelihood security of the communities should be adequately addressed and the notification should be further strengthened by protecting the rights of the fishermen communities and other communities, who are dependent upon the coastal resources. For this purpose, the NGOs have indicated that the ocean part should be brought under the CRZ notification.
- The Coastal Zone Management Authorities have been highly ineffective in enforcing the Notification hence; the NGOs should be included in the Authority.

5.2 Consultations undertaken on draft CMZ notification & Hazard Line

After the issue of draft CMZ Notification in 2006, large scale consultations were carried out by the Ministry, NGOs appointed by MoEF and various other organizations.

5.2.1 Consultations conducted by MoEF

On 10th October 2008 under the Chairmanship of the Principal Secretary to the Prime Minister, Government of India, a meeting was convened to discuss issues concerning the Draft CMZ Notification 2008 with the Chief Secretaries of the coastal states and UTs.

The generic questions raised by the participants in the interaction meeting on the hazard line mapping is summarized in table 5.1.

Table 5.1: Generic questions raised by the participants in the interaction meeting on the hazard line mapping

S. No.	Query	Remarks
1.	At what level does flooding or erosion constitute a hazard?	This depends on the flooding frequency and the maximum water level obtained in all these years for the coast.
		A maximum of 5m contour could be a guideline as the maximum possible flooding
		We recommend adopting the hazard event with a 100 year frequency as the critical level following international practice.
2.	How would the hazard line be defined and communicated to the public?	At first - training will be given to the Government officials on the "Hazard Mapping" based on internationally accepted scientific principles
		The government officials must then educate the public on the importance of hazard mapping in local languages, including the electronic media
		The hazard line can be demarcated by constructing pillars/ bench marks along the hazard line
		Digital data must be made available with the local government to cross check the boundaries
3.	How would spatial variations be dealt with, in each of the Coastal Management Zones?	For example, in the Ecologically Sensitive Areas – there is no hazard line – the entire area must be protected in this category
4.	How would the contour maps for the State's coastline be made available?	Survey of India must provide this data. Alternately, photogrammetric, Total Station and LIDAR data can be used – although time consuming
5.	How long would it take to prepare the Hazard Line for the entire State?	Considering the proposed methodology, preparation of the Hazard Line would take no longer than one year for each coastal State
		This is subjected to availability of digital elevation map from the Survey of India.
		MoEF is already in discussion with the SOI to procure the digital elevation data for all the coastal states at the earliest
6.	Is the flood from the landward side considered in this methodology?	No, the methodology takes into account only the flood from the sea (maximum water level) including storm surges and unusual events such as tsunami
7.	Cadastral level maps are not available for many of the States. The time to prepare such maps would be much longer in order to have this information input for the Hazard Line. How can this problem be solved?	Cadastral level maps are not mandatory in order to prepare the hazard line. A high resolution satellite map would suffice for this purpose. Such digital maps provide very high quality and accurate digital information (up to individual dwelling level) which could then be correlated to the survey numbers, if necessary

S. No.	Query	Remarks
8.	What is the most optimal return interval for hazard mapping? Suggestions for 1 in 50 and lesser were given by some States/ Union Territories	Prof. Pethick described the following aspects as advantages in considering a 1 in 100 in year flood return interval
		Hazard mapping defines the potential for harm: using event return intervals
		Natural hazards (floods, cyclones, tsunami) increase in magnitude as they decrease in frequency
9.	What is flood return interval? What is the internationally accepted return interval?	The chances (probability) of a flood of a given magnitude occurring can be expressed as a return interval (e.g. highest flood expected in 100 years). A probability is e.g. 0.01 of a percentage: e.g., a 1% chance in any given year
		Internationally accepted standards is 1:100 flood return interval
10.	How will the Hazard Line determine the development potential of the coast?	The hazard line is an indication of the vulnerability of the coast based on scientific studies
		Development which is permissible in certain sections within the CMZs will be determined by the Integrated Coastal Zone Management Plan considering the key scientific and social issues.
		Thus, the preparation of the hazard line is the foundation to the preparation of the ICZM Plan

A summary of the concerns raised on the draft CMZ notification during the interaction meeting by the participants is given in table 5.2.

Table 5.2: Summary of the concerns raised

S. No.	Query/ Suggestion	Remarks
1.	The draft notification does not clearly specify Development and No-Development Zones – providing an illusion of development in all the zones	The notification stresses the need for balanced development and environment protection – within the purview of the ICZM Plan as deemed appropriate by the Coastal States in consultation with the Central Government
2.	How can development in Ecologically Sensitive Areas be permitted (as given in the notification)?	Development is strictly prohibited in the ESAs. However, minor infrastructure facilities for local population (e.g. hospital, bridge etc) can be considered based on the recommendations of the ICZM Plan for a particular State/ UT
3.	When an area designated as CMZ II also contains ESAs, how would the notification characterize this zone?	The area will be considered as CMZ I although it is within the CMZ II area since the annexure clearly provide details of the ESAs that need to be considered under CMZ I
4.	Once the hazard line is mapped, would the fishermen and local communities be asked to relocate?	Clearly, the answer is “No” – the hazard line is to inform the public on the vulnerable zones that they are living in. Neither the fishermen nor the local population will be affected in any way.
5.	The CRZ Notification considered the area between the Low Tide Line and the High Tide Line as a No-Development Zone – while the new draft notification does not prescribe any such rigidity in order to preserve the ecology of the coast	The ESAs and ICZM Plan will address the ecological sensitivity of each of the CMZ categories

As a follow up to the above interaction meeting, it was suggested that state level meetings bodies need to be conducted in all coastal states. The Ministry of Environment and Forests, (MoEF), Government of India, has nominated the Institute for Ocean Management (IOM), Anna University Chennai to conduct Interaction Workshops in all the coastal states and Union Territories of India and a National Meeting in New Delhi.

Interaction Meetings with the senior representatives of eight State Governments and Union Territories was organized from November 20 to December 2, 2008. The details of the programmes are shown in table 5.3.

Table 5.3: Details of Interaction Meetings with the senior representatives of eight State Governments and Union Territories

S. No.	Date/ Time	State/ Union Territory	Venue
1	20 November 2008	Gujarat	Cambay Spa and Resort, Ahmedabad
2	21 November 2008	Maharashtra	Maharashtra Pollution Control Board, Mantralaya, Mumbai
3	22 November 2008	Goa	International Centre, Dona Paula
4	24 November 2008	Kerala	Kerala State Science and Technology Centre, Tiruvananthapuram
5	27 November 2008	West Bengal	West Bengal Pollution Control Board, Kolkata
6	28 November 2008	Andhra Pradesh	Andhra Pradesh Pollution Control Board, Hyderabad
7	29 November 2008	Karnataka	Karnataka State Environment Department, Bangalore
8	02 December 2008	Tamil Nadu and Pondicherry	Hotel GRT Grand Days, Chennai

The queries raised by various state officials and the responses provide by the MoEF are detailed in subsequent sub sections.

5.2.2 Consultations with the States

Gujarat

The reflections of the Gujarat state government on the hazard mapping is shown in table 5.4.

Table 5.4: Reflections of the Gujarat state government on the hazard mapping

S. No.	Queries/ Suggestions	Remarks/ Comments
1	At what level does flooding or erosion constitute a hazard?	Depends on the flooding frequency and the maximum water level obtained for the coast.
2	How would the hazard line be defined and communicated to the public?	At first - training will be given to the Government officials on the "Hazard mapping" based on internationally accepted scientific principles The government officials must educate the public on the importance of hazard mapping in local languages, including electronic media Digital data must be made available with the local government to crosscheck the boundary
3	How would spatial variations be dealt with, in each of the Coastal Management Zones?	Ecologically sensitive areas - no hazard line - must be protected over the entire area
4	How would the contour maps for the State's coastline be available?	Survey of India must provide this data

S. No.	Queries/ Suggestions	Remarks/ Comments
5	How long would it take to prepare the Hazard Line for the entire State	Considering the proposed methodology, preparation of the Hazard Line for every state's coastline would take no longer than one year
		This is subjected to availability of digital elevation map from the Survey of India.
		MoEF is already in discussion with the SOI to procure the digital elevation data for all the coastal states at the earliest
6	Is the flood from the landward side considered in this methodology?	No, the methodology takes into account only the flood from the sea (maximum water level) including storm surges and unusual events such as tsunami
7	Can the 5m contour be considered as a fool-proof line for vulnerability?	NO. It is an indication of the maximum flood level – and would be much lesser along the coast of India. The 5m contour is much higher than the 100 year flood and was only used to give a huge margin of error.
8	A uniform 3 - 5 m setback line could be proposed and could be made as a "thumb rule"	Scientific merit demands a thorough study to prepare the hazard line

Reflection of the state officials from Gujarat state on the draft CMZ notification is summarized in table 5.5

Table 5.5: Reflection of the state officials from Gujarat state on the draft CMZ notification

S. No.	Queries/ Suggestions	Remarks/ Comments
1	Gujarat has a few islands attached to its mainland - how would the hazard line be defined for these islands?	Will be included under CMZ IV and hazard line should be included in all CMZ IV areas in other words – just like everywhere else.
2	Knowledge of the local public must be incorporated in the preparation of the Coastal Management Plan	Crucial question. We recommend that ICZM Plans are prepared by the State, National Government only advises
3	State level institutions must be involved in the preparation of the Hazard/ setback line along with the Survey of India	Same as above
4	Concept of vulnerability line along with its implication needs to be further understood and deliberated for both ecological and economic aspects	A Vulnerability line does not exist. It is the hazard line
5	Public opinion on the setback line must be taken and local participation must be encouraged	
6	Estuaries, creeks and sandy coasts are more vulnerable than the rocky shores	NO coastal feature is vulnerable to storms/ floods etc since this is what forms coastal features

The representatives from the Government of Gujarat were extremely convinced with the proposed methodology for preparing the Hazard line, although their apprehensions with the draft notification still persists.

Maharashtra State

Reflections of the Government of Maharashtra on the Hazard Line are mentioned in table 5.6. and the reflections of the Government of Maharashtra on the Draft CMZ is given in table 5.7

Table 5.6: Reflections of the Government of Maharashtra on the Hazard Line

S. No.	Queries/ Suggestions	Remarks/ Comments
1	Has the case study been concentrated only on the Puri coast or has it been done for Maharashtra as well - due to great diversity in coastline	Case study - out of academic interest was carried out only for the Puri Coast. Hazard mapping for Chennai and Cuddalore coasts are currently being prepared. No case study for Maharashtra coast is available
2	The preparation of the hazard line involves many implications socially and economically, which could be different from state to state	ICZM Plan will determine these differences and the States will prepare these ICZM Plans
3	There seems to be inconsistency in the availability of various datasets required to prepare the hazard line - such as 10 year data for maximum water level, 16 years data for coastal erosion prediction etc. How can this difference in data acquiring affect the prediction for the future?	There is no interaction between flood and erosion predictions - so, there is no concern on this issue
4	Geomorphology has been neglected - which is an important criteria for the preparation of the hazard line - criteria for hazard line unable to comprehend	Geomorphology determines the flood level and erosion rate - but these two parameters are measured directly and not via the geomorphology
5	Training of State staff by IOM was requested for the preparation of the hazard line	IOM will consider based on reference from MoEF
6	For the return interval, it would be better to provide scenarios for 1 in 10, 20 50 and 100 years so that the State can decide on the optimal period for their coast	Will be prepared
7	Existing flood defense structures must be considered while demarcating the hazard line	Will be considered
8	Request to IOM was made for demarcation of hazard line for construction of a new airport in Mumbai	IOM will consider based on reference from MoEF
9	Cadastral level maps for the entire coast of Maharashtra is available on a 1:500 scale. How long would it take to complete the Hazard mapping under such circumstances?	Less than 1 year. In addition, satellite imageries on a fine scale are also available to speed up the process

Table 5.7: Reflections of the Government of Maharashtra on the Drfat CMZ

S. No.	Queries/ Suggestions	Remarks/ Comments
1	The CMZ notification has plenty of inconsistencies and needs to be resolved before implementation	The Director, Maharashtra State Environment Department, remarked that all the feedback on the notification has already been forwarded to the MoEF for consideration before implementing the CMZ.

Many questions and clarifications on the “hazard line” were posed to the expert members. At the end of the discussion, the Principal Secretary agreed that mapping the hazard line was crucial particularly for a State like Maharashtra. He wanted to have the hazard line mapped for the New Bombay coast where a Greenfield airport is proposed. Representatives of the various state governments were of the opinion that the methodology can be tested with a pilot study for which they would provide IOM with the necessary data (elevation and cadastral maps on a 1:4000 scale). However, the participants required a more detailed

discussion on the Coastal Management Zone draft notification, and wanted the MoEF to consider all the queries raised on behalf of the State Government of Maharashtra. The Adviser MoEF Dr. Nalini Bhat assured that all the concerns of the State Government would be considered before any action was taken on the notification.

Goa

Reflections of the Government of Goa on the Hazard Line are mentioned in table 5.8.

Table 5.8: Reflections of the Government of Goa on the Hazard Line

S. No.	Queries/ Suggestions	Remarks/ Comments
1	How soon can the hazard line be implemented?	2 years for the entire nation
2	How would the hazard line balance hazards of the coast with attraction of the coast	The categorization of CMZs will take care of this - CMZ I-ESAs, CMZ II-APC and CMZ III-un-developed areas
3	No problem of flooding due to presence of uplands - so no hazard. Does that mean the hazard line would be on the coast itself?	Yes -
4	Consider NIO as the lead organization for the preparation of the Hazard line for the state of Goa	Suggestion will be considered by the MoEF
5	In the preparation of the hazard line, too many lines have to be drawn on a single map - how can this be tackled?	Concept of a composite line (one single line) solves drawing many lines
6	Currently, huge developmental activities are taking place along the Goan coast - which will alter the coastal geomorphology? How can the hazard line be predicted under such constantly changing scenario?	Prediction through 10, 20, 50 and 100 year return interval. A roadmap of the State's proposed developmental activities is required in order to prepare an integrated coastal zone management plan
		Prof. Pethick mentioned that it is possible to change the vulnerability of manmade structures
		Changes in hazard line must be made constantly taking into consideration the current context
7	The Naval Hydrographic Charts are rather outdated. There is an urgent need to update the bathymetry data for the coast	Suggestion will be considered by the MoEF
8	Regarding the elevation data - there are plenty of possibilities for error when different institutions (other than the State's own institutions) carry out the task. Recommendation is to assign the task of preparing the elevation map to a local institution	Suggestion will be considered by the MoEF. Training will be given to the staff of the concerned local authorities to have a common standard methodology
9	Use of predicted data (for extreme water levels) would not give extreme events. How can the predicted data from tide gauges then be used in the preparation of the hazard line?	Predicted data cannot be used for the purpose of preparing the hazard line. Survey of India must provide tide gauge data for the entire coast
10	Archeological and historical data may be included in the hazard line preparation	Maybe true but not relevant to this work
11	Coastal landforms - must be considered while preparing the hazard line	Not necessary

S. No.	Queries/ Suggestions	Remarks/ Comments
12	Tide and surge data must be made available by SOI to the State Government in order to prepare the hazard line	MoEF is already in the process of procuring this data from SOI
13	Social aspects must be considered while preparing the hazard line - an this requires deliberation	Suggestion will be considered by the MoEF
14	How will the hazard line be marked on the ground? If by erecting stones or bench marks - which organization is responsible for this?	Ground control points will be available
15	How will a local Sarpanch locate such benchmarks?	DTM data must be made available in order to simplify this

Reflections of the Government of Goa on the Draft CMZ are given table 5.9.

Table 5.9: Reflections of the Government of Goa on the Draft CMZ

S. No.	Queries/ Suggestions	Remarks/ Comments
1	Development and reclamation activities are continuously ongoing in States of Gujarat and Maharashtra, with huge repercussions in the coastline of Goa	A suitable management plan/ tool to tackle this problem will be addressed at an appropriate time
2	The draft CMZ notification tends to be in favour of development - in the case of Goa - tourism infrastructure. This favours developers than conservation of the ecosystem	Not correct - the new CMZ notification have considered environmental protection and development
3	Would the concerns on legal aspects be taken care of in the draft notification?	Will be considered by MoEF in consultation with the Ministry of Law, as appropriate
4	According to the State's regional plan - ~40% of Goa's coastline is covered under the ESA. How would the notification cover the social issues under this context?	The ICZM Plan provides the State to decide on this issue
5	There are no suggestions/ recommendations in the draft notification for restoration of coastal dunes/ marshy areas in the ICZM Plan	Suggestions will be considered by the MoEF
6	Plan must include measures to restore areas polluted by industries	Suggestions will be considered by the MoEF

Representatives from the National Institute of Oceanography (NIO), Goa have conducted similar studies on preparation of a "vulnerability line" for the coast of Orissa. Dr. Sanil Kumar and Dr. Krishnan of NIO, who carried out the studies, were critical about the methodology adopted for the case study developed by IOM. After detailed deliberations and on clarifying the various queries, the scientists from NIO, Goa and the other representatives from the Government of Goa were convinced and uniformly agreed to adopt the methodology proposed for the preparation of the hazard line. Detailed discussions were held on the narrow "Hazard Zone" in Goa due to higher elevation. It was stressed that this does not necessarily transform into a "development Zone" on the coastline. Under such circumstances, ICZM Plan, to be prepared in consultation with the State Government would be key in determining the future development of this coastline. The Secretary, Department of Environment mentioned that the concerns on the Draft CMZ have been sent to the MoEF for consideration but their queries on the methodology have been sufficiently and satisfactorily clarified.

Kerala

Reflections of the Government of Kerala on the Hazard line are mentioned in table 5.10

Table 5.10: Reflections of the Government of Kerala on the Hazard line

S. No.	Queries/ Suggestions	Remarks/ Comments
1	In Kerala, there was a unanimous consensus on the methodology for the preparation of the hazard line. The primary concerns were regarding the CMZ	
2	Will be local self government be authorized by the ministry to prepare the hazard line?	Training of concerned State authorities will be considered once the methodology is frozen
3	How long would it take to map (hazard line) the entire coast of Kerala and then also prepare the ICZM Plan?	All depends on availability of data - when data is available - the time required to complete the task is a few months
4	There could be areas along the coastal zone, where the hazard line could be on the coast (zero) and there would then be no buffer zone for protection	Then ICZM Plan take over in such cases
5	If the coastline has a cliff - the hazard line is zero - are there any buffer zones in such cases?	The hazard line merely advises on the danger and risks to the coastal population. It is the ICZM Plan that decides on 'buffer zones'
6	The basic parameters used in the preparation of the hazard line must be "binding" to inland water bodies as well	Not necessary
7	Not many states have cadastral level maps - what are its implications on the hazard line mapping?	Not necessary since high resolution satellite imageries are a solution cadastral maps and are available digitally
8	What is the status of inland water bodies on the hazard line? What are the limits if the inland water body does not abut the sea coast	Surely it isn't the salinity that is important but the rise and fall of the tide. It is the limit of sea flooding that is the key (not tides).
9	Science of hazard line preparation is simple - but decision must be made on spatial scale data , which is not available on cadastral level - no tide data - no time interval	The entire procedure for the preparation of the hazard line is fairly simple - provided data are available
10	When a 100 year return interval is computed, there are many events happening in between - alternate erosion and accretion	The hazard line is valid only for a certain period of time - say 10 years. The State government has to review this periodically to take into consideration all the new changes along the coast
11	Kerala is concerned with seasonal erosion - so data availability would be crucial to delineate the "after 100 years" erosion rate. Without actual data - simple projections would be arbitrary	Actual/ observed data is mandatory
12	On a cadastral scale (1:4000) inaccuracies may happen:	Benchmarks are very accurate and hence this is not an issue. The concern is regarding the data of surge frequencies
	Where erosion and tide levels are different...	For primary data - one must use the flood height data from the Cochin Port. For other areas along the coast - secondary (minor) port situated every 10 km can be correlated.
13	Starting the whole exercise on a cadastral scale would take many years to complete the hazard mapping for Kerala	Use current elevation - follow procedures similar to coarser level mapping - extend it to cadastral level when required
		High resolution satellite imageries are available and marking the composite hazard line on this will suffice instead of preparing cadastral level maps
14	Physical visibility of the hazard line on ground marking needs to be mentioned	Suggestion will be considered by the MoEF

Reflections of the Government of Kerala on the Draft CMZ are summarized in table 5.11.

Table 5.11: Reflections of the Government of Kerala on the Draft CMZ

S. No.	Queries/ Suggestions	Remarks/ Comments
1.	Key coastal sectors such as the Fisheries and tourism have many apprehensions about the new draft notification	
2.	Suggestion was made to strengthen the local environment and forest ministry in Kerala	
3.	The senior officials of the Kerala government praised the MoEF towards this initiative of sending a team of experts to each state in order to clarify the methodology on the preparation of the hazard line and also to provide greater understanding of the draft notification	
4.	More such efforts were recommended	
5.	The basic understanding was - that the experts would clarify doubts on CMZ but the discussion has to be restricted to the methodology	
6.	What is the underlining objective of the MoEF with regard to this draft notification - open avenues for development or comitment towards conservation of ecosystems?	Response from Dr. Harpanahalli: Interest of the government (MoEF) is protection/ conservation of coastal resources balanced with development
7.	Suggestions given by one of the participants (Dr. Shastri) was to retain the 500m from HTL as a borderline and no development must be encouraged on the seaward side	The regulation of development is the responsibility of the ICZM Plan. The whole philosophy of the hazard line is that it is NOT regulatory but relies on management. We recommend management plans prepared by the State in consultation with local people.
8.	There were concerns about the regulatory aspects of the CMZ. When centralized - it is extremely rigid. The government of Kerala prefers:	
a)	local people and state government to decide on the management of their coasts	Suggestion will be considered by the MoEF
b)	decision on CMZ I, CMZ II and CMZ III must be taken in consultation with the local people	
c)	Plea to the central government to accord more powers to the State government	
9.	Panchayats- subjected to tidal action or backwaters in States such as Kerala. This is not included in the draft CMZ notification	
10.	The officials of the Government of Kerala pointed out a few "gross omissions" under CMZ III as follows:	
a)	In a State like Kerala - almost the entire coastal area will come under CMZ II because the population is >400 persons km-2 for the entire state's coastal area	Ministry may review this aspect based on new census data of >400 km2
b)	This results in the State losing all the facilities pertaining to CMZ III	
11.	In CMZ I - development can take place provided the Coastal management committee approves the development. Thus, protection is disregarded	The government works on public demands. Site specific or region specific issues cannot be generally addressed - however, any suggestions from the state government will be considered while finalizing the draft notification.

The officials of the Government of Kerala unanimously accepted the methodology proposed for the mapping of the hazard line, based on the presentation by Prof. John Pethick and Prof. Ramesh. They mentioned that

all their concerns on the scientific basis of hazard mapping were clarified and appreciated the efforts taken by the MoEF and the expert team towards this initiative. Summarizing the discussions, Dr. Harpanahalli, Director Environment, Southern Region, mentioned that the Ministry and the Government, takes decisions based on public demands. However, site specific/ region specific issues cannot be generally addressed unless exceptional. He also mentioned that the draft CMZ notification is subjected to criticisms and inaccuracies, which are to be modified before implementation.

West Bengal

The reflections of the Government of West Bengal on the Hazard line are given in table 5.12.

Table 5.12: Reflections of the Government of West Bengal on the Hazard line

Sl. No.	Queries/ Suggestions	Remarks/ Comments
1	The Ministry has based the science of mapping the hazard line on an "additive model"	This is not an additive model; it is based on probability theory and statistics. Weibull Distribution is based on Extreme value theory to assess risk for highly unusual events, such as 100-year floods
2	Flood defense is completely ignored	Not true
3	Although several parameters for delineation of Setback Line has been mentioned in Appendix-I, it has been clearly mentioned under Appendix-I that "further detailed Technical Guidelines for delineation of the Setback Line may be provided by the Central Government in the Ministry of Environment & Forests". But no technical guidelines has been issued so far by the ministry.	Ministry has developed new guidelines for preparing the hazard line. This will be disseminated to all the State Governments/ UTs after the National Workshop is held in February 2009
4	For West Bengal, the surge height is 6m. When the wave height and surge heights are added, the line becomes 100 - 200 km from the coast - covering vast areas under the No development zone - huge loss of economy	The maximum water level includes the wave and surge heights. Depending on the maximum observed data for 100 years, the hazard line will be drawn accordingly. It must be stressed that the hazard zone IS <u>NOT</u> A 'NO DEVELOPMENT ZONE'!
5	Sea Level Trend data shall be based on specific Regional Model	Long term sea level change data will be obtained from the Survey of India for any specific location. In addition, the IPCC's predicted SLR will be used
6	What should be Return period of Flood? 100 yrs or 25 years?	100 year return interval is international
7	What should be criteria for Hazard Line? In case of horizontal displacement , erosion & accretion should not be equated	The criteria include: erosion, flooding, elevation and sea level rise
8	Special mention about Sunderban must be given as in the CRZ notification	Suggestion will be given to MoEF
9	Construction of Roads/ infrastructure must be included based on recommendations of the ICZM Plan	
10	Accretion and erosion - both should not be equated	In Sagar Island, the hazard line will be on the embankment and parts of these are above 1m in a 100 year flood level. Otherwise the entire Sagar Island will be in the Hazard zone
11	Presence or construction of embankments along the coast should be considered as hazard line	
		Height of the embankment is already at a height of 5m - therefore no flooding
12	Any 'hazard line' drawn on an additive model of different parameters will go much inside inland and may eventually cover extensive areas of coastal zone bringing under 'No further Development'	See answer #4 above

Sl. No.	Queries/ Suggestions	Remarks/ Comments
13	Salinity is a major issue - entire area up to Navdeep will be covered by the hazard line	The hazard line is defined quite independently of salinity-changes up an estuary, creek or backwater. If the 100 year, sea-flood, water-level reaches a given point then this is the hazard line location – it doesn't matter where this is in relation to the coast, salinity, creek or any other factor.
14	Problems - once the hazard line is mapped, there are many loopholes - so CMZ is bound to be amended many times like CRZ	Prof. Pethick suggested that besides that besides the a) development zone and b) No development zone, a third zone c) Future development zone (or can be developed zone) must be introduced
15	Development must be allowed with caution. There is no need for a hazard line since HTL is already there	
16	Within the hazard line some development must be allowed	
17	Science is not going to rule - administration is!	
18	When prediction is made for a 100 year period, are we taking the historical data?	Observed data for over at least a 20 years period is taken and fitted into a log linear graph using Weibul/ Gumbell Distribution
19	Is the hazard line static or reviewed?	Must be reviewed periodically - each state has the responsibility to reverse the line once every 5 years and in 10 years a major review is required
20	Dhigga is located in the West Bengal-Orissa Border - with diverse geomorphological features. Thus not including geomorphology as a parameter is wrong. The geomorphology of the coast of Goa and West Bengal are not similar - there is an error in the methodology	No error in methodology. Geomorphology determines the flood level and erosion rate - but these two parameters are measured directly not via the geomorphology
21	The water quality in Haldia area is 5ppt. Big estuaries have significant dilution - during rainy season. How is the salinity criteria considered in hazard mapping?	In West Bengal, rains occur only in the month of May. In a low gradient delta, there is a gap between high and low tides. During high tide - the water from the Bay of Bengal enters the river and the vice versa during low tide. The Southern side of Diamond Harbour has a salinity between 4 and 5 ppt. Salinity is not a very relevant factor' – See remarks for Q 13
22	Should we have the same "hazard line" concept throughout the country without considering the geomorphology? Notification is silent on this aspect	No. See answer for Q. 21 above

The reflections of the Government of West Bengal on the Draft CMZ are mentioned in table 5.13

Table 5.13: Reflections of the Government of West Bengal on the Draft CMZ

S. No.	Queries/ Suggestions	Remarks/ Comments
1	No insurance available for the hazard area	All these concerns will be appropriately addressed by the Ministry
2	Is the CMZ - managing the coast with Participatory Approach to a blanket ban on development? There is a departure from Swaminathan's report	
3	For Defining Inland water bodies under CZM Notification:	
a)	Geomorphologic criterion like trumpet shaped estuary	
b)	Chemical criterion like salinity	
c)	Biological criteria like presence of Barnacles etc	
	Provisions in earlier CRZ Notification has been ignored	

S. No.	Queries/ Suggestions	Remarks/ Comments
4	It would be difficult to incorporate all individual development projects stretching over the entire area under the ICZMP for SBR and monitor individual cases based on the approved ICZMP by Central Government. Hence, the inhabited portion of Sundarban Biosphere Reserve (SBR), altogether 19 Comprehensive Development Blocks, should be kept outside the CMZ-I	
5	Entire Sundarban Biosphere Reserve should not be considered as CMZ-I	
a)	Reserve Forest Area under Mangroves should be CMZ-I	
b)	The inhabited portion should be considered as CMZ-II or CMZ-III depending on population density	
c)	Special mentioning about the SBR should be incorporated within Notification justifying special status	
6	Entire West Bengal Coast seems to be CMZ-II based on population density The earlier concept of management of APC based on Construction / Existence of Flood Defense Structure should be followed	
7	Extension of Coastal Boundary upto the boundary of Coastal Panchayats may be in contradiction with the Panchayati Raj System, since as per this notification, Integrated Plan for entire coast needs to be drawn up and then approved by MoEF in one shot and then to be implemented.	
8	The provision of "Designated Area for Tourism Industry" should be kept within the Notification itself especially under APC	
9	Notification has described that 'there shall be no restriction in the fishing and fisheries related activities of local communities living in the area' – Over fishing has become a problem in some of the areas and in certain cases 'Fishing Holiday' has been imposed by the State Government.	
10	Groundwater in coastal zone should be regarded as an important natural resource, which is missing	
11	Swaminathan Report wanted to consider it as a 'Social Resource	
12	The recommendations of the Swaminathan Report for ICZM and a less regulatory, more participatory approach are welcome	
13	A redefinition of the areas of the coast where development would put people and property at risk is proposed	
14	However, the present Notification seems to be prepared based on 'selective comments' of the report and thus not holistic in nature	
15	None of the ICZM Plan available for the country is in public domain	
16	IPCC Reports must not be ignored - 9 institutions in India work for the climate change report	
17	Maintenance of Sunderban and other embankments well above the flood line is essential	
18	Maintenance must be taken up by the government. Funding of 75% by the Government of India and 25% by the State government for maintenance is recommended	
19	Concerns from the Sunderban Biosphere Reserve are that - any development will have an effect on the mangroves. Therefore the Sunderban Biosphere Reserve must be given the authority and power.	

S. No.	Queries/ Suggestions	Remarks/ Comments
20	No mention on dredging of Ports/ harbours etc in the draft notification. Dredging and disposal of dredged material must be mentioned	
21	Concerns from the Tourism Department, WB: There are many hotels on the seaward side of the hazard line - do they have to be demolished?	All existing structure can be retained unless illegal (violation of the CRZ)
22	Can flood defense structures be constructed in designated tourism areas?	Yes, based on the recommendations of the Coastal Management Authority on the ICZM Plan
23	Flood defense has been omitted and thus creates a major problem for the Government of West Bengal	This concern will be addressed
24	The draft Notification, as a whole, failed to keep the expectation of conserving the coast and simultaneously economic development with a pragmatic approach	

The following suggestions were given by the Government of West Bengal to consider before implementing the notification:

1. Finalization of Technical Guidelines for the preparation of the hazard line
2. Pilot Studies & its impact
3. Nation-wide Discussion on Results of Pilot Studies
4. At least one Specific Study in East Coast
5. Incorporating appropriate safeguard measures within Notification
6. Is CMZ - Too hasty a decision?
7. A suggestion for Coastal Management and Regulation Zone (CM&RZ) has been proposed
8. If islands on the mainland is considered and if Sunderban is included under this - this would be a misfit because the geology and geomorphology is different
9. Pilot Study for West Bengal must be carried out
10. Ministry must get back to West Bengal with clarifications before implementing the notification
11. There should be no rush in implementing the CMZ notification

On providing appropriate clarifications, the officials of the State Government of West Bengal, agreed in principle to two major decisions – i) to change the nomenclature from “setback line” to a “hazard line” and ii) accepted the proposed methodology for the mapping of the hazard line. It was agreed upon to conduct a “Pilot Study” for West Bengal based on the proposed methodology. The officials of the State Government also requested the expert team to convey to the ministry to consult the WB State before finalizing the CMZ Notification. They also were of the view that there should be “NO RUSH” in implementing the CMZ because the contents of the notification are still largely inconclusive and non-descriptive at this stage.

Andhra Pradesh

The reflections of the Government of Andhra Pradesh on the Hazard line are given in table 5.14 and the reflections of the Government of Andhra Pradesh on the Draft CMZ are mentioned in table 5.15

Table 5.14: Reflections of the Government of Andhra Pradesh on the Hazard line

S. No.	Queries/ Suggestions	Remarks/ Comments
1	Erosion of Puri coast is a recent phenomenon. Has there been any previous study on this?	Erosion has noticed only in the recent times. Probable reasons could be the aftermath of the Indian Ocean tsunami
2	East and West Godavari Districts are very densely populated - many agricultural activities. A pilot study carried out for Andhra Pradesh would have given a better impression of the hazard mapping procedure	
3	If a development project is only for a period of 15 years - a 100 year hazard line would then be very restricting. Therefore a 20 or 50 year hazard line must be included	A 100 year surge might come even tomorrow - therefore 15/20 year timescale (return interval) is invalid - it is a question of probability
4	The notification was supposed to emphasize "participatory Management"- According to the Center for Environment Education - there is a strong ground swell against the notification	
a)	Should the MoEF continue with the discussion on the "hazard line"?	Yes, since it is a scientific basis for coastal management
b)	Strengthening of the CRZ would be a better management plan under current conditions'	

Table 5.15: Reflections of the Government of West Andhra Pradesh on the Draft CMZ

S. No.	Queries/ Suggestions	Remarks/ Comments
1	The draft notification does not recognize that the entire coast is ecologically sensitive	
2	There seems to be a paradigm shift from protection/ conservation to development	
3	Lack of monitoring mechanisms	
4	What is the role of Pollution Control Board in CMZ? Not given in the draft notification	
5	Need a total restructuring of the Environmental Impact Assessment	
6	Require a specific legislation for protection of marine ecology and ecosystems	
7	Developmental activities on the seaward side of the hazard line including seashore facilities - e.g. SEZ; what happens to the coastal ecology?	
8	In the No Development Zone - certain activities are permitted. What are they?	
9	What about water bodies which also serve as bird nesting sites - e.g. near Machilipattinam, MoEF has notified as CRZ I now. A Private entrepreneur has been given 1200 ha of land. In this, mangroves have been destroyed (70-8- ha); mudflats were not considered as biologically active sites.	
10	500 m from the HTL must be retained	
11	Need public demand on the notification	
12	Why should activities in CMZ I be permitted at all?	In order to provide basic facilities for the local people - based on the ICZM Plan

S. No.	Queries/ Suggestions	Remarks/ Comments
13	Notification must clearly specify the types of activities that may be permitted in CMZ I	
14	What about mangroves that are destroyed? Would they be included under CMZ I? Ambiguity must be removed.	Under the ESAs, areas which have been degraded/ destroyed - but have the potential for conservation/ regeneration of mangroves must be considered
15	In coastal lakes and rivers fishing activities are permitted - no culture fishing will be permitted - ambiguity exists	
16	Rephrasing of mangrove forests - instead of mangroves	
17	Request to include "Foresters" and Representatives from the State Government on the National Board of Sustainable Coastal Management	
18	In the new notification - all states/ UTs must be empowered financially and with manpower	
19	In Andhra Pradesh - coastal protection (structures) does not exist - would this be permitted in the future?	
20	The Ecologically Sensitive areas (ESAs) have already been approved by the Government of India. Now, under the CMZ I, there is a separate delineation for the ESAs - this might cause confusion	
21	In CMZ II the boundary of villages restricted to HTL - no provisions for accretions in the notification.	
a)	A classification is required in the notification	
b)	special activities in fisheries such as processing units etc were not permitted in the CRZ - but now permitted under CMZ - thus conservation is ignored	
c)	under such circumstances, input of hazardous wastes may be permitted due to this lacuna	
22	CMZ notification - does not have any provisions for regulations	

Summing up the interaction meeting, Mrs. Janaki Kondapi, I.A.S., Principal Secretary to Government, Government of Andhra Pradesh, thanked the MoEF for preparing the State Coastal Management Plan. She mentioned that various agencies have been involved for preparing the specific activities on the coast and a participatory approach will be followed. While designating CMZ-I, the MoEF and the National Committee must specify designated areas for defense, protection, conservation etc because the State Government might have developmental interest. Further, the role of states requires more clarity and focus with greater powers given to the State Government, which are implementable and not tossed back to the Central Government. Finally, the Principal Secretary mentioned that the State Government of Andhra Pradesh welcomes the 100-year return interval since it offers plenty of flexibility for planning development.

Karnataka

The reflections of the Government of Karnataka on the Hazard line are given in table 5.16 and the reflections of the Government of Karnataka on the Draft CMZ are given in table 5.17

Table 5.16: Reflections of the Government of West Bengal on the Hazard line

S. No.	Queries/ Suggestions	Remarks/ Comments
1	Flood level - is this the worst case scenario?	Yes
2	How was the prediction for 1 in 100 years made	Taken from maximum flood level - simple extrapolation of observed data
3	Flooding along the coast is usually from the land - and has nothing to do with the sea.	Wrong - flood level is flooding from the sea up to a maximum level inland
4	The Centre for Environment Education made public surveys and the questions on behalf of the people were the following: a. Vulnerability of the coast changes depending on the nature of the hazard - how can the hazard line be justified? b. Hazard line and ICZM Plan must go together - is this the case?	All types of coastal hazards - cyclones, storm surges etc., that occurred >20 years are included while marking the hazard line. Thus, this line is the maximum extent of inundation to a particular coast with respect to the different types of coastal hazards Preparing the hazard line is the foundation for the preparation of the ICZM Plan
5	What kind of developmental activities can take place once the hazard line is drawn?	Specified in the various annexures of the draft CZM notification
6	Public participation is a must before mapping the hazard line - nowhere in the notification there is a mention about this.	Suggestion will be considered by the MoEF
7	Hazard line must be presented to the public - as more awareness to the general public is essential	Suggestion will be considered by the MoEF
8	The institution that prepares the hazard line must also be given the responsibility of preparing the ICZM Plan	
9	For the preparation of the hazard line - a clear capacity building exercise (locally: state-wise) must be made	Training will be given to the state authorities for this purpose once the scientific methodology is accepted
10	Clear demarcation of the hazard line on the ground and its maintenance must be mentioned	
11	Cadastral maps are not available for Karnataka	Under such circumstances, high resolution satellite imageries could be used
12	Would the mindset of the people change if the nomenclature were to be changed from "setback line" to hazard line"? This is because hazard is often correlated to chemical or toxic inputs	There is a general consensus on rephrasing the setback line to hazard line since the line is an indication of potential damage or injury to people and property
13	A clause must be included in the notification that "no claims can be made if construction/ new development is made within the hazard line"	Suggestion will be considered by the MoEF
14	Common man does not want his rights to be restricted - therefore suitable defense mechanisms must be suggested for protection of his property	Suggestion will be considered by the MoEF

Table 5.17: Reflections of the Government of Karnataka on the Draft CMZ

S. No.	Queries/ Suggestions	Remarks/ Comments
1	More qualified statement on activities such as onshore storage facilities, fishery-related activities (details on which are permitted and not permitted) is essential	
2	Activities on the seaward side of the hazard line (upto 12 nM) must be clearly defined in the CMZ notification	
3	Mangroves are not delineated as Reserve Forests in the draft notification	But they are covered in the ESAs

S. No.	Queries/ Suggestions	Remarks/ Comments
4	Private lands with plantations and mangrove areas/ containing forests cannot be declared as Reserve Forest area	
5	The draft CMZ notification must be translated in the local language for circulation	Suggestion will be considered by the MoEF
6	According to the draft notification - already existing structures on the seaward side need not be disturbed. But can they make claims if there is a hazard?	The decision on this will be taken by MoEF in conjunction with the Ministry of Law
7	Plans are already prepared by the Town and Country Planning Department. Should there be differences between this and the hazard line - which would supercede? The notification is inconsistent on this	Depending on the vulnerability of the coast, the ICZM Plan would recommend which should supercede and where
8	In CMZ I - developmental activities are permitted - however there are other acts such as Tribal Act/ Wild Life Act/ Fisheries Act etc - would these acts supercede or is the Hazard line the final demarcation on the coast?	
9	State government wants institutionalization and strengthening of the State Coastal Management Authorities and Institutions	Suggestion will be considered by the MoEF

The Interaction Meeting at Bangalore concluded with a general agreement to the proposed methodology for “hazard line mapping”. The state government (like other states) wanted more powers to the State Coastal Management Authority and requested MoEF to take participatory approach before finalizing the draft CMZ notification. There was a general consensus on the need for implementation of ICZM Plan and along with the hazard line mapping for the maximum benefit of the new notification. The strong desire to conduct public consultations and creation of increased awareness on the hazard line in the local language was stressed by the officials of the Government of Karnataka.

Tamil Nadu and Puducherry

The reflections of the Governments of Tamil Nadu and Puducherry on the Hazard line are given in table 5.18.

Table 5.18: Reflections of the Governments of Tamil Nadu and Puducherry West Bengal on the Hazard line

Sl. No.	Queries/ Suggestions	Remarks/ Comments
1	Tectonic activity would alter the erosion and accretion of the coastline	Hazard line is not forever. Frequency of change is dependent on the activity on the coast
2	Geomorphological features are ignored - must be included to protect the coastal features	Hazard line is determined by the flood level and is measured directly not via coastal geomorphology
3	Government of Pondicherry: what is the average setback line for a coast?	There is no specific average hazard line for all the coasts - it is location specific
4	In the presence of a cliff - hazard line drawn?	The cliff becomes the "hazard line". If the cliff is eroding the erosion rate per year is calculated and is multiplied by 100 years
5	With the present methodology we assume that there will be a uniform (linear) erosion rate for the next 100 years. But the sand and clay areas are different and differs from east and west coast	

Sl. No.	Queries/ Suggestions	Remarks/ Comments
6	Also, is the methodology different for river and tidal areas?	The same methodology is followed if the river is tidal (connected to the sea). Parameters such as elevation and erosion line for 100 years will take care of this
7	Setback line or Hazard Line - there is a lot of difference. Where to draw the line so that development can take place. But once development is allowed beyond the hazard line, what happens to the coast is ignored	Ministry is not promoting any developmental activity by introducing the "hazard line". This is the most scientifically precise, internationally accepted methodology to progress on all fronts
8	There is no environmental plan	Environmental concerns exist - the Environmentally Sensitive Areas (ESAs) of the CMZ I is only concerned with environmental plan
9	What is the guarantee that industry does not pollute the coastal waters? Would there be another committee to take care of this?	
10	Environmentalists push the hazard line away from the coast while the developmentalists are pushing it towards the coast	The hazard line simply tells us where the dangers are - after this management takes over. The problems mentioned in this forum are with the notification not in the mapping
11	Hence, 500m from the HTL is the best - since it supports the environment	
12	Calculating this line involves 6 - 7 parameters. But numbers used in the calculations change minute by minute. What is the confidence limit or level of predicting the hazard line?	>95% is the confidence limits for the prediction of 1 in 100 year flood return interval. This is because only past data records (actual measurements) are taken for demarcating the hazard line. For example, to obtain the elevation - methods on spot height is important. Total station has an accuracy of 1mm, while the LIDAR has 10cm accuracy. So, the accuracy is rather dependent on the type of data available.
13	Whatever the line is proposed - the CMZ should have the following 4 parameters:	
	a. Which line would lead to minimum loss of flora and fauna habitat?	
	b. Minimum effect on stakeholders of the coast	Nowhere in the notification there is a mention that the fishermen will have to be relocated- but caution to the coastal community about hazards is necessary
	c. Minimum loss of coastal settlements, fishermen	
d. Minimum pollution of the coast	Once the hazard line has been mapped, infrastructure development (such as industries) will be governed by the ICZM Plan for the particular coast. So, the question of pollution will be taken care of in the ICZM plan and through EIA	
14	What is the target for demarcating the "hazard line"? Methods will have to be improved as this methodology cannot be assumed to be the final	This methodology is robust, scientifically precise and internationally followed for mapping the hazard line. This has also been accepted by all the officials of the coastal State Governments/ UTs who have tried and tested various other methods for mapping the hazard line and have not had much success.
	a. What is the anticipated time frame in which the CMZ I and II will be mapped - because it is very difficult to get the elevation data from SOI	
	b. Google images give only relative elevations and the 2 year timeline to scrap CRZ for CMZ	

Sl. No.	Queries/ Suggestions	Remarks/ Comments
	is too short	
	c. The contour intervals of 0.5 to 1.0m are too fine. Is it not possible that we take the hazard line qualitatively rather than quantitatively?	Fine contours are not required for the entire country. So, the timeline of 2 years for demarcating the hazard line for the entire coast of India is possible
	d. Which agency will be responsible for marking the hazard line? Public will be concerned if changed from 500m from HTL to Hazard line.	Ministry of Environment and Forests will identify suitable institutions/ organizations capable of this task. Further training will be given to representatives from the State Governments/ UTs in order to complete the process on schedule (2 years) The scientific background and purpose of the hazard line will be explained to the public in the local language (vernacular) to enable them understand the value of changing from 500m arbitrary line to a hazard line There is no reason for public concern, as the changes will be informed to the public as and when necessary. Until the entire exercise of mapping the CMZ is completed, CRZ rules.
	e. Is it not possible to map with the existing contours in order to delineate the hazard line?	We can begin mapping for areas of immediate concern and for coastal areas where data are available.
	f. Further to this argument and the explanation through the Puri Case Study, the participant agreed to the methodology of preparing the hazard line mapping proposed by the expert team.	
15	How can activities be permitted on the seaward side of the hazard line knowing that it is a hazard prone zone?	
16	The entire municipalities of the Tamil Nadu State will be delineated as CMZ II now. In the absence of a hazard line, a tar road can be considered - how can we consider approval of development in this case based on the master plan already prepared by the CMDA?	

Some specific concerns on CMZ were also raised by the Governments of Tamil Nadu and Puducherry and are given in table 5.19.

Table 5.19: Specific concerns on CMZ were also raised by the Governments of Tamil Nadu and Puducherry

Sl. No.	Queries/ Suggestions	Remarks/ Comments
1	The CRZ has undergone 30 amendments - almost fool proof now - what is the guarantee that the CMZ will not undergo amendments? Is the Ministry bending the lines according to the whims and fancies of the states?	No guarantee that CMZ will not be modified. Modifications are made based on needs better management and protection of the coast
2	There is a need to evolve a National Working Code for preparing the ICZM Plan (similar to those existing for Wildlife areas)	Suggestion will be given to the MoEF for consideration
3	Regional offices/ institutions are required to take care of the ICZMP based on a national code of implementation. This must include the type of primary and secondary data required etc.	

Sl. No.	Queries/ Suggestions	Remarks/ Comments
4	There is a debate if ICZMP should be on a district/ State level. Recommendations are that it should be done on a District level	The concerned State/ UT Coastal Management Authority can decide on the management plan of the coast rather than State/district/ panchayat level planning.
5	The National Board of Sustainable Management consists of 32 members, not including environmental engineers, water resources experts or air quality specialists	Suggestion will be considered by the MoEF
6	Correction of the word "compiling" to "complying" in the section under CMZ II i) e.	Suitable changes will be made in the final notification
7	Notification indicates - Monitoring needs to be made by the State authorities. This is not possible because this type of activity requires a huge infrastructure. Which authority nominates that?	MoEF plans to strengthen all the State authorities with more finance and manpower. The concerned coastal state must decide on the management of subdivision of the coast based on the nature of the coast
8	Representatives from the Pondicherry Government: What is the need for changing the 500m from HTL CRZ line to the CMZ now? The fishermen will be displaced if the CMZ were to be enforced.	All apprehensions can be cleared if proper education on the risks to their life and property is given to them by explaining the scientific basis of the hazard line. The apprehensions on more industries/ development leading to loss of their livelihood is false as the notification clearly mentions that no fisherman or fishing-related activities will be disturbed
9	In spite of the wording in the draft notification "no displacement of fishermen" the fishermen have many apprehensions - only the CRZ status quo must be maintained - because more industries/ development the livelihood will be affected	

Both the Government of Tamil Nadu and the Government of Puducherry have many reservations in accepting the present draft CMZ Notification. The general opinion is that the CRZ be retained perhaps with minor modifications to the present regulation to provide more restrictions on development along the coast. The officials from the Government of Puducherry were more critical of the draft CMZ notification than the officials representing the Government of Tamil Nadu although they had a fair share of apprehensions in accepting the notification in its current form. According to them, the interests of fishermen have not been adequately addressed in the draft CMZ notification and require a thorough redrafting in consultation with the state representatives. As regards the "Hazard Line" mapping, there were many queries from academicians who found a few loop holes in the mapping procedure. Their contentions included the following:

- Non-inclusion of geomorphology as one of the base criteria for hazard mapping is a major drawback to the methodology. Subsequently, this issue was addressed and clarified by both Prof. Pethick and Prof. Ramesh to the satisfaction of the officials.
- The methodology also has only a limited description of mapping areas around creeks and water bodies adjoining the coast and requires more clarity
- The time required to complete hazard mapping for the entire country would take at least 2 years due to non-availability of data from the Survey of India.

Despite some pessimistic view points, there was a general consensus that a change in the concept from a "setback line" to "hazard line" was a positive indication of linking science to management of the coastal zone and the officials welcomed the change in terminology.

Conclusions on State level consultations

The various state officials were positive about the new approach towards the demarcation of the "hazard line" based on scientific data and principles. All the States agree that such a foundation for coastal management is necessary, although the return interval (on a 1 in a 100 years or lower) is still debatable.

The concept of “Hazard Line” substituting the “Setback Line” was also welcomed by the State/ UT Governments. This Hazard line is not a constant. It is dynamic and needs to be reviewed with a fixed time frame between 5 and 10 years.

Most of the coastal states preferred to retain the existing CRZ with appropriate modifications. The States/ UTs insisted on a “Participatory Management”, which is the essence of the Swaminathan Report – for the delineation of the Hazard Line and also the CMZ Notification before being implemented by the MoEF. The State Governments and the UTs opined that the local government must be vested with greater powers to implement coastal regulation and the ICZMP. The suggestion to strengthen the State Coastal Zone Management Authority was also made during the meeting. Suggestions and objections on the Draft CMZ Notification have been sent to the MoEF by all the State/ UT Governments and are awaiting a follow up by the Ministry.

5.2.3 Consultations Undertaken BY CEE on behalf of MoEF

The Ministry appointed Ahmedabad based Centre for Environment Education (CEE) to conduct large scale consultations with major stakeholders all over the coastal states of India. During the months of July and August, 2008, CEE conducted 35 consultations across 13 coastal states and UTs, with representatives of local communities and non-governmental organizations and submitted a report to MoEF in September 2008. In each consultation meeting one senior officer in charge has presented the details of the notification and some experts in the field of coastal zone management lead discussions. Almost all categories of stakeholders were participated in the meetings. One general criticism with respect to the consultation was that the meetings were held in closed halls and has to be conducted in open areas in the coastal stretches. Another criticism is the consultants are part of MoEF system, therefore will not properly communicate the findings.

The key issues and concerns raised in the consultations held by the Centre for Environment Education are mentioned below:

- The Coastal Regulation Zone needs to be retained and improvements incorporated in it, furthermore, clarity has to be brought in with regards to setback line, ecologically sensitive areas, Integrated coastal Zone Management and the methodologies of management, etc.
- The existing CRZ Notification, 1991 has enough scope to manage coastal zones efficiently if implemented effectively, with some improvements and existing violations penalized.
- Representatives from various stakeholder groups, particularly from local communities, should be involved in the entire process of formulation and drafting of the CMZ Notification, 2008 framework.
- The CMZ Notification, 2008 introduces new management methodologies which are open to subjective interpretation and can be used to promote and legalize corporate activities.
- The CMZ Notification, 2008 will promote (SEZ) Special Economic Zones, thus opening up the coastal space and resources to the industrial sector without considering the basic rights of the local community.
- The roles of the local authorities and state governments are not adequately addressed in the proposed CMZ Notification, 2008 management methodology and structure. The basic rights of and opportunities for local communities and their representatives (Panchayat Members) to participate in and plan the activities in their local environment and settlement areas appear to have been curtailed in the proposed Integrated Coastal Zone Management Plan process.

- Looking at several amendments and impacts of the CRZ Notification, 1991 that have led to the dilution of its original objectives, there are apprehensions about the amendments in the case of the CMZ Notification, 2008 as well, and their impacts, especially on fisher folk.
- Legislation or an Act on coastal management is needed, which will ensure protection of the coastal ecology and the basic rights of the traditional coastal communities. Elected members of the legislative assembly should discuss the coastal policies to initiate such an Act. Till the time a comprehensive legislation on the management of the coastal zones is enacted, the CRZ Notification 1991, without amendments, needs to be effectively implemented and violators punished.

The issues raised by various groups in the consultations are summarized in a matrix (table 5.20) and is analyzed in figures 5.1 & 5.2.

5.2.4 Consultations by other organizations

In June, 2007 the South Indian Federation of Fishermen Societies (SIFFS) organized a two day long consultation meeting at Chennai. As many as 37 groups including fishermen' federations participated in the consultations. The major players were South Indian Federation of Fishermen Societies (SIFFS), the Matchyakar Unions from Andhra Pradesh and Maharashtra, the National Fish workers Forum, CEC, New Delhi, ATREE, Bangalore, The Consumer Action Group, Coastal Action Network, Tamil Nadu, OTFWF, Orissa, Disha, West Bengal etc.

The consultations discarded the CMZ Notification 2008, saying the new plan would be dangerous for India's coastal life and communities. The major concerns raised in the meeting leading to the negative response of the CMZ Notification, 2008 are mentioned below:

- Only fish landing (harbours, mostly under private management) finds mention in the CMZ, there is no word on the activity of fishing which is the livelihood of millions along India's nearly 8,000-km coastline
- Inundation is mentioned in the draft CMZ, this is just a trick to move people and existing traditional habitations away from the sea.
- The inclusion of 12 nautical miles of sea from the shoreline in the CMZ has major implications for the livelihoods of fishing communities, but the draft CMZ notification does not explicitly mention that this area should be managed with full participation of fishing communities.
- The interests of the communities traditionally depending on coastal resources for their livelihood should also be considered when enacting the new legislation
- Civil society groups from the coasts urged the government to ensure 'community-based and participatory coastal management'.
- All violations committed under the CRZ Notification 1991 be penalised with utmost urgency according to the Environment Protection Act.
- The 'setback line' in the draft CMZ completely nullify the protection to the coast gained by the 500 m and 200 m restrictions of the CRZ and would mean a 'blatant commercialisation of the coast'. It would help expand the CRZ II areas and bring CRZ III areas into CRZ II zone. This would mean any building work could take place on the landward side of the setback line. In most cases, the sea walls would become the setback line, and more sea wall would be built.

Table 5.20: Matrix showing participation and issues raised during consultation meetings by CEE

Sl. No.	Participants/Issues Raised	Venue and Date of Consultation*																				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Participants																						
1	Scientists/ Academicians	+	+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	Details not Available
2	NGOs working in R&D sector	+	+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	
3	Organization working for fishermen welfare	+	+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	
4	Fishermen and related workers	+	+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	
5	Other coastal inhabitants	+	+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	
6	Officials from Fisheries/Agriculture/Forest Departments		+		+	+			+	+	+	+										
7	Dependents of fishermen		+			+			+	+								+	+			
8	College students (mainly from fisheries colleges)				+	+				+	+											
9	Media persons	+								+	+											
10	Fish processing industry representatives																+					
11	Boat owners																					
12	Resort owners											+										
13	Legal experts	+										+										
14	LSG representatives												+						+			
15	Representatives of political parties																+		+		+	
16	Members of Legislative assembly																					
17	State Minister for Fisheries																					
Issues Raised																						
1	CRZ is well framed and clear - only that is not implemented properly, CMZ has no clarity - better to implement CRZ regulation properly, removing the loopholes and reject CMZ	+	+	+		+	+		+		+	+	+		+			+	+	+	+	
2	There was no demand from the major stakeholders for framing new notification withdrawing CRZ	+		+								+										
3	The concept of Setback lines is vague and confusing- the local community will lose their present dwellings and agricultural land inside the setback line		+	+	+	+	+		+	+	+	+		+	+	+		+	+	+	+	
4	Fishermen dwellings (old as well new ones for family members) to be allowed in the seaward side of setback line in CMZ II & III		+							+			+	+	+	+	+					
5	Setback lines will not be stable – it may change after some period when the nature of disaster changes , due to sea level rise, climate change etc (can be permanently demarked in CRZ)		+	+	+	+	+		+	+	+	+						+			+	
6	Setback line to be identified through a consultative process		+									+										
7	CRZ areas are not well identified after 17 years of notification. As no timeline fixed for identifying setback line and ESAs, it is difficult to believe that Setback lines and ESA will be identified in time	+		+		+	+	+			+	+	+					+	+			
8	Livelihood issues of local community is not addressed in the notification - No clarity in saying many that fishing activities "not disturbed" and allowing many activity which hinder fishing	+		+	+	+	+				+	+	+		+	+		+	+	+	+	
9	Right of access to the sea for local communities not ensured						+				+		+									

Sl. No.	Participants/Issues Raised	Venue and Date of Consultation*																				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
10	CMZ notification framed without wide consultations with major stakeholders and convincing the civil society	+	+				+		+		+	+	+	+	+	+				+	+	
11	The rights of fishing community not protected - first priority to be given to fishing community while framing any management plans	+	+	+					+		+	+	+	+	+		+	+		+	+	
12	Tourism is projected for economic development of local community - this will increase land value and there is chances for selling coastal lands for tourism, thus the local people will be out		+								+	+	+		+	+	+	+	+	+	+	
13	Sustainable local economic development activities to be promoted and funds to be allotted	+	+			+	+				+	+										
14	Facilities for education to children to be provided		+			+					+											
15	Provision for compensation to farmers during disaster required						+															
16	The notification is not well communicated to the coastal community – to be communicated through local news papers	+				+		+	+		+			+	+	+						
17	Open consultations in the village level is actually required rather than indoor meeting		+								+	+		+	+							
18	The notification is giving more thrust to Development than Environment	+	+	+							+	+	+		+				+	+	+	+
19	Change from 'regulation' to 'management' is intended for protecting the interest of big people and are subsidized in the name of SEZ, coastal corridors etc	+	+	+					+		+	+	+						+	+		
20	The notification will give legal validity for all the violations of CRZ in the past	+		+		+	+				+	+	+								+	+
21	It is difficult to believe that Management plans will be developed effectively as it was not done even after Supreme court judgment			+							+	+							+			
22	Coastal area extension of 12 nautical mile to sea will permit more development activity in this area, affect fishing community			+	+		+		+		+	+			+				+			+
23	EIA not taking seriously for setting industries, oil drilling etc and should be included in management		+			+	+			+	+	+					+	+	+			
24	No action against industries in the coast causing pollution and depletion of fish resources	+	+		+	+	+				+						+	+	+			+
25	Notification not mentioned any legal action for the violation				+												+					
26	Developmental activities allowed in various coastal zone categories are not clear						+	+		+	+	+		+	+	+						
27	No clarity on coastal zone towards landward side							+				+		+	+	+						
28	“No Development Zone” as in CRZ is required for protecting ecosystem and interest of traditional fishermen						+	+			+	+										
29	ICZM is a good concept as it includes Management & Development and - help to save the degrading coasts - an ecosystem based management with maximum benefit to fishing community is required				+		+		+	+	+	+		+								
30	Mangroves areas has to be well protected and not destructed for any purpose including aquaculture	+	+								+	+										

Sl. No.	Participants/Issues Raised	Venue and Date of Consultation*																				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
31	Aquaculture in the coast has to be stopped - Promoting Aquaculture in coast is against Supreme court orders		+														+		+	+		
32	Removing of Estuaries and other wetlands from ESA list (included by MSS Committee) is purposeful, has to be included											+										
33	Protection by sea walls will cause more damage to neighboring areas without protection wall and also affect fish breeding						+	+				+										
34	Coastal areas to be mapped based on level of degradation and a baseline to be developed						+												+			
35	Alternate energy sources (wind, tide etc) to be tapped						+															
36	Local level scientific institutions to be strengthened for preparation and implementation of ICZMP						+				+											
37	The CRZ notification has to be made as an Act	+				+	+															
38	Common Act/Policy for the entire coast is not feasible as the coastal environmental conditions are different						+					+										+
39	Single Authority with full control is required for implementation						+															
40	Mechanism for public participation and their capacity building for evolving management plans is required						+					+	+									+
41	Gender issues to be addressed										+						+					
42	Coastal security issues to be addressed											+										
43	The role of Local self Government in coastal zone management has to be clearly stated and their capacity to be increased							+			+	+	+	+					+			
44	CMZ notification takes away the rights of LSGs and is against the 73 & 74th amendments of Indian Constitution																+		+			
*Venue and dates of Consultations																						
1. Andhra Pradesh – Vishakapatnam, 26.07.08						8. Karnataka – Honnavar, 14.08.08						15. Orissa – Chhatrapur, 07.08.08										
2. Andhra Pradesh – Kakkina, 29.07.08						9. Karnataka – Mangalore, 16.08.08						16. Pondichery - Pudusery, 13.08.08										
3. Goa – Goa, 08.08.08						10. Kerala – Trivandrum, 08.08.08						17. Tamil Nadu - Nagarcoil, 08.08.08										
4. Gujarat – Veravel, 31.07.08						11. Kerala Ernakulum 13.08.08						18. Tamil Nadu – Thoothukudi, 09.08.08										
5. Gujarat - Bhadreshwar, 09.08.08						12. Maharashtra – Mumbai, 19.08.08						19. Tamil Nadu - Karikal, 14.08.08										
6. Gujarat – Ahemadabad, 20.08.08						13. Orissa – Balasore, 04.08.08						20. Tamil Nadu – Ramanathapuram, 16.08.08										
7. Karnataka – Ankola, 13.08.08						14. Orissa – Konark, 06.08.08						21. West Bengal - Dhamakhali Island, 13.08.09										

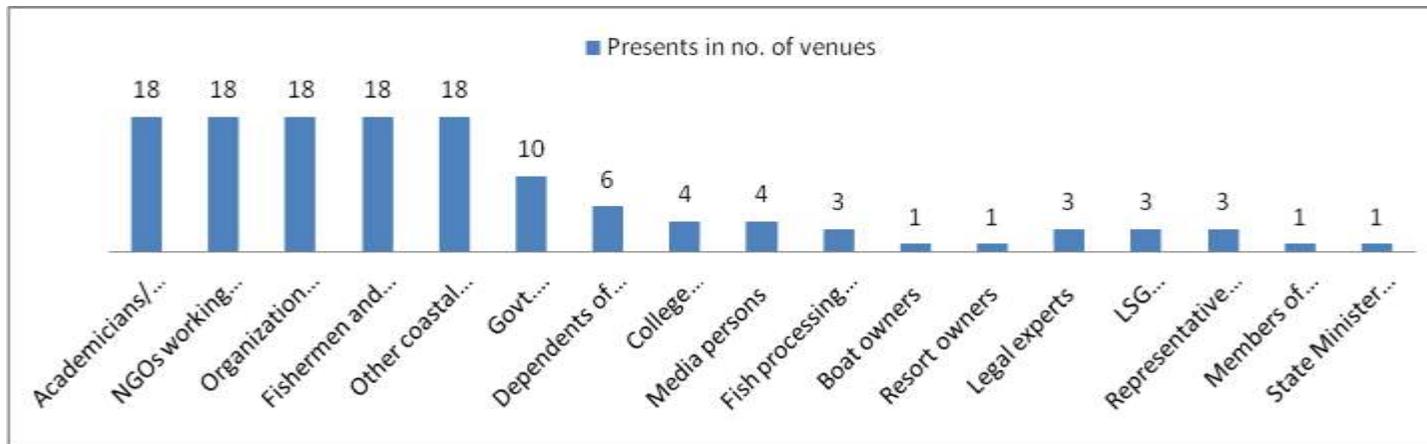


Fig. 5.1: Present of participants in various venues

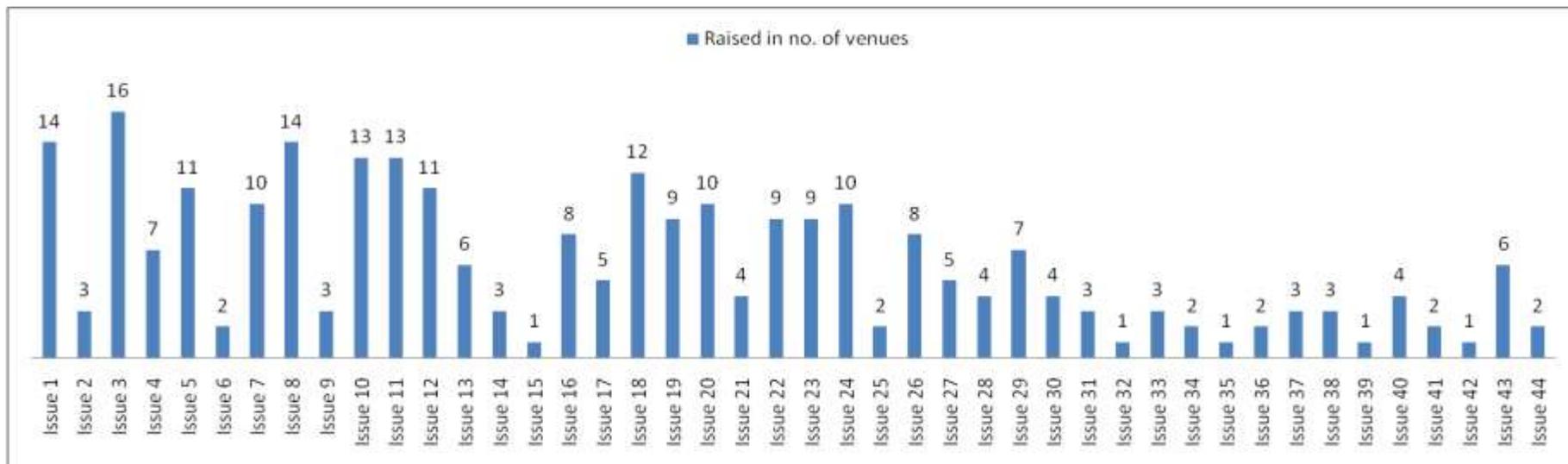


Fig. 5.2: Issue raised in different venues

- Sea walls are bad as they prevent nutrient from rivers and the land from flowing into coastal waters and nutrients for coastal marine life is cut off
- With the new CMZ, India would also be violating the Convention on Biological Diversity, Ramsar Resolution and the 1995 FAO Code of Conduct for Responsible Fisheries
- The proposed CMZ zone, in particular the CMZ II, paves the way for the proliferation of SEZs, ports, tourist resorts, mining and similar activities in large areas of the coastal zone. It also paves the way for displacement of fishing communities from their habitats and the areas they have traditionally used and fished especially as the Swaminathan Committee has not, in its recommendations, recognized the traditional and customary rights of fishing communities to their habitat, highlighted in the 1991 Notification.
- With the new Notification, all violations that have taken place since 1991 under the CRZ Notification, mainly by commercial interests, with severe implications for the social and ecological integrity of the coastal zone and traditional livelihoods, are likely to be condoned. This will again be a concession to commercial interests that have blatantly violated the provisions of the earlier Notification.
- The very existence and future of fishing and other natural-resource dependent communities is linked to the health of the coastal ecosystem. Effective protection of coastal habitats and regulation of activity in the coastal zone is very much in the interests of coastal communities, and fishing communities have taken several initiatives to protect coastal habitats and resources
- However, even as large areas of the coastal zone declared as CMZ II are likely to be taken over for unsustainable development, areas declared as CMZ I, for conservation, are likely to pose as much threat to livelihoods of fishing communities, if the non-participatory, exclusionary approaches adopted by the MoEF in marine protected areas in India so far, are anything to go by.

5.2.5 Comments received on the draft Notification, 2008

Eight state governments i.e. Gujarat, Maharashtra, Goa, Karnataka, Kerala, Andhra Pradesh, Orissa and West Bengal have provided comments along with comments from the fishermen forum and central government departments i.e. Ministry of agriculture, Urban development, Civil Aviation, Commerce and Industry, Petroleum and Natural Gas, Atomic Energy, Earth Sciences, Shipping, Road Transport and highways, Port Authorities, Panchayat raj, Textiles, Defence, Planning Commission, Department of Space, CIDCO and administrative authorities of the various UT islands.

Except for the Ministry of Defence all other organizations, government departments have raised objections to the draft Notification, 2008. The suggestions / concerns raised on the draft Notification, 2008 by the various state governments and Union Territories are illustrated in table 5.21.

Table 5.21: Suggestions / concerns raised on the draft Notification, 2008

Sl. No	Name of the State	Comments		
		Suggestions for incorporation	Concern on CMZ	Recommendation
1.	Gujarat	CRZ Notification 1991 should be enforced. The coastal policy and legislation to be tailor made for different States for different coastal environments. It is unclear how activities will be handled amongst various govt. departments concerned with implementation of CZM Notification,	Zonation not demarcated clearly in CMZ. Livelihoods rights of the fishermen ignored. Role of the local communities in ICZM is not mentioned.	CMZ Notification, 2008 to be withdrawn.

Sl. No	Name of the State	Comments		
		Suggestions for incorporation	Concern on CMZ	Recommendation
2.	Maharashtra	<p>During the last 17 years of CRZ existence, High Tide Line (HTL), Low Tide Line (LTL) has not been demarcated as yet.</p> <p>The role of village Panchayat and other Public Authorities in implementing CMZ is not clear.</p>	<p>Rights and livelihood of the fishing and other local communities including coastal ecology are not protected.</p> <p>CMZ would open up the coast for commercial activities.</p> <p>The management activities of CMZ are ambiguous.</p>	<p>Not favouring/ supporting CMZ.</p> <p>CRZ Notification 1991 should be strengthened and enforced with active participation of local communities.</p>
3.	Goa	<p>CRZ Notification, 1991 should be strengthened by drawing some good features of CMZ such as Setback Line and develop ICZMP for practical implementation, effectively.</p>	<p>The drafting process of the CMZ notification 2008 is controversial.</p> <p>If CMZ comes into force, there is fear that all the violations of CRZ would be regularized.</p>	<p>CMZ Notification 2208 should be withdrawn.</p>
4.	Karnataka	<p>CMZ lead to denial of the rights of fishermen communities, who live near the coast for their livelihood.</p> <p>CMZ must protect the coastal ecosystem.</p> <p>Since the local bodies on the coast with more than 400 persons per square kilometer come under "Areas of Particular Concern" and hence in CMZ II, most of the coastal fishing villages in Karnataka coast will come under CMZ II, opening up the coast to the external stakeholders.</p>	<p>The "Setback line" which is yet to be demarcated will be a "Lakshman Rekha" for construction of community dwelling units and related activities.</p> <p>Rapid urbanization on the coast through CMZ will be disastrous for the eco-system and environment.</p> <p>CMZ will lead to regularization of illegal structures that came up since 1991, violating the current CRZ-II areas.</p>	<p>CMZ notification should be withdrawn.</p> <p>Recommended to implement the Original CRZ Notification 1991, and ensure its strict enforcement.</p> <p>Violators should be punished.</p>
5.	Kerala	<p>Each coastal State requires a different Management Plan for its development and protection.</p> <p>In the case of Kerala, a state characterized by backwaters and more than 40 rivers, most of the inland water bodies which will be affected by high tide, will come under CMZ III. Hence, while CRZ affects only the sea coast, CMZ will affect the inland water bodies also.</p> <p>The setback line is not very clear to anybody.</p>	<p>Violations of CRZ Notifications, 1991 are likely to be regularized by CMZ.</p> <p>The law is likely to be diluted to suit the interests of industry, tourism, mining and real estate lobbies.</p> <p>The coast belongs to the fisher community by tradition – do not alienate this community from their homeland.</p>	<p>CMZ should be scraped and CRZ should be implemented without diluting it with the amendments made.</p> <p>CMZ favours large investment sectors like tourism, industry, refineries, mining, besides SEZs.</p>
6.	Andhra Pradesh	<p>The activities that might happen in the 12 nautical miles (territorial waters) need to be listed out and no activity, which threatens the livelihoods of fishermen should be allowed.</p> <p>A comprehensive legislation is the need of the hour to protect the marine resources, fishermen rights and to protect the ecology – Traditional rights of fishermen should be clearly stated.</p> <p>Consultations should cover substantial representation of fisher communities and Panchayats and decision should be taken only after considering their opinion.</p> <p>Clear guidelines for categorization of island villages should be given and protection of the same should be ensured in the wake of global warming.</p>	<p>While CRZ Notification, 1991 has a mandate for protection of the coastal environment, CMZ Notification, 2008 appears to be more 'development' or industry driven.</p> <p>While 500 meters demarcation as in CRZ Notification, 1991 should remain, setback line concept of CMZ can be integrated into CRZ.</p>	<p>CMZ Notification, 2008 severely affects the livelihood of the local communities and their traditional lifestyle.</p>

Sl. No	Name of the State	Comments		
		Suggestions for incorporation	Concern on CMZ	Recommendation
7.	Orissa	<p>CRZ, 1991 protects the rights of traditional fisher folk, their livelihood needs and coastal ecology.</p> <p>A comprehensive Act needs to be in place for coastal management.</p> <p>The permission for fishing within 12 nautical miles should be controlled by the State Government only.</p> <p>Foreign vessels should be allowed to fish in coastal zone waters.</p> <p>The local community representatives must have the right to plan developmental activities in their immediate surroundings especially in case of external industrial projects coming up in coastal areas.</p>	<p>The violations in CRZ are being regularized in the name of CMZ. No consultation was done with the local communities who are the primary stakeholders.</p> <p>CMZ Notification allows various activities in these sensitive ecosystems.</p> <p>The CMZ notification allows a number of new stakeholders ignoring the local fishermen, who traditionally linked to the sea and real owners and protectors of the coast.</p>	<p>Since its formulation CRZ 1991, is not implemented effectively.</p> <p>CMZ to be withdrawn as there is no Zonation has been demarcated clearly for management.</p>
8.	West Bengal	<p>Zonation criteria in CMZ and the management methodology to be clearly defined.</p> <p>The Draft Notification uses the words “sustainable development”, “sustainable coastal zone management practices” and the definition of ‘green field airports’ which is added as amendment is not given in the notification.</p> <p>“sound scientific principles” which are not clearly defined.</p>	<p>CMZ notification has not at all considered the strengths of CRZ notification on the other hand will legalise all the violations that have taken place under CRZ so far.</p>	<p>CMZ notification 2008, is not beneficial to the local communities.</p>
9.	The Union Territory of Andaman & Nicobar Islands	<p>CMZ-IV is also required to be included under SETBACK LINE in the Appendix – I, otherwise, the primary objective may be lost sight of in the Integrated Coastal Zone Management Plan, since the Union Territory of Andaman and Nicobar Islands is no less vulnerable to natural and manmade hazards.</p> <p>Protection from which is the main objective of the CMZ, Notification.</p> <p>As CMZ-IV will be managed entirely on the basis of Integrated Coastal Zone Management Plan, a detailed guideline is required to be adduced to the Notification for CMZ-IV.</p> <p>There is no designated authority to take cognizance of CMZ violations and also a defined procedure for filling the complaints before the appropriate Court of Law.</p> <p>Provision for the same may be provided for in the notification.</p>		
10.	The Administration of Union Territory of Lakshdweep Islands			Endorsed
11.	The Union Territory of Puducherry		Coastal Regulation Zone Notification, 1991 should be implemented in its original form without any amendments.	Opposed

The suggestions / concerns raised on the draft Notification, 2008 by the various central government ministries/departments are illustrated in table 5.22.

Table 5.22: Suggestions / concerns raised on the draft Notification, 2008 by various central government ministries/departments

Sl. No	Name of the Ministry/ Department	Comments		
		Suggestions for incorporation	Concern on CMZ	Recommendation
1.	M/o. Agriculture	Sandy beaches, sand dunes, mudflats, coastal fresh water bodies to be removed from the list of Ecologically Sensitive Areas (ESA): The definition of Setback Line of ambiguous and therefore could easily be misinterpreted. Moreover the Setback Line to be demarcated in 2 years time after the passing of the CMZ act. The Setback Line demarcation should be done to passing of the CMZ Act. The Notification to be provided in local languages.	Appendix – VI (i) © should read 'Mariculture including hatcheries and Coastal Aquaculture as regulated by Coastal Aquaculture Authority Act, 2005'. This is required because traditional Aquaculture is not the only method approved by Coastal Aquaculture Authority. Further as per CCA 2005 aquaculture is already a permitted activity in the CRZ.	
2.	M/o. Urban Development	The parameters of the setback line to be reviewed keeping in view the climate change seismic activity and natural hazard. The institutional setup procedures for mapping etc. to be spelt out.	ESA need to be demarcated and protected keeping in view the local requirements and prevailing amendment. In the National Board representative of tribal leader of A&N to be included.	
3.	M/o. Urban Development	Setback line parameters to be reviewed keeping in view the dynamics of the ocean: ESA to be demarcated. The provisions of proposed CMZ regulations need to be in harmony with the Allocation of Business Rules, 1961 without bringing in conflicting provisions in CMZ areas for town and country planning, powers of local Municipal Corporations and Municipalities, and for providing water supply, sewerage, drainage and sanitation.		
4.	M/o. Civil Aviation	Appendix-VI with respect to activities that can be permitted in CMZ-III with Environmental impact Assessment and Environmental Management plan to be approved by Ministry of Environment & Forests should also include expansion & upgradation activities for development of existing Airports/ Heliports or development of Greenfield Airports in CMZ-I as well in view of essential requirement to provide reliable connectivity & economic development of remote coral islands of Lakshadweep and Andaman & Nicobar Islands.		
	Comments expressed by CIDCO	Time frame should be prescribed for preparation of ICZMP on part of local authority, and approval of same on part of the Central Govt. The role of National Coastal Zone Management authority and that of State Coastal Zone Management Authorities need to be defined. Mangroves etc. which grow in manmade water bodies (like holding ponds, flood control channels etc.) should not be given status of CMZ I.	Once the setback Line is delineated, development should be allowed as per the approvals obtained from the local authority. The condition of approval from ICZMP should be deleted.	

Sl. No	Name of the Ministry/ Department	Comments		
		Suggestions for incorporation	Concern on CMZ	Recommendation
		Activities requiring water front such as ports, water transports terminals, water sports marina etc should be allowed in CMZ-I, CMZ-II and CMZ-III.		
5.	M/o Commerce & industry			No Comments
6.	M/o Petroleum & Natural Gas	Many facilities for Paradip Refinery project (PDRP) like crude oil pipelines & product pipelines corridor from refinery to south Jetty and facilities within the refinery boundary wall have been constructed and planned as per the Coastal regulation Zone Notification, 1991. Considering such cases of huge investment, the new notification should be made applicable only for new projects with prospective effect.	The creek having mixed from a river body and sea should be kept under CMZ-III with Set-back line of 100 m. Such creek of PDRP of IOCL is Santra Creek, which is a nalla of 40 sq. km. Catchment area as per Oct '98 report of the Govt. of Orissa, Department of Water Resources and Setback Line of 100 m as per the Forest & Environment department, gov. of Orissa. The refinery layout has been firmed up considering Set-back Line of 100 m as per CRZ notification, 1991.	
7.	D/o Atomic Energy (DAE)	As per CRZ-1991 notification, 'projects of DAE' were placed under permissible activities. Similarly, mining of those rare minerals containing monazite not available outside CRZ areas was also permitted activity. It is therefore suggested that provision similar to CRZ-1991 notification may be made in the proposed CMZ-2008 notification with respect to the Projects of the Department of Atomic Energy incorporate the following: "Projects of the Department of Atomic Energy including expansion and modernization of existing projects, and mining of placer minerals containing monazite in coastal areas" as permissible activities in CMZ areas.		
8(a)	D/o Space, National Remote sensing Agency, Hyderabad	In the draft notification, the CMZ Act/ Rule covers the entire coast as a system including seaward boundary (12 nautical miles) rather than shoreline as in CRZ. This is in principle with scientific approach for sustainable coastal protection and environmental conservation. The term Integrated Coastal Zone Management Plan (ICZMP) is perceived as land utilization/ usage and development plan for ICZM implementation. This helps futuristic and long term protection of coast. The Set-back Line forms the basis for CMZ and ICZMP and replaces the erstwhile HTL and 500 meter boundary. The time frame for determining the Set-back Line is not specified.	The Setback Line (as per definition given in the draft notification) implies an arbitrary line depending on the vulnerability, which is location dependent, subjective of natural process and influence of tidal periodicity in time and space. Fixing of such a line requires analysis of historical data and modern techniques like remote sensing and GIS. The concept of Integrated Coastal Zone Management (ICZM) in this notification ensures scope for decision-making on protection of coastal population and infrastructure. This provides conservation and sustainable development of coastal resources.	

Sl. No	Name of the Ministry/ Department	Comments		
		Suggestions for incorporation	Concern on CMZ	Recommendation
8(b)	D/o Space, Space Applications Centre, Ahmedabad	Sr. N. (vi): Coastal fresh water bodies such as creeks, lakes etc. Creeks are not coastal fresh water bodies. Instead of writing coastal fresh water bodies, it should be written as Inland/ tide water bodies such as estuaries, lakes, lagoons, creeks (refer Annexure-II of the M. S. Swaminathan Committee Report) Creeks, lagoons are also purely tidal in a number of places on the Indian coast. All the coral reef lagoons are purely tidal. The creeks in the mangrove areas in most of the mangrove habitats of Gujarat, etc. are purely tidal in nature.		
9	M/o Earth Sciences (INCOIS)	The definition of ICZM should include protection and conservation of coastal and marine ecosystems and resources. There is no justification of classifying backwater islands in CMZ IV (b). These islands cannot be and should not be equated with the Lakshadweep and Andaman and Nicobar Islands. The main reason for making this suggestion is non-availability of elevation, geomorphology, sea level trends and horizontal shoreline displacement data at the cadastral scale, at present.	Notification of the Setback Line: Though the Setback Line needs to be drawn on Cadastral scale: however this will be a huge task for the Central Government to take up. It may be a good idea to prepare maps on a smaller scale, say, 1:25,000 or so by the Central Government. The preparation of maps at Cadastral scale may be left to concerned parties/ local bodies/ State Governments.	
10	Ministry of Shipping, Road Transport & Highways and major Port Authorities	Department of Shipping should be given a permanent representation in the proposed National Board for Sustainable Coastal Zone Management (NBSCM). The same criteria as applicable to airports should be made applicable for expansion and modernisation of Ship building Yards and existing sea ports. The type of industries to be permitted in the proposed SEZ's may specifically be incorporated in the CMZ notification to facilitate the environmental clearance of SEZ's to be established in the Coastal Zones. In the definition of coastal zone, area from the territorial waters limit (12 nautical miles measured from the appropriate baseline) not clear in Draft CMZ 2008, requires some more in-depth definition/ clarifications. Most of the land available with KPT is tidal affected and covers with Mangroves, Mudflats etc. Therefore, while framing the Integrated Coastal Zone Management Plans for CMZ-I area it is also required to consider the future development of the Port Projects with necessary EIA and EMP.	Major ports should be treated as separate entities for the purpose of preparation of Integrated Coastal Zone Management Plan (ICZMP) under CMZ notification 2008. The development activities of the Ports, both seaward and landward side of the Set-back Line may be regulated based on the ICZMP of the Ports for which one time CMZ, clearance be accorded, and thereafter there should be no further need to obtain clearances of individual projects so long as the projects conform to the ICZMP. Natural Gas, so as to read as below: "Pipelines for transfer of petroleum or chemicals or liquefied natural gas, storage facilities for storage of petroleum or chemical products or liquefied natural gas and re-gasification facilities". Development of facilities in the existing ports may be permitted with the approval of State or Union Territory Coastal Zone Management Authority.	

Sl. No	Name of the Ministry/ Department	Comments		
		Suggestions for incorporation	Concern on CMZ	Recommendation
		<p>A provision under Para 6(iii) Coastal Management Zone-II, should be introduced as below:</p> <p>“With regard to economically important areas of Ports & harbours, the Deptt. Of Shipping in the Ministry of Shipping , road transport & Highways would prepare an Integrated Coastal Zone Management Plan and submit it to MoEF. Such plans would be accorded clearance by a special committee constituted by the Central Government.”</p> <p>In Appendix-VI (iii), Item (x) shall be modified for including the item of Liquefied.</p> <p>As per the notification, any development of Ports and harbours in green field site will be falling under CMZ III. For development of any new Port the Indian Ports Act as well as Major Port Trusts Act empowers the Central/ State Government to Notify the Port limits. It is not clear whether such notification can be issued only after getting the clearance of area identified from the ministry of Environment & Forests.</p>	<p>It is felt that a separate Port Zone under CMZ notification along with permissible and prohibited activities within this zone would be more appropriate. This will provide uniform guidelines to all the Major Port and non-major ports in the country.</p> <p>The notification also specifies under item no. (iv) in Appendix V – Guidelines for preparation of integrated management plan for CMZ II areas, that “No construction shall be permitted on the seaward side of any existing (as on 2008) approved building or tarred or surfaced road in the area”. This clause is detrimental to the ports as it prohibits further development in the port on seaward side.</p>	
11	M/o Textiles			No Comments
12	M/o Panchayati Raj	<p>Chodan – Mandal Village Panchayat, Tiswadi, Goa has passed a resolution stating that the move to replace existing Coastal regulation Zone with Coastal Management Zone will effect fishing activities besides this there would be no easy access on Coastal sides as the construction coming up with the help of Coastal Management Zone would then completely block the public visiting the beaches/ coastal areas and hence it is unanimously resolved and decided to oppose the move to replace existing Coastal Regulation Zone rules with Coastal Management Zone.</p>	<p>It was resolved by Gram Sabha members that we are not in favour of Coastal Management Zone (CMZ) as proposed in the 2008 notification and demand that the same be scrapped forthwith and further resolved that existing CRZ notification of 1991 be maintained and strengthened to be more effective.</p>	
13	M/o Defence	<p>Chief hydrographer to the Government of India, who heads the National Hydrography Office (NHO), should also be included in the list of experts.</p>	<p>Appendix – V of the draft Notification (Guidelines for preparation of integrated Management Plan for CMZ II areas) may suitably incorporate necessary provisions to address the security concerns regarding strategically important areas, such as ports/ harbours and defence installations.</p>	
14	M/o Mines,			‘No Objection’
15	Planning Commission	<p>Constitution of an Authority under the Environment (Protection) Act, 1986 would provide for not only the statutory backing required but also financial support for functioning of wetlands.</p>	<p>The demarcation between the Setback line and the water body including the backwaters is not clearly discernible and permission of boating activity in lakes which are contiguous with the sea front needs reconsideration.</p>	

Sl. No	Name of the Ministry/ Department	Comments		
		Suggestions for incorporation	Concern on CMZ	Recommendation
		Appendix – III of the notification lists areas of concern in CMZ II and does not include hotels and residential areas near the coast line and these also do not figure in Appendix – VI – CMZ III of permissible development activities. The inclusion/ Exclusion require detailing.	Boating as part of tourism could be permitted with the approval of the State or Union Territory Coastal Zone Management Authorities.	
16	Office of The Salt Commissioner, Govt. of India, Jaipur	The Salt Commissioner to Govt. of India should also be included as member on National and State/ UT Coastal Zone Management Authorities.		

The suggestions / concerns raised on the draft Notification, 2008 by the Fishermen's forum are given in table 5.23.

Table 5.23: Suggestions / concerns raised on the draft Notification, 2008 by the Fishermen's forum

(National Fish Workers' Forum (NFF), Kolkata)

Suggestions for incorporation	Concern on CMZ
<p>Protection of coastal ecology and recognition of basic rights and livelihood of the local communities over the sea and the coast should be at the heart of any coastal zone planning.</p> <p>Coastal management plan should be framed by taking coastal fishermen/ local communities into confidence.</p> <p>Bottom-up public participation approach is preferred rather than top-down decisions made by Government.</p> <p>Demands elaborate consultation with fishing community as recommended by Parliamentary Standing Committee before drafting any legislation. Notification on coastal issues.</p>	<p>CMZ legalizes all violations made so far as per CRZ Notification.</p> <p>Curtail accessibility of local community to the shore and sea resources and serve the economic interests of the corporate sector/ large sector/ large investors like tourism industry, refinery, mining etc.</p> <p>A High Power Committee, along the lines of the P. Moral Committee should be formed to lead this process of consultations.</p> <p>NFF rejects formation of another committee again chaired by Prof. Swaminathan to recommend a new draft Notification for the coastal zone.</p> <p>High level delegation of NFF would meet HMoEF, other Ministers and Hon'ble PM. In first week of July, 2009, State level dharna proposed on 30.06.2009 declaring it as National Day of Action.</p> <p>(MoEF given time for discussion on 02.07.2009 at 3:00 PM)</p>

5.2.6 Parliamentary committee findings

In 2008, the parliamentary committee on science and technology, environment and forest also examined the draft notification. After consultations, the parliamentary committee also concluded that the Ministry "should not make haste in implementing the CMZ Notification without addressing the conflict of interests between the stakeholders – mainly the fisher folk and coastal communities." It recommended that the "CMZ Notification be kept pending / in abeyance till mechanisms / instruments – executive and legislative – are put in place for inclusion and integration of coastal communities through participative, decision making and control; instruments.

5.2.7 Review Committee appointed by MoEF

MoEF constituted a high powered four member committee on June 15, 2009 involving representatives from Government, NGO sector and distinguished fellows, under the chairmanship of Dr. M.S. Swaminathan. The committee was constituted to examine the comments received by MoEF on the draft CMZ notification, 2008 and to advise on the policy and legal framework for integrated coastal zone management.

In order to examine the comments received by MoEF, the expert review committee held five consultations / meetings with representatives of various groups who have sent the comments. The expert review committee concluded following points of concerns:

- There is widespread opposition to the draft CMZ notification. All eight state governments, which have submitted written comments, have recommended that CMZ 2008 should be withdrawn. The draft notification has also been rejected by fisher folk's organizations as well as environmental NGO's. Even real estate developers and private sector have expressed serious reservations regarding the CMZ 2008 Notification.
- There is wide spread concern that the scientific management regime proposed in the draft notification is open to misinterpretation and abuse. There is some ambiguity about the demarcation of the setback line. There is near unanimity among all groups that the demarcation of the setback line is fraught with scientific and data problems and would lead to delays in implementation. Without a clear set back line, even private developers who prefer management regime of CMZ are not clear how they will be impacted. It has also been pointed out that the draft notification includes inconsistencies and also terms and proposals not clarified adequately, which would lead to selective interpretation and high transaction costs. All this could prove to be detrimental to the protection of the coast. It is evident from discussions that however "unscientific" the present demarcation based on 500 meters is, it is preferred because it is time tested and clearly understood.
- It is apprehended that the interim period – between the time that the setback line is demarcated and the integrated coastal zone management plan is formulated and cleared by the central government – will be a period of tremendous activity by some interested parties, who might be expecting that these violations would be legalized when the plan is approved. The Ministry of Agriculture, the nodal agency for fisheries in the country, has requested that the setback line demarcation should be done prior to the notification. It also says that the definition of setback line is ambiguous and could be easily misinterpreted.
- Another overwhelming concern is regarding the change in the prohibitory regime, which may lead to widespread commercial activities and urbanization on the coast. The Karnataka and Kerala governments have expressed their fear that CMZ would legalize all violations made so far under CRZ. Even the Goa government, which is battling for legalization of the current violations, concurs with this view in its written comments. The Maharashtra government say the CMZ would open up the coast for commercial activities; the Orissa government points out that the draft notification allows various activities even in designated sensitive eco systems. It is needless to say that environmental groups have opposed CMZ on this very ground.
- It has also been suggested that the livelihood rights of fisher folk has been ignored in the draft notification. The national fish workers forum says the CMZ curtails accessibility of local communities, but will serve the interests of the corporate and large investors in different sectors. Governments and non-governmental groups have all expressed this concern. The Kerala government is categorical: "The coast belongs to the fisher community by tradition and they must not be alienated from their homeland."
- Even though an effort was made through the consultations held by CEE to publish and distribute material in local languages, it was observed that as the notification was not widely available, it could not be discussed across the coastal villages. It is feared that the proposed changes are not understood and accepted by large numbers of people who live on the coast. The submissions demand that their participation is necessary before the notification is finalized.

- A number of agencies have asked that their representatives should be included in the National Board for sustainable coastal zone management, which is currently proposed to have 32 members.
- While groups have raised issues regarding the draft notification, most have also pointed to problems in the current CRZ regime and have called for amendments to the CRZ notification. It has been pointed out that the current system of enforcement is weak and violations are common.

The Review Committee headed by Prof. M. S. Swaminathan had consultation among the members of the committee (on June 27th 2009) and representatives of Central and State governments (on July 7th 2009) Chamber of Commerce and Industry (on July 8th 2009) and NGOs, and fisherfolks' associations (on July 11th 2009).

The following decisions/issues were considered by the committee after the consultation among expert members of the committee,

- (i) The CMZ Notification has not been understood by the local communities and many of its scientific terminologies are unclear and may be open to misuse and selective interpretation.
- (ii) The main thrust of the CMZ Notification is on the vulnerability line which is demarcated based in the four parameters, namely, (i) Tides, (ii) Waves, (iii) Sea level rise due to existing natural factors and the climate change and (iv) Horizontal displacement of shoreline. Based on these parameters the vulnerability line could differ from area to area. Hence, it will be difficult for the communities and the stakeholders to abide by the CMZ regulation until unless the vulnerability line is demarcated on the ground. In the period before the vulnerability line is demarcated there could be a sudden increase in violations and trigger large scale development.
- (iii) It was agreed the seaward side — the water area up to territorial limit and the tidal influenced water body — need be included in coastal management. As such, regulation may be needed for conserving and protecting the ecologically sensitive areas even in the aquatic zone similar to that of the regulations on the landward side.
- (iv) Special considerations can be given to Sunderbans as the area is not only ecologically sensitive but is prone for sea level rise and has been extensively damaged during the recent Aila cyclone. The local communities living in Sunderbans have also experienced damage to property and loss of life.
- (v) The ecologically sensitive areas such as Chilka, Pulikat, Pichawaram, Gulf of Mannar, Vembanad, Coringa, Gulf of Kachchh could also need attention for ensuring better conservation. The Committee agreed to consider in its deliberations the need to declare these areas as Critically Vulnerable Coastal Areas so that management plans could be prepared for conservation and protection.
- (vi) The work assigned by Ministry to Centre for Environment and Development (CED) for the purpose of management of ecologically sensitive areas and demarcation of their biological boundaries was discussed. The Committee sought for the Report from CED at the earliest.
- (vii) It was agreed that the coast especially the beaches are facing severe erosion and the shorelines are changing. These could be due to natural or manmade activities such as construction of ports, harbours, groynes, shore protection measures etc. It was also indicated that the Central Government/State Governments propose to construct several ports and harbours all along the shore in the coming years. These could have irreversible adverse impact on the coast if such infrastructures are constructed without scientific studies. It was also discussed that there is a need to study the cumulative impact of the individual projects on the

entire coastline. Keeping in view the seriousness of the matter the Committee suggested that the Ministry should study the impacts of such projects and also make policy changes to ensure the damage to the beaches and coastline is mitigated.

- (viii) For the purpose of protecting the islands of Andaman & Nicobar and Lakshadweep it was thought that a possible approach could be to separate these from the rest of the coastal areas. In this case, a special dispensation de-linking the islands from the CRZ Notification could be considered. This "Island Protection Zone (IPZ)" Notification could be based on the principles mentioned by the Chairman in his opening remarks and put for further discussions. The Committee agreed to discuss this approach in the further meetings.

In the second meeting (on July 7th) with the representatives of central and state governments, the following issues were discussed (Table 5.24)

Table 5.24: Consultation of review Committee with Central and State Government Representatives

Central & State Government Representatives	Opinion/Issue raised
Nuclear Power Corporation India Limited (NPCIL)	<ul style="list-style-type: none"> • Specific provision needs to be made in the Coastal Management Zone Notification providing for all facilities relating to nuclear power generation, atomic mineral mining both in onshore and offshore. • Thorium deposits were available on the beaches which needs to be mined mostly by manual method should be permitted in all coastal areas. • Once the nuclear facilities are installed on the coast, there is no restriction of fishing activities in the coastal waters near the nuclear installations. Further, there is no record of destruction of fisheries due to the discharge of cooling water from the nuclear plant. • Department of Atomic Energy (DAE) projects may be treated on par with the defence projects mentioned in the notification. The Integrated Coastal Zone Management Plans of DAE project shall be prepared by DAE and one time approval obtained from Ministry of Environment and Forests.
Ministry of Shipping	<ul style="list-style-type: none"> • Ports and harbours to be permitted on par with the green field airports who have been permitted in the CRZ-I areas. • Ministry of Shipping would undertake the Integrated Coastal Zone Management Plan preparation for the port area and seek one time approval of the Plan. • The individual projects would be cleared by Ministry of Environment and Forests only if it attracted Environment Impact Assessment Notification, 2006. • Ports are not consulted by other project proponents who propose to set up ports and harbours within the close vicinity of the existing port. • The Committee observed that such lack of consultation/coordination of the port authorities is serious keeping in view the impact on the coastal areas due to such mega constructions which can cause serious erosion/accretion, loss of habitats, adverse impact on coastal communities etc. • In view of the above the Committee reiterated the need for undertaking a comprehensive study along the coastline to assess the impact of such development along the coastal areas.
Town and Country Planning Office, Ministry of Urban Development	<ul style="list-style-type: none"> • Setback line should be done in a time bound manner and the parameters shall include the sea level rise and the local characteristics of the area.

	<ul style="list-style-type: none"> National Board for Sustainable Coastal Zone Management shall include tribal leaders of Andaman & Nicobar Islands and fishermen communities
Ministry of Agriculture	<ul style="list-style-type: none"> The mariculture and aquaculture activities shall be regulated as per the Coastal Aquaculture Act. The National Board for Sustainable Coastal Zone Management shall also include Members from Aquaculture Authority. Certain discrepancy in the notification with regard to dredging and construction of fishing harbours and requested for corrections to be carried out.
Shri Lalu Bhai Patel, Member of Parliament, Lok Sabha (on behalf of Administration of Daman and Diu)	<ul style="list-style-type: none"> Requested the Ministry to consider declaring Daman and Diu as CRZ-II except for the portions declared as CRZ-I, where there are forest areas and for for permitting cremation grounds in CRZ areas.
Shri Nanda from Government of Gujarat	<ul style="list-style-type: none"> Setback line demarcation would take a long time until such time the vulnerability line is drawn the CMZ Notification cannot be imposed. Hence, there would be a vacuum in the regulations which will lead to violations. He appreciated the move to link the seaward side in the coastal management. Suggested that the mangroves of all kinds should not be disturbed and peoples involvement should be built-in for promoting conservation of mangroves. He pointed out the discrepancies in the port related activities which are mentioned in Coastal Management Zone-II and also in Coastal Management Zone-III. Further, dredging activity is mentioned in Coastal Management Zone-III, separately which needs to be corrected. He indicated that for the purpose of clearance of project in coastal areas about four clearances from various agencies are required, which is extremely time consuming and requested for a single window streamlined process for clearance.
Official from Karnataka	<ul style="list-style-type: none"> Apprehensive towards demarcation of the vulnerability line in a specific time. He requested for including Members of Maritime States in the National Board and to give more powers to the Coastal Zone Management Authorities for according clearance to plans and coastal projects. With regard to the population density criteria for determining the areas as Coastal Management Zone-II, he suggested that the recent census of 2000 may be considered. With regard to the clearance process he suggested a single window mechanism for clearance.
Shri Anna Malai from Government of Tamil Nadu	<ul style="list-style-type: none"> Mentioned that the Chief Minister, Tamil Nadu has written a letter seeking further extension of time for obtaining suggestions and objections from the people on the notification and also to provide Tamil version of the notification to the Government. He suggested that the freezing of development on the landward side of the vulnerability line will have an adverse impact on cities development. He also suggested that the forest related activities, not to be subjected to clearance.
Shri G. S. Gill from CIDCO	<ul style="list-style-type: none"> Suggested that Metropolitan cities like Mumbai should be provided a special status and developmental regulations in metropolitan cities should be left to local town planning authorities. Any freezing of development would have adverse impact on the development of such cities as there is no means to control the rural migration of people to cities. The mangroves in the holding ponds should be permitted to be removed by dredging in order to maintain a suitable holding capacity during flooding conditions.

	<ul style="list-style-type: none"> • Issues relating to housing in Mumbai he indicated that large population lives in slums and dilapidated houses. In order to provide them a secured decent living condition as per National Policy for Housing and Settlement a Floor Space Index, which is economically viable should be provided. • He also suggested that there should be clear guideline for demarcating the vulnerability line and a single agency to be assigned for the work so that there are no disputes at a later stage. The data pertaining to vulnerability line shall be provided in the digital form or on a large scale map by Ministry of Environment and Forests.
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In the third meeting (on July 8th) with the representatives of Chambers of Commerce and Industry the following issues were discussed (Table 5.25)

Table 5.25: Consultation of review Committee with representatives of Chamber of Commerce and Industry

Representatives of Chamber of Commerce and Industry	Opinion/Issue raised
Member from CREDAI, Tamil Nadu	<ul style="list-style-type: none"> • Suggested that the demarcation of the vulnerability line should be left to the local body. • Further, in the Coastal Management Zone Notification there is no explicit mention of housing. Hence, the same should be incorporated. • He sought clarity with regard to the criteria of 400 persons per square km for declaring as Coastal Management Zone-II.
The Member from Kerala Builder Association	<ul style="list-style-type: none"> • Mentioned that the backwater areas in Kerala should be treated separately, since, the area along the backwaters are more than the seashore in Kerala and such backwaters areas are thickly populated. • He requested the Ministry to suggest the guidelines for demarcating the setback line and leave it to the local bodies for implementing.
The Members from CREDAI, Mumbai	<ul style="list-style-type: none"> • Indicated that in Mumbai more than 60% of people live in slums and about 16,000 old buildings are located in the CRZ area. These old buildings are crumbling and several deaths have occurred over a period of time. In order to provide a decent housing for the slum dwellers and for the people in the old buildings a higher Floor Space Index is required to make it viable. Hence, they requested the Ministry to consider providing higher FSI as provided in the DCR Rules.
The Member from Remaking of Mumbai	<ul style="list-style-type: none"> • Reiterated the same issues as mentioned by CREDAI, Mumbai. • He requested the Ministry to permit higher FSI in all developed areas and subject to the condition that the environmental issues are taken into consideration in the byelaws.
The Member from ACE Links	<ul style="list-style-type: none"> • Suggested the same as above and appreciated the Coastal Management Zone Notification as it provides for zonal planning
The Members for Alkani Manufactures Association and Tata Chemicals	<ul style="list-style-type: none"> • Indicated that the existing units of caustic soda, salt manufacturing units and other products which use seawater as raw material shall not be disturbed. • They also requested for permitting expansion and modernization of such units in the CRZ area. • The Member from Tata Chemicals suggested that the Coastal Management Zone Notification is a way forward for integrating the social and livelihood issues in the zonal plan. • The Ministry could stipulate conditions on the units operating in the area to have social responsibility as a part of their project.
The Member from Ganesh Benzoplast	<ul style="list-style-type: none"> • Suggested that storage of all products should be permitted in the coastal areas to be stored and handled

In the fourth meeting (on July 11th) with the representatives of NGOs and Fisherfolks' Association the following issues were discussed (Table 5.26)

Table 5.26: Consultation of review Committee with representatives of NGOs and Fisherfolks' Association

Representatives of NGOs and Fisherfolks' Association	Opinion/Issue raised
Ms. K. Hemalata, General Secretary, All India Fishers & Fisheries Workers' Federation	<ul style="list-style-type: none"> • Mentioned that if the CMZ Notification is finalized thousands of fishers would be displaced and their livelihood affected. • Large industrial development, thermal powers, ports etc., would be constructed in the coastal areas which will affect the fishermen. • She emphasize that the CRZ Notification prohibits activities and imposes regulation on development, while, the CMZ Notification allow setting up of industries, resorts, green filed airports etc. • The Federation has requested for a detailed and wide spread consultations before finalizing any notification. • She also mentioned that developmental activity in the coastal areas should be permitted only after the approval of the Gram Sabhas and the elected local bodies. • Trade union representing fishers should be included in the National Board.
Shri Mahesh Pandya, Paryavaran Mitra, Ahmedabad	<ul style="list-style-type: none"> • Agreed to the comments of Ms. K. Hemalata and brought to the notice of the Committee regarding the violations in Gujarat especially at Mundra. • He informed the Committee that large scale destruction of mangroves are taking place in the Mundra Region for developing SEZ. In spite of several representations, the Authorities have not taken any action so far and the SEZ is in progress.
Mr. Mangera, Chairman, Juhu Narayan, Juhu Moragaon, Mumbai	<ul style="list-style-type: none"> • He informed that in the name of slum redevelopment State Government gives away the land of the fishermen community to the builders with an assurance that the fishermen community would get a decent dwelling unit, but this has not happened. • The fishermen communities who occupy the prime land in Mumbai are displaced and their land sold at premium price to the developers. • They also showed pictures of illegally constructed building in the fishing, village in Versova against which they are fighting a legal battle for several years. • They requested the Committee to address the issues of the fishing community and to provide them the rights and ensure that their livelihood is not affected. • They also informed that if permitted they would construct their own houses but would require a higher Floor Space Index to meet the growing family needs.
Shri Ravindra D. Bhosale, Pune	<ul style="list-style-type: none"> • He requested the Committee to permit tourism projects which are located on the elevated areas of coast.
Shri T. S. Pawar, President, MHADA, Mumbai	<ul style="list-style-type: none"> • Inform the Committee that about 10,000 people from economically weaker section which have been allotted land in Mumbai are unable to undertake construction since, these plots fall in the buffer area of the mangroves. • He requested the Committee to consider their views and amend the notification accordingly.
The Representative from the Green Peace	<ul style="list-style-type: none"> • Agreed with the comments made by the above Representatives

The expert committee urged that the coastal zone management notification of 2008 may be allowed to lapse. Keeping the CRZ notification, 1991 as the basic framework, suitable additions/amendments may be made taking into account the new challenges likely to arise from climate change induced sea level rise, and the growing pressure of population on coastal resources and biodiversity. The lives and livelihoods of nearly 25%

of our population living within 50km of the shoreline, as well of the nearly 10 million fisher folk, will depend upon the decisions we take now to develop enforceable regulations for integrated attention to both ecological and livelihood security. In addition to regulations, education and social mobilization through Panchayat, Nagar Palika and other local bodies will be vital for ensuring that the unique benefits coastal eco systems confer are preserved in perpetuity for present and future use.

5.3 Consultations undertaken for project design – National Component

5.3.1 Consultations undertaken for setting up of a national Institute

The assessment was based on a desktop study (browsing institution websites and review of existing documents) and a questionnaire aimed at selected stakeholders. Two workshops were conducted to identify the existing challenges in coastal zone management in India, capacity constraints of institutions and opportunities and challenges facing professionals in the field of coastal management. A “Focus Group Discussion” (FGD) was conducted in April 2009 with International experts in coastal zone management from the UK, The Netherlands, and Canada. The Focus group discussion concluded that establishment of NISCZM in India is a unique idea and would serve as a role model for other coastal nations in South East Asia and rest of the World.

A detailed questionnaire with specific list of questions drafted using a few key benchmarks have been distributed to institutions working on coast-related themes. The questionnaire has been used in this study to reach a wide range of institutions, reach participants distributed over a larger geographical area especially covering every coastal state/ Union territory in India.

5.3.2 Consultations undertaken for Hazard mapping

A technical meeting was organized by the MoEF in New Delhi on 18th March 2008 to finalize the methodology for demarcation of vulnerability line envisaged in the Swaminathan Committee report. The meeting was attended by experts from various national and international institutes, representatives from the state government / coastal zone management authorities and World Bank. The following recommendations were made by the participants for hazard mapping:

1. For technical and scientific reasons, the term “Hazard Line” should replace the term “Vulnerability Line” for the purposes of mapping and demarcation along the Indian Coast.
2. Delineation of Hazard line will be based on following two components:
3. the coastal inundation levels (Flood line) due to natural factors such as tides, storm surges and cyclones;
4. the rate of coastal displacement (Erosion line);
5. A composite line representing the most forward side of the Flood and Erosion lines will form the Hazard Line;
6. Flood line will be estimated from the existing tide gauge data available for the country. The estimation will be based on three return intervals ie, 25,50 and 100 years;
7. Erosion Line will be estimated based on the rate of erosion computed from recent satellite data and topo-sheets. Extent of erosion for the next 25,50 and 100 years will be estimated from the rate of erosion;
8. The delineation of the Hazard Line will be done digitally on 1:50,000 scale. Wherever topo-sheets on 1:25,000 or better scales are available, the hazard line will be delineated on them. Additional accuracy will be provided by using GPS technology for specific sites;

9. the final output (Hazard Maps) will depict Hazard Lines as well as important landforms and landmarks for location identification;
10. NIO will be responsible for coordinating the work on flood elevations including the processing of raw tide gauge data provided by the Survey of India. Final output will be provided by NIO to Survey of India within six months of project initiation;
11. SAC will be responsible for coordinating the preparation of the Erosion line and providing all relevant data to Survey of India within one year from the start of project;
12. SOI will be responsible for the preparation of Hazard Maps as specified in recommendation 7 above;
13. In addition to the Hazard Maps, the position of the hazard lines will be marked on the ground by fixed markers on the ground;
14. A detailed project report will be prepared by the MoEF in association with above organizations and experts. The project will be completed in five years including the fixing of markers on the ground. Priority will be given to CMZ II and III in consultation with the State Governments;
15. A pilot study to test the above methodology will be conducted at selected site(s) in Orissa by SAC as a priority. For this purpose Sol has already provided elevation map to SAC. NIO will provide the flood line information to SAC as a priority.
16. Based on the experience gained in Orissa study (recommendation 13), a manual will be prepared under the auspices of the MoEF specifying the methodology to be used throughout the country.

The participants provided valuable inputs in the finalization of the methodology for hazard mapping. The details of participants are given in table 5.27.

Fig. 5.27: Participants of the technical meeting organized by the MoEF in New Delhi on March 2008

State/Agency	Participant
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WEST BENGAL	The Member Secretary, West Bengal Pollution Control Board & Member Secretary, West Bengal Coastal Zone Management Authority, West Bengal Pollution Control Board, Paribesh Bhavan, 10A, Block-L.A, Sector III, Salt Lake City, Kolkata - 700 098.

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WORLD BANK	GV Abhyankar

5.3.3 Consultations undertaken for Mapping and Delineation of Ecological Sensitive Areas

As part of framing methodology for Mapping and Delineation of Ecological Sensitive Areas several level consultations were undertaken. This includes i) one brainstorming session for finalizing the methodology for undertaking the study, ii) three regional workshops at different parts of the nation and iii) one national workshop.

Consultation Workshop (11th Aug., 2008, Thiruvananthapuram)

Experts in the coastal ecosystem studies and related field including experts from MoEF and from the state of West Bengal attended the meeting (Table 5.28). The objective is to discuss and finalize the strategy and methodology to be adopted for the successful execution of the project. It was decided in the session to prepare a list consisting of different ecosystems to be considered as potential ESA types and also to develop a set of definitions for ESAs in general and for each type of ESAs separately with justifications for each as well as various criteria for identification and delineation of ESAs. Unique areas such as seasonal mud banks in the Kerala coasts were also decided to be appropriately considered for inclusion in the list of ESA.

Table 5.28: Participants of consultation Workshop, Thiruvananthapuram

Sl. No	Name and Address
1.	Shri. Asheem Kumar Srivastav, Senior Technical Expert, ICZM Project, MoEF, Govt. of India
2.	Shri Pradeep Shukla, Director, Sundarban Biosphere Reserve, Government of West Bengal
3.	Dr. S.K. Khandoori, Director, Environment Management Agency, Government of Kerala

4.	Dr. Kamalakshan Kokkal, Principal Scientific Officer, Kerala State Council for Science, Technology and Environment,
5.	Dr. A.S.K. Nair, Senior Scientist, Marine Science Division, Centre for Earth Science Studies, Thiruvananthapuram
6.	Dr. Babu Ambat Executive Director, Centre for Environment and Development, Thiruvananthapuram
7.	Dr. Thrivikramji K.P. Senior Advisor, Centre for Environment and Development
8.	Dr. P. Natarajan, Team Member, Centre for Environment and Development
9.	Sri, V. Sisupalan, Team Member, Centre for Environment and Development
10.	Dr. George Chackacherry, Team Member, Centre for Environment and Development
11.	Dr. T. Sabu, Team Member, Centre for Environment and Development
12.	Dr. P.V. Karunakaran, Team Member, Centre for Environment and Development
13.	Dr. Vinod T.R, Scientist, Centre for Environment and Development
14.	Smt. P.N. Syamala, Scientist, Centre for Environment and Development
15.	Smt. Sumitha G.K., Scientist, Centre for Environment and Development

Regional Workshop-1(25 Sept.08, CED, Thiruvananthapuram)

Group of experts from various fields like Marine Sciences, Ecology and Natural Resources Management, Geology, Sociology etc participated in the workshop (table 5.29). In the beginning, the group discussed about various habitats and other areas to be considered as ESAs in the coastal regions of India and recommended the following ecosystems/areas to be considered as ESAs:

- | | | |
|-------------------|-----------------------|--|
| 1. Mangroves | 2. Lagoons | 3. Coastal forests |
| 4. Coral reefs | 5. Saline Creeks | 6. Salt Marshes |
| 7. Rocky Beaches | 8. Fresh water Creeks | 9. Sea grass beds |
| 10. Sandy Beaches | 11. Straits | 12. Sea weeds |
| 13. Muddy Beaches | 14. Mudflats | 15. Coastal Sacred grove |
| 16. Sand Dunes | 17. Sea cliffs | 18. Special Habitats (Turtle nesting grounds, Horse shoe crabs habitats, nesting grounds of birds, etc.) |
| 19. Estuaries | 20. Barrier islands | 23. Unique ecosystems (Mud banks, Pokkali, Kaipad, Kole Lands, Bheries, etc.) |
| 21. Lakes | 22. Coastal islands | |

The meeting examined the definition given to the coastal ESAs by the Swaminathan committee and suggested some modification as follows:

“ESAs are areas of coastal zone which need special protection and play an important role in maintaining the functional integrity of the coastal and marine environment, based on the current value and potential value when restored, harbouring diverse natural resources including biodiversity that provide valuable resources to local communities, support education and research and/or act as natural barriers to coastal hazards”.

The group also discussed some possible criteria for identification of ESAs in the coastal stretches of India. Biodiversity, Habitat, Geology, Socio – economic and Education & Research were identified as the main criteria with a number of sub criteria for each. The criteria which are pertinent to each of the above identified 23 ESA types have to be listed and the methodology for measuring each of the criteria has to be developed. The group also scrutinized the criteria required for the mapping of the Coastal ESAs, satellite data to be used, scale of the input and output maps, etc.

Table 5.29: Participants of Regional Workshop 1, Thiruvananthapuram

Sl. No.	Participant Name and Address
1.	Dr. A.S.K. Nair, Senior Scientist, Marine Science Division, Centre for Earth Science Studies,
2.	Prof. M.K. Prasad, Executive Chairman, Information Kerala Mission, Government of Kerala
3.	Dr. M.P. Nayar, Former Director, Botanical Survey of India, Calcutta
4.	Dr. K.T. Damodaran, Former Director, School of Marine Sciences, Cochin University of Science and Technology (CUSAT, Kochi
5.	Dr. P. Natarajan, Professor, Rajiv Gandhi Chair for Contemporary Studies, CUSAT
6.	Dr. V. Shobha, Head, Department of Environmental Sciences, University of Kerala,
7.	Dr. P.V. Madhusoodhanan, Head, Department of Botany, University of Calicut
8.	Dr. George Chackacherry, Team Member, Centre for Environment and Development
9.	Dr. Manoj Changat, Reader, Department of Futures Studies, University of Kerala, Thiruvananthapuram
10.	Dr. R. Sunil, Senior Development Consultant, Thiruvananthapuram
11.	Dr. E.J. James Team Leader & Chairman (RAC), Centre for Environment and Development
12.	Dr. Thrivikramji K.P. Senior Advisor, Centre for Environment and Development
13.	Dr. P.V. Karunakaran Senior Scientist, Centre for Environment and Development
14.	Sri. K.V. Ravindran Senior Advisor, Centre for Environment and Development
15.	Dr. Vinod T.R Senior Scientist, Centre for Environment and Development
16.	Dr. Babu Ambat Executive Director, Centre for Environment and Development

Regional workshop 2 (14th Oct., 2008, Central Institute for Brackish water Aquaculture, Chennai):

The main objectives of the workshop were:

- To discuss the definition of coastal ESA
- To identify the indicative habitats or biomes or ecosystems to be considered as ESAs
- To develop the criteria for the identification of ESAs

The workshop was attended by 22 experts representing different institutions and fields (table 5.30). To initiate discussion, the general approach of the study, definitions on ESAs, indicative list of habitats to be considered as ESAs and the draft criteria prepared based on the earlier workshop was presented in the workshop. After the presentation the gathering was divided into three groups to finalize (i) the definition, (ii) list of ESAs and

(iii) the criteria. The definitions for coastal ESAs as included in the MoEF notification and the one proposed by the project team were also examined by the group.

The definition derived during the workshop was “ESAs of coastal zone are areas that are vulnerable to degradation, need conservation, play an important role in maintaining the functional integrity of the coastal and marine environment, harbouring diverse natural resources for traditional and sustainable uses and/or act as natural barriers to coastal hazards”.

The lists of coastal habitats to be considered as ESAs were categorized in to four groups: (i) Terrestrial, (ii) Wetland, (iii) Marine and (iv) Special Habitats & Unique Geographical Ecosystem.

During discussion, it was suggested that some of the criteria may be considered as Primary, which could be used for identifying ESA and the remaining criteria may be used for categorizing the ESA in to different classes.

The following criteria were suggested as Primary criteria for identification of ESA

- Biodiversity
 - Species Richness
 - Community Richness
 - Endemism
 - Conservation Status of Species
- Habitat Suitability
 - Roosting/Breeding/Spawning of Species
 - Uniqueness
 - Naturalness (indicated by threats/management issues)
- Geology
 - Ground Water Recharge
- Socio-economic
 - Traditional Values

A list of other criteria presented has been regarded as Secondary criteria or the criteria that could be used for categorizing the ESAs.

Table 5.30: Participants of Regional Workshop 2, Chennai

Sl. No.	Name and Address
1.	Dr. Mohammed Kasim Principal Scientist, Central Marine Fisheries Research Institute, Ernakulam, Kochi
2.	Dr. A. G. Ponniah, Director, Central Institute of Brackishwater Aquaculture, Chennai – 600 028
3.	Dr. P. Ravichandran Head, Crustacean Culture Division, Central Institute of Brackishwater Aquaculture
4.	Dr. M. Jayanthi Senior Scientist , Central Institute of Brackishwater Aquaculture
5.	Dr. M. Muralidhar Senior Scientist , Central Institute of Brackishwater Aquaculture
6.	Dr. R. Selvam Senior Scientist & Project Director, M.S. Swaminathan Research Foundation (MSSRF), Chennai – 600113
7.	Dr. M. Srinivasan Centre of Advanced Study in Marine Biology, Annamalai University, Parangipettai - 608 502

Sl. No.	Name and Address
8.	Dr. Ajmal Khan Professor, Centre of Advanced Study in Marine Biology, Annamalai University,
9.	Dr. R. Sankaran, Director, Salim Ali Centre for Ornithology and Natural History, Coimbatore – 641 108
10.	DR. Mahendra (representing Director) Senior Scientist, Indian National Centre for Ocean Information Services (INCOIS), Hyderabad - 500 055
11.	Mr. Bijoy K. Thomas, Fellow, Ashoka Trust for Research in Ecology and the Environment (ATREE), Bangalore - 560 024
12.	Dr. Palaniswami, Senior Scientist, Botanical Survey of India, Southern Circle, Coimbatore – 641 003
13.	Prof. R. Ramesh, Director, Institute for Ocean Management, Anna University, Chennai - 600 025
14.	Dr. P.M. Mohan, Head of the Department, Department of Ocean Studies & Marine Biology, Pondichery University, Brooksha Campus, Junglighat, Port Blair – 744 103
15.	Dr. Ramesh, Department of Ecology, French Institute of Pondicherry, Pondicherry – 605 001
16.	Dr. A. S. K. Nair, Scientist, Centre for Earth Science Studies, Thiruvananthapuram
17.	Dr. E.J. James Team Leader & Chairman (RAC), Centre for Environment and Development
18.	Dr. Thirvikramji K.P. Senior Advisor, Centre for Environment and Development
19.	Dr. P.V. Karunakaran Senior Scientist, Centre for Environment and Development
20.	Sri. K.V. Ravindran Senior Advisor, Centre for Environment and Development
21.	Dr. Vinod T.R Senior Scientist, Centre for Environment and Development
22.	Dr. Babu Ambat Executive Director, Centre for Environment and Development

Regional workshop 3 (28th and 29th Nov., 2008, Ahmedabad):

The workshop was attended by 13 experts from various disciplines (Table 5.31). The findings of the last two workshops were presented in the beginning. After the presentation, the participants discussed on the definition and made some modifications in the proposed definition which is as follows:

“ESAs of coastal zone are areas which play an important role in maintaining the functional integrity of the coastal and marine environment, harbours diverse natural resources for traditional and sustainable uses, vulnerable to degradation, act as natural barriers to hazards, and areas which are ecologically important and significant”.

The participants also discussed about the types of coastal habitats to be considered as ESAs and modified the list prepared after the Chennai workshop. The addition in the list was as given below:

- Near Shore Marine Nurseries
- Marine PAs and their Eco-sensitive Buffer Zones
- Marine Mammals and Whale Shark Habitat

- Other Habitats of Conservation Significance
- Rocky Shores Rich in Biodiversity
- Coastal Important Bird Areas (IBAs)

The criteria for the identification of ESAs were then discussed and necessary modifications were made in the general criteria and for certain ESAs the criteria developed by the project team had been modified. The participants in general agreed on the approach for identifying criteria and suggested changing the scoring pattern or rather giving more than one method for identifying Ecologically Sensitive Areas. They also suggested that the adding up of sub criteria and ascertaining weightage may not be a good practice and instead it would be easier for subjective scoring of the sub criteria. But the project team insisted on quantitative weighted method rather than subjective scoring.

The general approach of using the concept of Conservation Value and Dependency Value for identification was agreed up on and it was suggested that the sub criteria under Conservation Value need not be added up on since they have individuality. The criteria used for Conservation Value are Biodiversity and Habitat. The sub criteria under Biodiversity are:

- Species Richness (key, unique or characteristic species)
- No. of Functional/Taxonomic Group
- No. of Endemic Species (among key, unique and characteristic species)
- No. of Threatened/Scheduled Species- IUCN, red data book of ZSI and BSI and Wildlife (Protection) Act

The sub criteria under Habitat are:

- Canopy Cover/Density or Vegetation Cover
- Roosting/Breeding/Spawning grounds
- Any Unique Geological Features
- Soil Organic Carbon

Under Dependency Value, there is only one criterion, Socio-Economic Criteria and it has been divided into different sub criteria

- Coastal Livelihood Dependency (No. and type of dependency)
- Naturalness (No. of anthropogenic threats/level of degradation)
- Cultural Value or Dependent on Cultural Value
- Aesthetic Value or Dependent on Aesthetic Value
- Coastal Protection against Natural Calamities

Table 5.31: Participants of Regional Workshop 3, Ahmedabad

Sl. No.	Name and Address
1.	Dr. Dishant Parasharya, Scientist, BNHS, Gujarat
2.	Dr. G. A. Thivakaran, Senior Scientist, Gujarat Institute of Desert Ecology, Bhuj – 370 001

3.	Dr. Indra Gadhvi, Professor, Marine Science Department, Bhavnagar University,
4.	Dr. Arun M. Dixit, Senior Program Associate, Centre for Environment & Social Concerns, Ahmadabad – 380 058
5.	Mr. Hardik Shah, Under Secretary, Department of Forests and Environment, Gandhi Nagar, Gujarat
6.	Dr. K. K. Ghosh, Director, Gujarat Ecology Society, Vadodara, Gujarat – 390 023
7.	Dr. Jayendra Lakhmapurkar, Associate Ecologist, Gujarat Ecology Society, Vadodara, Gujarat – 390 023
8.	Dr. Bharat Jethva Wetland International, Ahmadabad
9.	Nitin Vyas Department of Forests and Environment, Gandhi Nagar, Gujarat
10.	Dr. A. S. K. Nair, Scientist, Centre for Earth Science Studies, Thiruvananthapuram
11.	Dr. E.J. James Team Leader & Chairman (RAC), Centre for Environment and Development
12.	Dr. P.V. Karunakaran Senior Scientist , Centre for Environment and Development
13.	Dr. Babu Ambat Executive Director, Centre for Environment and Development
14.	Dr. P.V. Karunakaran Senior Scientist , Centre for Environment and Development

National Workshop (22nd Dec., 2008, IHC, New Delhi)

The workshop was organized to discuss and finalize the criteria for identification and mapping of Ecologically Sensitive Areas in the coastal areas as per the ToR. Senior level officers from MoEF (including Dr Nalini Bhat, Project Director ICZM) and state Forest departments of West Bengal and Gujarat, heads and senior scientists from various R&D organizations and national and international NGO representatives working in the field of coastal studies attended the workshop (table 5.32).

The theme of the workshop and suggestions and comments from the 3 regional workshops were presented initially. After the presentation, the participants discussed on the definition of ESA and suggested some modifications in the proposed definition. The definition was modified and finalized as given below:

“Coastal Ecological Sensitive Areas are those areas of coast that are biologically diverse, provide significant ecosystem services, maintain functional integrity and are susceptible to degradation that may cause irreversible ecological and economic loss”.

It was also decided that a paragraph of explanatory note will be provided for the definition in the final report.

The participants discussed the indicative list provided by M.S. Swaminathan Committee Report, MoEF notification and the list proposed by the project team. The participants generally agreed up on the fact that the Marine Protected Areas need not be considered as ESA since it already enjoys protection under different acts and it is an administrative unit rather than a habitat. After detailed discussion, a list of 14 items was accepted by the participants and they are termed as indicative coastal habitats to be considered as ESAs. The list is given below:

- | | | | | | |
|---|-------------|---|-----------|----|------------|
| 1 | Mangroves | 6 | Mud flats | 11 | Lagoons, |
| 2 | Coral reefs | 7 | Beaches | 12 | estuaries, |

3	Sea grass beds	8	Sand dunes	13	Creeks
4	Sea weed beds	9	Littoral forests	14	Salt marshes,
5	Mud banks	10	Rocky shores		

The approach and criteria presented by the project team has been principally accepted by the participants. The hierarchical approach of geographical classification which ensures the representativeness of bio geographic features, biological or natural value and human ecological aspect has been discussed. The group also agreed upon the approach of using Conservation Value and Dependency Value in identifying the ESAs. The major suggestions and comments on criteria and approach are,

- (1) In the hierarchical approach of mapping only three geographic levels (macro-bio geographic zone; meso-biotic province; and micro- land region) has been included. It was suggested that there can be two more levels in mapping i.e biome and site level.
- (2) It has been agreed by the participants to use the high resolution satellite data for the mapping exercise.
- (3) Once mapping of the coastal land covers are completed with ground truth verification, a preliminary exercise (with a few critical criteria) may be carried out for identifying the potential ESAs.
- (4) These potential ESAs may be further confirmed and prioritised based on criteria and weightage.
- (5) In principle the criteria prepared for each type of habitat has been agreed by the participants. But with respect to weightage, it is suggested that there may be more objectivity (statistical support). Moreover it was also suggested to refer the standard terminologies and procedures used in other countries for similar exercise.
- (6) It was also decided that the criteria should reflect the definition of ESA
- (7) The spatial approach of identification and vector analysis is accepted and it was suggested that field testing of the same may be attempted before finalizing the approach and criteria.
- (8) The workshop suggested avoiding sub criteria like soil organic carbon in identification, since it may be laborious to collect such data with respect to different patches of the same ESA type.

Table 5.32: Participants of National Workshop 2, New Delhi

Sl. No.	Name and Address
1.	Sri. D.K. Sharma IFS, Chief Conservator of Forests, Government of Gujarat, Gandhi Nagar - 382 010, Gujarat
2.	Dr. S.A. Hussain Wildlife Institute of India, Dehradun - 248 001
3.	Dr. B. R. Subramaniam, Project Director, ICMAM, NIOT Campus, Chennai – 601 302
4.	Dr. H.S.Mehta, Joint Director, Zoological Survey of India, Kolkatta - 700 053
5.	Dr. Ravisankaran, Director, Salim Ali Centre for Ornithology and Natural History, Coimbatore - 641 010
6.	Ms Asta Lakshmi, TE, PPF, ICZM MoEF, NewDelhi
7.	Ms. Vishaish Uppal Senior Coordinator, Sustainable Livelihoods Programme, WWF – India, New Delhi – 110 003
8.	Dr. C. L. Trisal, Director, Wetlands International – South Asia, New Delhi – 110 024

Sl. No.	Name and Address
9.	Dr. Nalini Bhat, Adviser, Ministry of Environment and Forests, Government of India, New Delhi – 110 003
10.	Dr. Rita Chauhan, Research Associate, PPF,ICZM,MoEF, New Delhi – 110 003
11.	Sri. N.C. Bahuguna IFS, Chief Conservator of Forests & Director, Sundarban Biosphere Reserve, West Bengal – 743 329
12.	Sri. Asheem Kumar Srivastav IFS STE-ICZM Project, Ministry of Environment and Forests, Government of India,
13.	Dr. Babu Ambat Executive Director , Centre for Environment and Development, Thiruvananthapuram
14.	Dr. E.J. James Team Leader & Chairman (RAC), Centre for Environment and Development
15.	Dr. P.V. Karunakaran Senior Scientist , Centre for Environment and Development

5.3.4 Consultations undertaken for the National Institute

The development of national institution building for ICZM was initiated with the assessment of the current capacity of the various institutions working on coastal themes and skill gap assessment. This was undertaken through interviews / questionnaire surveys / site visits and focus group discussions.

The Focus Group Discussions were held with the experts from MoEF – Government of India, international experts from UK, Netherlands, and Germany in addition to the Indian experts. The Focus Group Discussions concluded that the establishment of NISCZM in India is a unique idea and would serve as a role model for other coastal nations in South East Asia and the rest of the World.

The analysis carried out for the appraisal of the capacity and skills assessment of institutions was discussed in large participatory sessions with the Government officials and other key stakeholders to share their views on the country's existing capacities and constraints with regards to coastal management. These consultations have led to significant contribution to understand the deficits and needs while proposing the National Institute for Sustainable Coastal Zone Management.

5.4 Consultations undertaken by Communication Consultant

The ICZMP has been conceived by the MoEF as essentially a pilot to implement the new ICZM approach as formulated by the Swaminathan Committee. As the new reform is predicated on ushering in a new approach to the management of coastal zone areas, its success is envisaged to hinge for a large part on the successful communication of the (i) the aims of the new sustainable and integrated ICZM approach; (ii) the consultative and participatory manner in which this was forged and will be implemented; (iii) the expected environmental and social benefits it is expected to bring in. Although the approach itself and the Project design were based on a participatory and consultative approach there may also be some genuine concerns from some stakeholders that need to be addressed. With this larger objective, a project specific communication strategy is proposed to be formulated with the help of a designated consultancy, with the aim to generate awareness about the Integrated Coastal Zone Management Project among various stakeholder groups, minimizing misconceptions and creating stakeholder buy-in for the Project and the ICZM approach; help create two-way channels of communications between stakeholder groups at various levels and the project authorities to help in the design and implementation of the ICZMP; help develop the strategic communication capabilities of agencies engaged in implementing the program at the national, state and local levels; help incorporate

processes and mechanisms that enhance public disclosure and transparency within the ICMP project design and implementation activities. Given this background, consultations were carried out by the Communications Consultant, as vital aspect to the successful implementation of the project in the three pilot states and at national level. Various consultations were conducted at national and state level during preparation of the communications needs assessment.

The consultations at national level involved environmental experts, wildlife experts, representatives of the national fishermen federation and fishermen cooperative and officials of the MoEF responsible for the project. The consultations at the state level involved officials from the nodal implementing agencies, implementing partners, stakeholders from the fishermen community, Panchayat and community leaders, including discussions with representatives from media, industry, NGO's and academicians. The key outcome of the consultation is mentioned below:

- All print media reports on the MOEF's draft CMZ notification, very little on the ICZMP has been reported.
- Perception that regulations were not understood by the common coastal dweller and in particular the fisher people's views and concerns needs to be addressed
- Accurate information needed to counter belief that livelihoods are not really safeguarded by this project
- Confusion over categorisations requires attention and clarification- for example belief that earlier CRZ III categories would now become CMZ II which doesn't have a 'no development zone'
- Greater information sharing required on concerns over lack of transparency in implementation, lack of mechanisms of monitoring and redressal of grievances

The consultations conducted identified the following communications gaps that need to be addressed for successful implementation of the ICZM Project.

Communication Gaps (Fisherman groups)

- Awareness about ICZMP is varied
- Divided on how it will benefit them
- Larger fisherman approve it and smaller fishermen oppose it
- Man/animal conflict especially against Olive Ridley Turtles, crocodiles
- No clear understanding of benefits of alternative livelihoods

Communication Gaps (Farmers groups)

- Awareness on ICZMP varies
- Not very clear understanding of linkage between environment and mangroves
- Not clear of the benefits of environment protection to community
- Need accurate communication on changing shoreline and steps taken to arrest it
- Cannot understand technical interventions like geo tubes, therefore simpler communication is required to explain technology, advantages and disadvantages.

Communication Gaps (Panchayats)

- Awareness of ICZMP is limited
- Unaware of special services available that can be accessed for improved livelihood

Communication Gaps (Women groups)

- Gender component missing in all states as part of the priority investments —not a priority for PIAs
- Not aware of the difference between CRZ and ICZMP
- Awareness of linkages between environmental conservation and sustained livelihood varies

Communication Gaps (Media)

- In all three states awareness of ICZMP varies
- Keen to know more
- Want information in simple language and quickly
- Want dedicated communication officer/senior govt. official from whom information can be accessed quickly

Communication Gaps (Academics & NGOs)

- Limited consultations with both groups though they are knowledgeable & active
- Both groups want to be involved in developmental activities in their areas
- Need a common platform on which all the stakeholders can come together to share information

Skills Gaps (PIAs)

- PIAs have good levels of understanding of ICZMP concept but lack skills to communicate with NGOs, media, industry and academics
- Despite meetings held with the community, communication gaps exist especially on issues considered sensitive
- Need for better understanding of community issues, need to give more information as well as have more interaction
- PIAs of all three states need better inter-sector linkages, coordination and cooperation
- Greater inter-sector coordination needed between state agencies dealing with central government organizations
- State Nodal Agencies often unable to access MOEF's ICZM officials.
- Need skills to give technical information in a simple, easy to understand manner to community
- Mindset of forest department needs to change from one of authoritarianism to one of partnership
- Documentation not a priority, thus documentation of all meetings not well organized

5.5 Consultations during Environmental and Social Assessment Study

As part of the Environmental and Social Assessment study the Consultants project team visited the project areas in Gujarat, Orissa and West Bengal and informal discussions with officials of State departments like forest, environment, fisheries, water resources etc and some other stakeholders like fishermen, boat workers

and other coastal inhabitants. The major objective of this consultation is to identify the social and environmental issues in this area in general and to identify any specific issues related to priority investments identified by the States. The results of the consultations are given here.

5.5.1 Gujarat State

The project team undertaken consultations with officials and various stakeholders of the Gulf of Kachchh at Jamnagar, Bhuj and Veraval areas during the period of 16th to 19th February, 2009.

The stakeholders from the following categories were consulted.

1. Officials of State Environment and Forest Departments
2. Officials of GEER foundation, Gujarat Ecological Society and BAISAG
3. Officials of Jamnagar Municipal Corporation
4. Coastal inhabitants
5. Fishermen
6. Agriculturalists
7. Workers in Mangrove and other plantations

The following general environmental and social issues with respect to coastal area management were identified:

- Anthropogenic and natural factors pose severe threats to the marine ecosystems on the coast. At present, the damage caused by human activities is much higher than the damage caused by natural calamities like cyclones, storms and earthquakes.
- Concentration of population along the coast and municipal & household wastes are directly entering the coastal wetland system
- Many industries located very close to the coast, the major ones include cement, chemicals, petroleum and oil refineries, ship breaking industries, power plants, fertilizer, fishing etc. Coasts of Jamnagar, Kachchh, Hajira and Umbergaon are the glaring examples in Gujarat where large scale coastal border areas have been diverted for rapid industrialization.
- The increasing effluent waste discharged into the marine environment poses a serious threat to the marine flora and fauna especially to the coral reefs.
- As major refineries are established on coastline especially that of Gulf of Kachchh the ship and heavy vessel traffic has also increased in the area.
- Accidental oil spills from various vessels ferrying in GoK is a matter of serious concern as it may also be a potential threat to the coastal flora and fauna.
- Establishment of cross-country pipelines also causes disturbances particularly at the time of their establishment.
- The increasing ports and jetties especially mushrooming of private jetties causes serious concern for the conservation of marine life and calls for serious attention and efforts for conservation of marine biodiversity.

- Over exploitation of natural resources and destructive fishing practices using chemicals and pesticides like DDT have caused a lot of damage to the marine ecosystem.
- There is a spurt in recreational and tourism activities which causes threat to the marine life
- Presently, the coastal habitats, especially wetlands, mangroves, salt marshes, sea grasses and areas near beaches are facing coastal land clearance or used for urban, industrial and recreational development.
- Measures of coastal habitat loss are difficult to assess as there is hardly any record available.
- Coastal Cyclones, Earthquakes, Storms and flood are the major natural disasters occur in Gujarat coats of which the cyclones are the deadliest. There is about 2860 sq km cyclone prone area of which about 85% (2430 sq km) lies in the Saurashtra region and particularly the districts of Jamnagar, Junagadh, Amreli, Bhavnagar, Porbandar and Kachchh region. The Saurashtra and Kachchh regions experienced on 9th July 1998 the most devastating cyclone in recent past. Again in May 1999 the state would have been under devastating impact of cyclone, which, however deviated towards Pakistan in the West. Over a century from 1877 the coast here has experienced 16 worst cyclones – mainly over Saurashtra and Kachchh

Specific environmental issues with respect to the priority investments identified by the State are:

- Setting up environmentally friendly and effective system for collection, treatment and safe disposal of urban sewage in Jamnagar may cause pollution of water bodies land and ground water contamination in the surrounding areas of STP.
- Various construction activities for STP, lab buildings etc may cause water, air and noise pollution in the vicinity, if not mitigated properly.
- The Coral transplantation activity may have some consequences to the basic ecology of present reef systems (subsiding the growth of present reefs and loss of biodiversity due to one species dominance etc)
- If pollution is not checked properly, the survival of the transplanted species will be affected
- The Eco-tourism Development activities, if not properly planned and managed will create issues like air, water and noise pollution and biodiversity loss
- The Mangrove restoration activities, if not planned properly will cause loss of local species present in some areas

Specific social issues with respect to the priority investments identified by the State are:

- Construction activities may cause temporary obstruction to passage
- The proposed site for STP is now illegally used by local poor people for cultivation and taking over of the land from them may create some livelihood issue
- Selection beneficiaries for planting and sustainable use of Mangroves, various ecotourism activities and socioeconomic development activities may create conflict among the stakeholders
- The transplantation activity may hinder the moving of fishing crafts
- There is chances for hike in land value due to eco-tourism and local people may be shifted

- Proper marketing and capacity building strategies needed for various economic activities associated with ecotourism

5.5.2 Orissa State

The project team undertaken consultations with officials and various stakeholders of the Orissa coasts, mainly at Bhubaneswar, Chilika and Paradeep areas during the period of 13th to 15th January, 2009, 18th and 19th February, 2009 and 25th May, 2009..

The following categories of stakeholders were consulted during the visits:

1. Officials of State Environment, Forest, Fisheries, Water resources and Disaster Management Departments and OSPCB
2. Officials of Chilika Development Authority
3. Officials of Paradeep Municipal Corporation
4. Coastal inhabitants including women
5. Fishermen
6. Agriculturalists
7. Boat operators
8. Food stall owners in present ecotourism areas

The general environmental and social issues with respect to coastal area management identified during these consultations are:

- Orissa coasts are one of most vulnerable areas for tropical coastal cyclones. Recurring coastal cyclones and disruption of normal life in the coastal areas is a regular phenomenon along the Orissa coast. Over a century nearly 58 coastal cyclones affected Orissa coast.
- The super coastal cyclone of 1999 and its aftermath caused "severe" damage in the districts of Jagatsinghpur, Balsore, Cuttack, Puri, Nayagarh, Jajpur Kendrapada, Bhadrak and Khurda and "moderate" damage in the districts of Mayurbhanj, Dhenkanal and Keonjhar.
- The limited community and panchayat level resources can hardly be sufficient for restoration and the problem continues as a vicious coastal lands.
- Untreated disposal of industrial effluents, solid wastes, sewage and sewerage into the coastal water bodies is a major problem causing threat to biological resources. Among all the estuary of Orissa, Mahanadi estuary is considered as most polluted one and is still under potential threat from the future industrial expansion in its watershed. Atharbanki creek is heavily loaded with most of the municipal sewage of Paradip Township and effluents from the local industries.
- Fishing harbour activities at the estuary also affect the water quality.
- The pollution has far-reaching impact on the biota of the estuary, the spawning and the migration of the fish, shrimp and crab also on the mangrove swamps.
- The alteration of fresh water flow due to construction of hydrological structures upstream is also posing a major threat to the ecosystem of Bhitarkanika

Specific environmental related to priority investments envisaged in ICZM project identified during these consultations are:

- Adapting coastal protection measures in some areas and collection of sand for filling bags during the coastal protection activity may have some impact on coastal geomorphology and stability of beaches in the neighbouring unprotected areas
- The construction activities proposed for various activities like protection measures, regional laboratory etc, if not mitigated properly may cause water, air and noise pollution in the vicinity during construction phase.
- The Eco-tourism Development activities, if not properly planned and managed will create issues like air, water (oil spill from boats) and noise pollution and biodiversity loss
- The Mangrove restoration activities, crab fattening, goat rearing etc, if not planed properly will cause loss of local species present in some areas
- Waste management in the ecotourism areas requires high priority
- The solid waste management unit may create pollution issues in nearby areas, during transportation and processing

Specific social issues related to priority investments envisaged in ICZM project identified during these consultations are:

- Construction activities may cause temporary obstruction to passage
- Selection beneficiaries for various ecotourism and socioeconomic development activities may create conflict among the stakeholders
- Proper marketing and capacity building strategies needed for various economic activities associated with ecotourism
- There may be land value decline near the solid waste management site
- There are some kind of local informal groups in the surrounding villages of the ecotourism proposed areas(from only three islands traders are coming here and there is some sort of controlling mechanism among them); those can be strengthened and given livelihood trainings of their choice and also training on eco tourism. Similarly tourist spots could be developed in other islands by such clusters.
- Setting food courts in disaster prone areas will create economic loss

5.5.3 West Bengal State

The project team undertaken consultations with officials and various stakeholders of the West Bengal coasts, mainly at Sagar, Digha and Shankarpur areas during the period of 16th to 19th January, 2009 and 18th and 19th Jun, 2009.

The following categories of stakeholders were consulted during the visits:

1. Officials of State Environment and Forest Departments
2. Officials of DSDA and Sundarbans Affairs Department
3. Local Self Government representatives
4. Coastal inhabitants including women
5. Fishermen
6. Agriculturalists
7. Boat operators
8. Shop owners

9. Tourists

The general environmental issues with respect to coastal area management identified during these consultations are:

- Land reclamation by people for agriculture and settlement, destructing forest area. The gradual extinction of forest has given rise to less resistance of the land from the ravages of cyclonic storm and soil erosion.
- Anthropogenic threats like diesel driven fishing boats releasing hydrocarbon, fishing harbor activities, aquaculture farms, agriculture, tourism activities etc has increased tremendously during the last few decades.
- Construction of series of irrigation and drainage canals over centuries interfering the natural gradients
- Raising embankments along the major river systems against insurgence of saline water
- Excessive exploitation of mangrove forest wealth like timbers and fire woods. Several important fish and prawn species have been declining in the region due to deterioration of the mangrove vegetation and disturbances in the natural ecosystem.
- Indiscriminate collection of prawn seedlings and excessive fishing round the year in Sunderbans water, pose a serious threat on the natural environmental balance, flora and fauna of the region.
- The coastal water quality in West Bengal is changing due to untreated domestic and industrial effluents of the cities of Kolkatta, Haldia and also from major activities of ports, fishing and cargo boats, shipping discharges, wastewater from aquaculture farms etc
- About 400 tons of sewage per day arrives in the Sundarban area from Kolkatta Municipal Area, while another around 30 tons are released into the Hoogly per day which are then transported to the estuary
- The entire effluent of domestic and hotel sector of the largest coastal tourist resort of Digha is discharged untreated into the coastal waters.
- Saline water intrusion in surface and ground water is high in Digha area due to the indirect effect of shore line shifting in this region.

Specific environmental related to priority investments envisaged in ICZM project identified during these consultations are:

- Setting up environmentally friendly and effective system for collection, treatment and safe disposal of urban sewage may cause pollution of water bodies land and ground water contamination in the surrounding areas of STP.
- Adapting coastal protection measures in some areas and collection of sand for filling bags during the coastal protection activity may have some impact on coastal geomorphology and stability of beaches in the neighbouring unprotected areas.
- Protection with RCC will adversely affect marine biodiversity and economic activities in the nearby brackish water system
- Various construction activities for STP, Sewerage lines, Electrification, Tourism facilities etc may cause water, air and noise pollution in the vicinity, if not mitigated properly.
- The afforestation activities, if not planed properly will cause loss of locally important species

- Chances of water body pollution from the fish auction centre
- The Eco-tourism Development activities, if not properly planned and managed will create issues like air, water and noise pollution and biodiversity loss
- Tourist accommodation and Waste disposal system during festival periods is not managed properly now creating pollution. Special effort is needed in this regard.

Specific environmental and social issues related to priority investments envisaged in ICZM project identified during these consultations are:

- Construction activities may cause temporary obstruction to passage
- Selection of beneficiaries for shop rehabilitation, ecotourism and afforestation and other livelihood generation activities may create conflict among the stakeholders.
- Proper marketing and capacity building strategies needed for various economic activities associated with ecotourism
- There is chances for hike in land value due to eco-tourism and local people may be shifted

CHAPTER 6

ANALYSIS OF ALTERNATIVES

One of the major objectives of ecological assessment is to do a thorough analysis of alternative investment options and strategies considered in terms of environmental costs and benefits. A comparative analysis of alternative programs is highly recommended, applying indicators of environmental and social impacts and methods to evaluate and compare the indicators and ultimately the alternative options. The analysis of impacts and alternatives should result in a recommendation for an optimal investment strategy, in terms of environmental and social costs and benefits. This chapter outlines the various alternatives considered for the overall design of the project and the proposals for priority investments.

6.1 Analysis of alternatives for overall project design

An alternative to adopting ICZM approaches was to design this operation as a “simple and narrow” investment operation, concentrating only on the habitat protection and pollution control, in which the premier implementing agency, the MoEF, has substantial experience. This option was not selected because: it would not have resulted in sustenance of the outcomes (for example, coral reefs cannot be protected unless sewage flow to the reefs stops); it would not have responded to the request from Gol for supporting their reform agenda; and it might not have been practical at all, given that the MoEF has no jurisdiction on urban sanitation or similar other sectors responsible for degradation of coastal ecology.

Another possible option would have been to dedicate most of the project investment for coastal protection infrastructure, which is a popular demand at local levels; and linking capacity building actions indirectly to this. This was rejected due to the lack of understanding of regional coastal sediment transport processes, the risk of creating larger impacts elsewhere in the coasts, and lack of institutional viability. Given the survival and livelihood risks to the large coastal zone population, the rapid degradation of coastal resources, and the opportunity cost of prohibited economic activities, a “no project” option is neither viable nor desirable.

A potential feeble option was to limit the project only to training, awareness campaigns and studies on coastal conservation - mainly at national level but with possible inclusion of modules for each coastal state. This was rejected as it would have had only marginal impact on sustainable development of the coastal zone; would not have helped adoption of ICZM approaches (as the global experiences point out); and as such was not requested by the Gol. Also, it is important to note that all lessons learnt from implementation of Bank-financed projects point out that such approaches to project design are seldom viable, and such projects are unlikely to be sustainable.

Choice of the three participating states was based on extensive consultation among different Gol sector ministries, a prioritization based on the range and significance of the coastal zone management issues for the coastal communities. The choice was endorsed by a meeting of the NCZMA, where all coastal states participated. Within each of three states, the choice of the coastal stretch for preparation of ICZM plan and complementary priority investments was similarly debated, discussed and agreed among the key stakeholders.

6.2 Alternatives Considered for Hazard Line identification

The hazard line identification and mapping component is a key element of the project which has placed very strong emphasis on the definition and delineation methods. The design of this component is based on the premise and guided by the principles laid out in the Prof. M.S. Swaminathan Committee Report, which include elevation, geology geomorphology, sea level trends, horizontal shore line displacement, tidal range, and wave heights with MoEF as its key facilitator as follows:

- First, to ensure that the principle of security and safety of lives and properties is achieved, it is essential to define planning boundaries for ICZM, which takes care of the issue of coastal hazards. This will be achieved by delineating the coastal hazard line to form the basis for landward boundary of the planning unit. The hazard line needs to be defined based on “scientific” principles, and not by arbitrary definitions. This is to ensure that not only are local variations in coastal processes and geomorphology taken care of, but the principles are the same nation-wide. Once the hazard line is delineated, the landward boundary of the local administrative unit (panchayat or town boundaries) through which the hazard line passes will constitute the coastal management zone in mainland India. However, there is no need to delineate hazard lines for islands, as the entire island areas are subjected to coastal hazards. Hazard lines need to be delineated before the ICZM planning process starts at the state or local government levels.
- Second, to ensure that the principle of ecological security is achieved, and to respond to the national need for conservation of ecologically important areas, habitats and ecological associations, it is essential to delineate areas which need to be protected, restored and conserved. This will be achieved by defining such areas and habitats as ecologically sensitive areas (ESAs).

The above stated principles were debated among scientific communities in India with advantages and disadvantages and to develop appropriate methods for mapping. The following observations /outcomes were made during these consultations,

- The definition may be modified in two ways. First, it is not the coast that is vulnerable to coastal hazards, but rather coastal people and their properties. Second, the mapping of Vulnerability is distinct from the mapping of Coastal Hazards.
- These hazards should include flooding by the sea and coastal erosion.
- Of all coastal hazards, flooding by the sea is perhaps the biggest cause of death and injury to people and damage to property. Floods are caused by storms and such phenomena as surges, fresh water discharges to the coast and tsunamis. Floods occur with a statistical frequency so that bigger floods occur less frequently. It is clearly vital that flood hazard should be quantified and used in the definition of any setback zone on the coast of India.
- It is important to distinguish between the two concepts of *hazard* and *vulnerability*. The combination of hazard and vulnerability is the *risk* to people and property.
 - **Hazards** are defined as the events that harm people or things that humans value
 - **Vulnerability** is defined as the potential for damage or harm during a given hazard event
 - **Risk** = (Probability of Hazard) x Vulnerability.
- The advantages of coastal location attract development but coastal hazards put such development at risk. It is argued that the task of management is to provide a factual basis for people to decide when advantages of a coastal location are lower than the risks from coastal hazards.

- The approach adopted by most European nations has been one of protection against floods and erosion using various forms of hard defence. This has inevitably led to a mistaken belief that hazards have been eliminated and thus population density and infrastructures have increased along coastal areas, necessitating continuous and costly upgrading of defences. In addition, the lack of sedimentation landward of the defences and the increase in sea level to seaward has meant that many areas are now considerably below sea level with attendant increases in risk.
- The approach taken in India is, wherever possible, to resist the construction of hard defences and instead to avoid coastal hazards by locating populations and infrastructures away from the coast. This was the basis of the initial CRZ Notification and remains the goal of the Vulnerability Mapping proposed by the Swaminathan Report.

In view of the above discussion, it is emphasised that the use of the term Vulnerability Mapping in the Swaminathan Report should be replaced by the term Hazard Mapping.

- a. It is important to note that the vulnerability of an area to coastal hazards can be reduced through risk intervention. For example, houses can be raised on stilts or mounds. Similarly, the vulnerability of people can be reduced, for example using flood warning systems, providing escape roads or raised flood shelters. Equally, coastal hazards may be reduced using hard defences (e.g., embankments) or soft defences such as bio-shields (mangrove, salt marshes, and sand dunes). Such intervention should play a part in the evaluation of risk to any coastal community. The hazard mapping proposed here, however, is designed to reflect the natural hazards of an area without any such intervention occurring.
- b. The methodology suggested accordingly, contain the following components.
 - Flood Hazard Mapping (Flood return intervals, Flood hazard statistics)
 - Sea level rise
 - Coastal erosion
 - The composite flood line
 - The preferred return interval

The conclusions from the Swaminathan Report, as well as the several expert committee meeting (convened by MoEF since 2005) can be briefly summarized as follows:

- Mapping the coastal hazard zone is an internationally accepted approach to set-back line definition;
- The methodology proposed here is simple and unambiguous;
- The data requirements are flexible and adaptable;
- Adoption of a hazard zone approach would reduce risks to people and their property

The methodology for delineating the hazard line (earlier called the “vulnerability line”) has been agreed by the experts and the representatives of the coastal states. Implementation of this component is however dependent on several factors – (i) availability of data, both topographic and coastal flood data; (ii) capability of the agencies and institutions to undertake this work; and the (iii) challenge of coordination of the different agencies that could be involved in the work. For topographic data, either the Survey of India (Sol) or the Indian Space Research Organization (ISRO) would need to be involved, as most of the data is classified and is not publicly available. Even within Sol or ISRO, reasonable doubts remain that the relevant data (0.5m contour) is not available, and more importantly, that these agencies will be able to collect the data

and process it in such time that it is useful for the project. On the coastal flood levels, the historical database is available with the Sol, but the analyses needs to be undertaken by a specialized agency/individual.

6.3 Alternatives Considered in ESA Mapping

ESAs consist of all protected areas (PAs), and ecosystems and habitats which has got significant ecological and social values. ESAs, including those not under the PA category, need to be identified and delineated before the ICZM planning process starts at the state or local government levels. All such ESAs will be classified into CRZ-I, and the responsibility of preparing and implementing management plans for such areas will rest with the MoEF,GoI. This will ensure that important ecological and intergenerational values are not disturbed by local development pressures, if any. During the consultation for developing the methodology for mapping and delineation of ESAs, various alternatives were considered at different stages, from definition to methods of mapping. The whole exercise was carried out in the context of the lapsed notification (CMZ notification, 2008). Since the said notification is not in place, the purpose of this national component is to strengthen the capacity building of the project. The choice of continuing the coastal zone management with the ambiguity and subjectivity of the ecological sensitive area of CRZ notification in the context of ICZM project is highly irrelevant and it continued to invite more violations. Hence the mapping and delineation of ESA is suggested to bring an end to this ambiguity or vagueness exists with the CRZ.

6.3.1 Definition

The definition for the ecologically sensitive area was evolved from the concept of ecological sensitivity which is inextricably linked with the concept of biological diversity, human use and sustenance for posterity. Some of the important considerations borne in mind to formulate the definition are the potentiality of loss of existing biological wealth. Accordingly the MoEF, in its draft notification (2008) defines ESAs as *“areas of coastal zone that play an important role in maintaining the functional integrity of the coast, including acting as natural barriers to coastal hazards and/ or harbouring a diverse biodiversity that provide valuable resources to local communities”*.

During the regional workshops (refer chapter 5 section 5.3.3. of this report) this definition was presented and was modified two times before finalization (refer chapter 5 section 5.3.3. of this report). Finally, the national workshop finalised ESAs as *“Coastal Ecologically Sensitive Areas are biologically diverse ecosystems which provide significant ecosystem services, maintain functional integrity, withstand stress factors but are susceptible to degradation that may cause irreversible ecological and economic loss”*.

This definition infers that the ESAs should have considerable degree of conservation importance indicated by:

- biological diversity which is the simplest expression of species assemblage (native species) in an area that should be representative to the particular land region;
- ecosystem services such as provisioning (food, water and other resources), regulating (pollution, climate, disasters, disease, etc) supporting (nutrient cycling), preserving (guarding or protection from disasters) and cultural (aesthetic , educational, recreational, etc);
- Functional integrity which is the total expression of an ecosystem towards its services to different components viz., living and non living. A well integrated system responds to external pressures so that the impacts will be minimized (resilience);
- Stress factors which mean any anthropological events or actions that are capable of changing the ecosystem structure, either the physical or biological components. Such events results to

degradation which ultimately brings economic and ecological loss to a quantum that may not have perceived in the current scenario.

6.2.2 Indicative list of ESAs

The M.S. Swaminathan Committee Report provided an indicative list (mangroves, coral reefs, sand dunes, Inland tide/ water bodies such as estuaries, lakes, lagoons, creeks & straits, mudflats, marine parks and sanctuaries, coastal forests & wildlife, coastal fresh water lakes, salt marshes, turtle nesting grounds, horse shoe crabs habitats, seagrass beds, sea weed beds, and nesting grounds of migratory birds) of 14 important areas to be considered as ESAs. The MoEF while preparing the draft notification (which is lapsed) has removed two of them (i. Inland tide/water bodies such as estuaries, lakes, lagoons, creeks and straits ii. coastal forests and wildlife) and suggested 12 areas as indicative ESAs (some are vague eg, Coastal freshwater bodies such as creeks, lakes etc). During the regional and national workshops these lists were discussed (refer chapter 5 section 5.3.3 of this report) with additions and deletions. Finally the list came up to 14 coastal habitat types that could be considered as potential ESAs (refer chapter 5 section 5.3.3 of this report).

The alternate available is the existing practise of identification of ecologically important areas (a study conducted by the Institute of Ocean Management, Anna University) in the coastal region of India based on biological criteria which are derived from satellite data and literatures. Earlier Government of India also declared (under Environment Protection Act) certain areas as ecologically fragile/important but with no scientific and objective criteria. But in the context of reform agenda for sustaining coastal and marine areas where not only the biological wealth is important but the social and cultural aspect too are vitally relevant, a scientific approach is warranted. Hence the choice of going ahead with the existing practise of using only biological parameters and subjective approach for identification and mapping of ESAs vis-à-vis CRZ-I would not do justice to the broader project objectives and goals, i.e the sustainability and conservation of coastal environment. The reform agenda put participation, integration and decentralization as the key element for managing the coastal resources. Hence giving adequate weightage to both biological and social values have been necessitated and the same is being incorporated in the criteria. Regarding the methodology for delineating, a threshold level score for each criterion would allow to identify the biologically rich and socially relevant patches of habitats or ecosystems among the non-PAs in the coastal belt to be declared as ESAs. It is important in the context of multi land tenureship in the coastal belt of certain states especially in Kerala, Karnataka, Goa, etc. where otherwise declaration of such private property would become a prolonged legal battle.

In order to ensure geographical representation for ESAs a hierarchical scale or “top-down” approach, i.e., starting from Country (at Macro level), the region is successively subdivided into smaller scales at Meso level and to Micro level. The micro- level geographical region, called the Land Region is a unique approach adopted in the mapping and delineation of ESAs. It takes into consideration of the variability within the coastal habitats in different regions of the country.

6.3 Selection of states, coastal stretches and priority Investments

At the outset, the need for the state components was determined by the intent, and importance placed by Government of India on the decentralized management of coastal zones at state or local government level. In this context, Gujarat, Orissa and West Bengal have been selected by the Ministry of Environment and Forests in consultation with the government departments of the coastal states of the country over the

remaining nine states. As both land and water are subjects within the state's jurisdiction, no development or conservation plan can be prepared or implemented at the national level. While the national government may make policies and legislation (subject to state ratification, as far as jurisdiction apply), application of ICZM will be at the state/local levels. A project to support operationalization of ICZM approaches in India will not have any impact unless such approaches are piloted at the state/local levels. International experiences also suggest that adoption of ICZM policies do not result in conservation or sustainable management of coastal zones, until the practical benefits of adopting the policies are demonstrated at the local level.

Recognizing the current scenario, where there is insufficient understanding about stakeholder participation, inclusion processes, coastal processes and ecological resources, there is no effective mechanism for integration of sectoral activities, or for resolving competitive demands on resources. In many cases, there is no culture of integrated or joint actions for common purposes. It was therefore recognized that a plan preparation process, howsoever extensive, (such as the ICZMP proposed) cannot address each of these issues, and needs complimentary activities to ensure its success. These complimentary activities will include institutional capacity building, and demonstration investment in priority activities.

- a) ICZM plans: The coastline in each of the three states is long. It is unlikely that one plan can take care of the entire coastal zone of Gujarat (approximately 1600km), or Orissa (480km). Each state therefore recommended one or two of their priority coastal stretches, following the project criteria of environment degradation, livelihood security and coastal protection. The project will support preparation of ICZM plans for these stretches. In the process of preparation of such plans, the expectation is to build capacity of the state and the stakeholders such that they will prepare the ICZM plans for the other stretches. Once ICZM plans are prepared, the states will adopt and implement these.
- b) Capacity building needs, complimentary to the ICZM plan process, are different for each state, depending on the particular need of the state. Overall, the state level capacity building sub-component in this project will concentrate on (i) understanding the nature and propagation of water pollution that affects coastal and marine life; and (ii) research on important coastal ecological resources. These capacity building activities are designed to inform the stakeholders about the ICZM plan process.
- c) International experience shows that unless local priority issues are directly addressed by simultaneous actions, an ICZM plan process may be seen as an exercise in the abstract by stakeholders. Some investment is needed therefore in conserving critically endangered ecosystem, particularly where waiting for completion of the plan process would mean accelerated destruction of ecological resources. Investment in priority activities is important also to complement the process of inter-sector integration through the ICZM plan. However, the selection of priority investments needs to be done carefully, based on the following principles.
- d) The priority investments are such that they would expectedly be part of any eventual ICZM plan prepared, such as protection of coral reefs, or pollution control at beaches. However, any investment that can potentially jeopardize quality of the ICZM plan itself needs to be avoided (e.g., any investment in large-scale infrastructure, such as a seawall). The current selection of priority investments in the project is consistent with this principle.

- e) As the priority investments are selected to complement the ICZM plan, these are located only in the coastal stretches for which ICZM plans would be prepared. Each of the priority investment is designed to ensure the sectoral departments participate in the ICZM plan process.
- f) Further, the priority investments selected are expected to support the inter-sector integration. Each of the priority investments is expected to demonstrate benefits of either inter-departmental integration (two or more sector departments working together in one activity, such as a combination of hard and soft coastal erosion protection work); integration of purpose (two or more departments working to achieve one objective, such as restoration of coral reef by planting of diverse species of corals and stopping sewage flow into the corals); or geographic integration (two or more departments achieving independent but consistent result in the same geography, such as a sea beach).

The current selection of priority investments evolved through a consultative process among relevant stakeholders. The eventual selection of priority investments incidentally offers the possibility of demonstrating investments in conservation of ecological and cultural heritage resources, livelihood improvement activities for coastal communities, including alternative livelihood for people where return from traditional livelihood is reducing; and pollution control or mitigation (*This was incidental because there was no deliberate intention at any of the three project states to cover all of these issues. As such, in none of the three states all of these are covered, denoting the differences of coastal resource endowments, of perceived threats, and of priorities among the stakeholders. Overall, this incidental selection of priority investments which shows a strong linkage to the recommendations of the Swaminathan Committee possibly demonstrates the strong alignment between the state and the national level policy-makers on issues and options for coastal zone management*). In design of the priority investments, attention was focused on clear demonstration of inter-sectoral integration; community participation; mainstreaming gender, poverty and equity issues.

As applicable, design of each priority investment concentrated on the need to demonstrate physical, environmental and financial sustainability; quality control; and clear allocation of financial and human resources for operation and maintenance.

In the above context, the table 6.1 provides a summary of the platform for analyzing alternatives for the coastal stretches and investments, covering development issues pertaining to each participating state, challenges for ICZM, identified coastal stretches for demonstrating ICZM related activities, current status of State government response to existing regulatory regime and identified institutional gaps.

Table 6.1: Readiness Criteria to Determine Scope and Need for State Level Pilot Investments

Description	Gujarat	Orissa	West Bengal
Issues	Rapid development of economic infrastructure, conservation of marine ecosystem, cyclones, pollution threats	Rapid Development, extremely fragile marine ecosystem, livelihood, floods and cyclones	Erosion and sedimentation, biodiversity, livelihood, floods and cyclones, climate change
Identified Areas for State Level Pilot ICZM Activities	(i) Southern Coast of the Gulf of Kachchh	Identified based on feasibility and expected complexity: (i) Gopalpur - Chilika (ii) Paradip - Dhamra	(i) Digha - Shankarpur; (ii) Limited area to be identified in the Sundarbans (i.e. Sagar Island)

Description	Gujarat	Orissa	West Bengal
ICZM Challenges	<p>Improve coordination between industrial/ urban development and conservation of the marine national park;</p> <p>Improve management of oil-spill response (institutionally and through hardware).</p> <p>Development of marine resources for sustainable economic livelihood</p>	<p>Coastal erosion & saline water ingress – prominent in Pentha, Gopalpur, Satabhaya etc.</p> <p>Vulnerability to disasters– frequent floods, cyclones</p> <p>Biodiversity conservation – reduction of mangroves vegetation , protection of Olive Ridley, crocodiles, dolphins, birds & species research</p> <p>Livelihood security – loss of livelihood due to biodiversity conservation & protection of fish breeding area</p> <p>Environmental quality management – pollutions due to industries, ports, inadequate monitoring mechanism.</p> <p>Preservation & improvement of archaeological & cultural heritage – inadequate maintenance in saline environment</p>	<p>Maintain the natural resource base in order to continue providing the basis for long-term economic development</p> <p>Manage environmental health and hygiene among tourists and host population, including appropriate sewage options.</p> <p>Link livelihood needs to coastal infrastructure development/maintenance (embankments; beach erosion measures)</p>
State Government Response	<p>State CZM Authority convenes regularly.</p> <p>Already prepared draft ICZM plan for the state.</p> <p>Already prepared proposals for oil-spill management.</p> <p>Already have initial working arrangements between the state and the large industries for coastal zone management.</p> <p>CRZ regulations being implemented.</p> <p>Good achievement in implementing the disaster management projects.</p>	<p>State CZM Authority is convened irregularly.</p> <p>Limited success in implementing CRZ regulations.</p> <p>Good achievement in implementing the disaster management projects.</p> <p>Good experience in conservation and development of Chilika lagoon.</p>	<p>State CZM Authority convenes regularly.</p> <p>A number of studies on Sundarbans, its delta, mangroves and livelihood completed¹.</p> <p>Already prepared proposals for ICZM in each of the 3 coastal stretches.</p> <p>Developed some institutional capacity and expertise.</p> <p>CRZ regulations somewhat implemented.</p> <p>Development Authorities such as Digha Sankarpur Development Authority, Sundarbans Affairs Department, with clear mandate are already in place.</p>

¹ A number of studies have been conducted in the Sundarbans on geomorphology, mangroves, man-tiger conflicts, livelihood issues, etc. For e.g on *Environment, Population And Human Settlements of Sunderban Delta* by Anuradhha Banerjee; *Sunderban–A Socio Bio-Ecological Study* by A.K Mandal and R.K. Ghosh; *Mangrove Forest of the Sunderbans : Its Impact on Estuarine Fisheries* by K.R. Naskar and A Ghosh; *Development Perspective of Coastal Ecosystem of Sunderban Forests* by Kalyan Chakrabarti; *Issues in the Integrated Planning and Management of River/lake Basins and Coastal Areas* by UNCHS (Habitat); *National Report on the Status and Development Potential of the Coastal and Marine Environment of the East Coast of India and its Living Resources* by Sampath, V; *Review of coastal and marine livelihoods and food security in the Bay of Bengal large marine ecosystem region* by Philip Townsley; etc.

Description	Gujarat	Orissa	West Bengal
			A number of actions related to protection of shoreline and prevention of erosion.
Gaps to be Addressed before Preparation of Proposals for Priority Investments – Readiness Criteria	<p>Environment Department to create a Project Preparation Cell.</p> <p>Agreement with the Jamnagar Municipal Corporation to address the coastal sewage issues.</p> <p>Willingness of the Tourism department for development of appropriate eco-tourism program.</p> <p>Agreement that responsibilities for off-shore oil-spill management would be better managed (with Indian Coast Guards) with clear mandate and adequate resources.</p>	<p>Environment Department to create a Project Preparation Cell.</p> <p>Preparation and agreement on a Plan for overall capacity building of the Environment Department and other Departments linked to coastal zone issues.</p> <p>Better acknowledgement of the environmental and pollution issues in the coastal zone.</p> <p>Agreement that the State CZM Authority will include / coordinate with the Chief Wildlife Warden (who currently holds jurisdiction over 350km of the 480km coastline), and the Orissa State Disaster Management Authority.</p>	<p>Environment Department to create a Project Preparation Cell.</p> <p>Agreement that sewage and other pollution issues would be addressed by the ICZM plans.</p> <p>Willingness to inventory the hotels and guest houses, which operate without licenses in the Digha - Shankarpur sector.</p>

6.3.1 Preparation of ICZM Plans

The ICZM plan would minimum illustrates the following

- New Coastal Impact Zone as per the M S Swaminathan Committee Report will be identified
- Description on the coastal and marine natural processes and anthropogenic activities
- Resource base maps (spatial data based)
- Stakeholder scenario, their requirements, concerns, conflicts, and perceptions
- Information on the current pressures and dependency on coastal and marine resources (both traditional and modern)
- Descriptions on management issues
- Management strategies and actions

Considering the above points, the choice of preparation of sectoral plans for different agencies involved in the coastal resource utilization was not considered to tackle the multitude of issues, because a study conducted earlier on the effectiveness of projects already implemented in the coastal region indicated that one of the major flip side of the these projects were lack of coordination or integration in the sectoral activities. Hence most of the problems still exist even after the implementation of CRZ for more than one and half decade, for example, the discharge of sewage and solid waste into coastal environment. Since the responsibility of treatment vested with local self governments (Municipal Corporations/Municipalities/ Grama Panchayat) and the implementation of the regulations (CRZ) is by Department of Environment in respective state, there is no proper coordination in these activities. In such situations it would be always better if both the agencies are involved in the management. Moreover the availability of resources (technical, technological, financial) could also be shared among various agencies if an integrated approach is being adopted.

The sectoral plans will only address the capacity building, training and awareness of that particular sector or stakeholder associated with that sector. This would not help in managing the issues in a highly dynamic coastal and marine environment. Hence an integrated approach would always address the strength, weakness and other aspects of the cross cutting sectors which would enable them to address the issue of sustainability.

6.3.2 Analysis of DPRs on Alternatives Considered

An analysis of the DPRs prepared by the States shows that, most of the priority investments are related to capacity building or knowledge base development where alternatives are seldom available. Although knowledge base could be developed through published information, they may not be relevant to the context. Hence primary study has been suggested. In the case of waste treatment and sewage disposal according to the prevailing legal frameworks, they can not be discharged directly into the environment. So no alternative for the approach is available. Moreover considering the significance of the ecosystem or habitat, sewage and solid wastes need to be treated with the best technologies available in the country. So technology wise also minimum or no alternative is available other than the suggested one in the DPR. Even then the methods adopted for most of the activities are based on lessons learned and experience gathered from different practices done previously. However, attempts were made in some of DPRs to identify alternatives (Table 6.2).

Table 6.2 Priority investments, activities and alternatives considered for the project components in the three states

Priority action proposed	Activities	Alternatives Considered
Gujarat		
Setting up environment friendly and effective system for collection, treatment and safe disposal of urban sewage in Jamnagar (JMC)	Commissioning of a sewerage treatment plant and sewer network	Nil
Coastal Resources Conservation and Management: Mangrove Restoration (GEC & MNP)	Conservation and regeneration of mangroves by local communities, Government and coastal industries. Capacity building of coastal communities and Government for community based mangrove regeneration	Nil
Coastal Resources Conservation and Management: Coral Transplantation	Transplant some of the selected coral species in Gulf of Kachchh.	Nil
Coastal Resources Conservation and Management: Eco-tourism Development (Forest Department –MNP)	Ecotourism through developing Oceanarium, Coral watch trail, Mangrove canopy walk etc. Eco Development in 85 villages around Gulf of Kachchh, Sea Turtle conservation programme on the northern coast of Gulf of Kachchh in Gujarat. Conservation awareness and education programme Protection, boat patrolling	Nil

Priority action proposed	Activities	Alternatives Considered
Coastal Environment Monitoring and Conservation: Sea Water Monitoring for Chemical Parameter (GSPCB)	Strengthen the two coastal regional offices and establish an additional office equipped with state of the art high tech instruments and monitoring facilities including logistics and communication support. Provide additional training to the staff (including new staff) to maintain these facilities with an aim to control environmental pollution in the coastal areas	Alternative-1: The entire work based on the scope and the requirement, could be outsourced to any expert institute / agency. This could definitely offer us quicker and easier way of the task. However, this cannot inherit any scientific training and understanding to the GPCB staff and the perpetual propagation of skill and knowledge which imparts institutional reform through paradigm shift in the attitudinal and behavioural pattern, that human resource cultivation component is missing. Alternative-2: The task can be broken up in to micro part as per the spatial requirement and then the location specific work can be assigned to local authority / agencies and World Bank can straightway finance at micro level. However, this will require more material, finance, time and manpower and still the quality of work and uniformity in the exercise could not be guaranteed and again the data and observations could conflict among each other. Thus the vision behind offering such project could be jeopardized.
Coastal Environment Monitoring and Conservation: Sea Water Monitoring for Bio-Physical Parameters (GEER Foundation)	Capacity building of GEER Foundation for long-term research and bio-physical monitoring in the coastal areas of Gujarat Generating information about biophysical status of the intertidal areas and to develop benchmark information about the floral and faunal diversity in the Gulf of Kachchh.	Nil
Socio-Economic Development (GEC)	Improve socio-economic conditions of coastal community and protect, conserve and sustainably utilize coastal resources local communities and government. Capacity building of coastal communities to manage coastal zone in integrated manner	Nil
Integration of Geo-Spatial Information	Preparation of an organized, planned and coherent coastal spatial database for effective and constant coastal zone management. Provide a system for supporting the process of integrated coastal zone planning and management at various levels	Nil

Priority action proposed	Activities	Alternatives Considered
Orissa		
Regional coastal processes studies (CDA & BU)	Collection and collation of primary/ secondary information on coastal processes, change analysis, construction of impact models and development of Shoreline Management Plans for the critical areas	Nil
Shoreline Protection at Pentha (Water Resource Department)	Build a second retard line (embankment) and to protect the existing retard line, a Geotube filled with sand is proposed to be constructed between the existing embankment and the proposed one (retard line)	The alternatives considered are (i) concrete wall protecting the embankment, (ii) masonry wall protecting the embankment, (iii) embankment protected by rock rip-rap and (iv) embankment protected by geotubes covered with gabion mattress and gabion bonat. Geotubes are found to be more feasible because <ul style="list-style-type: none"> they are more stable hydraulically and geotechnically since they are heavier units with larger width to height ratio and have better boundary contact with adjacent units. The gabion mattresses will absorb the wave forces and dissipate the wave energy in a better way due to void spaces in between the stones and larger surface area of the small stones used in the gabions.
Construction of Multipurpose Cyclone Shelters (MPCS) (OSDMA)	Construction of 14 Multi-Purpose Cyclone Shelters (MPCS) – with total built up area of 22,000 sq. ft. to accommodate 22,000 people and using the MPCS.	The only alternative is to use existing buildings which is not safe due to low floor height
Protection of Olive Ridley Turtles & Aquatic Wildlife (CDA & Wildlife Dept.)	Boat based intensive patrolling at sea and watch and ward on beaches for conserving Olive Ridley turtle	Mentioned that this is the standard way
Species Research at Chilika (CDA & Wildlife Dept.)	Water quality monitoring and species research	Nil
Plantation of Mangroves and Mangrove Associates (CDA & Wildlife Dept.)	Plantation of mangrove (133 ha) and casuarinas (77 ha) along eroded river banks and in other degraded areas	Nil
Livelihood opportunities Fisheries based livelihood option (Fisheries Dept.)	Crab fattening, Dairy & Goatery, Value addition of fishery products) and by forming 600 SHGs	The alternatives considered are growing of sea weeds and sea grass. Since they require more efforts and attention, crab fattening is preferred.
Coir making (Industries Dept.)	Establishment of training-cum-production centre.	Mentioned that no other alternatives available
Eco-tourism based Livelihood Improvement in Chilika and Tampara (Tourism department)	Developing various facilities for ecotourism Development	Nil
Ecotourism in sensitive habitats (Forest & Wildlife Dept.)	Creation of facilities for camping and trekking in sensitive areas	Nil
Establishment of Environmental Monitoring Laboratory at	Construction and equipping Environmental Monitoring	Nil

Priority action proposed	Activities	Alternatives Considered
Paradeep (Orissa SPCB)	Laboratory at Paradeep	
Establishment of solid waste landfill and treatment facility at Paradeep (Housing and UD department)	Collection, segregation and transportation and disposal of Municipal Solid Wastes in hygienic and systematic way	Nil
Conservation and improvement of Archaeological and cultural assets (State Archaeology Department)	Conservation, environmental upgradation and providing illumination to major forts and temples in the coast	Nil
West Bengal		
Renovation of Sanitary Sewerage Scheme for Digha Area (P.H.E Directorate)	Construction Sewerage lines and Waste stabilization ponds comprising of anaerobic, facultative and maturation ponds	There are four most commonly used biological processes, (i) Activated Sludge Process, (ii) Trickling Filter, (iii) Aerated Lagoons and (iv) Stabilization Ponds. A comparative study of such processes has been made regarding advantages and disadvantages. Corresponding cost for initial construction as well as operation and maintenance have also been taken into account. Waste stabilization ponds comprising of anaerobic, facultative and maturation ponds would be the best option as the anaerobic and facultative ponds are used for BOD removal and maturation ponds are used for pathogen removal.
Environment amelioration, beach cleaning and restoration, eco-tourism for Digha & Shankarpur area (DSDA)	Solid Waste Management system Development of drainage system Beach cleaning and sanitation Beach beautification and illumination Livelihood generation	Nil
Afforestation programme towards coastal protection in Purba Medinipur Dist. (Forest Dept.)	Developing coastal bio-shield (palisade work) Livelihood generation and capacity building in coastal resources management	Different models earthen mound technique, planting of potted seedlings, direct dibbling, trench cutting and planting, multilayer greening model and palisade work were considered for implementation and palisade work is found suitable because of shore dynamics
Post Harvest Handling- Fish Auction Centre at Digha Mohana – (Fisheries Department)	Construction of Auction Hall Drainage, Internal and connecting Roads, Box washing room, Public change room, feet washing place, public utility, waste water	Nil

Priority action proposed	Activities	Alternatives Considered
	management facility, cold storage and ice plant and quality control lab	
Strengthening of Marine Aquarium and Research Center at Digha (ZSI)		
Short Term Management to Protect Coastal Erosion at Sagar Island – (SDB)	Armour the embankment for 1500 M length by 2.0 M x 1.0 M x 0.60 M thick M-15 concrete block pitching works over filter beds in addition to construction of cross walls	It is stated that present method is adopted based on lessons learned from the previous revetment activities – details not given
Ecology-tourism at Sagar Island (SDB)	Encouraging alternative livelihood options through conservation of the environment, improvement of the environment in the vicinity of Kapil Muni temple, creation of additional infrastructure facilities e.g. handicraft centre, marine museum cum aquarium, planned shopping arcade for existing shop owners	Nil
100% House Hold Electrification of Sagar Island – (West Bengal State Electricity Distribution Company Ltd)	Providing access to the rural households in the Sagar island to grid electricity	Nil
Enhancing Livelihoods in Sagar Island, Sundarbans (SDB)		
Capacity Building for Climate Change Studies in Calcutta University		
Capacity Building for West Bengal Biodiversity Board		
A well equipped Remote Sensing Laboratory with state of art facilities		

The above mentioned activities and the alternatives considered at the planning stage for certain investments indicate the consultative process of project preparation and transparency in the project components which may be considered a positive aspect in the ICZMP. Nevertheless during the final design of the investments, further engineering and technology alternatives / methodologies may be considered to ensure the right environmental and economical balance that benefit the communities.

The components/subcomponents/activities and alternatives considered would definitely give an opportunity for exploring the various issues in the coastal region. But except the national components other investments may not yield considerable outcome in the long run. For example even the choice of states, such as Gujarat which promotes the “Vibrant Gujarat” slogan for its economic development, keep tapping the coastal area for developing refinery, ports and other allied industries. Proximity to Gulf Countries continued to be a lucrative way for using Gujarat Coast, especially Kachchh area for these purposes. If that is the case, the oil spill and pollution can not be checked (only monitored) with the subcomponents (Coastal Environment Monitoring and Conservation: Sea Water Monitoring for Chemical Parameter by GSPCB) envisaged in the project. Secondly the feasibility of coral reintroduction in Kachchh area, unless and until the pollution level is not under control, may not yield desirable results (**Excerpts From DPR of Gujarat: The Foundation (GEER) also proposes to carry out coral restoration and regeneration work at Narara and Poshitra**

located in Gulf of Kachchh in Jamnagar district of Gujarat State as coral reefs are found in a very small and restricted area of Gulf of Kachchh and they are under continuous threat due to industrial activities in the Gulf. It is illustrated in these lines that the reason behind the disappearance of coral

species is nothing but industrial activities and resultant pollution. Moreover the Gujarat State Pollution Control Board has already installed permanent water quality monitoring centres (47 Nos.) in these regions (Anon, 2008)

Among the 13 coastal states/UTS only three states are tackled for certain components and one of the major issue in the coastal

Box I - Excerpts From DPR of Gujarat

Following types of industries come-up in the coastal area of Gulf of Kutch.

- Oil & Gas Refinery
- Petrochemicals
- Salts and Marine Chemicals (Basic Chemicals & Fine Chemicals)
- Cement, Glass and Ceramics
- Food and Fish Processing
- Dye and Dye intermediate
- Textile, Rayon and Manmade Fiber
- Drugs and Pharmaceuticals
- Organic and Inorganic Chemicals
- Pesticide and Agrochemicals
- Steel, Metallurgy and Foundry
- Thermal Power Plants

There are about 12 towns and city along the coast and 13 ports and many fishing harbors in this region. All the wastes generated there are received in the coastal waters

area is pollution. How does the project help in checking the pollution generated from other locations in the states selected under ICZMP and other states/UTs (except three locations where sewage, solid or both treatment facilities are provided) when the polluting agents are entering into the aquatic environment? It is a particular concern when most of the entry of pollutants will be through an estuary with mangroves and other habitats (designated ESA?- the outcome of national component). Hence the sustainability of national component will depend on the state level activities. In such situations, to get maximum desirable output, it should be ensured that

- (i) The allied rules and acts (e.g., Municipal Rules 2000) should also be enforced strictly through appropriate institutional mechanism.
- (ii) In the state of Gujarat and Orissa the ICZM Plan may be prepared for the entire coastal stretches rather part of it as envisaged now.

CHAPTER 7

ISSUES, IMPACTS AND MITIGATION MEASURES

7.1 Key Issues – Coastal Areas in India

Coastal areas in India today face multiple environmental issues due to overexploitation of the natural resource base, conflicting uses among various stakeholders in addition to the natural and man-made disasters encountered in coastal areas of the country. Key environmental issues are described below.

Fresh Water: The freshwater for the coastal areas of the country mainly comes from surface water and ground water. Rainwater harvesting and desalination are beginning to be practiced in areas facing scarcity. Since the demand for the surface water sources are ever-increasing in the hinterland, the sustainable source for freshwater requirement of the coastal areas is groundwater. The principal aquifers in the coastal area belong to unconsolidated sediments of Quaternary and Upper Tertiary age, deposited under various sedimentary environments like fluvial, back swamp, deltaic, sub-marine and marine environments. These aquifers occur both in unconfined and confined condition. Two major problems are likely to be cropped up consequent to extensive ground water development in coastal areas are saltwater intrusion and land subsidence. The major problems in the groundwater sector of coastal areas are over development leading to the ever-increasing fresh water demands, declining water table and salinity ingress in coastal aquifers. A regulated development regime is crucial particularly, in the coastal areas due to the high vulnerability for salinity intrusions causing permanent damage to the aquifers. Similarly, groundwater recharge schemes need to be taken in the coastal areas on a priority.

Marine Biodiversity: The coastal areas of the country experiencing tropical climate and having a diverse geological and geomorphologic set up favours a multitude of coastal and offshore marine ecosystems. The coastal habitat and marine environment offers areas for reproduction, recruitment, feeding and shelter and should be protected. The euphotic zone of the sea (of nearly 200 m depth) is teeming with life having phytoplankton, copepods, eggs, larvae of fishes, jelly fishes, mollusks, pelagic fishes, turtles and mammals. The sediments and chemicals, the runoff water carries to the sea, have profound effect on fertilization of eggs of marine species. Many areas in Andaman and Nicobar Islands, Gulf of Kachchh and Gulf of Mannar have large quantities of sediment laden freshwater runoff impinging on coral reefs, causing high levels of coral mortality. The conservation of these faunal resources will help in the sustainability of coastal fishery and thereby ensure livelihood of the coastal communities.

Coastal area fishing: India has 3,638 fishing villages and 2,251 fish landing centers. The total marine fish production is about 2.695 million tones. Out of the total, nearly 50% comes from near shore waters and contributed by traditional fishermen. The major problems in coastal fisheries are overfishing, habitat destruction and degradation, pollution, post-harvest damages due to lack of infrastructure, fishing during breeding season, conflicts, among mechanized and traditional sectors, inter-state problems, etc. In addition to these, fishing communities also face compensation from other resource users. For example, coastal tourism interferes with traditional fishermen in their activities by replacing them and denying access to their traditional fishing grounds and beaches. Thus, the livelihood of the fishermen may be threatened.

Coastal Ecosystems: Several coastal ecosystems like coral reefs, mangroves etc., have high species diversity. Pollution through discharge of effluents or otherwise may cause mortality, which shall lead to

extinction. Restrictions of freshwater flow into estuaries and reclamation also affected biodiversity. Over fishing and selective fishing is against sustaining biodiversity. Introduction of exotic species and diseases are other detrimental factors. A productive ecosystem is characterized by a high degree of biological diversity. It contains a large assemblage of plant and animal organisms in which each species has a well-defined role to play. A high level of species diversity in an ecosystem, therefore guarantee stability because many species provide numerous path ways for the energy flow. Thus each species plays its role in the food cycle, and if, because of human activities, there is destruction of one group of organisms, it would lead to the predominance of the other which had earlier formed its food components, thus leading to an inevitable ecological disturbance.

Threat to Mangroves: While mangrove forests have specific ecological role in the coastal ecosystem and they provide a life support system and income for millions of people, thus destruction is wide spread for shorter economic benefits. This happens because mangroves are too often considered wastelands of little or no value unless they are "developed". In the recent times there has been increased ingress to convert them into agricultural areas. The irony of the situation is that the conversion of mangroves for aquaculture is detrimental to the very same activity as the shrimp fry (baby shrimp) availability decreases, as the mangroves are the natural wild fry collection habitats. The overdose of chemical fertilizers and pesticides not only destroy the aquaculture farms but also become detrimental to the remaining mangrove ecosystems in the vicinity. Even in the case of capture fisheries low recruitment will consequently affect production. With the fishing grounds already overexploited, mangrove destruction can only further reduce stock recruitment and production. In general the mangroves are resistant to much kind of environmental perturbations and stresses. However, mangrove species are sensitive to excessive siltation or sedimentation, stagnation, surface water impoundment and major oil spills. Salinities high enough to kill mangroves result from reductions in the freshwater inflow and alterations in flushing patterns from dams, dredging and bulk heading. Seawalls, bunds and other coastal structures often restrict tidal flow, resulting in the killing of mangroves. It is important to recognize that many of the forces, which detrimentally alter mangroves, have their origin outside the mangrove ecosystem. Traditional settlers of the mangrove area normally do not cause destruction to the system.

Threat to Coral Reefs: Coral reefs are constantly degraded. The degradation is both due to natural and anthropogenic reasons. The natural causes may be due to the outbreak of reef destroying animals, storms, "bleaching" and depletion of essential symbiotants. The destruction may be due to chemical pollution, mechanical damage, nutrient loading or sediment loading. The pesticides or fertilizers reaching coral reefs from agricultural areas, destructive fishing practices, heavy metals from industrial sources, petroleum hydrocarbons. etc chemically damage the corals. Dredging, shipping, tourism, mining or collection is also detrimental to the coral reefs. Nutrient loading due to aquaculture practices and sewage discharge both from land and ships cause pollution leading to eutrophication and oxygen depletion. Similarly sediment loading resulting from construction activity, runoff of sediments, dredging and turbidity can choke the coral growth.

Threat to Sea grass beds: Large scale exploitation of marine algae is depleting these resources. A sea grass called *Enhalus acaroids* is now a threatened species. Dugong, a mammal dependent on sea grass for food, is also on the verge of extinction. Several causes have been suggested for deterioration of sea grass beds. Anthropogenic activities like eutrophication, siltation, trawling, coastal constructions and removal for commercial purposes are the major threats for sea grass beds. Sea grass occurs in shallow water bodies

and since water bodies are not brought under regulations, the CRZ notification is ineffective to protect sea grass beds as the seagrass beds are below the Low Tide Line.

Threat to forests and wildlife / protected areas: The coastal forest includes the natural forest and the shelter belt plantations undertaken by the Forest Department. These coastal forests are not only habitats for several flora and fauna but also protect the shoreline from erosion, cyclones and flooding. Most of the coastal forests are found along the western coastal part of Maharashtra, Goa, and Karnataka. Coastal forests are found along the Tamil Nadu and Andhra Pradesh in the east coasts too. Several of the local communities depend upon the resources from these forest areas. Due to increasing pressures and conflicting resource uses, these fragile areas are under constant threat of degradation.

Threat to Mudbanks: The mud bank appears to be a biologically fertile, perhaps due to the abundance of organic matter ($\geq 5\%$) attached to the sediment particles or due to the reduced turbulence and the enhanced turbidity, which seem to attract the juvenile fishes and the larger fishes, which feed upon them. Mudbank accretes the coast behind, boosts fishing and it is an economic harbinger to the fisher folk. However, it erodes the down coast and it is unpredictable. The challenges are to predict mud bank formation, integrated management of mud bank areas taking into account the phenomena, coastal protection, socio-economic and infrastructure development.

Threat to Coastal Beaches: Beaches are not stable entities, but rather dynamic landforms that are constantly subjected to erosion and/or accretion. The changes on a beach are responses to processes acting from outside the beach. These include waves and currents as well as inland dune systems, which induce the erosional and depositional cycles. Difference in beach form (or type) and position reflect the local balance or imbalance between deposition and erosion. Threats to the beaches include construction, sand mining (for construction and minerals), activities which accelerate the erosion processes (such as river dams, barrages, and diversions that either trap sedimentary materials, thus preventing their entry into the coastal zone, or reduce the river water's transport power), poorly designed coastal engineering works (that alter long shore currents or wave forces and lead to undesirable erosion and deposition patterns) and coastal dredging/mining projects.

Threat to Sand dunes: Man's impact on coastal dunes has caused extensive ecological and geomorphologic changes. Increasing pressures place the dune communities under immense physiological stress, both from direct damage (trampling, grazing) and indirect damage through alterations in climate, soil and moisture regimes. Many dune systems around the world are in advanced stages of despoliation as a result of man's activities. In some cases the dunes have been completely removed. Major threats to the sand dunes include mining leveling for construction, industries, road, rail and other infrastructure development.

Threat to Rocky Shores: The majority of rocky shores, on open coasts, experience the relatively stable conditions. Major threats include unplanned tourism activities, pollution and mining activities.

Threat to Estuaries: The CRZ notification regulates all developmental activities along the CRZ area of the estuaries upto the extent of 5 Parts Per Thousand (PPT) of salinity felt upstream of the estuary. The measure of 5 PPT salinity during the driest period is one of the issues for implementing the CRZ Notification, 1991. Some of the estuaries become dry during peak summer seasons as there is no flow of fresh water. In some situations based on the geomorphological characteristics and hydro dynamics of the estuary, a salt wedge is formed at the bottom of the estuary while the upper surface has freshwater. Further, due to constructions of barrages, dams, upstream of the river, the salt water flow from the sea is

also affected in the estuaries. Major threats to the estuaries include reclamation activities, pollution from urban and industrial waste disposal, reduction in fresh water discharge due to upstream dams, prevention of fresh water flows and dredging of waterways for navigation purposes etc.

Threat to lagoons: Human activities often affect the structure of lagoons, due to hydraulic works (e.g. dikes, dams, and artificial bars), land-reclamation activities and through changes in the inland watershed. Major threats include reclamation, pollution due to urban and industrial waste disposal, modifications for aquaculture, discharge from aqua farms, constructions like dike, artificial bars, jetties affect the structure of lagoons and construction of dams affecting the freshwater discharge.

Threat to Mud flats: The CRZ notification is silent about the protection/conservation of mudflats. Major threats include reclamation, urban and industrial waste disposal and waste disposal/effluent discharge.

Threat to Salt marshes: The marshes act as buffer areas during flooding and storm surges. Direct protection of tidal marshes against pollution from the sea seems to be practically impossible, as an open relationship with the tides is a prerequisite for the survival of the marsh ecosystem. Major threats include reclamation, cutting and removal of marsh vegetation for agriculture and construction of embankments.

The proposed project does not intend to find solutions to all the above mentioned issues/threats instead build capability among the various stakeholders to deal with threats by means of undertaking projects. However, looking at the history of coastal zone regulation in India, there is very limited experience with proactive and holistic management of the coastal zone in the country's institutions. The project therefore has been designed to demonstrate the effectiveness of an integrated approach to coastal zone management through several components (national and state level). The national components would allow enhancing the capacity, capability and awareness through conduct of research, adoption of scientific methods to delineate hazard line, identifying, mapping and delineation of ecologically sensitive area, development of communication strategy, and establishment of national centre for sustainable coastal zone management for capacity building. All these activities would help in strengthening the CRZ Notification (1991) in the context of lapsing CMZ Notification. Particularly according to the 1991 Notification no comprehensive methods were developed for ESA identification and mapping. The habitats such as mud flats, estuaries, mud banks, rocky shores, etc getting into the status of ESA would definitely enhance the level of conservation and sustainability of the coastal environment.

The institutional mechanism suggested at various levels (national, state and local) for implementing, monitoring and evaluation of the project component would ensure the smooth implementation and effective coordination of different stakeholders which was lacking in the last more than one decade. The project team from top bottom includes specialists from all aspects of the projects including procurement and financial management expertise. Additionally, the project preparation ensured the involvement of all relevant stakeholders and existing expertise in the country at various levels to build a strong and broad understanding of the project and information base.

The state level components especially pollution monitoring and sewage and solid waste disposal facilities envisaged in the project would help in understanding the depth and graveness of one of the most significant issues pertaining to the coastal and marine resources, pollution, and develop appropriate strategies to mitigate this issue. The installation of pollution tackling facilities in all the three states could be considered as a litmus test for the initiative taken in this respect which would help in reducing the waste/sewage flow into the coastal aquatic environment.

It is equally important to consider the coastal people and their livelihood issues while formulating any project for the coastal environment. It may be reiterated that all the three states have included livelihood improvement subcomponents in the priority investments either based on the existing resources (fisheries, ecotourism, crab fattening, etc) or assets developed through the project (mangrove afforestation). Nevertheless these initiatives would indirectly help in winning the confidence of coastal communities which may in turn results in reducing or mitigating the management issues.

Coastal environment is one the most dynamic ecosystems in the world. It is not only the biological dynamics but physical forces such as recurring storm surges, waves, erosion, accretion, etc. Containing these forces rather dynamics is a Herculean task simply because of its nature and occurrence. So construction of physical structures envisaged at Pentha in Orissa and Sagar Island in West Bengal as remedy may expect to perform only for a short period. This aspect may be communicated to the local people effectively. They are of the opinion that these structures are the permanent solutions for their problem of sea encroachment or rather sea surges.

The capacity building activities envisaged in the piloting state would definitely contribute considerably in understanding the threats to coastal environment. The database (knowledge resource) that would develop through conduct of research and monitoring will enhance the problem analysing capacity of the team involved in the coastal zone management.

Likely adverse impacts due to the ICZM project components are addressed in the subsequent sections of the chapter along with suggested mitigation measures.

7.2 National component – Environmental, social issues and mitigation

7.2.1 Hazard line Identification and demarcation

The Hazard Line identification and demarcation component is a key element to strengthen the CRZ notification and the project has placed very strong emphasis on the definition and delineation methods. The Swaminathan Committee Report concluded that Vulnerability Mapping should be carried out to define the 'Vulnerability of the coast to natural and manmade hazards' and this mapping would redefine the existing CRZ on a more scientific basis.

Although mapping the hazard line are technical activities based on scientific principles, their political dimensions may have far reaching impacts, as changing / altering current restrictions will open (or close) / significantly modify economic opportunities for certain stakeholders.

Mapping of hazard line will include demarcation of hazard zones susceptible to natural disasters and flooding. It would also take into account forecast impacts of climate change as applicable. The potential impacts and mitigation measures for hazard line mapping and demarcation are shown in table 7.1.

Table 7.1: Potential impacts and mitigation measures for hazard line mapping and demarcation

Potential Impacts	Type of Impact	Description of Impacts	Proposed mitigation measures
Decline in property value	Indirect	Once the hazard line is defined on the ground, all the structures whether residential or commercial will suffer the loss of resale value and property owners will have to go for additional mitigation measures as defined by the competent authority / ICZM plan.	Based on zonation strategy and resource specific management plans, action plans will be developed for specific sites that are currently experiencing critical resource use conflicts or have proposed resource development that may result in such conflicts.

Potential Impacts	Type of Impact	Description of Impacts	Proposed mitigation measures
Displacement; Loss of livelihood or livelihood sources; socio-cultural fabric will be affected;	Perceived	General apprehension among the local community that hazard line is a setback line and post mapping, authorities will not allow coastal based economic activities and people will be evicted from the zone. Lack of adequate clarity on what activities is permissible for fishermen in the sea and coastal territories may become inaccessible to local fishermen.	Awareness generation campaign using IEC materials; regular communication with local community; representative groups and NGOs
Resistance of the local community to change	Direct	The local community feels that they have not been involved during the framing of the policy and hence they are not aware of the provisions. This has also resulted in local level unrest.	Local level consultations should be followed up by regular consultations with the representative groups; regular communication with concerned local NGOs.
Change in Land use / land cover	Indirect	Upon establishment of the hazard line and formulation of ICZM plan, further growth and development of activities will be governed by the plan.	The existing land use activities (permitted under the current CRZ regulation & other applicable laws) not compatible with the proposed ICZM plan shall not be discontinued but appropriate mitigation measures shall be proposed to safeguard life and property in such areas.

The hazard line identification and mapping also have many positive environmental and social impacts. They are:

Positive Environmental impacts

- Minimise developmental works hence less habitat modification
- Regulated reclamation or alteration of habitats with in the hazard line for residential and non residential purpose.
- Conservation of habitat niche with reference to certain species enhances biodiversity.
- Enhance ground water recharge, reduce littering and pollution.
- Promotes ecological succession and stabilisation of the coastal line.

Positive Social impacts

- People have been alerted on chances of occurrence of natural hazards and will be more vigilant.
- Aesthetic value of the area being maintained.
- Chances for enhanced livelihood improvement activities from coastal habitats and ecosystems.
- Increased opportunities for local economic development through non destructive ways such as conduct of tourism (Mangroves, Corals, beaches, Sand dunes etc.

7.2.2 Ecologically sensitive area (ESA) mapping

Mapping of ESA would comprise delineation and mapping of coastal ecosystems/habitat. The likely adverse impacts due to ESA mapping along with the mitigation measures are described 7.2.

Table 7.2: Potential impacts and mitigation measures for ESA mapping

Potential	Type of	Description of Impacts	Proposed mitigation
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Impacts	Impact		measures
Decline in property value	Indirect	Once the ESA is defined on the ground, all the structures in vicinity whether residential or commercial may suffer the loss of resale value. There will be restriction of certain kind of activities in vicinity of the ESA apprehending degradation of the ESA eco system.	Based on zonation strategy and resource specific management plans, action plans will be developed for specific sites that are currently experiencing critical resource use conflicts or have proposed resource development that may result in such conflicts.
Displacement; Loss of livelihood or livelihood sources; socio-cultural fabric will be affected;	Perceived	General apprehension among the local community that post ESA identification and mapping, authorities will not allow coastal based economic activities in such area and people will be evicted from the ESA zone.	Awareness generation campaign using IEC materials; regular communication with local community; representative groups and NGOs
Local level protest	Direct	The local community feels that they have not been involved during the framing of the policy and hence they are not aware of the provisions. This has also resulted in local level unrest.	Local level consultations should be followed up by regular consultations with the representative groups; regular communication with concerned local NGOs.

The ESA mapping shall have many positive social and environmental impacts such as;

Positive Environmental impacts

- Conservation of habitats/ecosystems enhances biodiversity
- The ecosystems/habitats provide facility for roosting, spawning and breeding ground for many species both aerial and aquatic species
- Checks salinity ingress and control disasters such as erosion, sea surges and cyclones (Mangroves, Sea grasses, beeches, Sand dunes etc.
- Enhances availability of resources such as fisheries, fodder, etc (mangroves, coral, sea grasses, mud banks, mudflats etc.)
- Mudflats supports ecological succession towards halophytic vegetation

Positive Social impacts

- Provide increased security from natural disasters (mangroves, corals, sea grasses, beeches, Sand dunes etc
- Conservation habitats checks salinity ingress will enhance drinking water availability (mangroves, beeches, sand dunes, salt marshes etc)
- Chances for enhanced livelihood development activities from coastal resources
- Increased opportunities for local economic development through non destructive ways such as conduct of tourism (mangroves, corals, beeches, sand dunes etc.

7.2.3 National Level Components

The sub components include

1. Capacity building of the MoEF as the secretariat of the National Coastal Zone Management Authority (NCZMA), and nation-wide training program for integrated coastal zone management. The success of the project will largely depend on developing and strengthening the capacity of key

institutions involved in the project management to adopt and practice ICZM approaches. At the national level, specific support will be provided to MoEF's capacity building plan, and training of coastal zone managers from all coastal states and UTs. This component also support project management, which will include staffing and operation of the national project management unit (NPMU); establishment of adequate financial and procurement management systems; implementation of communication plan and RTI related activities; governance and accountability actions; M&E and third party audits; coordination meetings with states and other stakeholder engagement; and special evaluation studies. The plan is that the NPMU, which is being set up as an autonomous society will be transformed during the project implementation period into the coastal zone management division of MoEF, as per the MoEF capacity building plan.

The capacity building sub component of the project would not impose any negative impact on the environmental and social aspects. At the same time it provides ample opportunity for the social uplift of the staff of MoEF who are attached with the NCZMA and NPMU. The working environment will be considerably improved which would enhance the productivity of the project. A better understanding of the project activities and ground realities will fasten the implementing process. The exposure and experiences which the members of the NCZMA and NPMU gathered through capacity building will be an asset for the national agency.

2. Setting up and operationalization of the new National Centre for Sustainable Coastal Zone Management (NCSCZM). The vision behind the NCSCZM is to promote sustainable coasts through increased partnerships, conservation, research and knowledge for the benefit and wellbeing of current and future generations. The major objectives of the centre are (i) to carryout research activities on different aspects of the coastal and marine environment, (ii) to build an understanding of factors shaping the lives of the people and promote role of women in management of coastal and marine resources, (iii) to provide updated knowledge on coastal and marine resources and issues to government and other stakeholders through appropriate dissemination methods, and (iv) to provide information on legal and policy aspects and international best practices and advice to national authorities to facilitate policy formulation in the country related to coastal and marine resource management. Three different institutional models were proposed for the NCSCZM (i) Virtual Institution (Knowledge is the Core), (ii) Research Institution (Research is Core) and (iii) Integrated Institution (Knowledge, Research and Advisory are Core Mandates).

The setting up of the NCSCZM (probably in an existing Institution campus) would not affect the environment negatively, except some short term impacts at construction stage which could be mitigated appropriately by adopting generic EMP. At the same time it provides an opportunity for a huge leap in the management of coastal and marine resources. The array of technical persons and their involvement in understanding the complexities of such a dynamic system would definitely benefit the overall management of the resources. The only gap in the structure of the institution is the absence of an extension wing to coordinate the training and other extension activities among different stakeholders which is a vital element for the sustenance of coastal resources. In other words the vision is not completely encompassed in the proposed structures of the institution.

7.3 Environment and social issues – state level

With regard to demonstrations of the ICZM approach through priority investments, any integrated management in the coastal areas would make space for economic infrastructure which potentially is

expected to meet opposition by the rhetoric on fisher people's livelihood. Factoring the technical view that fisheries have become unsustainable due to over exploitation, there would be concerns that poor people would not eventually benefit directly from development of economic infrastructure. The risks need to be ascertained, apportioned and mitigated through a process of continued social analyses. Various local level priority investments have been planned and social assessment has been carried out.

The project design has ensured that potential of involuntary resettlement is absolutely minimized. The project will support mangrove and shelterbelt plantation on 20,245 hectares in Gujarat, Orissa and West Bengal, all of which are forest or revenue land. In Orissa, plantations are proposed on 105 hectare of private land with consent of landowners and no land will be acquired. Site verification has been conducted for 15,500ha of revenue and forest land; and no squatter or encroachment has been identified. At Village Pentha (Orissa) and at Sagar Island (West Bengal) the project supports restoration and augmentation of coastal protection works that have been severely breached. These existing embankments were constructed on land donated by the community or individuals. However, these voluntary donations were not clearly documented. Approximately 30ha of additional land will also be donated for augmentation of the coastal protection works. In Sagar Island, West Bengal the project will finance construction of distribution system for grid power. The project financed distribution system has a direct linkage with the construction of the transmission system, which will be solely financed by the state government (GoWB). As part of the transmission system, for a step-down transformer, private land was acquired by the GoWB, and fully compensated, as per prevailing land acquisition laws. The people from whom land was acquired are equivalent to project affected people, in retrospect, and will be eligible for applicable resettlement assistance. At Digha beach (West Bengal), in-situ improvement and restoration of 1,480 vendors operating on the sandy beach itself (commercial squatters and footloose kiosks) is proposed. The in-situ restoration by accommodating all the vendors in organized shopping spaces and shopping arcades is being planned in full consultation and consensus with the vendors. Before initiating implementation of the related activities, formal agreement with each vendor will be signed. To take care of each of these cases, the project has prepared an entitlement framework, consistent with the National Resettlement and Rehabilitation Policy (NRRP 2007) and the Bank's OP 4.12. As the number of attributable cases is not known, notional numbers has been used to define a resettlement and rehabilitation budget, which will be updated as these chances cases are discovered during the implementation period.

The project will also finance preparation of ICZM plans for the Gulf of Kachchh (Gujarat), Paradip-Dhamra and Gopalpur-Chilika coastal stretches in Orissa, and the West Bengal coasts. Each of these plans will be prepared at a regional plan scale. It is unlikely that the planning exercise will be able to identify directly attributable cases of involuntary resettlement. However, the plan process will include an examination of the final plan for its consistency with the OP 4.12, the applicable national policy and legislation on displacement from or loss of access to traditional and customary rights and assets; as well as with the objective of ICZM plans.

The sections below detail out the priority investment wise potential impacts and its mitigation measures for each of the three pilot states.

7.3.1 Gujarat State Components

The priority investments and the capacity building supports are complementary to each other, and serve common objectives. Together with the ICZM plan, these address the major coastal zone management issues in the Gulf of Kachchh in particular and the entire coastal and marine areas of Gujarat in general. Intervention in Gujarat include (i) capacity building of the state level agencies and institutions, including

preparation of ICZM plan for the coastal sediment cell which includes the Gulf of Kachchh, and (ii) priority investments. The priority investments in Gujarat, all located in the Gulf of Kachchh, will include the following:

- Conservation and protection of the coastal resources – (i) mangrove plantation by Gujarat Ecology Commission, (ii) coral reef regeneration by the Forest and Environment Department and GEER Foundation, (iii) mangrove and shelterbelt plantation by the Marine National Park, and (iv) a marine aquarium at Dwarka, by the Forest and Environment Department through a private-public-partnership model.
- Environment and pollution management – (i) completing the environmental sanitation of Jamnagar city, by the Jamnagar Municipal Corporation (ii) capacity building of the Gujarat Pollution Control Board.
- Livelihood security of the coastal communities – (i) livelihood improvement activities by the Gujarat Ecology Commission in the non-forest villages of the coast, and (ii) ecotourism and related livelihood improvement activities by the Marine National Park for villages within the protected areas.

Though there is no direct loss of immovable property, still some adverse environmental and social impacts have identified as given in table 7.3.

Table 7.3: Potential impacts and mitigation measures for priority investments in Gujarat

Priority action proposed	Potential Impacts	Type of Impact	Description of Impacts	Proposed Mitigation Measures
Environmental Sanitation – Jamnagar (JMC)	<ul style="list-style-type: none"> Impact on the surrounding land use due to location of STP Loss of land value around the STP sites etc Impacts on the land/water in vicinity of the discharge for treated waste. Impact on Ground water resources Management of waste during construction stage Loss of livelihood on eviction of people from the proposed site Access to common or private property is denied 	Direct	<ul style="list-style-type: none"> Though land is already available for STP, access to common or private property may be denied especially during construction. Land parcels in vicinity of STPs may suffer loss in property value The environmental adverse impacts during the construction phase will be short term direct impacts The final discharge may contain unallowable quantity of impurities due to failure in process 	<ul style="list-style-type: none"> Loss of livelihood to be compensated as per the entitlement framework Executing Agency to ensure right of access EMP management measures to ensure that the ground water quality does not get adversely impacted All short term direct adverse impacts related to civil works execution shall be mitigated through implementation of generic mitigation measures. Periodic monitoring and appropriate correction measures to be taken Regular monitoring of the quality of discharge (based on CPCB standards) and taking correction measures
Mangrove Plantation (GEC) Coastal Resources Conservation and Management: Mangrove Restoration	<ul style="list-style-type: none"> Conflicts in using common resources Elite capture of CBOs; Conflict among office bearers and / or community members over resource allocation. Impacts due to introduction of alien species and species selection Damage to plantation due to natural disasters before maturity. Effect on present vegetation – loss of any species of conservation importance 	Indirect	<ul style="list-style-type: none"> The executing authority will carry out this activity in consultation with the community and will be handed over to the community. The selection of site and species is critical for the success of the mangrove plantation along with its maintenance till maturity. The area selected for planting may contain some locally important species which will be lost during afforestation. 	<ul style="list-style-type: none"> Bye laws to be developed for the CBOs Executing Agency to ensure adequate representation of gender and vulnerable group in CBOs Information dissemination and awareness campaigns during implementation Clear guidelines to be developed for beneficiary selection. ensuring community participation and oversight; ensuring strong grievance redress mechanisms Executing Agency to ensure adequate representation of gender and vulnerable group in CBOs Species selected should be such as to ensure suitability for plantation in the given area and ensuring biodiversity. Strategy to avoid / mitigate resource misuse through controlled access. Detailed analysis of the present sp composition to be conducted. Avoid removal of native sp present now and

Table 7.3: Potential impacts and mitigation measures for priority investments in Gujarat

Priority action proposed	Potential Impacts	Type of Impact	Description of Impacts	Proposed Mitigation Measures
				planting to be done without affecting the native sp
Coral Reef Regeneration & Other Conservation (Forest Department - MNP) Coastal Resources Conservation and Management: Coral Transplantation	<ul style="list-style-type: none"> Loss of livelihood and / or loss of access to livelihood sources for the fishing community in regenerated areas Impacts on the basic ecology of the present reef systems. Loss of biodiversity due to one species dominance. Impacts due to anthropogenic activities. Survival of the transplanted coral in changed condition (root cause is pollution and is still continuing) 	Direct	<ul style="list-style-type: none"> Poor species selection process adopted may lead to loss of biodiversity and change in the ecological conditions The transplantation may subside the growth of present reefs and loss of biodiversity due to the dominance one species As the condition which is detrimental to the growth of the coral species still prevail the transplanted specie will not survive 	<ul style="list-style-type: none"> Loss of livelihood to be compensated as per the entitlement framework. Reducing adverse impacts due to anthropogenic activities in vicinity which led to degradation of the coral reefs. Conduct detailed study and analysis before introduction of any species / transplantation Conduct detailed study on the reason for the loss of this species and take measures to rectify
Coastal Resources Conservation and Management: Eco-tourism Development (Forest Department –MNP)	<ul style="list-style-type: none"> Conflicts during beneficiary selection Elite group capture Impacts during the construction stage of the project Impacts due to Waste generation, collection and disposal. Impacts on wildlife 	Indirect	<ul style="list-style-type: none"> Lack of transparency in selection of beneficiaries – village or individual will lead to inter village and intra community conflict. This could also lead to capture of CBOs by the powerful community in the village and thus marginalization of vulnerable community. The movement of vehicles and use of mechanized speed boats will cause air and noise and water pollution 	<ul style="list-style-type: none"> Bye laws to be developed for the CBOs Bye laws to be developed for the CBOs Clear guidelines to be developed for beneficiary selection. ensuring transparency through adequate disclosure; ensuring community participation and oversight; ensuring strong grievance redress mechanisms Executing Agency to ensure adequate representation of gender and vulnerable group in CBOs Waste management plan to be formulated to ensure minimal adverse impacts Short term impacts due to construction stage activities shall be mitigated by adopting Generic EMP provisions. Regulate tourist inflow, use of electric vehicles and restriction on use of mechanized boats.

Table 7.3: Potential impacts and mitigation measures for priority investments in Gujarat

Priority action proposed	Potential Impacts	Type of Impact	Description of Impacts	Proposed Mitigation Measures
Improved Livelihood of Coastal Communities (GEC) Socio-Economic Development	<ul style="list-style-type: none"> • Elite capture of CBOs • Conflict during beneficiary selection • Depletion of natural resource base due to increased exploitation and /or over dependence on single resource. • Environmental and ecological impacts due to entry level activities. 	Indirect	<ul style="list-style-type: none"> • Lack of transparency in selection of beneficiaries – village or individual will lead to inter village and intra community conflict. This could also lead to capture of CBOs by the powerful community in the village and thus marginalization of vulnerable community. • The natural resources collection for eco. dev, if not well planed, will result in depletion of some important species 	<ul style="list-style-type: none"> • Bye laws to be developed for the CBOs • Clear guidelines to be developed for beneficiary selection. • ensuring transparency through adequate disclosure; • ensuring community participation and oversight; • ensuring strong grievance redress mechanisms • Executing Agency to ensure adequate representation of gender and vulnerable group in CBOs • DPR shall provide an assessment of the existing resource base which can be exploited in a sustainable manner.
Capacity Building for Pollution Monitoring (GSPCB)	<ul style="list-style-type: none"> • Disposal of waste being generated from the various testing laboratories 	Direct		<ul style="list-style-type: none"> • The DPR shall ensure adequate mitigation measures for treatment and safe disposal of waste generated from the testing laboratories.
Improving Research capacity & coral transplantation (GEER Foundation)	<ul style="list-style-type: none"> • Disposal of waste being generated from the various testing laboratories 			<ul style="list-style-type: none"> • The DPR shall ensure adequate mitigation measures for treatment and safe disposal of waste generated from the testing laboratories.

Positive Impacts

The negative impacts mentioned in the above table could be overcome by appropriate management strategies mentioned against each impact. The investment equally brings certain positive impacts too for which only the programme has been designed. The environmental sanitation project at Jamnagar would help in treating the Municipal Sewage thus the direct discharge of sewage into the estuarine system of the Marine National Park could be reduced. The capacity building of Gujarat Pollution Control Board, in addition to the enhancement of in house strength, would help in updating the data on the pollution level of the coastal region which in turn could be used for strict enforcement.

The mangrove plantation will be benefited in many ways. It provides habitat for many species, enhance biodiversity, stabilise the shoreline, protect from natural hazards such as erosion, storm surges, provide fodder for local cattle herders, check salinity ingress and pollution, provide non wood forest produces, enhance the aesthetics of the region, provide enhanced opportunity for local economic development, etc. The coral reef regeneration or transplantation, if become successful, will enhance the coral biodiversity and provide habitat for many fish species for reproduction. Ecotourism activities envisaged in the priority investment would not only help in providing local employment opportunities but strengthen the conservation measures also. It also helps in strengthening the interaction among the CBOs or SHGs with managers of the area, tour operators but their relation with environment too. The capacity building, awareness, micro-entrepreneurship, networking with markets and other institutional infrastructures would enhance the capability of coastal dwelling communities especially marginalised people (fisherfolk, scheduled tribes, scheduled castes) in rationalising their livelihood options and support conservation efforts.

7.3.2 Orissa State Components

The components in Orissa include (i) capacity building of the state level agencies and institutions, including preparation of ICZM plan for the coastal sediment cells which include the stretches of Paradip-Dhamra and Gopalpur-Chilika, including a regional coastal process study, and (ii) priority investments

The priority investments in Orissa are concentrated in the two reaches of (i) Gopalpur-Chilika and (ii) Paradip-Dhamra - and will include the following:

Conservation and protection of the coastal resources:

- (i) Protection of olive ridley turtle and other aquatic wildlife by the Chilika Development Authority,
- (ii) Mangrove plantation by the Forest and Environment Department,
- (iii) Conservation of archaeological heritage, which serve as cyclone shelters at times of distress by the Culture Department, and
- (iv) A pilot work in shoreline protection for village Pentha by the Water Resources Department.

Environment and pollution management: Environmental sanitation of coastal town of Paradip by Housing and Urban Development Department

Livelihood security of the coastal communities:

- (i) Livelihood improvement support in 60 fishing villages in the periphery of the Chilika lake and the Gahirmatha Wildlife Sanctuary to develop allied farming activities by the Fisheries Department,

- (ii) Support to fisher-people groups in developing small-scale tourism activities by the Tourism Department,
- (iii) Support to fishing communities in developing small-scale industrial and marketing activities, such as coir-making, by the Industries Department, and
- (iv) Provision of cyclone shelters in the 13 coastal villages, where cyclone shelters were not constructed from earlier programs, by the Disaster Management Authority.

The adverse environmental and social impacts are listed table 7.4.

Table 7.4: Potential impacts and mitigation measures for priority investments in Orissa

Priority action proposed	Potential Impacts	Type of Impact	Description of Impacts	Mitigation Measures Proposed
Shoreline Protection at Pentha (Water Resource Department) Coastal protection measures	<ul style="list-style-type: none"> Loss of income / livelihood source Probable loss of access to sea coast due to project activities for the community Impacts due to use of non biodegradable materials Impacts on beach stability in neighboring areas Impacts during construction stage of the project and if any due to materials procurement sites from nearby locations Impact due to introduction of alien species if any Impacts due to poor site selection of borrow areas. 	Direct	<ul style="list-style-type: none"> The land will be donated by the local community for shoreline protection works. However, this will result in loss of income to the owner donating land. Secondly due to the protection works, access to coast will be hampered 	<ul style="list-style-type: none"> To ensure that land donation is documented by way of either gift deeds or affidavits. Executing Agency to ensure that access to coast especially for fishing community is maintained ensuring community participation and oversight; and ensuring strong grievance redress mechanisms The short term impacts during the construction stage shall be mitigated by adopting generic EMP provisions. The selection of borrow areas for sand and other materials shall not be from the same sediment cell. Community shall be selected during species selection for afforestation.
Construction of Multipurpose Cyclone Shelters (OSDMA)	<ul style="list-style-type: none"> Loss of land Displacement of squatters and encroachers Loss of ecologically sensitive areas or protected areas Impact on the natural drainage of the site due to construction of structures and approach road. Waste management and other adverse impacts during the construction stage of the project. Short term direct impacts during the construction stage of the project 	Direct	<ul style="list-style-type: none"> Loss of private land if government land is not available. Even on the government land, there could be encroachers and / or squatters. The adverse impact on air / water and land during construction stage are short term impact s. 	<ul style="list-style-type: none"> Compensation for land at replacement value and other R&R Assistance as per the entitlement framework. Assistance to squatters / encroachers as per the policy. The short term impacts during the construction stage shall be mitigated by adopting generic EMP provisions. Consultation with the local community in site selection for the cyclone shelters The short term impacts during the construction stage shall be mitigated by adopting generic EMP provisions including waste management plan.
Protection of Olive Ridley Turtles & Aquatic Wildlife (CDA) Biodiversity conservation	<ul style="list-style-type: none"> Loss of livelihood (source) Impacts due to selection of species and sites for plantation. Impacts on the ESA in vicinity of the proposed site. Oil spills from mechanized boats 	Direct	<ul style="list-style-type: none"> Traditional fishermen may not be allowed to traverse in the protected area thus affecting the livelihood and/or source Even though the vessels are very small in size, there is chances for oil spill 	<ul style="list-style-type: none"> Assistance for income restoration as per the policy. Adequate Precautions to be ensured to avoid oil spills

Table 7.4: Potential impacts and mitigation measures for priority investments in Orissa

Priority action proposed	Potential Impacts	Type of Impact	Description of Impacts	Mitigation Measures Proposed
Alternate livelihood option: Fisheries based livelihood option (Fisheries department)	<ul style="list-style-type: none"> Intra village conflict Long term sustainability of SHGs Marketing of products Anticipated impacts on the pond biodiversity Impacts of increased grazing due to promotion of goaterly as alternative livelihood. 	Indirect	<ul style="list-style-type: none"> If the selection of beneficiary is not transparent and there are variations in return, this could lead to intra – community conflict. 	<ul style="list-style-type: none"> Clear guidelines to be developed for beneficiary selection. ensuring transparency through adequate disclosure; ensuring community participation and oversight; and ensuring strong grievance redress mechanisms
Tourism-based Livelihood Improvement (Tourism department)	<ul style="list-style-type: none"> Loss of private land Displacement of squatters if government land is not free of encroachment and other encumbrances Conflicts during beneficiary selection Impacts on ESA in vicinity of proposed facilities Impacts due to increased inflow of tourists / resource exploitation Impacts on the surface water quality in nearby areas. Short term impacts during the construction stage of the project. 	Direct	<ul style="list-style-type: none"> If the selection of beneficiary is not transparent and there are variations in return, this could lead to intra – community conflict. Loss of private land if government land is not available. In case government land is available and is not free of encumbrances, could lead to loss of livelihood or sources 	<ul style="list-style-type: none"> Clear guidelines to be developed for beneficiary selection. ensuring transparency through adequate disclosure; ensuring strong grievance redress mechanisms Replacement value for private land All livelihood losses to be compensate as per the policy. The short term impacts during the construction stage shall be mitigated by adopting generic EMP provisions including waste management plan. Limitation on the tourist inflow in sensitive areas
Biodiversity-based Livelihood Improvement Alternate livelihood option: Ecotourism in sensitive habitats	<ul style="list-style-type: none"> Conflicts during beneficiary selection Impacts on the drainage, loss of tree cover, loss of critical species Impacts due to deepening of the creeks on marine flora and fauna. Impacts due to increased tourist inflow on the natural resource base. 	Indirect	<ul style="list-style-type: none"> If the selection of beneficiary is not transparent this could lead to intra – community conflict. 	<ul style="list-style-type: none"> Clear guidelines to be developed for beneficiary selection. ensuring transparency through adequate disclosure; ensuring community participation and oversight; and ensuring strong grievance redress mechanisms The short term impacts during the construction stage shall be mitigated by adopting generic EMP provisions including waste management plan. The tourist inflow in the critical areas should be strictly regulated
Small Scale Enterprise-based Livelihood Improvement Alternate livelihood option: Coir making	<ul style="list-style-type: none"> Conflicts during beneficiary selection Impacts due to waste water disposal from soaking tanks. (coir making activities) Air pollution due to retting (coir making activities) 	Direct	<ul style="list-style-type: none"> If the selection of beneficiary is not transparent this could lead to intra – community conflict. 	<ul style="list-style-type: none"> Clear guidelines to be developed for beneficiary selection. ensuring transparency through adequate disclosure; ensuring community participation and oversight; and ensuring strong grievance redress mechanisms

Table 7.4: Potential impacts and mitigation measures for priority investments in Orissa

Priority action proposed	Potential Impacts	Type of Impact	Description of Impacts	Mitigation Measures Proposed
Establishment of Environmental Monitoring Laboratory at Paradeep	<ul style="list-style-type: none"> Loss of private land Displacement of squatters if government land is not free of encroachment and other encumbrances Taking of land lead to loss of livelihood /shelter / access, etc Short term impacts during the construction stage of the project. Impacts due to waste disposal Impacts on critical areas / ESA in vicinity of proposed facility. 	Direct	<ul style="list-style-type: none"> Loss of private land if government land is not available. Even on the government land, there could be encroachers and / or squatters. 	<ul style="list-style-type: none"> Compensation for land at replacement value and other R&F Assistance as per the entitlement framework. Assistance to squatters / encroachers as per the policy. The short term impacts during the construction stage shall be mitigated by adopting generic EMP provisions including waste management plan.
Pollution Abatement in Coastal Cities (Housing and UD department) Establishment of solid waste landfill and treatment facility at Paradeep	<ul style="list-style-type: none"> Land value decline near landfill site Loss of access during construction? Impacts due to ground water and surface water pollution Short term impacts due to construction stage activities. Impacts on land / water / air during the operation phase of the project. 	Direct	<ul style="list-style-type: none"> Though land is already available for landfill site, access to common or private property may be denied especially during construction. Secondly private property in around STPs may suffer loss in property value 	<ul style="list-style-type: none"> Loss of livelihood to be compensated as per the entitlement framework Executing Agency to ensure right of access The short term impacts during the construction stage shall be mitigated by adopting generic EMP provisions including waste management plan. The DPR document shall ensure that the landfill site is scientifically engineered site with provisions for leachate collection and disposal systems.
Conservation and improvement of archeological and cultural assets	<ul style="list-style-type: none"> Impacts due to air pollution for use of chemicals Effects of illumination on the local environment Impacts due to increased inflow of tourists 			<ul style="list-style-type: none"> The short term impacts during the construction stage shall be mitigated by adopting generic EMP provisions including waste management plan. The flow of tourists to these structures shall be regulated through entry tickets and will also generate revenue for O&M costs.

Positive Impacts

The fisheries based livelihood activities envisaged in the priority investment directly benefit the marginalised communities in accruing more income from their traditional activities. It also bring social cohesiveness among the CBOs, SHGs, NGOs and resource managers to sustain the coastal resources. Tourism and ecotourism based activities envisaged in the project would not only help in providing local employment opportunities and increasing income generation avenues but strengthen the conservation measures also. The depth of awareness that could be communicated through these activities address the sustainability of the very same resource they are depending on. It also helps in better interaction among all the stakeholders involved in the resource management and utilization. The coir making opportunity envisaged in the project benefit in many ways. It gives an opportunity for the people to utilize and dispose the local resources meaningfully and make a meaningful living.

The construction of shoreline protection measures at Pentha would help in protecting the agricultural land and their assets of the village Pentha and check the coastal erosion so as to create habitat for nesting species such sea turtles. It also strengthens the participation of local people in tackling one of the severe coastal hazards, sea surges and coastal erosion, affecting hundreds of people. The backshore provides excellent agricultural land, thereby checking the entry of saline water increases the productivity of the land.

The cyclone shelters proposed to construct under this component would give opportunity for the people and villages which are not yet covered under cyclone vulnerability. Although these shelters may be utilised for the stipulated purpose once in a while, its utility as school or other community infrastructure would definitely benefit the local people in long run.

The monitoring of olive ridley turtle and other nesting reptiles in the Orissa Coast would support the ongoing measures taken by the Forest and Environment Department. It helps in checking the poaching of eggs and mortality of juveniles. The efforts would definitely boost the morale of the people involved in conservation of coastal and marine biodiversity.

The installation of solid waste treatment and landfill facility will be a remarkable step towards checking the littering and pollution in the coastal area. Paradip, a developing Municipality due to its multitude of activities (ports and industries) would definitely contribute more to the pollution if not checked as early as possible. In this regard, the steps taken in this project always praiseworthy. It could have been better if liquid waste also being treated in this project. The support given to the Orissa Pollution Control Board, for capacity building and strengthening the infrastructures would enhance the ongoing measures taken by them for checking the pollution.

The integrated nature of the project is well demonstrated through the sub component proposed in the project for the conservation and improvement of archaeological and cultural sites. This would help in conveying a larger message to the community regarding the objectives of the ICZMP.

7.3.3 West Bengal State Components

The project components in West Bengal include:

1. Capacity building of the state level agencies and institutions, including preparation of ICZM plan for the coastal sediment cells which include the coastal areas of West Bengal, and

2. Priority investments.

The priority investments in West Bengal will take place in two limited areas – (i) Digha-Shankarpur, and (ii) Sagar Island in the Sundarban – and will include the following:

I. **Conservation and protection of the coastal resources:**

- a. Mangrove plantation by the Forest Department,
- b. A pilot work in shoreline protection for Digha beach, based on the learning from previous protection works, by the Irrigation Department,
- c. A pilot work in shoreline protection for the southern end of Sagar Island by the Sundarban Development Corporation, and
- d. Rehabilitation of the marine aquarium at Digha by the Zoological Survey of India.

II. **Environment and pollution management:**

- a. Completing the sewerage system and environmental sanitation of Digha by the Public Health Department,
- b. Cleaning and environmental improvement of the Digha beach, and solid waste management in Digha by the Digha-Shankarpur Development Authority,
- c. Improvement of the fish auction centre at Digha by the Fisheries Development Corporation, and
- d. Distribution of grid electricity in Sagar Island to replace diesel generation and prevent air, soil and water pollution by the State Electricity Distribution Company Limited.

III. **Livelihood security of the coastal communities:** – these activities will be implemented in Sagar Island will include:

- a. Improvement in fishery based livelihood systems by the Fisheries Department, and
- b. Support to CBO coordinated livelihood improvement and market access, afforestation-based livelihood improvement, as well as promotion of local small-scale tourism and ecotourism activities – all by the Sundarban Development Corporation.

Similar to Gujarat and Orissa, the priority investments and the capacity building support are complementary to each other, and serve common objectives. Together with ICZM plan, these address the major coastal zone management issues in the two targeted coastal stretches in particular and the entire coastal and marine areas of the state in general.

The anticipated adverse environmental and social impacts and mitigation measures are given in table 7.5.

Table 7.5: Potential impacts and mitigation measures for priority investments in West Bengal

Priority action proposed	Potential Impacts	Type of Impact	Description of Impacts	Mitigation Measures Proposed
Well designed engineering structures and Coastal bioshields – Digha – Shankarpur – Jalda WB	<ul style="list-style-type: none"> Loss of private land Displacement of encroachers and squatters on government land Loss of livelihood / livelihood sources for fishing community Conflict on the species selected Impacts on coastal geomorphology Impacts due to use of non biodegradable materials Impacts due to natural disasters till maturity Impacts on the stability of the beaches in neighboring areas. 	Direct	<ul style="list-style-type: none"> Loss of private land if government land is not available. Even on the government land, there could be encroachers and / or squatters. Species selected may not be acceptable to the community, may result in conflict between the community and executing agency. 	<ul style="list-style-type: none"> Compensation for land at replacement value and other R&R Assistance as per the entitlement framework. Assistance to squatters / encroachers as per the policy. Consult community in species selection and make adequate disclosure; ensuring community participation and oversight; and ensuring strong grievance redress mechanisms The borrow area for materials procurement shall not be within the same sediment cell
Coastal Bioshield -Digha – Shakerpur - Jalda	<ul style="list-style-type: none"> Loss of access / restricted access to the coast due to project activities for the community Land donation Impact on the present species composition and biodiversity of the area Impacts due to natural disasters till maturity. 	Direct	<ul style="list-style-type: none"> The land will be donated by the local community for shoreline protection works. However, this will result in loss of income to the owner donating land. Secondly due to the protection works, access to coast will be hampered 	<ul style="list-style-type: none"> To ensure that land donation is documented by way of either gift deeds or affidavits. Loss of income to be compensated as per the policy Executing Agency to ensure that access to coast especially for fishing community is maintained Species selection criteria shall be adopted to ensure biodiversity in the area and no alien species are introduced.
Solid Waste Management - Digha – Shakerpur	<ul style="list-style-type: none"> Land taking for landfill site Possible displacement of squatters / encroachers Land value decline near landfill site Impacts on surface and ground water sources in vicinity. Impacts of air pollution in vicinity of the project site Short term impacts during construction stage of the project Impacts on the surface drainage in the proposed site. 	Direct	<ul style="list-style-type: none"> If land is not available for landfill site, private land will be acquired. Government land if available may have squatters / encroachers. Possible displacement of squatters / encroachers leading to loss of livelihood / source of livelihood access to common or private property may be denied especially during construction Secondly private property in around STPs may suffer loss in property value 	<ul style="list-style-type: none"> Land compensation at replacement value. Loss of livelihood to be compensated as per the entitlement framework Executing Agency to ensure right of access The short term impacts during the construction stage shall be mitigated by adopting generic EMP provisions including waste management plan.
Development of Drainage System – Digha	<ul style="list-style-type: none"> Land taking for STPs – loss of shelter / livelihood/assets/etc. Temporary loss of access to residential and commercial structures during construction 	Direct	<ul style="list-style-type: none"> Loss of private land if government land is not available. Even on the government land, there could be encroachers and / or squatters. access to common or private property may 	<ul style="list-style-type: none"> Compensation for land at replacement value and other R&R Assistance as per the entitlement framework. Assistance to squatters / encroachers as per the policy.

Table 7.5: Potential impacts and mitigation measures for priority investments in West Bengal

Priority action proposed	Potential Impacts	Type of Impact	Description of Impacts	Mitigation Measures Proposed
	<ul style="list-style-type: none"> ◆ Impact on the natural drainage of the area ◆ Impacts due to flooding /water logging due to altered drainage patterns. 		be denied especially during construction	<ul style="list-style-type: none"> • Executing Agency to ensure right of access
Beach Cleaning and Sanitation - Digha	<ul style="list-style-type: none"> • Temporary loss of business opportunities • conflict among vendors • Conflicts during allotment of • Conflict in upkeep and maintenance of toilets • Adverse environmental impacts on land / air / water during the construction stage of the project. • Impacts due to waste disposal • Short term impacts due to construction related activities 	Direct	<ul style="list-style-type: none"> • Temporary loss of business opportunities during shifting • conflict among vendors relocated and those who are not affected • Conflicts during allotment of shops and lack of willingness to shift from present location – probable loss of advantage • Willingness and attitude to pay for toilet usage, upkeep and maintenance. 	<ul style="list-style-type: none"> • Shifting to be done in a phased manner. Loss of income to be compensated as per the policy. • Define cut off distance to avoid conflict among vendors relocated and those who are not. Develop mechanism to ensure that individual agreements are signed with each of the total 1480 vendors for shifting to shopping arcade • Conduct consultation with the vendors prior to relocation and ensure transparency in selection of shops in vendor market • Create awareness among vendors and users to generate funds for upkeep and maintenance of toilets • The short term impacts during the construction stage shall be mitigated by adopting generic EMP provisions including waste management plan.
Beach Beautification and Illumination - Digha	<ul style="list-style-type: none"> • Loss of access to coast • Impacts of illumination and landscaping on the marine species, nesting grounds etc • Impacts of waste disposal related activities • Short term impacts related to construction activity 	Direct	<ul style="list-style-type: none"> • There could be temporary hindrance to fishing community during the implementation stage 	<ul style="list-style-type: none"> • Executing agency to ensure access to coast • The short term impacts during the construction stage shall be mitigated by adopting generic EMP provisions including waste management plan.
Livelihood generation-Digha	<ul style="list-style-type: none"> • Conflicts in beneficiary selection • Acquisition of private land • Displacement of encroachers and squatters from government land Loss of livelihood or livelihood source • Short term impacts related to construction activity • Loss of critical habitat if any in 	Indirect	<ul style="list-style-type: none"> • Loss of private land for construction of training centre • If government land is available, chances of encroachment is high. Displacement of encroachers / squatter could lead to loss of livelihood • Lack of transparency in selection of beneficiaries may lead to conflict 	<ul style="list-style-type: none"> • Replacement value of land acquired • Loss of income to be compensated as per the policy. • Alternative income restoration scheme for loss of livelihood. • Consult community in beneficiary selection process and make adequate disclosure; • ensuring community participation and oversight; and

Table 7.5: Potential impacts and mitigation measures for priority investments in West Bengal

Priority action proposed	Potential Impacts	Type of Impact	Description of Impacts	Mitigation Measures Proposed
	vicinity of the proposed site			<ul style="list-style-type: none"> ensuring strong grievance redress mechanisms The short term impacts during the construction stage shall be mitigated by adopting generic EMP provisions including waste management plan.
Fish Auction Centre – Sagar (Fisheries Development Corporation)	<ul style="list-style-type: none"> Inadequate land ownership record Loss of livelihood if land identified is encroached Short term impacts related to construction activity 	Direct	<ul style="list-style-type: none"> Land earmarked could be private land 	<ul style="list-style-type: none"> Review of land records to establish ownership of land If government land, establish that land is free of all encumbrances Replacement value, if land is private Loss of livelihood to be compensated as per the policy. The short term impacts during the construction stage shall be mitigated by adopting generic EMP provisions including waste management plan.
Coastal Erosion Protection Sagar (Sundarban DB) Well designed engineering structures and Coastal bioshields – Sagar	<ul style="list-style-type: none"> Approach to traditional fishermen Land donation Social acceptance of the structure and species selected for afforestation 	Direct	<ul style="list-style-type: none"> The land will be donated by the local community for shoreline protection works. However, this needs to be documented for further mutation. Secondly due to the protection works, access to coast will be hampered especially for the fishermen Community should be consulted before selecting the species for bio-shield or else that will lead to conflict 	<ul style="list-style-type: none"> To ensure that land donation is documented by way of either gift deeds or affidavits. Executing Agency to ensure that access to coast especially for fishing community is maintained Species will be selected in consultation with the community.
Ecotourism/Tourism & Local Community Development at Sagar (Sundarban DB) Diversification of income generation activities through Ecotourism development – Sagar	<ul style="list-style-type: none"> Conflicts among vendors during shifting Resistance among vendors to shift Conflict during selection of beneficiaries 	Direct	<ul style="list-style-type: none"> Temporary loss of business opportunities during shifting conflict among vendors relocated and those who are not affected Conflicts during allotment of shops and lack of willingness to shift from present location – probable loss of advantage Lack of transparency in selection of beneficiaries may lead to conflict 	<ul style="list-style-type: none"> Shifting to be done in a phased manner. Loss of income to be compensated as per the policy. Define cut off distance to avoid conflict among vendors relocated and those who are not. Develop mechanism to ensure that individual agreements are signed with each vendor for shifting to shopping arcade Conduct consultation with the vendors prior to relocation and ensure transparency in selection of shops in vendor market Consult community in beneficiary selection process and make adequate disclosure; ensuring strong grievance redress mechanisms

Table 7.5: Potential impacts and mitigation measures for priority investments in West Bengal

Priority action proposed	Potential Impacts	Type of Impact	Description of Impacts	Mitigation Measures Proposed
Support connection and provide distribution of grid-electricity – Sagar	<ul style="list-style-type: none"> ◆ Private land acquisition ◆ Crop damage ◆ Reduction in land value ◆ Likely displacement 	Direct	<ul style="list-style-type: none"> • Loss of private land for construction of sub stations and possible crop damage during installation of pylons and overhead wires • If government land is available, chances of encroachment is high. Displacement of encroachers / squatter could lead to loss of livelihood • Displacement of households on the alignment of HT Lines ◆ Reduction in land value of affected agriculture land 	<ul style="list-style-type: none"> • Replacement value of land acquired • Loss of income/ crop damage to be compensated as per the policy. • Alternative income restoration scheme for loss of livelihood. • Consult community in beneficiary selection process and make adequate disclosure; • ensuring strong grievance redress mechanisms
<p>Afforestation-based Livelihood Improvement (SDB)</p> <p>Value addition activities such as handicrafts and cottage industry; Aquaculture; Agroforestry; Semi processing, processing, storage and transport; Local market development and skill enhancement - Sagar</p>	<ul style="list-style-type: none"> • Conflicts during beneficiary selection • Marketing arrangements • Long term sustainability of SHGs • Participation of vulnerable 	Direct	<ul style="list-style-type: none"> • If the selection of beneficiary is not transparent and there are variations in return, this could lead to intra –community conflict. 	<ul style="list-style-type: none"> • Clear guidelines to be developed for beneficiary selection. • ensuring transparency through adequate disclosure; • ensuring community participation and oversight; and • ensuring strong grievance redress mechanisms

Positive Impacts

The well conceived proposal for the protection of one of the most dynamic shorelines of the country, Digha-Sankarpur-Jalda, through palisade approach of mangrove and other species plantation is going to be a blessing for the local community. The local people have already demonstrated their attitude towards such measures taken by the forest department. This has been well read from the generosity of the people through donating land for afforestation. This indicates the acceptability of the project, the agency who is implementing it, and the ultimate aim of ICZMP. The plantation thus raised would give protection to the properties and livelihood of the people.

The solid and liquid waste management facilities envisaged at Digha would not help in environmental sanitation but employment opportunities for a sector of people also. It is also a revival of the once initiated project on liquid waste management by the local development authority. The Digha-Sankarpur is being visited by thousands of people every day hence the initiative taken for beach cleaning and environmental sanitation will have long lasting effect on the sustainability coastal activities. The beautification of the beaches and associated activities will provide recreation opportunities for the visitors which in turn enhance the local economic development.

The initiative proposed to support the vendors as part of livelihood improvement in Digha would be an eye opening activity if implemented successfully. The garbage filled beaches and makeshift shops in rows of kilometres are definitely an unpleasant scene in the coastal area. Tackling this through organised and centralised structure would definitely enhance the aesthetics of the area and provide nearly equal business opportunity to all the vendors. The acceptance of the vendors to the centralised shopping centre also illustrates their gesture and willingness to keep the environment clean.

The fish auction centre being proposed at Sagar Island will be an added dimension to the traditional activity of the fishermen. This would not only increase the income but also helps in sustainable utilisation of resources from the marine environment. Ecotourism and tourism activities in the Sagar Island may boost the local economic development. The Island, which has got limited opportunities and activities for their dwellers, these proposed projects will be a new arena for their exposure and experience. The annual pilgrimage at Kapil Muni Temple and the amount of resources and infrastructures being developed for this will be better utilised if additional activities such tourism is accommodated. The only apprehension is that the required capacity building for the local community to manage the tourists and their requirement need to be assured.

The coastal protection measures proposed at Dablat in Sagar Island if sustained will be an excellent opportunity for the implementing agencies to show cases their affinity towards protecting the coastal people, their assets and livelihood activities. Dablat is very peculiar where high waves are being experience during tidal seasons. The waves surge into the backshore and destroy houses, agriculture and other economic activities. Hence the physical infrastructure will help in protecting the assets of thousands of people in the Mouza.

The envisaged provision of providing grid electricity to Sagar Island will definitely bring lots of positive social changes in the area. Being one of the farthest Island in the Sundarbans, with a sizable population and series of economic activities, the power supply illuminates the life of the people. It helps in enhancing agricultural productivity, social upliftment, better communication and above all the sustenance of many other project

component of the ICZMP. For e.g in order to flourish tourism or ecotourism activities or fish auction centre or any other livelihood activities grid power availability is one of the important prerequisite.

The afforestation based livelihood activities bring multidirectional positive impacts. In one hand it provides employment opportunities to the local people thus enhancing their income. On the other they will take the responsibility of protecting the assets developed through this project. It also takes care of better and optimum utilisation of coastal and marine natural resources. The micro level institutions that is being constituted as part of the intervention will be aiming the empowerment of marginalised communities especially fisherfolk, schedules tribes or castes.

7.4 Resettlement and Rehabilitation Aspects

The project design has ensured that potential of involuntary resettlement is absolutely minimized. The project will support mangrove and shelterbelt plantation on 20,245 hectares in Gujarat, Orissa and West Bengal, all of which are forest or revenue land. In Orissa, plantations are proposed on 105 hectare of private land with consent of landowners and no land will be acquired. Site verification has been conducted for 15,500ha of revenue and forest land; and no squatter or encroachment has been identified. At Village Pentha (Orissa) and at Sagar Island (West Bengal) the project supports restoration and augmentation of coastal protection works that have been severely breached. These existing embankments were constructed on land donated by the community or individuals. However, these voluntary donations were not clearly documented. Approximately 30ha of additional land will also be donated for augmentation of the coastal protection works. In Sagar Island in West Bengal the project will finance construction of distribution system for grid power. The project financed distribution system has a direct linkage with the construction of the transmission system, which will be solely financed by the state government (GoWB). As part of the transmission system, for a step-down transformer, private land was acquired by the GoWB, and fully compensated, as per prevailing land acquisition laws. The people from whom land was acquired are equivalent to project affected people, in retrospect, and will be eligible for applicable resettlement assistance. At Digha beach (West Bengal), in-situ improvement and restoration of 1,480 vendors operating on the sandy beach itself (commercial squatters and footloose kiosks) is proposed. The in-situ restoration by accommodating all the vendors in organized shopping spaces and shopping arcades is being planned in full consultation and consensus with the vendors. Before initiating implementation of the related activities, formal agreement with each vendor will be signed. To take care of each of these cases, the project has prepared an entitlement framework, consistent with the National Resettlement and Rehabilitation Policy (NRRP 2007) and the Bank's OP 4.12. As the number of cases is not known, unit price have been given to define a resettlement and rehabilitation budget, which will be updated as these chances cases are discovered during the implementation period.

The project will also finance preparation of ICZM plans for the Gulf of Kachchh (Gujarat), Paradip-Dhamra and Gopalpur-Chilika coastal stretches in Orissa, and the West Bengal coasts. Each of these plans will be prepared at a regional plan scale. It is unlikely that the planning exercise will be able to identify directly attributable cases of involuntary resettlement. However, the plan process will include an examination of the final plan for its consistency with the OP 4.12, the applicable national policy and legislation on displacement from or loss of access to traditional and customary rights and assets; as well as with the objective of ICZM plans (the primary objective of which is protection of life and property of vulnerable coastal communities).

7.5 The Entitlement Framework

The entitlement framework designed for the project is presented in table 7.6. The framework covers direct as well as indirect losses incurred due to the project.

Table 7.6: The Entitlement Framework

Type of Impact/Loss	Nature of Ownership	Unit of Entitlement	Entitlements as per Policy
Loss of Land			
Agricultural land	Titleholders and customary or usufruct right holders	Family	Direct purchase of land /Or Cash compensation at replacement value. Land for land of equivalent area or a maximum of one Ha of irrigated land or two Ha of unirrigated/ cultivable wasteland subject to availability of Government land in the district. One time assistance of Rs 15,000 per hectare towards land development charges if land allotted is wasteland or degraded land. One time assistance of Rs. 10,000 towards agriculture production /Or Rehabilitation Grant equivalent to 750 days of minimum agriculture wages (MAW) – in lieu of options 3 to 5. Reimbursement of registration and stamp duty charges Subsistence grant equivalent to 300 days of MAW PAPs will be eligible for Training (one person per family) Annuity policies for vulnerable PAPs that will pay a pension for life. Cost will be borne by the project
	Share croppers	Family	Rehabilitation grant equivalent to 750 days of MAW. PAPs will be eligible for Training (one person per family) Notice of at least 4 months to harvest standing crops
	Encroacher	Family	Notice of at least 4 months to harvest standing crops. PAPs will be eligible for Training (one person per family)
	Squatter	Family	Rehabilitation grant equivalent to 300 days of MAW for vulnerable squatter. Notice of at least 4 months to harvest standing crops. PAPs will be eligible for Training (one person per family)
Partial loss of land – Less than 25% of the total holding (Agricultural land)	Titleholders and customary or usufruct right holders	Family	Direct purchase of land /Or Cash compensation at replacement value. Reimbursement of registration and stamp duty charges Rehabilitation Grant equivalent to 500 days of MAW Subsistence grant for 250 days of MAW PAPs will be eligible for Training (one person per family)
Loss of Structure			
Residential	Titleholder	Family	Cash compensation at replacement value. A plot of 150 sq. m free of cost for each nuclear family. One time assistance of Rs 15,000 towards construction of Cattle shed Shifting grant of Rs 10,000 for transportation of building materials, cattle etc. PAPs will be eligible for Training (one person per PAF)
	Squatters	Family	Cash compensation for the structure at replacement value A plot of 100 sq. m, free of cost for vulnerable squatter. Shifting grant of Rs 10,000 for transportation of building materials, cattle etc. PAPs will be eligible for Training (one person per PAF)
	Encroacher	Family	PAPs will be eligible for training (one person per family)
Commercial	Titleholder	Family	Cash compensation at replacement value. Shifting grant of Rs 10,000 for transportation of building materials, cattle etc. PAPs will be eligible for Training (one person per PAF) Annuity policies for vulnerable PAPs that will pay a pension for life. Cost will be borne by the project

Type of Impact/Loss	Nature of Ownership	Unit of Entitlement	Entitlements as per Policy
	Encroacher	Family	PAP will be eligible for training – one person per family
	Squatter / Kiosk owner	Family	Relocation of shop to the vendor market under the project /OR Shifting allowance of Rs. 10,000
Loss of Livelihood			
Agriculture and Non-agriculture labour		Family	Rehabilitation Grant @ of 750 days of MAW Subsistence grant for 300 days of MAW of project State PAPs will be eligible for Training (one person per family)
Rural Artisan / small trader/ self employed	Titleholder and non titleholder	Family	One time financial assistance of Rs. 25000 for construction of work shed

7.6 Tribal Population impacts and mitigation

7.6.1 Gujarat

On average, coastal districts in Gujarat record a lower concentration of scheduled tribes than the non-coastal districts. Among coastal districts, Valsad and Navsari record high tribal concentrations, with nearly half of the total population of the district(s) comprising of tribal groups. Among mainland districts in Gujarat, the Dangs has the highest share of STs, who comprise nearly 94 percent of the district population. Kachchh and Jamnagar – the two project districts – have relatively marginal tribal presence, with more tribals in Kachchh than in Jamnagar. The scheduled tribes constitute about 8 per cent of the total population of Kachchh, and are mostly concentrated in the eastern and northern talukas. The major scheduled tribes in Kachchh are the Bhil and the Koli communities.

The present project plans many activities for the socioeconomic upliftment of the backward communities including the scheduled tribes. Major activities in this direction are:

- Mangrove restoration in Jamnagar and Kachchh districts
- Socioeconomic development of coastal villages of Rajkot and Kachchh districts
- Eco development in 85 villages around Gulf of Kachchh,

More than 8% of the population in Kachchh district are scheduled tribes. In Rajkot and Jamnagar districts there is no tribal population. However, the priority investments in Gujarat not selected the major scheduled tribe concentrated coastal districts of the state viz. Valsad (55% tribal population), Navsari (48% tribal population), Bharuch (32% tribal population) and Surat (28% tribal population),

7.6.2 Orissa

The project is planning to develop alternate livelihood options for fisher folk along the Gopalpur-Chilika stretch in the state. According to the 2001 census data, all villages selected by the project in this stretch have very low to zero tribal population.

The project also plans to undertake similar activities, in addition to plantation of mangroves, in the Paradeep-Dhamra stretch in Kendrapara district. One of the suggested project villages – Dangmal – however has some tribal presence (24.2% of the village population based on 2001 census data).

Dangmal: Dangmal falls under the gram panchayat of Dangmal in Rajnagar Block in the district of Kendrapara. According to the 2001 census, the village was inhabited by approximately 200 households with a population of 2500. A few years ago, WWF-India had undertaken a Biodiversity Conservation Prioritization Project (BCPP) in three villages in the Bhitarkanika sanctuary, including Dangmal. The project, undertaken in

association with NGOs and the local government, sought to aid conservation of biodiversity through recognition of local interests and stakes on biotic natural resources. The project had two main components: (1) documentation of knowledge and perceptions of different sections within the local community regarding biodiversity and its conservation using the Community Biodiversity Register (CBR) methodology; (2) facilitation of discussions on perceptions and opinions among various interest groups at different levels (e.g. village/panchayat/ cluster level to district and state level), with a view to enabling them to arrive at common strategies for bio-diversity conservation.

The social assessment undertaken for the project suggested Dangmal to be the oldest village of Dangmal Panchayat inhabited by Oriya and Bengali people with agricultural lands largely in possession of “outsiders”, while most indigenous people are landless. The primary occupation of people is agriculture, with the majority of farmers working as share croppers. The Dalai and the Sabars constitute the most important tribal group in the village of Dangmal. At the time of the visit for the assessment, most tribal households in the village were engaged in fuel wood collection (The Sabars are traditionally known as hewers of wood and are regarded as an indigenous tribe of Orissa), honey collection or served as agricultural wage labor on farms of general caste households (Brahmins, Goudas, Kesaris and the Khandayats). Fuelwood collection was a year round activity undertaken by tribal women; while honey collection is a seasonal activity performed by male members of the families.

The only mode of communication to the village is through water. Mechanized country boats and launch services are available in Rajnagar (block head quarter, Kendrapara district) to travel to the village. The village has a primary health care center, but tribal are known to depend on the forest for medicinal purposes (herbal and home remedies).

Honey Collection

Honey collection is a major source of livelihood for the Dalai people. At the time of the visit for the WWF-India project, seventy percent of all Dalai families in the village were engaged in this activity. Unlike firewood collection which has been banned outright, honey collection was regulated through a system of passes. The forest department issue a collection pass on the guarantee that all the honey collected would be sold to them at a fixed price, much less than the prevailing market price. In the year 1995-96, the price was Rs. 25/- per kg of honey, while the price offered by private traders varied between Rs. 40-50 per kg.]

Despite departmental restrictions, the assessment revealed that collectors managed to sell sometimes, part of the honey to private traders (the villagers placed this amount at around 10% of the total collection). In 1996, the total honey supplied from Dangmal Panchayat to the forest department was estimated to be about 17 quintals. The total quantity sold to private traders was approximately 12%. On average, the Dangmal Panchayat supplies around 20 quintals of honey each year (the total collection of honey from the entire Bhitarkanika sanctuary is about 50 quintals per annum). The long association of tribal families with honey collection is apparent from the knowledge they have about the entire process of honey making – they can identify the flower from which honey has been prepared just from the taste and the color of the honey. Apart from the honey, the yield of wax is about 4.5 kg every quintal of honey. The income from honey collection was estimated at Rs. 80 per family per day at the time of the assessment. However, as indicated earlier, the Dalais are engaged only seasonally in honey collection – for about 3-4 months in a year- and received an average income of about Rs. 1500 from the activity every season. Collection usually takes place in the months from March to July.

In interviews undertaken with the Dalais for the assessment, they indicate how besides the low price offered for honey by the department, issuing of passes by them to non-traditional honey collectors creates problems. The traditional honey collecting communities like Dalais have acquired skill and expertise over the years and take special care not to kill bees while extracting honey. On the other hand, the non-traditional collectors, due to lack of experience and little concern for the long term livelihood source, resort to unfriendly practices including killing of large number of bees. The tribals therefore stress on the need for more care and attention while issuing honey passes. In addition, they emphasize the need for raising the price of honey and setting up of small scale honey processing units that can generate employment at the local level.

Fuel wood collection

The tribals in Dangmal (particularly the Sabars) earn their livelihood from fuel wood collection as well. Since the declaration of the Bhitarkanika sanctuary, tribal people in the village have lost their traditional rights over the forest. However, since there are no alternative livelihood opportunities available in the area, tribal people continue to derive their livelihood from forest based activities. Fuel wood gathering is a daily activity of the tribal community. Similarly, for tribal women in Dangmal, head loading is major source of income.

Fuel wood gathered is sold in nearby market places and also in the village. The assessment undertaken for the WWF-India project estimated that a family earned about Rs. 25-30 from fuel wood activity in a day. Since fuel wood collection is a banned activity, most tribals constantly fear being caught and fined by the department and therefore restrain from going into the interior of the forest. Instead, fuel wood is primarily collected from the periphery of the forest. However, the increasing pressure on the periphery has resulted in gradual depletion of the forest cover. The fuel wood gatherers say that a huge amount of wood gets decayed and destroyed in the forest. If the Forest Department could make suitable arrangements and allow them to collect the fallen and dry wood, it would help the tribals eke out a sustainable livelihood. In addition, they suggest the establishment of a wood depot at the panchayat level. Before independence, a depot was established in the area that met the forestry needs of people at subsidized rates. Tribals suggest that fuel wood can be made available similarly to people at a lower price by establishing a depot. The depot, they suggest, in turn can engage wage labor in collection of dry, fallen twigs and branches. This would help providing employment to the landless and the marginal farmers during the lean period and also prevent illicit fellings.

Seasonal activities

The agricultural season in the village extends from the middle of May to the end of December each year. Ploughing of land starts from the month of May. Sowing starts from the month of June after pre-monsoon showers. Paddy (the major crop) is harvested from the middle of October and last till the end of December. For landless agricultural families therefore, there is sufficient agricultural labor work in May-June and then during October-December. After sowing paddy, some migrate to towns and cities for labor work and then return in the month of October/November. Again, towards the end of December until April, they migrate out. Those who are not able to migrate are the worst off, and have to depend on the forest (as headloaders) to eke out a living.

Impact on tribal people and mitigation measures

The project has identified livelihood opportunities of people in the area as one of the key aspects of ICZM to be dealt with. The major activities proposed under the project in Orissa, relating to conservation and increasing livelihood opportunities are: i) intensifying patrolling through modern crafts, ii) afforestation in

mangrove areas , iii) crocodile rearing and research, iv) eco-tourism in Bhitarkanika mangroves, Tampara and Chilika lagoon, cultural and religious tourism promotion by maintaining and up keeping the dilapidated archeological sites and cultural assets iv) brackishwater aquaculture with crabs and fishes, v) dairy and goatery, vi) coir making and vi) value added fishery and other products.

It is expected that provision of all these alternative livelihoods would have a positive impact on the tribals in Dangmal. Initiatives to facilitate coir-making for instance are likely to help tribals supplement their family income, as all households in the village (including tribal households) have anywhere between 5 to 50 coconut trees. Residents of the village usually supplement their family income by selling green coconuts and using coconut fiber as fuel. It is proposed that coir making be supported through establishment of a training-cum-production center of coir products at Chilika. Such training is expected to generate employment opportunities for tribals.

Similarly, efforts to develop eco-tourism in the area by involving local people are also likely to open an alternative livelihood avenue for the tribal population. Finally, care would be taken to select mangrove species for planting that aid (and do not hinder) honey collection. For instance, the Jagula (*Tamarix indica*); Kharasi (*Aegiceras corniculatum*); and Harakanch (*Acanthus spp*) are flowering species that attract bees. These would be planted so that honey collection as an activity for the tribals, flourishes further. The plantation would also be done with the help of groups of local people, including tribal groups, so they stay involved in the protection and management of the mangroves.

The community based economic development activities such as coir making, crab fattening, ecotourism etc should be based on the formation of community institutions. These institution building would have been the primary agenda of activities then only the activities envisaged in the project will sustain. It is particularly important since most of the products developed through the project activities need be marketed appropriately. In the absence of such institutional mechanism marketing and attaining optimum price for the product is less realized.

7.6.3 West Bengal

None of the project villages in West Bengal have major tribal presence. On average, villages in Sagar report 0-2% tribal population. Tribal presence in Digha-Shankarpur too is very marginal. Thus no major impact on tribal population is envisaged.

The components envisaged at the national and state level will have far reaching impact on the coastal and marine resource management of the country in general and three piloting states in particular. Overall the project would benefit in supporting the sustainable utilization of resources and it also take care of the marginalized communities including women, scheduled caste and scheduled tribes. Since the coastal communities are less exposed to the reform agenda or principles of ICZM it is crucial to give them necessary awareness and capacity building opportunities. This necessitates an appropriate communication strategy which suits to the local requirement. The communication should be more on face to face nature or frequent dialogue which would convey the concerns, concepts, perceptions and worries meaningfully. The procurement of a community organizer, local level communication expert and participatory specialist is essential for the success of the project. As mentioned earlier the establishment and strengthening of the local level institutional mechanism depend on the combined effort of these key functionaries in the project.

CHAPTER 8

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The chapter presents the details of the measures to be taken during implementation and operation of the project to eliminate or offset adverse environmental and social impacts or to reduce them to acceptable levels and the actions needed to implement these measures. The details of positive and negative impacts that could be resulted during the implementation has been described in the Chapter 7 of this report. Since positive impacts are welcome by all, the negative impacts need to be minimized or brought to the level of acceptable limits. Besides, both the positive and negative impacts need to be monitored. Hence this chapter gives the details of environmental and social management plan, and monitoring details of each component and its activities.

8.1 Environmental Management Plan

Mitigation measures to prevent, minimize, and compensate the adverse environmental impacts are proposed for the priority investments under the ICZM Project. These ESMP documents need to be translated to the specific site conditions through inclusion into the bid and contract documents for priority investments wherein specific ESMP documents are not prepared with the DPR documents.

The ESMP also provide details of the monitoring measures during project implementation to provide information about key environmental aspects, particularly the environmental impacts of the project and the effectiveness of the mitigation measures.

The project activities for environmental mitigation plan preparation can be broadly classified as erosion protection through plantation related activities; civil works for infrastructure development activities, civil works related to architectural conservation and grid electricity distribution. The environmental management measures and described in table 8.1.

To effectively implement the environmental and social management measures suggested, necessary budgetary provisions will be made in the DPRs for the individual priority investments. Tentative budget for each of the project shall include the environmental management costs along with the good engineering practices, cost for monitoring environmental and social aspects. All administrative costs for implementing the Environmental and social mitigation measures shall be budgeted for as part of the SPMU/PEA costing.

Table 8.1: Environmental Management Plan

Project Activity	Key Issues	Mitigation Measures	Type of Mitigation	Monitoring measures proposed	Responsible Agency	Budget (INR)	Timeline
Coastal erosion protection works involving plantation / regeneration of mangrove, shelter bed plantations	Improper Siting	Nesting/breeding grounds of threatened or endangered species must be avoided.	Prevention	The PEA shall ensure that site criteria have been adopted.	PEA / SPMU	Nil	Before final selection of the site
	Species Selection	The hydrology, depth, duration and frequency of tidal inundation, tidal flooding shall be considered while choosing mangrove species. Monoculture and introduction of exotic species shall be avoided.	Prevention	PEA shall maintain documentation to ensure species selection procedures adopted; Consultation conducted with the local community during species selection	PEA / SPMU	50,000/site	Before starting the planting
	Biodiversity Impacts	Proper planning measures for addressing issues related to habitats and impacts on bio diversity. Address the arrival of new species and changes in habitat food chain	Prevention and Minimization	Regular monitoring by PEA	PEA / SPMU	100,000/site (Ecotourism, plantation and crab fattening areas)	Entire project period
	Health and survival of plantation	Ensure all stresses to mangrove regeneration have been addressed prior to initiation of plantation activity. Plantation should be undertaken in the appropriate season in consultation with the Environmental Expert of the state to ensure maximum survival.	Mitigate	Approval of PEA before start of the plantation ; Consultation with the local community before start of the plantation.	PEA / SPMU	30,000/site	Before starting the planting
	Soil Contamination	Minimize the use of pesticides and fertilizers	Minimization	Regular monitoring during plantation by PEA / CBO's	CBO/PEA	Nil	Entire project period
	Water pollution	Minimize the use of pesticides and fertilizers. Excessive use of fertilizers may lead to eutrophication of water bodies. Avoid or minimize the run off of pesticides and fertilizers	Minimize	Regular monitoring during plantation by PEA / CBO's	CBO/PEA	Nil	Entire project period

Project Activity	Key Issues	Mitigation Measures	Type of Mitigation	Monitoring measures proposed	Responsible Agency	Budget (INR)	Timeline
	Impacts due to grazing	Adopt proper planning measures/ Adequate provisions of alternate grazing lands	Prevention and compensate	Establishment of the fodder requirements and controlled grazing in selected areas	CBO/PEA	30,000/Ha (One fodder garden is sufficient for 100 goats)	Entire project period
Coastal erosion protection works involving construction of geo tube based embankments	Impact on ecologically sensitive areas	Survey is to be carried out to study the impact of gap filling at areas with proximity to environmentally sensitive areas like mangrove forests/ coral reefs/agricultural lands. Identify CRZ applicable zones.	Prevention and Minimization	Regular monitoring and implementation of corrective actions	PEA	50,000/site	Before starting the protection work
	Improper Construction Schedule	The activities of construction shall be scheduled taking into consideration factors such as sowing of crops, harvesting, availability of labor during particular periods and other site specific conditions.	Prevention	Consultations with the local community and approval of PEA for start of the activity	PEA	25,000/site	Before starting the protection work
	Soil erosion	In slopes and other suitable places along the landward side, grass should be planted. Strengthening of sides by laying stones.	Prevention and minimization	Regular monitoring and corrective actions in disturbed areas prone to erosion.	Contractor / PEA	50,000/Ha	Entire project period
	Transport of construction materials	Local materials should be used as much as possible so as to avoid long distance transportation, especially that of earth and stone. Borrow areas for sand filling should not be from the same sediment cell. Borrow areas should be selected such that irrigated/ agricultural/ grazing land and land close to settlements are avoided.	Minimize	To be incorporated in the contract document of the respective works; Monitoring during construction stage of the project	Contractor / PEA	Nil	Entire project period
	Waste management	The construction site must be restored. Any construction related waste must be cleared and transported to waste disposal sites.	Mitigation	Regular monitoring and consent of the land owner before handing over the site To be incorporated in the contract document of the contractor undertaking the civil works.	Contractor	Nil	Entire project period
Priority investments	Improper siting	Apply siting criteria Siting will be done after proper consultations	Prevention and	Consultations conducted and issues raised	PEA / SPMU	10,000/site	Before selection of

Project Activity	Key Issues	Mitigation Measures	Type of Mitigation	Monitoring measures proposed	Responsible Agency	Budget (INR)	Timeline
involving civil works for infrastructure development			Minimization				land
	Destruction of or disturbance to habitat	Wildlife habitat areas / ESA will be established and such areas not be used.	Prevention	Regular monitoring by PEA	PEA / SPMU	Nil	Before selection of land
	Flooding	Proper siting – select less vulnerable site	Prevention	Adoption of a well defined site selection criteria	PEA / SPMU	Nil	Before selection of land
	Tree felling	Tree felling shall be minimized; Afforestation/ reforestation measures should be adopted. Cutting of trees with specific medicinal, religious, archaeological, environmental importance should be avoided.	Minimization and compensation	Regular Monitoring by PEA	Contractor / PEA	Nil	Before selection of land
	Waste Disposal	Solid/ liquid/ construction/ domestic waste, contaminants (oil/ grease etc.) shall not be disposed in water bodies/ open lands. Construction debris shall be disposed separately and properly.	Mitigation	To be incorporated in the contract document of the respective works and monitored	Contractor / PEA	Nil	Entire project period
	Transport of construction materials	Local materials should be used as much as possible so as to avoid long distance transportation, especially that of earth and stone.	Minimize	To be incorporated in the contract document of the respective works and monitored	Contractor / PEA	Nil	Before assigning the works
	Water Pollution	Run off from the construction site must be diverted to proper drains Wastes should be properly disposed off or contained	Mitigate	To be incorporated in the contract document of the respective works and monitored	Contractor / PEA	Nil	Before assigning the works
	Soil erosion	The stockpiles for preserving top soil should be designed such that the slope does not exceed 1:2 (vertical to horizontal) and the height of the pile is restricted to 2m. Containment measures should be undertaken to avoid soil wash off	Prevention and minimization	To be incorporated in the contract document of the respective works and monitored	Contractor / PEA	Nil	Before assigning the works
	Occupational health and safety	Workers shall be educated about personal safety measures and location of safety devices. Personal Protective Equipment shall be provided to all workers.	Prevention	To be incorporated in the contract document of the respective works and monitored	Contractor / PEA	Nil	Before assigning the works
	Water pollution during operations	Adequate sewerage and sanitation facilities Proper disposal of liquid waste, construction	Mitigation	Regular monitoring by PEA	CBO's / PEA	Nil	Entire project

Project Activity	Key Issues	Mitigation Measures	Type of Mitigation	Monitoring measures proposed	Responsible Agency	Budget (INR)	Timeline
	stage	debris, and other solid wastes Proper containment to avoid rain water runoff carrying wastes and/or materials					period
	Solid Waste Management	Adequate provision and transportation to existing facilities	Mitigation	Regular monitoring by Community	CBO's / PEA	25,000/site	Entire project period
	Sewerage and sanitation facilities	Proper design and siting of latrines/ septic tanks Adequate provision and connection to existing facilities	Mitigation	Regular monitoring by Community	CBO's / PEA	25,000/site	Entire project period
	Drainage Flow	Regular inspection and cleaning of drain to remove any debris or vegetative growth that may interrupt the flow.	Prevention and Minimization	Regular monitoring by Community	CBO's / PEA	25,000/site	Entire project period
	Setting up of Construction camps and other facilities	Selection of site for various construction facilities such as camp site, plant sites, project office, etc. at places without sensitive environmental features	Prevention and Minimization	Monitoring by PEA	Contractor / PEA	Nil	Entire project period
Priority investments involving civil works for Electricity grid distribution system	Land use impacts due to transmission line RoW and substation location	Environmentally sensitive areas and areas with dense population pockets shall be avoided	Prevention	Alignment finalization adopting a well defined criteria	PEA	Nil	Before starting project activities
	Clearing and control of vegetation in RoW areas	The clearing of vegetation shall be restricted to the required width within the RoW	Minimization	Areas cleared of vegetation cover within RoW	PEA / Contractor	Nil	Before starting project activities
	Erosion during construction stage	Adequate temporary protection measures to control erosion shall be implemented including slope terracing, ground cover vegetation etc as applicable	Mitigation	Adopted erosion control measures	PEA / Contractor	50,000/Ha	Entire project period
	Damage due to natural disasters	The alignment shall be finalized avoiding hazard prone areas. Wherein such areas are not available adequate protection measures need to be implemented	Prevention and Compensation	Alignment and hazard zone map; protection measures to be implemented	PEA / SPMU	50,000/Km for protection measures	Before starting project activities and during project period

8.2 Resettlement Policy Framework

8.2.1 Contents of the Resettlement Policy Framework

The RPF consists of (i) a monitoring mechanism to identify potential, even if unlikely, cases of (non-building) squatters and encroachers; (ii) an entitlement framework to compensate and assist for possible types of losses; and (iii) a three-tier grievance mechanism to be widely publicized. As the number of attributable cases is not known, notional numbers were used to define a resettlement and rehabilitation budget of INR 134 million, which will be updated as these chance cases are discovered during the implementation period.

8.2.2 Monitoring mechanism to identify potential unlikely cases of involuntary resettlement

A detailed component wise monitoring plan has been prepared for the project. Monitoring involves periodic assessment to ascertain whether activities are being undertaken according to the plan. It includes component wise activities, monitoring indicator, tool and frequency, responsibility for carrying out the monitoring and reporting mechanism. For details of the social assessment, refer the report on the Environmental and Social Assessment and Management Plan for the Project,

Specifically, monitoring in the project will include monitoring of the issues and impacts avoided. The project does not involve land acquisition, and it is unlikely that in during the project implementation period, and need for land acquisition will arise. However, as such possibility cannot be absolutely ruled out, every quarterly implementation progress report will have a section either (i) certifying that no private land is proposed to be acquired in the project, or (ii) if any parcel of land is proposed to be acquired, an proposed plan to acquire land and a request for no-objection from the World Bank on the proposed plan.

Chance of discovery of any encroacher or squatter on public land used for the project is also not very high, particularly because most of these proposed sites have been examined in last two years, and no such encroachment or squatter has been found. However, it is possible that a few squatters or encroachers might be discovered in a later date during project implementation; or some residual claims may come to be known. These would be discovered either by implementation of the monitoring mechanism, or by the grievance mechanism.

Monitoring will be done by the third-party monitoring consultants in the project, which also includes social audits. This monitoring will be regular and continuous during project implementation. The monitoring responsibility of the third-party consultants will specifically include reporting on the discovery of any claim to land, property, income or access impacted by any of the project activities. Separate environmental and social audit consultants will also prepare annual audit reports.

8.2.3 R&R Principles, Policy Framework, and Entitlement Matrix

A. Broad Principles of the Policy

A1. This policy document describes the principles and approach to be followed in minimizing and mitigating negative social and economic impacts by the sub projects. The guidelines are prepared for addressing the issues limited to this projects for resettlement and rehabilitation of the PAPs. This policy has been developed based on the National Resettlement and Rehabilitation Policy, 2007.

A2. The broad principles of the policy are as below:

- The **negative impact** on persons affected by the project would be **avoided** to the extent possible.
- Where the negative impacts are unavoidable, the project-affected persons will be assisted in improving or regaining their standard of living. Vulnerable groups will be identified and assisted to improve their standard of living.
- All information related to resettlement preparation and implementation will be disclosed to all concerned, and community participation will be ensured in planning and implementation.
- All acquisition of land if required, would be through private negotiation. The persons affected by the project who does not own land or other properties but who have economic interest or lose their livelihoods will be assisted as per the broad principles brought out in this policy.
- Before taking possession of the acquired lands and properties, compensation and R&R assistance will be made in accordance with this policy.
- There would be no/or minimum adverse social, economic and environmental effects of displacement on the host communities but if needed specific measures would be provided.
- Broad entitlement framework of different categories of project-affected people has been assessed and is given in the entitlement matrix. Provision has been kept in the budget. However, anyone moving into the project area after the cut-off date will not be entitled to assistance.
- Three tier appropriate grievance redress mechanism has been established in the project to ensure speedy resolution of disputes.
- All activities related to resettlement planning, implementation, and monitoring would ensure involvement of women. Efforts will also be made to ensure that vulnerable groups are included.
- All consultations with any potential PAPs shall be documented. Consultations will continue during the implementation of resettlement and rehabilitation works.
- If required (even if unlikely), a Resettlement Plan will be prepared including a fully itemized budget and an implementation schedule.

B. Abbreviations, Terms and Definitions

B1. Following **abbreviations** have been used in the policy:

WB	World Bank	LAA	Land Acquisition Act
PAP	Project Affected Person	NGO	Non-Government Organisation
PAF	Project Affected Families	RAP	Resettlement Action Plan
BPL	Below Poverty Line	R & R	Resettlement and Rehabilitation
CPRs	Common Property Resources	SC	Scheduled Caste
EP	Entitled Person	ST	Scheduled Tribe
ha	Hectare	U/s	Under Section

B2. Following **terms** have been used in the policy:

Bigha	1/5 of an acre
Hectare	Hectare equals 10000 Square Meters
Development Block	A number of villages grouped together form a Development Block.
Tehsil/Subdivision	A group of Blocks
Panchayat Samiti	Local Self-governing body at Block level is Panchayat Samiti.
District Collector /Magistrate	Administrative head of a District.
Divisional Commissioner	Administrative head of a division comprising a number of districts.
Panchayat	Elected local self-governing body at village level.
Poverty Line	A family whose annual income from all sources is less than a designated sum as fixed by the concerned State Government. in

which the project falls, will be considered to be below Poverty Line.

Sarpanch	Elected chief of a village.
Non titleholders	Drawing economic benefits from a piece of land, but not the owner of the land
Pucca	Cement, bricks or concrete build structure
Semi Pucca	Structures with tiles/ thatch roof/ brick cement wall
Kachha	Structures with stone/ mud wall/ thatch roof
Entitled Person	A person adversely impacted by the project and is entitled to some kind of assistance as per the project entitlement framework
Titleholder	A person who possess legal documents towards the claim for the property
Grievance Redress Cell	A cell set up by the project authority at various levels to look in to grievances of a potential project affected person or persons

B3. Definitions

Cut-off date: Cut-off date shall be the following:

- In the cases of land acquisition affecting legal titleholders, the cut-off date would be the date of issuing the notice u/s 4(1) of the LA Act, 1894.
- In cases where people lack title, the cut-off-date shall be a year prior to 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.

Family: "Family" shall mean husband, wife and dependants including parents and children in case of joint family on the date of section 4 of LA Act or entry in the family register of Panchayat. Major sons and daughters will be treated as separate family if their livelihood is separately affected by the project.

Wage Earner: A person who is working with a commercial establishment or working as a labour in an agriculture land, which is being affected by the project.

Encroacher: A person, who has trespassed government. 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 is land less and has settled on publicly owned land without permission and has been occupying publicly owned building without authority 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.

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 government agencies for identifying BPL families. The certificate of BPL from the block / Tehsil will be used for identifying the BPL.

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 government level will be considered a vulnerable person. Disadvantaged persons belonging to SC, ST, disabled, handicapped, orphans, destitute persons and woman heading the household will also be recognized as vulnerable person.

Titleholders: Persons who possess legal documents in support of claims made towards ownership of structure or land are titleholder.

Subtenants: Persons, who not being tenants, are allowed to cultivate land on certain terms and conditions.

Sharecroppers: Persons who cultivate land of a titleholder on terms of sharing income there from with the titleholder

Minimum Economic Holding (MEH): Five bighas (one acre) of a landholding shall be considered as MEH. In schedule areas 20 bighas is the minimum economic holding.

Kiosk: Kiosk is a temporary structure not fixed to ground. Normally kiosks are wooden structure on four legs on the ground and can be easily moved.

C. The Process

C1. Declaration of the project and its impact zone: The project executing agency (PEA) will inform the community well in advance about the project, its feature and likely adverse impact if any and also the positive impact of the project.

C2. Procedure to be followed for social impact assessment: The PEA will undertake a survey

for identification of the persons and their families likely to be affected by the project. Every survey shall contain the following village-wise information of, the project affected families:

- members of families who are permanently residing, practicing any trade, occupation or vocation in the project affected area;
- Project Affected Families who are likely to lose their house, agricultural land, employment or are alienated wholly or substantially from the main source of their trade occupation or vocation.
- Agricultural labourers and non-agriculture labourers.

C3. The PEA on completion of the survey will disseminate the survey results among the affected community. Based on the social impact assessment survey, PEA will prepare an action plan to mitigate or minimize the adverse impacts as identified during the survey. The draft mitigation plan in form of resettlement action plan (RAP) will be again disseminated among the affected individuals / community. The feedback received from the affected groups will be incorporated to the extent possible before finalization of the RAP.

C4. Every-draft Plan of resettlement and rehabilitation prepared shall contain the following particulars namely:

- The extent of area to be acquired for the project and the name(s) of the corresponding village(s).
- A village-wise list of project affected families and likely number of displaced persons, family-wise and the extent and nature of land and immovable property in their possession indicating the survey numbers thereof held by such persons in the affected zone;
- A list of agricultural labourers in such area and the names of such persons whose livelihood depend on agricultural activities;
- A list of persons who have lost or are likely to lose their employment or livelihood or who have been alienated wholly and substantially from their main sources of occupation or vocation consequent to the acquisition of land for the project;
- A list of occupiers; if any
- A list of public utilities and Government buildings which are likely to be affected;
- A comprehensive list of benefits and packages which are to be provided to project affected families;
- Details of the extent of land available which may be acquired in settlement area for resettling and allotting of land to the project affected families;
- Details of the basic amenities and infrastructure facilities which are-to be provided for resettlement;

- The time schedule for shifting and resettling the displaced families in resettlement zones;
- Such other particulars as the Administrator for Resettlement & Rehabilitation may think fit to include for the information of the displaced persons.

C5. The final RAP and list of PAPs will be cleared by the office of the district magistrate. The final RAP will also be hosted on the website of the PEA and copies of the RAP in local language will be placed at (i) the project site (ii) panchayat offices; and (iii) office of the district magistrate.

D. R&R Benefits for Project Affected families

D1. The resettlement and rehabilitation (R&R) benefits shall be extended to all the Project Affected Families (PAF) whether belonging to below poverty line (BPL) or non-BPL

D2. Any project affected family losing house or residential structure will be eligible for a free house plot including vulnerable residential squatters.

D3. Each PAF owning agricultural land in the affected zone and whose entire land has been acquired may be allotted agricultural, land, or cultivable waste, land to the extent of actual land loss subject to a maximum of one hectare of irrigated, land or two hectares of un-irrigated land/cultivable waste land subject to availability of Government land in the district.

D4. Stamp duty and other fees payable for registration shall be borne by the/requiring body.

D5. The Land allotted shall be free from all encumbrances. The Land allotted may be in the joint names of the titleholder and the spouse.

D6. In case of allotment of wasteland/degraded land, in lieu of acquired land, each PAF shall get financial assistance of Rs.10,000/- per hectare for land development.

D7. Each PAF having cattle shall get financial assistance of Rs. 15,000/- for construction of cattle shed.

D8. Each PAF shall get financial assistance of Rs. 10,000/- as transportation cost for shifting of building materials, belongings and cattle etc. from the affected zone to the resettlement zone.

D9. Each PAF owning agricultural land in the affected zone and whose entire land has been acquired shall get one-time financial assistance equivalent to 750 days minimum agricultural wages for loss of livelihood where neither agricultural land nor regular employment to one 'member of the PAF has been provided and 300 days of MAW as subsistence allowance A sharecropper losing total land will be eligible for 750 days of MAW as rehabilitation grant and vulnerable squatter will also be eligible for 300 days of MAW as rehabilitation grant.

D10. Each PAF owning agricultural land in the affected zone and loses 25% of his total landholding will be eligible for one time financial assistance equivalent to 500 days minimum agricultural wages and 250 days of subsistence allowance.

D11. The Project Affected Families shall be provided necessary training facilities for development of entrepreneurship to take up self-employment projects at the resettlement zone as part of R&R benefits.

D12. Rural artisan/ small trader/ self employed are eligible for one time financial assistance of Rs. 25000 for construction of work shed

D13. Agriculture and Non-agriculture labour are eligible for (i) Rehabilitation Grant @ of 750 days of MAW; (ii) Subsistence grant for 300 days of MAW of project State

D14. Details for each of these above are provided in the entitlement matrix.

E. R&R Benefits for Project Affected families of the Scheduled Tribes

E1. Each of such Scheduled Tribe PAF will be eligible for all benefits described from sub-sections D1 to D13, as applicable. The following are over and above these benefits.

E2. Each Project Affected Family of ST category shall be given preference in allotment of land.

E3. Each ST PAF shall get additional financial assistance equivalent to 500 days minimum agriculture wages for loss of customary rights/usages of forest produce.

E4. The ST PAFs will be re-settled close to their natural habitat in a compact block so that they can retain their ethnic .linguistic and cultural identity, if any such displacement happens due to the project activities.

E5. The Tribal Land Alienated in violation of the laws and regulations in force on the subject would be treated as null and void and-the R&R benefits would be available only to the original tribal land owner.

F. Overall Entitlement Matrix

The following table summarizes the entitlements that would accrue is any person is discovered to be affected by the project, as per definition of a PAP.

Type of Impact/Loss	Nature of Ownership	Unit of Entitlement	Entitlements as per Policy
For Loss of Land			
Agricultural / Residential / Commercial land	Titleholders and customary or usufruct right	Family	1. Direct purchase of land Or 2. Cash compensation at replacement value 3. Land for land of equivalent area or a maximum of one ha of irrigated land or two ha of unirrigated/

Type of Impact/Loss	Nature of Ownership	Unit of Entitlement	Entitlements as per Policy
	holders		<p>cultivable wasteland, subject to availability of Government land in the district</p> <ol style="list-style-type: none"> 4. One-time assistance of Rs 15,000 per hectare towards land development charges if land allotted is wasteland or degraded land. 5. One-time assistance of Rs.10,000 towards agriculture production <p>OR</p> <ol style="list-style-type: none"> 6. Rehabilitation Grant equivalent to 750 days of minimum agriculture wages (MAW) – in lieu of options 3 to 5. 7. Reimbursement of registration and stamp duty charges 8. Subsistence grant equivalent to 300 days of MAW 9. PAPs will be eligible for Training (one person per family) 10. Annuity policies for vulnerable PAPs that will pay a pension for life - cost of such will be borne by the project
	Share croppers	Family	<ol style="list-style-type: none"> 1. Rehabilitation grant equivalent to 750 days of MAW. 2. PAPs will be eligible for Training (one person per family) 3. Notice of at least 4 months to harvest standing crops
	Encroacher	Family	<ol style="list-style-type: none"> 1. Notice of at least 4 months to harvest standing crops. 2. PAPs will be eligible for Training (one person per family)
	Squatter	Family	<ol style="list-style-type: none"> 1. Rehabilitation grant equivalent to 300 days of MAW for vulnerable squatter. 2. Notice of at least 4 months to harvest standing crops. 3. PAPs will be eligible for Training (one person per family)
Partial loss of land – Less than 25% of the total holding (Agricultural land)	Titleholders and customary or usufruct right holders	Family	<ol style="list-style-type: none"> 1. Direct purchase of land <p>OR</p> <ol style="list-style-type: none"> 2. Cash compensation at replacement value 3. Reimbursement of registration and stamp duty charges 4. Rehabilitation Grant equivalent to 500 days of MAW

Type of Impact/Loss	Nature of Ownership	Unit of Entitlement	Entitlements as per Policy
			5. Subsistence grant for 250 days of MAW 6. PAPs will be eligible for Training (one person per family)
For Loss of Building Structure			
Residential	Titleholder	Family	1. Cash compensation at replacement value. 2. A homestead plot of 150 sq. m free of cost for each nuclear family. 3. One time assistance of Rs 15,000 towards construction of Cattle shed 4. Shifting grant of Rs 10,000 for transportation of building materials, cattle etc. 5. PAPs will be eligible for Training (one person per PAF)
	Squatters	Family	1. Cash compensation for the structure at replacement value 6. A plot of 100 sq. m, free of cost for vulnerable squatter 7. Shifting grant of Rs 10,000 for transportation of building materials, cattle etc 8. PAPs will be eligible for Training (one person per PAF)
	Encroacher	Family	1. PAPs will be eligible for training (one person per family)
Commercial	Titleholder	Family	1. Cash compensation at replacement value 2. Shifting grant of Rs 10,000 for transportation of building materials, cattle etc. 3. PAPs will be eligible for Training (one person per PAF) 4. Annuity policies for vulnerable PAPs that will pay a pension for life. Cost will be borne by the project
	Encroacher	Family	1. PAP will be eligible for training – one person per family
	Squatter / Kiosk owner	Family	<ul style="list-style-type: none"> • Relocation of shop to the vendor market under the project OR <ul style="list-style-type: none"> • Shifting allowance of Rs. 10,000

Type of Impact/Loss	Nature of Ownership	Unit of Entitlement	Entitlements as per Policy
Loss of Livelihood / Livelihood Source or Access to Livelihood Source			
Agriculture and Non-agriculture labour		Family	<ul style="list-style-type: none"> Rehabilitation Grant @ of 750 days of MAW Subsistence grant for 300 days of MAW of project State PAPs will be eligible for Training (one person per family)
Rural Artisan / small trader/ self employed	Titleholder and non titleholder	Family	<ul style="list-style-type: none"> One-time financial assistance of Rs. 25000 for construction of work shed

8.3 Monitoring Plan

Monitoring and Evaluation (M&E) are critical activity in the implementation stage. Monitoring involves periodic assessment to ascertain whether activities are being undertaken according to the plan. It provides the feedback necessary for project management to keep the programs on schedule. By contrast, evaluation is essentially a summing up, the end of the project assessment of whether those activities actually achieved their intended aims. As per World Banks' OP/BP 4.12 "Monitoring provides both working system for project managers and a channel for the community to make known their needs and their reactions to the program execution".

8.3.1 Monitoring plan and reporting – national component

The details on monitoring plan and reporting for both national and state components are given in table 8.4 and 8.5.

Table 8.4: Monitoring details of national component

Component	Potential Impacts	Monitoring indicator	Tool & Frequency	Monitoring by	Reporting to
Hazard line mapping	Decline in property value Displacement; Loss of livelihood or livelihood sources; Local level protest	Awareness generation campaign conducted Number of persons attended Number of persons aware of the project % of local population complained loss of livelihood or sources Entitlement matrix followed	Consultation & Quantitative Survey during Quarterly monitoring Quantitative survey during midterm and end term evaluation	Monitoring Consultants Evaluation Consultants	RD and M&E Expert of NPMU and SPMU
Demarcation and	Displacement; Loss of livelihood or	Number of ESA identified	Review meeting and Consultations	NPMU	NCZMA, MoEF

Component	Potential Impacts	Monitoring indicator	Tool & Frequency	Monitoring by	Reporting to
ESA mapping	livelihood sources; Local level protest Delineation of Conservation area	Number of sediment cells (land regions) completed for mapping Number of maps completed Number of consultation with local stakeholders or focal group discussions conducted	carried out quarterly		
Capacity building of the members of NCZMA, and nation-wide training program for integrated coastal zone management	The technical knowledge of the members of the NCZMA improved; Improved management of coastal zone in the country; Better implementation of ICZMP; Officials involved in the coastal zone management trained;	Number of staff of NCZMA attended the capacity building programme; Number of officers from different states (SCZMA) attend the training programme	Performance of implementation of ICZMP; Better management of Coastal Zone indicated by minimum conflicts	NPMU, NCSCM	MoEF; SPMU
Setting up and operationalization of the new National Centre for Sustainable Coastal Zone Management (NCSCZM)	Improved management of coastal and marine environment, reduced conflicts, enhancement of biodiversity	Type and number of infrastructure developed; man power employed; Number of academic works under taken including publishing in peer reviewed journals, Number of training and capacity building conducted; Number of people trained; Demonstrated evidence of networking with local, state and national level institutions	Consultations, review meetings, perusal of administrative and annual reports, etc	NPMU	NCZMA, MoEF

Table 8.5: Reporting frequency and responsibility

No	Particulars	Frequency	Reporting Responsibility	Monitoring responsibility
1	Compliance Status report: 'Environmentally & socially sensitive sites, and status of compliance at these sites	Quarterly	PEA	SPMU – NPMU Environmental ; Rural Development and M&E Expert
2	Environment and social site visit report encapsulating–	Quarterly	SPMU	NPMU Environmental

No	Particulars	Frequency	Reporting Responsibility	Monitoring responsibility
	a. plan vs actual b. exceptions noted in visit			Rural Development and M&E Expert
3	Verification of land to be acquired and status of land acquisition if any	One time	PEA / SPMU	NPMU
4	Distribution of entitlements and assistances	Monthly	PEA / SPMU	NPMU
5	Community consultations	Quarterly	Social Facilitators PEA / SPMU – Rural Development and M&E Expert	SPMU NPMU – Environmental Rural Development and M&E Expert
6	Progress of grievance redressal	Monthly Quarterly	PEA SPMU	SPMU NPMU

8.3.2 Institutional arrangement for implementation

GOI's MoEF will have the lead responsibility for project implementation and ensuring that the project components and subcomponents are implemented properly. The DeFE of each of the three participating states will be the key partners of MoEF in project implementation. Each of these four main partners have set up special purpose institutions in the form of registered societies (National and State level PMUs), to exclusively lead and coordinate project activities on a full time basis and directly implement some of the project sub components. They have the expertise, experience and demonstrated capacity in coastal zone management and have been the obvious choice to lead project implementation. Similarly the pilot execution agencies have been selected by MOEF and the State DOFEs in view of their singular expertise in implementing respective coastal zone conservation and development interventions. The proposed institutional arrangements, roles and responsibilities of various actors and their organizational linkages are given in figure 8.1 to 8.4.

At the National Level MoEF is setting set up a NPMU to exclusively manage the project and is also in the process of establishing an Empowered Committee (EC) to facilitate speedy implementation of the project. The EC s main functions would be: providing policy and implementation framework, approval of AAPs and budgets, approval to high cost consultancy (more than US\$ 300,000) and works contract (more than US\$ 3 M) awards and provide an oversight on the project's implementation performance and outcomes. The NPMU is being set up within the MoEF with an exclusive mandate for providing countrywide leadership, collaboration and management of the ICZM project. NPMU will be responsible for ensuring that the PDOs are fully achieved in a timely manner through overall project planning and management, directly implementing the national component, providing guidance, support and approvals as needed to the three SPMUs including monitoring performance of the State components, management of project funds including timely release of advance project funds to the States and seeking reimbursements from the Bank. Its functions will also include: capacity building of all Project partners, managing country wide IEC campaigns and stakeholder participation, ensuring appropriate procurement practices and high quality of engineering designs and construction, ensuring compliance with the project's safeguard policies, implementing enhanced Governance and Accountability Action Plan, and regular monitoring and evaluation of project performance, liaising with the World Bank and for sending quarterly progress reports to EC of the MOEF and the Bank and conduct regular

review of strategies and implementation arrangements in the context of implementation experiences and for ensuring course corrections as needed.

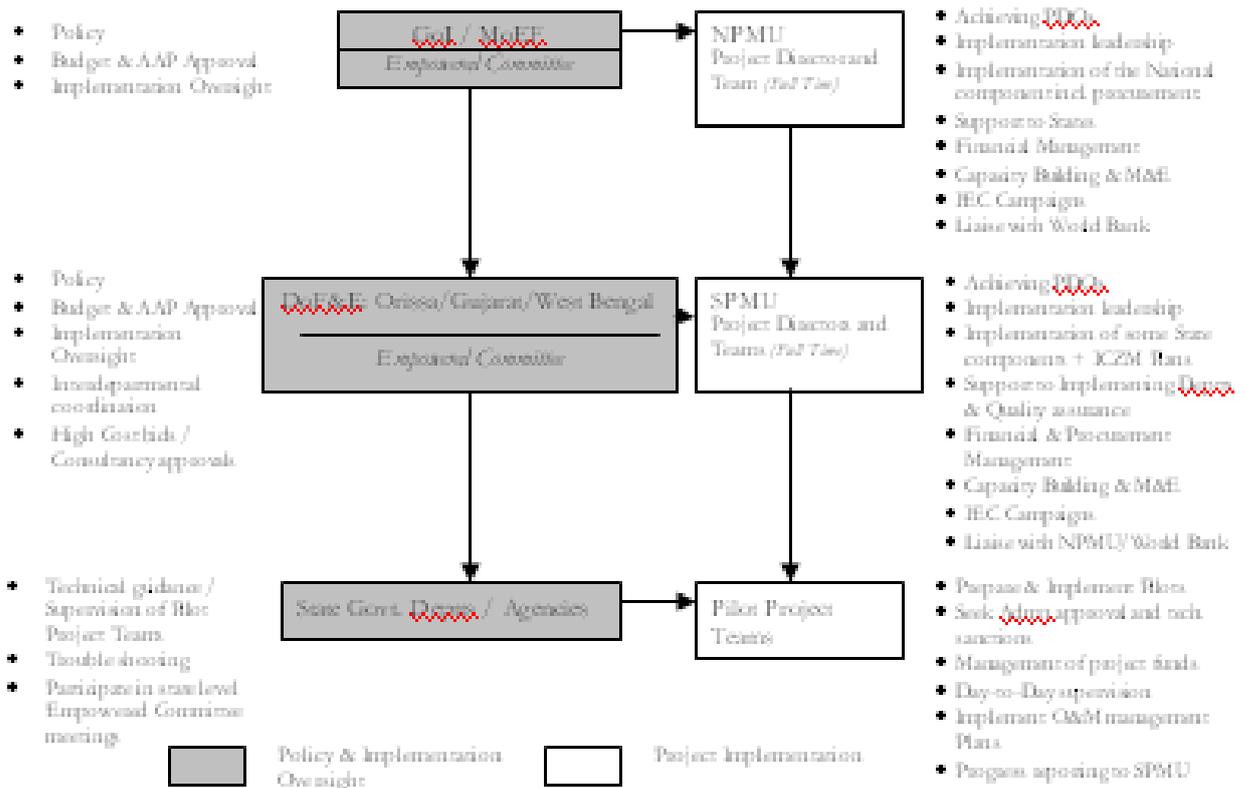
At the State Level the DoFE would be primarily responsible for implementing the respective state components of the project. The three states are setting up SPMUs to manage the project in their states and are also establishing ECs to facilitate speedy implementation of the project. These ECs would be providing state level ICZM policy and implementation framework, approval of AAPs and budgets, ensure inter-departmental coordination and partnership, approval to high cost consultancy and provide an oversight on the project's implementation performance and outcomes.

The SPMUs would be state level counterparts of the NPMU and have similar responsibilities for the respective state components. Their main functions include overall project planning and management, directly implementing some of the agreed sub-components/ pilots, providing guidance, support and approvals as needed to the pilot executing agencies (PEAs), and monitoring their performance, management of project funds including timely release of advance project funds to the PEAs, and ensuring that agreed safeguard and fiduciary policies and procedures are fully complied with by the PEAs, capacity building of all project partners, managing state level IEC campaigns and ensuring stakeholder participation, ensuring appropriate procurement practices and high quality of engineering designs and construction, implementing enhanced Governance Action Plan, and regular monitoring and evaluation of project performance in the State..

The PEAs are the same as the various line departments who are implementing the pilot investments. The departments have identified exclusive project teams to be responsible for implementing the agreed pilot projects adopting the project guidelines contained in Project Agreements signed with the Bank, the state project reports and PIPs. The main function of these project teams include preparing DPRs as per nationally accepted technical standards and specifications, seeking appropriate technical and administrative approvals from within their own departments and SPMU, construction/ installation of facilities, managing project funds if required, related capacity building, ensuring compliance with project's safeguard and fiduciary policies, standards and procedures, and supporting concurrent M&E.

The institutional arrangement proposed for the implementation of the project is principally based on the existing hierarchical organization structure of the Ministry of Environment and Forests at national level and Department of Forests and Environment at State level. The highly acclaimed reform agenda for sustaining coastal and marine areas in India which emphasize the principle to support participatory, integrated but decentralized planning and management is partially covered in the institutional mechanism. It is observed that the participation is limited with line departments only, where as the devolution of decision making to the coastal state's local self government level is hardly met with. In order to fulfill the reform agenda, the implementation arrangement should be participatory with the involvement of local people through local self government institutions such (grama panchayat, block panchayat and district panchayat) the representatives of major stakeholders other than line departments such as fisherfolks', CBOs, NGOs, entrepreneurs, etc. This is particularly important because there are many investments in the state level components where chances of disputes, grievances, conflicts are there and need to be settled as far as possible at the local level. Moreover the formulation of local representative involved implementation mechanism would increase the transparency of the project and help in developing capacity, creating awareness and to get logistic support. Hence it is recommended that each priority investment site should have local level implementation and monitoring committee with active participation of local people or their representatives, fisherfolk, CBOs, NGOs etc.

ICZM PROJECT - INSTITUTIONAL ARRANGEMENTS



NPMU Staffing

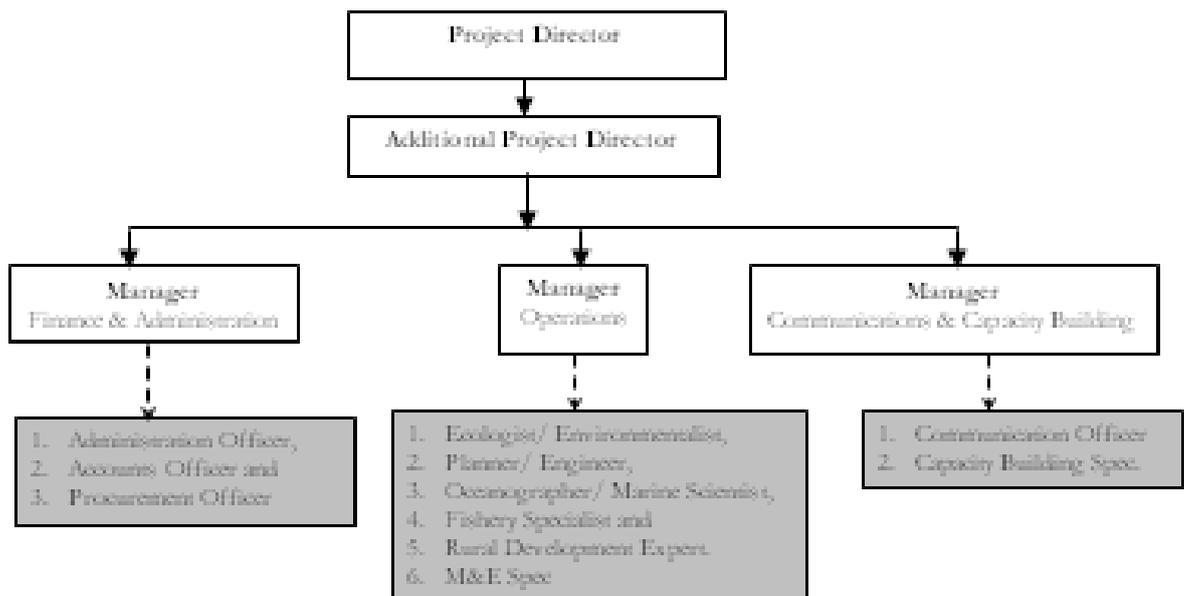


Figure 8.1: Institutional arrangement for implementation - National

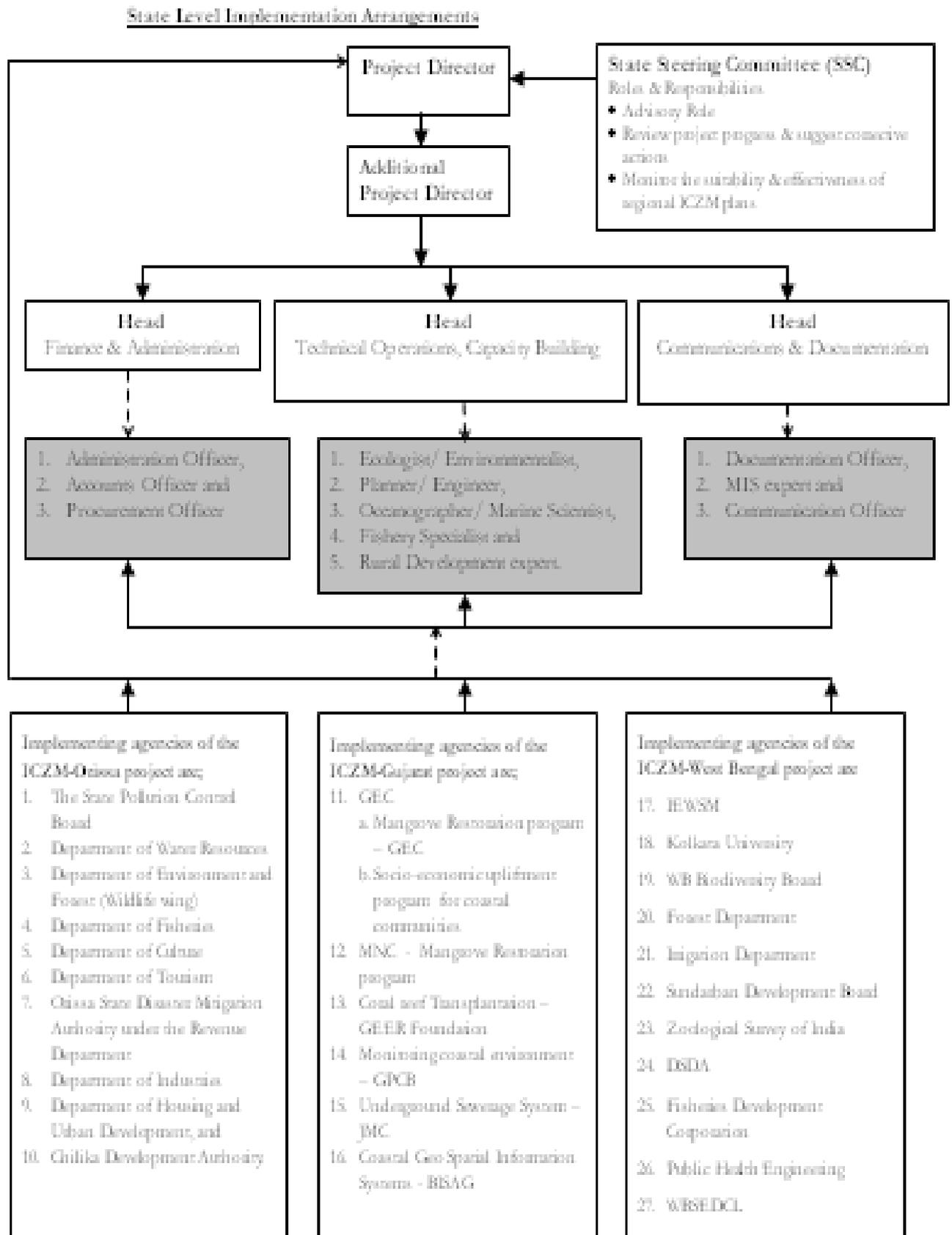
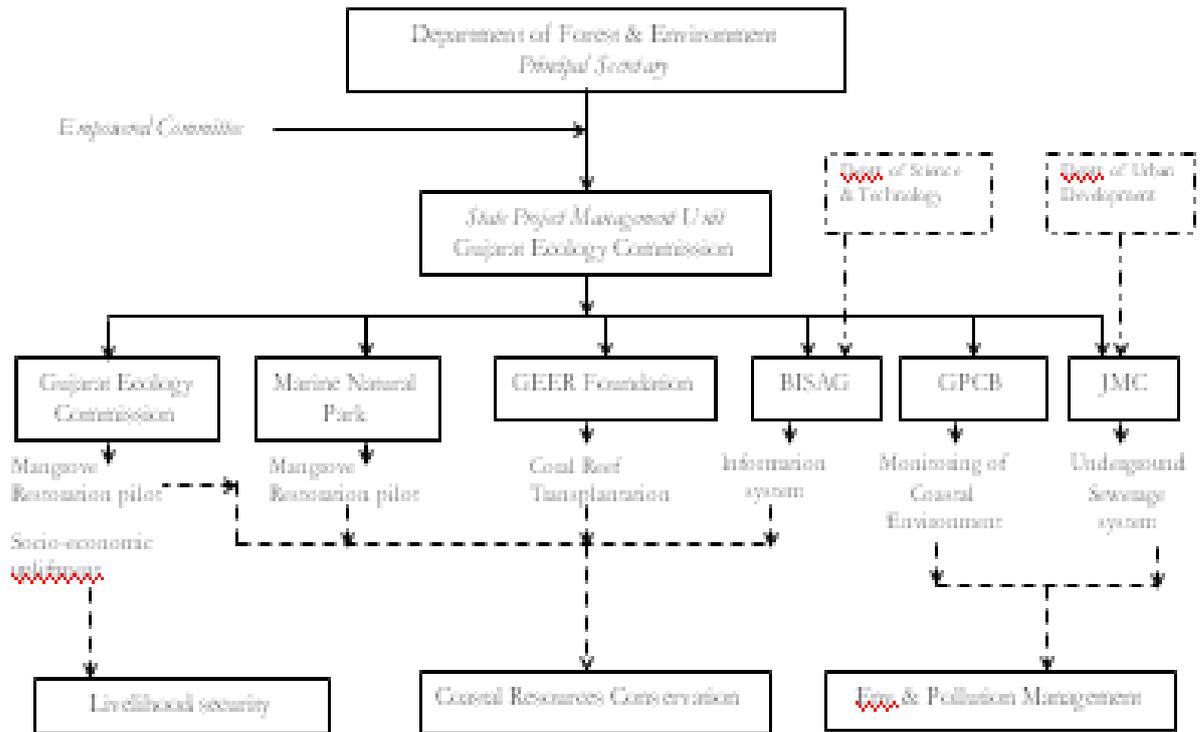


Figure 8.2: Institutional arrangement for implementation – State level

ICZMP Institutional Arrangements – Gujarat State



SPMU Staffing

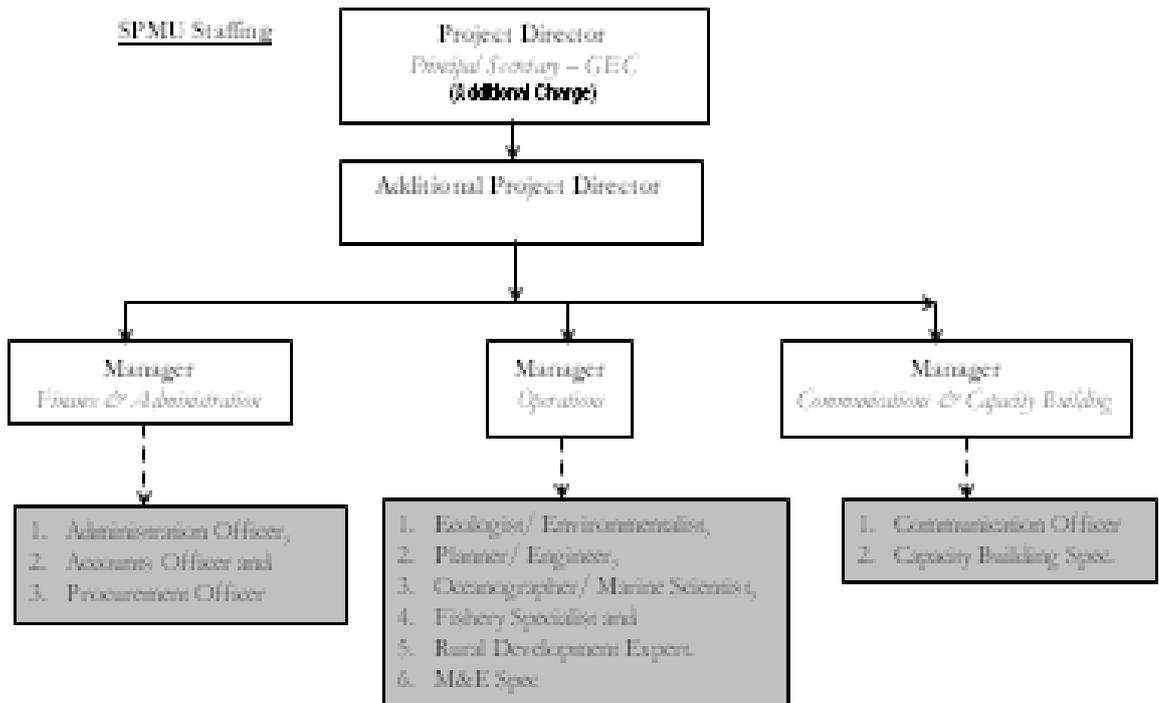
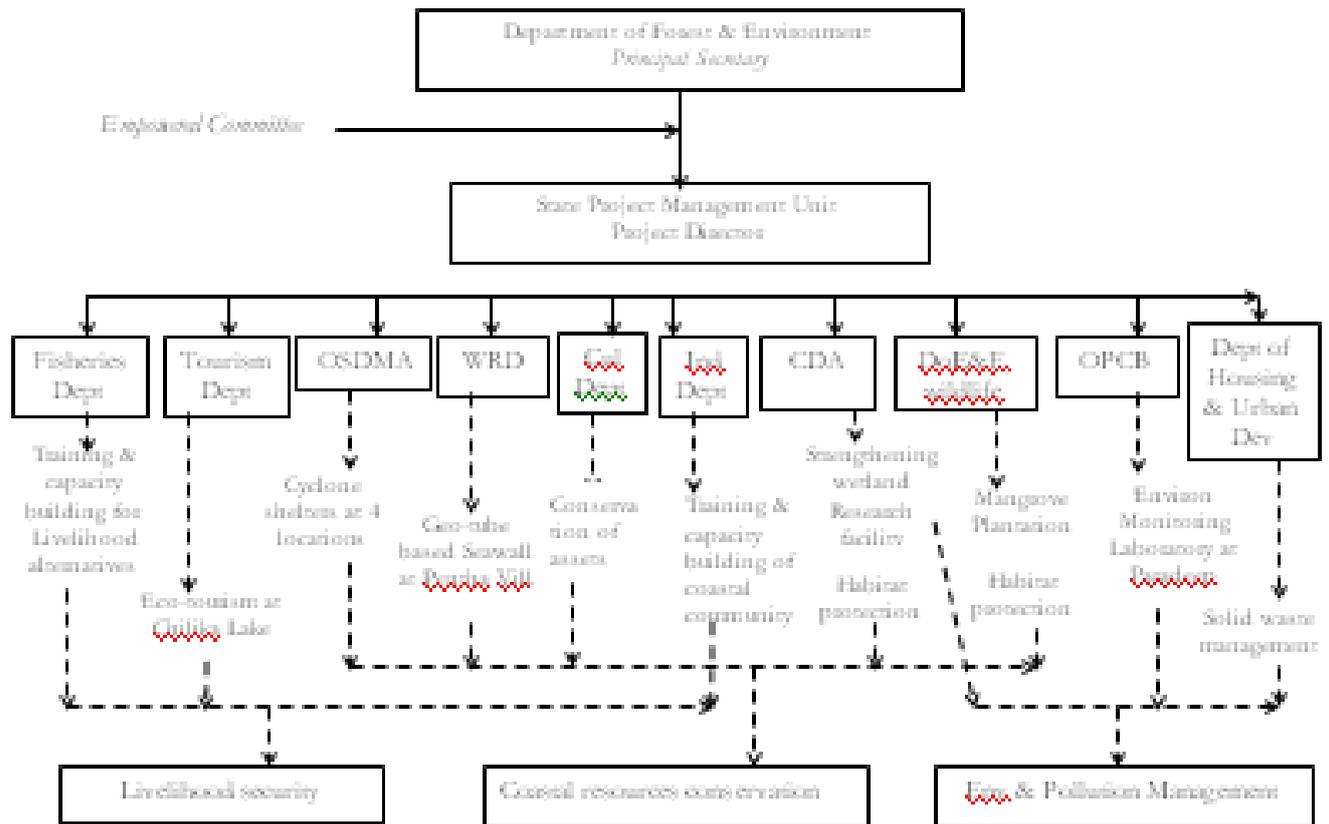


Figure 8.3: Institutional arrangement for implementation – Gujarat

ICZMP Institutional Arrangements – Orissa State



SPMU Staffing

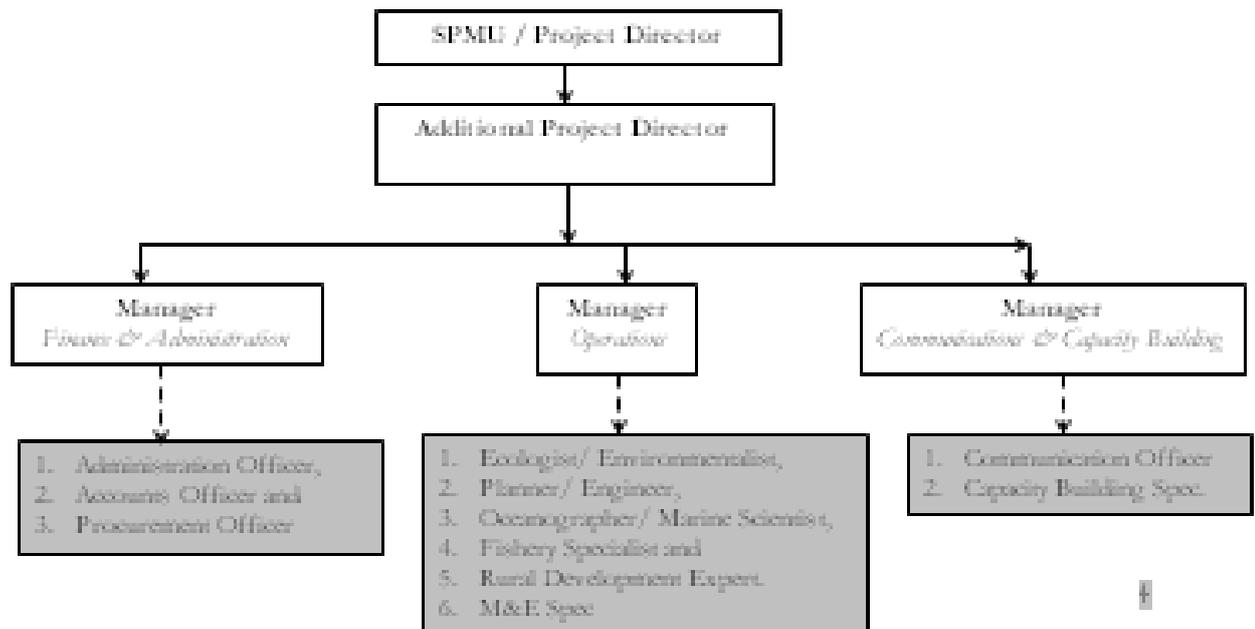


Figure 8.4: Institutional arrangement for implementation – Orissa

Monitoring exercise will be undertaken both internally and externally. The internal monitoring is a conventional monitoring related to physical and financial aspects. While the Rural Development and M&E Expert of state project management unit (SPMU) will carry out the project's internal monitoring, an external monitoring agency will be hired by SPMU to conduct quarterly monitoring which will include process documentation. The social facilitators in PEAs will carry out daily monitoring. At the end of the month, a consolidated report will be forwarded to SPMU. An external agency will be appointed for third party evaluation at midterm and end term of the implementation stage.

8.3.3 Grievance Redressed Mechanism

The project will establish three tiers of Grievance Redress Mechanism.

Communication, facility for free registration of grievance and monitoring: The project will abide by the RTI Act of 2005 and under provisions of Section 4 of the Act, it will commit itself for proactive disclosure and sharing of information with the key stakeholders, including the communities/ beneficiaries. The project will have a communication strategy focusing on efficient and effective usage of print and electronic media, bill boards, posters, wall writing, and adoption of any other method suiting local context, logistics, human and financial resources. The Communication Specialist at the SPMUs and NPMU will register user complaints using various mediums (e.g. a dedicated, toll free phone line, web based complaints, written complaints and open public days). The website of NPMU and SPMU will have a page for registering grievances. The NPMU, SPMU and PEA will take note of the grievance and will also upload the decision taken on each of the grievances registered on the website. Any grievance registered with NPMU, SPMU or PEA will be addressed within 30 days from the date of registration.

First-tier Grievance Redress: The community organizers at the village / project site, for each activity implemented at village level, will be the first level contact for any aggrieved person. On a fixed date of every month, individuals / community can approach the community organizer to register their grievance. That apart, the project sites will have information board with the (i) name of the PEA; (ii) name of the nodal grievance redress/social development officer of SPMU; and (iii) a toll free number to register grievances. The community organizer will prepare a monthly report on these cases, and submit to the respective PEA. Wherever the nature of the project activity does not include a community organizer, the Nodal Officer of the PEA will assume the same responsibility.

Second-tier Grievance Redress: Any grievance of the community / individual addressed to the community organizer, if remains unresolved will be passed on to the higher level by the community organizer. At the SPMU level, the grievance redress mechanism will comprise of the (i) grievance registration system as described above, (ii) a dedicated staff of the Communication and Capacity Building Cell of SPMU to prepare monthly reports on grievances and escalate specific grievances within a day of receiving a complaint or grievance to the SPMU Grievance Committee, and (iii) a Grievance Committee of the SPMU which will include the Additional project Director, the Social

Development Specialist of SPMU and the Communications Specialist of the SPMU. This committee will prepare a quarterly report on grievances received and resolved, and provide specific detailed description of the cases where the issues were escalated, and submit to the State Project Director, within 10 days of completion of each calendar quarter. The mechanism at NPMU will be exactly the same.

Second-tier Grievance Redress: In case grievance is not addressed at this tier as well, the aggrieved person can approach the State Coastal Zone Management Authority or the National Coastal Zone Management Authority, as the case may be. The National and State Coastal Zone Management Authorities have, apart from representation from the Government agencies, members who are either experts independent of the Government or representatives of NGOs working on coastal zone management issues. The State/National Project Director, through the Department of Environment of the State or the MOEF will place the case in the agenda of the SCZMA/NCZMA meeting. The SPMU/NPMU Social Development Specialist will be responsible to prepare all background documentation for the SCZMA/NCZMA to consider the case with all required information. The Communication Specialist in SPMU/NPMU will be responsible to inform the aggrieved person the process of contacting the SCZMA/NCZMA, and the date and time of meeting of the SCZMA/NCZMA at least 3 days in advance of the meeting.

Assistance for aggrieved persons belonging to vulnerable groups for accessing legal recourse: If an aggrieved person is not satisfied with the results of grievance redress by the SCZMA/NCZMA, such a person can approach the Courts, under the laws of the Country, and the verdicts of the Courts will be final, as per the judicial processes established in India. In general, the legal system is accessible to all such aggrieved persons. However, there might be cases where vulnerable sections of the citizens of India face hurdles in accessing the legal recourse system. These hurdles usually include the cost of litigation, knowledge about the legal system, or the lack of awareness about formal legal procedures. To help citizens to access the legal recourse system, each State has an operational mechanism called the Legal Aid Centre, which provides free services including services of lawyers without any cost to the litigants. SPMUs in this project will establish a partnership with respective State legal Aid Centre to provide such services to the aggrieved persons claiming impact from the project. As part of the partnership, the project will reimburse all additional costs that accrue to the State Legal Aid Centres. This facilitation will be available to the aggrieved person(s) if they fulfil the following two conditions: (1) that such aggrieved person(s) belong to any of the following vulnerable sections of the society - below poverty line families, scheduled castes, scheduled tribes; or is disabled, handicapped, orphaned or destitute person; and (2) such a person or persons have at least accesses both the second and third tier grievance redress mechanism offered by the project.

The table below summarizes the grievance mechanism in the project.

Grievance Redress Mechanism in the Project

Tiers of Grievance Redress Mechanism	Nodal Person for Contact	Contacts, Communication and Other Facilitation by Project	Timeframe to address grievance
First Tier: Project Site or Village	Community Organizer or Nodal Officer of PEA	<ul style="list-style-type: none"> • Each Project Site or Village will have Information Board listing the names and contact telephones. • One public meeting day with regular pre-decided schedule organized every month. 	15 days
Second Tier: SPMU / NPMU	Social Development Specialists and Communication Specialists NOTE: The NPMU/SPMU Grievance Redress Committee also includes the Additional Project Director (as head of the committee), and the representative from the respective Finance and Administration Cell.	<ul style="list-style-type: none"> • A toll-free dedicated telephone number to register grievances, advertised in each Information Board at Project Site or Village. • Website advertisement, public notices in print media. • Additional means include the social audit and surveys undertaken by the third-party monitoring consultants; or annual stakeholder meetings. • In-house monitoring of the project activities by the NPMU/SPMU technical, communication and capacity building cells are also expected to assist in the process of grievance registration and management. • The Social Development Specialist will be responsible to ensure that there is no cost imposed on the aggrieved person due to the grievance redress mechanism at the first and second tier (as an example, the aggrieved person should not be requested to travel to SPMU/NPMU offices at his/her own cost). 	30 days
Third Tier: SCZMA or NCZMA	State or National Project Director, with assistance from SPMU/NPMU Social Development Specialists	<ul style="list-style-type: none"> • Only after exhausting the first and second tiers • Website advertisement, public notices in print media. • State Project Director will place the specific grievance and the background documentation in the agenda of the SCZMA/NCZMA meetings. • The aggrieved person can attend the hearing by SCZMA/NCZMA in person. The Social Development Specialist will be responsible to ensure that there is no cost imposed (such as for travel, etc) on the aggrieved person if the 	60 days

Tiers of Grievance Redress Mechanism	Nodal Person for Contact	Contacts, Communication and Other Facilitation by Project	Timeframe to address grievance
		<p>person belongs to the vulnerable groups. If required, the Social Development Specialist of the concerned Community Organizer shall represent the aggrieved vulnerable persons.</p> <ul style="list-style-type: none"> • Further, the project will assist the vulnerable aggrieved person if such a person is requested to attend the hearing in person by any of the following - SCZMA/NCZMA, Secretary, State Department of Environment, or Secretary, MOEF. 	
Assistance to Vulnerable Persons beyond the Project's Grievance Redress Mechanism	State Project Director with assistance from SPMU Social Development and Communication Specialists	<ul style="list-style-type: none"> • Only for vulnerable person(s) as per the grievance redress mechanism of the project. • Only after exhausting at least both of the second and third tiers of the grievance redress mechanism of the • Partnership agreed with State Legal Aid Centre to facilitate the vulnerable aggrieved persons, and the process and schedules of reimbursement of incremental cost to the State Legal Aid Centre. • At the start of every quarter of a calendar year, State Project Director will send a list of vulnerable aggrieved persons who should be supported by the State Legal Aid Centre. • The Communication Specialist will ensure that such information reaches the concerned vulnerable aggrieved person without delay. • The Social Development Person will contact all such persons listed by the State Project Directors to confirm that the persons are receiving assistance from the State Legal Aid Centre, and submit this as part of the project's quarterly implementation progress report. 	As per established judicial procedures

8.3.4 Monitoring details of state components

The details of monitoring of the state components for state of Gujarat, Orissa and West Bengal are given in tables 8.6 to 8.8.

Table 8.6: Monitoring details of state components - Gujarat

Activity	Potential Impacts	Monitoring indicator	Tool & Frequency	Monitoring	Reporting to
Environmental Sanitation – Jamnagar (JMC)	Impact on the surrounding land use due to location of STP Loss of land value around the STP sites etc Impacts on the land/water in vicinity of the discharge for treated waste. Management of waste during construction stage Impact on Ground water resources Loss of livelihood on eviction of people from the proposed site Access to common or private property is denied	Water testing results of the treated water Quantity of waste generated during construction stage and disposal sites. Effectiveness in Implementation of waste management plan Awareness generation campaign conducted Number of persons attended % of local population aware of the project % of local population losing private land and / or livelihood and livelihood sources entitlement matrix is followed % reporting loss of access to common or private property	Monitoring of water quality as per CPCB norms. Consultation & Quantitative Survey during Quarterly monitoring Quantitative survey during midterm and end term evaluation	PEA Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEA RD and M&E Experts of SPMU
Mangrove Plantation (GEC) Coastal Resources Conservation and Management: Mangrove Restoration	Conflicts in using common resources Elite capture of CBOs; Conflict among office bearers and / or community members over resource allocation. Impacts due to introduction of alien species and species selection Damage to plantation due to natural disasters before maturity. Effect on present vegetation – loss of any species of conservation importance	Info. disseminated and tools used Number of consultations conducted with the local community % of local population attended Guidelines drafted for formation of CBOs GRC formed and operational % of women as members and office bearers % of vulnerable persons as members and office bearers Survival rate of the plantation Inventory of the baseline conditions – biodiversity (important species in the area) Increase in area under plantation	Desk Review (review of guidelines and minutes of the meetings ;) Consultation & Quantitative Survey during Quarterly monitoring and periodic evaluation Survival rate once in a year Yearly survey	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEA RD and M&E Experts SPMU
Coral Reef Regeneration & Other Conservation(Forest Department - MNP) Coastal Resources Conservation and Management: Coral Transplantation	Loss of livelihood and / or loss of access to livelihood sources for the fishing community in regenerated areas Impacts on the basic ecology of the present reef systems. Loss of biodiversity due to one species dominance.	Awareness generation campaign conducted Number of persons attended % of local population aware of the project % of local population losing livelihood and / or livelihood sources entitlement matrix is followed Inventory of species present in the area before the start of the investment and after	Consultation & Quantitative Survey during Quarterly monitoring Quantitative survey during midterm and end term evaluation	Social Facilitators Monitoring Consultants	Designated Officer of PEA RD and M&E

Activity	Potential Impacts	Monitoring indicator	Tool & Frequency	Monitoring	Reporting to
	Impacts due to anthropogenic activities.	completion Inventory of the water quality status before, during and after the implementation Survival rate of the transplanted corals in new environment	Regular monitoring of water quality adopting CPCB norms Once a year survey	Evaluation Consultants	Experts of SPMU
Coastal Resources Conservation and Management: Eco-tourism Development (Forest Department – MNP)	Conflicts during beneficiary selection Elite group capture Impacts during the construction stage of the project Impacts due to Waste generation, collection and disposal. Impacts on wildlife	Info. disseminated and tools used Number of beneficiaries aware of the program % of women and vulnerable as beneficiary Guidelines drafted for formation of CBOs and beneficiary selection GRC formed and operational % of women as members and office bearers % of vulnerable persons as members and office bearers Baseline inventory of the species diversity Coastal Water quality baseline and intermittent stage	Desk Review (review of guidelines and minutes of the meetings ;) Consultation & Quantitative Survey during Quarterly monitoring and periodic evaluation Status of EMP implementation Regular monitoring of water quality as per CPCB norms	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEA RD and M&E Experts of SPMU
Improved Livelihood of Coastal Communities (GEC Socio-Economic Development)	Elite capture of CBOs Conflict during beneficiary selection Depletion of natural resource base due to increased exploitation and /or over dependence on single resource. Environmental and ecological impacts due to entry level activities.	Info. disseminated and tools used Number of beneficiaries aware of the livelihood program % of women and vulnerable as beneficiary Guidelines drafted for formation of CBOs and beneficiary selection GRC formed and operational % of women as members and office bearers % of vulnerable persons as members and office bearers Existing status of the resource base and past & present utilization trends to estimate future requirement	Desk Review (review of guidelines and minutes of the meetings) Consultation & Quantitative Survey during Quarterly monitoring and periodic evaluation	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEA RD and M&E Experts of SPMU
Capacity Building for Pollution Monitoring (GSPCB)	Disposal of waste being generated from the various testing laboratories	Quantification of waste likely to be generated and disposal techniques adopted	Yearly monitoring	PEA	SPMU

Activity	Potential Impacts	Monitoring indicator	Tool & Frequency	Monitoring	Reporting to
Improving Research capacity & coral transplantation (GEER Foundation)	Disposal of waste being generated from the various testing laboratories	Quantification of waste likely to be generated and disposal techniques adopted Survival rate Increase in area under plantation	Yearly monitoring	PEA	SPMU

Table 8.7: Monitoring details of state components - Orissa

Component	Potential Impacts	Monitoring indicator	Tool & Frequency	Monitoring by	Reporting to
Shoreline Protection at Pentha (Water Resource Department) Coastal protection measures	Loss of income / livelihood source Probable loss of access to sea coast due to project activities for the community Impacts due to use of non biodegradable materials Impacts on beach stability in neighboring areas Impacts during construction stage of the project and if any due to materials procurement sites from nearby locations Impact due to introduction of alien species if any Impacts due to poor site selection of borrow areas.	Awareness generation campaign conducted Number of persons attended % of local population aware of the project % of local population losing private land and / or livelihood and livelihood sources entitlement matrix is followed % reporting loss of access to common or private property Number of land donors signed MOU for land donation Effectiveness in EMP implementation for construction stage impacts Incidence of increased / decreased erosion within the same sediment cell due to protection works.	Review of land donation documentation Consultation & Quantitative Survey during Quarterly monitoring Quantitative survey during midterm and end term evaluation	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEA RD and M&E Experts of SPMU
Construction of Multipurpose Cyclone Shelters (OSDMA)	Loss of land Displacement of squatters and encroachers Loss of ecologically sensitive areas or protected areas Impact on the natural drainage of the site due to construction of structures and approach road. Waste management and other adverse impacts during the construction stage of the project. Short term direct impacts during the construction stage of the project	Clear ownership of land % of local population aware of the project % losing private land and / or livelihood and livelihood sources Number of land owners paid compensation entitlement matrix is followed % displaced Effectiveness in EMP implementation for construction stage impacts Loss of any critical habitat area or filling up of water bodies etc Number of trees cut and compensatory plantation undertaken. Quantity of waste generated and disposal site details	Consultation & Quantitative Survey during Quarterly monitoring Quantitative survey during midterm and end term evaluation Monthly monitoring during implementation stage	Social Facilitators Monitoring Consultants Evaluation Consultants PEA	Designated Officer of PEA RD and M&E Experts of SPMU

Component	Potential Impacts	Monitoring indicator	Tool & Frequency	Monitoring by	Reporting to
Protection of Olive Ridley Turtles & Aquatic Wildlife (CDA) Biodiversity conservation	Loss of livelihood (source) Impacts on the ESA in vicinity of the proposed site. Oil spills from mechanized boats	Awareness generation campaign conducted Number of persons attended % of local population aware of the project % of local population losing private land and / or livelihood and livelihood sources entitlement matrix is followed % reporting loss of access to common or private property Number of land donors signed MOU for land donation Increase in area under mangrove plantation. Inventory of protection measures undertaken during implementation	Review of land donation documentation Consultation & Quantitative Survey during Quarterly monitoring Quantitative survey during midterm and end term evaluation	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEA RD and M&E Experts SPMU
Alternate livelihood option: Fisheries based livelihood option (Fisheries department)	Intra village conflict Long term sustainability of SHGs Marketing of products Anticipated impacts on the pond biodiversity Impacts of increased grazing due to promotion of goatery as alternative livelihood.	Info. disseminated and tools used Number of consultations held in the village Number of women and vulnerable as member of SHGs Guidelines drafted for formation of SHGs and beneficiary selection GRC formed and operational % of women and vulnerable as members and office bearers % increase in household income Area designated as grazing land , estimation of the fodder requirement Water quality of pond before and during implementation.	Desk Review (review of guidelines and minutes of the meetings ;) Consultation & Quantitative Survey during Quarterly monitoring and periodic evaluation	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEA RD and M&E Experts of SPMU
Tourism-based Livelihood Improvement (Tourism department)	Loss of private land Displacement of squatters if government land is not free of encroachment and other encumbrances Conflicts during beneficiary selection Impacts on ESA in vicinity of proposed facilities Impacts due to increased inflow of tourists / resource exploitation Impacts on the surface water quality in nearby areas.	Info. disseminated and tools used Clear ownership of land % of local population aware of the project % losing private land and / or livelihood and livelihood sources Number of land owners paid compensation entitlement matrix is followed Number of beneficiaries aware of the livelihood program % of women and vulnerable as beneficiary Guidelines drafted for beneficiary selection GRC formed and operational Water quality as per CPCB norms in vicinity Effectiveness in implementation of EMP	Consultation & Quantitative Survey during Quarterly monitoring Quantitative survey during midterm and end term evaluation	Social Facilitators Monitoring Consultants	Designated Officer of PEA RD and M&E

Component	Potential Impacts	Monitoring indicator	Tool & Frequency	Monitoring by	Reporting to
	Short term impacts during the construction stage of the project.	measures during construction stage Inventory of tourist inflow and stress of resource base		Evaluation Consultants	Experts of SPMU
Biodiversity-based Livelihood Improvement Alternate livelihood option: Ecotourism in sensitive habitats	Conflicts during beneficiary selection Impacts on the drainage, loss of tree cover, loss of critical species Impacts due to deepening of the creeks on marine flora and fauna. Impacts due to increased tourist inflow on the natural resource base.	Info. disseminated and tools used Number of consultations held Number of beneficiaries aware of the livelihood program % of women and vulnerable as beneficiary Guidelines drafted for beneficiary selection GRC formed and operational Tree cutting and compensatory plantation Resource base utilization trends and future demand Change in Water quality	Consultation & Quantitative Survey during Quarterly monitoring Quantitative survey during midterm and end term evaluation	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEA RD and M&E Experts of SPMU
Small Scale Enterprise - based Livelihood Improvement Alternate livelihood option: Coir making	Conflicts during beneficiary selection Impacts due to waste water disposal from soaking tanks. (coir making activities) Air pollution due to retting (coir making activities)	Info. disseminated and tools used Number of consultations held Number of beneficiaries aware of the livelihood program % of women and vulnerable as beneficiary Guidelines drafted for beneficiary selection GRC formed and operational Quantity of waste water generated and disposal techniques adopted Change in ambient air quality	Consultation & Quantitative Survey during Quarterly monitoring Quantitative survey during midterm and end term evaluation Site monitoring on seasonal basis	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEA RD and M&E Experts of SPMU
Establishment of Environmental Monitoring Laboratory at Paradeep	Loss of private land Displacement of squatters if government land is not free of encroachment and other encumbrances Taking of land lead to loss of livelihood /shelter / access, etc Short term impacts during the construction stage of the project. Impacts due to waste disposal Impacts on critical areas / ESA in vicinity of proposed facility.	Info. disseminated and tools used Clear ownership of land % of local population aware of the project % losing private land and / or livelihood and livelihood sources Number of land owners paid compensation entitlement matrix is followed GRC formed and operational Effectiveness in implementation of EMP measures during construction stage activities Quantity of waste generated and disposal details.	Consultation & Quantitative Survey during Quarterly monitoring Quantitative survey during midterm and end term evaluation	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEA RD and M&E Experts of SPMU

Component	Potential Impacts	Monitoring indicator	Tool & Frequency	Monitoring by	Reporting to
Pollution Abatement in Coastal Cities (Housing and UD department) Establishment of solid waste landfill and treatment facility at Paradeep	Land value decline near landfill site Loss of access during construction? Impacts due to ground water and surface water pollution Short term impacts due to construction stage activities. Impacts on land / water / air during the operation phase of the project.	Awareness generation campaign conducted Number of persons attended % of local population aware of the project entitlement matrix is followed % reporting loss of access to common or private property Effectiveness in implementation of EMP measures during construction stage activities Water / air quality monitoring at proposed site before, during and after implementation.	Consultation & Quantitative Survey during Quarterly monitoring Quantitative survey during midterm and end term evaluation	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEA RD and M&E Experts of SPMU
Conservation and improvement of archeological and cultural assets	Impacts due to air pollution for use of chemicals Effects of illumination on the local environment Impacts due to increased inflow of tourists	Inventory of tourist inflow and resource utilization		PEA / Community	SPMU

Table 8.8: Monitoring details of state components – West Bengal

Component	Potential Impacts	Monitoring indicator	Tool & Frequency	Monitoring by	Reporting to
Coastal bioshields – Digha – Shakerpur – Jalda WB	Loss of private land Loss of livelihood / livelihood sources for fishing community Conflict on the species selected Impacts on coastal geomorphology Impacts due to natural disasters till maturity Impacts on the stability of the beaches in neighboring areas. Impact on the present species composition and biodiversity of the area	Info. disseminated and tools used Clear ownership of land Awareness generation campaign conducted Number of persons attended % of local population aware of the project Number of consultation with the community on species selection Number of land owners paid compensation entitlement matrix is followed GRC formed and operational Increase / decrease in erosion rates in the sediment cell Survival % of planted seedlings Number of forest protection committees formed	Consultation & Quantitative Survey and focal group discussions and perusal of administrative records, Minutes of the meeting Review of land donation documentation	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEA, SPMU

Component	Potential Impacts	Monitoring indicator	Tool & Frequency	Monitoring by	Reporting to
		% reporting loss of access to common or private property Number of land donors signed MOU for land donation	Quarterly monitoring Quantitative survey during midterm and end term evaluation		
Solid Waste Management - Digha – Shakerpur	Land taking for landfill site Possible displacement of squatters / encroachers Land value decline near landfill site Impacts on surface and ground water sources in vicinity. Impacts of air pollution in vicinity of the project site Short term impacts during construction stage of the project Impacts on the surface drainage in the proposed site.	Awareness generation campaign conducted Number of persons attended % of local population aware of the project entitlement matrix is followed Number of squatters / encroachers identified Number of squatters / encroachers evicted Water quality in vicinity before, during and after implementation. Effectiveness in implementation of EMP provisions for mitigating construction stage impacts.	Consultation & Quantitative Survey Minutes of the meeting, administrative reports, water quality analysis reports Quarterly monitoring Quantitative survey during midterm and end term evaluation	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEA RD and M&E Experts of SPMU
Development of Drainage System – Digha	Land taking for STPs – loss of shelter / livelihood/assets/etc. Temporary loss of access to residential and commercial structures during construction Impact on the natural drainage of the area Impacts due to flooding /water logging due to altered drainage patterns.	Awareness generation campaign conducted Number of persons attended % of local population aware of the project entitlement matrix is followed Number of land affected persons Number paid land compensation Number of squatters identified and evicted Number of persons denied access to common and / or private property Incidence of water logging for longer duration Spread of water borne diseases in vicinity of the proposed site. Surface water quality before, during and after implementation.	Consultation & Quantitative Survey, Minutes of the meeting, administrative reports Quarterly monitoring Quantitative survey during midterm and end term evaluation	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEA RD and M&E Experts of SPMU
Beach Cleaning and Sanitation - Digha	Temporary loss of business opportunities conflict among vendors Conflicts during allotment Conflict in upkeep and maintenance of toilets Adverse environmental impacts	Info. disseminated and tools used Number of consultations held MOU drafted Number of vendors signed MOU and PEA Guidelines for allotment of shops drafted GRC formed and operational	Consultation & Quantitative Survey, administrative reports Quarterly monitoring	Social Facilitators Monitoring Consultants	Designated Officer of PEA RD and M&E Experts of SPMU

Component	Potential Impacts	Monitoring indicator	Tool & Frequency	Monitoring by	Reporting to
	on land / air / water during the construction stage of the project. Impacts due to waste disposal Short term impacts due to construction related activities		Quantitative survey during midterm and end term evaluation	Evaluation Consultants	
Beach Beautification and Illumination - Digha	Loss of access to coast Impacts of illumination and landscaping on the marine species, nesting grounds etc Impacts of waste disposal related activities Short term impacts related to construction activity	Awareness generation campaign conducted % of local population aware of the project Number of individuals denied access to coast GRC in place and functional Quantity of waste generated and disposal locations Effectiveness in implementation of EMP measures to mitigate adverse impacts related to construction stage activity.	Review of land donation documentation Consultation & Quantitative Survey, administrative reports Quarterly monitoring Quantitative survey during midterm and end term evaluation	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEA RD and M&E Experts of SPMU
Livelihood generation- Digha	Conflicts in beneficiary selection Acquisition of private land Displacement of encroachers and squatters from government land Loss of livelihood or livelihood source Short term impacts related to construction activity Loss of critical habitat if any in vicinity of the proposed site	Info. disseminated and tools used Clear ownership of land % of local population aware of the project Number of land losers Number of land owners paid compensation Guidelines for selection of beneficiaries drafted Draft guidelines consulted with the beneficiaries % of women and vulnerable among the beneficiaries Number losing livelihood and livelihood sources Number of adversely affected individuals assisted entitlement matrix is followed GRC formed and operational Effectiveness in implementation of EMP measures to mitigate adverse impacts related to construction stage activity.	Review minutes of the meetings and guidelines Consultation & Quantitative Survey during Quarterly monitoring Quantitative survey during midterm and end term evaluation	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEA RD and M&E Experts of SPMU
Fish Auction Centre – Sagar (Fisheries Development Corporation)	Inadequate land ownership record Loss of livelihood if land identified is encroached Short term impacts related to construction activity Impact on water quality	Clear ownership of land Number of land losers Number of land owners paid compensation % losing livelihood and livelihood sources Number of adversely affected individuals assisted entitlement matrix is followed GRC formed and operational Effectiveness in implementation of EMP measures	Consultation & Quantitative Survey during Quarterly monitoring Quantitative survey during midterm and end term evaluation	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEA RD and M&E Experts of SPMU

Component	Potential Impacts	Monitoring indicator	Tool & Frequency	Monitoring by	Reporting to
		to mitigate adverse impacts related to construction stage activity. Quantity of waste generated and disposal options			
Coastal Erosion Protection Sagar (Sundarban DB) Well designed engineering structures and Coastal bioshields – Sagar	Approach to traditional fishermen Land donation Social acceptance of the structure and species selected for afforestation	Info. disseminated and tools used Clear ownership of land MOU for land donation drafted Number of land donors signing MOU Number of consultation conducted with the community on selection of species Number denied access to coast for fishing GRC formed and operational Survival rate of the plantation Baseline inventory of species existing, species proposed for plantation. Water quality before, during and after implementation.	Review MOUs and minutes of the meeting Consultation & Quantitative Survey during Quarterly monitoring Quantitative survey during midterm and end term evaluation	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEAR and M&E Experts of SPMU
Ecotourism/Tourism & Local Community Development at Sagar (Sundarban DB) Diversification of income generation activities through Ecotourism development – Sagar	Conflicts among vendors during shifting Resistance among vendors to shift Conflict during selection of beneficiaries Short term impacts on land / air / water during construction stage of the project.	Number of consultations with the vendors w.r.t reason for relocation; relocation schedule; and plan Number reporting loss of income Implementation of entitlement framework Individual agreement drafted and discussed with the vendors Number of vendors signing individual agreements Mechanism to allocate shops in arcade drafted. Draft mechanism discussed with the vendors Number of vendors aware of the draft mechanism Guidelines for beneficiary selection drafted and discussed Number of beneficiary aware of the guideline Number of women and vulnerable among the beneficiaries grievance redressal mechanisms functioning effectiveness in implementation of the EMP provisions to mitigate adverse impacts during construction stage waste collection and disposal systems planned and implemented	Review MOUs; guidelines; and minutes of the meeting Consultation & Quantitative Survey during Quarterly monitoring Quantitative survey during midterm and end term evaluation	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEAR and M&E Experts of SPMU

Component	Potential Impacts	Monitoring indicator	Tool & Frequency	Monitoring by	Reporting to
Support connection and provide distribution of grid-electricity – Sagar	Private land acquisition Crop damage Reduction in land value Likely displacement Construction stage impacts on land / water / air Erosion during construction Land use impacts due to transmission line RoW Clearing and control of vegetation in RoW's	Info. disseminated and tools used Clear ownership of land % of local population aware of the project Number of land losers Number of land owners paid compensation Number of individual reporting crop damage Number of individual compensated for crop damage Number of households displaced Number of households resettled / assisted Number losing livelihood and livelihood sources Number of adversely affected individuals assisted entitlement matrix is followed GRC formed and operational No of trees cut , compensatory plantation undertaken RoW passing through ESA or other critical habitat areas. Specific Erosion control measures undertaken	Consultation & Quantitative Survey during Quarterly monitoring Quantitative survey during midterm and end term evaluation	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEA RD and M&E Experts of SPMU
Afforestation-based Livelihood Improvement (SDB) Value addition activities such as handicrafts and cottage industry; Aquaculture; Agroforestry; Semi processing, processing, storage and transport; Local market development and skill enhancement - Sagar	Conflicts during beneficiary selection Marketing arrangements Long term sustainability of SHGs Participation of vulnerable	Number of consultations with the community Number of individuals aware of programme Guidelines for beneficiary selection drafted and discussed Number of beneficiary aware of the guideline Number of women and vulnerable beneficiaries Number of SHGs formed Trades selected for SHGs and marketing avenues Grievance Redress Cell established and functioning	Review guidelines; and minutes of the meeting Consultation & Quantitative Survey during Quarterly monitoring Quantitative survey during midterm and end term evaluation	Social Facilitators Monitoring Consultants Evaluation Consultants	Designated Officer of PEA RD and M&E Experts of SPMU

Conclusion

The project which envisaged the improvement of coastal and marine environment of the country would definitely bring remarkable changes in the near future. The national and piloting state level components are capable of making such modifications in the management of this most dynamic and productive ecosystem of the world. The only apprehension is that since the coastal environment is fluid in nature and only part of the coast is being considered for investment, the visibility of the positive impact may be limited. It would have been better if the entire coastal stretches of the piloting state has considered for activities such as ICZM plan preparation. Because such move would definitely contribute a lot for the formulation of local level policy (state level) if required for the management of the coastal area.

The implementation of the above mentioned environmental and social management plans, mitigation steps and monitoring of the project activities would definitely take the project forward through its development objectives. One of the key aspect in implementation of any project in a country like India is to ensure transparency and acceptance among local people including tribal population, scheduled caste, women, fisherfolk, etc. Although there have been lots of activities in this project for their economic development and improvement of social security, the target could be achieved only with the full hearted support of the relevant sector. This support could be gained only through continuous dialogue with them especially informal social interactions. The tailor made “consultations” which we often mention for the participation of stakeholders may not work in most of the case. May be that could be one of the reasons for the marginalization of these population even after implementation of many projects in the past decades by the national and state governments.