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Capacity Needs Assessment for Participatory Management of Coastal and Marine Protected Areas in India: Fisheries Sector

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Conservation and Sustainable Management of Coastal and Marine Protected Areas

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Capacity Needs Assessment for Participatory Management of Coastal and Marine Protected Areas in India: Fisheries Sector

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PART – 1
Gujarat State Report

Disclaimer

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List of Accronyms

BOBP-IGO:	Bay of Bengal Programme Inter-Governmental Organisation
CAA:	Coastal Aquaculture Authority
CIFE:	Central Institute of Fisheries Education
CMFRI:	Central Marine Fisheries Research Institute
CRZ:	Coastal Regulation zone
CSO:	Civil Society Organisations
DAHD&F:	Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, Government of India
EAF:	Ecosystem Approach to Fisheries
FSI:	Fishery Survey of India
GCZMA:	Gujarat Coastal Zone Management Authority
GDF:	Department of Fisheries, Government of Gujarat
GEC:	Gujarat Ecology Commission
GEF:	Global Environment Facility
GFA:	Gujarat Fisheries Act of 2003
GFCCA:	Gujarat Fisheries Central Co-operative Association Limited
GFE:	Forests & Environment Department, Government of Gujarat
GMB:	Gujarat Maritime Board
GPCB:	Gujarat Pollution Control Board
HCD :	Human Capacity Development
ICG:	Indian Coast Guard
ICSF:	International collective in support of fish workers
ICZM:	Integrated Coastal Zone Management
IIM-A:	Indian Institute of Management, Ahmadabad (Centre for Management of Agriculture)
IRMA:	Institute of Rural Management, Anand
IUCN:	International Union for Conservation of Nature
MDP:	Management Development Programmes
MFF:	Mangroves for the Future
MNP:	Marine National Park
MOEF:	Ministry of Environment and Forest, Government of India
MPA:	Marine Protected Area
MPEDA:	Marine Products Export Development Authority
NBA:	National Biodiversity Authority
NFDB:	National Fisheries Development Board
NFF:	National Fishworkers' Forum
NGO:	Non-Governmental Organisations
NIRD:	National Institute of Rural Development, Hyderabad
REGS:	Rural Employment Guarantee Schemes
TU:	Trade Unions
UNEP:	United Nations Environmental Programme
UTs:	Union Territories
WBG:	World Bank Group
WII:	Wildlife Institute of India
WPA:	Wildlife Protection Act, 1972

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Summary

Conservation of critical ecosystem comes under the purview of the Ministry of Environment and Forests, Government of India (MOEF). Traditionally, Fisheries Officials either in the provincial or the union government are concerned only with conservation of fishery resources from a perspective of achieving Maximum Sustainable Yield (MSY) in fisheries. The existing fisheries-related laws and acts and allocation of business rules at provinces or union level do not give much leverage to the fisheries officials for conservation-related activities. However, as recently the Ecosystem Approach to Fisheries (EAF) is gaining currency, fisheries officials are becoming more aware about the conservation needs. On the other hand, for fishers, conservation is usually equated to loss of livelihoods and is, therefore, unpopular. Although when consulted and educated properly, fishers have supported conservation measures. One such example is time closure under the Gujarat Fisheries Act, 2003. In fisheries science, raising awareness of the fishers and other stakeholders were never a priority and fisheries scientists by and large also lack communication skills with the media and stakeholders at large.

In view of this, mainly three types of Human Capacity Development (HCD) are needed. First, improving knowledge of stakeholders, especially fisheries officials and fishers on concerned national and international laws and agreements; second developing managerial skills, including organizing people and institution building for both fisheries officials and fishers; and third, improving communication and networking, especially targeting fisheries scientists and fisheries officials.

While, there are a large number of institutions involved in fisheries research and extension, as of now, no organisation has any dedicated programme to meet such needs. Therefore, providing these HCD programmes need curriculum development and institutionalization. However, it is unlikely that without assured funding support such programmes will be institutionalized.

1. Introduction

1.1. Current status of coastal and marine biodiversity in Gujarat

Gujarat is located in the northwest coast of India. The State borders with the province of Sindh in Pakistan to the northwest, by the Arabian Sea to the southwest, Rajasthan to the northeast, Madhya Pradesh to the east, and with Maharashtra, Union Territories (UTs) of Diu and Daman and Dadra and Nagar Haveli to the south. The geographical position of the State lies between 23° 13′ 0″ N, 72° 41′ 0″ E. Gujarat is the largest coastal fishing State in India in terms of area. The State holds about 21 percent (1 663 km) of the country's coastline and about 33 percent of the continental shelf area. The State has an area of 196,204 km^2 (75,755 sq. miles). Fisheries is one of the major primary activities in Gujarat where it is competing with shipping and industry – the other major activities along the coast. The State has rich biodiversity and exclusive strengths in marine resources. The long coastline confers enviable richness in terms of species diversity with about 462 marine species of flora and 782 species of marine fauna. The State also has 4 National parks, 23 wildlife sanctuaries and 8 wetlands that cover the total biodiversity of Gujarat.

The recorded floristic and faunal species in Gujarat are estimated at 7 048, including 4 320 species of plants and 2 728 species of animals (GEC, 1996). These represent terrestrial, freshwater and marine habitats. In comparison to the entire country, the State harbours 14 percent of the fish species, 9 percent of amphibians, 19 percent of reptiles, 37 percent of birds and 25 percent of the mammals. There are 2 198 species of higher plants belonging to 902 genera and 155 families, representing nearly 13 percent of the floristic diversity of the country. About 310 plants and 60 animals have been recorded as threatened species. These include only the higher species and the status of most of the lower organisms is yet to be assessed.

The costal and marine ecosystems of Gujarat are spread along the long coastline, which is indented by two major gulfs *viz*., the Gulf of Khambhat and the Gulf of Kachchh. The Gulf of Khambhat, also called the Gulf of Cambay, is a trumpet-shaped gulf of the Arabian Sea, indenting northward into the coast of Gujarat State, between Mumbai (Bombay) and the Kathiawar Peninsula. It is 120 miles (190 km) wide at its mouth between Diu and Daman, but rapidly narrows to 15 miles (24 km). The Gulf receives many rivers, including the Sabarmati, Mahi, Narmada and Tapti. Its shape and orientation in relation to the southwest monsoon winds accounts for its high tidal range (12 metres) and the high velocity of the entering tides, and all the Gulf ports have suffered from siltation caused by tides and flood torrents from the rivers. On the eastern side of the Gulf, lies Bharuch, one of the oldest Indian ports, and Surat, identified with early European commercial contacts with India. The town of Khambhat is at the head of the Gulf. Although the importance of the ports in the Gulf has been local, the discovery and exploration of oil-particularly near Bharuch, around the head of the Gulf, and in the offshore Mumbai High field-has caused a commercial revival in the region. The Gulf contributes to the maximum species and biomass of seaweeds for the west coast of India. The southern coast of the Gulf supports luxuriant growth of marine algae because the shoreline has gradual slope with high tidal amplitude, moderate wave action and low turbidity. The northern shore of the Gulf has very poor algal biodiversity, as

the sandy/muddy substratum is associated with relatively high turbidity that does not support algal growth. Sea grass species exist in the subtropical regions of a few Islands. Ridges of loose sand drifted by the wind often support vegetation known as sand dunes. The dominant species of sand flora are *Euphorbia caudicifolia, E. nerifolia*, *Aloevera sp*., *Ephedra foliata* and *Urochodra setulosa*.

The Gulf of Kachchh, the north-eastern arm of the Arabian Sea, extends between the Rann of Kachchh (a salt waste) and the Kathiawar Peninsula of west-central India. Reaching eastward for some 110 miles (180 km), the Gulf varies in width from 10 to 40 miles (16 to 65 km). It is rimmed with mudflats, and many small islands rise from its waters. The port at the entrance to the Gulf is Okha; other ports include Māndvi, Bedi, and Kandla. The Gulf is the only area in Gujarat where corals exist with high diversity and density. The coral formations of the Gulf are found exclusively between latitude $22^0$15' to $23^0$40' N and $68^0$20'to $70^0$40'E longitudes along the coast of Jamnagar district. Based on the existing classification, these reefs are classified into fringing reefs (north of Okha, north of Bet Shankodar fringing the mainland from Dhani Bet to Sikka, Jindra and Chad, Pirotan, near Valsura), platform reefs (Paga reefs, Bural Chank, Karumbhar, Munde reef, etc.), patch reefs (Goose and Ajad) and several coral pinnacles (*e.g.* Chandri, etc.). The most northerly reefs are coral patches found at Munde reef and Pirotan Island, but solitary corals are found as far as Jakhau in the east and Dwarka on the Saurashtra coast. Recently live corals with associated flora and fauna have been observed off Mundra for the first time.

The costal ecosystems are diversified in nature, having intertidal mudflats, coral reefs, estuaries, mangroves, sandy and rocky beaches offering diverse habitat in this region. Of the 991 km^2 area under mangroves in the State, almost 96 percent is in the Gulf of Kachchh region. Although both these districts have the maximum mangrove cover in the State, it displays the least diversity – with only one dominating species *Avicennia marina* (Cher) and others include *A. officinalis*, *Rhizopora mucronata* and *Ceriops tagal*. The species associated with mangroves are *Salvadora persica*, *Salicornia brachiata*, *Suaeda spp* and *Alueropus* grass. A total of 37 species of corals have been recorded in Gujarat including species of *Acropora*, *ontipora* and *Gorgonians* in association with Perch fish, *Sabella sp*. and sea weeds like *Caulerpa*, *Coralline*, *Enteromorpha* and *Gracilaria*.

However, the marine ecosystem in the Gulf of Kachchh seems to be stressed. One study reports as per the satellite data, the total reef area in the Gulf decreased from 217 sq. km in 1975 to 123 sq. km in 1986; a net loss of 43 percent. During this period, the coral reef cover within the core areas of the Marine National Park and Sanctuary declined by 54 percent. The study also states that, in fact, reefs presumed to have died, actually lie buried under mud, thus indicating that heavy silt load is the reason for coral damage. Coral dredging by a cement company is held to be largely responsible for the heavy siltation.

1.2. Drivers and Pressures for loss of coastal and marine biodiversity in the State

Fisheries in Gujarat form one of the vital sources of food security. In 2011, marine fish production was estimated at 692 702 tonnes (***Figure 1***). The production, which was continuously falling since reaching a peak in 2000, turned around during the last part of decade. However, according to a study by the Central Marine Fisheries Research Institute (CMFRI), Kochi, there is a conspicuous change in the resource composition over the years with quality fishes like pomfrets, larger sciaenids, threadfins and penaeid prawns being replaced by low value fishes such as ribbonfishes, threadfin breams, carangids, non-penaeid prawns and smaller crabs. The emergence of mackerel fishery in 2006 coupled with increased landings of high export value cephalopods and tunas provide scope for the sustenance of marine fishery of Gujarat.

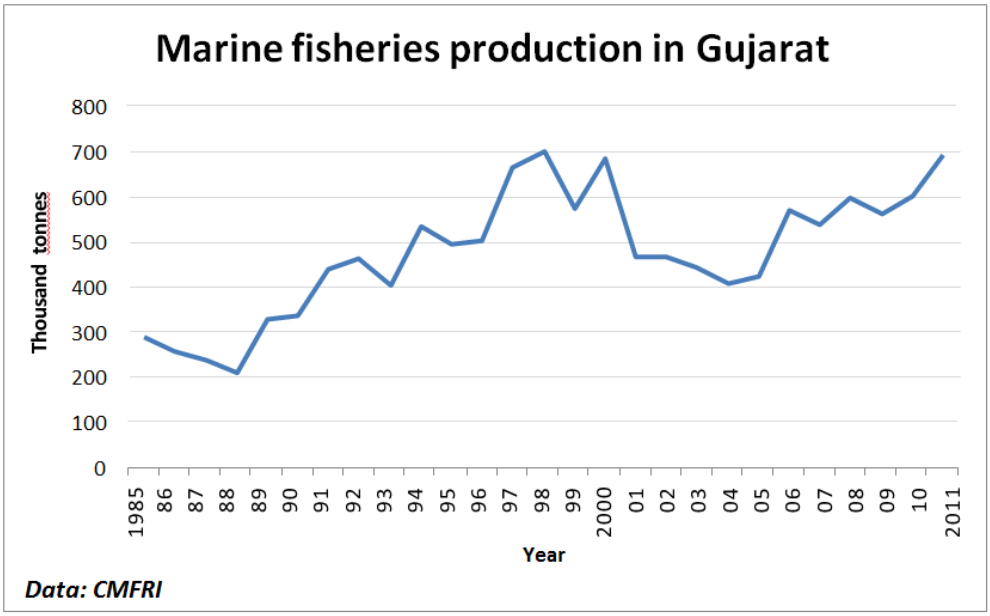

Figure 1: Marine fisheries production in Gujarat

A set of factors, both endogenous and exogenous are driving the changes in coastal biodiversity in the State. Among the exogenous factors, global warming is now well-documented to have an impact on coral reefs, distribution and composition of species along the coast (Vivekanandan 2010, 2012). However, institutional factors and anthropogenic activities are likely to be the most significant drivers of change in the region. In Institutional factors, lack of a proper monitoring and conflict resolution mechanism could be highlighted as a major factor. Due to lack of such a mechanism, the marine waters are being subjected to pollution leading to degradation of critical habitats. Increased fishing activities along the coast are also putting pressure on the biodiversity.

1.3. Protected status in the State *vis-à-vis* coastal and Marine Protected Areas

The Government of Gujarat realising the conservation significance of coral reefs and mangroves declared southern part of the Gulf of Kachchh along with 42 islands as Marine Sanctuary in 1980, which has been expanded to about 45 793 ha in 1982. To provide total protection, the islands and some of the area of the sanctuary have been notified as Marine National Park, which happens to be the first Marine National Park of the country. Practically, both Marine Sanctuary and Marine National Park are part of one ecological area or MPA in the Gulf for purpose of management (Singh, 2003). Two wildlife sanctuaries- Wild Ass Sanctuary (495 400 ha) and Kachchh Desert Sanctuary (750 600 ha.) have been constituted by the State Government in this area, but they are not classified as MPA. Similarly, Khijadia Bird Sanctuary, a reclamation bund (manmade lake) across two creeks, is influenced by the marine environment but not categorized as MPA. Gujarat has a diverse range of wetlands including both coastal and inland systems and characterized with varying salinity regimes of all the major wetlands. In Gujarat, Nal Sarovar (120.82 km^2), Khijadia Bird Sanctuary (49.54 km^2), Marine National Park & Sanctuary (457.93 km^2) and Little Rann of Kachchh are the only wetlands that are protected.

2. Situation analysis

2.1. Stakeholder Analysis

The major stakeholders in the fisheries sector are the fishers and fisheries officials. However, in view of multiple uses of coastal areas and keeping in view the conservation of biodiversity, other governmental agencies such as Ministry/Department of Environment and Forests are playing a major role. As mentioned earlier, the coastal belt in Gujarat has high industrial concentration and hence tackling pollution is a major challenge. Other than these state and national level players who are engaged in exploitation or administration of coastal zones in Gujarat, various international agencies such as the World Bank Group (WBG) and IUCN are also actively engaged in Gujarat environment and development scenario. Coastal aquaculture and salt manufacturing are also important activities along the coastline. Although, such multiple uses denote a complex inter-dependent framework, in reality cross-sectoral interaction is very low. Especially, at administration level, although platform exists for cross-sectoral dialogue, it is limited in actual practice.

Box 1 and ***Figure 2*** give a mapping of selected stakeholders active at the state level. In the figure, location of the bubble is determined by their dependency on coastal and marine biodiversity and interest (positive or negative) in setting up of the MPA. There sizes are functions of their influence, positively or negatively affecting the decision to set up an MPA. The magnitudes of various dimensions of a particular stakeholder are constructed from mandates and personal understanding of the authors. It is seen that the 'state of the resources', whether good or bad, is not usually considered as a factor determining the career graph of the officials concerned. Career-related dependency is bit higher for forestry officials as there are other incentives (+ve/ - ve) such as media reports, etc which can motivate their actions. Salt manufacturing although a major activity along the coastal belt may not be much influenced as salt production areas are already demarcated and hence not considered for further analysis.

Box 1: Axiomatic scoring of selected stakeholders for illustrative purpose

Stakeholder	Dependency	Interest	Influence
Fishers	10	8 (-)	5
Fish farmers	5	3	5
Salt producers	1	2	3
Other Industries	3	8 (-)	9
Fisheries officials	4	5	6
Foresters	6	10	9
GPCB	1	5	8
GEC	1	8	8
Salt officials	1	2	4
GCZMA	2	8	7

Note: The interest could be negative or positive.

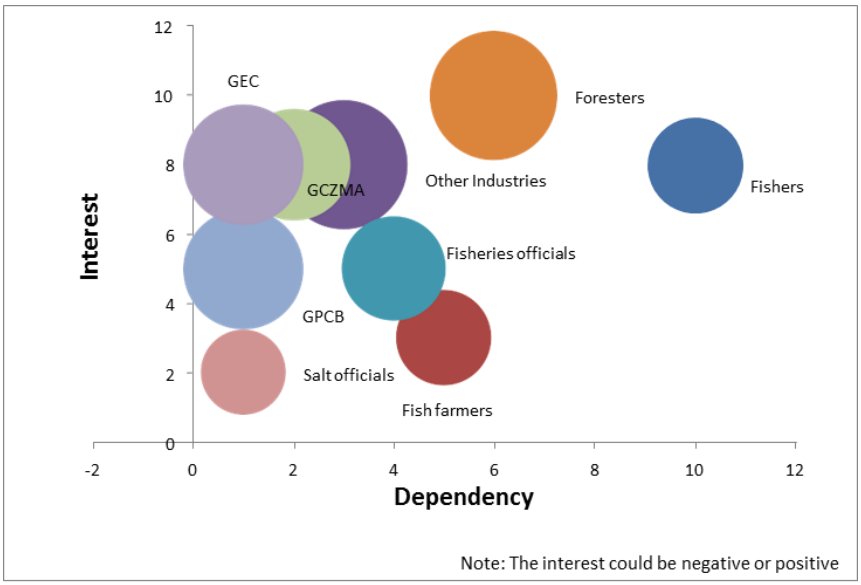

Figure 2: Mapping of selected stakeholders for conservation of coastal and marine biodiversity in Gujarat

Description of stakeholders

Fishers:

As per the 2010 Marine Fisheries Census conducted by the CMFRI, the total marine fisher population of Gujarat is 336 181, with 175 427 males and 160 754 females and a sex ratio of 916. The literacy rate is 49 percent. Of the total marine fisher population, 134 695 are engaged in fishing and fishing related activities. A total 8 903 fish workers are members of fisheries cooperatives. There are a total of 28 400 fishing craft in the state of which 18 278 are mechanized, 8 238 motorized and 1 884 non-motorized. The state has 121 fish landing centres spread over 247 fishing villages. Major fishing communities in Gujarat are Kharvas, Kolis and Macchiyaras. The fishers are mostly organized along the caste line.

Department of Fisheries, Government of Gujarat (GDF)

GDF holds the responsibility of fisheries management and development within the state and the territorial waters (12 nautical miles from the shore). The GDF is mainly engaged in implementation of various welfare measures, such as providing oil subsidies to the fishermen and other developmental programme. These welfare activities consume nearly all resources of the Department and resultantly the Department is lacking in implementation of fisheries management measures.

The Gujarat Fisheries Act (GFA) of 2003 is the main legislation defining the scope of the Department in fisheries management. The Act provides for power to regulate, restrict or prohibit certain fishing activities within specified areas, prohibition against destruction of fish by explosives, by poisoning of water and against introduction of exotic fish. Other measures include prohibiting all fishing in the specified waters for a specified period; prohibiting the use of any gun, spear, arrow or the like in any water, with intent thereby to take or destroy any of the fish therein; regulating the standard of sale of fish spawn, fry, fingerling and yearling; prohibiting fishing and marketing of the fish during closed season.. While the Act directly does not address biodiversity conservation, as mentioned above, there is scope within the Act to introduce necessary measures for conservation.

Fish (Shrimp) farmers

Although started slowly during 1990s, brackish water aquaculture is booming in Gujarat, especially in the southern districts of the State namely, Valsad, Navsari, Surat and Bharuch. Presently, about 522 farmers are registered with the Coastal Aquaculture Authority (CAA), including local fishermen, and entrepreneurs. The CAA has also permitted to undertake culture of a new variety of shrimp '*Litopenaeus vannamei'* (white leg shrimp), which is an exotic species in the country subject to certain guidelines. Specific pathogen free variety of this species is farmed in moderately high stocking densities. One major aspect of the land leasing policy for brackish water aquaculture in Gujarat is the scope for industrial houses. Although brackish water aquaculture has low dependence on coastal biodiversity, but due to presence of industrial houses has high interest and influence.

Coastal Aquaculture Authority (CAA)

CAA was established under the Coastal Aquaculture Authority Act, 2005 and notified vide a Gazette Notification dated 22nd December, 2005. It was formed amid criticisms of destructions of mangroves and spill over effect in agriculture from coastal aquaculture and is a quasi-judicial body that mainly deals with shrimp farming in the coastal areas of the country. The main objective of the Authority is to regulate coastal aquaculture activities in coastal areas in order to ensure sustainable development without causing damage to the coastal environment. The Authority is empowered to make regulations for construction and operation of aquaculture farms in coastal areas, inspection of farms to ascertain their environmental impact, registration of aquaculture farms, fixing standards for inputs and effluents, removal or demolition of coastal aquaculture farms, which cause pollution, etc. The Authority, being a new entity, has no prior experience in cross-sectoral conservation of coastal resources or being consulted in setting up of MPAs.

Gujarat Maritime Board

The objective of GMB is to maximize coastal benefits and strategic advantages of Gujarat Ports; to provide services, property and infrastructure support that will promote private investment; to ensure and protect ecological balance and safeguard social and

environmental issues; to ensure safety and security at all levels of operation. Non Major Ports of GMB primarily utilised for fishery activity are: Bharuch, Pindhara, Mangrol, Kotda, Navabunder, Rajpara, Talaja, Gogha, Bhagwa, Onjal, Bilimora, Valsad, Umarsadi, Kolak, Sachana (LDT), and Alang (LDT). Gujarat has adopted a port-led development strategy by encouraging setting up of ports by private sector. Some fishermen groups are agitating against this policy as being detrimental to livelihoods and environment. For example, National Coastal Protection Campaign (http://ncpcindia.wordpress.com/resources/); a joint body of likeminded organizations including International Collective in Support of Fishworkers (ICSF); National Fishworkers' Forum (NFF); Worldwide Fund for Nature (WWF) have expressed concerns about increasing number of ports in the country.

GMB enjoys high level of influence in coastal development and how it sees the issue of coastal and marine biodiversity is of utmost importance. A targeted awareness programme may be necessary to raise their awareness.

Gujarat Fisheries Central Co-operative Association Limited (GFCCA)
GFCCA is an apex co-operative body registered under the Co-operative Societies Act, 1961. Its mandates are: (i) marketing of fresh water fish and marine fish in wholesale and in retail through its different outlets and mobile vans; (ii) supply fishing equipment at economical rate, and (iii) implementation of Government Schemes & New Projects. The main role of this agency is from the point of ensuring use of eco-friendly fishing gear in the state and monitoring trends in fishing effort.

Forests & Environment Department, Government of Gujarat (GFE)
GFE has an environment wing and a forest wing. The environment wing of the Department is the apex body in Gujarat State for implementation of all environment related matters including Environment (Protection) Act, 1986, which is an umbrella Act on environment in the country. The main mandate of the Department is to achieve sustainable development in the state and introducing the sound environmental management practices.
The Department has four executing agencies *viz.* Gujarat Pollution Control Board, Gujarat Ecology Commission, Gujarat Institute of Desert Ecology and Gujarat Environmental Management Institute, for discharging its functions.

Gujarat Ecology Commission (GEC)
GEC was established in 1992 by the Forest & Environment Department of the Government of Gujarat. The main purpose of the Commission's appointment was the Government of Gujarat's aim to set up an apex body in charge of implementing a comprehensive policy encompassing aspects of pollution control, environmental upgradation and improved ecological management. GEC is a platform for providing information and other inputs, which are needed to develop a policy and approach for ecological conservation and sustainable development. At the same time, it undertakes, on its own and in collaboration with other agencies, initiatives for the protection of ecosystems under threat and restoration of ecologically degraded zones.

GEC is presently engaged in 3 projects aimed at improving conservation and creating awareness as shown in the ***Box 2***.

Box 2: Projects being implemented by GEC

Project	Partners/Collaborators	Objectives
Green Action for National Dandi Heritage Initiative A Project for the Overall Development and Conservation of the Environment of Dandi and its surrounding villages based on Gandhian Teachings on Environmental Conservation and Village Development	**Funding**: MOEF **Implementation**: Society for Integrated Coastal Management (SICOM), GEC	• Contribute towards increased understanding and acceptance of the need to protect, conserve and regenerate coastal natural resources by local communities and the government. • Contribute towards capacity building of coastal communities and government for community based bio-shield creation. • Enhance the socio-economic conditions of the communities situated in and around Dandi coastal belt. • Prepare and implement the integrated environment management plan for Dandi and surrounding villages situated on the coastal belt. • Maintain historical value of Mahatma Gandhi and to promote Gandhian ideology in environment. • Promote eco-tourism for the betterment of local communities
National Centre for Marine Bio-Diversity (NCMB)	**Funding:** MOEF **Implementation**: SICOM, GEC, Marine National Park & Sanctuary (MNP&S)	• Build database on coastal & marine bio-diversity, its conservation & management practices. • Promote technically sound & practically applicable management approaches and develop suitable applications to conserve marine biodiversity in India. • Advise state governments and other stakeholders on policy, legal and scientific matters related to conservation & management of marine biodiversity. • Serve as an interface between coastal communities, experts, and state governments. • Promote applied research; education and awareness towards coastal & marine biodiversity. • Serve as the prime institute in India to develop ecological models based on international best practices.
Development of Marine Research, Conservation & Information Centre (MRCI) - The MRCI is a concept to promote research and disseminate information about marine life. It is	**Funding**: World Bank **Implementation**: GEC, MNP&S	• Undertake education, research and conservation activities concerning marine life and ecosystems through the institution. • Provide facilities for breeding and preservation of endangered marine species.
educative experience to visitors. It is also important from the point of view of breeding & preserving threatened marine species.		• Create infotainment avenues to spread knowledge and information regarding marine life among potential target groups. • Ensure self-sustenance of the center for continued operations and maintenance.

Gujarat Coastal Zone Management Authority (GCZMA)
The mandate of the GCZMA is (i) to ensure livelihood security of the fishing communities and other local communities living in the coastal areas; (ii) to conserve and protect coastal stretches and; (iii) to promote development in a sustainable manner based on scientific principles, taking into account the dangers of natural hazards in the coastal areas and sea level rise due to global warming.

Gujarat Pollution Control Board (GPCB)
GPCB was constituted by Government of Gujarat on 15th October, 1974 in accordance with the provision of the Water Act, 1974. The mandate of the GPCB is to (i) bring about all round improvement in the quality of the environment in the State by effective implementation of the laws; (ii) control of pollution at source to the maximum extent possible with due regard to technological achievement and economic viability as well as sensitivity of the receiving environment. This objective is being fulfilled through laying down the disposal standards as well as gaseous emission standards; (iii) identification of sites and development of procedures and methods for the disposal of hazardous wastes; (iv) maximisation of re-use and re-cycle of sewage and trade effluent on land for irrigation and for industrial purpose after giving appropriate treatment and thereby economising and saving on the use of water. The practice also helps in stopping pollution of water due to reduction in discharges of waste into water bodies; (v) minimisation of adverse effect of pollution by selecting suitable locations for the establishment of new industrial projects; (vi) co-ordination with other agencies of the State Government and local authorities to encourage the Common Effluent Treatment Plants and Treatment Stabilisation Disposal Facilities, and (vii) close co-ordination and rapport with educational institutions, non-government organisations, Industries Associations, Government organisations, etc. to create environmental awareness.

Gujarat State Biodiversity Board (GSBB)
Government of Gujarat has established Gujarat Biodiversity Board (GSBB) in the year 2006. GSBB is presently concentrating on (i) constitution of Biodiversity Management Committees (BMCs); (ii) preparation of People's Biodiversity Registers (PBRs); (iii) organization of Awareness Camps; (iv)regulation of Biological Resources; (v) identification of rare and threatened species; (vi) identification of Biodiversity Heritage Site(BHS); and (vii) implementation of UNEP-GEF-MOEF Project on "Strengthening the Implementation of Biological Diversity Act, & Rules with Focus on its Access & Benefit Sharing Provision" for five States namely Andhra Pradesh, Gujarat, Himachal Pradesh, Sikkim & West Bengal. The project was launched in Gujarat State in 2011.

Cross Sectoral interaction in Gujarat in respect of fisheries and HCD needs
As mentioned earlier, in Indian context conservation activities are carried out by the MOEF and its line agencies and GFE and its line agencies in the state. While, fisheries forms a major part of coastal environment there are inadequate institutional provisions to involve fisheries sector in conservation related activities.

Given this, with the focus on development of local level institutions, such as BMC and involving them in conservation are a possible entry point for fisheries sector. In Gujarat, GDF is member in GCZMA and GSBB although does not figure in institutional framework for implementing ICZM in the state (**Figure 3**). Within GCZMA framework, GDF often deals with complaints regarding pollution (for details see Minutes of the meetings of GCZMA: http://www.gczma.org/momlist.asp). However, it is not a member of GPCB!

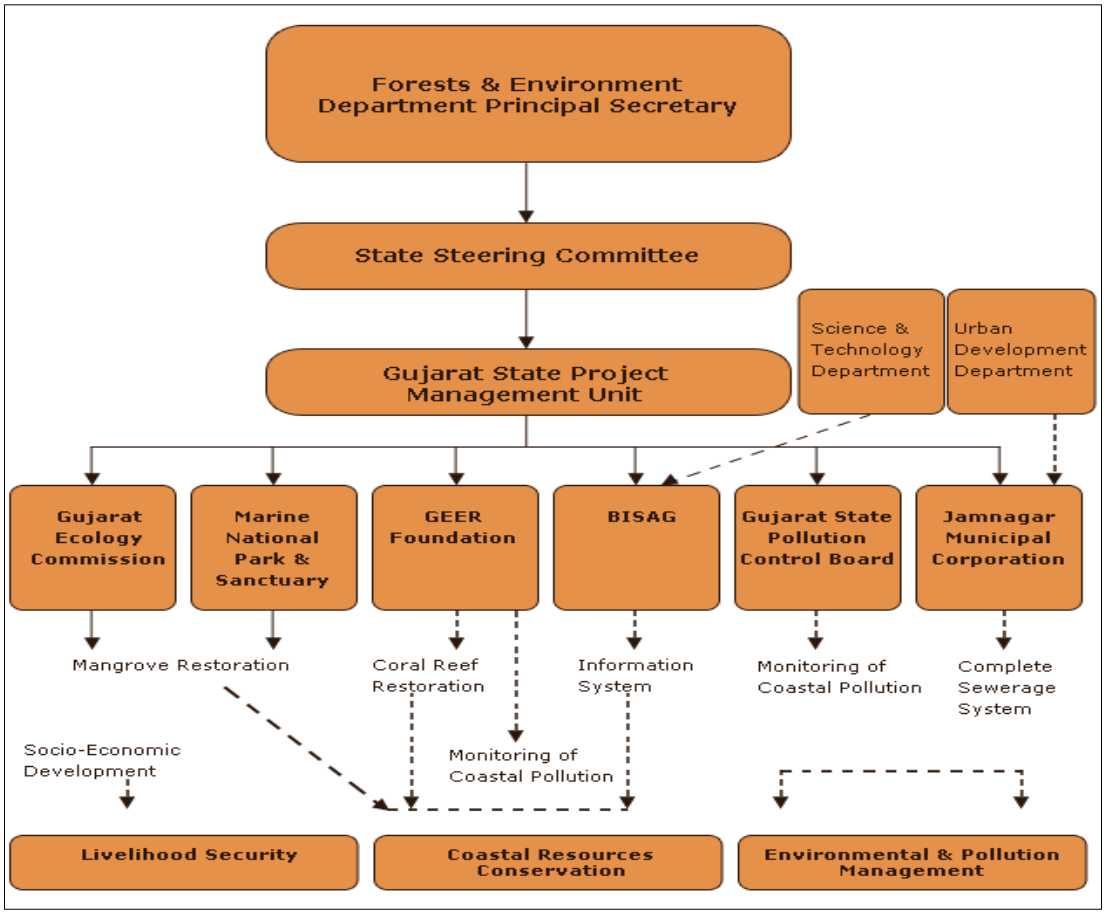

Figure 3: Institutional framework for State Project Management Unit for ICZM in Gujarat (http://www.geciczmp.com/org-chart-spmu-staff.aspx)

Therefore, HCD needs of fisheries sector as a whole need to focus on scope and limitation in existing institutional framework (Knowledge development on institutional framework) and communicating concerns of the sector effectively within this institutional framework (Improving communication). While for other agencies and sectors, the need is to understand particulars of fisheries sector, including its importance in the overall conservation needs.

This can begin with developing points of common understanding through a process of open discussions between fisheries and related sectors (such as environment and forestry). At the same time, for knowledge development in fisheries sector and other related sectors, a course on Ecosystem Approach to Fisheries (EAF) may be implemented. Recently, the Bay of Bengal Large Marine Ecosystem Project developed a training module on EAF (http://www.boblme.org/eafm-training.html). This course provides basic knowledge on the EAF process and how this can assist in decision-making for responsible and sustainable capture fisheries. The course is designed for fishery and environment staff, as well as related economic development and planning staff, at the provincial/state and district/local levels, who are responsible for administrating fisheries and the marine environment in which they operate. The course material is annexed to this report.

Table 1 gives a broad description of stakeholders.

Table 1: Stakeholder mapping and analysis

Stakeholder	Size (approx. number of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[1]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
Sector: Fisheries						
National						
Ministry of Agriculture (Department of Animal Husbandry, Dairying & Fisheries		National	Development of marine fisheries, welfare of fish workers, etc.	Neutral	Medium	Positive relation with GDF. No regular interactions with the MOEF.
National Fisheries Development		National	Fisheries development	**Neutral**	Low	Positive relation with the GDF and DAHD&F.
CAA		National	Promoting sustainable aquaculture.	**Neutral**	Medium	Interaction with shrimp farmers and others practising aquaculture in the coastal areas of the country. .
Marine Products Export Development Authority (MPEDA)		National	Promoting fisheries trade.	**Neutral**	Low	Interaction with exporters and lager mechanized fishing vessels.

[1] ***Includes dependence on coastal and marine areas for livelihood.***

Stakeholder	Size (approx. number of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[1]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
Fishery Survey of India (FSI)		India	Survey and assessment of fish stocks and charting of fishing grounds in the Indian Exclusive Economic Zone (EEZ) and adjoining high seas; Human resources development through training of fishing operatives and meeting faculty requirements of sister institutes and organization.	**Positive**	Low	Positive relation with fishers, Fisheries Department and ICAR Institutes
International collective in support of fish workers (ICSF)		National	Protecting the rights of fish workers	**Inhibitive (?).** While ICSF supports PAs, it is concerned about the design of PAs and possible loss of livelihoods of fishers.	Medium. Lobbying with DAHD&F and organizing fishermen associations; lobbying with FAO	Positive relation with fisheries associations and FAO.
National Fishworkers' Forum (NFF)			To protect the life and livelihoods of fishing communities and its basic source – fisheries resources, biodiversity and	**Inhibitive** (?). Might be concerned about the loss of livelihoods	Medium. Lobbying with like-minded organizations. NFF successfully campaigned to modify the	Positive with fisheries organization.

Stakeholder	Size (approx. number of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[1]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
Central Marine Fisheries research Institute (CNFRI)			R&D	**Positive**	ICAR research institutes can provide necessary research inputs to educate	Issue-based.
State						
GDF		State	To augment aquatic resource production in the inshore areas by conservation measures, stock enhancement and establishing of artificial reefs etc., along the coast and to enforce regulatory measures through legislation for conservation of fishery resources both in Inland and Coastal waters.	**Neutral**. So far the GDF either at State or DAHD&F at the Central level have played very limited role in setting up or management of PAs.	**Medium.** Conservation is in the domain of the Ministry/Department of Environment and Forests.	GDF has contact with different fishermen groups much owing to their welfare activities. However, so far they have not exercised their control in terms of motivating or influencing the fishermen for bio- diversity conservation.

Stakeholder	Size (approx. number of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[1]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
GMB		State	To maximize coastal benefits and strategic advantages of Gujarat Ports; to provide services, property and infrastructure support that will promote private investment; to ensure and protect ecological balance and safeguard social and environmental issues; to ensure safety and security at all levels of operation	**Inhibitive** (?). The state is pursuing an active port development plan	High	Better relation with the industry.

Stakeholder	Size (approx. number of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[1]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
GFCCA			GFCCA is an apex co-operative body registered under the Co-operative Societies Act 1961.	Marketing of fresh water fish and marine fish in wholesale and in retail through its different outlets and mobile vans; To supply fishing equipment at economical rate; To implementation of Government Schemes & New Project.	Low	-
Site						
Association of Artisanal fishers		Site/District	Welfare of members	**Inhibitive**	Low	Conflict with motorized and mechanized fishing vessels. However, they also work as crew in these categories of vessels. The interaction of this group with the government officials is also minimal and issue- based.

Stakeholder	Size (approx. number of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[1]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
Motorized boat owners		Site/District	Welfare of members	**Inhibitive**	Medium	Conflict with mechanized vessels. They also have a better working relation with the Government as this group usually comprises the beneficiaries of Government schemes.
Mechanized boat owners		Site/District/state	Welfare of members	**Inhibitive**	High	Conflict with traditional and motorized fishing vessels.
Fish traders/ money lenders		Site/District	Individuals	**Inhibitive**	High. They may influence fishermen.	Mostly interact with fishermen only.

Stakeholder	Size (approx. number of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[1]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
Other sectors that have a major influence on establishment and management of coastal and marine protected areas. Only most relevant stakeholders at relevant level (Supra National/ National/ regional/ State/ site) have been described below						
Supra National						
World Bank (Integrated Coastal Zone Management (ICZM) Project) (P097985)	-	Global	The project development objective is to assist Government of India in building national capacity for implementation of comprehensive coastal management approach in the country, and piloting the integrated coastal zone management approach in states of Gujarat, Orissa and West Bengal.	**Positive**	High (World bank is a major lender to the State and Union Governments)	Positive
GEF		Global	Strengthening the Implementation of Biological Diversity Act, & Rules with Focus on its Access & Benefit Sharing Provision	**Positive**	Medium	Positive

Stakeholder	Size (approx. number of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[1]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
Regional						
IUCN-MFF		Regional	IUCN-MFF is working on conservation of mangroves and coral reefs	**Positive**	Medium. IUCN-MFF is basically an advisory body working in close connection with Ministry of Environment and Forests, Government of	Close relation with scientist and policy makers. Limited field presence.
National						
Ministry of Environment and Forest, GoI		National	Promoting conservation of biodiversity as per CBD convention and other National and International regulations	**Positive**	High	Conflict with resource users.
National Biodiversity			To promote objectives of CBD	**Positive**	Low.	Low field presence.
Indian Coast Guard		National	The Coast Guard is the principal agency for enforcement of provisions of all national enactment in force in the maritime zones of India.	**Positive**	Medium	Good

Stakeholder	Size (approx. number of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[1]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
State						
GFE		State	Promoting conservation of biodiversity as per CBD convention and other National and International regulations	**Positive**	High	Conflict with resource users.
GEC			Implementing a comprehensive policy encompassing aspects of pollution control, environmental upgradation and improved ecological management.	**Positive**	High	Work in coordination with GFE, GPCB, etc.
GCZMA		State	Sustainable coastal development.	**Positive**	High	Work in coordination with GFE, GPCB, GDF, Gujarat Industrial Development Board, etc.
GPCB		State	Pollution control	**Positive**	Not known	Working with the GCZMA and GDF in areas of conservation of coastal zone.

Stakeholder	Size (approx. number of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[1]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
GSBB		State	Conservation of biodiversity	**Positive**		Positive. Platform for GFE and GDF in areas of conservation of coastal zone.
Site						
Village Panchayats This includes both political and community- based Panchayats. They play important role in designing allocation and access rules and		Site/district/state	Promotion and protection of interest of related groups	**Positive**. However, there are concerns for livelihoods.	High	Good relation with fishermen organizations

2.2. Capacity Gap Analysis

An overview of the major capacity gaps vis-à-vis enabling environment, cross-sector and cross-stakeholder cooperation, organizations and individuals in the fisheries sector of Gujarat.

Table 2: Problem analysis and capacity gap analysis

Dimensions of Capacity	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation *vis-à-vis* dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
Enabling Environment									
Policy implementation									
The Gujarat Fisheries Act (GFA), 2003	The GFA provides the legal framework for fisheries management. The objective of GFA is conflict resolution among different user groups and prohibiting harmful fishing practices.	High. The Act provides for time and area closure and also has provisions for use of fishing gear. These clauses in combination can be used for creating a closed area from fisheries perspective.	GDF	• Understanding and communicating ecosystem implications of fisheries management measures. • Creating a voluntary environment for implementation of the Act. • Information management and awareness building.	High	• Officials are only aware of the provisions of the Act but not their implications in larger ecosystem setting. • Officials are aware about the commitments of the nations as party to different international agreements and their implications. • Necessary skills are there to communicate the management needs to the fishing communities and taking them on board.	• The provisions of the Act needs to be understood from an ecosystem perspective. • Commitment of the nation in international agreements and their implications for the state needs to be understood. • Playing the role of a facilitator to engage fishing communities in fisheries mangement needs to be developed.	• Officials are aware of the legal provisions, particularly of acts specefic to the fisheries sector. However, they are unaware of the related provisions of other Acts and especially provisions of international agreements. • Relationship between the fishing	• Officials needs to be updated about cross-sectoral and overarching Laws and Acts including international agreements. • Outreaching and communication skills needs to be developed.

Dimensions of Capacity	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation *vis-à-vis* dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
								community and the officials is defined by job specifications.	
			Fishers and their organizations.	While fishers are aware and partly complying to the provisions of the Act, it is not embedded in their internal business practices.	High	Volunary and effective implementation of the Act.	Fishers understand the importance of the Act from sustainability perspective.	Fishes are aware of some provisions of the Act but not exactly guided by the Act.	Awareness building is required on why the Act is necessary for sustainability of fisheries and why sustainability of fisheries is important for their business.
Coastal Regulation Zone Notification, 2011	To ensure livelihood security to the fisher communities and other local communities, living in the coastal areas, to conserve and protect coastal stretches, its unique. environment and its marine area and to	High	Gujarat Coastal Zone Management Authority (GCZMA) (http://www.gczma.org/).	Lack of understanding of ICZM concepts.	High	The CRZ Notification is understood as a building block of ICZM framework	Understanding of ICZM framework and importance of fisheries sector.	An instrument pertaining to conservation of coastal zone.	Having a holistic view on ICZM and efficacy of the Notification towards this.
		High	GDF	Lack of understanding of ICZM concepts.	High	The CRZ Notification is understood as a building block of ICZM framework.	Understanding of ICZM framework and importance of fisheries sector	An instrument pertaining to conservation of coastal zone	Having a holistic view on ICZM and efficacy of the Notification towards this.
		High	Fishers and their organizations	Lack of awareness about the Act	High	Fishers and their organizations are aware about their	Understanding of notification and basic concepts of	-	Understanding of notification and basic

Dimensions of Capacity	Function / purpose	Level of importance	Stakeholders involved	What are the Related	Level of complexity	Target situation *vis-à-vis* dimension of	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
	promote development through sustainable manner based on scientific principles taking into account the dangers of natural hazards in the coastal areas, sea level rise due to global warming					rights provided under the Notification	ICZM		concepts of ICZM.
Coastal Aqauculture Authority Act, 2005	For setting up of Coastal Aquaculture Authority with a mandate to ensure sustainable aquaculture	Low	Coastal Aquaculture Authority	Setting up of shrimp farms in prohibites areas such as mangroves; shrimp farm waste water that can create eutrophicatio n of coastal waters, catching of mother shrimps through trawling.	Medium	Awareness about growth of aquaculture and how it may impact coastal environment.	Understanding associated risks, especially from over-capacity of aquaculture farms and also the threats from introduction of exotic species, if allowed without proper risk assesment.	-	Understanding the threats from introduction of exotic species, if allowed without proper risk assesment.
			Shrimp farners	Rights and duties of fish	Medium	Voluntary implementation of the	Understanding of the Act and basic	Understanding of	Like fisheries, shrimp farmers

Dimensions of Capacity	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation *vis-à-vis* dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
				farmers under the Act		Act while developing and running farms.	concepts of ICZM	requirements to set up a farm	should be aware about the impact of farming in coastal zone if carried out in unsustianable manner and also the possibility of adverse impacts of introduction of exotic species, if carried out without risk assessment.
Rural Employment Guarantee Schemes	To generate employment in rural areas and to develop entrepreneurial skill and attitude among rural unemployed youth.	High	Village Panchayat	-	-	-	-	-	-
			Other resouurce users	-	-	-	-	-	-
			Fishermen organizations	Fishermen are not aware about the scope of the scheme in looking for additional/ alternative options	High	Fishermen are aware about the scope of the scheme in looking for additional/ alternative options	Awareness building on various government schemes for rural sector.	Awareness on fisheries-specefic schemes.	Awareness and training programme on using applicable developmental schemes of the government.
Wildlife Protection Act, 1972	The Act provides for the protection of	High	Ministry of Environment and Forests	Lack of consultation with	High	Consultative mechanism to	Awareness creation on needs of consultation	Benefits of consultation is not realized	Legal and implementatio nal gap exist to

Dimensions of Capacity	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation *vis-à-vis* dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
	wild animals, birds and plants; and for matters connected therewith or ancillary or incidental thereto.			stakeholders while implementing the Act and during creation of PAs under the Act		implement the Act needs to be in place.			ensure consultation.
			GDF	Lacks understanding	Medium	Officials can advise fishers/ forestry officials on scope and implementation of the Act	Training programme on all relevant Acts.	-	-
			Indian Coast Guard	-	-	-	-	-	-
Organizational and network capacity									
Better intra-departmental and inter-departmental communication	To implement fisheries policies and liaison with fishers and sister organizations	High	GDF	Relation with fishers mostly limited to implementation of welfare schemes.	High	The Department having the required clout in fisheries.	Image-building; self-assertion	-	Image-building; self-assertion
	To ensure interest of its members.	High	Fishers	Lack of leadership and vision	Medium	Fishers Organization are functioning as trade union and civil societies to ensure well-being of members and the resources.	Leadership development; skills in organizational management and communication with media and other agencies/organizations	-	Leadership development; skills in organizational management and communication with media and other agencies/organizations

Dimensions of Capacity (one per line)	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation *vis-à-vis* dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	**existing**	**gaps**
	NFDB has the mandate to co-ordinate activities of various Ministries/Department towards fisheries and aquaculture development	Medium	NFDB, GDF; GFE	NFDB is a fairly new organization and lacks prior experience in coordinating.	Low	NFDB officials are aware about ecosystem approach and have better coordination skills.	Training programme in ecosystem approach, project management and coordination.	-	Training programme in ecosystem approach, project management and coordination.
Cross-sector cooperation capacities									
Better coordination between forestry and fisheries departments	To communicate exogenous issues in fisheries with other sectors and ensuring their cooperation.	High	GDF; GFE; GCZMA; GEC	Lack of understanding of issues of other sectors.	High	Each concerned Department is aware about issues in other sectors and implication of those issues in their own sector.	Image-building; self-assertion; awareness and knowledge on activities of other departments; negotiation skills.	-	Image-building; self-assertion; awareness and knowledge on activities of other departments; negotiation skills.
Creating media awareness	To create awareness among tertiary stakeholders and integrating primary stakeholders on issues concerning fisheries sector	High	GDF; GFE; GCZMA; GEC	Problems in identifying 'news-worthy' issues and presenting activities in a media-savvy manner	High	Skills in identifying 'news-worthy' issues and presenting activities in a media-savvy manner	Training in preparation of briefs, maintaining contact with media	-	Training in preparation of briefs, maintaining contact with media

Cross-stakeholder cooperation:									
Dimensions of Capacity	**Function / purpose**	**Level of importance**	**Stakeholders involved**	**What are the Related problems**	**Level of complexity**	**Target situation *vis-à-vis* dimension of capacity**	**Capacities to achieve the desired framework/ process**		
							Required	**existing**	**gaps**
problems Better coordination between forestry and fisheries sector									
Creation of a common platform for dialogue between environment (including forestry) and fisheries secor									
Individual competence									
Communicating scientific findings	To better communicate scientific findings to common people.	Medium	Fisheries and environmental scientists	Scientific finding are closed within the concerned circle.	Medium	Policy-oriented researches are undertaken and findings are communicated to stakeholders in non-technical language.	Identifying policy issues; non-technical writing and presentation of scientific findings.		Identifying policy issues; non-technical writing and presentation of scientific findings.
Improving extension services	Improving linkages bewteen primary stakeholders and officials and creation of a feedback process	High	GDF; GFE	Extension services are not desgnied to deal with community mobilization and leadership creation.	Medium	Extension activities are used for creating a platform for conservation and related issues.	Identification of extension needs in the new context, designing of strategy and necessary training.	Conventional extension (usually informing about government schemes).	Identification of extension needs in the new context, designing of strategy and necessary training.
Leadership skills in fisheries organizations	To enable fisheries organisation to look beyond immediate issues.	High	Fishers	Lack of leadership skills in fisheries organizations.	High	Effective leadership developed at fisheries organizations and cooperatives.	Training programme in visioning, organisation management and community mobilization.	-	Training programme in visioning, organisation management

3. Recommendations for Possible HCD Interventions:

Main gaps identified for officials (Fishery/Forestry) are lack of understanding of the National Laws having bearing on fisheries sector from an ecosystem perspective. Especially for fisheries officials, their qualification for appointment and post-recruitment departmental training programmes does not include familiarization with the Acts and Laws other than the immediate Acts. There is also lack of awareness on international binding and non-binding agreements, to which India is a party. Therefore, the possible HCD interventions include development of a curriculum for a refresher course in national and international laws and their larger implications. For sustainability, this curriculum is needed to be adopted in the Departmental training facilities.

The fishers and their organizations are also lacking in these areas. However, for them a targeted awareness programme could have a better reach.

There is also a need to develop networking and leadership capabilities among fishery and forestry officials aiming at intra-departmental; inter-departmental and department-community interaction.

Table 3: Recommendations for possible HCD interventions

Target situation vis-à-vis dimension of capacity	Capacity gaps	Possible intervention	For whom (target group)	Resource organizations/ persons (providers)	Expected impact	Expected synergies with other dimensions
Officials are aware of the provisions of the Gujarat Fisheries Act, other relevant acts and international agreements and its implication in larger ecosystem setting.	Officials needs to be updated about cross-sectoral and overarching Laws and Acts including international agreements.	1. Review of the curriculum for training of fisheries officials; 2. Development of a curriculum on legal setting in fisheries; 3. Incorporating legal setting in fisheries in existing curriculum; 4. Organizing a 5-day training programme for existing staff	**GDF**	Junagadh Fisheries College (JFC) /Wildlife Institute of India (WII)/Anand Agriculture University (AAU)/ CMFRI/ Central Institute of Fisheries Education (CIFE)	Improved awareness and better implementation of fisheries provisions	Better linkages with ICZM and biodiversity conservation.

Target situation vis-à-vis dimension of capacity	Capacity gaps	Possible intervention	For whom (target group)	Resource organizations/ persons (providers)	Expected impact	Expected synergies with other dimensions
Necessary skills are there to communicate the management needs to the fishing communities and taking them on board.	Outreaching and communication skills needs to be developed.	1. Review of the curriculum for training of fisheries officials; 2. Development of a curriculum on legal setting in fisheries; 3. Incorporating legal setting in fisheries in existing curriculum; 4. Organizing a 5-day training programme for existing staff.	**GDF**	AAU/ IIM-A/NIRD	Improved communication and management skills	Better coordination with fishers and improved extension services.
Volunary and effective implementation of Acts by the fishers	Awareness building is required on why Acts are necessary for sustainability of fisheries and why sustainability of fisheries is important for	Organizing location-specefic awarness camp cum workshop	**Fishers/ NGOs**	JFC/ WII/AAU/ CMFRI/ CIFE/FSI	Easeness in implementation/ improved cooperation	Better linkages with stakeholders.

Target situation vis-à-vis dimension of capacity	Capacity gaps	Possible intervention	For whom (target group)	Resource organizations/ persons (providers)	Expected impact	Expected synergies with other dimensions
The CRZ Notification, 2011 is understood as a building block of ICZM framework	Having a holistic view on ICZM and efficacy of the Notification towards this.	State-level workshops	GCZMA; GDF, GPCB; GFE, ICG	JFC/ WII/AAU/ CMFRI/ CIFE.	Better implementation of CRZ	Easeness in management of MPAs
Organizational and network capacities						
Optimazing organizational and networking capacity	Image-building; self-assertion; awareness and knowledge on	1. Review of the curriculum for training of	GDF, GFE, GCZMA	IIM-A/NIRD/IRMA	Improved organizational capacity and management.	
	activities of other departments; negotiation skills	forestry/fisheries officials; 2. Development of a curriculum on legal setting in fisheries/ICZM; 3. Incorporating legal setting in fisheries/ICZM in existing curriculum; 4. Organizing a 5-day training programme for existing staff.				

Target situation vis-à-vis dimension of capacity	Capacity gaps	Possible intervention	For whom (target group)	Resource organizations/ persons (providers)	Expected impact	Expected synergies with other dimensions
Cross-sectoral and cross-stakeholder cooperation						
Better coordination between forestry and fisheries departments	Image-building; self-assertion; awareness and knowledge on activities of other departments; negotiation skills		GDF, GFE, GCZMA	IIM-A/NIRD/IRMA	Imporved branding and scope of taking responsibilities.	
Skills in identifying 'news-worthy' issues and presenting activities in a media- savvy manner	Training in preparation of briefs, maintaining contact with media					
Individual						
Policy-oriented researches are undertaken and findings are communicated to stakeholders in non- technical	Identifying policy issues; non-technical writing and presentation of scientific findings.	Training programme on policy oriented research and dissemination.	CMFRI,CIFE,JFC	GIZ/FAO/BOBP-IGO/WII	Better scientific communication	Overall improvement in understanding the need for conservation.
Extension activities are used for creating a platform for conservation and related issues.	Identification of extension needs in the new context, designing of strategy and necessary training.	Training programme	GDF,GFE	GIZ/FAO/BOBP-IGO/WII	Improve extension	Overall improvement in understanding the need for conservation.

Target situation vis-à-vis dimension of capacity	Capacity gaps	Possible intervention	For whom (target group)	Resource organizations/ persons (providers)	Expected impact	Expected synergies with other dimensions
Effective leadership developed at fisheries organizations and cooperatives.	Training programme in visioning, organisation management and community mobilization.	Training programme on management	Fisheries organisations/ coopertives	NIRD/IRMA	Improved organisation capacity	Improved particiaption in dialogue process.

3.1. Training capacities in/for the state:

Table 4: Description of resource organizations/ networks/ individuals (providers)

Name of organization	Type of capacity-strengthening programmes they are engaged in?[2]	Target group	What is their thematic focus?	Geographical focus[3]	Information on the existing training/ capacity building networks they are part of (with reference to the 4 project states)	Support required by the organization itself to sustain its capacity building measures to the other stakeholders			
						Curriculum development	Training system development	Faculty development	others
National									
CMFRI	Fisheries research, additional/ alternative employment	Fishers/Fisheries/Forestry officials	Fisheries R&D	India	No dedicated training programme	X	X	Available	
CIFE	Fishing technology, fish processing, value addtion, additional/ alternative employment	Fishers/Fisheries officials	Fisheries R&D	India	No dedicated training programme	X	X	Available	
IIM-Ahmedabad (Centre for	The Centre conducts short duration Management	Senior officials	Management	India/World	No dedicated training programme	X	X	Available	

[2] Innovation and Knowledge Networks/ Leadership Development/ Policy Dialogue/ Cross-sector and cross-stakeholder learning / Training / Training of Trainers/ capacity building of training institutions/ research / Fellowships/ exposure visits

[3] indicate names of the project partner states

Management of Agriculture)	Development Programmes (MDPs)								
National Institute of Rural Development (NIRD)	NIRD is a school for practicing managers engaged in rural development. It also trains functionaries from the Government, development banking institutions and community based organizations to help carry forward and spread the message of all-round rural development.	Fisheries and forestry officials/ community groups/NGOs	Management/ Administration	India	No dedicated training programme	X	X	Available	
Institute of Rural Management Anand (IRMA) - MDP	MDPs constitute one of the major activities of IRMA, which addresses the in-service training needs of the executives and managers working in the co-operatives, not-for-profit organisations, and government and semi-government organisations engaged in rural development. So far, IRMA has conducted over	Fisheries and forestry officials/ community groups/NGOs	Management/ Administration	India	No dedicated training programme	X	X	Available	

	675 programmes with an enrolment exceeding approximately 14500 personnel.								
State									
Junagadh Fisheries College	Fisheries education	Students/fishers/ fisheries officials	Fisheries R&D	Gujarat	No dedicated training programme	X	X	Available	Communication; policy research.
Anand Agriculture University (Extension Training Institute)	The mandate of EEI is to train middle level functionaries of various line departments to improve upon their job performance wherever they are working in different capacities.	Students/fishers/ fisheries and forestry officials	Fisheries R&D	Gujarat	No dedicated training programme	X	X	Available	Communication; policy research.
Site									

PART - 2

Maharashtra State Report

Disclaimer

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List of Accronyms

BOBP-IGO:	Bay of Bengal Programme Inter-Governmental Organisation
CAA:	Coastal Aquaculture Authority
CIFE:	Central Institute of Fisheries Education
CMFRI:	Central Marine Fisheries Research Institute
CRZ:	Coastal Regulation Zone
CSO:	Civil Society Organisations
DAHD&F:	Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, Government of India
EAF:	Ecosystem Approach to Fisheries
FSI:	Fishery Survey of India
MCZMA:	Maharashtra Coastal Zone Management Authority
DoF-MH:	Department of Fisheries, Government of Maharashtra
GEF:	*Global Environment Facility*
MMFRA:	Maharashtra Marine Fishing Regulation Act, 1981
MFD:	Maharashtra Forest Department
MPCB:	Maharashtra Pollution Control Board
HCD :	Human Capacity Development
ICG:	Indian Coast Guard
ICSF:	International Collective in Support of Fishworkers
ICZM:	Integrated Coastal Zone Management
IIM-A:	Indian Institute of Management, Ahmadabad (Centre for Management of Agriculture)
IRMA:	Institute of Rural Management, Anand
IUCN:	International Union for Conservation of Nature
MDP:	Management Development Programmes
MFF:	Mangroves for the Future
MNP:	Marine National Park
MoEF:	Ministry of Environment and Forest, Government of India
MPA:	Marine Protected Area
MPEDA:	Marine Products Export Development Authority
NBA:	National Biodiversity Authority
NFDB:	National Fisheries Development Board
NFF:	National Fishworkers' Forum
NGO:	Non-Governmental Organisations
NIRD:	National Institute of Rural Development, Hyderabad
REGS:	Rural Employment Guarantee Schemes
TU:	Trade Unions
UNDP:	United Nations Development Programme
UTs:	Union Territories
WBG:	World Bank Group
WII:	Wildlife Institute of India
WPA:	Wildlife Protection Act, 1972

Summary

Conservation of critical ecosystem comes under the purview of the Ministry of Environment and Forests (MoEF), Government of India. Traditionally, Fisheries Officials either in the provincial or the union government are concerned only with conservation of fishery resources from a perspective of achieving Maximum Sustainable Yield (MSY). The existing fisheries-related laws and acts and allocation of business rules at provinces or union level do not give much leverage to the fisheries officials for conservation-related activities. However, as recently the Ecosystem Approach to Fisheries (EAF) is gaining currency, fisheries officials are becoming more aware about the conservation needs. On the other hand, for fishers, conservation is usually equated to loss of livelihoods and is, therefore, unpopular; although when consulted and educated properly, fishers have supported conservation measures. In fisheries science, raising awareness of the fishers and other stakeholders was never a priority and fisheries scientists by and large also lack communication skills with the media and stakeholders at large.

In view of this, mainly three types of Human Capacity Development (HCD) are needed. First, improving knowledge of stakeholders, especially fisheries officials and fishers on concerned national and international laws and agreements; second developing managerial skills, including organizing people and institution building for both fisheries officials and fishers; and third, improving communication and networking, especially targeting fisheries scientists and fisheries officials.

While, there are a large number of institutions involved in fisheries research and extension, as of now, no organisation has any dedicated programme to meet such needs. Therefore, providing these HCD programmes need curriculum development and institutionalization. However, it is unlikely that without assured funding support such programmes will be institutionalized.

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1. Introduction

1.1. Current status of coastal and marine biodiversity in Maharashtra

Maharashtra is located in the West coast of India and bordered by the Arabian Sea to the west, Gujarat and the Union Territory (UT) of Dadra and Nagar Haveli to the northwest, Madhya Pradesh to the north and northeast, Chhattisgarh to the east, Karnataka to the south, Andhra Pradesh to the southeast and Goa to the southwest. The state covers an area of 307,731 km^2 (118,816 sq. miles) or 9.84 percent of the total geographical area of India. Mumbai, the capital city of the State is India's largest city and the financial capital of the nation. The Maharashtra coast is characterized by pocket beaches flanked by rocky cliffs of Deccan basalt; estuaries and patches of mangroves. The State has about 720 km long indented coastline, which is marked by the presence of major estuaries and narrow creeks. It comprises the coastal districts of Thane, Raigad, Greater Bombay, Ratnagiri and Sindhudurg.

The Maharashtra coast, popularly known as Konkan coast, is an important area on the West coast of India, because of its physical distinctiveness, biota and marine resources. The coastal region is hilly, narrow, highly dissected with transverse ridges of the Western Ghats and at many places extending as promontories, notches, sea caves, embayment, submerged shoals and offshore islands. The shoreline is generally straight and the area receives over 300 cm of annual rainfall spread over 4 months of the year. Marine algae are more in number along rocky shores; altogether, 91 marine algal species were found along the Maharashtra coast with Malvan displaying the maximum number (73) of marine algal species. Some species are economically important (species belonging to genera such as Monostroma, Gelidium, Gracilaria, Sargassum, etc) and exploited for their commercial value, while others (Acetabularia sp., Caulerpa verticillata) are rare (Untawale and Dhargalkar, 2002).

Malvan is one of the biologically richest coastal regions in Maharashtra. Malvan coast extends from 16°00’ 00” N to 16°05’00” N Lat and 73°25’00” E to73°30’ 00” E Long. The marine flora and fauna of Malvan pertain to sea anemones, molluscs, polychaetes, pearl oysters, corals, seaweeds and mangroves. Marine flora and fauna of the rocky, sandy and muddy shores of Malvan comprise 367 species belonging to 173 genera (97 families, 16 classes and 9 phyla). One of the ecologically important faunal groups recorded at only a few locations (Vengurla Rock Island, Malvan, Ratnagiri and Mumbai) is coral, and of these sites corals are most abundant at Malvan. Eleven species of corals are reported from Malvan waters (ICMAM Project Directorate Report, 2002). The Maharashtra coast also has porpoises, dolphins and marine turtles. Three species of sea turtles are found to be most commonly nesting along the Maharashtra coast: olive ridleys (*Lepidochelys olivacea*) are the most common species (Survey conducted by Bombay Natural History Society (BNHS) in 2001). The biological organisms range from 73 species of marine seaweeds (*Ernodemis verticilata*) to mangroves (18 species), corals (11 species), molluscs (73 species), polychaetes (47 species), arthropods (47 species) and fishes (74 species). The region harbours a rich avian fauna. There are 367 species of flora and fauna reported for the Malvan coast, though recent records show only 279 species.

1.2. Drivers and Pressures for loss of coastal and marine biodiversity in the State

The fisheries in Maharashtra form one of the vital sources of food security. The marine fish production in the State was estimated at 449 599 tonnes during 2002 and since then it has shown a decreasing tendency with a production of 291 791 during 2011 and the majority (65.68%) of the catch coming from pelagic sources. (Fig. 1).

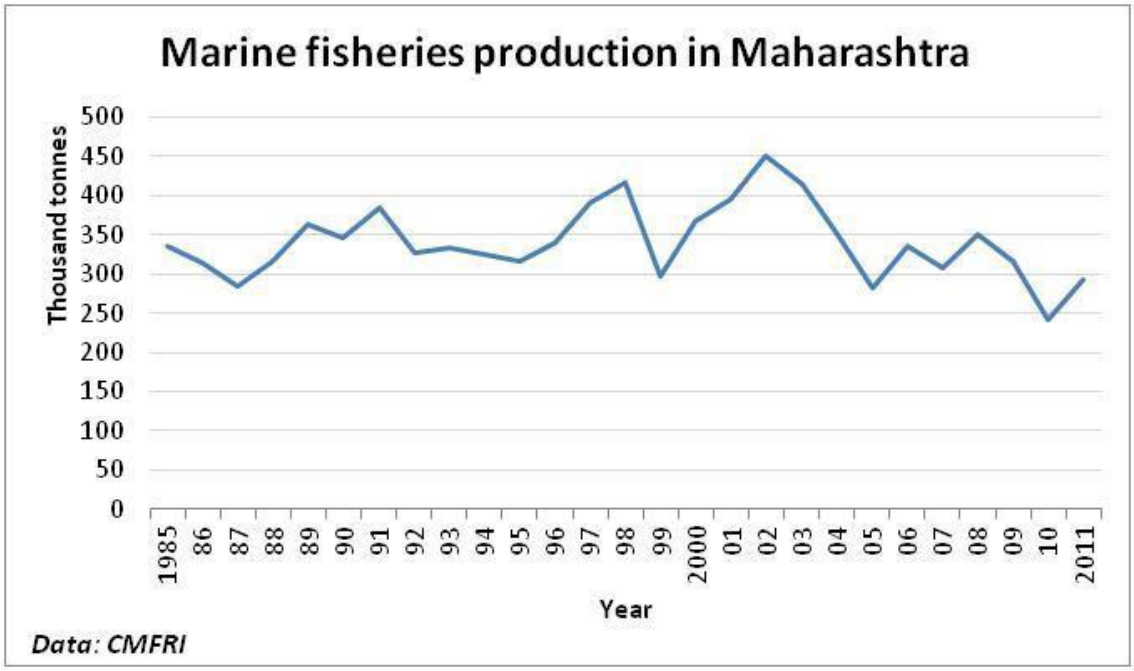

Figure 1: Marine fisheries production in Maharashtra

A set of factors, both endogenous and exogenous are driving the changes in the coastal biodiversity in the State. There has been a rapid mechanization of the fishing industry in recent years. Fish stocks are considered to be overexploited. Damage is being caused by the non-implementation of regulations related to mesh size and gear, which results in removal of juvenile fish that compromises future recruitment of fish stocks (Table 1).

The concentration of a large number of trawlers in Malvan Bay (which is very close to the Marine Wildlife Sanctuary) is impacting the critical habitat of Malvan. Because of the sheltered bay and fish marketing related infrastructures, trawlers and other mechanised fishing vessels from all parts of Malvan taluka congregate here. The sheltered nature of the bay means that flushing of water is poor, and this compounds the impact on the surrounding environment. Traditional fishermen are gradually losing their livelihood opportunities owing to unsustainable fishing by the mechanized vessels. Data shows that the catch per unit effort (CPUE) of the Non-Mechanised fishing vessels has fallen considerably in past 5 years in Maharashtra. In Sindhudurg, the decline in CPUE is quite explicit across all categories of fishing vessels (Table 2). Although, there seems to be some improvement in CPUE in case of mechanized fishing vessels during the recent years, this could be due to increasing area of operation coupled with the use of efficient fishing gear. Overall, the fisheries situation in the State and Malvan region is that of concern.

The loss of traditional livelihoods combined with inadequate or inappropriate skills for alternative employment opportunities has increased the reliance of some sections of the local population on a shrinking natural resource base, including on the Marine Wildlife Sanctuary.

Table 1: Trends in fishing effort and production in Maharashtra

Year	Production In Tonne	Production In Tonne	Production In Tonne	Efforts In Numbers	Efforts In Numbers	Efforts In Numbers	Catch per unit Effort (Kg)	Catch per unit Effort (Kg)
	Mechanised	Non-Mechanised	Total	Mechanised	Non-Mechanised	Total	Mechanised	Non-Mechanised
2007-08	414647	5168	419815	904793	143789	1048582	458	36
2008-09	392198	3765	395963	918996	173361	1092357	427	22
2009 -10	410695	5072	415767	1044265	239323	1283588	393	21
2010 - 11	440393	6310	446703	952434	209305	1161739	462	30
2011 - 12	428805	4879	433684	974224	243795	1218019	440	20

Source: UNDP

Table 2: Trend in fishing effort and production in Sindhudurg

Per Unit production by different boat types in Sindhudurg District							
Type of Activity	Parameters	2006-07	2007-08	2008-09	2009-2010	2010-11	2011-12
mechanised	production (mt)	20967	14407	16604	17917	20446	22674
	Effort in Nos	124404	116107	122007	169308	159379	188852
	catch per unit effort(kg)	169	124	136	106	128	120
non-mechanised	production (mt)	4928	2663	2071	2219	2890	1889
	Effort in Nos	55941	65053	55204	77441	73609	67868
	catch per unit effort (kg)	88	41	38	29	39	28
Rampan	production mt	4326	2173	1591	1680	2238	1219
	Effort in Nos	4798	4477	4864	6098	6112	3063
	catch per unit effort (kg)	902	485	327	276	366	398

Source: UNDP

Among the exogenous factors, global warming is now well-documented to have an impact on coral reefs, distribution and composition of species along the coast (Vivekanandan, 2010, 2012).

1.3 Protected status in the State *vis-à-vis* coastal and Marine Protected Areas

The Malvan (Marine) Wildlife Sanctuary was designated on 13 April 1987 by a notification by the Forest Department, Government of Maharashtra. The total area of the sanctuary is 29.12 sq. km, with a core zone of 3.18 sq. km and the rest (25.94 sq. km) as the buffer zone (see Figure 5). The core zone includes the Sindhudurg Fort, Padamged Island and other submerged rocky structures. The proclamation notice for the sanctuary from the District Collector's office was issued in 1991, subsequent to the notification from the Department of Forests and Environment in 1987. Another notification in 1992 designated the area of the sanctuary. However, this MPA is yet to be fully functional.

The World Bank during 1992-2000 implemented a Forestry Project[1] in Maharashtra with the following objectives: (a) Increase productivity on forest and wastelands; (b) Increase community participation to improve rural incomes and equity, and raise biomass self-sufficiency; (c) conserve biodiversity;(d) improve sector management. According to the Project Report "participatory mechanisms were strengthened and a component was added to introduce Joint Forest Management in 200 villages. To support this initiative a two-pronged training strategy was developed. All Maharashtra Forest Department (MFD) field staff were to be trained in participatory approaches with senior officers participating in training of local staff. This was

[1] ***World Bank. 2000. India - Maharashtra Forestry Project. Washington, DC: World Bank. http://documents.worldbank.org/curated/en/2000/09/729271/india-maharashtra-forestry-project.***

particularly important because it provided an opportunity for officers to translate policy into operational guidance and to clarify any issues that arose. The second important modification was the introduction of "heterogeneous" training with FD staff and local community members receiving training together. This approach proved effective in raising issues and identifying solutions for both community members and MFD field staff."

Presently (2010-14) a UNDP-GEF Project is under implementation in Malvan coast for "Mainstreaming Coastal and Marine Biodiversity Conservation into India's Production Sectors". The components of this project include (i) cross-sectoral planning framework (spatial and sector development planning) that mainstreams coastal and marine biodiversity conservation, with a special emphasis on an ecosystem approach to fisheries (EAF) management; (ii) institutional strengthening for implementing EAF, and biodiversity mainstreaming, and (iii) sustainable natural resource use by communities residing on the Malvan coast.

2.1 Situation Analysis

2.2 Stakeholder Analysis

The major stakeholders in the fisheries sector are the fishers and fisheries officials. However, in view of multiple uses of coastal areas and keeping in view the conservation of biodiversity, other governmental agencies such as Ministry/Department of Environment and Forests are playing a major role. As mentioned earlier, the coastal belt in Maharashtra has high industrial concentration and hence tackling pollution is a major challenge. Other than these State and national level players who are engaged in exploitation or administration of the coastal zones in Maharashtra, various international agencies such as the World Bank Group (WBG) and UNDP are also actively engaged in the environmental and developmental scenario of Maharashtra.

Box 1 and ***Figure 2*** give a mapping of selected stakeholders active at the state level. In the figure, location of the bubble is determined by their dependency on coastal and marine biodiversity and interest (positive or negative) in setting up of the MPA. Their sizes are functions of their influence, positively or negatively affecting the decision to set up an MPA. The magnitude of various dimensions of a particular stakeholder is constructed from mandates and personal understanding of the authors. It is seen that the 'state of the resources', whether good or bad, is not usually considered as a factor determining the career graph of the officials concerned. Career-related dependency is bit higher for forestry officials as there are other incentives (+ve/ - ve) such as media reports, etc which can motivate their actions.

Box 1: Axiomatic scoring of selected stakeholders for illustrative purpose

Stakeholder	Dependency	Interest	Influence
Fishers	10	8 (-)	5
Fish farmers	5	3	5
Other Industries	3	8 (-)	9
Fisheries officials	4	5	6
Foresters	6	10	9
MPCB	1	5	8
MCZMA	2	8	7

Note: The interest could be negative or positive.

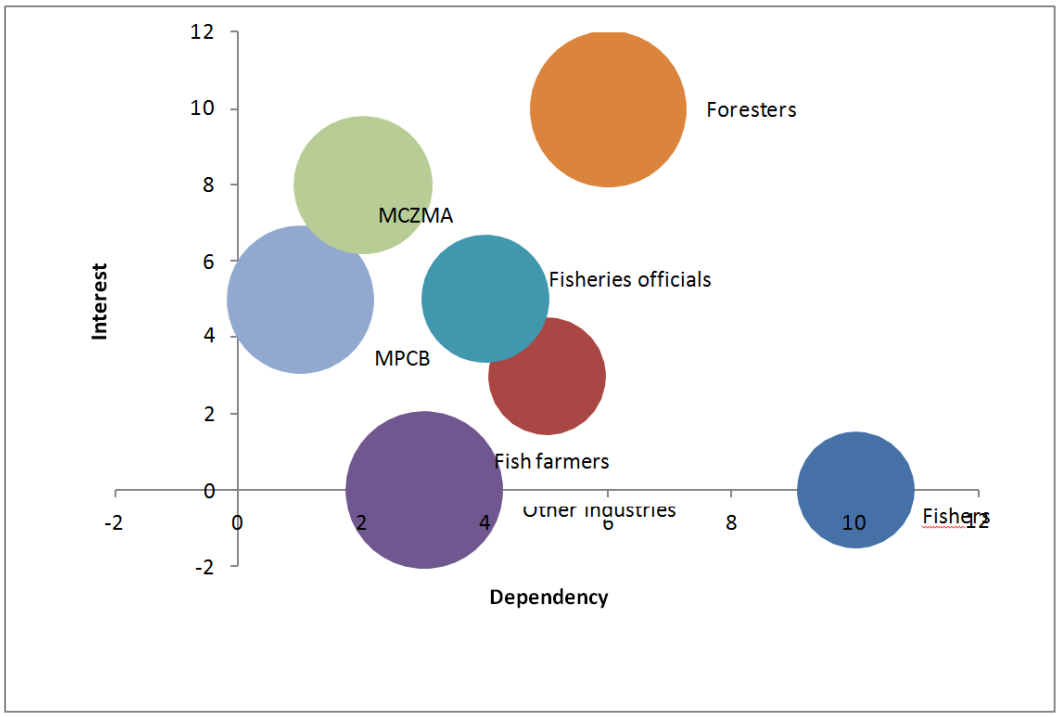

Figure 2: Mapping of selected stakeholders for conservation of coastal and marine biodiversity in Maharashtra

Description of stakeholders

Fishers:

The total marine fisher population of Maharashtra is 386 259 with 81 492 fishermen families, as per the 2010 Marine Fisheries Census[2]. Of the total marine fisher population, the male with female sex ratio is 953. There are 456 marine fishing villages with the maximum number in Raigad district (168). The total number of fish landing centres is estimated at 152 numbers. There are about 15 509 households below poverty line, with the highest in Sindhudurg district (37%). The literacy rate is 69 percent, with the highest in Raigad district. The total number of active fishermen is 76 345 (40% of the total) and the remaining 60 percent are engaged in fishing allied activities like fish marketing, labourers, making/repairing nets, curing, processing and peeling. About 23 percent of the adult fisherfolk are having membership in co-operative societies out of which 95 percent are in fisheries co-operative societies.

The State has a total of 17 362 fishing craft of which 13 016 are mechanized, 1 563 motorized and 2 783 non-motorized. The fishing gears used in the State are bag net, cast net, gillnet and trawl net. There are 49 ice factories, 45 freezing plants, 33 cold storages, 10 curing yards, 9 peeling sheds and 5 boat yards in Maharashtra.

National Fishworkers Forum (NFF)

The NFF registered under the Trade Union Act of India, is a national federation of State level small and traditional fish workers' unions of India. NFF has affiliated organizations in all the coastal states and Union Territories of the Indian mainland. The objective of this CBO is to protect the life and livelihoods of fishing communities and its basic source - fisheries resources, biodiversity and natural environment. The Organisation has a strong presence in Maharashtra (3 out of 8 office bearers are from Maharashtra)

[2] A quinquennial survey conduct by the Central Marine Fisheries Research Institute, Kochi on behalf of the Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India. Prior to this a similar survey was conducted in 2005.

Department of Fisheries, Government of Maharashtra (DoF-MH)

The DoF-MH holds the responsibility of fisheries management and development within the State and its territorial limits in the sea (12 nautical miles from the shore). The Department is presently functioning as a service Department under the Animal Husbandry, Dairy and Fisheries Secretariat of the Government of Maharashtra. In terms of manpower, budget, spread of offices as well as public contacts, it is one of the smaller sized departments. At the State-level, a Commissioner is the head, while four Deputy Directors supporting him. At the regional level, six Regional Deputy Directors are assisted by District Fisheries Development Officers. However, in costal districts, the post of Assistant Directors (Fisheries) also exists. The Registrar (Cooperatives) and Statistical Officers are deputed from concerned Departments to the Fisheries Department.

The main objectives of the department are:

- *To optimize fish production from available and new water resources by extending the area of operation and by increasing productivity;*
- *To impart educational and occupational training to fishermen and to encourage new entrants to fish farming; and*
- *To ameliorate the socio-economic conditions of fishermen, who form a weaker section of society.*

The activities in marine sector comprise development of infrastructure facilities and post-harvest linkages. There are three fishing harbours in the state- Sassoon Dock and Ferry Wharf in Mumbai and Mirkarwada in Ratnagiri. Further construction of fishing harbours has been taken up at Agrav in Raigad and three jetties each in Raigad and Sindhudurg districts as a part of strengthening fisheries infrastructure. The present exploration is up to 75 meter fathoms. Financial assistance is provided to extend the area of fishing up to 110 fathoms by supporting boats of 14 to 16 m. Assistance for the same is available from the National Cooperative Development Corporation (NCDC). For increasing the present level of fish production in the marine sector, modern technology is also being made available to non-traditional fishing crafts.

The Maharashtra Marine Fishing Regulation Act, 1981 (MMFRA) is the main legislation defining the scope of the Department in fisheries management. The Act provides for powers to regulate, restrict or prohibit certain fishing activities within specified area, prohibition against destruction of fish by explosives or by poisoning of water and against introduction of exotic fish. Prohibiting all fishing in the specified waters for a specified period; prohibiting the use of any gun, spear, arrow or the like in any water, with intent thereby to take or destroy any of the fish therein; regulating the standard of sale of fish spawn, fry, fingerling and yearling; prohibiting the fishing and marketing of fish during closed season, etc. While the Act is broad in its scope, it is based on top-down management approach. There is scope within the Act to encourage stakeholder participation. The Acts holds that while taking any measures, the State Government will "protect the interests of different particularly of those engaged in fishing by use of traditional fishing craft such as catamaran, country craft or canoes," However, the format for accommodating such needs is not defined. The MMFRA in essence is also an intra-sectoral Act and neither shelters the fisheries sector nor encourages the fisheries organizations in entering into active negotiations with complimenting organizations. While the Act directly does not address biodiversity conservation, as mentioned above, there is scope within the Act to introduce necessary measures for conservation.

Fish (Shrimp) farmers

Maharashtra has a long coastline and its 70 creeks provide large areas for brackish water farming. However, the scale is still low. There are four Brackish water Fish Farmers Development Agency (BFDA)[3] with an area coverage of 1539 hectare (ha). About 80 percent of farms are below 5 ha, implying a small-scale production structure. So far about 2015 people are trained under the BFDA.

[3] ***http://www.dahd.nic.in/dahd/WriteReadData/Fisheries%20States%20Profile/Maharashtra.pdf***

Coastal Aquaculture Authority (CAA)

The CAA was established under the Coastal Aquaculture Authority Act, 2005 and notified vide a Gazette Notification dated 22nd December, 2005. It was formed amid criticisms of destructions of mangroves and environmental pollution from coastal aquaculture and is a quasi-judicial body that mainly deals with shrimp farming in the coastal areas of the country. The main objective of the Authority is to regulate coastal aquaculture activities in coastal areas in order to ensure sustainable development without causing damage to the coastal environment. The Authority is empowered to make regulations for construction and operation of aquaculture farms in coastal areas, inspection of farms to ascertain their environmental impact, registration of aquaculture farms, fixing standards for inputs and effluents, removal or demolition of coastal aquaculture farms, which cause pollution, etc. The Authority, being a new entity, has no prior experience in cross-sectoral conservation of coastal resources or being consulted in setting up of MPAs.

Maharashtra Coastal Zone Management Authority (MCZMA)

The MCZMA was constituted by the Ministry of Environment & Forests under Environment (Protection) Act, 1986. The Authority has the power to take necessary measures for protecting and improving the quality of the coastal environment and preventing, abating and controlling environmental pollution in the coastal areas. The Authority deals with environmental issues relating to Coastal Regulation Zone, which may be referred to it by the State Government, the National Coastal Zone Management Authority or the Central Government. The main functions of MCZMA are (i) to take measures for protecting and improving the quality of the coastal environment; (ii) examination of proposals for changes or modification in classification of Coastal Regulation Zone (CRZ) areas; (iii) enquiry into cases of alleged violation of the provisions of the CRZ Notification, 1991 and take appropriate decision under Section-5, 10 & 19 of Environment (Protection) Act, 1986; (iv) to examine all projects proposed in the CRZ areas and give its recommendations, and (v) to identify ecologically, economically and highly vulnerable areas of the coastal zone and formulate area specific management plans.

Maharashtra Pollution Control Board (MPCB)

The MPCB is implementing various environmental legislations in the State, mainly including Water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act, 1981, Water (Cess) Act, 1977 and some of the provisions under the Environmental (Protection) Act, 1986 and the rules framed there under like, Biomedical Waste (M&H) Rules, 1998, Hazardous Waste (M&H) Rules, 2000, Municipal Solid Waste Rules, 2000 etc. The MPCB is functioning under the administrative control of Environment Department of the Government of Maharashtra. Some of the important functions of MPCB are: (i) to plan comprehensive program for the prevention, control or abatement of pollution and secure executions thereof; (ii) to collect and disseminate information relating to pollution and the prevention, control or abatement thereof; (iii) to inspect sewage or trade effluent treatment and disposal facilities, and air pollution control systems and to review plans, specification or any other data relating to the treatment plants, disposal systems and air pollution control systems in connection with the consent granted; (iv) supporting and encouraging the developments in the fields of pollution control, waste recycle reuse, eco-friendly practices etc.; (v) to educate and guide the entrepreneurs in improving environment by suggesting appropriate pollution control technologies and techniques, and (vi) creation of public awareness about the clean and healthy environment and attending to public complaints regarding pollution. In 2007-08, the MPCB with the National Institute of Oceanography (NIO), Mumbai conducted a study on coastal marine and estuarine ecology of Maharashtra[4]. The data on water quality as evaluated from various physico-chemical and biological parameters indicated that the coastal waters (unto 5 km) between Dahanu and Redi were healthy except for a few areas near highly industrialized centres of Mumbai along the north Maharashtra. Over all, most of environmental parameters showed normal values along the south Maharashtra coast compared to the north Maharashtra. The biological productivity

[4] http://mpcb.gov.in/images/pdf/Coastal_MPCB_EXECUTIVE_SUMMARY.pdf

in terms of phyto-pigments and cell counts indicated higher primary production potential for the northern coastal segment as compared to the southern areas of Maharashtra. The generic diversity of phytoplankton was relatively more along the southern than that of the northern coast. Such trend in high primary production along north shore was probably associated with the nutrient inputs through anthropogenic fluxes such as sewage.

Maharashtra Forest Department (MFD)

The MFD is entrusted with the role of conservation and development of the State's forests spread over about 20 percent of its geographical area. The missions of the MFD are towards: (i) transformation of forestry into an important sector in the State's economy; (ii) ensuring stability of the eco-system; (iii) ensuring equity of the various stakeholders in using the forest resources (especially needs of local community); (iv) enhancing productivity of resources; (v) increasing forest cover: (vi) conservation of gene pool and bio-diversity, and (vii) becoming a responsive and transparent organisation.

Table 3 gives a broad description of stakeholders.

Table 3: Stakeholder mapping and analysis

Stakeholder	Size (approx. number of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[5]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
National						
Ministry of Agriculture (Department of Animal Husbandry, Dairying & Fisheries DAHD&F), Government of India		National	Development of marine fisheries, welfare of fish workers, etc.	Neutral	Medium	Positive relation with DOF-MH. No regular interactions with the MOEF.
National Fisheries Development Board (NFDB)		National	Fisheries development.	**Neutral**	Low	Positive relation with the DOF-MH and DAHD&F.
Coastal Aquaculture Authority (CAA)		National	Promoting sustainable aquaculture.	**Neutral**	Medium	Interaction with shrimp farmers and others practising aquaculture in the coastal areas of the country.
Marine Products Export Development Authority (MPEDA)		National	Promoting fisheries trade.	**Neutral**	Low	Interaction with exporters and lager mechanized fishing vessels.
Fishery Survey of India (FSI)		India	Survey and assessment of fish stocks and charting of fishing grounds in the Indian Exclusive Economic Zone (EEZ) and adjoining high seas; Human resources development through training of fishing operatives and meeting faculty requirements of sister institutes and organization.	**Positive**	Low	Positive relation with fishers, Fisheries Department and ICAR Institutes

Stakeholder	Size (approx. number of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[5]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
International Collective in Support of Fish Workers (ICSF)		National	Protecting the rights of fish workers	**Inhibitive (?).** While ICSF supports PAs, it is concerned about the design of PAs and possible loss of livelihoods of fishers.	Medium. Lobbying with DAHD&F and organizing fishermen associations; lobbying with FAO and like-minded organizations.	Positive relation with fisheries associations and FAO.
National Fishworkers' Forum (NFF)/ Maharashtra Machhimar Kruti Samiti (MMKS)			To protect the life and livelihoods of fishing communities and its basic source – fisheries resources, biodiversity and natural environment.	Inhibitive (?). Might be concerned about the loss of livelihoods.	Medium. Lobbying with like-minded organizations. NFF successfully campaigned to modify the prohibition on shark fishing by MoEF in early 2000.	Positive with fisheries organization.
Central Marine Fisheries Research Institute (CMFRI); Central Institute of Fisheries Education (CIFE); National Institute of Oceanography (NIO)			R&D	Positive	ICAR research institutes can provide necessary research inputs to educate stakeholders	Issue-based.
State						
DOF-MH		State	To augment aquatic resource production in the inshore areas by conservation measures, stock enhancement and establishing of artificial reefs, etc., along the coast and to enforce regulatory measures through legislation for conservation of fishery resources both in Inland and Coastal waters.	**Neutral**. So far the DOF-MH either at the State or DAHD&F at the Central level has played very limited role in setting up or management of PAs.	**Medium.** Conservation is in the domain of the Ministry/Department of Environment and Forests.	DOF-MH has contacts with different fishermen groups much owing to their welfare activities. However, so far they have not exercised their control in terms of motivating or influencing the fishermen for bio-diversity conservation.

Stakeholder	Size (approx. number of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[5]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
Site						
Association of artisanal fishers		Site/District	Welfare of members	**Inhibitive**	Low	Conflict with motorized and mechanized fishing vessels. However, they also work as crew in these categories of vessels. The interaction of this group with the government officials is also minimal and issue-based.
Motorized boat owners		Site/District	Welfare of members	**Inhibitive**	Medium	Conflict with mechanized vessels. They also have a better working relationship with the Government as this group usually comprises the beneficiaries of Government schemes.
Mechanized boat owners		Site/District/state	Welfare of members	**Inhibitive**	High	Conflict with traditional and motorized fishing vessels.
Fish traders/ money lenders		Site/District	Individuals	**Inhibitive**	High. They may influence fishermen.	Mostly interact with fishermen only.
Sindhudurg Sanchrajeevi Rampan Machhimar Utapada Co-operative Society		State/Malvan		Positive/Inhibitive. There are concerns about livelihood issues in PAs.		
Malvan Taluka Machhimar Shramik Sangh		State/Malvan		Positive/Inhibitive. There are concerns about livelihood issues in PAs.		

Stakeholder	Size (approx. number of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[5]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
Sindhudurg Zilla Wayapari Mahasangh		State/Malvan		Positive/Inhibitive. There are concerns about livelihood issues in PAs.		
Stakeholder	**Size (approx. number of organizations or individuals)**	**Geographical area of influence**	**Mandate, role, responsibility and function in relation to coastal and marine areas and PAs**	**Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[7]**	**Power to influence management of coastal and marine PAs, specific areas of influence**	**Relationship to other stakeholders, and the nature of the relationship**
Other sectors that have a major influence on establishment and management of coastal and marine protected areas. Only most relevant stakeholders at relevant level (Supra National/ National/ regional/ State/ site) have been described below						
Supra National						

Stakeholder	Size (approx. number of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[5]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
UNDP/GEF	-	Global	UNDP is executing a project in Sindhudurg, Maharashtra 'Mainstreaming Coastal and Marine Biodiversity into Production Sectors in Sindhudurg Coast in Maharashtra'. The project, in partnership with the Ministry of Environment and Forests and financed by the Global Environment Facility (GEF), aims to mainstream biodiversity conservation into Sindhudurg coastal district's production sectors. It also seeks to generate awareness among local communities on biodiversity conservation amidst the threat of unsustainable fishing practices, rising pollution from fishing vessels and maritime traffic in the region.	**Positive**	High	Positive

World Bank		Global	World Bank earlier during 1992-2000 implemented a Forestry Project in Maharashtra with the following objectives: (a) Increase in productivity on forest and wastelands; (b) Increase community participation to improve rural incomes and equity, and raise biomass self-sufficiency; (c) Conserve biodiversity;(d) Improve sector management.	Positive. However, the modus operandi may differ with GIZ.	High. World Bank is a major lender to many State Governments. Proposed PAs may also come under areas of work of the World Bank	World Bank is mostly working with policy-makers and media. The organization is related to other stakeholders through project partners.
National						
Ministry of Environment and Forest, GoI		National	Promoting conservation of biodiversity as per CBD convention and other National and International regulations	**Positive**	High	Conflict with resource users.
National Biodiversity Authority			To promote objectives of CBD	**Positive**	Low.	Low field presence.

Indian Coast Guard		National	The Coast Guard is the principal agency for enforcement of provisions of all national enactment in force in the maritime zones of India.	**Positive**	Medium	Good
State						
MFD		State	Sustainable forestry	**Positive**	High	Conflict with resource users.
MCZMA		State	Sustainable coastal development.	**Positive**	High	Not known
MPCB		State	Pollution control	**Positive**	Not known	Not known
Site						
Village Panchayats This includes both political and community-based Panchayats. They play important role in designing allocation and access rules and mediate during conflicts.		Site/district/state	Promotion and protection of interest of related groups	**Positive**. However, there are concerns for livelihoods.	High	Good relation with fishermen organizations

2.3 Capacity Gap Analysis

An overview of the major capacity gaps *vis-à-vis* enabling environment, cross-sector and cross-stakeholder cooperation, organizations and individuals in the fisheries sector of Maharashtra.

Table 4: Problem analysis and capacity gap analysis

Dimensions of Capacity (one per line)	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation *vis-à-vis* dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
Enabling Environment									
Policy implementation									
The Maharashtra Marine Fishing Regulation Fisheries Act, 1981 (MMFRA)	The MMFRA provides the legal framework for fisheries management. The objective of MMFRA is conflict resolution among different user groups and prohibiting harmful fishing practices.	High. The Act provides for time and area closure and also has provisions for use of fishing gear. These clauses in combination can be used for creating a closed area from fisheries perspective.	DoF-MH	• No prior experience in marine conservation. • Understanding and communicating ecosystem implications of the fisheries management measures. • Creating a voluntary environment for implementation of the Act. • Information management and awareness building.	High	• Officials are only aware of the provisions of the Act but not their implications in larger ecosystem setting. • Officials are aware about the commitments of the nations as party to different international agreements and their implications. • Necessary skills are there to communicate the management needs to the fishing communities and taking them on board.	• The provisions of the Act need to be understood from an ecosystem perspective. • Commitments of the nation in international agreements and their implications for the state needs to be understood. • Playing the role of a facilitator to engage fishing communities in fisheries mangement needs to be developed.	• Officials are aware of the legal provisions particularly of the acts specefic to the fisheries sector. However, they are unaware of the related provisions of other Acts and especially provisions of international agreements. • Relationship between the fishing community and the officials is	• Officials need to be updated about cross-sectoral and overarching Laws and Acts including internationa l agreements. • Outreaching and communicat ion skills need to be developed.

Dimensions of Capacity	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation *vis-à-vis* dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
								defined by job specifications.	
MMFRA	Do	Do	Fishers and their organizations	While fishers are aware and partly complying to the provisions of the Act, it is not embedded in their business practices which can be broadly defined as 'animal spirit'	High	Volunary and effective implementation of the Act.	Fishers understand the importance of the Act from sustainability perspective.	Fishes are aware of some provisions of the Act but not exactly guided by the Act.	Awareness building is required on why the Act is necessary for sustainability of fisheries and why sustainability of fisheries is important for their business.
Coastal Regulation Zone Notification, 2011	To ensure livelihood security to the fisher communities and other local communities, living in the coastal areas, to conserve and protect coastal stretches, its unique environment and its marine area and to promote development through sustainable manner based on scientific principles taking	High	MCZMA	Lack of understanding of ICZM concepts	High	The CRZ Notification is understood as a building block of ICZM framework.	Understanding of ICZM framework and importance of fisheries sector.	An instrument pertaining to conservation of coastal zone.	Having a holistic view on ICZM and efficacy of the Notification towards this.

Dimensions of Capacity (one per line)	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation *vis-à-vis* dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
	into account the dangers of natural hazards in the coastal areas, sea level rise due to global warming								
		High	DoF-MH	Lack of understanding of ICZM concepts	High	The CRZ Notification is understood as a building block of ICZM framework	Understanding of ICZM framework and importance of fisheries sector.	An instrument pertaining to conservation of coastal zone.	Having a holistic view on ICZM and efficacy of the Notification towards this.
		High	Fishers and their organizations	Lack of awareness about the Act	High	Fishers and their organizations are aware about their rights provided under the Notification	Understanding of notification and basic concepts of ICZM.	-	Understanding of notification and basic concepts of ICZM.
Coastal Aqauculture Authority Act, 2005	For setting up of Coastal Aquaculture Authority with a mandate to ensuring sustainable aquaculture	Low	Coastal Aquaculture Authority	Destruction of mangroves for construction of shrimp farms, catching of mother shrimps through trawling.	Medium	Awareness about growth of aquaculture and how it may impact coastal environment.		-	
Coastal Aqauculture Authority Act, 2005	For setting up of Coastal Aquaculture Authority with a mandate to ensuring sustainable aquaculture	Low	Shrimp farners	Rights and duries of fish farmers under the Act	Medium	Voluntary implementation of the Act while developing and running farms.	Understanding of the Act and basic concepts of ICZM	Understanding of requirements to set up a farm	Like fisheries, shrimp farmers should be aware about impact of farming in coastal zone including

Dimensions of Capacity (one per line)	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation *vis-à-vis* dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
									possibility of allien invassion.
Rural Emplyment Guarantee Schemes	To generate employment in rural areas and to develop entrepreneurial skill and attitude among rural unemployed youth.	High	Village Panchayat	-	-	-	-	-	-
Rural Emplyment Guarantee Schemes	To generate employment in rural areas and to develop entrepreneurial skills and attitude among rural unemployed youth.	High	Fishermen organizations	Fishermen are not aware about the scope of the scheme in looking for additional/ alternative options.	High	Fishermen are aware about the scope of the scheme in looking for additional/ alternative options.	Awareness building on various government schemes for rural sector.	Awareness on fisheries-specefic schemes.	Awareness and training programme on using applicable developmental schemes of the government.
Wildlife Protection Act, 1972	The Act provides for the protection of wild animals, birds and plants; and for matters connected therewith or ancillary or incidental thereto.	High	Ministry of Environment and Forests	Lack of consultation with stakeholders while implementing the Act and during creation of PAs under the Act.	High	Consultative mechanism to implement the Act needs to be in place.	Awareness creation on needs of consultation.	Benefits of consultation are not realized.	Legal and implementational gaps exist to ensure consultation.
Wildlife Protection Act, 1972	The Act provides for the protection of wild animals, birds and plants; and for matters	High	DoF-MH	Lacks understanding	Medium	Officials can advise fishers/ forestry officials on scope and implementation of the Act.	Training programme on all relevant Acts.	-	-

Dimensions of Capacity (one per line)	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation *vis-à-vis* dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
	connected therewith or ancillary or incidental thereto.								
Wildlife Protection Act, 1972	The Act provides for the protection of wild animals, birds and plants; and for matters connected therewith or ancillary or incidental thereto.	High	Indian Coast Guard	-	-	-	-	-	-
Organizational and network capacity									
Better intra-departmental and inter-departmental communication	To implement fisheries policies and liaison with fishers and sister organizations	High	DOF-MH	Relation with fishers mostly limited to implementation of welfare schemes.	High	The Department having the required clout in fisheries.	Image-building; self-assertion	-	Image-building; self-assertion
	To ensure interest of its members.	High	Fishers	Lack of leadership and vision	Medium	Fishers Organizations are functioning as trade union and civil societies to ensure well-being of members and the resources.	Leadership development; skills in organizational management and communication with media and other agencies/organizations.	-	Leadership development; skills in organizational management and communication with media and other agencies/organizations.

Dimensions of Capacity (one per line)	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation *vis-à-vis* dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
	NFDB has the mandate to co-ordinate activities of various Ministries/Department towards fisheries and aquaculture development.	Medium	NFDB, DOF-MH; MFD	NFDB is a fairly new organization and lacks prior experience in coordinating.	Low	NFDB officials are aware about ecosystem approach and have better coordination skills.	Training programme in ecosystem approach, project management and coordination.	-	Training programme in ecosystem approach, project management and coordination.
Cross-sector cooperation capacities									
Better coordination between forestry and fisheries departments	To communicate exogenous issues in fisheries with other sectors and ensuring their cooperation.	High	DOF-MH; MFD; MCZMA	Lack of understanding of issues of other sectors.	High	Each concerned Department is aware about issues in other sectors and implication of those issues in their own sector.	Image-building; self-assertion; awareness and knowledge on activities of other departments; negotiation skills.	-	Image-building; self-assertion; awareness and knowledge on activities of other departments; negotiation skills.
Creating media awareness	To create awareness among tertiary stakeholders and integrating primary stakeholders on issues concerning fisheries sector.	High	DOF-MH; MFD; MCZMA	Problems in identifying 'news-worthy'issues and presenting activities in a media-savvy manner.	High	Skills in identifying 'news-worthy'issues and presenting activities in a media-savvy manner.	Training in preparation of briefs, maintaining contact with media.	-	Training in preparation of briefs, maintaining contact with media.
Cross-stakeholder cooperation:									
Better coordination between forestry and fisheries									

Dimensions of capacity (one per line)	Function / purpose	Level of importance	Stakeholders involved	What are the related problems	Level of complexity	Target situation *vis-à-vis* dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	**existing**	**gaps**
Creation of a common platform for dialogue between environment (including forestry) and fisheries secor.									
Individual competence									
Communicating scientific findings	To better communicate scientific findings to common people.	Medium	Fisheries and environmental scientists	Scientific finding are closed within the concerned circle.	Medium	Policy-oriented researches are undertaken and findings are communicated to stakeholders in non-technical language.	Identifying policy issues; non-technical writing and presentation of scientific findings.		Identifying policy issues; non-technical writing and presentation of scientific findings.
Improving extension services	Improving linkages bewteen primary stakeholders and officials and creation of a feedback process.	High	GDF; GFE	Extension services are not designed to deal with community mobilization and leadership creation.	Medium	Extension activities are used for creating a platform for conservation and related issues.	Identification of extension needs in the new context, designing of strategy and necessary training.	Conventional extension (usually informing about government schemes).	Identification of extension needs in the new context, designing of strategy and necessary training.
Leadership skills in fisheries organizations	To enable fisheries organisation to look beyond immediate issues.	High	Fishers	Lack of leadership skills in fisheries organizations.	High	Effective leadership developed at fisheries organizations and cooperatives.	Training programme in visioning, organisation management and community mobilization.	-	Training programme in visioning, organisation management and community mobilization.

3.1 Recommendations for Possible HCD Interventions:

Main gaps identified for officials (Fishery/Forestry) are lack of understanding of the National Laws having bearing on fisheries sector from an ecosystem perspective. Especially for fisheries officials, their qualification for appointment and post-recruitment departmental training programmes does not include familiarization with the Acts and Laws other than the immediate Acts. There is also lack of awareness on international binding and non-binding agreements, to which India are a party. Therefore, the possible HCD interventions include development of a curriculum for a refresher course in national and international laws and their larger implications. For sustainability, this curriculum is needed to be adopted in the Departmental training facilities. The fishers and their organizations are also lacking in these areas. However, for them a targeted awareness programme could have a better reach. There is also a need to develop networking and leadership capabilities among fishery and forestry officials aiming at intra-departmental; inter-departmental and department- community interaction.

Table 5: Recommendations for possible HCD interventions

Target situation *vis-à-vis* dimension of capacity	Capacity gaps	Possible intervention	For whom (target group)	Resource organizations/ persons (providers)	Expected impact	Expected synergies with other dimensions
Officials are aware of the provisions of the MMFRA, other relevant Acts and international agreements and its implication in larger ecosystem setting.	Officials need to be updated about cross-sectoral and overarching Laws and Acts, including international agreements.	1. Review of the curriculum for training of fisheries officials; 2. Development of a curriculum on legal settings in fisheries; 3. Incorporating legal settings in fisheries in existing curriculum; 4. Organizing a 5-day training programme for existing staff.	**DoF-MH**	Ratnagiri Fisheries College/State Fisheries Training Institutes/Wildlife Institute of India/ CMFRI/ Central Institute of Fisheries Education (CIFE)	Improved awareness and better implementation of fisheries provisions	Better linkages with ICZM and biodiversity conservation.
Necessary skills are there to communicate the management needs to the fishing communities and taking them on board.	Outreaching and communication skills need to be developed.	1. Review of the curriculum for training of fisheries officials;	**DoF-MH**	IIM-A/NIRD	Improved communication and management skills	Better coordination with fishers and improved extension services.

Target situation *vis-à-vis* dimension of capacity	Capacity gaps	Possible intervention	For whom (target group)	Resource organizations/ persons (providers)	Expected impact	Expected synergies with other dimensions
		2. Development of a curriculum on legal settings in fisheries; 3. Incorporating legal settings in fisheries in existing curriculum; 4. Organizing a 5-day training programme for existing staff.				
Volunary and effective implementation of Acts by the fishers.	Awareness building is required on why the Acts are necessary for sustainability of fisheries and why sustainability of fisheries is important for their business.	Organizing location-specefic awarness camp cum workshop	**Fishers/ NGOs**	Ratnagiri Fisheries College/State Fisheries Training Institutes/Wildlife Institute of India/ CMFRI/ CIFE /FSI/BNHS/UNDP	Easeness in implementation/ improved cooperation	Better linkages with stakeholders.
The CRZ Notification is understood as a building block of ICZM framework.	Having a holistic view on ICZM and efficacy of the Notification towards this.	State-level workshops	KSCZMA; DoF-MH, Department of Forests/IC	Ratnagiri Fisheries College/State Fisheries Training Institutes/Wildlife Institute of India/ CMFRI/ CIFE /FSI/BNHS/UNDP.	Better implementation of CRZ	Easeness in management of MPAs
Organizational and network capacities						
Optimizing organizational and networking capacity	Image-building; self-assertion; awareness and knowledge on activities of other departments; negotiation skills.	1. Review of the curriculum for training of forestry/fisheries officials; 2. Development of a curriculum on legal settings in fisheries/ICZM;	DoF-MH, Department of Forests		Improved organizational capacity and management.	

Target situation *vis-à-vis* dimension of capacity	Capacity gaps	Possible intervention	For whom (target group)	Resource organizations/ persons (providers)	Expected impact	Expected synergies with other dimensions
		3. Incorporating legal settings in fisheries/ICZM in existing curriculum; 4. Organizing a 5-day training programme for existing staff.				
Cross-sectoral and cross-stakeholder cooperation						
Better coordination between forestry and fisheries departments	Image-building; self-assertion; awareness and knowledge on activities of other departments; negotiation skills		DoF-MH, MDF, MCZMA	IIM-A/NIRD/IRMA	Imporved branding and scope of taking responsibilities.	
Skills in identifying 'news-worthy' issues and presenting activities in a media-savvy manner	Training in preparation of briefs, maintaining contact with media					
Individual						
Policy-oriented researches are undertaken and findings are communicated to stakeholders in non-technical language.	Identifying policy issues; non-technical writing and presentation of scientific findings.	Training programme on policy oriented research and dissemination.	CMFRI,CIFE,JFC	GIZ/FAO/BOBP-IGO/WII	Better scientific communication	Overall improvement in understanding the need for conservation.
Extension activities are used for creating a platform for conservation and related issues.	Identification of extension needs in the new context, designing of strategy and necessary training.	Training programme	DoF-MH; MDF	GIZ/FAO/BOBP-IGO/WII	Improve extension	Overall improvement in understanding the need for conservation.

Target situation *vis-à-vis* dimension of capacity	**Capacity gaps**	**Possible intervention**	**For whom (target group)**	**Resource organizations/ persons (providers)**	**Expected impact**	**Expected synergies with other dimensions**
Effective leadership developed at fisheries organizations and cooperatives.	Training programme in visioning, organisation	Training programme on management	Fisheries organisations/ coopertive	NIRD/IRMA	Improved organisation capacity	Improved particiaption in dialogue process.
	management and community mobilization.					

3.2 Training capacities in/for the state:

By involving these organizations during the delivery of HCD, the sustainability of further training is safeguarded, and mainstreamed at the local level.

Table 6: Description of resource organizations/ networks/ individuals (providers)[8]

Name of organization	Type of capacity-strengthening programmes they are engaged in?[9]	Target group	What is their thematic focus?	Geographical focus[10]	Information on the existing training/ capacity building networks they are part of (with reference to the 4 project states)	Support required by the organization itself to sustain its capacity building measures to the other stakeholders			
						Curriculum development	Training system	Faculty development	others
Supra National									
BOBP-IGO	Awareness building, Technology diffusion	Fishers/ Fisheries officials	Sustainable fisheries	South Asia					
National									
CMFRI	Fisheries research, additional/ alternative employment	Fishers/Fisheries/Forestry officials	Fisheries R&D	India	No dedicated training programme	X	X	Available	
CIFE	Fishing technology, fish processing, value addtion, additional/ alternative employment	Fishers/Fisheries officials	Fisheries R&D	India	No dedicated training programme	X	X	Available	
IIM-Ahmedabad (Centre for Management of Agriculture)	The Centre conducts short duration Management Development Programmes (MDPs)	Senior officials	Management	India/World	No dedicated training programme	X	X	Available	

Name of organization	Type of capacity-strengthening programmes they are engaged in?[9]	Target group	What is their thematic focus?	Geographical focus[10]	Information on the existing training/ capacity building networks they are part of (with reference to the 4 project states)	Support required by the organization itself to sustain its capacity building measures to the other stakeholders			
						Curriculum development	Training system	Faculty development	others
National Institute of Rural Development (NIRD)	NIRD is a school for practicing managers engaged in rural development. It also trains functionaries from the Government, development banking institutions and community based organizations to help carry forward and spread the message of all-round rural development.	Fisheries and forestry officials/ community groups/NGOs	Management/ Administratio n	India	No dedicated training programme	X	X	Available	

Name of organization	Type of capacity-strengthening programmes they are engaged in?[9]	Target group	What is their thematic focus?	Geographical focus[10]	Information on the existing training/ capacity building networks they are part of (with reference to the 4 project states)	Support required by the organization itself to sustain its capacity building measures to the other stakeholders			
						Curriculum development	Training system	Faculty development	others
Institute of Rural Management Anand (IRMA) - MDP	MDPs constitute one of the major activities of IRMA, which addresses the in-service training needs of the executives and managers working in the co-operatives, not-for-profit organisations, and government and semi-government organisations engaged in rural development. So far, IRMA has conducted over 675 programmes with an enrolment exceeding approximately 14500 personnel.	Fisheries and forestry officials/ community groups/NGOs	Management/ Administration	India	No dedicated training programme	X	X	Available	

Name of organization	Type of capacity-strengthening programmes they are engaged in?[9]	Target group	What is their thematic focus?	Geographical focus[10]	Information on the existing training/ capacity building networks they are part of (with reference to the 4 project states)	Support required by the organization itself to sustain its capacity building measures to the other stakeholders			
						Curriculum development	Training system	Faculty development	others
State									
Ratnagiri Fisheries College	Fisheries education	Students/fishers	Fisheries R&D	Maharashtra	The College of Fisheries, Ratnagiri is going to conduct a series of capacity building programmes for the members of the 30 Fishermen Cooperative				
					Societies in Sindhudurg pertaining to Sustainable marine fisheries resource use and management including implementation of FAO's CCRF, EAF and implementation of Maharashtra Marine Fisheries Regulations.				
Site									
Kirat Trust	Turtle conservation activities in Vengurla block of Sindhudurg District								

4.1 Annexes

Detailed list of literature cited

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PART - 3

Karnataka State Report

Disclaimer

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CONTENTS

List of Accronyms

BOBP-IGO:	Bay of Bengal Programme Inter-Governmental Organisation
CAA:	Coastal Aquaculture Authority
KCZMA:	Karnataka Coastal Zone Management Authority
CIFE:	Central Institute of Fisheries Education
CMFRI:	Central Marine Fisheries Research Institute CRZ:
	Coastal Regulation zone
CSO:	Civil Society Organisations
DAHD&F:	Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, Government of India
DEF-KR:	Department of Environment and Forests, Government of Karnataka
DoF-KR:	Department of Fisheries, Government of Karnataka
EAF:	Ecosystem Approach to Fisheries
FSI:	Fishery Survey of India
GEF:	Global Environment Facility
HCD :	Human Capacity Development
ICG:	Indian Coast Guard
ICSF:	International collective in support of fish workers
ICZM:	Integrated Coastal Zone Management
IIM-A:	Indian Institute of Management, Ahmadabad (Centre for Management of Agriculture)
IRMA:	Institute of Rural Management, Anand
IUCN:	International Union for Conservation of Nature
KCFF:	Karnataka Co-operative Fisheries Federation, Mysore KFDC:
	Karnataka Fisheries Development Corporation, Mangalore
KMFRA:	Karnataka Marine Fisheries Regulation Act of 1986
KSPCB:	Karnataka State Pollution Control Board
MDP:	Management Development Programmes
MFF:	Mangroves for the Future
MNP:	Marine National Park
MOEF:	Ministry of Environment and Forest, Government of India
MPA:	Marine Protected Area
MPEDA:	Marine Products Export Development Authority
NBA:	National Biodiversity Authority
NFDB:	National Fisheries Development Board
NFF:	National Fishworkers' Forum
NGO:	Non-Governmental Organisations
NIRD:	National Institute of Rural Development, Hyderabad
REGS:	Rural Employment Guarantee Schemes
TU:	Trade Unions
UNEP:	United Nations Environmental Programme UTs:
	Union Territories
WBG:	World Bank Group
WII:	Wildlife Institute of India
WPA:	Wildlife Protection Act, 1972

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SUMMARY

Conservation of critical ecosystem comes under the purview of the Ministry of Environment and Forests, Government of India (MOEF). Traditionally, Fisheries Officials either in the provincial or the union government are concerned only with conservation of fishery resources from a perspective of achieving Maximum Sustainable Yield (MSY) in fisheries.
The existing fisheries-related laws and acts and allocation of business rules at provinces or union level do not give much leverage to the fisheries officials for conservation-related activities. However, as recently the Ecosystem Approach to Fisheries (EAF) is gaining currency, fisheries officials are becoming more aware about the conservation needs. On the other hand, for fishers, conservation is usually equated to loss of livelihoods and is, therefore, unpopular. Although when consulted and educated properly, fishers have supported conservation measures. One such example is time closure under the Karnataka Marine Fisheries Regulation Act, 1986. In fisheries science, raising awareness of the fishers and other stakeholders were never a priority and fisheries scientists by and large also lack communication skills with the media and stakeholders at large.

In view of this, mainly three types of HCD are needed. First, improving knowledge of stakeholders especially fisheries officials and fishermen on concerned national and international laws and agreements; Second developing managerial skill including organizing people and institution building for both fisheries officials and fishers, and third, improving communication and networking, especially targeting fisheries scientists and fisheries officials.

While, there are a large number of institutions involved in fisheries research and extension, as of now, no organisation has any dedicated programme to meet such needs. Therefore, providing these HCD programmes need curriculum development and institutionalization. However, it is unlikely that without assured funding support such programmes will be institutionalized.

1. INTRODUCTION

1.1. CURRENT STATUS OF COASTAL AND MARINE BIODIVERSITY IN KARNATAKA

Karnataka is located in the southwest coast of India and is bordered by the Arabian Sea to the west, Goa to the northwest, Maharashtra to the north, Andhra Pradesh to the east, Tamil Nadu to the southeast, and Kerala to the southwest. Karnataka state is situated between 11° 31' and 18° 45' N lat. and 74° 12' and 78° 40' E longitude and lies in the west-central part of peninsular India. More than one dozen rivers originating from the Western Ghats open into the Arabian Sea along the Karnataka coast, rendering the inshore waters rich in nutrients and plankton. Netravati, Gurupur, Gangoli, Sitanadi, Aghanasini, Kali and Sharavati are the important rivers. The estuaries formed by these rivers are important from the ecological and biological points of view. There are 26 estuaries with more than 70 000 ha water spread area and 8 000 ha of brackish water area, making the 3 coastal districts of Karnataka very rich in marine, estuarine and riverine biodiversity. Karnataka has a coastline of about 300 km starting from Talapadi in the south to Karwar in the north.

Distribution of marine algae in the littoral zone of the entire Karnataka coast was first studied in detail by Agadi (1985) and is found to comprise 43 species. Ecology of tidal pond in Mavinahole estuarine creek, Karwar was studied in 1979 by Bopaiah and Neelakantan (1982). NAAS (2003) reported 39 species of seaweeds from Karnataka coast, whereas Untawale *et al.* (1989) observed 65 species belonging to 42 genera from the northern Karnataka coast alone. Venkataraman and Wafar (2005) listed 39 species of seaweeds from Karnataka coast. Through a comprehensive study, Kaladharan *et al.* (2011) reported that among the 78 species of commercially important seaweeds belonging to 52 genera and 28 families and occurrence of red seaweed *Gracilariopsis lemaneiformis* in certain estuarine areas indicates the possibility of its farming in the estuary. There are 14 coral species and 4 sponge species found in this region such as *Dendrophyllion sp*.

Species such as *Turbinana sp.*, *Goniastrea pectinata,* small gaint clams (*Tridacna maxiona*) are protected under the Wildlife Protection Act, 1972 (WPA 1972). There are about 62 phytoplankton species; 78 species of sea weeds (*Sangassam ilicifolium*), 2 species of sea grass, 115 zooplankton species such as *Acartia clausii*, *Acrocalanus gibber, Euphausia diomedeae, Stylocheiron armatum,* etc observed along the Karnataka coast. Apart from these, 234 species of Molluscs out of which 3 are threatened such as *Tridacna maxima, Lambis chiragra* and *placenta*, 33 species of shrimps were first recorded from Karnataka coast. Recently, 103 species of crabs, 5 species of star fish, 2 species of sea urchins, one species of sea cucumber have been observed along the coast. Also 390 marine fish species, 3 species of sea turtles, 4 species of whales and 4 species of dolphins are commonly seen along the Karnataka coast. Existence of rich fringing coral reef ecosystem surrounding the Nethrani Island can also be observed (Prajapati, 2010).

The Netrani Island is located nearly 19 km away from the main land off Murdeshwar. The sea depth surrounding this island ranges between 6 to 40 m, with water visibility of 15-30 m. The Island has existence of a rich fringing coral reef ecosystem around it, which is very rich in biodiversity with nudi branch, schools of blue trigger fish, fusiliers, groupers, parrot fish, gobies, lion fish and scorpion fish. In a survey conducted during 2005-2006, a total of 89 coral associated fishes were recorded from the area in which 27 species and 4 Genera were new records from the Indian coast. Out of the fishes studied, four fish Genus were reported for the first time from Indian coast. Out of the nine grouper fish species identified from this island, two species such as *Cheilinus undulatus* (endangered) and *Rhincodon typus* (vulnerable) are included in the IUCN red list.

The Survey identified 14 coral species, 4 sponge species, 15 species of bivalves, 48 species of gastropods and 8 species of nudibranchs from this island. Small giant clams (*T. maxima*), which is protected under the WPA, 1972 and included in the IUCN Invertebrate Red Data Book as 'Lower Risk: Conservation Dependent' species, was observed from this area. Two species of Palinurid lobsters *Panulrus polyphagus* and *P. versicolor* and one species of shrimp, *Rhynchocinetes durbanensis*, belonging to family *Rhynchocinetidae* were also recorded from the area.

1.2. Drivers and Pressures for loss of coastal and marine biodiversity in the State

Like most other coastal States/Union Territories (UTs) in India, fisheries in Karnataka also form one of the vital sources of food security. The marine fisheries production in the State has been recorded as 390 178 tonnes in 2011, which is steadily increasing (***Fig.1***). The commercially important fishes in the sea around Karnataka are soil sardine, mackerel, catfishes, penaeid prawns, sharks, seer fishes, anchovies and other clupeids, squill and squids. Karnataka has a shelf area of 25 000 sq. km of which 7 000 sq. km with water depth up to 50 m is extensively exploited for marine fisheries.

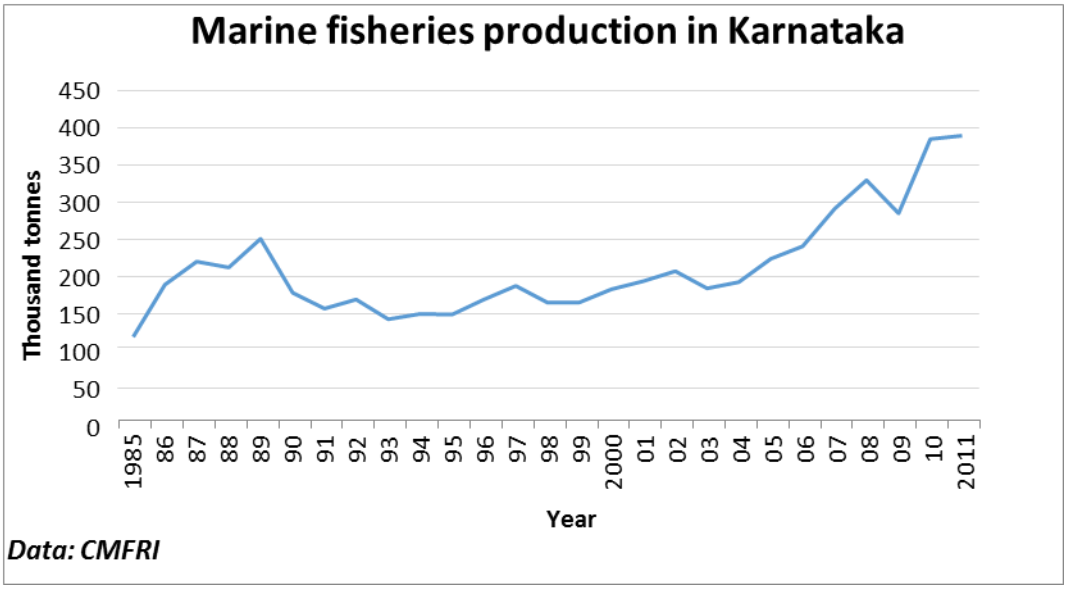

Figure 1: Marine fisheries production in Karnataka

The coastal zone of Karnataka is one of the better-developed geographical areas of the State with high degree of economic development and density of population. The settlements in the coastal region consist of 22 urban agglomerations and 1 044 villages. The anthropogenic pressure of the region can be attributed to agricultural activities, aquaculture, fish landing and processing, port maintenance, mining for lime shell, bauxite and silica sand and coir retting. The population density of Mangalore and Udupi taluks are 1 048 persons per sq. km and 572 persons per sq.km respectively. Anthropogenic pressure is likely to increase in the urban areas of Mangalore and Udupi regions. The Karnataka coast is subjected to three types of erosion occurring along the open beaches, mouths of rivers/estuaries and the tidal reach of rivers causing considerable loss of land, vegetation and revenue.

The State contributes about 10 percent of the total marine fish landing in the country and is increasing for last three years. As per the estimate provided by the CMFRI (2012), major catches comprise oil sardine (25.2%); threadfin breams (12.8%); mackerels (7.1%); scads (6.5%) and ribbonfish (6.2%). Mechanized sector (trawlers, purse seiners, etc.) landed about 88 percent of the catch in 2012 of which trawlers (multi-day and single-day) landed about 72 percent of the total catch.

The concentration of industries and the direct or indirect disposal of industrial effluents and municipal drains to estuaries, rivers or near shore cause water pollution. The haphazard dumping of waste from fish landing centres, processing of fish catch and the large number of ice factories (about 200) also cause water pollution. Further, improper solid waste disposal and inadequate treatment of sewage is also causing pollution.

The estuarine areas of Netravathi and Gurpur rivers are considerably affected by the discharge of sewage from Mangalore city. Coastal erosion is caused due to both natural processes and anthropogenic interventions. Anthropogenic interventions such as coastal protection structures, breakwaters, dredging in harbours, silt traps/dams in upstream portions of rivers, removal of sand from the beaches, etc., often hinder the natural process beyond resilience limit and aggravate the problem of erosion. The stress on marine fisheries is mainly due to the confinement of fishing activity in the near shore zone up to a depth of 50 meters. The increased use of trawl nets further accentuates degradation of fishery. Trawling has resulted in disproportionate destruction of non- target groups along with juveniles and sub adults of desirable fishes and other benthic organisms. Most of the by catches are of low economic value, but are vital for the food web. The discarded by catch often includes low valued crustaceans, anemones, sponges, echinoderms, jelly fishes, etc.

1.3. Protected status in the State *vis-à-vis* coastal and Marine Protected Areas

There are 100 PAs (10 in main Indian coast and 90 island PAs in Andaman & Nicobar and Lakshadweep islands) which constitute boundaries with seawater or partly contain some marine environment. The total area of these PAs is 1 745 440 ha, which contribute to marine biodiversity conservation but these are not included in the MPAs. Goa, Karnataka, Kerala, Daman Diu, Dadara and Nagar Haveli have coastal ecosystems but none of them have constituted MPAs, although proposals have been submitted for some of the area by the respective Governments. Honavar (2 000 ha), Kundapur (100 ha) and Sand Rock Coast (200 ha) in Karnataka should be considered for declaration as marine sanctuaries (Singh, 2003)

2. Situation analysis

2.1. Stakeholder Analysis

The major stakeholders in the fisheries sector are the fishers and fisheries officials. However, in view of multiple uses of coastal area and keeping in view the conservation of biodiversity, other governmental agencies such as Ministry/Department of Environment and Forests are playing a major role. As mentioned earlier, coastal belt in Karnataka have high industrial concentration and hence tackling pollution is a major challenge. Other than these state and national level players who are engaged in exploitation or administration of coastal zones in Karnataka are also having impact on fisheries sector. Coastal aquaculture is also a developing activity along the coastline. Although, such

multiple uses denote a complex inter-dependent framework, in reality cross-sectoral interaction is very low. Especially, at administration level, although platform exists for cross-sectoral dialogue, it is limited in actual practice. ***Box 1*** and ***Figure 2*** give a mapping of selected stakeholders active at the state level. In the figure location of the bubble is determined by their dependency on coastal and marine biodiversity and interest (positive or negative) in setting up of MPA. There sizes are function of their influence in positively or negatively affecting the decision to set up an MPA. The magnitudes of various dimensions of a particular stakeholder are constructed from mandates and personal understanding of the authors. . It is seen that the 'state of the resources', whether good or bad, is not usually considered as a factor determining the career graph of the officials concerned. Career- related dependency is bit higher for forestry officials as there are other incentives (+ve/ - ve) such as media reports, etc which can motivate their actions.

Box 1: Axiomatic scoring of selected stakeholders for illustrative purpose

Stakeholder	Dependency	Interest	Influence
Fishers	10	8 (-)	5
Fish farmers	5	3	5
Other Industries	3	8 (-)	9
Fisheries officials	4	5	6
Foresters	6	10	9
KSPCB	1	5	8
KSCZMA	2	8	7

Note: The interest could be negative or positive.

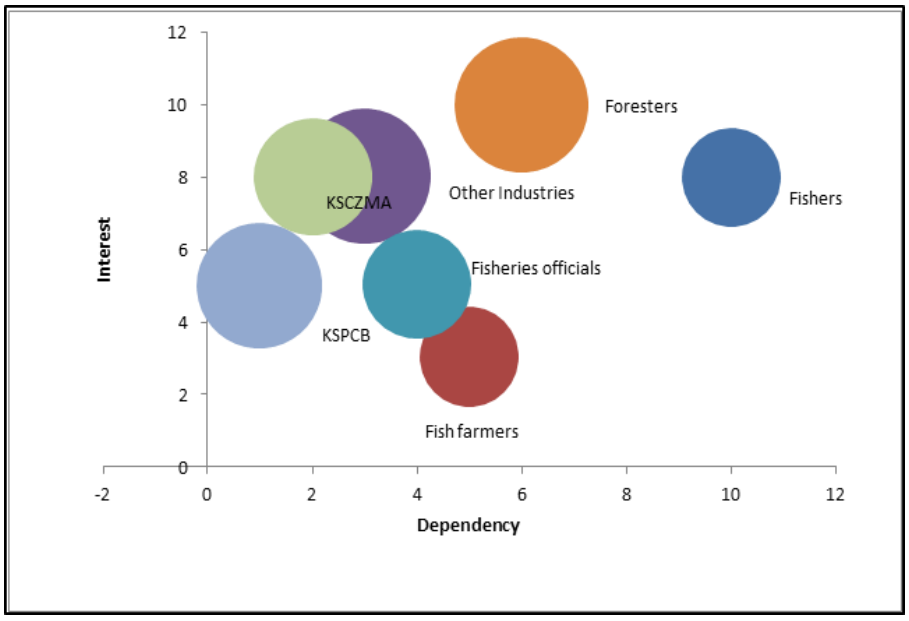

Figure 2: Mapping of selected stakeholders for conservation of coastal and marine biodiversity in Karnataka

Description of stakeholders

Fishers:

As per the 2010 Marine Fisheries Census, the total marine fisher population of Karnataka is 167 429, with a family count of 30 713. The fisher female to male ratio is 916 for 1000 males and the average family size is 5.5. About 93 percent of the total fisher population is traditional. There are 144 marine

fishing villages, with the maximum number in Uttar Kannada district (86) followed by Udupi (41) and Dakshina Kannada district (17). The total number of fish landing centre is 96 of which 51 are in Uttar Kannada district followed by Udupi (31) and rest from Dakshina Kannada district. The literacy is 64 percent and 77 percent families are below poverty line. Among the major fishing allied activities, women predominantly are engaged in curing/ processing (90%), peeling (88%) and marketing (83%). About 36 percent of the adult fisherfolk are members of cooperative societies, of which 69 percent are in fisheries co-operatives. The total number of fishing crafts has been estimated at 14 023, of which 3 643 are mechanized, 7518 motorized and 2 862 non-motorized. The State has 206 ice factories, 52 boat yards, 36 cold storages, 32 fish meal plants, 23 extraction plants, 16 processing plants and 10 freezing plants.

Department of Fisheries, Government of Karnataka (DoF-KR)

The Department of Fisheries, Government of Karnataka (DoF-KR), holds the responsibility of fisheries management and development within the State and the territorial limits (12 nautical miles from the shore). A major activity of the DoF-KR is implementing various welfare measures, such as subsidies for oil and other developmental programmes. These welfare activities consume nearly all resources of the Department and resultantly the Department is lacking in implementing fisheries management measures. The Department is headed by the Minister of State for Fisheries. The Principal Secretary to Government, Animal Husbandry and Fisheries Department is the head at the Government level (Figure 2). The main functions of the Department are:

1) Development, conservation and regulation of inland and marine fisheries.
2) Promotion of marine fisheries development by providing infrastructure facilities like approach roads, landing facilities, fishing harbours, etc.
3) Promotion of welfare of fishermen by various welfare schemes.
4) Conducting training programmes and extension activities for the benefit of the farmers.
5) Administration of aquaria and popularization of ornamental fisheries.
6) Providing infrastructure for fish marketing.
7) Supply of quality fish seed for fish culture.
8) Conservation of indigenous fish species.
9) Promotion of fish culture as a livelihood activity in the rural areas.
10) Promotion of fisheries as a source of rural nutrition.
11) Formulation, implementation and supervision of various socio economic programmes.
12) Collection and compilation of fisheries statistics for management and development of fisheries.
13) Promotion of fisheries as a recreational activity.

The Karnataka Marine Fishing (Regulation) Act, 1986 (KMFRA, 1986) is the main legislation defining the scope of the Department in fisheries management. It is an Act to provide for the regulation of fishing by fishing vessels in the sea along the coastline of the State. The Act has provisions to regulate, restrict or prohibit certain fishing activities within specified area, prohibition against destruction of fish by explosives or by poisoning of water and against introduction of exotic fish species. The Act also provides for prohibiting all fishing in the specified waters for a specified period; prohibiting the use of any gun, spear, arrow or the like in any water, with intent thereby to take or destroy any of the fish therein; regulating the standard of sale of fish spawn, fry, fingerling and yearling; prohibiting fishing and marketing of the fish during closed season. While the Act is broad in its scope, it also follows a top- down management approach. There is scope within the Act to encourage stakeholder participation.

KMFRA, 1986 is also in essence an intra-sectoral Act and neither shelters the fisheries sector nor encourages fisheries organizations in entering into active negotiations with complimenting

organizations. While the Act does not address biodiversity conservation directly, there is scope within the Act to introduce necessary measures for conservation.

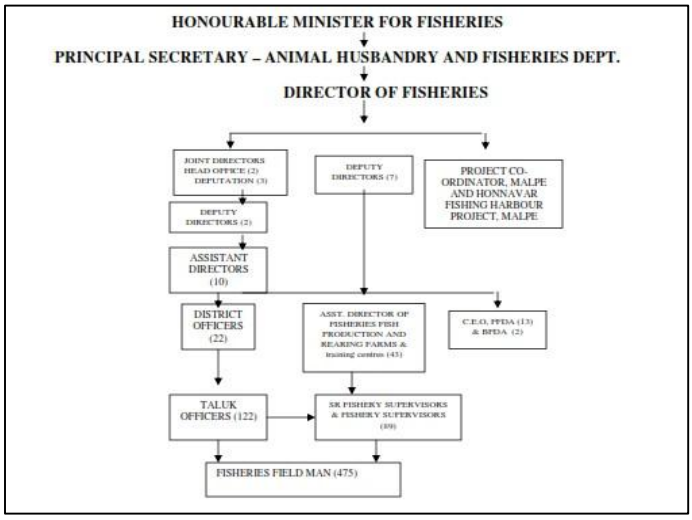

Figure 3: Organogram of Department of Fisheries, Karnataka

Karnataka Fisheries Development Corporation (KFDC), Mangalore

The KFDC Ltd. was established during 1971 under the Indian Companies Act, 1956 with an authorized share capital of Rs. 3 crores. The important developmental activities taken up by the corporation are providing ice, cold storage and processing facilities, freezing of fish, production of fish meal and oil, marketing of fresh and frozen fish and supply of diesel and oil to fishing boats and fish transport facilities.

Karnataka Co-operative Fisheries Federation (KCFF), Mysore

The organization was registered mainly to implement reservoir fisheries project with NCDC assistance. The objective of the federation is to carry out activities conducive to socio-economic development of fishermen by organizing effective production, procurement, processing and marketing of fish through fishermen co-operative societies who are members of the federation on the basis of cooperative principles. The federation is also involved in establishing fish seed production farms, supply of fishery requisites to fishermen co-operative societies and render financial, technical and administrative assistance to societies.

Table 1 gives a broad description of stakeholders

Table 1: Stakeholder mapping and analysis

Stakeholder	Size (approx. No. of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[1]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
National						
Ministry of Agriculture (Department of Animal Husbandry, Dairying & Fisheries DAHD&F)		National	Development of marine fisheries, welfare of fish workers, etc.	Neutral	Medium	Positive relations with the Department of Fisheries. No regular interaction with MOEF.
National Fisheries Development Board (NFDB)		National	To bring activities relating to fisheries and aquaculture for focused attention and professional management; to coordinate activities pertaining to fisheries undertaken by different Ministries/ Departments in the Central Government and also coordinate with the State/Union Territory Governments; to improve production, processing, storage, transport and marketing of the products of capture and culture fisheries; to achieve sustainable	**Neutral**	Low	Positive relations with the Department of Fisheries and DAHD&F

Stakeholder	Size (approx. No. of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[1]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
			management and conservation of natural aquatic resources including fish stocks; to apply modern tools of research and development including biotechnology for optimizing production and productivity from fisheries; to provide modern infrastructure mechanisms for fisheries and ensure their effective management and optimum utilization; to generate substantial employment; to train and empower women in the fisheries sector; to enhance contribute of fish towards food and nutritional security.			
Coastal Aquaculture Authority		National	Promoting sustainable aquaculture.	**Neutral**	Medium	Interaction with shrimp farmers.
Marine Products Export Development Authority		National	Promoting fisheries trade.	**Neutral**	Low	Interaction with exporters and lager mechanized fishing vessels.
Fishery Survey of India		India	Survey and assessment of fish stocks and charting of fishing grounds in the Indian Exclusive Economic Zone (EEZ) and adjoining high seas; Monitoring of fishery resources for fisheries regulation, management and conservation; Assessment of suitability of deep-sea fishing gear with special reference to the concepts of maximum	**Positive**	Low	Positive relations with fishers, Fisheries Department and ICAR Institutes

Stakeholder	Size (approx. No. of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[1]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
			sustainable yield, preservation of environment and ecology of marine ecosystem; Marine fisheries forecasting including application of remote sensing in fisheries management; Maintaining data on deep sea fishery resources and dissemination of information to different user groups; Human resources development through training of fishing operatives and meeting faculty requirements of sister institutes and organization.			
International Collective in Support of Fish Workers (ICSF)		National	Protecting the rights of fish workers	**Inhibitive (?).** While ICSF supports PAs, it is concerned about design of PAs and possible loss of livelihoods of fishers.	Medium. Lobbying with DAHD&F and organizing fishermen associations, lobbying with FAO and like-minded organizations	Positive relations with fisheries associations and FAO.
National Fishworker's Forum (NFF)			To protect the life and livelihood of the fishing communities and its basic source - fisheries resources, biodiversity and natural environment.	Inhibitive (?). Might be concerned about loss of livelihoods	Medium. Lobbying with like-minded organizations. NFF successfully campaigned to modify the prohibition on shark fishing by MOEF in early 2000.	Positive relations with fisheries organization.
ICAR Institutes (Central Marine Fisheries Research Institute-CMFRI; Central Institute of Brackishwater Aquaculture-			R&D	Positive	ICAR research institutes can provide necessary research inputs to educate stakeholders.	Issue-based.

Stakeholder	Size (approx. No. of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[1]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
CIBA; Central Institute of Fisheries Education- CIFE, etc.)						
State						
Department of Fisheries, Government of Karnataka (DoF-KR)		State	To augment aquatic resource production in the inshore areas by conservation measures, stock enhancement and establishing artificial reefs etc., along the coast and to enforce regulatory measures through legislation for conservation of fishery resources, both in Inland and coastal waters.	Neutral. So far the Department of Fisheries either at State or DAHD&F at the Central level have played very limited role in setting up or management of PAs.	**Medium.** Conservation is in the domain of the Ministry/Department of Environment and Forests.	Positive. DoF-KR has contacts with different fishermen groups, owing much to their welfare activities. However, so far they have not exercised their control in terms of motivating or influencing the fishermen for bio-diversity conservation.
Karnataka Fisheries Development Corporation (KFDC), Mangalore		State	Development and Managing of fishing harbours.	-	Low	Positive
Karnataka Co-operative Fisheries Federation (KCFF), Mysore			To carry out activities conducive to socio-economic development of fishermen by organizing effective production, procurement, processing and marketing of fish through fishermen cooperative societies who are members of the federation on the basis of cooperative principles.	-	Low	Positive
Site						
Association of Artisanal fishers		Site/District	Welfare of members	Inhibitive	Low	Conflict with motorized and mechanized fishing vessels. However, they also work as crew in these categories of vessels. The interaction of this group with the Government officials is also minimal and

Stakeholder	Size (approx. No. of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[1]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
						issue-based.
Motorized boat owners		Site/District	Welfare of members	Inhibitive	Medium	Conflict with mechanized vessels. They also have a better working relation with the Government as this group usually comprises the beneficiaries of Government schemes.
Mechanized boat owners		Site/District/state	Welfare of members	Inhibitive	High	Conflict with traditional and motorized fishing vessels.
Fish traders/ money lenders		Site/District	Individuals	Inhibitive	High. They may influence fishermen.	Mostly interact with fishermen only.
Other sectors that have a major influence on establishment and management of coastal and marine protected areas. Only most relevant stakeholders at relevant level (Supra National/ National/ regional/ State/ site) have been described below						
Ministry of Environment and Forest, Government of India (MOEF)		National	Promoting conservation of biodiversity as per CBD convention and other National and International regulations.	Positive	High	Conflict with resource users.
National Biodiversity Authority (NBA)			To promote objectives of CBD.	Positive	Low.	Low field presence.

Stakeholder	Size (approx. No. of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[1]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
Indian Coast Guard (ICG)		National	Principal agency for enforcement of provisions of all national enactment in force in the maritime zones of India and provides following services: (i) ensuring safety and protection of the artificial islands, offshore installations and other structure in our maritime zones; (ii) providing protection to fishermen and assistance to them at sea while in distress; (iii) preservation and protection of maritime environment including prevention and control of maritime pollution; (iv) Enforcement of MZI Acts, etc.	Positive	Medium	Good
State						
Department of Environment and Forests (DEF-KR)		State	Promoting conservation of biodiversity as per CBD convention and other National and International regulations	Positive	High	Conflict with resource users.
Karnataka State Coastal Zone Management Authority (KSCZMA) http://www.ksczma.kar.nic.in/		State	• To ensure livelihood security of the fishing communities and other local communities living in the coastal areas; • To conserve and protect coastal stretches and;	Positive	High	To be covered during field work

Stakeholder	Size (approx. No. of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[1]	Power to influence management of coastal and marine PAs, and specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
			• To promote development in a sustainable manner based on scientific principles, taking into account the dangers of natural hazards in the coastal areas and sea level rise due to global warming.			
Karnataka State Pollution Control Board (KSPCB)		State	Implementation of Water (Prevention and Control of Pollution) Act, 1974, and Air (Prevention and Control of Pollution) Act, 1981, (Section 17)	Positive	Not known	Working relation.
Site						
Village Panchayats officials. This includes both political and community-based Panchayats. They play important role in designing allocation and access rules and mediate during conflicts.		Site/district/state	Promotion and protection of interest of related groups.	Positive. However, there are concerns for livelihoods.	High	Good relations with fishermen organizations.

2.2. CAPACITY GAP ANALYSIS

------An overview of the major capacity gaps vis-à-vis enabling environment, cross-sector and cross-stakeholder cooperation, organizations and individuals in the fisheries sector of Karnataka.

Table 2: Problem analysis and capacity gap analysis

Dimensions of Capacity (one per line)	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation vis- à-vis dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
Enabling Environment									
Policy implementation									
The Karnaraka Marine Fishing Regulation Fisheries Act (KMFRA)	The KMFRA provides the legal framework for fisheries management. The objective of KMFRA is conflict resolution among different user groups and prohibiting harmful fishing practices.	High. The Act provides for time and area closure and also has provisions for use of fishing gear. These clauses in combination can be used for creating a closed area from fisheries perspective.	DoF-KR	• No prior experience in marine conservation. • Understanding and communicating ecosystem implications of the fisheries management measures. • Creating a voluntary environment for implementation of the Act. • Information management and awareness building.	High	• Officials are only aware of the provisions of the Act but not their implication in larger ecosystem setting. • Officials are aware about the commitments of the nations as party to different international agreements and their implications. • Necessary skills are there to communicate the management needs to the fishing communities and taking them on board.	• The provisions of the Act needs to be understood from an ecosystem perspective. • Commitments of the nation in international agreements and their implications for the state needs to be understood. • Playing the role of a facilitator to engage fishing communities in fisheries mangement needs to be developed.	• Officials are aware of the legal provisions particularly of acts specefic to the fisheries sector. However, they are unaware of the related provisions of other Acts and especially provisions of international agreements. • Relationship between the fishing community and the officials is defined by job specifications.	• Officials needs to be updated about cross-sectoral and overarching Laws and Acts including international agreements. • Outreaching and communication skills needs to be developed.

Dimensions of Capacity (one per line)	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation vis-à-vis dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
-Do-	Do	Do	Fishers and their organizations	While fishers are aware and partly complying to the provisions of the Act, it is not embedded in their business practices which can be broadly define as 'animal spirit'	High	Volunary and effective implementation of the Act	Fishers understand the importance of the Act from sustainability perspective.	Fishes are aware of some provisions of the Act but not exactly guided by the Act.	Awareness building is required on why the Act is necessary for sustainability of fisheries and why sustainability of fisheries is important for their business.
Coastal Regulation Zone Notification, 2011	To ensure livelihood security to the fisher communities and other local communities, living in the coastal areas, to conserve and protect coastal stretches, its unique environment and its marine area and to promote development through sustainable manner based on scientific principles taking into account the dangers of natural hazards in the coastal areas, sea level rise due to global warming,	High	KSCZMA	Lack of understanding of ICZM concepts	High	The CRZ notification is understood as a building block of ICZM framework	Understanding of ICZM framework and importance of fisheries sector	An instrument pertaining to conservation of coastal zone	Having a holistic view on ICZM and efficacy of the Notification towards this.

Dimensions of Capacity (one per line)	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation vis-à-vis dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
-Do-		High	DoF-KR	Lack of understanding of ICZM concepts	High	The CRZ notification is understood as a building block of ICZM framework	Understanding of ICZM framework and importance of fisheries sector	An instrument pertaining to conservation of coastal zone	Having a holistic view on ICZM and efficacy of the Notification towards this.
-Do-		High	Fishers and their organizations	Lack of awareness about the Act	High	Fishers and their organizations are aware about their rights provided under the Notification	Understanding of notification and basic concepts of ICZM	-	Understanding of notification and basic concepts of ICZM.
Coastal Aqauculture Authority Act, 2005	For setting up of Coastal Aquaculture Authority with a mandate to ensure sustainable aquaculture	Low	Coastal Aquaculture Authority	Destruction of mangroves for construction of shrimp farms, catching of mother shrimps through trawling.	Medium	Awareness about growth of aquaculture and how it may impact coastal environment.		-	
Coastal Aqauculture Authority Act, 2005	For setting up of Coastal Aquaculture Authority with a mandate to ensure sustainable aquaculture	Low	Shrimp farmers	Rights and duries of fish farmers under the Act	Medium	Voluntary implementation of the Act while developing and running farms.	Understanding of the Act and basic concepts of ICZM	Understanding of requirements to set up a farm	Like fisheries, shrimp farmers should be aware about impact of farming in coastal zone including possibility of allien invassion.
Rural Emplyment Guarantee schemes	To generate employment in rural areas and to develop entrepreneurial skill and attitude among rural	High	Village Panchayat	-	-	-	-	-	-

Dimensions of Capacity (one per line)	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation vis-à-vis dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
	unemployed youth.								
Rural Emplyment Guarantee schemes	To generate employment in rural areas and to develop entrepreneurial skill and attitude among rural unemployed youth.	High	Fishermen organizations	Fishermen are not aware about the scope of the scheme in looking for additional/ alternative options	High	Fishermen are aware about the scope of the scheme in looking for additional/ alternative options	Awareness building on various government schemes for rural sector.	Awareness on fisheries-specefic schemes.	Awareness and training programme on using applicable developmental schemes of the government.
Wildlife Protection Act, 1972	The Act provides for the protection of wild animals, birds and plants; and for matters connected therewith or ancillary or incidental thereto.	High	Ministry of Environment and Forests	Lack of consultation with stakeholders while implementing the Act and during creation of PAs under the Act	High	Consultative mechanism to implement the Act needs to be in place.	Awareness creation on needs of consultation	Benefits of consultation is not realized	Legal and implementatio nal gap exist to ensure consultation.
Wildlife Protection Act, 1972	The Act provides for the protection of wild animals, birds and plants; and for matters connected therewith or ancillary or incidental thereto.	High	DoF-KR	Lacks understanding	Medium	Officials can advise fishers/ forestry officials on scope and implementation of the Act	Training programme on all relevant Acts.	-	-
Wildlife Protection Act, 1972	The Act provides for the protection of wild animals, birds and plants; and for matters connected therewith or	High	Indian Coast Guard	-	-	-	-	-	-

Dimensions of Capacity (one per line)	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation vis-à-vis dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
	ancillary or incidental thereto.								
Organizational and network capacity									
DoF-KR	To implement fisheries policies and liaison with fishers and sister organizations	High	DoF-KR	Relation with fishers mostly limited to implementation of welfare schemes.	High	The Department having clout in fisheries.	Image-building; self-assertion	-	Image-building; self-assertion
Fishers Organisation	To ensure interest of its members.	High	Fishers	Lack of leadership and vision	Medium	Fishers Organization are functioning as trade union and cinic bodies to ensure well-being of members and the resources.	Leadership development; Skills in organizational management and communication with media and other agencies/organizations	-	Leadership development; Skills in organizational management and communication with media and other agencies/organizations
NFDB	NFDB has the mandate to co-ordinate activities of various Ministries/Department towards fisheries management.	Medium	NFDB, DoF-KR; Department of Forestry and Environment	NFDB is a fairly new organization and lacks prior experience in coordinating.	Low	NFDB officials are aware about ecosystem approach and have better coordination skill	Training programme in ecosystem approach, project management and coordination	-	Training programme in ecosystem approach, project management and coordination.

Dimensions of Capacity (one per line)	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation vis-à-vis dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
Cross-sector cooperation capacities									
Better coordination between forestry and fisheries departments	To communicate exogenous issues in fisheries with other sectors and ensuring their cooperation.	High	DoF-KR; DEF-KR	Lack of understanding of issues of other sectors.	High	Each concerned Department is aware about issues in other sectors and implication of those issues in their own sector.	Image-building; self-assertion; awareness and knowledge on activities of other departments; negotiation skills.	-	Image-building; self-assertion; awareness and knowledge on activities of other departments; negotiation skills.
Creating media awareness	To create awareness among tertiary stakeholders and integrating primary stakeholders on issues concerning fisheries sector.	High	DoF-KR; DEF-KR	Problem in identifying 'news-worthy' issues and presenting activities in a media-savvy manner	High	Skills in identifying 'news-worthy' issues and presenting activities in a media-savvy manner	Training in preparation of briefs, maintaining contact with media		Training in preparation of briefs, maintaining contact with media
Cross-stakeholder cooperation:									
Better coordination between forestry and fisheries sector									
Creation of a common platform for dialogue between environment (including forestry) and fisheries secors.									

Dimensions of Capacity (one per line)	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation vis-à-vis dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
Individual competence									
Communicating scientific findings	To better communicate scientific findings to lay persons	Medium	Fisheries and environmental scientists	Scientific finding are closed within the concerned circle.	Medium	Policy-oriented researches are undertaken and findings are communicated to stakeholders in non-technical language.	Identifying policy issues; non-technical writing and presentation of scientific findings.		Identifying policy issues; non-technical writing and presentation of scientific findings.
Improving extension services	Improving linkages bewteen primary stakeholders and officials and creation of a feedback process	High	DOF-KR; DEF-KR	Extension services are not desgnied to deal with community mobilization and leadership creation	Medium	Extension activities are used for creating a platform for conservation and related issues.	Identification of extension needs in the new context, designing of strategy and necessary training	Conventional extension (usually informing about government schemes)	Identification of extension needs in the new context, designing of strategy and necessary training
Leadership skills in fisheries organizations	To enable fisheries organisation to look beyond immediate issues	High	Fishers	Lack of leadership skills in fisheries organizations	High	Effective leadership developed at fisheries organizations and cooperatives.	Training programme in visioning, organisation management and community mobilization.	-	Training programme in visioning, organisation management and community mobilization.

3. RECOMMENDATIONS FOR POSSIBLE HCD INTERVENTIONS:

Main gaps identified for officials (Fishery/Forestry) are lack of understanding of the National Laws having bearing on fisheries sector from an ecosystem perspective. Especially for fisheries officials, their qualification for appointment and post-recruitment departmental training programmes does not include familiarization with the Acts and Laws other than the immediate Acts. There is also lack of awareness on international binding and non-binding agreements, to which India is a party. Therefore, the possible HCD interventions include development of a curriculum for a refresher course in national and international laws and their larger implications. For sustainability, this curriculum is needed to be adopted in the Departmental training facilities.

The fishers and their organizations are also lacking in these areas. However, for them a targeted awareness programme could have a better reach.

There is also a need to develop networking and leadership capabilities among fishery and forestry officials aiming at intra-departmental; inter-departmental and department-community interaction.

Table 3: Recommendations for possible HCD interventions

Target situation vis-à-vis dimension of capacity	Capacity gaps	Possible intervention	For whom (target group)	Resource organizations/ persons (providers)	Expected impact	Expected synergies with other dimensions
Officials are aware of the provisions of the KMFRA, other relevant acts and international agreements and its implication in larger ecosystem setting.	Officials needs to be updated about cross-sectoral and overarching Laws and Acts including international agreements.	1. Review of the curriculum for training of fisheries officials; 2. Development of a curriculum on legal setting in fisheries; 3. Incorporating legal setting in fisheries in	**DoF-KR**	Mangalore Fisheries College/State Fisheries Training Institutes/Wildlife Institute of India/ CMFRI/ Central Institute of Fisheries Education		

		existing curriculum; 4. Organizing a 5-day training programme for existing staff.				
Necessary skills are there to communicate the management needs to the fishing communities and taking them on board.	Outreaching and communication skills needs to be developed.	1. Review of the curriculum for training of fisheries officials; 2. Development of a curriculum on legal setting in fisheries; 3. Incorporating legal setting in fisheries in existing curriculum; 4. Organizing a 5-day training programme for existing staff.	**DoF-KR**	IIM-A/NIRD		
Volunary and effective implementation of Acts by the fishers	Awareness building is required on why Acts are necessary for sustainability of fisheries and why sustainability of fisheries is important for their business.	Organizing location-specefic awarness camp cum workshop	**Fishers/ NGOs**	Mangalore Fisheries College/State Fisheries Training Institutes/Wildlife Institute of India/ CMFRI/ Central Institute of Fisheries Education/FSI		
The CRZ notification is understood as a building block of ICZM framework	Having a holistic view on ICZM and efficacy of the Notification towards this.	State-level workshops	KSCZMA; DoF-KR, Department of Forests/ICG	Mangalore Fisheries College/State Fisheries Training Institutes/ Wildlife Institute of India/ CMFRI/ Central Institute of Fisheries Education.		

Organizational and network capacities						
Optimazing organizational and networking capacity	Image-building; self-assertion; awareness and knowledge on activities of other departments; negotiation skills	1. Review of the curriculum for training of forestry/fisheries officials; 2. Development of a curriculum on legal setting in fisheries/ICZM; 3. Incorporating legal setting in fisheries/ICZM in existing curriculum; 4. Organizing a 5-day training programme for existing staff.	DoF-KR, Department of Forests			
Cross-sectoral and cross-stakeholder cooperation						
Better coordination between forestry and fisheries departments	Image-building; self-assertion; awareness and knowledge on activities of other departments; negotiation skills		DoF-KR, DEF-KR, KCZMA	IIM-A/NIRD/IRMA	Imporved branding and scope of taking responsibilities.	
Skills in identifying 'news-worthy' issues and presenting activities in a media-savvy manner	Training in preparation of briefs, maintaining contact with media					
Individual						
Policy-oriented researches are undertaken and findings are	Identifying policy issues; non-technical writing	Training programme on policy oriented	CMFRI/CIFE/MFC	GIZ/FAO/BOBP-IGO/WII	Better scientific communication	Overall improvement in understanding the need for conservation.

communicated to stakeholders in non-technical language.	and presentation of scientific findings.	research and dissemination.				
Policy-oriented researches are undertaken and findings are communicated to stakeholders in non-technical language.	Identifying policy issues; non-technical writing and presentation of scientific findings.	Training programme on policy oriented research and dissemination.	CMFRI,CIFE,JFC	GIZ/FAO/BOBP-IGO/WII	Better scientific communication	Overall improvement in understanding the need for conservation.
Extension activities are used for creating a platform for conservation and related issues.	Identification of extension needs in the new context, designing of strategy and necessary training.	Training programme	DoF-KR; DEF-KR	GIZ/FAO/BOBP-IGO/WII	Improve extension	Overall improvement in understanding the need for conservation.
Effective leadership developed at fisheries organizations and cooperatives.	Training programme in visioning, organisation management and community mobilization.	Training programme on management	Fisheries organisations/ coopertives	NIRD/IRMA	Improved organisation capacity	Improved particiaption in dialogue process.

3.1. TRAINING CAPACITIES IN/FOR THE STATE:

In this section, all those stakeholders (Organizations, network, as well as individuals) will be analysed in greater detail, which are relevant from the view point of partnering for various HCD interventions.

By involving these organizations during the delivery of HCD, the sustainability of further training is safeguarded, and mainstreamed at the local level.

Table 4: Description of resource organizations/ networks/ individuals (providers)[2]

Name of organization	Type of capacity-strengthening programmes they are engaged in?[3]	Target group	What is their thematic focus?	Geographical focus[4]	Information on the existing training/ capacity building networks they are part of (with reference to the 4 project states)	Support required by the organization itself to sustain its capacity building measures to the other stakeholders			
						Curriculum development	Training system development	Faculty development	others
CMFRI	Fisheries research, additional/ alternative employment	Fishers/Fisheries/Forestry officials	Fisheries R&D	India	No dedicated training programme	X	X	Available	
CIFE	Fishing technology, fish processing, value addtion, additional/ alternative employment	Fishers/Fisheries officials	Fisheries R&D	India	No dedicated training programme	X	X	Available	
IIM-Ahmedabad (Centre for Management of Agriculture)	The Centre conducts short duration Management Development Programmes (MDPs)	Senior officials	Management	India/World	No dedicated training programme	X	X	Available	

Name of organization	Type of capacity-strengthening programmes they are engaged in?[3]	Target group	What is their thematic focus?	Geographical focus[4]	Information on the existing training/ capacity building networks they are part of (with reference to the 4 project states)	Support required by the organization itself to sustain its capacity building measures to the other stakeholders			
						Curriculum development	Training system development	Faculty development	others
National Institute of Rural Development (NIRD)	NIRD is a school for practicing managers engaged in rural development. It also trains functionaries from the Government, development banking institutions and community based organizations to help carry forward and spread the message of all-round rural development.	Fisheries and forestry officials/ community groups/NGOs	Management/ Administration	India	No dedicated training programme	X	X	Available	

Name of organization	Type of capacity-strengthening programmes they are engaged in?[3]	Target group	What is their thematic focus?	Geographical focus[4]	Information on the existing training/ capacity building networks they are part of (with reference to the 4 project states)	Support required by the organization itself to sustain its capacity building measures to the other stakeholders			
						Curriculum development	Training system development	Faculty development	others
Institute of Rural Management Anand (IRMA) - MDP	MDPs constitute one of the major activities of IRMA, which addresses the in-service training needs of the executives and managers working in the co-operatives, not-for-profit organisations, and government and semi-government organisations engaged in rural development. So far, IRMA has conducted over 675 programmes with an enrolment exceeding approximately 14500 personnel.	Fisheries and forestry officials/ community groups/NGOs	Management/ Administration	India	No dedicated training programme	X	X	Available	
State									
Mangalore Fisheries College	Fisheries education	Students/fishers/ fisheries officials	Fisheries R&D	Gujarat	No dedicated training programme	X	X	Available	Communication; policy research.

4. ANNEXES

4.1. DETAILED LIST OF LITERATURE CITED

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PART - 4

Tamil Nadu State Report

CONTENTS

1. INTRODUCTION

1.1. CURRENT STATUS OF COASTAL AND MARINE BIODIVERSITY IN THE TAMIL NADU

Tamil Nadu is one of the leading States in India in fisheries development having coastal length of 1 076 km. Tamil Nadu is bordered on the north by Andhra Pradesh, on the north-west by Karnataka, on the west by Kerala state and on the east and south by the Bay of Bengal and the Indian Ocean. The State has an area of 1 30 058 sq.km. (50 216 sq. miles). The geographical position of the State lies between north latitude to $8^{o}\ 5^{'}$ and $13^{o}\ 35^{'}$ east longitude between $76^{o}\ 15^{'}$ and $80^{o}\ 20^{'}$. It is separated from Sri Lanka by the narrow Palk Strait. The climate is tropical. The different types of aquatic resources like marine, freshwater, brackish water, rivers and their estuaries and the cold water streams in the upland areas of the State are bestowed with rich biodiversity of aquatic fauna and flora. About 2 500 fish species have been recorded from these aquatic resources.

The marine waters of Tamil Nadu may be classified into four sub-ecosystems; namely Coromandal coast, Gulf of Mannar, Palk Bay and Kanniakumari Coast on Arabian Sea. The geographical limits and districts falling under these sub-ecosystems are given in **Table 1**. These sub-ecosystems have also their distinct characters and fishing practices. Especially, the Gulf of Mannar and Palk Bay are considered as bio-diversity hotspots.

Table 1: Description of coastal and marine ecosystem in Tamil Nadu

Sub-Ecosystem	Boundary	District	Length (Km)
Coromandal Coast	Pulicat lake to Pt. Calimere	Thiruvallur, Chennai, Kanchipuram, Villupuram, Pondichery, Cuddalore and Nagapattinam	357.2
Palk Bay	Pt.Calimere to Vembar	Thanjavur, ThiruvarPudukottai & Ramnad	293.9
Gulf of Mannar	Vembar to Idinthakarai	Tuticorin and Tirunelveli	364.9
Kanniakumari	Arokiyapuram to Neerodi	Kanyakumari district	60.0

Compiled from Department of Fisheries and FIMSUL (2011)

The Gulf of Mannar (GoM) is a unique ecosystem characterized by its rich biodiversity including the corals. The Exclusive Economic Zone (EEZ) of GoM is about 15 000 km^2 in which, commercial fishing is carried out in about 5,500 km^2 up to a depth range of 50 to 200m. The GoM is considered as 'Biologists' paradise' because of its extremely rich biological diversity

encompassing about 3600 species of flora and fauna. It is the home to an endemic organism called Balanoglossus (*Phychodera fluva*), a unique living fossil that links vertebrates and invertebrates. The diverse nature of ecosystems in the GoM supports a wide variety of significant species including 117 species of corals, 641 species of crustaceans, 731 species of molluscs, 441 species of finfishes and 147 species of seaweeds apart from the seasonally migrating marine mammals like whales, dolphins, porpoises and turtles.

The GoM alone produces about 20 per cent of the marine fish catch in Tamil Nadu. Of the 2200 fish species distributed in Indian waters, 450 species have so far been recorded in this area. More than 50 000 fishermen living along the coast of the GoM directly depend on the fishery resources of the reserve for their livelihood. Majority of the fish species are caught in trawl net, followed by gill nets and long line. About 465 species of bony fishes are used as food fish in the GoM region. About 175 species can be used as potential marine ornamental fishes and about 145 species are thrown as trash fish. The trash fishes are mostly utilized for preparing the poultry feed. A total of 68 species of elasmobranches were recorded from the GoM which include 41 sharks and 27 rays.

In the GoM, the pearl banks extend from Kilakarai to Cape Comorin at depths of 15 to 20m. The northern and southern banks are almost barren and those in the central sector between Kayalpatnam and Vaippar alone remain productive and the fisheries are operated from Tuticorin. In the earlier days, during sorting the by-catch, the various shells were thrown back into the sea as discards. Once the shell-craft industries got established and flourished these gastropods were brought ashore and exclusively sold to the industries. They in turn used to separate the gastropod shells and sell to the exporters. The most important shells of commercial value include the Button shell (Umbonium spp.), Winged shells (Strombidae), the spider shells or the scorpion shells (Lambis spp.), Cowries (Cypraeidae), Helmet shells (Cassididae), Hairy tritons (Cymatidae), Frog shells (Bursidae), Murex shells (Muricidae), Rock snails (Thaididae) and Whelks (Nassaridae). In the GoM, the near shore areas of these islands provide a favourable environment for the various gastropod species to thrive.

Palk Bay, located further south of GoM, shares the ecological characteristics of the GoM. However, detailed information is sparse. The coral reefs in Palk Bay run parallel to the shore between longitudes 79°17’ E and 79°8’ E, at the latitude 9°17’ N. It lies in an east-west direction and is about 200 to 600 m away from the shore at different places at a depth of 1 to 5 m. The western part of this reef which extends westward from Pamban Pass up to Thedai is called Velapertumunai reef and the eastern part which extends up to Pamban Pass is called Kathuvallimunai. The Central Marine Fisheries Research Institute is carrying out several studies on Palk Bay and reported following changes/extent of biodiversity in Palk Bay (2010-13):

- *Coscinodiscus excentricus* (6.88%) and *Coscinodiscus marginatus* (6.71%) were the major phytoplankton species in Palk Bay.
- A rich sponge bed has been observed at Thonithurai (near Pamban) in Palk Bay at Sanghumal and Rameswaram which has a rich sponge resource, dominated by *Spirastrella* sp.
- Soft corals and sponges from Thankachimadam in the Palk Bay were observed during Scuba diving.
- One species of *Lobophytum* and three species of *Sinularia* were also observed.
- Biodiversity of crabs and other crustaceans in the intertidal coral reef areas of Gulf of

Mannar and Palk Bay was studied. Twenty five brachyuran crabs, one anomuran crab and 3 species of hermit crabs were collected.

- Total of 87 species of macroalgae were collected during three surveys conducted in the Gulf of Mannar and Palk Bay along the south-east coast of India.
- In Palk Bay and GoM, four species of scyphozoan jellyfishes were recorded. The species *Cassiopea* cf. *andromeda* was recorded from Tuticorin coast and the remaining three species *Chrysaora caliparea* (Reynaud, 1830), *Mastigias* cf. *papua* (Lesson) and *Rhopilema* cf. *hispidum* was recorded from Mandapam and Thiruppalaikudi coast of Palk Bay.

However, the marine ecosystem in Palk Bay is seems to be stressed. An analysis of satellite images have recorded an areal coverage of 286.95 ha of reef area during 2004, which is 177.54 ha lesser than that of the reef area of 1996. The seagrass beds of Munaikkadu region of the Palk Bay are comparatively protected and have gained over 7.5 ha between 1996 and 2004. Whereas in Devipattinam region, anthropogenic pressures were likely has led to the reduction of over 785.5 ha of dense seagrass beds between 1996 and 2004. Another study have found that live coral cover of Velapertumunai reef declined from 44% in 2004 to 13.6% in 2008. In Kathuvallimunai reef, it declined from 37.8% to 12.9% (Sukumaran S *et al* 2013).

1.2. Drivers and Pressures for loss of coastal and marine biodiversity in the State

The fisheries in Tamil Nadu form one of the vital sources of food security. The marine fisheries production in the State has been recorded as 631 002 tonnes in 2011, which is steadily increasing after the severe destruction caused by the 2004 Asian Tsunami (Fig.1).

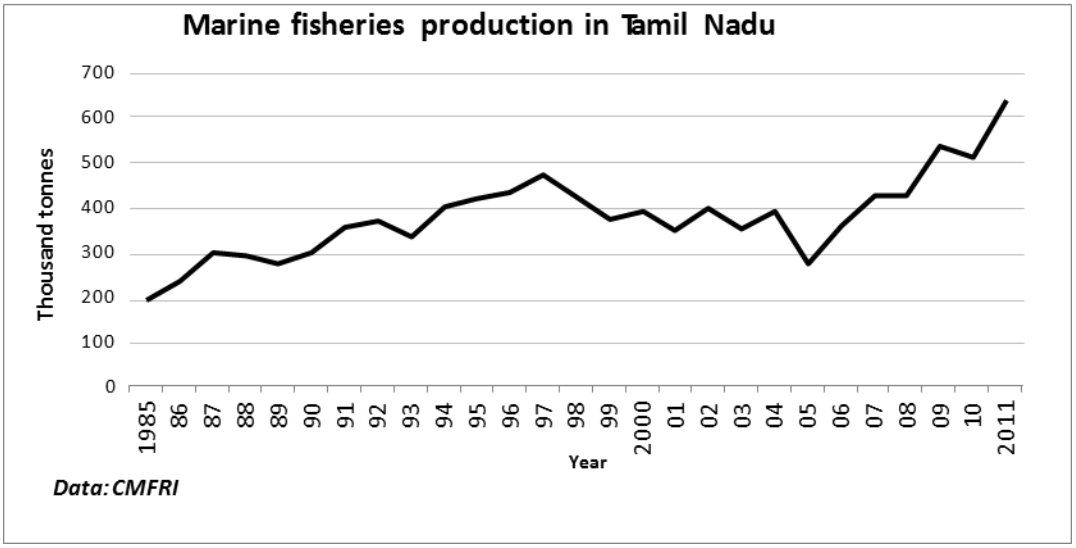

Figure 1: Marine fisheries production in Tamil Nadu

A set of factors, both endogenous and exogenous are driving the changes in coastal biodiversity in the State. Among the exogenous factors, global warming is now well-documented to have an impact on coral reefs, distribution and composition of species along the coast (Vivekanandan 2010, 2012).

However, institutional factors and anthropogenic activities are likely to be the most significant drivers of change in the region. In Institutional factors, lack of a proper monitoring and conflict resolution mechanism could be highlighted as a major factor. Due to lack of such a mechanism, the marine waters is being subjected to pollution leading to degradation of critical habitats. Increased fishing activities along the coast are also putting pressure on the biodiversity. CMFRI (2012) reported that the mini trawls locally called *thallu valai* are operated in the sea grass beds off Devipattinam and Thiruppalaikudi in the Palk Bay. These gears target the juveniles of *Penaeus semisulcatus*, which are found to inhabit in the sea grass beds. About 10 to 15 kg of sea grass are removed during a single operation while the targeted *P. semisulcatus* constituted about 3 kg. *Pentaceraster* spp. gastropods, large numbers of juvenile crabs (*Portunus pelagicus*) are also very common. Highly endangered animals like sea cucumber and pipe fish are also caught in this gear.

1.3. PROTECTED STATUS IN THE STATE *VIS-À-VIS* COASTAL AND MARINE PROTECTED AREAS

Tamil Nadu has three marine protected areas (MPAs): the Point Calimere Wildlife Sanctuary, the Pulicat Wildlife Sanctuary (1980), and the Gulf of Mannar National Park and Biosphere Reserve .The Gulf of Mannar National Park (GOMNP), though proposed by scientists in 1976 to prevent the destruction of coral reefs by the construction industry, was officially declared as a national park in 1986. The national park forms the core area of the Gulf of Mannar Biosphere Reserve (GOMBR), declared in 1989, which is the first marine biosphere reserve in India.

2. SITUATION ANALYSIS

2.1. STAKEHOLDER ANALYSIS

The total marine fisher population of Tamil Nadu is 802 912, as per the 2010 Marine Fisheries Census[1]. Of the total marine fisher population, 414 167 are males and 388 745 females with a sex ratio of 939. The literacy rate is 66 percent. Of the total marine fisher population, 285 605 (36%) are engaged in fishing and fishing related activities. A total of 254 378 fish workers are members of fisheries cooperatives. The State has a total of 46 070 fishing craft of which 10 692 are mechanized, 24 942 motorized and 10 346 non-motorized. These fishing crafts operate from 407 fish landing centres spread over 573 fishing villages in
Tamil Nadu. However, fishermen are divided along caste lines and are concentrated in different geographical regions. Major fishing communities in Tamil Nadu are Pattinavars, Mukkuvars, and Paravas. Other communities involved in fishing are Kadayar, Thevar, Konar and Muthurayar. These communities have their own community institutions, which along with political institutions play a major role in fishing practices.

[1] ***A quinquennial survey conduct by the Central Marine Fisheries Research Institute, Kochi on behalf of the Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India. Prior to this a similar survey was conducted in 2005.***

Various studies (*e.g.* FIMSUL Reports[2]) have shown that fishermen are quite aware of the dwindling resources and are concerned about their future in fisheries. However, they mostly believe that it is the responsibility of the Government to address these issues. There is lack of awareness on possible ranges of actions that fishers can take to improve the scenario. Although, responsibility of fisheries management lies with the Department of Fisheries (DoF), in isolated cases, fishermen have taken initiative, especially in terms of access control, which can be seen as a crude form of participation in the management process. In Chennai, the Trawler Owners' Associations have implemented self rules regarding capitalization of fishing vessels and area of fishing. In some other places also there are tacit agreements within a particular gear-user group (*e.g. trawlers)* or between two gear-user groups on access to fishing grounds.

The Department of Fisheries, Government of Tamil Nadu (DoF-TN) holds the responsibility of fisheries management and development within the State and Territorial Waters limits (12 nautical miles- NM from the shore). A major activity of the DoF-TN is implementing various welfare measures, such as subsidies for oil and other developmental programme. These welfare activities consume nearly all resources of the Department and resultantly the Department is lacking in both funds as also manpower for implementing fisheries management measures.

Apart from fisheries, coastal aquaculture and salt production are other two primary activities carried out in coastal Tamil Nadu. Tamil Nadu is having the second longest coastline in the country with rich natural resources in coastal areas for coastal aqua farming. The total estimated brackish water area of Tamil Nadu is about 56,000 ha. The total area under shrimp farming is 4,455 ha out of which 3,178 ha is creek based and 1,277 ha is sea based. The farming is carried out mostly by the small-scale farmers. While shrimp aquaculture forms the majority of coastal aquaculture, other activities such as sea weed culture, crab fattening, pearl culture, etc are also being promoted.

The Coastal Aquaculture Authority set up under the coastal Aquaculture authority Act, 2005 is responsible for licensing and registration of shrimp aquaculture farms.

Tamil Nadu is also a major salt producing state. Tuticorin is a major salt production centre. The Salt Commissioners Organisation is responsible for leasing of identified salt production lands, maintaining a record of salt producers and carrying out welfare activities for salt workers.

Table 2 gives a broad description of stakeholders.

[2] ***The Fisheries Management for Sustainable Livelihoods Project (FIMSUL), a collaborative initiative between the Government of India, the Government of Tamil Nadu and the Food and Agricultural Organization of the United Nations was implemented in Tamil Nadu and Puducherry during April 2010 to December 2011.***

Table 2: Stakeholder mapping and analysis

Stakeholder	Size (approx. No. of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[3]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
Supra National						
World Bank- projects Post-Tsunami recovery and improving fisheries Governance in Areas Beyond National Jurisdiction (ABNJ)		Global	World Bank is promoting sustainable fisheries through Fisheries management for Sustainable Livelihoods (FIMSUL) programme and development of fisheries infrastructure. It has also shown interest in improving fisheries governance in ABNJ especially for species like Tuna.	Positive. However, the modus operandi may differ with GIZ.	High. World Bank is a major lender to Government of Tamil Nadu. Proposed PAs may also come under areas of work of the World Bank	World Bank is mostly working with policy-makers and media. The organization is related to other stakeholders through project partners.
FAO		Global	Apart from various in-country activities, FAO is executing regional LME project which covers east coast of India. GEF is also collaborating with MOEF	High	High	Working with policy makers, research institutes and media.

[3] Includes dependence on coastal and marine areas for livelihood

Stakeholder	Size (approx. No. of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[3]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
			in other projects			
Regional						
BOBP-IGO	6	South Asia	Establishing responsible fisheries though securing fisheries resources and livelihoods	Positive	Medium. BOBP-IGO is working with Ministry of Agriculture (DAHD&F). Management of PAs comes under MOEF.	Effective linkages with fisheries stakeholders and policy makers and both fisheries and environmental NGOs
SACEP		South Asia	To promote regional co-operation in South Asia in the field of environment and management of natural resources of the region.	Positive	Weak. SACEP has limited presence in India	-
BOBLME Project		Bay of Bengal	Conservation of critical habitat is focus area for the project	High	Low. Is likely to work through its national and regional partners. BOBP-IGO is a regional partner. The Project is coming to an end in March 2015. Its influence will depend on the organisation that succeed sthe project.	Working relation with scientist and policy makers
National						
Ministry of Agriculture		National	Development of marine	Neutral	Low	Positive relation with

Stakeholder	Size (approx. No. of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[3]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
(Department. Of Animal Husbandry, Dairying & Fisheries)			Fisheries, welfare of fish workers, etc.			Fisheries associations
Coastal Aquaculture Authority		National	Promoting sustainable aquaculture	**Neutral**	Medium	Interaction with fish farmers.
Marine Products Export Development Authority		National	Promoting fisheries trade	**Neutral**	Low	Interaction with exporters and lager mechanized fishing vessels.
ICSF		National	Protecting the rights of fish workers	**Inhibitive (?). While ICSF supports PAs, it is concerned about design of PAs and possible loss of livelihoods of fishers.**	Medium. Lobbying with DAHD&F and organizing fishermen associations, lobbying with FAO and like-minded organizations	Positive relation with fisheries associations and FAO.
National Fishworkers Forum (NFF)			To protect the life and livelihood of the fishing communities and its basic source - fisheries resources, biodiversity and natural environment.	Inhibitive (?). Might be concerned about loss of livelihoods	Medium. Lobbying with like-minded organizations. NFF successfully campaigned to modify the prohibition on shark fishing by MOEF in early 2000.	Positive with fisheries organization.

Stakeholder	Size (approx. No. of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[3]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
ICAR Institutes (CMFRI, CIBA, etc)			R&D	Positive	ICAR research institutes can provide necessary research inputs to educate stakeholders	Issue-based.
State						
Department of Fisheries, Government of Tamil Nadu (DoF-TN)		State	To augment aquatic resource production in the inshore areas by conservation measures, stock enhancement and establishing of artificial reefs etc., along the coast and to enforce regulatory measures through legislation for conservation of fishery resources both in Inland and Coastal waters.	Neutral. So far the Department of Fisheries either at State or at the Central level have played very limited role in setting up or management of PAs.	**Medium.** Conservation is in the domain of the Ministry/Department of Environment and Forests.	DoF-TN has contact with different fishermen groups much owing to their welfare activities. However, so far they have not exercised their control in terms of motivating or influencing the fishermen for bio-diversity conservation.
Fishermen associations (including SIFFS)		State	Welfare of members	Inhibitive	High	There are conflicts amongst different gear users. They also have conflict with MoEF. Relation with DoF-TN is usually good.
Tamil Nadu Fisheries University		State	R&D, fisheries education	Positive	Low	Limited within academic circle.

Stakeholder	Size (approx. No. of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[3]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
Site						
Association of Artisanal fishers		Site/District	Welfare of members	Inhibitive	Low	Conflict with motorized and mechanized fishing vessels. However, they also work as crew in these categories of vessels. The interaction of this group with the government officials is also minimal and issue-based.
Motorized boat owners		Site/District	Welfare of members	Inhibitive	Medium	Conflict with mechanized vessels. They also have a better working relation with the Government as this group usually comprises the beneficiaries of Government schemes.
Mechanized boat owners		Site/District/state	Welfare of members	Inhibitive	High	Conflict with traditional and motorized fishing vessels.
Offshore fishers	These fisher groups are organized around Nagapattanam and	Site/District/state	Welfare of members	Neutral (?)	High	Conflict with other mechanized fishing vessels.

Stakeholder	Size (approx. No. of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[3]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
	Kanniyakumari districts and engaged in tuna long lining and shark fishing.					
Fish traders/ money lenders		Site/District	Individuals	Inhibitive	High. They may influence fishermen.	Mostly interact with fishermen only.
Other sectors that have a major influence on establishment and management of coastal and marine protected areas. Only most relevant stakeholders at relevant level (Supra National/ National/ regional/ State/ site) have been described below						
Supra National						
GEF		Global	GEF is financing regional LME project which covers east coast of India. GEF is also collaborating with MOEF in other projects	Positive. However, the modus operandi may differ with GIZ.	Medium	Working with policy makers.
Regional						
IUCN-MFF		Regional	IUCN-MFF is working on GoM towards establishing a bi-national platform for	Positive	Medium. IUCN-MFF is basically an advisory body working in close	Close relation with scientist and policy makers. Limited field

Stakeholder	Size (approx. No. of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[3]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
			sustainable use of GoM		connection with Ministry of Environment and Forests, Government of India (MOEF).	presence.
SACEP		South Asia	To promote regional co-operation in South Asia in the field of environment and management of natural resources of the region.	Positive	Weak. SACEP has limited presence in India	-
National						
Ministry of Environment and Forest, GoI		National	Promoting conservation of biodiversity as per CBD convention and other National and International regulations	Positive	High	Conflict with resource users.
National Biodiversity Authority			To promote objectives of CBD	Positive	Low.	Low field presence.
Salt Commissioner's Organization		National	Development of salt industry and welfare of salt workers	Neutral. In some cases when existing salt farms comes within PA, there might be conflict	Low	Mostly with salt producers.

Stakeholder	Size (approx. No. of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[3]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
State						
Department of Environment and Forests		State	Promoting conservation of biodiversity as per CBD convention and other National and International regulations	Positive	High	Conflict with resource users.
Tamil Nadu State Coastal Zone Management Authority		State	To take measures for protecting and improving the quality of the coastal environment and preventing, abating and controlling environmental pollution in the coastal areas of the State of Tamil Nadu	Positive	High	Conflict with fisheries sector.
Site						
Other coastal resource users		Site	-	Inhibitive. Fear of alienation	High	Conflict over resource uses but overall positive
Religious Institutions		Site/State	Community development	Positive. However, there are concern for livelihoods.	High	Good relation with fishermen organizations
Village Panchayats officials. This includes both		Site/district/state	Promotion and protection of interest of related groups	Positive. However, there are concern for livelihoods.	High	Good relation with fishermen organizations

Stakeholder	Size (approx. No. of organizations or individuals)	Geographical area of influence	Mandate, role, responsibility and function in relation to coastal and marine areas and PAs	Interest in and support to coastal and marine areas and PAs (can be positive, neutral or inhibitive)[3]	Power to influence management of coastal and marine PAs, specific areas of influence	Relationship to other stakeholders, and the nature of the relationship
political and community-based Panchayats. They play important role in designing allocation and access rules and mediate during conflicts.						

2.2. CAPACITY GAP ANALYSIS

An overview of the major capacity gaps vis-à-vis enabling environment, cross-sector and cross-stakeholder cooperation, organizations and individuals in the fisheries sector of Tamil Nadu.

Table 3: Problem analysis and capacity gap analysis

Dimensions of Capacity (one per line)	**Function / purpose**	**Level of importance**	**Stakeholders involved**	**What are the Related problems**	**Level of complexity**	**Target situation vis-à-vis dimension of capacity**	**Capacities to achieve the desired framework/ process**		
							Required	**existing**	**gaps**
Enabling Environment									

Dimensions of Capacity (one per line)	**Function / purpose**	**Level of importance**	**Stakeholders involved**	**What are the Related problems**	**Level of complexity**	**Target situation vis-à-vis dimension of capacity**	**Capacities to achieve the desired framework/ process**		
							Required	**existing**	**gaps**
The Tamil Nadu Marine Fishing Regulation Act (TNMFRA)	The TNMFRA provides the legal framework for fisheries management. The objective of TNMFRA is conflict resolution among different user groups and prohibiting harmful fishing practices.	High. The Act provides for time and area closure and also has provisions for use of fishing gear. These clauses in combination can be used for creating a protected area or in other words closed area from fisheries perspective.	DoF-TN	Department of Fisheries lacks manpower and funds to implement such measures. For example, the Department does not have its own Fisheries Guards for 24X7 monitoring of closed areas or when there is ban on fishing.	High	Effective implemetation of TNMFRA through proper monitoring, control and surveillance and participatory management.	Monitoring, control and surveillance, knowledge management and adopting a participatory approach	Officials are over-burdened with welfare work	A dedicated fisheries managemen t unit is required
			Fishermen organizations	Unrestricted entry into fisheries led	High	Reducing pressure on fisheries through bar on entry	Voluntary removal/ controling of	Lack of alternative to reduce	HCB to reduce dependance

Dimensions of Capacity (one per line)	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation vis-à-vis dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
				to over-exploitation			fishing effort	dependence on fisheries	on fisheries sector.
Coastal Regulation Zone Notification, 2011	To ensure livelihood security to the fisher communities and other local communities, living in the coastal areas, to conserve and protect coastal stretches, its unique environment and its marine area and to promote development through sustainable manner based on scientific principles taking into account the dangers of natural hazards in the coastal areas, sea level rise due to global warming,	High	Tamil Nadu State Coastal Zone Management Authority	Fishermen have complained of many violation of the Notifications by industry and tourism sector. A proper monitoting and implementation mechanism is absent.	High	Provisions for improving monitoring and enforcement exist.	Regular monitoring and periodic physical verification	-	Physical monitoring is absent
Coastal Aqauculture Authority Act, 2005	For setting up of Coastal Aquaculture Authority with a mandate to ensure sustainable aquaculture	Low	Coastal Aquaculture Authority	Destruction of mangroves for construction of shrimp farms, catching of mother shrimps through	Medium	Provisions for conservation of mangroves exist but not for trawling for mother shrimps	Provisions for harvesting of mother shrimps in sustainable manner	-	Provisions for harvesting of mother shrimps does not exist.

Dimensions of Capacity (one per line)	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation vis-à-vis dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
				trawling.					
Rural Emplyment Guarantee schemes	To generate employment in rural areas and to develop entrepreneurial skill and attitude among rural unemployed youth.	High	Village Panchayat	Opening suitable for fishers are not being created	High	Creation of alternative/additional employment opportunities for fishermen	HCB for taking alternative/additional ventures	Regular training programmes suitable for migration of fishermen absent	Curricula for conducting a regular trainbing programme based on skills of fishermen to migrate to new sectors.
			Other resouurce users		High	Managing conflict with other resource users			
			Fishermen organizations	Fishermen are not migrating outside the sector	High	Creation of alternative/additional employment opportunities for fishermen	HCB for taking alternative/additional ventures	Regular training programmes suitable for migration of fishermen absent	Curricula for conducting a regular trainbing programme based on skills of fishermen to migrate to new sectors.
Wildlife Protection Act, 1972	The Act provides for the protection of wild animals,	High	Ministry of Environment and Forests	Lack of consultation with stakeholders	High	Consultative mechanism to implement the Act needs to be in place.	Awareness creation on needs of consultation	Benefits of consultation is not realized	Legal and implementational gap exist to

Dimensions of Capacity (one per line)	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation vis-à-vis dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
	birds and plants; and for matters connected therewith or ancillary or incidental thereto.			while implementing the Act and during creation of Pas under the Act					ensure consultation.
Salt Cess Act ,1953	An Act to provide for the levy and collection of a cess on salt in connection with the manufacture, supply and distribution of salt.	Low	Salt Commissioner's Organizations						
			Salt producers						
Organizational and network capacity									
Availability of reports and awareness material on biodiversity	To sensitize stakeholders on need of conservation of biodiversity	High	ICAR Institutions	Non-technical briefs for stakeholders in vernacular absent	Low	Scientific studies on biodiversity are going on which needs to be translated in non-technical readable content	HCB in translation of scientific results	Lack of incentives in translating scientific material	Non-technical material are absent

Dimensions of Capacity (one per line)	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity	Target situation vis-à-vis dimension of capacity	Capacities to achieve the desired framework/ process		
							Required	existing	gaps
Organizing fishermen and raise their voice in policy making	To arrive at a consultative mechanism and felt need in conservation	High	ICSF/NFF	Lack of agreement on role of fishermen in existing legal framework	High	Fishermen are aware of their responsibility on conservation			
Availability of regular HCB programmes aimed at additional/alternative livelihoods	To enable migration of people from over-exploited resource areas	High	ICAR Institute/ Panchayat/ DAHDF	Regular training programmes are absent	Meedium	No proven alternative options exist	Market survey to explore options for fishers	Project-design based training	Location specefic training programmes
Comprehensive policy and funding mechanism to enable governemntal agencies in implementing relevant Acts exist	Poor implemntation of relevant Acts is a major cause which needs to be corrected	High	World Bank/GEF/BOBP-IGO/BOBLME/IUCN						
Individual competence									
Leadership skills in fisheries organizations	To enable fisheries organisation to look beyond immediate issues	High	ICAR Institute/ World Bank/GEF/BOBP-IGO/BOBLME/IUCN	Lack of leadership skills in fisheries organizations	High				

3. RECOMMENDATIONS FOR POSSIBLE HCD INTERVENTIONS:

Table3: Recommendations for possible HCD interventions

Target situation vis-à-vis dimension of capacity	Capacity gaps	Possible intervention	For whom (target group)	Resource organizations/ persons (providers)	Expected impact	Expected synergies with other dimensions
Effective implemetation of TNMFRA through proper monitoring, control and surveillance and participatory management.	A dedicated fisheries management unit is required			ICAR Institute/ DAHDF/BOBP-IGO/World Bank		
Reducing pressure on fisheries through bar on entry	HCB to reduce dependance on fisheries sector.					
Coastal Regulation Zone Notification 2011. Provisions for improving monitoring and enforcement exist.	Physical monitoring is absent					
Coastal Aqauculture Authority Act. Provisions for conservation of mangroves exist but not for trawling for mother shrimps	Provisions for harvesting of mother shrimps does not exist.					

Target situation vis-à-vis dimension of capacity	Capacity gaps	Possible intervention	For whom (target group)	Resource organizations/ persons (providers)	Expected impact	Expected synergies with other dimensions
Rural Emplyment Guarantee schemes. Creation of alternative/additional employment opportunities for fishermen	Curricula for conducting a regular trainbing programme based on skills of fishermen to migrate to new sectors.					
Wildlife Protection Act	Consultative mechanism to implement the Act needs to be in place.	Legal and implementational gap exist to ensure consultation				
Organizational and network capacities						
Availability of reports and awareness material on biodiversity. Scientific	Non-technical material are absent					
studies on biodiversity are going on which needs to be translated in non-technical readable content						
Organizing fishermen and raise their voice in policy making. Fishermen are aware of their responsibility on conservation.						

Target situation vis-à-vis dimension of capacity	Capacity gaps	Possible intervention	For whom (target group)	Resource organizations/ persons (providers)	Expected impact	Expected synergies with other dimensions
Availability of regular HCB programmes aimed at additional/alternative livelihoods. No proven alternative options exist	Location specefic training programmes					
Comprehensive policy and funding mechanism to enable governemntal agencies in implementing relevant Acts exist						

3.1. TRAINING CAPACITIES IN/FOR THE STATE:

By involving these organizations during the delivery of HCD, the sustainability of further training is safeguarded, and mainstreamed at the local level.

Table 4: Description of resource organizations/ networks/ individuals (providers)[4]

Name of organization	Type of capacity-strengthening programmes they are engaged in?[5]	Target group	What is their thematic focus?	Geographical focus[6]	Information on the existing training/ capacity building networks they are part of (with reference to the 4 project states)		Support required by the organization itself to sustain its capacity building measures to the other stakeholders			
							Curriculum development	Training system development	Faculty development	others
Supra										

[4] Please provide brief information in this table. Detailed information, if possible, can be provided n the fact-sheet for each organization in the Annexure.

[5] Innovation and Knowledge Networks/ Leadership Development/ Policy Dialogue/ Cross-sector and cross-stakeholder learning / Training / Training of Trainers/ capacity building of training institutions/ research / Fellowships/ exposure visits

[6] indicate names of the project partner states

National										
BOBP-IGO	Awareness building, Technology diffusion	Fishers/ Fisheries officials	Sustainable fisheries	South Asia						
National										
ICAR Institutes	Fishing technology, fish processing, value addtion, additional/ alternative employment	Fishers	Fisheries R&D	India						
State										
TNFU (Tamil Nadu Fisheries University)	Fisheries education	Students/fishers	Fisheries R&D	India						
Site										

4. ANNEXES

4.1. DETAILED LIST OF LITERATURE CITED

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About the Study

The Ecosystem Approach to Fisheries is gaining currency in the recent times, and fisheries officials are becoming more aware about the conservation needs. On the other hand, for fishers, conservation is usually equated to loss of livelihoods and is, therefore, unpopular; although when consulted and educated properly, fishers have supported conservation measures. There is, therefore, need to systematically assess the pereceptions and capacity needs of the fisheries sector stakeholder, to enable their full participation in conserving coastal and marine biodiversity and MPA management. The study customized the existing Capacity Needs Assessment (CNA) tool developed by CMPA project, conducted by the Bay of Bengal Programme (BOBP). A situation analysis of the fisheries sector in India vis-à-vis capacity development systems, structures and tools relevant to marine protected areas (MPA's) was carried out. The assessment was carried out in the four coastal states Gujarat, Maharashtra, Karnataka and Tamil Nadu to understand the existing capacities available with the fisheries sector as well as their requirements/needs to participate in the effective management and conservation of coastal and marine protected areas.

The CMPA Project

The Project "Conservation and Sustainable Management of Coastal and Marine Protected Areas" (CMPA) is a project of the Indo-German technical cooperation. It is funded by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) and implemented by the Ministry of Environment, Forests and Climate Change (MoEFCC), Government of India, and the *Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of BMUB.*

Established to support the achievement of the Aichi targets of the Convention on Biological Diversity, the Project's overall goal is to contribute to conservation and sustainable use of biodiversity in selected areas along the coast of India. Taking into consideration the economic importance of the coastal zone for large segments of the population, the Project's approach is people-centered, thus ensuring the support for conservation by those depending on coastal ecosystems.

CMPA Technical Report Series

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December 2013

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On behalf of:

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

of the Federal Republic of Germany

Indo-German Biodiversity Programme
Conservation and Sustainable Management of Coastal and Marine Protected Areas