



## Capacity Needs Assessment for participatory management of coastal and marine protected areas in India with special reference to Forest Sector and Youth

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Capacity Needs Assessment for participatory management of coastal and marine protected areas in India with special reference to Forest Sector and Youth

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### **List of Acronyms (in alphabetical order)**

ATREE – Ashoka Trust for Research in Ecology and Environment  
BNHS – Bombay Natural History Society  
BOBP – Bay Of Bengal Program  
CASMB, AU – Centre of Advanced Study in Marine Biology, Annamalai University  
CEE – Center for Environment Education  
CIFE – Central Institute of Fisheries Education  
CMFRI – Central Marine Fishery Research Institute  
CNA – Capacity Needs Assessment  
CPREEC – CPR Environmental Education Centre  
CRZ – Coastal Regulation Zone  
CSM-CMPA - Conservation and Sustainable Management of existing and potential Coastal and Marine Protected Areas  
EEZ – Exclusive Economic Zone  
GEER – Gujarat Ecological Education and Research Foundation  
GIZ - Deutsche Gesellschaft für Internationale Zusammenarbeit  
GJ – Gujarat  
GoI – Government of India  
GOMBRT – Gulf of Mannar Biosphere Reserve Trust  
GUIDE – Gujarat Institute of Desert Ecology  
HCD – Human Capacity Development  
ICMBA – Important Coastal and Marine Biodiversity Areas  
ICSF – International Collective in Support of Fish workers  
IIFM – Indian Institute of Forest Management  
IISc – Indian Institute of Science  
IIT – Indian Institute of Technology  
IUCN – International Union of Conservation of Nature  
KBB - Karnataka Biodiversity Board  
KR – Karnataka  
LBSNAA – Lal Bahadur Shastri National Academy of Administration  
MH – Maharashtra  
MNP – Marine National Park  
MoEF – Ministry of Environment and Forests  
MPA's – Marine Protected Areas  
MSSRF – M. S. Swaminathan Research Foundation  
NBA – National Biodiversity Authority  
NCSCM – National Centre for Sustainable Coastal Management  
NFF – National Fish workers Forum  
NICMB - National Institute for Coastal and Marine Biodiversity  
NIO – National Institute of Oceanography  
SDMRI – Suganthi Devadason Marine Research Institute  
TISS – Tata Institute of Social Sciences  
TN – TamilNadu  
UNDP – United Nation Development Program  
UNEP – United National Environment Program  
WFFP – World Forum of Fishers People  
WII – Wildlife Institute of India  
WTI – Wildlife Trust of India  
WWF – World Wildlife Fund  
ZSI – Zoological Survey of India



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## ***Summary***

Coastal and marine ecosystems and their resources provide large benefits to the countries of the region through fisheries and tourism, which are highly important economic sectors in most of the countries, particularly India. Many people throughout the region are directly dependent on these resources, however, poverty is widespread, especially among coastal populations. Millions of people rely heavily on coastal and marine ecosystems and resources for livelihoods. India has a vast coastline of 7, 517 km, with an Economic Exclusive Zone of 2.02 million sq. km. This coastline supports a high human population that is dependent on the rich coastal and marine resources. It is estimated that nearly 250 million people live within a swath of 50 km from the coastline of India. Therefore, the ecological services of the marine and coastal ecosystems play a vital role in India's economic growth. Despite the tremendous ecological and economic importance and the existence of a policy and regulatory framework, India's coastal and marine biodiversity including sea turtles are under threat. Marine protected areas network in India has been used as a tool to manage natural marine resources for biodiversity conservation and for the well-being of people dependent on.

In this context, this assessment study was aimed to customize the existing Capacity Needs Assessment (CNA) tool and to prepared the "Conceptual and Situation Analysis" of the capacity development systems, structures and tool relevant to marine protected areas (MPA's) in India under the Indo-German Biodiversity Programme with a project entitled "Capacity Needs Assessment for participatory management of coastal and marine protected areas in India with special reference to Forest Sector and Youths". This program was jointly implemented by the Ministry of Environment and Forests (MoEF), Government of India, and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).

The capacity needs assessment was carried out in the four coastal states Gujarat, Maharashtra, Karnataka and Tamil Nadu to understand the existing capacities available with the forest sector as well as their requirements/needs to participate in the effective management and conservation of coastal and marine protected areas. In addition, the

capacity needs of the youths of local populations and fishermen to know the socio-economic status in sustaining the livelihoods.

Based on the field assessment studies, the major gaps in the capacities of the forest sectors of all the coastal states (Gujarat, Maharashtra, Karnataka and Tamilnadu) are inadequacy in baseline data of biodiversity, infrastructure and leadership qualities to involve all the stake holders in policy making; lack of inter-sectoral coordination and adequate skills for the effective management of MPA's; and lack of necessary infrastructure and equipments to carry out the applied research and development of research framework for the improved conservation of coastal and marine protected areas in all the four coastal states.

The major possible interventions of the HCD measures of forest sector and youths of local populations of all the project states have been identified as: they require a conducive environment to consult, debate, understand and mutually agree for a common goal i.e. conservation of marine protected areas with the involvement of identified stake holders including the participation of local communities; intervention in existing policies to enhance the participatory approaches in the PA management; capacity building of resource organizations towards the emerging issues such as climate change, endangered species and invasive species with better linkage and understanding; issues related to lack of funds and manpower for the applied research; and training for leadership development and establishment of knowledge based system with participatory approaches for effective management of marine protected areas.

## 1. INTRODUCTION

The sea around India is part of the great Indian Ocean, and the Indian subcontinent forms a major physical division between the Arabian Sea and the Bay of Bengal of the Indian Ocean. India has a vast coastline of 7,517 km, of which, 5,423 km belong to Peninsular India and 2,094 km to the Andaman, Nicobar, and Lakshadweep Islands, and with an Economic Exclusive Zone of 2.02 million sq. km. This coastline also supports a huge human population, which is dependent on the rich coastal and marine resources. It is estimated that nearly 250 million people live within the swath of 50 km from the coastline of India. Therefore, the ecological services of marine and coastal ecosystems of India play a vital role in India's economic growth and in ensuring human well-being.

Despite the tremendous ecological and economic importance and the existence of a policy and regulatory framework, India's coastal and marine ecosystems are under threat. Numerous direct and indirect pressures arising from different types of economic development and associated activities are having adverse impacts on coastal and marine biodiversity across the country. Additionally, climate change is likely to have an impact on coastal and marine ecosystems, including a likely increase in extreme weather events as well as sea level rise, warming of the sea surface temperatures and ocean acidification. A rise in the sea level is likely to have significant implications on the coastal populations and agricultural productivity.

Marine protected areas network in India has been used as a tool to manage natural marine resources for biodiversity conservation and for the well-being of people. India has designated four legal categories of protected areas *viz.* National Parks, Wildlife Sanctuaries, Conservation Reserves and Community Reserves. Scientific monitoring and traditional observations confirm that depleted natural marine resources are getting restored and/or pristine ecological conditions have been sustained in well managed Marine Protected Areas. Recently, a total of 106 coastal and marine sites have been identified and prioritized as Important Coastal and Marine Areas (ICMBA) using globally used criteria by the Wildlife Institute of India. These sites have been proposed as Conservation / Communities Reserves with participation of local communities. Efforts are currently underway in securing and strengthening community participation in management of the marine protected area network in India.

India and Germany have joined hands to work towards the conservation of coastal and marine biodiversity and the improvement of the livelihoods of the local population concerned under the new project “Conservation and Sustainable Management of existing and potential Coastal and Marine Protected Areas” (CSM-CMPA). The project is jointly implemented by the Ministry of Environment and Forests (MoEF), Government of India, and *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) GmbH on behalf of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).

The basic premise of the project is that “Improved conservation and management of biodiversity in selected existing and potential Coastal and Marine Protected Areas (CMPA) supports improvements in biodiversity and local livelihoods”.

Capacity Needs Assessment (CNA) for participatory management of coastal and marine protected areas in India, to guide the development of a customised comprehensive capacity building plan is essential. Further, based on this assessment, relevant project activities will be designed and implemented in the partner States in cooperation with National and International institutions.

## **1.1. Objectives**

Capacity development means different things to different people, therefore, when one thinks about capacity development, courses or training programmes often come to mind. Although, training is certainly an important component of capacity development, but not all training interventions have the desired result. Training can enhance knowledge, strengthen skills or influence changes in attitude, but long-term solutions to CMPAs require more intervention than training alone. Having the capacity is actually the same as having the ability to perform, therefore, WII has carried out this assessment analyzing the available capacity with Forests Sectors and Youths to improve the conservation and management of selected coastal and marine protected areas in India.

## **1.2. Current status of coastal and marine ecosystem of India**

India has a vast extent of coast line of about 8000 km spanning 13 maritime mainland States and Union Territories, which are home to a diversity of coastal and marine ecosystems, comprising nationally and globally significant biodiversity (Venkataraman and Wafar, 2005). It also supports

almost 30% of its human population being dependent on the rich exploitable coastal and marine resources. The coastline of the Bay of Bengal and Arabian Sea continues to be a rich fishing ground in the south Asian region and India is one of the world's largest marine product nations. Marine ecosystems such as estuaries, coral reefs, marshes, lagoon, sandy and rocky beaches, mangrove forests and seagrass beds are all known for their high biological productivity, which provide a wide range of habitat for many aquatic flora and fauna. It also provides important food resources and innumerable ecological services to human beings. Therefore, sustainability of these fragile ecosystems needs to be our primary concern. So far, we have largely looked at the marine biodiversity as a source of commercial products instead of appreciating their ecological values and services which has resulted in over exploitation and several coastal and marine species are now in the verge of extinction. Moreover, human activities such as destructive fishing, shipping, coastal developments, discharge of untreated effluent from industries have caused considerable damage and pose a severe threat to the coastal and marine biodiversity. In addition to these, global warming due to climate change also poses a major challenge to our marine biodiversity.

The marine and coastal environment of India comprises varieties of geomorphological features, which harbor a unique and rich biodiversity. Marine Protected Area Network is a tool to manage natural marine resources for biodiversity conservation and for the well-being of people dependent on. Scientific monitoring and traditional observations confirm that depleted natural marine resources can get restored and/or pristine ecological condition can be sustained in well managed MPAs. In India there are 31 Coastal and Marine Protected Areas present (Fig 1). Of the 31MPAs, 18 are offshore or away from the mainland, which are protecting or conserving exclusively marine life forms and these PAs are considered as exclusive MPAs. Of the 18 MPAs, seven have the status of Marine National Parks, whereas the remaining are Wildlife Sanctuaries. Wildlife Institute of India through its satellite marine centre 'National Institute for Coastal and Marine Biodiversity (NICMB)', Kanyakumari had carried out a nationwide assessment on the status of Indian coastal and marine environment to identify the important coastal and marine biodiversity areas (ICMBA), which may have the potential to be declared either Marine PAs or Community Reserves or Conservation Reserves or Biodiversity Heritage sites. Excluding MPAs, five newer offshore sites along the east and west coast of Indian mainland and one at Lakshadweep Island were recognized as Important Coastal and Marine Biodiversity Areas which may be declared as MPAs.

**Table 1: Marine protected areas in the Penninsular India**

Sl.No.	PA Name	Area
1	Coringa	235.7
2	Krishna	194.81
3	Pulicat Lake	500
4	Dadra & Nagar Haveli	92.16
5	Fudam	2.18
6	Chorao Island	1.78
7	Marine (Gulf of Kachchh)	162.89
8	Khijadia	6.05
9	Marine (Gulf of Kachchh)	295.03
10	Kadalundi Vallikkunnu Com R	1.50
11	Malvan Marine	29.12
12	Bhitarkanika	145
13	Bhitarkanika	672
14	Chilka (Nalaban)	15.53
15	Gahirmatha	1435
16	Gulf of Mannar Marine	6.23
17	Point Calimere	172.6
18	Pulicat Lake	153.67
19	Sundarbans	1330.1
20	Haliday Island	5.95
21	Sajnakhali	2091.12
22	Lothian Island	38

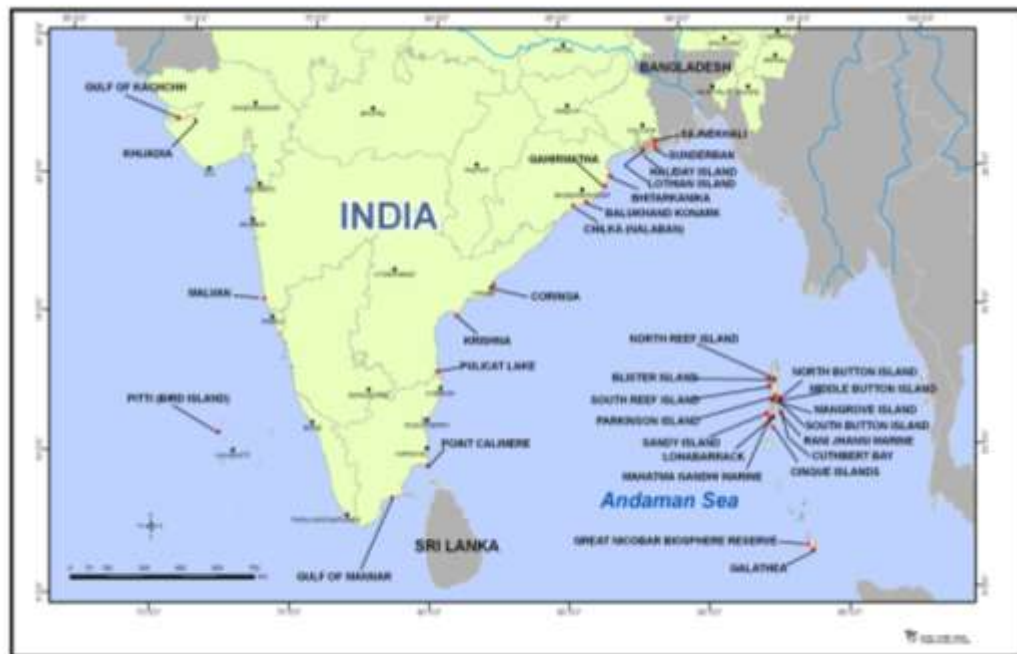
**Category II (Islands)**

<b>19.</b>	North Buttan N.P., Middle Andaman	044
<b>20.</b>	Middle Buttan N. P., Middle Andaman	044
<b>21.</b>	South Buttan N.P., Middle Andaman	003
<b>22.</b>	North Reef Island Sanctuary, North Andaman	348
<b>23.</b>	South Reef Island Sanctuary, Middle Andaman	117
<b>24.</b>	Cuthbert Bay Sanctuary, Middle Andaman	582
<b>25.</b>	Cingue Sanctuary, South Andaman	951



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<b>26.</b>	Galathea Bay Sanctuary, Great Nicobar*	1,144
<b>27.</b>	Parkinson Island Sanctuary, Middle Andaman	034
<b>28.</b>	Mangroves Island sanctuary	039
<b>29.</b>	Blister Island Sanctuary, North Andaman	026
<b>30.</b>	Sandy Island Sanctuary, South Andaman	158
<b>31.</b>	Pitti Wildlife Sanctuary, Lakshadweep	01
<b>TOTAL</b>		<b>3,491</b>
Grand total – 33 national parks and sanctuaries (31 MPA's)		<b>6,27,121</b>



**Figure 1: Location of Marine Protected Areas in India (See Table 1 for further details)**

### 1.3. Threats to Coastal and Marine Biodiversity

Coastal and marine ecosystems are among the most biologically and economically productive ecosystems in the world and the same is true for India where these ecosystems are both a source of livelihood as well as of a range of ecological services that are critical for the day to day well-being of millions of people particularly coastal communities. Despite their tremendous ecological and economic importance and the existence of a substantial policy and regulatory framework, India's coastal and marine ecosystems are under increasing threat. Numerous direct and indirect pressures arising from different types of economic development and associated activities are having adverse impacts on coastal and marine biodiversity across the country. Major anthropogenic direct drivers of ecosystem degradation and destruction include habitat conversion to other forms of land use, overexploitation of species and associated destructive harvesting practices, the spread of invasive alien species, and the impacts of agricultural, domestic and industrial sewage and waste. Additionally, climate change is likely to have a growing impact on coastal and marine ecosystems, including a likely increase in extreme weather events as well as sea level rise, warming of the sea surface temperatures and ocean acidification. Coastal habitats are also subject to powerful natural weather phenomena, such as, cyclones, hurricanes and storms. Indirect drivers of ecosystem change include demographic, socio-political, cultural, economic and

technological factors. The indirect drivers of change are primarily demographic, economic, socio-political, scientific and technological, and cultural and religious. The interaction of several of these drivers in turn affects the overall level of resource consumption and disparities in consumption within and between marine protected areas. Clearly these drivers are changing: population and the global economy are growing, there are major advances in information technology and biotechnology, and the world is becoming more interconnected. Changes in these drivers are projected to increase the demand for food, fiber, clean water, and energy, which will in turn affect the direct drivers. The direct drivers are primarily physical, chemical, and biological, such as land cover change, climate change, air and water pollution, irrigation, use of fertilizers, harvesting, and the introduction of alien invasive species.

The post independence era has witnessed a rapid growth of human population coupled with urbanization and industrialization. This has taken a heavy toll on India's wilderness. Creation of Protected Areas has been a major conservation measure to mitigate the impacts of these pressures. Now, India has a total of 683 wildlife Protected Areas (PA), covering 5.02% of the total geographical area (WII Database, 2013).

## Chapter 2

# GUJARAT

### 2.1. Introduction

Gujarat has a coastline of 1663 km, which is the longest among all the littoral States of the country; it shares about 21.3% of the Indian coastline of total 7517 km. It occupies 35% and 9.9% of the total Indian Continental shelf and EEZ respectively. It stretches from Lakhpat in the northwest of Kachchh district to Umargam in the south of Valsad district. The coastline touches 11 districts and 40 talukas.

Gujarat's coast is distinct from the other coasts of the country with its shallow depth, wider continental shelf and vast stretches of saline and tidal mudflats. While the continental shelf of upto 50m depth is spread over 64,810 sq km area, those with a depth between 50 – 200 m is spread over 99,373 sq km. The Gulf of Kachchh is aligned in an east-west direction, has depths ranging from less than 20 m at the head to about 60m at the mouth (Nair *et al.*, 1982). The Gulf of Khambhat is aligned in a north-south direction and the depth ranges from 5-27m., the continental shelf off the west coast of Saurashtra slopes very gently to a depth of 60m over a distance of 350km.

The entire coastline exhibits a wide diversity of geo-morphological features including mudflats, sandy beaches, coral reefs, rocky cliffs, estuaries and off-shore islands. The beaches of Gasabara and Madhavpur were important olive ridley turtle nesting sites. The intertidal mudflats extend from 3-3.5 km between Mundra and Kandla areas of Gulf of Kachchh; Khambhat and Wadgham in Gulf of Khambhat. The total mudflat area covers about 2176 km<sup>2</sup> and 2588 km<sup>2</sup> in Gulf of Kachchh and Gulf of Khambhat respectively. Mudflats alone occupy about (73%) areas among total coastal wetland types in Gujarat.

Sabarmati, Narmada, Mahi and Tapi are the four major river systems that form estuarine environment at confluence of their mouths. All these lie within the Gulf of Khambhat and south Gujarat forms their course as muddy substratum. Gulf of Kachchh is the only area in Gujarat where corals exist. Satellite imageries indicated that the total reef area of Gulf of Kachchh was 217km<sup>2</sup> in 1975 and fluctuation in total coverage has been recorded since then. Bahuguna and Nayak (1998)

accounted the differences in coral cover and distribution pattern in MNP for a 15 year period from 1987 to 1991. There are 34 islands of the Gulf out of 42 in the MNP bordering Jamnagar were reported to support coral and coral reefs (ICMAM, 2002) and their age vary from 5240 to 45000 years (Gupta, 1972).

Seagrasses occurs only in the sub-tidal regions of a few islands in the Gulf of Kachchh. *Halophila ovalis* and *Thalassia sp.* were seen off Piroton. Rashid (1985) reported the presence of *Cymodocea serrulata* in Gulf of Kachchh with restricted distribution. Present survey records the presence of *H.ovalis* and *C.serrulata* in Narara bet and in Piroton as small patches distributed contiguously. Gujarat State is historically known to have supported extensive mangrove cover in India. According to FSI 2005 report, Gujarat State has 960 km<sup>2</sup> of mangrove cover and this shows a marked (49km<sup>2</sup>) increase from the earlier survey.

Gujarat tops the list of the 9 littoral States of India accounting for 23.1% and 32.5% in marine fish production and export of National total respectively (GES, 2000). Marine fish production has reached to a maximum of 7,43,638 MT (28.7%) in 2002-2003 (SOE, 2005).

### **2.1.1. Threats to the coastal environment**

Industrialization and consequent urbanization has brought environmental degradation inland and pressures on coastal biodiversity too. Gujarat ranks second in industrial development among the Indian States. Industrial developments, its related urbanization, land reclamation, effluent discharge and spills, saltpans, mining-dredging, cattle grazing, natural catastrophe etc. are the factors that generally threatens the coastal ecosystems. All anthropogenic activities either destroy the environment directly or degrade the ecosystems by simply adding pollutants into them. Based on field surveys and on thorough literature survey of environmental degradation along Gujarat coast has been described under different general categories.

Historical information shows that there were 84 ports in Gujarat during the medieval period, and there were about 62 ports in Saurashtra alone as late as 1842 (Thakker *et al.*, 2007). At present, Gujarat has the highest number of ports in the country; there are about 41 ports - 29 minor, 11 intermediate and one major port. With new policy of economic liberalization and encouragement

of privatization, the State Government has been evolving an ambitious plan for the development of its vast coastal zone for new ports, harbours, jetty and industries etc.

It was estimated that more than 50% of the total future investment coming to Gujarat in the industrial sector is likely to be located nearer to the port locations. About 5 million tonnes of solid wastes have been estimated to be generated from these industries annually. The solid wastes from chemical units, scum and byproducts from petrochemicals, fertilizer and pesticide production units, ash and burnouts, scraps from steel industries etc adds more bulk dumps with potential hazardous properties. Further, shortcomings in capacity to manage the coastal ecosystems were also observed.

### **2.1.2. Conservation Measures**

In India, Gujarat has taken a lead in the afforestation of mangroves, which is remarkable and the target of achievement in the State have been higher than the total mangrove afforestation in the rest of the States in India. A total of 37100 ha of intertidal mudflats have been afforested till 2005 (Singh, 2006). According to the Forest Department, about 46351 ha of area were planted with mangroves under different plantation scheme.

There are Pirs (religious sites of Muslim) on islands and in beyts, where mangroves and mangroves associated trees are considered as nature's gift and worth worship since they provide livelihood. Very old mangrove trees are still protected due to establishment of the Pir within the grove and fishermen worship them. Not only the Muslim community, fishermen belong to Hindu also worship and protect these areas as sacred groves. They are marked by green or red flag as symbol of site for worship place.

Shravan Kavadiya, a landlocked mangrove patch is treated as temple forest and no damage is caused to the grove. These practices are comparable to similar kind of worship in south Indian mangrove areas, e.g., Pichavaram mangrove forest.

### *Prayers while plantation*

In recent years, mangrove plantation programs were started as per Hindu rituals with prayers and mantras so as to grab the local attention and to protect them in the view of sacredness. A mangrove plantation program implemented by KSVS in 2000 at Dumas was initiated in such a way with local people's participation.

An NGO based at Kachchh utilized the so said '*exotic weed*' species efficiently to generate alternative income for the poor coastal people. The pod from this species has been used for large-scale production of gum, honey, charcoal and cattle feed. Similarly, a private industrial group in Kachchh is utilizing the saline areas for raising *Salvadora persica*, a mangrove associate species that can tolerate high salinity.

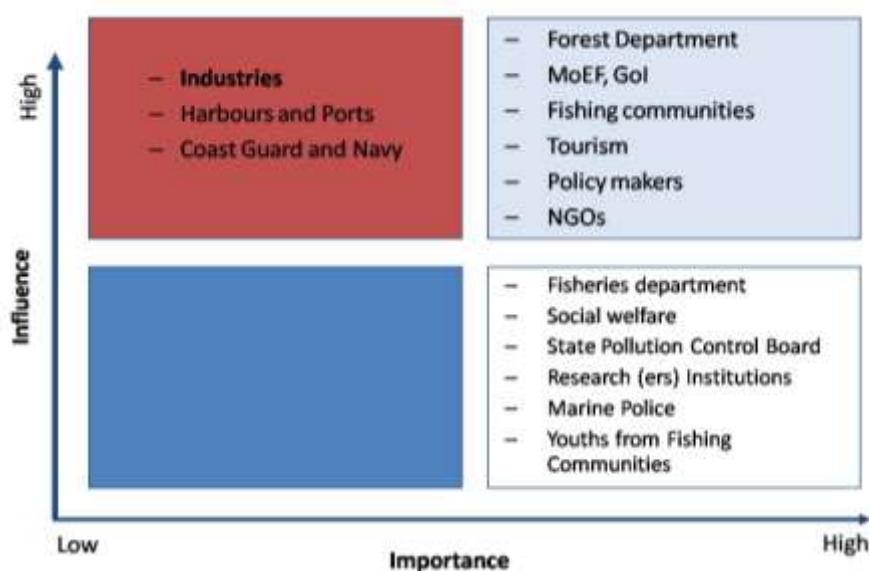
Along the coastal stretch between Mahuva and Gopnath of Bhavnagar district *Aloe vera* is being cultivated in between the gaps of *Prosopis juliflora*. Several tonnes of Aloe have recently been harvested which has previously been auctioned to a Tamil Nadu based pharmaceutical unit.

### **2.1.3. Porbandar Marine Conservation Reserve in Gujarat**

The Porbandar coast in Gujarat is a well known nesting site for the Green, Hawksbill and Olive Ridley marine turtles. Because of this, the Gujarat Forest Department has set up the Madhavpur Turtle Hatchery, which has been functional for over decade. However, the offshore waters of the Porbandar coast have global significance now because of the whale sharks. It is now known that atleast two to three hundred whale sharks migrate into this region and are reportedly breeding in this area. The Gujarat Forest Department is facilitating the Wildlife Trust of India and a corporate group for initiating a major whale shark conservation programme. In addition to Gir Lion, Wild Ass and Flamingo, the Whale Shark breeding location may also be exclusive to State of the Gujarat. The WII is recommending the Gujarat Government and MoEF, GOI to consider establishing the Porbandar Marine Conservation Reserve. Being a conservation reserve eco-compatible marine fisheries and other activities along the marine turtle nesting beaches in Porbandar-the birth place of Mahatma Gandhi can be regulated. The exact area of the proposed Porbandar Marine Conservation Reserve needs to be assessed once an in-principle acceptance of its feasibility is established.

## 2.2. Situation and Conceptual Analysis

### 2.2.1. Stakeholders Analysis



**Figure 2: Existing influence and importance matrix of stakeholders in the management of Marine Protected Areas in Gujarat**

**Table 2: Stakeholders for conservation and management of MPAs in Gujarat**

Sector	Stakeholder	Support to coastal and marine protected areas (Positive/neutral/inhibitive)	Livelihood dependence on coastal and marine biodiversity/protected area	Power to influence	Geographical area of influence	Mandate / Responsibility/ specific interest in coastal areas of MPA's	Inter-sectoral coordination
Forest	Decision makers: State Forest Department	Positive	Low	High	State Level: MPAs, Forests, Zone I of CRZ of Gujarat	Protection and Management of Biodiversity	Average
	CWLW of MNP, Range officers and forest guards	Positive	Medium	High	State and site level: State forests and CWLW of MNP	Protection of biodiversity and Promote alternate livelihoods	Very good with Fishing Community but average relationship with other stakeholders
	Ministry of Environment and Forest, GOI	Positive	Low	High	National level	Promote conservation of biodiversity as per CDB convention and other national , international regulations	Good with forest sector but average with other stakeholders
	State pollution control board	Positive	Low	Medium	State Level or site level	Control pollution	Average
	National Biodiversity Authority	Positive	Low	Medium	State level	Provides insights on the knowledge of biodiversity and conservation	Average
	State	Positive	Medium	Medium	State level	Provides insights on	Good



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	biodiversity authority					the knowledge of biodiversity and conservation	
	State tourism	Neutral	High	High	State Level : MPAs and other coastal areas that could attract tourists	Promote tourism	Average
	Social Welfare	Neutral	Medium	Low	State Level	Strengthening welfare of local communities	Average
	Policy Makers	Neutral	High	High	State and National Levels	Mainstreaming biodiversity conservation into production sectors	Good
	Climate change cell of Gujarat State	Positive	High	Medium	State level	Help management of climate change related issues	Average
	Researchers/ Research institutions	Positive	Medium	Low	Site/State/National Levels	Help management of biodiversity through research and monitoring	Average to Good
	Harbours and Ports	Neutral/ inhibitory	Low	Low	State or site level	Promote export and imports	Average
	Coast Guard and Indian Navy	Neutral/ inhibitory	Low	Low	State or site level	Protection of sovereignty of country	Average
	Coastal Police	Neutral/ inhibitory	Low	Low	State or site level	Protection of coastal areas	Average
	Industry associations	Neutral/ inhibitory	Low	Low	State level and adjoining landscape	Promote industrial productions	Very good with stakeholders other than Forest,
	NGOs	Positive	Medium	Medium to high	Site/State/National/ International	Environment education and community development	Good
Fisheries	State fisheries departments	Positive	Medium	Medium	State level EEZ other than MPA's	Promote fisheries	Very good with fishing community but average with forest sectors
	Fishing Community		High	Medium	Site/State	Not known	Good with Fisheries department but average with Forest sectors
	Other local community		Low	Medium	Site/State	Not known	Good

## 2.2.2. Capacity Gap Analysis

**Table 3: Problem analysis**

Dimensions of Capacity	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity
<b>Enabling environment:</b> <b>- Policies</b> National Biodiversity Action Plan	Very importance for formulation of legal frameworks for ensuring the success of conservation and management of coastal and marine protected areas	Extremely high	MoEF, GOI, State forest departments, CWLW of MNP's, State fisheries, WII, BNHS, GUIDE, ZSI, CMFRI, GEER etc.	Inadequacy of required data base to take finer decisions/ lack of participatory consultations	Medium
<b>Enabling environment:</b> <b>- Legal frameworks</b> Wildlife (Protection) Act, 1972	Provide legal framework and help to develop management plans for ensuring the success of conservation and management of coastal and marine protected areas	Extremely high	MoEF, GoI, BOB, GJFD,	Lack of intersectoral coordination, timeliness in implementation of management plans, participation of local communities in Governance and lack of basic infrastructure	High
Environment Protection Act	Protection and improvement of environment and prevention of hazards to human beings	Extremely high	MoEF, GoI, BOB, GJFD	Lack of inter-sectoral coordination and knowledge among the stake holders	High
Biodiversity Act	Provides mechanism for equitable sharing of benefits arising from traditional biological resources and knowledge	Extremely high	MoEF, GoI, BOB, GJFD	Lack of required database to take finer decisions and lack of inter-sectoral coordination among the stake holders	High
<b>Enabling environment:</b> <b>- Implementation strategies</b>	Extremely High	Extremely high	GJFD, MoEF-GoI, BOB, WII, BNHS, GEER	Lack of inter-sectoral coordination with other stakeholders, Lack of skill to evaluate the management effectiveness.	Extremely High
<b>Enabling environment:</b> <b>- Financing instruments areas</b>	Extremely high	High	MoEF-GoI GJFD	Always inadequate funds to implement the Management Plan successfully	Medium
<b>Enabling environment:</b> <b>- Research and development</b>	Extremely important to ensure the success of conservation and	High	National and State Level research Institutions, GJFD,	Lack of capacity to conduct research on emerging issues such as climate	High

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Dimensions of Capacity	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity
	management of MPAs in Gujarat			change, invasive species. Poor linkage between research and management of MPAs, Lack of fund for applied research etc.	
<b>Enabling environment:</b> - Education and human resource development	Extremely important to ensure the success of conservation and management of MPAs in Gujarat	Extremely high	Wildlife Institute of India for training managers for MPAs, Site/State/National level institutions for environment education and other human resource development for conservation and management of MPAs in Gujarat	Lack of fund resources and short comings in capacity among stakeholders who are responsible for providing education and human resource development with respect to emerging conservation issues	High
<b>Enabling environment:</b> - Knowledge and Awareness generation activities	Very important to ensure the success of conservation and management of MPAs in Gujarat	High	Site/State/National level institutions , ICSF, CMFRI, BNHS, GUIDE, GEER, ZSI, State forest and State fisheries departments etc	Lack of fund resources	High
<b>Enabling environment:</b> - Science-policy linkages	Extremely important to ensure the success of conservation and management of MPAs in Gujarat	High	Site/State/National level researcg institutions, MoEF-GoI, GJFD	Lack of intersectoral coordinations and participatory approaches. Poor understanding of researchers about policy requirements.	High
<b>Cross-sectoral coordination:</b> State forest departments and State fisheries	Both departments have high sake in the coastal and marine ecosystem, so any decision on MPA's requires both departments are in synchronization with each other on the management planning	Extremely High	GJFD, GJFisheriesD, GJTourism, CWLW MNP etc.	Poor understanding about participatory approaches in management of MPAs. Very poor intersectoral coordination among stakeholders due to conflict of interests in their respective mandate.	Extremely High
State forest departments and Research Institutions	Both departments have high sake in the coastal and marine ecosystem,	Extremely high	CMFRI, CIFE, BNHS, ICSF, GUIDE, GEER, ZSI, etc.	Poor understanding about participatory approaches in management of	Extremely High

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Dimensions of Capacity	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity
	so any decision on MPA's requires both departments are in synchronization with each other on the management planning			MPAs. Very poor intersectoral coordination among stakeholders due to conflict of interests in their respective mandate.	
<b>Organizations:</b>	Extremely Important to train MPAs managers and officials of other line departments. Available curriculum / andragogy / overall training management system to provide training to cope up with new challenges in coastal marine areas	Extremely high	Wildlife Institute of India for MPAs Managers, Site/State/National level institutions for other stakeholders	Inadequate capacity among stakeholders who are responsible for providing training with respect to emerging conservation issues in successfully managing MPAs in GJ	Extremely High
Individuals:	Technical skills of a forest ranger to conduct marine species assessment; or conceptual understanding of a media professional on coastal and marine protected area management	Extremely High	Range Forest Officers, Fisheries Inspectors, Tourism Officer etc	Inadequate capacity among stakeholders who are responsible for providing training with respect to emerging conservation	Extremely high
<b>Youth Sector</b>	Understanding of participatory approaches on conservation of marine protected areas	Extremely High	Youth from Fishermen Communities etc	Inadequate skills for generating alternate/additional livelihoods other than through fisheries	Extremely high

## 2.3. Conceptual analysis to identify capacity needs and possible interventions

**Table 4: Conceptual analysis results for Capacity Needs**

Dimensions of capacity	Stakeholders	Problem Statement	Conceptual analysis		
			Required	existing	gaps
<b>Policies</b>	MoEF, GOI, State forest departments, CWLW of MNP's, State fisheries, WII, BNHS, CMFRI etc.	Inadequacy of required data base to take finer decisions/ lack of participatory consultations	Conducive environment to consult, debate, understand and mutually agree for a common goal i.e. conservation of MPAs in GJ among all stakeholders. Creation of data base.	Officers are available with MoEF and State Forest Departments. Some data available with various State and national level institutions, State departments.	Data collation and knowledge network and lack of leadership to involve all stakeholders in policies making.
<b>Legal frameworks</b>	MoEF, GoI GJFD, WII, BNHS, GEER, GUIDE, ZSI	Lack of intersectoral coordination and participation of local communities in Governance	Conducive environment for Intersectoral coordination and involvement of local communities in Governance	Basic infrastructure available State forest departments for implementation of management plans for the conservation of malvan marine sanctuary and other protected areas	Lack of enforcement of management plans. Lack of funding and skilled staffs for the assessment of socio-economic status of MNP's and fishermen communities.
<b>Implementation strategies</b>	GJFD, MoEF-GoI, WII, BNHS, GEER, GUIDE and ZSI	Lack of intersectoral coordination with other stakeholders. Lack of skill to evaluate the management effectiveness.	Conducive environment for Intersectoral coordination and MEE	Available with GJFD & WII	Lack of leadership to have better intersectoral coordination and lack of willingness to accept the importance of intersectoral coordination in better management of MPAs in GJ. Lack of adequate skill to self evaluation of Management effectiveness of MPAs.
<b>Financing instruments areas</b>	MoEF-GoI GJFD	Inadequate funds to implement the Management Plans successfully in the sites	Adequate funds required as per the Management Plans of each MPAs in GJ	Minimum required funds are available with MoEF-GoI and GJFD	Additional fund gathering capacity of Managers from other sources.
<b>Research and development</b>	National and State Level research Institutions, GJFD,	Lack of funds and state of art infrastructure to conduct research on emerging issues such as climate change, invasive species.	Capacity building towards conducting research on emerging issues such as climate change, invasive species. Better linkage between researchers and management of MPAs,	Certain capacity available with WII, CMFRI, BNHS, NIO, GUIDE, GEER, ZSI etc	Development of specialized capacity to carry out research on emerging issues such as climate change, invasive species. Establishment of necessary infrastructure with equipment for these researches. Development of

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Dimensions of capacity	Stakeholders	Problem Statement	Conceptual analysis		
			Required	existing	gaps
		Average linkage between researchers and management of MPAs, Lack of fund for applied research etc.	Adequate fund for applied research etc.		research framework for conservation of coastal and marine protected areas in GJ.
- Education and human resource development	CEE, ICSF, CMFRI, CIFE, BNHS, WII, GEER, GUIDE etc	Inadequate capacity among certain stakeholders who are responsible for providing education and training and human resource development with respect to emerging conservation issues and Lack of fund resources for establishing capacity	Enhancement of capacity of certain prime stakeholders with required infrastructure, for education and human resource development for conservation of MPAs in GJ.	Moderate capacity for education and human resource development are already available	Capacity in Participatory Approches and Governance i.e. capacity to promote integrated management of MPAs in GJ
Cross- sectoral and cross-stakeholder cooperation	GJFD, GJFisheriesD, GJTourism, GJIndustries, Coast Guard and Indian Navy, Marine Police, ICSF, Site/State/ National Level research and education institutions	Poor understanding or unwilling to accept the participatory approaches in management of MPAs. Very poor intersectoral coordination among stakeholders due to conflict of interests in their respective mandate.	Capacity training towards iintegrated management of MPAs involving all stakeholders in participatory approaches and Development of leadership for the same.	WII is being organizing such kind of courses only for forest sector at national level but more such training workshops are required at State/site level for all stakeholders with help of other capacity building institutions.	Leadership development for cross-sectoral coordination and resources for training workshop of integrated management of MPAs at site/State level
Organization of capacity development measures	GJFD, GJFisheriesD, Wildlife Institute of India for MPAs Managers, Site/State/Natio nal level institutions for other stakeholders	Inadequate capacity among stakeholders who are responsible for providing research and training with respect to emerging conservation issues in	Capacity training towards iintegrated management of MPAs involving all stakeholders in participatory approaches and Development of leadership for the same. Capacity building towards conducting research on emerging issues	WII is being organizing training programs for forest sector at national level but more such training workshops are required at State/site level for all stakeholders with help of other capacity building institutions to promote integrated	Leadership development for cross-sectoral coordination and resources for training workshop of integrated management of MPAs at site/State level. Development of specialized capacity to carry out research on emerging issues such as climate change, invasive species.

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Dimensions of capacity	Stakeholders	Problem Statement	Conceptual analysis		
			Required	existing	gaps
		successfully managing MPAs in GJ	such as climate change, invasive species. Better linkage between researchers and management of MPAs, Adequate fund for mariculture and sea ranching programs to enhance the target fishery stock in the wild etc	management of MPAs in GJ. Certain research capacity available with WII, CMFRI, BNHS, NIO, GEER, GUIDE, ZSI etc	Establishment of necessary infrastructure with equipment for these researches. Development of research framework for conservation of coastal and marine protected areas in GJ.
Capacity development measures of Individuals	ICSF, BNHS, CMFRI, GEER, GUIDE, ZSI, State Forest and Fisheries Departments, UNDP, UNEP, IUCN, GREEN PEACE etc	Inadequate skills development of youths from Fishing Community for generating alternate/ additional livelihoods due to lack of resources with stakeholders	Adequate resources at least certain stakeholders at sites level for skill development for additional or alternate livelihood generation of youths from fishermen communities such as suba diving, snorkeling, community based biodiversity monitoring, marine tourist guide etc,	Moderate infrasturcutre and capacity available	Lack of adequate instrastructure, equipment and fund
Capacity development measures of Other forest departments	WII, CMFRI, CIFE, BNHS, WTI, State Forest and Fisheries Institutes etc	Inadequate resources with astakeholders who are responsible for providing training with respect to emerging conservation	Adequate resources at least certain stakeholders at sites level for training frontline staff of Forest Staff towards marine biodiversity monitoring and protection, participatory approach, eco-development etc,	Moderate infrasturcutre and capacity available	Lack of adequate instrastructure, equipment and fund
Capacity development measures of Other line departments such as fisheries, tourism, etc	State forest departments, CMFRI, BNHS, GEER, GUIDE, ZSI, NIO, State Fisheries Institutes etc	Inadequate capacity among stakeholders who are responsible for providing training with respect to emerging conservation	Adequate resources at least certain stakeholders at sites level for training frontline staff of Forest Staff towards marine biodiversity monitoring and protection, participatory approach, eco-development etc,	Moderate infrasturcutre and capacity available	Lack of adequate instrastructure, equipment and fund

**Table 5: Conceptual analysis results 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
<b>Policies</b>  Adequate data to develop better policies.  Understanding of function and limits of knowledge management and requires general openness for various interest and their background as well  Sector policies that consider trade-offs and synergies with other sectors/ Common understanding of importance of integrated approaches	Appreciation of the importance of MPA management among leaders  Leadership skills among MPA managers to take forward the conservation agenda at the state or national level  Availability of knowledge management system for MPAs in GJ as well as linked to other states/ national/ international for better decision making on policies	Training for leadership development and establishment of knowledge management system and required capacities to use operate and maintain  Consultations of all sectors under the chairmanship of Chief Secretary/ Chief Minister level	Officials of State Forests Department, MOEF and other line departments in GJ.	Supra national: GIZ  National: WII, LBSNAA, IIFM  State level: CMFRI, GEER, BNHS, State forest departments and State fisheries, GUIDE, ZSI etc  Local: State forests, State fisheries, NGO's etc	Better leadership and better policies to create conducive environment for participatory management in MPAs in GJ	Better environment for Participatory Management of MPAs in GJ.
<b>Legal frameworks</b>  Separate guidelines for MPAs in India/  Further elaboration on the biodiversity heritage sites under the BD Act, to facilitate establishment of new coastal and marine PAS under this Act  Recognition of BHS under BD Act as Protected Areas	Integrated management of MPAs and addressing interface between existing legal systems and sustainable resources use of the MPAs.	Training towards integrated management of MPAs	Forest Officials of GJ, officials, State fisheries etc.	Supra national: GIZ  National: WII, LBSNAA, IIFM, MoEF	Enabling environment for Participatory Management of MPAs in GJ	Better environment for Participatory Management and cross-sectoral coordination for conservation of MPAs in GJ.
<b>Implementation strategies</b>  Promoting intersectoral coordination and enhancing skill to self evaluation	Lack of training for Self Evaluation of Management Effectiveness of MPAs in connection with Participatory Approaches	Training for Self Evaluation of Management Effectiveness of MPAs in connection with Participatory Approaches	Forest Officials	National level: WII  State level: Forest departments, GEER, GUIDE	Enabling environment for Participatory Management of MPAs in GJ	Better environment for Participatory Management and cross-sectoral coordination



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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
of management effectiveness						for conservation of MPAs in GJ.
<b>Financing instruments Areas</b>  Adequate funds to implement the Management Plans of MPAs, successfully in the sites	Resource generating skills	Consulation workshop to develop skills for resource mobilization	Managers of MPAs	GIZ	Identification of finance resources institutions and mobilization of adequate funds for MPAs	Better environment to successfully implement integrated management plans of MPAs
<b>Research and development</b>  In-house capacity in the state to conduct research/ seeking research solutions, on emerging issues such as climate change, and invasive species. An established working level theme-based association between researchers/ research institutions and MPAs. Adequate funds for coral or mangrove restoration and sea ranching of target fish groups to enhance fish stocks in the wild	Timeliness in implementation of existing projects and distribution of funds	Capacity building programme (training, study tour, consultation, scientist exchange program etc) to conduct research on emerging issues such as climate change and endangered species management with respect to MPAs in GJ. Fund resource mobilization training.	State level: State forest departments, CMFRI, CIFE, BNHS, GEER, GUIDE, ZSI etc.	Research Institutions at Germany and other countries	Better knowledge management system in place and better understanding about emerging conservation issues with respect to integrated management of MPAs in GJ.	Integrated and scientific management of MPAs with respect to emerging conservation issues
<b>Education and human resource development</b>  Enhance the capacity of certain prime stakeholders who are responsible for environment education and human resource development for	Lack of awareness among communities about ecological services of MPAs due to lack of capacity among stakeholders who are primarily responsible for Environment education and human resources development in the region	Environment Education training to school teachers and primary health workers of the region towards marine ecosystem.  Training workshop for stakeholders	School teachers, primary health workers, youths and adults from local communities especially fishermen.	CPREEC, CEE, ICSF, BNHS, CMFRI, TISS, GUIDE, GEER, etc	Better awareness about the ecological services of MPAs in the region and acceptance to conserve MPAs.	Participatory management of MPAs in the State.

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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 conservation of MPAs in GJ.		with required infrastructure, to promote environment education among adults of local communities.				
Cross-sectoral and cross-stakeholder cooperation  Enhance the understanding about the participatory approaches in successful management of MPAs. Improve the intersectoral coordination among stakeholders by promoting integrated management of MPAs with all stakeholders.	Lack of understanding and doubtfulness about efficacy of Participatory Management of MPAs in GJ.	Exposure visit of stakeholders (Forest, Fisheries, Tourism, etc) to the world's best practiced 'Integrated Management in MPAs'. Capacity training towards integrated management of MPAs involving all stakeholders.  Development of leadership for Participatory Management of MPAs.	State departments of Forest, Fisheries, Tourism, etc	GIZ/MoEF	Better cross-sectoral cooperation and understanding about participatory management of MPAs in GJ.	Leadership for cross-sectoral coordination and participatory management of MPAs in GJ.
Organization  Enhance the capacity of research and training to all stakeholders towards integrated management of MPAs,	Inadequate capacity of State Forest Department to conduct research, monitoring and management of MPAs in GJ.	Capacity building programme (training, study tour, consultation, scientist exchange program etc) to conduct research and monitoring with communities for participatory management of MPAs.	WII, Site/State/National level research institutions with more focus on site/State levels.	Research Institutions at Germany and other countries	Better understanding about emerging conservation issues with respect to integrated management of MPAs in GJ.	Integrated and scientific management of MPAs with respect to emerging conservation issues
Individual  Establishment of adequate resources with certain stakeholders at sites level for skill development for additional or alternate	Lack of skills for additional or alternate livelihoods generation of youths from fishermen communities for example, training on suba diving, snorkeling, community based biodiversity monitoring, marine tourist guide, etc,	Skills development /professional training to youths belong to fishermen communities for additional or alternate livelihoods generation.	Youths from fishermen community	ICSF, BNHS, CMFRI, GUIDe, GEER, State Forest and Fisheries Departments, UNDP, UNEP, IUCN, GREENPEACE, etc	Cooperations of local communities in MPAs management and reduction in the dependency of marine biodiversity resources of MPAs.	Successful conservation and management of MPAs and sustainable development of local communities .

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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
livelihood generation of youths from fishermen communities such as suba diving, snorkeling, community based biodiversity monitoring, marine tourist guide etc						
Forest Front Line staff  Capable and equipped to monitor the marine biodiversity in the MPAs and skill to involve other stakeholders in the participatory management of MPAs.	Lack of skills for monitoring the marine biodiversity in the MPAs and skill to involve other stakeholders in the participatory management of MPAs.	Skills development /professional training to monitor marine biodiversity in the MPAs and skill to involve other stakeholders in the participatory management of MPAs	Forest Front Line staff	WII, CMFRI, GEER, GUIDE, BNHS, State Forest and Fisheries Departments	Better monitoring system available with Management Authority	Successful conservation and management of MPAs
Other line departments such as fisheries, tourism, etc Appreciate the importance of ecological services of MPAs and cooperate the Forest Sectors for the successful management of MPAs, therefore, establishment of resources and infrastructure for training programs	Poor understanding and appreciation of importance of ecological services of MPAs and cooperation with the Forest Sectors for the successful management of MPAs	Consultation workshops and exposure visits to best managed MPAs with participation of all stakeholders.	Other line departments such as fisheries, tourism,	GIZ, MoEF, ICSF, CMFRI, GEER, GUIDE, BNHS, State Forest and Fisheries Departments, UNDP, UNEP, IUCN, GREENPEACE, etc	Better understanding about participatory management of MPAs and cross sectoral cooperation.	Successful conservation and management of MPAs

**Table 6: Conceptual analysis results for resource organizations/ individuals (providers)**

Who are they	what level do they operate (local, national or international)?	What are their mandates?	What are their capacities?	What is their focus in relation to the desired actions?	What types of capacity-strengthening Programmes do they currently offer?
GIZ	International	International cooperation services for sustainable development	Decentralised structures, intercultural competence and a highly professional workforce	Facilitate capacity building programs by linking relevant agencies at Germany	Human resource development in biodiversity conservation and research.
WII	International but largely national	Nurture the development of wildlife science and promote its application in conservation, in consonance with cultural and socio-economic milieu.	Capacity development towards management of Protected Areas in the region. Research, monitoring and environment education in the field of wildlife.	Facilitate capacity building programs targeting forest sector for participatory management of MPAs. Research and monitoring of marine biodiversity in MPAs.	Capacity development towards management of Protected Areas in the region. Research, monitoring and environment education in the field of wildlife.
LBSNAA	National	Promote good governance, by providing quality training for building a professional and responsive civil service in a caring, ethical and transparent framework	Develop leadership qualities and administrative skill through quality training	Facilitate leadership development programme for cross sectoral cooperation in participatory management of MPAs in India.	Develop leadership qualities and administrative skill through quality training
IIFM	National	Provide leadership in the field of Forestry, Environment and Natural Resource Management Education, be concerned with pushing the frontiers of knowledge for development of the sector.	Develop leadership qualities and administrative skill through quality training	Facilitate leadership development programme for cross sectoral cooperation in participatory management of MPAs in India.	Develop leadership qualities and administrative skill through quality training
MoEF	National	Nodal agency in the administrative structure of the Central Government for the planning, promotion, co-ordination and overseeing the implementation of India's	Planning, promotion, co-ordination and overseeing the implementation of India's environmental and forestry policies and programmes	Facilitate the planning, promotion, co-ordination and overseeing the implementation of the project and facilitate capacity building programme towards cross sectoral cooperation in participatory management of MPAs in India.	Support capacity strengthening programmes related to conservation and management of biodiversity in India

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Who are they	what level do they operate (local, national or international)?	What are their mandates?	What are their capacities?	What is their focus in relation to the desired actions?	What types of capacity-strengthening Programmes do they currently offer?
		environmental and forestry policies and programmes			
CEE	National	Improve public awareness and understanding of the environment with a view to promote the conservation of nature and sustainable use of the natural resources, leading to a better environment and a better quality of life	Environment Education and outreach activities	Facilitate training/capacity building programs related to Environment Education	Public awareness, environment education and outreach activities
ICSF	National	Establishment of equitable, gender-just, self-reliant and sustainable fisheries, particularly in the small-scale, artisanal sector	Promote equitable, gender-just, self-reliant and sustainable fisheries, particularly in the small-scale, artisanal sector	Stress fisheries development and management of a just, participatory and sustainable nature.	Development of alternatives in the small-scale fisheries sector
BNHS	National	Promote nature conservation through science	Research, Environment Education, Training in the field of biodiversity conservation	Capacity programs related to research, Environment Education, Training in the field of biodiversity conservation	Research, Environment Education, Training in the field of biodiversity conservation
GEER	State	Promote biodiversity and conservation through education	Research, environment education, training in the field of biodiversity and conservation of protected areas	Capacity building programs related to biodiversity and conservation	Research, environment education, training in the field of biodiversity and conservation of protected areas
GUIDE	State	Promote biodiversity and conservation	Research in the field of biodiversity and conservation of protected areas	Capacity building programs	Research in the field of biodiversity and conservation of protected areas
State Forest Department	State	Nodal agency in the administrative structure of the State Government for the planning, promotion, co-ordination and overseeing the implementation of India's/	Planning, promotion, co-ordination and overseeing the implementation of India's/State's environmental and forestry policies and programmes	Facilitate all capacity building programs related to Forest Sectors and management of Marine PAs.	Support capacity strengthening programmes related to conservation and management of biodiversity in GJ

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Who are they	what level do they operate (local, national or international)?	What are their mandates?	What are their capacities?	What is their focus in relation to the desired actions?	What types of capacity-strengthening Programmes do they currently offer?
		State's environmental and forestry policies and programmes			
State Fisheries Department	State	Nodal agency in the administrative structure of the State Government for the planning, promotion, co-ordination and overseeing the implementation of Fisheries related policies	Planning, promotion, co-ordination and overseeing the implementation of India's/State's fisheries policies and programmes	Facilitate all capacity building programs related to Fisheries and Fishing Community	Support capacity strengthening programmes related to Fisheries, Fishing Community and integrated management of MPAs in GJ.
NIO	National	Research: observing and understanding the special oceanographic features that the North Indian basin offers	research in four traditional branches of oceanography - biological, chemical, geological/geophysical, and physical - and some other areas such as marine instrumentation and archaeology	Capacity building programs related to research and monitoring	Teaching and research in four traditional branches of oceanography - biological, chemical, geological/geophysical, and physical - and some other areas such as marine instrumentation and archaeology
CMFRI	National	Promote teaching, training, research and technology development in the field of fisheries science in India	Teaching, training, research and technology development in the field of fisheries science.	Capacity building programs related to fisheries sector, Fishing Community, research on fisheries etc	Support capacity strengthening programs related to fisheries and alternate livelihoods (Mariculture), fishing community and integrated management of MPA's in Gujarat
ZSI	State	Promote coral restoration and biodiversity and conservation in Marine national parks	Research and development in the field of critical ecosystem restoration like corals	Research in the field of biodiversity and conservation of protected areas	Coral transplantation and marine biodiversity conservation in protected areas
CPR Environmental Education Centre (CPREEC)	National	Promote environmental education	Environment education	Capacity building related to environment education	Environment education

**Table 7: Conceptual analysis for Capacity Needs Assessment of stake holders**

Sub-Core area (of Forestry)	Dimensions of capacity	Stakeholders		Target	Issues to be addressed during data collection
		Target group	Providers		
<b>Policies</b>	<ul style="list-style-type: none"> <li>- Leadership development through Training/workshop</li> <li>- Establishment of knowledge management system for MPAs in GJ for better policies</li> </ul>	Officials of State Forests Department, MOEF and other line departments in GJ.	GIZ, LBSNAA, IIFM, WII	Better leadership and better policies to create conducive environment for participatory management in MPAs in GJ	Who are needed to be trained? How many people need to be trained? Who will provide training and what are their requirements? More details about leadership development programs of 'Providers' need to be acquired. Feasibility of developing course curriculum for this specialized course needs to be looked into.
<b>Legal frameworks</b>	Training towards integrated management of MPAs and addressing interface between existing legal systems and sustainable resources use of the MPAs.	Forest Officials	GIZ/WII/MoEF	Enabling environment for Participatory Management of MPAs in GJ	How many people and in what capacity need to be trained? Who will train and what are their requirements? Feasibility of organizing a workshop to review the existing legal and policies instruments available for management of MPAs for Integrated Management of MPAs in GJ. What would be expected outcomes of the training?
<b>Implementation strategies</b>	<p>Training for Self Evaluation of Management Effectiveness of MPAs in connection with Participatory Approaches</p> <p>Strengthening the capacity of management including necessary infrastructure for implementation of strategies/management plans of MPAs in GJ.</p>	Forest Officials	WII	Enabling environment for Participatory Management of MPAs in GJ	<p>Review the existing capacity and resources with WII to conduct this training program</p> <p>Details about existing and required capacity for the management including necessary infrastructure for implementation of strategies.</p>
<b>Financing instruments Areas</b>	Resource mobilization skills	Managers of MPAs	GIZ	Identification of finance resources institutions and mobilization of adequate funds	What are the existing hurdles to access adequate fund for successful implementation of management plans of MPAs in the State?

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Sub-Core area (of Forestry)	Dimensions of capacity	Stakeholders		Target	Issues to be addressed during data collection
		Target group	Providers		
				for MPAs	Who are potential funding agencies to support participatory management of MPAs in GJ.
<b>Research and development</b>	Capacity building programs to conduct research on emerging issues such as climate change, invasive species, landscape level changes with respect to MPAs in GJ through exposure visits, training, scientific cooperation etc	Site/State/National level research institutions with more focus on site/State levels.	Research Institutions at Germany and other countries	Better knowledge management system in place and better understanding about emerging conservation issues with respect to integrated management of MPAs in GJ	Identification of target groups in GJ and service providers at Germany
<b>Education and human resource development</b>	Training for conducting environment education/awareness programs  Training for monitoring biodiversity	School teachers, primary health workers, youths and adults from local communities especially fishermen.  Fishermen Youths Forest staff (divers)	CPRCCE, CEE, ICSF, BNHS, CMFRI, GUIDe, GEER, ZSI etc	Better awareness about the ecological services of MPAs in the region and acceptance to conserve MPAs.	Feasibility of organizing training programs? Assess the existing capacity of 'Providers' in this regard. Assess the requirements for organizing such kind of training programs.
<b>Cross-sectoral and cross-stakeholder cooperation</b>	Conduct of workshop/training/course to understand the importance and efficacy of Participatory Management of MPAs in GJ.	State departments of Forest, Fisheries, Tourism, etc	GIZ/MoEF	Better cross-sectoral cooperation and understanding about participatory management of MPAs in GJ.	Review the feasibility of organizing such kind of workshops? What about course curriculum? Who would support this program and how? Who would provide the technical inputs in this capacity programs and how? What is the frequency of capacity programs?
<b>Organization</b>	Building capacity of State Forest Department and other research institutions to conduct research, monitoring and management of MPAs in GJ.	State Forests Department, WII, Site/State/National level research institutions with more focus on site/State levels.	Research Institutions at Germany and other countries	Better understanding about emerging conservation issues with respect to integrated management of MPAs in GJ.	Review the feasibility of organizing such kind of workshops? What about course curriculum? Who would support this program and how? Who would provide the technical inputs in this capacity



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Sub-Core area (of Forestry)	Dimensions of capacity	Stakeholders		Target	Issues to be addressed during data collection
		Target group	Providers		
					programs and how? What is the frequency of capacity programs?
<b>Individual</b>  <b>Youth from Fishermen Communities</b>	Skill development trainings/ workshops for additional or alternate livelihoods generation of youths from fishing communities (for example, training on suba diving, snorkeling, community based biodiversity monitoring, marine tourist guide, etc.)	Youths from fishing community	ICSF, BNHS, CMFRI, GEER, GUIDE, State Forest and Fisheries Departments, UNDP, UNEP, IUCN, GREENPEACE, etc	Cooperations of local communities in MPAs management and reduction in the dependency of marine biodiversity resources of MPAs.	Analysis the actual requirements and attitude of youths from fishing communities for generating alternate or additional livelihoods. How many people need to be trained and how? Who will provide the training programs and what are their requirements? After training, what would be the requirement of youths to practice the skills acquired?
<b>Individual</b>  <b>Forest Front Line staff</b>	Skill development for monitoring the marine biodiversity in the MPAs and skill to involve other stakeholders in the participatory management of MPAs.	Forest Front Line staff	CMFRI, CIFE, BNHS, GEER, State Forest and Fisheries Departments	Better monitoring system available with Management Authority	Analysis the actual requirements, existing skill and attitude of frontline staff to acquire this training program. How many people need to be trained and how? Who will provide the training programs and what are their requirements? After training, what would be the requirement of management to successfully use their skills?
<b>Individual</b>  <b>Other line departments such as fisheries, tourism, etc</b>	Refresher course to understand and appreciate the importance of ecological services of MPAs and cooperation with the Forest Sectors for the successful management of MPAs	Other line departments such as fisheries, tourism,	GIZ, MoEF, ICSF, GUIDE, GEER, State Forest and Fisheries Departments, UNDP, UNEP, IUCN, GREENPEACE, etc	Better understanding about participatory management of MPAs and cross sectoral cooperation.	Analysis the actual requirements, existing skill and attitude of officials from line departments to acquire this training program. How many people need to be trained and how? Who will provide the training programs and what are their requirements? What would be course curriculum?

### Chapter 3

## MAHARASHTRA

### 3.1.1. Introduction

Maharashtra is the third largest State in the country in terms of size and second in terms of population. It is bordered by the Arabian Sea in the west with a coastline of 720 km. The State of Maharashtra stretches from the coast along the Western Ghats (which runs parallel to the coast) to the Deccan Plateau. The coast is characterized by pocket beaches flanked by rocky cliffs of Deccan basalt; coastal plateaus, moist deciduous forests on slopes and estuaries, plantations and patches of mangroves.

The coastal region of the Maharashtra State has five districts *viz.* Thane, Mumbai City, Mumbai suburban, Raigad, Ratnagiri and Sindhudurg. The entire region is hilly, narrow, highly dissected with transverse ridges of the Sahyadris hill ranges (Western Ghats) and at many places extending as promontories, notches, sea caves, embayment, submerged shoals and offshore islands.

Of the total length of the Maharashtra coast, 15 rivers, 5 major creeks and 30 backwater regions have been reported (Jagtap et al., 1994). All these creeks and estuaries together form the drainage in East-West direction and flow/drain into the Arabian Sea in the west. The various medium sized and small upstream freshwater rivers include Kundalika, Savitri, Vasishti, Shastri, Gad, Karli, Muchkundi, Vaitarna, Bhatsa and various creeks like Dativare, Vasai-Ulhas-Thane estuarine complex, Karanja-Dharmatar complex, Murud, Bankot, Dabhol, Jaigad, Purnagad, Devgad, Achra and Malvan creeks (Naskar and Mandal, 1999). Mouths of these rivers and creeks are wide-open, funnel shaped with shoals.

About 12 exclusive mangrove species have been identified along the northern Maharashtra coast, especially in Thane, mangroves occur in muddy creeks and saline areas at Mumbra, Vaitrana, Bhayander, Manori, Vasai creeks etc. Borkar, et al. (2002) recorded about 11 mangrove species from Thane-Ulhas creek complex. In these creeks *Avicennia marina* is the common and abundant. Along southern Maharashtra coast, mangrove growth is very rich with over 20 species along Dabhol, Jaigad, Ansure and several other creeks.

### 3.1.2 Threats

Coastal area has rocky formations but it is not confined to coastal erosion, siltation, pollution, destruction of mangrove swamps, upstream deforestation, salt marshes, sea level rise, landslides and slope failure, pressure of population, industrialization, road transport etc. According to Kumar, 2006, erosional changes on the southern bank of Thane creek, along the banks of Karanja-Dharamatar creek complex, mouth of Vasishthi river, west of Dapoli and north of Devgad in this State have been observed.

Jagtap et al. (1993) pointed out that during the last 25 years, about 40% mangrove areas of the Maharashtra coast have reduced especially by anthropogenic pressure and particularly by the 'Kharland Development Board' of Maharashtra. Similarly about 44% of the mangrove regions along this coast have been reclaimed during the last three decades, resulting in discontinuous distribution of a few species like *Bruguiera gymnorrhiza*, *Ceriops tagal*, *Aegiceras corniculatum* and *Sonneratia apetala*.

Pollution and destruction are the two major threats that have reduced the extant of mangrove ecosystem in Maharashtra coast. Untawale (1986) documented various impacts of sewage pollution and its harmful effects on the mangroves of this coast. Bhosale and Mulik (1991) reported in some areas of Maharashtra, roads were constructed right in the mangrove areas. In addition to this, in the rivers such as Kondalika and in Vairtana sand quarrying have been observed. Destruction of riverine substratum would probably impact the growth of mangrove in near future. Oil spills are major threats to mangroves particularly in Mumbai region.

### 3.1.3. Conservation measures

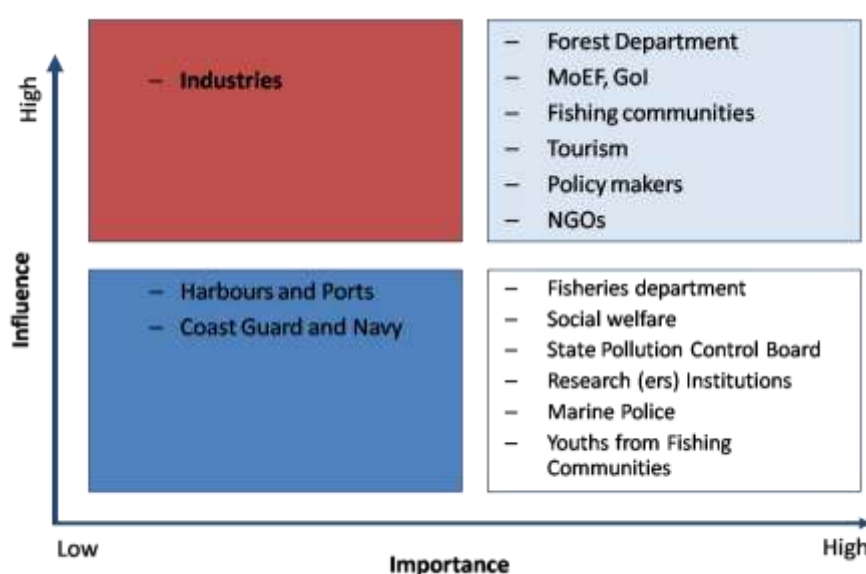
In 1987, the National Mangrove Committee identified 15 areas to start with for conservation and preparation of management action plan and the committee also identified the nodal academic/research institutions. In Maharashtra, area of about 2000 ha has been identified for such plan especially in Achra/Ratnagiri regions (ENVIS, 2002). Kogo (1987) pointed out that mangrove afforestation trials were conducted in large scale at six sites in Maharashtra as a part of the UNDP/UNESCO regional mangrove project for Asia and the Pacific area. Similar attempt has been made in areas near Ratnagiri with large scale plantation of *Rhizophora mucronota* (Kulkarni and Bhosale, 1992). In 2000, an NGO – HOPE introduced species like *Rhizophora mucronata*,

*Avicennia marina*, *Aegiceras corniculatum*, *Excoecaria agallocha*, *Ceriops tagal* and *Bruguiera cylindrica* in Rutuchakra of Thane creek with the help of Thane Municipal Corporation. Only species like *Rhizophora mucronata* and *Avicennia marina* were reported to be very successful survivors because of the local existence. Borkar *et al.* (2002) reported that Godrej has undertaken mangrove plantation in different places. Vikroli is an area of importance as a case for the conservation and management of mangrove forests in private ownership and preserved by M/s Godrej Trust Pvt. Ltd.

Personnel communication with the Forest Official (s) reveals that presently no scientific mangrove management plans exist. According to the Forest Department's circular dated 21st October 2005 all these mangroves (after acquisition of private owned by Revenue Department) must be taken over by the Forest Department for scientific management within six months and a management plan has to be prepared for their management using RS and GIS. The process of taking over of mangrove areas from the Revenue Department is in progress and about 80% of the area that has been owned by Revenue department is taken over by the Forest Department. Ratnagiri districts however have large tracks of private ownership of mangroves.

## 3.2 Situation and Conceptual Analysis

### 3.2.1. Stakeholders Analysis



**Figure 3: Existing influence and important matrices of stakeholders in the management of Marine Protected Areas of Maharashtra**

**Table 8: Stakeholders for conservation and management of MPAs in Maharashtra**

Sector	Stakeholder	Support to coastal and marine protected areas (Positive/neutral/inhibitive)	Livelihood dependence on coastal and marine biodiversity/protected area	Power to influence	Geographical area of influence	Mandate / Responsibility/ specific interest in coastal areas of MPA's	Inter-sectoral coordination
Forest	Decision makers: State Forest Department	Positive	Low	High	State Level: MPAs, Forests, Zone I of CRZ of Maharashtra	Protection and Management of Biodiversity	Average
	Range officers and forest guards	Positive	Medium	High	State and site level: State forests and CWLW	Protection of biodiversity and Promote alternate livelihoods	Very good with Fishing Community but average relationship with other stakeholders
	Ministry of Environment and Forest, GOI	Positive	Low	High	National level	Promote conservation of biodiversity as per CDB convention and other national , international regulations	Good with forest sector but average with other stakeholders
	State pollution control board	Positive	Low	Medium	State Level or site level	Control pollution	Average
	Revenue department	Neutral	Medium	Medium	National or State	Administration and revenue collection	Average with forest dept. and govt with agriculture department
	National Biodiversity Authority	Positive	Low	Medium	State level	Provides insights on the knowledge of biodiversity and conservation	Average
	State tourism	Neutral	High	High	State Level : MPAs and other coastal areas that could attract tourists	Promote tourism	Average
	Social Welfare	Neutral	Medium	Low	State Level	Strengthening welfare of local communities	Average
	Policy Makers	Neutral	High	High	State and National Levels	Mainstreaming biodiversity conservation into production sectors	Good
	Researchers/ Research institutions	Positive	Medium	Low	Site/State/National Levels	Help management of biodiversity through research and monitoring	Average to Good
	Harbours and Ports	Neutral/ inhibitory	Low	Low	State or site level	Promote export and imports	Average
	Coast Guard	Neutral/ inhibitory	Low	Low	State or site level	Protection of sovereignty of country	Good with forest and fisheries
	Coastal and Marine Police	Neutral/ inhibitory	Low	Low	State or site level	Protection of coastal areas	Good with forest and fisheries
	CBD COP (Hyderabad declaration)	High	Low	High	Supra National	Provide guidelines for conservation	Average
	Other Govt authorities	High	Low	High	State and National	Management of coastal habitats	Average to good
	NGOs like BNHS, Greenpeace	High to Medium	Medium	Medium to high	Site/State/ National/ International	Varied from nature conservation to community development to nature education	Good

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	Industries and industrial development corporation	Neutral/inhibitory	Low	Low	State level and adjoining landscape	Promote industrial productions	Very good with stakeholders other than Forest,
	Power generation corporations	Low	Low	High	National Level	Generate power and conservation through CSR	Average
	Road development authority	Low	Low	High	National	Road construction and conservation through CSR	Average
	Municipalities and local administrative bodies	Medium	Low	Medium	Local	City/village administration, planning and conservation	Average to Good
Fisheries	State fisheries departments	Positive	Medium	Medium	State level EEZ other than MPA's	Promote fisheries	Very good with fishing community but average with forest sectors
Youths	NFWF and WFFP	Positive	Medium	High	At local / community level	Disseminate informations to fishermen community related to management and conservation issues	Very good with fishing community and research institutions like CMFRI, CIFE, BNHS etc.
	Fishing Community		High	Medium	Site/State	Not known	Good with Fisheries department but average with Forest sectors
	Other local community like farmers, traders, salt pans, agriculture and residents		Low	Medium	Site/State	Not known	Average

### 3.2.2. Capacity Gap Analysis

Table 9: Problem analysis

Dimensions of Capacity	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity
<b>Enabling environment:</b> <b>- Policies</b> National Biodiversity Action Plan	Very importance for formulation of legal frameworks for ensuring the success of conservation and management of coastal and marine protected areas	Extremely high	MoEF, GOI, State forest departments, CWLW of MNP's, State fisheries, WII, BNHS, CIFE, CMFRI etc.	Inadequacy of required data base to take finer decisions/ lack of participatory consultations	Medium
<b>Enabling environment:</b> <b>- Legal frameworks</b> Wildlife (Protection) Act, 1972	Provide legal framework and help to develop management plans for ensuring the success of conservation and management of coastal and marine protected areas	Extremely high	MoEF, GoI, BOB, MHFD,	Lack of intersectoral coordination, timeliness in implementation of management plans, participation of local communities in Governance and lack of basic infrastructure	High
Environment Protection Act	Protection and improvement of environment and prevention of hazards to human beings	Extremely high	MoEF, GoI, BOB, MHFD	Lack of inter-sectoral coordination and knowledge among the stake holders	High
Biodiversity Act	Provides mechanism for equitable sharing of benefits arising from traditional biological resources and knowledge	Extremely high	MoEF, GoI, BOB, MHFD	Lack of required database to take finer decisions and lack of inter-sectoral coordination among the stake holders	High
<b>Enabling environment:</b> <b>- Implementation strategies</b>	Extremely High	Extremely high	State forest departments, MoEF-GoI, BOB	Lack of inter-sectoral coordination with other stakeholders, Lack of skill to evaluate the management effectiveness.	Extremely High
<b>Enabling environment:</b> <b>- Financing instruments areas</b>	Extremely high	High	MoEF-GoI MHFD	Always inadequate funds to implement the Management Plan successfully	Medium
<b>Enabling environment:</b> <b>- Research and development</b>	Extremely important to ensure the success of	High	National and State Level research Institutions,	Lack of capacity to conduct research on emerging issues	High

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Dimensions of Capacity	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity
	conservation and management of MPAs in Maharashtra		MHFD,	such as climate change, invasive species. Poor linkage between research and management of MPAs, Lack of fund for applied research etc.	
<b>Enabling environment:</b> - Education and human resource development	Extremely important to ensure the success of conservation and management of MPAs in Maharashtra	Extremely high	Wildlife Institute of India for training managers for MPAs, Site/State/National level institutions for environment education and other human resource development for conservation and management of MPAs in Maharashtra	Lack of fund resources and short comings in capacity among stakeholders who are responsible for providing education and human resource development with respect to emerging conservation issues	High
<b>Enabling environment:</b> - Knowledge and Awareness generation activities	Very important to ensure the success of conservation and management of MPAs in Maharashtra	High	Site/State/National level institutions , ICSF, CIFE, CMFRI, BNHS, Soonabhai Pirojsha Godrej Marine Ecology Center, TISS, Reef watch etc	Lack of fund resources	High
<b>Enabling environment:</b> - Science-policy linkages	Extremely important to ensure the success of conservation and management of MPAs in Maharashtra	High	Site/State/National level researcg institutions, MoEF-GoI, MHFD	Lack of intersectoral coordinations and participatory approaches. Poor understanding of researchers about policy requirements.	High
<b>Cross-sectoral coordination:</b> State forest departments and State fisheries	Both departments have high sake in the coastal and marine ecosystem, so any decision on MPA's requires both departments are in synchronization with each other on the management planning	Extremely High	MHFD, MHFisheriesD, MHTourism, CWLW MNP etc.	Poor understanding about participatory approaches in management of MPAs. Very poor intersectoral coordination among stakeholders due to conflirt of interests in their respective mandate.	Extremely High



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Dimensions of Capacity	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity
State forest departments and Research Institutions	Both departments have high stake in the coastal and marine ecosystem, so any decision on MPA's requires both departments are in synchronization with each other on the management planning	Extremely high	CMFRI, CIFE, BNHS, ICSF, TISS, WTI etc.	Poor understanding about participatory approaches in management of MPAs. Very poor intersectoral coordination among stakeholders due to conflict of interests in their respective mandate.	Extremely High
<b>Organizations:</b>	Extremely Important to train MPAs managers and officials of other line departments. Available curriculum / andragogy / overall training management system to provide training to cope up with new challenges in coastal marine areas	Extremely high	Wildlife Institute of India for MPAs Managers, Site/State/National level institutions for other stakeholders	Inadequate capacity among stakeholders who are responsible for providing training with respect to emerging conservation issues in successfully managing MPAs in MH	Extremely High
Integration of local traditional knowledge into protected area management	Valuable and practical knowledge exists in most communities for sustainability	Very high	Fishing practices, organic/ sustainable agri, holistic lifestyles	Total neglect on part of policy makers and implementing agencies	high
Individuals:	Technical skills of a forest ranger to conduct marine species assessment; or conceptual understanding of a media professional on coastal and marine protected area management	Extremely High	Range Forest Officers, Fisheries Inspectors, Tourism Officer etc	Inadequate capacity among stakeholders who are responsible for providing training with respect to emerging conservation	Extremely high
<b>Youth Sector</b>	Understanding of participatory approaches on conservation of marine protected areas	Extremely High	Presidents of NFWF, WFPF, Members of ICF, Youth from Fishermen Communities etc	Inadequate skills for generating alternate/additional livelihoods other than through fisheries	Extremely high

### 3.3. Conceptual analysis to identify capacity needs and possible interventions

**Table 10: Conceptual analysis results for Capacity Needs**

Dimensions of capacity	Stakeholders	Problem Statement	Conceptual analysis		
			Required	existing	gaps
<b>Policies</b>	MoEF, GOI, State forest departments, CWLW of MNP's, State fisheries, WII, BNHS, CMFRI etc.	Inadequacy of required data base to take finer decisions/ lack of participatory consultations	Conducive environment to consult, debate, understand and mutually agree for a common goal i.e. conservation of MPAs in MH among all stakeholders. Creation of data base.	Officers are available with MoEF and State Forest Departments. Some data available with various State and national level institutions, State departments.	Data collation and knowledge network and lack of leadership to involve all stakeholders in policies making.
<b>Legal frameworks</b>	MoEF, GoI MHFD,	Lack of intersectoral coordination and participation of local communities in Governance	Conducive environment for Intersectoral coordination and involvement of local communities in Governance	Basic infrastructure available State forest departments for implementation of management plans for the conservation of malvan marine sanctuary and other protected areas	Lack of enforcement of management plans. Lack of funding and skilled staffs for the assessment of socio-economic status of MNP's and fishermen communities.
Implementation strategies	MHFD, MoEF-GoI, WII, BNHS	Lack of intersectoral coordination with other stakeholders. Lack of skill to evaluate the management effectiveness.	Conducive environment for Intersectoral coordination and MEE	Available with MHFD, WII and BNHS	Lack of leadership to have better intersectoral coordination and lack of willingness to accept the importance of intersectoral coordination in better management of MPAs in MH. Lack of adequate skill to self evaluation of Management effectiveness of MPAs.
Financing instruments areas	MoEF-GoI MHFD	Inadequate funds to implement the Management Plans successfully in the sites	Adequate funds required as per the Management Plans of each MPAs in MH	Minimum required funds are available with MoEF-GoI and MHFD	Additional fund gathering capacity of Managers from other sources.
Research and development	National and State Level research Institutions, MHFD,	Lack of funds and state of art infrastructure to conduct research on emerging issues such as climate	Capacity building towards conducting research on emerging issues such as climate change, invasive species. Better linkage between	Certain capacity available with WII, CMFRI, BNHS, IISC, WTI, TISS, NIO, CIFE, Science and Technology Park, Poona university,	Development of specialized capacity to carry out research on emerging issues such as climate change, invasive species. Establishment of

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Dimensions of capacity	Stakeholders	Problem Statement	Conceptual analysis		
			Required	existing	gaps
		change, invasive species. Average linkage between researchers and management of MPAs, Lack of fund for applied research etc.	researchers and management of MPAs, Adequate fund for applied research etc.	IIT Mumbai etc	necessary infrastructure with equipment for these researches. Development of research framework for conservation of coastal and marine protected areas in MH.
- Education and human resource development	CEE, ICSF, CMFRI, CIFE, BNHS, NIO, TISS, WTI etc	Inadequate capacity among certain stakeholders who are responsible for providing education and training and human resource development with respect to emerging conservation issues and Lack of fund resources for establishing capacity	Enhancement of capacity of certain prime stakeholders with required infrastructure, for education and human resource development for conservation of MPAs in MH.	Moderate capacity for education and human resource development are already available	Capacity in Participatory Approches and Governance i.e. capacity to promote integrated management of MPAs in MH
Cross- sectoral and cross-stakeholder cooperation	MHFD, MHFisheriesD, MHTourism, MHIndustries, Coast Guard and Indian Navy, Marine Police, ICSF, Site/State/ National Level research and education institutions	Poor understanding or unwilling to accept the participatory approaches in management of MPAs. Very poor intersectoral coordination among stakeholders due to conflict of interests in their respective mandate.	Capacity training towards integrated management of MPAs involving all stakeholders in participatory approaches and Development of leadership for the same.	WII is being organizing such kind of courses only for forest sector at national level but more such training workshops are required at State/site level for all stakeholders with help of other capacity building institutions.	Leadership development for cross-sectoral coordination and resources for training workshop of integrated management of MPAs at site/State level
Organization of capacity development measures	MHFD, MHFisheriesD, Wildlife Institute of India for MPAs Managers, Site/State/National level institutions for other	Inadequate capacity among stakeholders who are responsible for providing research and training with respect to	Capacity training towards integrated management of MPAs involving all stakeholders in participatory approaches and Development of leadership for the same. Capacity	WII is being organizing training programs for forest sector at national level but more such training workshops are required at State/site level for all stakeholders	Leadership development for cross-sectoral coordination and resources for training workshop of integrated management of MPAs at site/State level. Development of

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Dimensions of capacity	Stakeholders	Problem Statement	Conceptual analysis		
			Required	existing	gaps
	stakeholders	emerging conservation issues in successfully managing MPAs in MH	building towards conducting research on emerging issues such as climate change, invasive species. Better linkage between researchers and management of MPAs, Adequate fund for mariculture and sea ranching programs to enhance the target fishery stock in the wild etc	with help of other capacity building institutions to promote integrated management of MPAs in MH. Certain research capacity available with WII, CMFRI, BNHS, NIO, WTI, TISS, CIFE etc	specialized capacity to carry out research on emerging issues such as climate change, invasive species. Establishment of necessary infrastructure with equipment for these researches. Development of research framework for conservation of coastal and marine protected areas in MH.
Capacity development measures of Individuals	ICSF, BNHS, CMFRI, CIFE, TISS, State Forest and Fisheries Departments, Soonabai Pirojsha Godrej Marine Ecology Centre, UNDP, UNEP, IUCN, GREEN PEACE etc	Inadequate skills development of youths from Fishing Community for generating alternate/ additional livelihoods due to lack of resources with stakeholders	Adequate resources at least certain stakeholders at sites level for skill development for additional or alternate livelihood generation of youths from fishermen communities such as suba diving, snorkeling, community based biodiversity monitoring, marine tourist guide etc,	Moderate infrastructure and capacity available	Lack of adequate infrastructure, equipment and fund
Capacity development measures of Other forest departments	WII, CMFRI, CIFE, BNHS, WTI, State Forest and Fisheries Institutes, Science and Technology park, Poona university etc	Inadequate resources with stakeholders who are responsible for providing training with respect to emerging conservation	Adequate resources at least certain stakeholders at sites level for training frontline staff of Forest Staff towards marine biodiversity monitoring and protection, participatory approach, eco-development etc,	Moderate infrastructure and capacity available	Lack of adequate infrastructure, equipment and fund
Capacity development measures of Other line departments such as fisheries, tourism, etc	CMFRI, BNHS, CIFE, TISS, WTI, NIO, State Fisheries Institutes, Science and Technology park, Poona university etc	Inadequate capacity among stakeholders who are responsible for providing training with respect to emerging conservation	Adequate resources at least certain stakeholders at sites level for training frontline staff of Forest Staff towards marine biodiversity monitoring and protection, participatory approach, eco-development etc,	Moderate infrastructure and capacity available	Lack of adequate infrastructure, equipment and fund

**Table 11: Conceptual analysis results 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
<b>Policies</b>  Adequate data to develop better policies.  Understanding of function and limits of knowledge management and requires general openness for various interest and their background as well  Sector policies that consider trade-offs and synergies with other sectors/ Common understanding of importance of integrated approaches	Appreciation of the importance of MPA management among leaders  Leadership skills among MPA managers to take forward the conservation agenda at the state or national level  Availability of knowledge management system for MPAs in MH as well as linked to other states/ national/ international for better decision making on policies	Training for leadership development and establishment of knowledge management system and required capacities to use operate and maintain  Consultations of all sectors under the chairmanship of Chief Secretary/ Chief Minister level	Officials of State Forests Department, MOEF and other line departments in MH.	Supra national: GIZ  National: WII, LBSNAA, IIFM  State level: CMFRI, CIFE, BNHS, State forest departments and State fisheries etc  Local: State forests, State fisheries, NGO's etc	Better leadership and better policies to create conducive environment for participatory management in MPAs in MH	Better environment for Participatory Management of MPAs in MH.
<b>Legal frameworks</b>  Separate guidelines for MPAs in India/  Further elaboration on the biodiversity heritage sites under the BD Act, to facilitate establishment of new coastal and marine PAS under this Act  Recognition of BHS under BD Act as Protected Areas	Integrated management of MPAs and addressing interface between existing legal systems and sustainable resources use of the MPAs.	Training towards integrated management of MPAs	Forest Officials of MH, officials, State fisheries etc.	Supra national: GIZ  National: WII, LBSNAA, IIFM, MoEF, BNHS	Enabling environment for Participatory Management of MPAs in MH	Better environment for Participatory Management and cross-sectoral coordination for conservation of MPAs in MH.
<b>Implementation strategies</b>  Promoting intersectoral coordination and enhancing skill	Lack of training for Self Evaluation of Management Effectiveness of MPAs in connection with Participatory Approaches	Training for Self Evaluation of Management Effectiveness of MPAs in connection with Participatory	Forest Officials	National level: WII  State level: Forest departments	Enabling environment for Participatory Management of MPAs in MH	Better environment for Participatory Management and cross-sectoral

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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
to self evaluation of management effectiveness		Approaches				coordination for conservation of MPAs in MH.
<b>Financing instruments Areas</b>  Adequate funds to implement the Management Plans of MPAs, successfully in the sites	Resource generating skills	Consulation workshop to develop skills for resource mobilization	Managers of MPAs	National level: GIZ  State level: State forest deparments and MoEF	Identification of finance resources institutions and mobilization of adequate fudns for MPAs	Better environment to successfully implement integrated management plans of MPAs
<b>Research and development</b>  In-house capacity in the state to conduct research/ seeking research solutions, on emerging issues such as climate change, and invasive species. An established working level theme-based association between researchers/ research institutions and MPAs. Adequate fundsfor coral or mangrove restoration and sea ranching of target fish groups to enhance fish stocks in the wild	Timeliness in implementation of existing projects and distribution of funds	Capacity building programme (training, study tour, consultation, scientist exchange program etc) to conduct research on emerging issues such as climate change and endangered soecies management with respect to MPAs in MH. Fund resource mobilization training.	State level: State forest departments, CMFRI, CIFE, BNHS etc.	Research Institutions at Germany and other countries	Better knowlde management system in place and better understanding about emerging conservation issues with respect to integrated management of MPAs in MH.	Integrated and scientific management of MPAs with respect to emerging conservation issues
<b>Education and human resource development</b>  Enchance the capacity of certain prime stakeholders who are responsible for environment education and human resource	Lack of awareness among communities about ecological services of MPAs due to lack of capacity among stakeholders who are primarily responsible for Environment educaton and human resources development in the region	Environment Education training to school teachers and primary health workers of the region towards marine ecosystem.  Training workshop for	School teachers, primary health workers, youths and adults from local communities especially fishermen.	CPREEC, CEE, ICSF, BNHS, Soonabhai Pirojsha Marine Ecology Center, Science and Technology park, Poona university CIFE, CMFRI, TISS, Green future etc	Better awareness about the ecological services of MPAs in the region and acceptance to conserve MPAs.	Participatory management of MPAs in the State.

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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
development for the conservation of MPAs in MH.		stakeholders with required infrastructure, to promote environment education among adults of local communities.				
Cross-sectoral and cross-stakeholder cooperation  Enhance the understanding about the participatory approaches in successful management of MPAs. Improve the intersectoral coordination among stakeholders by promoting integrated management of MPAs with all stakeholders.	Lack of understanding and doubtfulness about efficacy of Participatory Management of MPAs in MH.	Exposure visit of stakeholders (Forest, Fisheries, Tourism, etc) to the world's best practiced 'Integrated Management in MPAs'. Capacity training towards integrated management of MPAs involving all stakeholders.  Development of leadership for Participatory Management of MPAs.	State departments of Forest, Fisheries, Tourism, etc	GIZ/MoEF	Better cross-sectoral cooperation and understanding about participatory management of MPAs in MH.	Leadership for cross-sectoral coordination and participatory management of MPAs in MH.
Organization  Enhance the capacity of research and training to all stakeholders towards integrated management of MPAs,	Inadequate capacity of State Forest Department to conduct research, monitoring and management of MPAs in MH.	Capacity building programme (training, study tour, consultation, scientist exchange program etc) to conduct research and monitoring with communities for participatory management of MPAs.	WII, Site/State/National level research institutions with more focus on site/State levels.	Research Institutions at Germany and other countries	Better understanding about emerging conservation issues with respect to integrated management of MPAs in MH.	Integrated and scientific management of MPAs with respect to emerging conservation issues
Individual  Establishment of adequate resources with certain stakeholders at sites level for skill development for additional or	Lack of skills for additional or alternate livelihoods generation of youths from fishermen communities for example, training on suba diving, snorkeling, community based biodiversity monitoring, marine tourist guide, etc,	Skills development /professional training to youths belong to fishermen communities for additional or alternate livelihoods generation.	Youths from fishermen community	ICSF, BNHS, CMFRI, CIFE, NIO, TISS, State Forest and Fisheries Departments, UNDP, UNEP, IUCN, GREENPEACE, etc	Cooperations of local communities in MPAs management and reduction in the dependency of marine biodiversity resources of MPAs.	Successful conservation and management of MPAs and sustainable development of local communities .

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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
alternate livelihood generation of youths from fishermen communities such as suba diving, snorkeling, community based biodiversity monitoring, marine tourist guide etc						
Forest Front Line staff  Capable and equipped to monitor the marine biodiversity in the MPAs and skill to involve other stakeholders in the participatory management of MPAs.	Lack of skills for monitoring the marine biodiversity in the MPAs and skill to involve other stakeholders in the participatory management of MPAs.	Skills development /professional training to monitor marine biodiversity in the MPAs and skill to involve other stakeholders in the participatory management of MPAs	Forest Front Line staff	WII, CMFRI, CIFE, BNHS, State Forest and Fisheries Departments	Better monitoring system available with Management Authority	Successful conservation and management of MPAs
Other line departments such as fisheries, tourism, etc  Appreciate the importance of ecological services of MPAs and cooperate the Forest Sectors for the successful management of MPAs, therefore, establishment of resources and infrastructure for training programs	Poor understanding and appreciation of importance of ecological services of MPAs and cooperation with the Forest Sectors for the successful management of MPAs	Consultation workshops and exposure visits to best managed MPAs with participation of all stakeholders.	Other line departments such as fisheries, tourism,	GIZ, MoEF, ICSF, CMFRI, CIFE, BNHS, State Forest and Fisheries Departments, UNDP, UNEP, IUCN, GREENPEACE, Sahyadri Nisarga Mitra, Srushtidnyan, Konkan Krushi Vidyapeeth etc	Better understanding about participatory management of MPAs and cross sectoral cooperation.	Successful conservation and management of MPAs



**Table 12: Conceptual analysis results for resource organizations/ individuals (providers)**

Who are they	what level do they operate (local, national or international)?	What are their mandates?	What are their capacities?	What is their focus in relation to the desired actions?	What types of capacity-strengthening Programmes do they currently offer?
GIZ	International	International cooperation services for sustainable development	Decentralised structures, intercultural competence and a highly professional workforce	Facilitate capacity building programs by linking relevant agencies at Germany	Human resource development in biodiversity conservation and research.
WII	International but largely national	Nurture the development of wildlife science and promote its application in conservation, in consonance with cultural and socio-economic milieu.	Capacity development towards management of Protected Areas in the region. Research, monitoring and environment education in the field of wildlife.	Facilitate capacity building programs targeting forest sector for participatory management of MPAs. Research and monitoring of marine biodiversity in MPAs.	Capacity development towards management of Protected Areas in the region. Research, monitoring and environment education in the field of wildlife.
LBSNAA	National	Promote good governance, by providing quality training for building a professional and responsive civil service in a caring, ethical and transparent framework	Develop leadership qualities and administrative skill through quality training	Facilitate leadership development programme for cross sectoral cooperation in participatory management of MPAs in India.	Develop leadership qualities and administrative skill through quality training
IIFM,	National	Provide leadership in the field of Forestry, Environment and Natural Resource Management Education, be concerned with pushing the frontiers of knowledge for development of the sector.	Develop leadership qualities and administrative skill through quality training	Facilitate leadership development programme for cross sectoral cooperation in participatory management of MPAs in India.	Develop leadership qualities and administrative skill through quality training
MoEF	National	Nodal agency in the administrative structure of the Central Government for the planning, promotion, co-ordination and overseeing the implementation	Planning, promotion, co-ordination and overseeing the implementation of India's environmental and forestry policies and programmes	Facilitate the planning, promotion, co-ordination and overseeing the implementation of the project and facilitate capacity building programme towards cross sectoral cooperation in participatory management of MPAs in India.	Support capacity strengthening programmes related to conservation and management of biodiversity in India

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Who are they	what level do they operate (local, national or international)?	What are their mandates?	What are their capacities?	What is their focus in relation to the desired actions?	What types of capacity-strengthening Programmes do they currently offer?
		of India's environmental and forestry policies and programmes			
ICSF	National	Establishment of equitable, gender-just, self-reliant and sustainable fisheries, particularly in the small-scale, artisanal sector	Promote equitable, gender-just, self-reliant and sustainable fisheries, particularly in the small-scale, artisanal sector	Stress fisheries development and management of a just, participatory and sustainable nature.	Development of alternatives in the small-scale fisheries sector
CIFE	National	Human resource development in the field of teaching, research and extension activities in Marine Sciences	Teaching, research and extension activities in Marine Sciences	Capacity building programs related to research and monitoring, extension activities, livelihoods etc	Conducting post-graduate, M.Phil, PhD programs on fishery sciences and technology, research and extension activities
Soonabhai Pirojsha Godrej Marine Ecology Center Pvt Ltd	State	Promote conservation awareness and research in Marine Biodiversity Conservation	Research, participatory management, environment awareness and training for biodiversity monitoring	Capacity programs related to research, participatory management, environment awareness and training for biodiversity monitoring	Research, participatory management, environment awareness and training for biodiversity monitoring
BNHS	National	Promote nature conservation through science	Research, Environment Education, Training in the field of biodiversity conservation	Capacity programs related to research, Environment Education, Training in the field of biodiversity conservation	Research, Environment Education, Training in the field of biodiversity conservation
Other state Depts	State	Nodal agencies	Planning, coordination and promotion	Facilitate all capacity building in respective areas	--
Universities and other educational institutions	State	Teaching, research and technology development	Research and teaching	Capacity building programs	Research and teaching
State Forest Department	State	Nodal agency in the administrative structure of the State Government for the planning, promotion, co-ordination and overseeing the implementation of India's/ State's environmental	Planning, promotion, co-ordination and overseeing the implementation of India's/State's environmental and forestry policies and programmes	Facilitate all capacity building programs related to Forest Sectors and management of Marine PAs.	Support capacity strengthening programmes related to conservation and management of biodiversity in MH

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Who are they	what level do they operate (local, national or international)?	What are their mandates?	What are their capacities?	What is their focus in relation to the desired actions?	What types of capacity-strengthening Programmes do they currently offer?
		and forestry policies and programmes			
State Fisheries Department	State	Nodal agency in the administrative structure of the State Government for the planning, promotion, co-ordination and overseeing the implementation of Fisheries related policies	Planning, promotion, co-ordination and overseeing the implementation of India's/State's fisheries policies and programmes	Faciliate all capacity building programs related to Fisheries and Fishing Coomunity	Support capacity strengthening programmes related to Fisheries, Fishing Coomunity and integrated management of MPAs in MH.
TISS	State	Develop independent and right thinking individuals in the local community who will in turn help nurture a progressive and environment conscious movement among the people	Participatory programs in the field of biodiversity conservaton	Environment education and participation of local communities in monitoring	Practice, research and teaching; undertakes development and disseminates knowledge; and reaches out to the larger community through extension, at the local, national, regional and international levels
NIO	National	Research: observing and understanding the special oceanographic features that the North Indian basin offers	research in four traditional branches of oceanography - biological, chemical, geological/geophysical, and physical - and some other areas such as marine instrumentation and archaeology	Capacity building programs related to research and monitoring	Teaching and research in four traditional branches of oceanography - biological, chemical, geological/geophysical, and physical - and some other areas such as marine instrumentation and archaeology
Sahyadri Nisarga Mitra	Site / State	Nature Education	Trained team of educators on local issues	Awareness creation	Education and field visits
Srushtidnyan	State	Nature Education	Advocacy capabilities	Awareness creation	Education and field visits
Lokmanya Educational Trust	Site	Education, Vocational Training	Trained team of educators	Holistic education	Curricular and co-curricular hands-on education
Science and Technology Park- University of Poona	Site	Education and Research	Trained team of SCUBA and scientists	Research on biodiversity	Marine ecosystem

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Who are they	what level do they operate (local, national or international)?	What are their mandates?	What are their capacities?	What is their focus in relation to the desired actions?	What types of capacity-strengthening Programmes do they currently offer?
CMFRI	National	Promote teaching, training, research and technology development in the field of fisheries science in India	Teaching, training, research and technology development in the field of fisheries science.	Capacity building programs related to fisheries sector, Fishing Community, research on fisheries etc	Support capacity strengthening programs related to fisheries and alternate livelihoods (Mariculture), fishing community and integrated management of MPA's in Maharashtra
CPR Environmental Education Centre (CPREEC)	National	Promote environmental education	Environment education	Capacity building related to environment education	Environment education

**Table 13: Conceptual analysis for Capacity Needs Assessment of stake holders**

Sub-Core area (of Forestry)	Dimensions of capacity	Stakeholders		Target	Issues to be addressed during data collection
		Target group	Providers		
<b>Policies</b>	<ul style="list-style-type: none"> <li>Leadership development through Training/workshop</li> <li>Establishment of knowledge management system for MPAs in MH for better policies</li> </ul>	Officials of State Forests Department, MOEF and other line departments in MH.	GIZ, LBSNAA, IIFM, WII	Better leadership and better policies to create conducive environment for participatory management in MPAs in MH	Who are needed to be trained? How many people need to be trained? Who will provide training and what are their requirements? More details about leadership development programs of 'Providers' need to be acquired. Feasibility of developing course curriculum for this specialized course needs to be looked into.
<b>Legal frameworks</b>	Training towards integrated management of MPAs and addressing interface between existing legal systems and sustainable resources use of the MPAs.	Forest Officials	GIZ/WII/MoEF	Enabling environment for Participatory Management of MPAs in MH	How many people and in what capacity need to be trained? Who will train and what are their requirements? Feasibility of organizing a workshop to review the existing legal and policies instruments available for management of MPAs for Integrated Management of MPAs in MH. What

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Sub-Core area (of Forestry)	Dimensions of capacity	Stakeholders		Target	Issues to be addressed during data collection
		Target group	Providers		
					would be expected outcomes of the training?
<b>Implementation strategies</b>	<p>Training for Self Evaluation of Management Effectiveness of MPAs in connection with Participatory Approaches</p> <p>Strengthening the capacity of management including necessary infrastructure for implementation of strategies/management plans of MPAs in MH.</p>	Forest Officials	WII	Enabling environment for Participatory Management of MPAs in MH	<p>Review the existing capacity and resources with WII to conduct this training program</p> <p>Details about existing and required capacity for the management including necessary infrastructure for implementation of strategies.</p>
<b>Financing instruments Areas</b>	Resource mobilization skills	Managers of MPAs	GIZ	Identification of finance resources institutions and mobilization of adequate funds for MPAs	<p>What are the existing hurdles to access adequate fund for successful implementation of management plans of MPAs in the State? Who are potential funding agencies to support participatory management of MPAs in MH.</p>
<b>Research and development</b>	Capacity building programs to conduct research on emerging issues such as climate change, invasive species, landscape level changes with respect to MPAs in MH through exposure visits, training, scientific cooperation etc	Site/State/National level research institutions with more focus on site/State levels.	Research Institutions at Germany and other countries	Better knowledge management system in place and better understanding about emerging conservation issues with respect to integrated management of MPAs in MH	Identification of target groups in MH and service providers at Germany
<b>Education and human resource development</b>	<p>Training for conducting environment education/awareness programs</p> <p>Training for monitoring biodiversity</p>	<p>School teachers, primary health workers, youths and adults from local communities especially fishermen.</p> <p>Fishermen Youths Forest staff (divers)</p>	CPRCCE, CEE, ICSF, BNHS, CMFRI, CIFE, TISS, Science and Technology park, Poona university, etc	Better awareness about the ecological services of MPAs in the region and acceptance to conserve MPAs.	Feasibility of organizing training programs? Assess the existing capacity of 'Providers' in this regard. Assess the requirements for organizing such kind of training programs.
<b>Cross-sectoral and cross-stakeholder</b>	Conduct of workshop/training/course to understand the importance and	State departments of Forest, Fisheries, Tourism, etc	GIZ/MoEF	Better cross-sectoral cooperation	Review the feasibility of organizing such kind

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Sub-Core area (of Forestry)	Dimensions of capacity	Stakeholders		Target	Issues to be addressed during data collection
		Target group	Providers		
<b>cooperation</b>	efficacy of Participatory Management of MPAs in MH.			and understanding about participatory management of MPAs in MH.	of workshops? What about course curriculum? Who would support this program and how? Who would provide the technical inputs in this capacity programs and how? What is the frequency of capacity programs?
<b>Organization</b>	Building capacity of State Forest Department and other research insitutions to conduct research, monitoring and management of MPAs in MH.	State Forests Department, WII, Site/State/National level research institutions with more focus on site/State levels.	Research Institutions at Germany and other countries	Better understanding about emerging conservation issues with respect to integrated management of MPAs in MH.	Review the feasibility of organizing such kind of workshops? What about course curriculum? Who would support this program and how? Who would provide the technical inputs in this capacity programs and how? What is the frequency of capacity programs?
<b>Individual</b> <b>Youth from Fishermen Communities</b>	Skill development trainings/ workshops for additional or alternate llivelihoods generation of youths from fishing communitis (for example, training on suba diving, snorkeling, community based biodiversity monitoring, marine tourist guide, etc.)	Youths from fishing community	ICSF, BNHS, CMFRI, CIFE, TISS, Science and Technology park, State Forest and Fisheries Departments, UNDP, UNEP, IUCN, GREENPEACE, etc	Cooperations of local communities in MPAs management and reduction in the dependency of marine biodiversity reseources of MPAs.	Analysis the actual requirements and attitude of youths from fishing communities for generating alternate or additional livelihoods. How many people need to be trained and how? Who will provide the training programs and what are their requirements? After training, what would be the requirement of youths to practice the skills acquired?
<b>Individual</b> <b>Forest Front Line staff</b>	Skill development for monitoring the marine biodiversity in the MPAs and skill to involve other stakeholders in the participatory management of MPAs.	Forest Front Line staff	CMFRI, CIFE, BNHS, State Forest and Fisheries Departments, Science and Technology park etc	Better monitoring system available with Management Authority	Analysis the actual requirements, extisting skill and attitude of frontline staff to acquire this trainging program. How many people need to be trained and how? Who will provide the training programs and what are their requirements? After training, what would be the requirement of

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Sub-Core area (of Forestry)	Dimensions of capacity	Stakeholders		Target	Issues to be addressed during data collection
		Target group	Providers		
					management to successfully use their skills?
<b>Individual</b>  <b>Other line departments such as fisheries, tourism, etc</b>	Refresher course to understand and appreciate the importance of ecological services of MPAs and cooperation with the Forest Sectors for the successful management of MPAs	Other line departments such as fisheries, tourism,	GIZ, MoEF, ICSF, SDMRI, MSSRF, State Forest and Fisheries Departments, UNDP, UNEP, IUCN, GREENPEACE, Science and Technology park etc	Better understanding about participatory management of MPAs and cross sectoral cooperation.	Analysis the actual requirements, existing skill and attitude of officials from line departments to acquire this training program. How many people need to be trained and how? Who will provide the training programs and what are their requirements? What would be course curriculum?

## Chapter 4

# KARNATAKA

### 4.1.1. Introduction

Karnataka's coastline extends over a length of 298 km with 3 coastal districts; Majali borders Goa at north and Uchila borders Kerala State in South. The coast has one of the most indented shoreline with numerous river mouths, lagoon, bays, creeks, promontories, cliffs, spits, sand dunes and long beaches. The coast is also popularly known as 'Konkan coast' is an important sector on the West coast of India, because of its physical distinctiveness, biota and marine resources. The southern Karnataka coastal plain is narrow due to the descending Western Ghats where as in northern regions particularly in Uttar Kannada part of the coast rocky promontories extents into the sea. Unlike the east coast of India the coastal stretch of the State has no major delta formations. The shelf off Karnataka has an average width of 80 km and the depth of shelf break is between 90-120m.

Mudflats were noticed on the low lying areas adjacent to the estuaries, lagoons particularly near Karwar, Tadri, Kundapur and Mulki. There are a few islands (locally called 'jugu') off the coast, the major group being St. Mary's island, 4 km off the coast near Malpe. Many tiny offshore Islands are clearly visible near Maple, Kundapur, Bhatkal, Honnavar and Karwar regions. Kumagadagudda, Anjidip, Arge, Kukra, Basavarajadurg, Murudeshwar, Hadimadi, Hog and St.Mary's are the offshore islands seen along this coast. Estuarine islands locally called as "kudrus" which are generally muddy, low and flat often support good growth of mangroves, coconut plantation. Masurkurve, Chowlikurve, Kalsanamotte, Mulkod, Devanmotte, Mavinkurve, Kurigadde are some of the islets found within the estuarine areas along Uttara Kannada coast cover with mangrove patches or under paddy (*kagga* rice) cultivation.

Coral patches have been earlier reported to exist off Karwar and in and around Netrani islands (Zacharia et al., 2006) in Karnataka coast. About 14 coral species have so far been reported to exist around the Netrani island. Seagrass species such as *Halophila beccarii* and *Thalassia hemprichii* were previously been reported to exist along this coast (as cited in Jagtap et al., 2003). Karnataka Biodiversity Board (KBB) in 2005 survey recorded the presence of *Ruppia maritima* from Kundapur and Mavinahole estuaries and in intertidal areas of Devgad (Kaladharan and Zachariaiah, 2008). Marine algae and sea weeds are earlier been reported to found along this coast (Rao et al., 1989); the algae *Chaetomorpha lineum*, *Enteromorpha intestinalis*, *Porphyra vietnamensis*, *Gracillaria verrucosa* were common in this coast.

In Karnataka, mangroves forests occur from Karwar in the north to Netravati estuary in the south. According to FSI (2003) report, the mangrove cover in Karnataka is only 3 km<sup>2</sup>. So far about 14 species of mangrove have been reported (Untawale and Wafar, 1986) to exist with the dominant species being *Rhizophora mucronata*, followed by *Avicennia* and *Sonneratia*.



*Holothuria leucospilota* is the only sea cucumber species that was recorded from the coastal waters around Netrani island off 8 Echinoderm species of this coast. However, 3 sea turtle species were recorded, Olive ridley is the common all along this coast. Among mammals, the whale *Balaenoptera edeni*, *Balaenoptera musculus*, *Balaenoptera physalus* and *Physeter macrocephalus* were reported to be frequently stranded.

Fishing is the major source of livelihood in Karnataka coast next to agriculture. However traditional fishing communities sustain themselves by fishing near coast, in estuaries and rivers, most of them also involved in deep sea fishing equipped with mechanized boats. According to recent study about 34 (including 5 minor fishing harbours) fish landing centers do exist within the three coastal districts of the State with about 150 fishing villages. Of these, 3 are located in Dakshina Kannada, 10 in Udipi and 16 in Uttara Kannada districts. The commercially important fishes of this coastline are oil sardine, mackerel, cat fishes, penaeid prawns, sharks, seer fishes, anchovies and other clupeids, squill and squids. The State has a shelf area of 25000 square kilometers of which 7000 square kilometers with water depth upto 50m are extensively exploited for marine fisheries. The State contributes about 10% of the total marine fish landing in the country. About 82% of the total catch is harvested using purse-seine and trawl nets. The marine fish production is in fluctuating trend over years and indicates that the annual catch is getting stabilized around the estimated maximum sustainable yield.

#### 4.1.2. Threats

The occupational pressures 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. According to 2001 census, the average population in coastal areas is estimated to be around 253 persons per square kilometer and the highest population density of 337 persons per square kilometer is at Dakshina Kannada coast. It is estimated that about 250 tonnes/day of solid waste is generated in the Mangalore city, 18 tonnes/day in Karwar and 6 tonnes/day in Udupi. The coastline is dotted with one major port at Mangalore, nine minor ports at Karwar, Belikund, Tadri, Honavar, Bhatkal, Kundapur, Hangarkatta, Malpe and old Mangalore. However there is no major port exists in Karnataka coast.

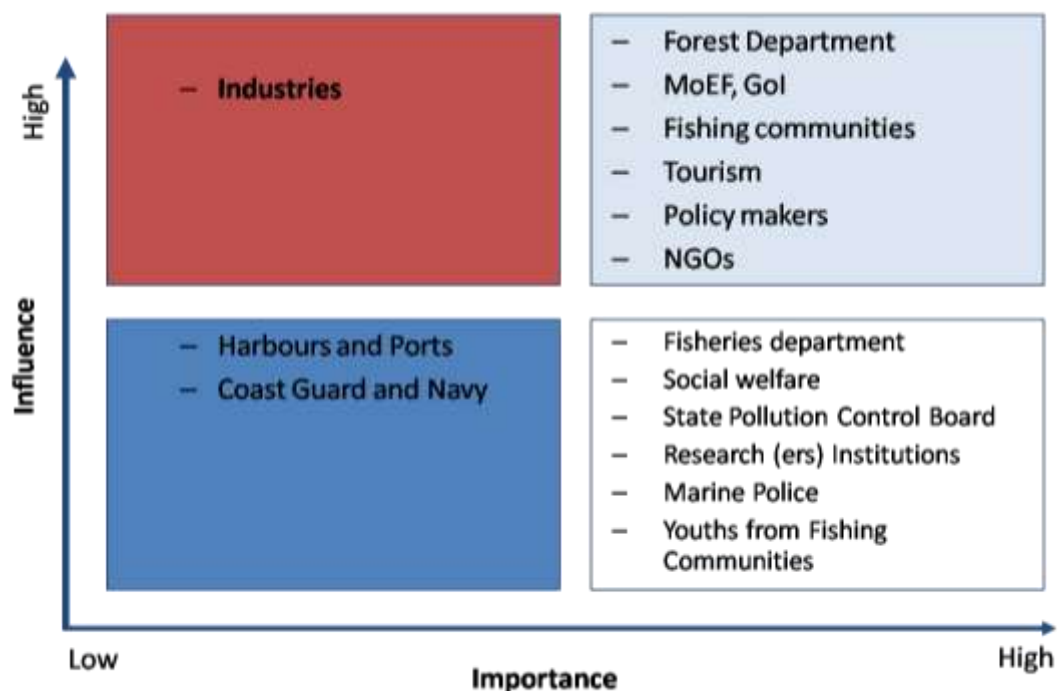
About 50% of the area under coastal zone is subjected to moderate soil erosion and 6 % is at severe erosion. In many sites, erosion damages the coastal shelter belt plantation. Encroachment into the active zone of the beach is the primary problem. The removal of clay from river banks and alluvial plains to the tune of 30 lakh tonnes/year and laterite and hard rocks of 22 lakh tonnes/year and sand mining to the tune of 1 lakh ton/year along the coast adversely affect the coastal topology. Sand mining is a routine activity in some river mouths of this coast, especially intensive sand mining were reported in Netravati river and in upstream of Kali estuarine areas. Sand mining have also been recorded in Upinakote, Kalyanpur, Haladi, Sharavati rivers.

The near shore and estuarine waters are subjected to pollution due to various reasons such as inadequate sanitation measures in adjacent areas, port activities, effluent discharge from

industries, dumping of fish wastes etc. The marine pollution is not a serious problem at present except for a few occasional reports of fish kill near Karwar and algal blooms off Mangalore coast. Of 90 beaches of Karnataka coast, Someshwar-Ullal, Malpe, St.Mary Island, Belekeri, Om beach, Kudle and Karwar are the important beaches attracting international tourists.

#### 4.1.3. Ongoing conservation measures

1. At present, there is no Marine Protected Area in the State. The State Forest Department involved in mangrove plantation since 1980s in Aghanashini and intensively established mangroves from 1992 in many places successfully, especially in Honnavar, Karwar, Kundapur and in Ullal regions near Malgalore coast.
2. Casuarina plantation was undertaken along the coast of Mangalore, Udupi, Hannovar and Karwar as coastal shelter belt plantation under afforestation program to protect the coast. Other than these, Coconut plantation have been established along this coastal plain.



**Figure 4: Existing influence and importance matrix of stakeholders in the management of Marine Protected Areas of Karnataka**

## 4.2. Situation and Conceptual Analysis

### 4.2.1. Stakeholders Analysis

**Table 14: Stakeholders for conservation and management of MPAs in Karnataka**

Sector	Stakeholder	Support to coastal and marine protected areas (Positive/neutral/inhibitive)	Livelihood dependence on coastal and marine biodiversity/protected area	Power to influence	Geographical area of influence	Mandate / Responsibility/ specific interest in coastal areas of MPA's	Inter-sectoral coordination
Forest	Decision makers: State Forest Department ,range officers and forest guards	Positive	Low	High	State Level: MPAs, Forests, CRZ - I of Karnataka	Protection and Management of Biodiversity	Average
	Karnataka Biodiversity Board (KBB)	Positive	Medium	High	State and site level: KBB and DCF, Mangalore	Protection of biodiversity and Promote alternate livelihoods	Very good with Fishing Community but average relationship with other stakeholders
	Ministry of Environment and Forest, GOI	Positive	Low	High	National level	Promote conservation of biodiversity as per CDB convention and other national , international regulations	Good with forest sector but average with other stakeholders
	State pollution control board	Positive	Low	Medium	State Level or site level	Control pollution	Average
	National Biodiversity Authority	Positive	Low	Medium	State level	Provides insights on the knowledge of biodiversity and conservation	Average
	State tourism	Neutral	High	High	State Level : MPAs and other coastal areas that could attract tourists	Promote tourism	Average
	Social Welfare	Neutral	Medium	Low	State Level	Strengthening welfare of local communities	Average
	Policy Makers	Neutral	High	High	State and Natioal Levels	Mainstreaming biodiversity conseration into production sectors	Good
	Researchers/ Research institutions	Positive	Medium	Low	Site/State/National Levels	Help management of biodiversity through research and monitoring	Average to Good
	Harbours and Ports	Neutral/inhibitory	Low	Low	State or site level	Promote export and imports	Average

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Sector	Stakeholder	Support to coastal and marine protected areas (Positive/neutral/inhibitory)	Livelihood dependence on coastal and marine biodiversity/protected area	Power to influence	Geographical area of influence	Mandate / Responsibility/ specific interest in coastal areas of MPA's	Inter-sectoral coordination
	Coast Guard and Indian Navy	Neutral/inhibitory	Low	Low	State or site level	Protection of sovereignty of country	Average
	Coastal Police	Neutral/inhibitory	Low	Low	State or site level	Protection of coastal areas	Average
	Industry associations	Neutral/inhibitory	Low	Low	State level and adjoining landscape	Promote industrial productions	Very good with stakeholders other than Forest,
	NGOs	Positive	Medium	Medium to high	Site/State/National/International	Environment education and community development	Good
Fisheries	State fisheries departments	Positive	Medium	Medium	State level EEZ other than MPA's	Promote fisheries	Very good with fishing community but average with forest sectors
Youths	Fishing Community		High	Medium	Site/State	Not known	Good with Fisheries department but average with Forest sectors
	Other local community		Low	Medium	Site/State	Not known	Good

#### 4.2.2. Capacity Gapa analysis

##### Table 15: Problem analysis

Dimensions of Capacity	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity
<b>Enabling environment:</b> - <b>Policies</b>  National Biodiversity Action Plan	Very importance for formulation of legal frameworks for ensuring the success of conservation and management of coastal and marine protected areas	Extremely high	MoEF, GOI, State forest departments, CWLW of PA's, State fisheries, WII, BNHS, NBA, CMFRI, ZSI etc.	Inadequacy of required data base to take finer decisions/ lack of participatory consultations	Medium
<b>Enabling environment:</b> - <b>Legal frameworks</b>  Wildlife (Protection) Act, 1972	Provide legal framework and help to develop management plans for ensuring the success of conservation and management of coastal and marine protected areas	Extremely high	MoEF, GoI, BOB, KFD and KBB	Lack of intersectoral coordination, timeliness in implementation of management plans, participation of local communities in Governance and lack of basic infrastructure	High
Environment Protection Act	Protection and improvement of environment and prevention of hazards to human beings	Extremely high	MoEF, GoI, BOB, KFD and KBB	Lack of inter-sectoral coordination and knowledge among the stake holders	High
Biodiversity Act	Provides mechanism for equitable sharing of benefits arising from the traditional biological resources and knowledge	Extremely high	MoEF, GoI, BOB, KFD and KBB	Lack of required database to take finer decisions and lack of inter-sectoral coordination among the stake holders	High
<b>Enabling environment:</b> - Implementation strategies	Extremely High	Extremely high	KFD, MoEF-GoI, BOB	Lack of intersectoral coordination with other stakeholders, Lack of skill to evaluate the management effectiveness.	Extremely High
<b>Enabling environment:</b> - Financing instruments areas	Extremely high	High	MoEF-GoI KFD	Always inadequate funds to implement the Management Plan successfully	Medium

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Dimensions of Capacity	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity
<b>Enabling environment:</b> - Research and development	Extremely important to ensure the success of conservation and management of MPAs in Karnataka	High	National and State Level research Institutions, KFD,	Lack of capacity to conduct research on emerging issues such as climate change, invasive species. Poor linkage between research and management of MPAs, Lack of fund for applied research etc.	High
<b>Enabling environment:</b> - Education and human resource development	Extremely important to ensure the success of conservation and management of MPAs in Karnataka	Extremely high	Wildlife Institute of India for training managers for MPAs, Site/State/National level institutions for environment education and other human resource development for conservation and management of MPAs in Karnataka	Lack of fund resources and short comings in capacity among stakeholders who are responsible for providing education and human resource development with respect to emerging conservation issues	High
<b>Enabling environment:</b> - Knowledge and Awareness generation activities	Very important to ensure the success of conservation and management of MPAs in Karnataka	High	Site/State/National level institutions , ICSF, ATREE Foundation, WTI, WWF, Dakshin, GREENPEACE, etc	Lack of fund resources	High
<b>Enabling environment:</b> - Science-policy linkages	Extremely important to ensure the success of conservation and management of MPAs in Karnataka	High	Site/State/National level research institutions, MoEF-GoI, KFD	Lack of intersectoral coordinations and participatory approaches. Poor understanding of researchers about policy requirements.	High
<b>Cross-sectoral coordination:</b> State forest departments and State fisheries	Both departments have high stake in the coastal and marine ecosystem, so any decision on MPA's requires both departments	Extremely High	KFD, KFisheriesD, Karnataka Tourism, KBB, DCF (Mangalore) etc	Poor understanding about participatory approaches in management of MPAs. Very poor intersectoral coordination among	Extremely High

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Dimensions of Capacity	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity
	are in synchronization with each other on the management planning			stakeholders due to conflict of interests in their respective mandate.	
State forest departments and Research Institutions	Both departments have high stake in the coastal and marine ecosystem, so any decision on MPA's requires both departments are in synchronization with each other on the management planning	Extremely high	CMFRI, BNHS, KBB, WTI etc.	Poor understanding about participatory approaches in management of MPAs. Very poor intersectoral coordination among stakeholders due to conflict of interests in their respective mandate.	Extremely High
<b>Organizations:</b>	Extremely Important to train MPAs managers and officials of other line departments. Available curriculum / andragogy / overall training management system to provide training to cope up with new challenges in coastal marine areas	Extremely high	Wildlife Institute of India for MPAs Managers, Site/State/National level institutions for other stakeholders	Inadequate capacity among stakeholders who are responsible for providing training with respect to emerging conservation issues in successfully managing MPAs in Karnataka	Extremely High
Individuals:	Technical skills of a forest ranger to conduct marine species assessment; or conceptual understanding of a media professional on coastal and marine protected area management	Extremely High	Range Forest Officers, Fisheries Inspectors, Tourism Officer etc	Inadequate capacity among stakeholders who are responsible for providing training with respect to emerging conservation	Extremely high
<b>Youth Sector</b>	Understanding of participatory approaches on conservation of marine protected areas	Extremely High	Youth from Fishermen Communities and fishermen Self Help Groups (SHG)	Inadequate skills for generating alternate/additional livelihoods other than through fisheries	Extremely high

### 4.3. Conceptual analysis to identify capacity needs and possible interventions

**Table 16: Conceptual analysis results for Capacity Needs**

Dimensions of capacity	Stakeholders	Problem Statement	Conceptual analysis		
			Required	existing	gaps
<b>Policies</b>	MoEF, GOI, State forest departments, State fisheries, WII, BNHS, Mangalore Fisheries college, CMFRI, ZSI etc.	Inadequacy of required data base to take finer decisions/ lack of participatory consultations	Conducive environment to consult, debate, understand and mutually agree for a common goal i.e. conservation of MPAs in Karnataka among all stakeholders. Creation of data base.	Officers are available with MoEF and State Forest Departments. Some data available with various State and national level institutions, State departments.	Data collation and knowledge network and lack of leadership to involve all stakeholders in policies making.
<b>Legal frameworks</b>	MoEF, GoI KFD,	Lack of intersectoral coordination and participation of local communities in Governance	Conducive environment for Intersectoral coordination and involvement of local communities in Governance	Basic infrastructure available State forest departments and Karnataka Biodiversity Board (KBB) for implementation of management plans for the conservation of marine protected areas	Lack of enforcement of management plans. Lack of funding and skilled staffs for the assessment of socio-economic status of MPA's and fishermen communities.
<b>Implementation strategies</b>	KFD, MoEF-GoI,	Lack of intersectoral coordination with other stakeholders. Lack of skill to evaluate the management effectiveness.	Conducive environment for Intersectoral coordination and MEE	Available with KFD, KBB & WII	Lack of leadership to have better intersectoral coordination and lack of willingness to accept the importance of intersectoral coordination in better management of MPAs in Karnataka. Lack of adequate skill to self evaluation of Management effectiveness of MPAs.
<b>Financing instruments areas</b>	MoEF-GoI KFD, KBB	Inadequate funds to implement the Management Plans successfully in the sites	Adequate funds required as per the Management Plans of each MPAs in Karnataka	Minimum required funds are available with MoEF-GoI and KFD	Additional fund gathering capacity of Managers from other sources.
<b>Research and development</b>	National and State Level research Institutions, KFD,	Lack of funds and state of art infrastructure to conduct research on emerging issues such as climate change, invasive species. Average linkage	Capacity building towards conducting research on emerging issues such as climate change, invasive species. Better linkage between researchers and management of MPAs,	Certain capacity available with WII, CMFRI, ZSI, BNHS, IISC, CMLRE, NIO, ATREE, Dakshin, CEE, IIFM, Mangalore Fisheries college etc	Development of specialized capacity to carry out research on emerging issues such as climate change, invasive species. Establishment of



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Dimensions of capacity	Stakeholders	Problem Statement	Conceptual analysis		
			Required	existing	gaps
		between researchers and management of MPAs, Lack of fund for applied research etc.	Adequate fund for applied research etc.		necessary infrastructure with equipment for this research. Development of research framework for conservation of coastal and marine protected areas in Karnataka.
- Education and human resource development	CEE, IISc, ICSF, Dakshin Foundation, IIFM, CMFRI, NCSCM, BNHS, IISC, CMLRE, NIO, MSSRF, Mangalore Fisheries College, ATREE etc	Inadequate capacity among certain stakeholders who are responsible for providing education and training and human resource development with respect to emerging conservation issues and Lack of fund resources for establishing capacity	Enhancement of capacity of certain prime stakeholders with required infrastructure, for education and human resource development for conservation of MPAs in Karnataka	Moderate capacity for education and human resource development are already available	Capacity in Participatory Approches and Governance i.e. capacity to promote integrated management of MPAs in Karnataka
Cross- sectoral and cross- stakeholder cooperation	KFD, KBB, KFisheriesD, KTourism, KIndustries, Coast Guard and Indian Navy, Marine Police, ICSF, Site/State/ National Level research and education institutions	Poor understanding or unwilling to accept the participatory approaches in management of MPAs. Very poor intersectoral coordination among stakeholders due to conflict of interests in their respective mandate.	Capacity training towards integrated management of MPAs involving all stakeholders in participatory approaches and Development of leadership for the same.	WII is being organizing such kind of courses only for forest sector at national level but more such training workshops are required at State/site level for all stakeholders with help of other capacity building institutions.	Leadership development for cross-sectoral coordination and resources for training workshop of integrated management of MPAs at site/State level
Organization of capacity development measures	KFD, KFisheriesD, Wildlife Institute of India for MPAs Managers, Site/State/National level institutions for other stakeholders	Inadequate capacity among stakeholders who are responsible for providing research and training with respect to emerging conservation issues in	Capacity training towards integrated management of MPAs involving all stakeholders in participatory approaches and Development of leadership for the same. Capacity building towards conducting research on	WII is being organizing training programs for forest sector at national level but more such training workshops are required at State/site level for all stakeholders with help of other capacity building institutions to	Leadership development for cross-sectoral coordination and resources for training workshop of integrated management of MPAs at site/State level. Development of specialized capacity to carry

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Dimensions of capacity	Stakeholders	Problem Statement	Conceptual analysis		
			Required	existing	gaps
		successfully managing MPAs in Karnataka	emerging issues such as climate change, invasive species. Better linkage between researchers and management of MPAs, Adequate funds for mariculture and sea ranching etc	promote integrated management of MPAs in Karnataka. Certain research capacity available with WII, CMFRI, ZSI, BNHS, IISC, CMLRE, ATREE, Dakshin foundation, NIO, Mangalore Fisheries Institutes etc	out research on emerging issues such as climate change, invasive species. Establishment of necessary infrastructure with equipment for these researches. Development of research framework for conservation of coastal and marine protected areas in Karnataka.
Individuals	ICSF, CMFRI, ZSI, BNHS, ATREE Foundation, Dakshin, KBB, State Forest and Fisheries Departments, UNDP, UNEP, IUCN, GREENPEACE, etc	Inadequate skills development of youths from Fishing Community for generating alternate/additional livelihoods due to lack of resources with stakeholders	Adequate resources at least certain stakeholders at sites level for skill development for additional or alternate livelihood generation of youths from fishermen communities such as suba diving, snorkeling, community based biodiversity monitoring, marine tourist guide etc.	Moderate infrastructure and capacity available	Lack of adequate infrastructure, equipment and fund
Other forest departments	WII, KBB, ZSI, WWF, WTI, State Forest and Fisheries Institutes etc	Inadequate resources with stakeholders who are responsible for providing training with respect to emerging conservation	Adequate resources at least certain stakeholders at sites level for training frontline staff of Forest Staff towards marine biodiversity monitoring and protection, participatory approach, eco-development etc.	Moderate infrastructure and capacity available	Lack of adequate infrastructure, equipment and fund
Other line departments such as fisheries, tourism, etc	ATREE, Dakshin, WTI, CMFRI, BNHS, IISC, CMLRE, NIO, State Fisheries Institutes etc	Inadequate capacity among stakeholders who are responsible for providing training with respect to emerging conservation	Adequate resources at least certain stakeholders at sites level for training frontline staff of Forest Staff towards marine biodiversity monitoring and protection, participatory approach, eco-development etc,	Moderate infrastructure and capacity available	Lack of adequate infrastructure, equipment and fund

**Table 17: Conceptual analysis results 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
<b>Policies</b>  Adequate data to develop better policies.  Understanding of function and limits of knowledge management and requires general openness for various interest and their background as well  Sector policies that consider trade-offs and synergies with other sectors/ Common understanding of importance of integrated approaches	Appreciation of the importance of MPA management among leaders  Leadership skills among MPA managers to take forward the conservation agenda at the state or national level  Availability of knowledge management system for MPAs in Karnataka as well as linked to other states/ national/ international for better decision making on policies	Training for leadership development and establishment of knowledge management system and required capacities to use operate and maintain  Consultations of all sectors under the chairmanship of Chief Secretary/ Chief Minister level	Officials of State Forests Department, MOEF and other line departments in Karnataka.	Supra national: GIZ  National: WII, LBSNAA, IIFM  State level: CMFRI, Karnataka Biodiversity Board	Better leadership and better policies to create conducive environment for participatory management in MPAs in Karnataka	Better environment for Participatory Management of MPAs in Karnataka
<b>Legal frameworks</b>  Separate guidelines for MPAs in India/  Further elaboration on the biodiversity heritage sites under the BD Act, to facilitate establishment of new coastal and marine PAS under this Act  Recognition of BHS under BD Act as Protected Areas	Integrated management of MPAs and addressing interface between existing legal systems and sustainable resources use of the MPAs.	Training towards integrated management of MPAs	Forest Officials of Karnataka, KBB, State fisheries etc.	Supra national: GIZ  National: WII, LBSNAA, IIFM, MoEF	Enabling environment for Participatory Management of MPAs in Karnataka	Better environment for Participatory Management and cross-sectoral coordination for conservation of MPAs in Karnataka
<b>Implementation strategies</b>  Promoting intersectoral coordination and enhancing skill to self evaluation	Lack of training for Self Evaluation of Management Effectiveness of MPAs in connection with Participatory Approaches	Training for Self Evaluation of Management Effectiveness of MPAs in connection with Participatory Approaches	Forest Officials	National level: WII	Enabling environment for Participatory Management of MPAs in Karnataka	Better environment for Participatory Management and cross-sectoral coordination

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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
of management effectiveness						for conservation of MPAs in Karnataka
<b>Financing instruments Areas</b>  Adequate funds to implement the Management Plans of MPAs, successfully in the sites	Resource generating skills	Consulation workshop to develop skills for resource mobilization	Managers of MPAs	GIZ	Identification of finance resources institutions and mobilization of adequate funds for MPAs	Better environment to successfully implement integrated management plans of MPAs
<b>Research and development</b>  In-house capacity in the state to conduct research/ seeking research solutions, on emerging issues such as climate change, and invasive species. An established working level theme-based association between researchers/ research institutions and MPAs. Adequate funds for coral or mangrove restoration and sea ranching of target fish groups to enhance fish stocks in the wild	Timeliness in implementation of existing projects and distribution of funds	Capacity building programme (training, study tour, consultation, scientist exchange program etc) to conduct research on emerging issues such as climate change, invasive species, landscape level changes with respect to MPAs in Karnataka. Fund resource mobilization training.	State level: State forest departments, KBB, ZSI, CMFRI, Mangalore fisheries college etc.	Research Institutions at Germany and other countries	Better knowledge management system in place and better understanding about emerging conservation issues with respect to integrated management of MPAs in Karnataka.	Integrated and scientific management of MPAs with respect to emerging conservation issues
<b>Education and human resource development</b>  Enhance the capacity of certain prime stakeholders who are responsible for environment education and human resource	Lack of awareness among communities about ecological services of MPAs due to lack of capacity among stakeholders who are primarily responsible for Environment education and human resources development in the region	Environment Education training to school teachers and primary health workers of the region towards marine ecosystem.  Training workshop for	School teachers, primary health workers, youths and adults from local communities especially fishermen.	CPREEC, CEE, ICSF, Dakshin foundation, ATREE, WTI, WWF, BNHS etc	Better awareness about the ecological services of MPAs in the region and acceptance to conserve MPAs.	Participatory management of MPAs in the State.

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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
development for the conservation of MPAs in Karnataka.		stakeholders with required infrastructure, to promote environment education among adults of local communities.				
Cross-sectoral and cross-stakeholder cooperation  Enhance the understanding about the participatory approaches in successful management of MPAs. Improve the intersectoral coordination among stakeholders by promoting integrated management of MPAs with all stakeholders..	Lack of understanding and doubtfulness about efficacy of Participatory Management of MPAs in Karnataka.	Exposure visit of stakeholders (Forest, Fisheries, Tourism, etc) to the world's best practiced 'Integrated Management in MPAs'. Capacity training towards integrated management of MPAs involving all stakeholders.  Development of leadership for Participatory Management of MPAs.	State departments of Forest, Fisheries, Tourism, etc	GIZ/MoEF	Better cross-sectoral cooperation and understanding about participatory management of MPAs in Karnataka	Leadership for cross-sectoral coordination and participatory management of MPAs in Karnataka.
Organization  Enhance the capacity of research and training to all stakeholders towards integrated management of MPAs	Inadequate capacity of State Forest Department to conduct research, monitoring and management of MPAs in Karnataka.	Capacity building programme (training, study tour, consultation, scientist exchange program etc) to conduct research and monitoring with communities for participatory management of MPAs.	WII, Site/State/National level research institutions with more focus on site/State levels.	Research Institutions at Germany and other countries	Better understanding about emerging conservation issues with respect to integrated management of MPAs in Karnataka.	Integrated and scientific management of MPAs with respect to emerging conservation issues
Individual  Establishment of adequate resources with certain stakeholders at sites level for skill	Lack of skills for additional or alternate livelihoods generation of youths from fishermen communities for example, training on suba diving, snorkeling, community based biodiversity monitoring, marine tourist guide, etc,	Skills development /professional training to youths belong to fisherman communities for additional or alternate livelihoods	Youths from fishermen community	ICSF, KBB, BNHS, ATREE Foundation, Dakshin, State Forest and Fisheries Departments, UNDP, UNEP, IUCN, GREENPEACE,	Cooperations of local communities in MPAs management and reduction in the dependency of marine biodiversity resources of	Successful conservation and management of MPAs and sustainable development of local communities

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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
development for additional or alternate livelihood generation of youths from fishermen communities such as suba diving, snorkeling, community based biodiversity monitoring, marine tourist guide etc		generation.		etc	MPAs.	.
Forest Front Line staff  Capable and equipped to monitor the marine biodiversity in the MPAs and skill to involve other stakeholders in the participatory management of MPAs.	Lack of skills for monitoring the marine biodiversity in the MPAs and skill to involve other stakeholders in the participatory management of MPAs	Skills development /professional training to monitor marine biodiversity in the MPAs and skill to involve other stakeholders in the participatory management of MPAs	Forest Front Line staff	KBB, State Forest and Fisheries Departments etc	Better monitoring system available with Management Authority	Successful conservation and management of MPAs
Other line departments such as fisheries, tourism, etc  Appreciate the importance of ecological services of MPAs and cooperate the Forest Sectors for the successful management of MPAs, therefore, establishment of resources and infrastructure for training programs	Poor understanding and appreciation of importance of ecological services of MPAs and cooperation with the Forest Sectors for the successful management of MPAs	Consultation workshops and exposure visits to best managed MPAs with participation of all stakeholders.	Other line departments such as fisheries, tourism,	GIZ, MoEF, ICSF, State Forest and Fisheries Departments, UNDP, UNEP, IUCN, GREENPEACE, etc	Better understanding about participatory management of MPAs and cross sectoral cooperation.	Successful conservation and management of MPAs

**Table 18: Conceptual analysis results for resource organizations/ individuals (providers)**

Who are they	what level do they operate (local, national or international)?	What are their mandates?	What are their capacities?	What is their focus in relation to the desired actions?	What types of capacity-strengthening Programmes do they currently offer?
GIZ	International	International cooperation services for sustainable development	Decentralised structures, intercultural competence and a highly professional workforce	Facilitate capacity building programs by linking relevant agencies at Germany	Human resource development in biodiversity conservation and research.
WII	International but largely national	Nurture the development of wildlife science and promote its application in conservation, in consonance with cultural and socio-economic milieu.	Capacity development towards management of Protected Areas in the region. Research, monitoring and environment education in the field of wildlife.	Facilitate capacity building programs targeting forest sector for participatory management of MPAs. Research and monitoring of marine biodiversity in MPAs.	Capacity development towards management of Protected Areas in the region. Research, monitoring and environment education in the field of wildlife.
LBSNAA	National	Promote good governance, by providing quality training for building a professional and responsive civil service in a caring, ethical and transparent framework	Develop leadership qualities and administrative skill through quality training	Facilitate leadership development programme for cross sectoral cooperation in participatory management of MPAs in India.	Develop leadership qualities and administrative skill through quality training
IIFM,	National	Provide leadership in the field of Forestry, Environment and Natural Resource Management Education, be concerned with pushing the frontiers of knowledge for development of the sector.	Develop leadership qualities and administrative skill through quality training	Facilitate leadership development programme for cross sectoral cooperation in participatory management of MPAs in India.	Develop leadership qualities and administrative skill through quality training
MoEF	National	Nodal agency in the administrative structure of the Central Government for the planning, promotion, co-ordination and overseeing the implementation of India's	Planning, promotion, co-ordination and overseeing the implementation of India's environmental and forestry policies and programmes	Facilitate the planning, promotion, co-ordination and overseeing the implementation of the project and facilitate capacity building programme towards cross sectoral cooperation in participatory management of MPAs in India.	Support capacity strengthening programmes related to conservation and management of biodiversity in India

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Who are they	what level do they operate (local, national or international)?	What are their mandates?	What are their capacities?	What is their focus in relation to the desired actions?	What types of capacity-strengthening Programmes do they currently offer?
		environmental and forestry policies and programmes			
CEE	National	Improve public awareness and understanding of the environment with a view to promote the conservation of nature and sustainable use of the natural resources, leading to a better environment and a better quality of life.	Environment Education and outreach activities	Facilitate training/capacity building programs related to Environment Education	Public awareness, environment education and outreach activities
Mangalore Fisheries college	State	Integrated management of coastal and marine ecosystem through research and training	Research, environment education and academics activities on coastal and marine ecosystems	Facilitate capacity building programs related to research and monitoring, additional livelihoods etc.	Education, research and training in the field of fisheries including stock assessment and technology development
ICSF	National	Establishment of equitable, gender-just,self-reliant and sustainable fisheries, particularly in the small-scale, artisanal sector	Promote equitable, gender-just,self-reliant and sustainable fisheries, particularly in the small-scale, artisanal sector	Stress fisheries development and management of a just,participatory and sustainable nature.	Development of alternatives in the small-scale fisheries sector
IISc	National	Human resource development in the field of teaching, research and extension activities in Marine Sciences	Teaching, research and extension activities in Marine Sciences	Capacity building programs related to research and monitoring, extension activities, livelihoods etc	Teaching and Research in ecological science
Dakshin Foundation	National	Promote nature conservation through science	Research, Environment Education, Training in the field of biodiversity conservation	Capacity programs related to research, Environment Education, Training in the field of biodiversity conservation	Research, Environment Education, Training in the field of biodiversity conservation



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Who are they	what level do they operate (local, national or international)?	What are their mandates?	What are their capacities?	What is their focus in relation to the desired actions?	What types of capacity-strengthening Programmes do they currently offer?
BNHS	National	To enlist Science and Technology as Allies in the Movement for Sustainable Development	Research, Environment Education, Training in the field of biodiversity conservation	Capacity programs related to research, Environment Education, Training in the field of biodiversity conservation	Research, Environment Education, Training in the field of biodiversity conservation
State Forest Department	State	Nodal agency in the administrative structure of the State Government for the planning, promotion, co-ordination and overseeing the implementation of India's/ State's environmental and forestry policies and programmes	Planning, promotion, co-ordination and overseeing the implementation of India's/State's environmental and forestry policies and programmes	Faciliate all capacity building programs related to Forest Sectors and management of Marine PAs.	Support capacity strengthening programmes related to conservation and management of biodiversity in Karnataka
State Fisheries Department	State	Nodal agency in the administrative structure of the State Government for the planning, promotion, co-ordination and overseeing the implementation of Fisheries related policies	Planning, promotion, co-ordination and overseeing the implementation of India's/State's fisheries policies and programmes	Faciliate all capacity building programs related to Fisheries and Fishing Community	Support capacity strengthening programmes related to Fisheries, Fishing Community and integrated management of MPAs in Karnataka.
ATREE Foundation	State	Develop independent and right thinking individuals in the local community who will in turn help nurture a progressive and environment conscious movement among the people	Participatory programs in the field of biodiversity conservation	Environment education and participation of local communities in monitoring	Participatory programs in the field of biodiversity conservation

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NIO	National	Research: observing and understanding the special oceanographic features that the North Indian basin offers	research in four traditional branches of oceanography - biological, chemical, geological/geophysical, and physical - and some other areas such as marine instrumentation and archaeology	Capacity building programs related to research and monitoring	Teaching and research in four traditional branches of oceanography - biological, chemical, geological/geophysical, and physical - and some other areas such as marine instrumentation and archaeology
WWF	National	Teaching, research and technology development in the field of science including ecological science	Research and teaching in the field of science	Capacity building programs related to research	Research, environment education and training towards participatory management of PA's
ATREE	National	Support integrated management of coastal and marine environment for livelihood security, sustainable development and hazard risk management by enhancing	Integrated Coastal Zone Management	Capacity building programs related to Integrated Coastal Zone Management	Research, environment education and outreach activities
CMFRI	National	Promote teaching, training, research and technology development in the field of fisheries science in India	Teaching, training, research and technology development in the field of fisheries science.	Capacity building programs related to fisheries sector, Fishing Community, research on fisheries etc	Teaching, training, research and technology development in the field of fisheries science.
CMLRE	National	Develop management strategies for marine living resources through Ecosystem monitoring and modelling efforts and R&D in basic Sciences on Marine Living Resources and	Research and monitoring of marine living resources	Capacity building programs related to research and monitoring of marine living resources	Nil

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Who are they	what level do they operate (local, national or international)?	What are their mandates?	What are their capacities?	What is their focus in relation to the desired actions?	What types of capacity-strengthening Programmes do they currently offer?
		Ecology			
CPR Environmental Education Centre (CPREEC)	National	Promote environmental education	Environment education	Capacity building related to environment education	Environment education

**Table 19: Conceptual analysis for Capacity Needs Assessment of stake holders**

Sub-Core area (of Forestry)	Dimensions of capacity	Stakeholders		Target	Issues to be addressed during data collection
		Target group	Providers		
<b>Policies</b>	<ul style="list-style-type: none"> <li>- Leadership development through Training/workshop</li> <li>- Establishment of knowledge management system for MPAs in Karnataka for better policies</li> </ul>	Officials of State Forests Department, MOEF and other line departments in Karnataka	GIZ, LBSNAA, IIFM, WII	Better leadership and better policies to create conducive environment for participatory management in MPAs in Karnataka	Who are need to be trained? How many people need to be trained? Who will provide training and what are their requirements? More details about leadership development programs of 'Providers' need to be acquired. Feasibility of developing course curriculam for this specialized course needs to be looked into.
<b>Legal frameworks</b>	Training towards integrated management of MPAs and addressing interface between existing legal systems and sustainable resources use of the MPAs.	Forest Officials	GIZ/WII/MoEF	Enabling environment for Participatory Management of MPAs in Karnataka	How many people and in what capacity need to be trained? Who will train and what are their requirements? Feasibility of organizing a workshop to review the existing legal and policies instruments available for management of MPAs for Integrated Management of MPAs in Karnataka. What would be expected outcomes of the training?
<b>Implementation strategies</b>	Training for Selef Evaluation of Management Effectiveness of MPAs in connection with Participatory Approaches	Forest Officials	WII	Enabling environment for Participatory	Review the existing capacity and resources with WII to conduct this training

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Sub-Core area (of Forestry)	Dimensions of capacity	Stakeholders		Target	Issues to be addressed during data collection
		Target group	Providers		
	Strengthening the capacity of management including necessary infrastructure for implementation of strategies/management plans of MPAs in Karnataka.			Management of MPAs in Karnataka	program  Details about existing and required capacity for the management including necessary infrastructure for implementation of strategies.
<b>Financing instruments Areas</b>	Resource mobilization skills	Managers of MPAs	GIZ	Identification of finance resources institutions and mobilization of adequate funds for MPAs	What are the existing hurdles to access adequate fund for successful implementation of management plans of MPAs in the State? Who are potential funding agencies to support participatory management of MPAs in Karnataka
<b>Research and development</b>	Capacity building programs to conduct research on emerging issues such as climate change, invasive species, landscape level changes with respect to MPAs in Karnataka through exposure visits, training, scientific cooperation etc	Site/State/National level research institutions with more focus on site/State levels.	Research Institutions at Germany and other countries	Better knowledge management system in place and better understanding about emerging conservation issues with respect to integrated management of MPAs in Karnataka.	Identification of target groups in Karnataka and service providers at Germany
<b>Education and human resource development</b>	Training for conducting environment education/awareness programs  Training for monitoring biodiversity	School teachers, primary health workers, youths and adults from local communities especially fishermen.  Fishermen Youths Forest staff (divers)	CPRCCE, CEE, Dakshin, Foundation, ATREE, CMFRI, Mangalore Fisheries College, KBB, BNHS, IISc etc	Better awareness about the ecological services of MPAs in the region and acceptance to conserve MPAs.	Feasibility of organizing training programs? Assess the existing capacity of 'Providers' in this regard. Assess the requirements for organizing such kind of training programs.
<b>Cross-sectoral and cross-stakeholder cooperation</b>	Conduct of workshop/training/course to understand the importance and efficacy of Participatory Management of MPAs in Karnataka.	State departments of Forest, Fisheries, Tourism, etc	GIZ/MoEF	Better cross-sectoral cooperation and understanding about participatory management of MPAs in Karnataka.	Review the feasibility of organizing such kind of workshops? What about course curriculum? Who would support this program and how? Who would provide the technical inputs in this capacity

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Sub-Core area (of Forestry)	Dimensions of capacity	Stakeholders		Target	Issues to be addressed during data collection
		Target group	Providers		
					programs and how? What is the frequency of capacity programs?
<b>Organization</b>	Building capacity of State Forest Department and other research institutions to conduct research, monitoring and management of MPAs in Karnataka.	State Forests Department, WII, Site/State/National level research institutions with more focus on site/State levels.	Research Institutions at Germany and other countries	Better understanding about emerging conservation issues with respect to integrated management of MPAs in Karnataka.	Review the feasibility of organizing such kind of workshops? What about course curriculum? Who would support this program and how? Who would provide the technical inputs in this capacity programs and how? What is the frequency of capacity programs?
<b>Individual</b> <b>Youth from Fishermen Communities</b>	Skill development trainings/ workshops for additional or alternate livelihoods generation of youths from fishing communities (for example, training on suba diving, snorkeling, community based biodiversity monitoring, marine tourist guide, etc.)	Youths from fishing community	ICSF, Mangalore Fisheries college, CMFRI, BNHS, ATREE Foundation, WWF, WTI, KBB, State Forest and Fisheries Departments, UNDP, UNEP, IUCN, GREENPEACE, etc	Cooperations of local communities in MPAs management and reduction in the dependency of marine biodiversity resources of MPAs.	Analysis the actual requirements and attitude of youths from fishing communities for generating alternate or additional livelihoods. How many people need to be trained and how? Who will provide the training programs and what are their requirements? After training, what would be the requirement of youths to practice the skills acquired?
<b>Individual</b> <b>Forest Front Line staff</b>	Skill development for monitoring the marine biodiversity in the MPAs and skill to involve other stakeholders in the participatory management of MPAs.,	Forest Front Line staff	State Forest and Fisheries Departments, CMFRI, KBB, Mangalore Fisheries college, ATREE, IISc	Better monitoring system available with Management Authority	Analysis the actual requirements, existing skill and attitude of frontline staff to acquire this training program. How many people need to be trained and how? Who will provide the training programs and what are their requirements? After training, what would be the requirement of management to successfully use their skills?

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Sub-Core area (of Forestry)	Dimensions of capacity	Stakeholders		Target	Issues to be addressed during data collection
		Target group	Providers		
<b>Individual</b>  <b>Other line departments such as fisheries, tourism, etc</b>	Refresher course to understand and appreciate the importance of ecological services of MPAs and cooperation with the Forest Sectors for the successful management of MPAs	Other line departments such as fisheries, tourism,	GIZ, MoEF, ICSF, CMFRI, State Forest and Fisheries Departments, UNDP, UNEP, IUCN, GREENPEACE, etc	Better understanding about participatory management of MPAs and cross sectoral cooperation.	Analysis the actual requirements, existing skill and attitude of officials from line departments to acquire this training program. How many people need to be trained and how? Who will provide the training programs and what are their requirements? What would be course curriculum?

## Chapter 5

# TAMIL NADU

### 5.1.1. Introduction

Tamil Nadu is one of the largest southern States lying at extreme tip of Peninsular India. The State of Tamil Nadu has 1076 km long coastline extending in 13 districts with 25 blocks with 591 fishing villages from Thiruvallur in the north to Kanyakumari in the south. Pondicherry and Karaikkal belong to the Union Territory Pondicherry and thus form separate enclave at two different places within Tamil Nadu coastline. It is one of the longest coastline constitutes 15% of the total coastal length of India, stretches along Bay of Bengal, Indian Ocean and Lakshadweep Sea. Tamil Nadu coast ranks fourth in fish production in the country, has a continental shelf covering 41412 sq km and exclusive economic zone (EEZ) spreading over 0.19 million sq km. Often this coast has been described under three major divisions viz., Coromandel Coast, Palk Bay and Gulf of Mannar towards east and about 60 km along west coast. The southern tip of this State and a part along the west coast of Kanyakumari district is popularly known as '*wadge bank*'. The Tamil Nadu coastline encompasses all typical habitats viz., backwaters, brackish water lagoons and lakes, estuaries, mudflats, beaches, sand dunes, rocky shorelines and saline swamps etc. Each habitat reflects prevailing environmental factors and is further characterized by its biota.

Sandy beaches are vital coastal systems that occupy a significant part of the coastline. They are habitat for many inter-tidal flora and fauna and also are critical nesting habitats for marine turtles. The world famous Marine Beach in Chennai covers an area of about 10 km<sup>2</sup> with 1 km width. About 41 river-estuarine systems have been recorded along this coastline with perennial and non-perennial flow. Among them, Adyar, Vellar, Coleroon, Kaduvaiyar, Agniyar, Tamirabarani, Pazhayar (Manakudy estuary) and Thengaipatnam are the major drainage systems have an estuarine characteristics with regular freshwater flow and tidal flushing. Vellar, Coleroon, Pazhayar and Thengaipatnam estuaries were well studied in all aspects of its ecosystem and function.

Corals are found along the coastal stretch of Palk Bay and in Gulf of Mannar regions. In Gulf of Mannar, corals found as fringing types around the islands and forming a discontinuous barrier reef popularly known as '*Mannar Barrier Reef*'. About 117 species of corals have been so far reported

to exist within the shallow waters of this region with domination of *Acropora*, *Montipora*, *Pocillopora*, *Porites*, *Favia*, *Goniastrea* genera. Geological studies reveal that the islands of the Gulf of Mannar regions are resultant of exposure of raised coral due to sea level change during the past. In the Palk Bay corals were found only to the southern portion (Munaikadu) adjacent to the northern part of Gulf of Mannar (Sridhar et al., 2008). Entire Tamil Nadu coast is well known for the wide distribution of seagrasses, Gulf of Mannar, Palk Bay and Pulicat Lake have such seagrass meadows. About 13 species of seagrasses have been reported to exist and by far higher diversity and larger patches seagrass meadows were recorded along Palk Bay (11 species) and Gulf of Mannar (13 species) coastline and calculated that the Palk Bay and Gulf of Mannar together have seagrass cover of an area of about 30 km<sup>2</sup> but very recent Remote Sensing study by Thangaradjou et al. (2008) reveals that the Mandapam groups of island have only 1327.15 ha of sparse and dense seagrass beds.

The oldest known record on mangroves of Tamil Nadu coast has been documented by Blasco in 1975. He reported that once the entire Tamil Nadu coasts have been covered with thick mangrove about 100 years back. As many as reports on mangroves of Tamil Nadu are available after this, especially, the mangroves of Pichavaram, Muthupet and Gulf of Mannar were very well been studied then and popularized. The Tamil Nadu coast is also well known for sporadic turtle (Olive Ridley) nesting between Decembers - March every year (Bhupathy and Karunakaran, 2003).

Since the coastline has all typical habitats as earlier mentioned the diversity of coastal and marine flora and fauna of Tamil Nadu is very rich and varied. About 428 species of Molluscs and 112 species of Echinoderms were reported in Gulf of Mannar region. The Hemichordates such as *Ptychodera*, *Balanoglossus* and *Glandiceps* have also been recorded from Chennai and Gulf of Mannar regions. Kumaran (2002) reported that 16 species of marine mammals reported along the Tamil Nadu coastline and also cited many reports of occurrence, especially off Parangipettai and in Gulf of Mannar.

Since Tamil Nadu coastline has a fishing village at every 2 km interval it is obvious that the coastal community largely depends on fishing and fishery resources for their livelihood. Entire coastline has been heavily influenced by regular fishing activities by using different types of gears typical to target species. About 900 tonnes of fishes, 150 tonnes of crabs were reported to harvest from Pulicat Lake, constituting 14 and 2 species as major catch respectively. Fishermen



follows '*padu system*' -restricted fishing activity and operation within the lake to share the resource equally.

### 5.1.2. Threats

The coastal environment of Tamil Nadu is like other coastal States of India and experiences tremendous pressures due to pollution especially through anthropogenic activities. Tamil Nadu has several worst or most critical pollution hot spots lying within 50 km limits of coastal zone. Threats on the beach include sand mining, construction of roads and residence, beach armouring, plantations and port and jetties. Encroachment on the beach by plantation and construction of tourist resorts, coastal road obviously disturbs the entire habitat. The developments of ports and harbor have resulted in severe erosion and closure of several creeks and thus lead to coastal wetland degradation.

### 5.1.3. Conservation Measures

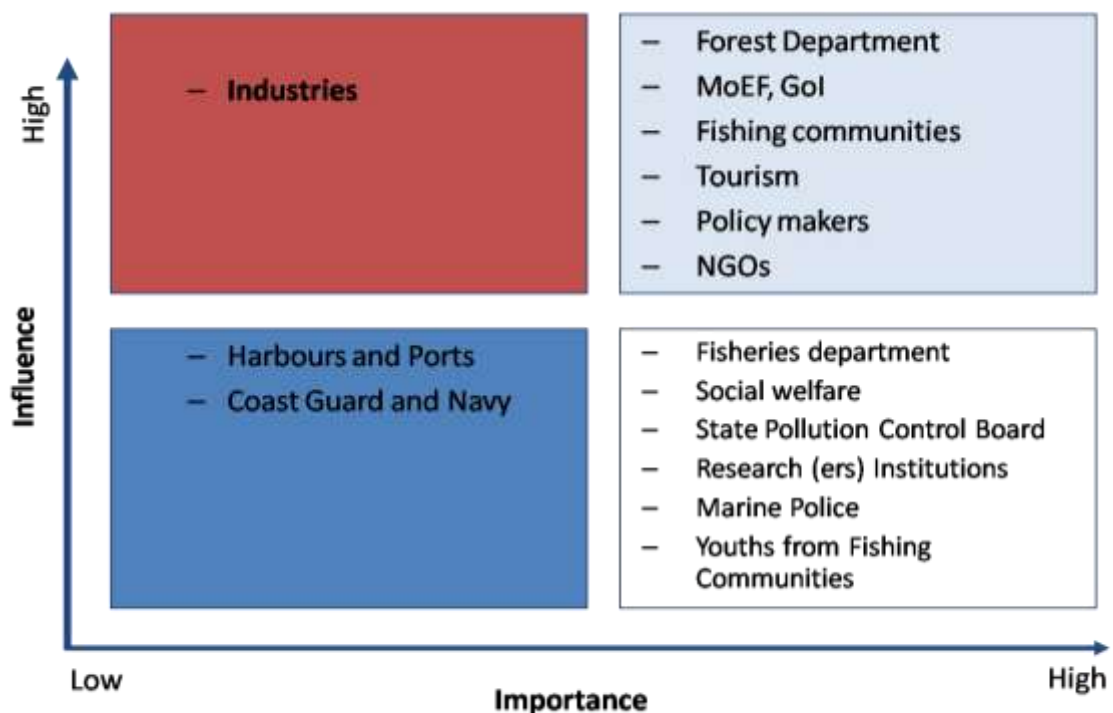
Mangrove plantation in the coastal Tamil Nadu has been carried out for several years back, especially the forest management by '*coupe felling*' has a typical plantation program in the harvest areas. However plantation has been carried out in many places, the practice has been intensified after Tsunami. Kaliveli, Ariyankuppam, Devanampattinam, Killai, Pazhayar, Karaikal, Talainayar, Muthupet, Kilathottam, islands of Gulf of Mannar and Manakudy are noteworthy sites where mangroves have been established by the State Forest Department involving NGOs.

Coastal shelterbelt plantation has largely been practiced in Community lands, Revenue lands and sometime even in Private lands. Mascarenhas (2004) described the importance of plantation of Casuarina along the coastline and also listed the occurrence of Casuarina belts in Nagore-Nagapattinam strip, Velankanni coast and as narrow strip along the coastal highway.

### 5.1.4. Palk Bay in Tamil Nadu:

The bay area is lying along the Coromandel Coast (southern Deccan Plateau) in the Bay of Bengal, just above the Gulf of Mannar Marine Biosphere Reserve in Tamil Nadu. It adjoins with Great Vedaranyam Swamp at its north and with the Gulf of Mannar Marine Biosphere Reserve at

south. The coral at the southern portion (5 to 250m width) of the Bay supports varieties of sponges, fish life, mollusks, crustaceans, echinoderms etc. The shallow offshore area harbors larger sea grass meadows and coral reef ecosystems. Recent exploration reveals that the sea grass meadows here are healthier than that of Gulf of Mannar. Similarly, sea horse and pipe fish population were recorded higher than Gulf of Mannar region. However, no authentic reports are available on the population of *Dugong*; several citations have been made and reported on their existence within the Bay. People largely depend on their livelihood by seaweed culture and fishing at southern portion of the Bay. Forest Department's sea turtle project, BNHS field research station and setting up of Ecological Monitoring Committee are the important initiatives. At present, Sethusamudram Ship Canal Project dredging is said to pose a greater threat to this fragile marine environment. So far no legal protection measures have been posed within its boundary. The Wildlife Institute of India with its preliminary survey suggests this Bay to be considered as a Marine Conservation Reserve involving the local panchayat in conservation and management.



**Figure 5: Existing influence and importance matrix of stakeholders in the management of Marine Protected Areas of Tamil Nadu**

## 5.2. Situation and Conceptual Analysis

### 5.2.1. Stakeholders Analysis

**Table 20: Stakeholders for conservation and management of MPAs in Tamil Nadu**

Sector	Stakeholder	Support to coastal and marine protected areas (Positive/neutral/inhibitive)	Livelihood dependence on coastal and marine biodiversity/protected area	Power to influence	Geographical area of influence	Mandate / Responsibility/ specific interest in coastal areas of MPA's	Inter-sectoral coordination
Forest	Decision makers: State Forest Department	Positive	Low	High	State Level: MPAs, Forests, Zone I of CRZ of Tamil Nadu	Protection and Management of Biodiversity	Average
	GOMBRT trust director, CWLW, range officers and forest guards	Positive	Medium	High	State and site level: GOMBRT and EEZ	Protection of biodiversity and Promote alternate livelihoods	Very good with Fishing Community but average relationship with other stakeholders
	Ministry of Environment and Forest, GOI	Positive	Low	High	National level	Promote conservation of biodiversity as per CDB convention and other national , international regulations	Good with forest sector but average with other stakeholders
	State pollution control board	Positive	Low	Medium	State Level or site level	Control pollution	Average
	National Biodiversity Authority	Positive	Low	Medium	State level	Provides insights on the knowledge of biodiversity and conservation	Average
	State tourism	Neutral	High	High	State Level : MPAs and other coastal areas that could attract tourists	Promote tourism	Average
	Social Welfare	Neutral	Medium	Low	State Level	Strengthening welfare of local communities	Average
	Policy Makers	Neutral	High	High	State and National Levels	Mainstreaming biodiversity conservation into production sectors	Good
	Researchers/ Research institutions	Positive	Medium	Low	Site/State/National Levels	Help management of biodiversity through research and monitoring	Average to Good
	Harbours and Ports	Neutral/inhibitory	Low	Low	State or site level	Promote export and imports	Average
	Coast Guard and Indian Navy	Neutral/inhibitory	Low	Low	State or site level	Protection of sovereignty of country	Average
	Coastal Police	Neutral/inhibitory	Low	Low	State or site level	Protection of coastal areas	Average
	Industry associations	Neutral/inhibitory	Low	Low	State level and adjoining landscape	Promote industrial productions	Very good with stakeholders other than Forest,
	NGOs	Positive	Medium	Medium to high	Site/State/National/ International	Environment education and community development	Good

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Sector	Stakeholder	Support to coastal and marine protected areas (Positive/neutral/inhibitive)	Livelihood dependence on coastal and marine biodiversity/protected area	Power to influence	Geographical area of influence	Mandate / Responsibility/ specific interest in coastal areas of MPA's	Inter-sectoral coordination
Fisheries	State fisheries departments	Positive	Medium	Medium	State level EEZ other than MPA's	Promote fisheries	Very good with fishing community but average with forest sectors
Youths	Fishing Community		High	Medium	Site/State	Not known	Good with Fisheries department but average with Forest sectors
	Other local community		Low	Medium	Site/State	Not known	Good

### 5.2.2. Capacity Gap analysis

**Table 21: Problem analysis**

Dimensions of Capacity	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity
<b>Enabling environment:</b> <b>- Policies</b> National Biodiversity Action Plan	Very importance for formulation of legal frameworks for ensuring the success of conservation and management of coastal and marine protected areas	Extremely high	MoEF, GOI, State forest departments, CWLW of MNP's, State fisheries, WII, BNHS, NBA, CMFRI, ZSI etc.	Inadequacy of required data base to take finer decisions/ lack of participatory consultations	Medium
<b>Enabling environment:</b> <b>- Legal frameworks</b> Wildlife (Protection) Act, 1972	Provide legal framework and help to develop management plans for ensuring the success of conservation and management of coastal and marine protected areas	Extremely high	MoEF, GoI, BOB, TNFD,	Lack of intersectoral coordination, timeliness in implementation of management plans, participation of local communities in Governance and lack of basic infrastructure	High
Environment Protection Act	Protection and improvement of environment and prevention of hazards to human beings	Extremely high	MoEF, GoI, BOB, TNFD	Lack of inter-sectoral coordination and knowledge among the stake holders	High
Biodiversity Act	Provides mechanism for equitable sharing of benefits arising from the traditional biological resources and knowledge	Extremely high	MoEF, GoI, BOB, TNFD	Lack of required database to take finer decisions and lack of inter-sectoral coordination among the stake holders	High
<b>Enabling environment:</b>	Extremely High	Extremely high	TNFD, MoEF-GoI, BOB	Lack of intersectoral	Extremely High

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Dimensions of Capacity	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity
- Implementation strategies				coordination with other stakeholders, Lack of skill to evaluate the management effectiveness.	
<b>Enabling environment:</b> - Financing instruments areas	Extremely high	High	MoEF-GoI TNFD	Always inadequate funds to implement the Management Plan successfully	Medium
<b>Enabling environment:</b> - Research and development	Extremely important to ensure the success of conservation and management of MPAs in Tamil Nadu	High	National and State Level research Institutions, TNFD,	Lack of capacity to conduct research on emerging issues such as climate change, invasive species. Poor linkage between research and management of MPAs, Lack of fund for applied research etc.	High
<b>Enabling environment:</b> - Education and human resource development	Extremely important to ensure the success of conservation and management of MPAs in Tamil Nadu	Extremely high	Wildlife Institute of India for training managers for MPAs, Site/State/National level institutions for environment education and other human resource development for conservation and management of MPAs in Tamil Nadu	Lack of fund resources and short comings in capacity among stakeholders who are responsible for providing education and human resource development with respect to emerging conservation issues	High
<b>Enabling environment:</b> - Knowledge and Awareness generation activities	Very important to ensure the success of conservation and management of MPAs in Tamil Nadu	High	Site/State/National level institutions , ICSF, TREE Foundation, DHAN Foundation, GREENPEACE, etc	Lack of fund resources	High
<b>Enabling environment:</b> - Science-policy linkages	Extremely important to ensure the success of conservation and management of MPAs in Tamil Nadu	High	Site/State/National level research institutions, MoEF-GoI, TNFD	Lack of intersectoral coordinations and participatory approaches. Poor understanding of researchers about policy requirements.	High

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Dimensions of Capacity	Function / purpose	Level of importance	Stakeholders involved	What are the Related problems	Level of complexity
<b>Cross-sectoral coordination:</b> State forest departments and State fisheries	Both departments have high stake in the coastal and marine ecosystem, so any decision on MPA's requires both departments are in synchronization with each other on the management planning	Extremely High	TNFD, TNFisheriesD, TNTourism, GOMBRT, CWLW Gulf of Mannar MNP etc.	Poor understanding about participatory approaches in management of MPAs. Very poor intersectoral coordination among stakeholders due to conflict of interests in their respective mandate.	Extremely High
State forest departments and Research Institutions	Both departments have high stake in the coastal and marine ecosystem, so any decision on MPA's requires both departments are in synchronization with each other on the management planning	Extremely high	GOMBRT, AU, SDMRI, CMFRI,	Poor understanding about participatory approaches in management of MPAs. Very poor intersectoral coordination among stakeholders due to conflict of interests in their respective mandate.	Extremely High
<b>Organizations:</b>	Extremely Important to train MPAs managers and officials of other line departments. Available curriculum / andragogy / overall training management system to provide training to cope up with new challenges in coastal marine areas	Extremely high	Wildlife Institute of India for MPAs Managers, Site/State/National level institutions for other stakeholders	Inadequate capacity among stakeholders who are responsible for providing training with respect to emerging conservation issues in successfully managing MPAs in TN	Extremely High
Individuals:	Technical skills of a forest ranger to conduct marine species assessment; or conceptual understanding of a media professional on coastal and marine protected area management	Extremely High	Range Forest Officers, Fisheries Inspectors, Tourism Officer etc	Inadequate capacity among stakeholders who are responsible for providing training with respect to emerging conservation	Extremely high
<b>Youth Sector</b>	Understanding of participatory approaches on conservation of marine protected areas	Extremely High	Youth from Fishermen Communities and fishermen Self Help Groups (SHG)	Inadequate skills for generating alternate/additional livelihoods other than through fisheries	Extremely high

### 5.3. Conceptual analysis to identify capacity needs and possible interventions

**Table 22: Conceptual analysis results for Capacity Needs**

Dimensions of capacity	Stakeholders	Problem Statement	Conceptual analysis		
			Required	existing	gaps
<b>Policies</b>	MoEF, GOI, State forest departments, CWLW of MNP's, State fisheries, WII, BNHS, NBA, CMFRI, ZSI etc.	Inadequacy of required data base to take finer decisions/ lack of participatory consultations	Conducive environment to consult, debate, understand and mutually agree for a common goal i.e. conservation of MPAs in TN among all stakeholders. Creation of data base.	Officers are available with MoEF and State Forest Departments. Some data available with various State and national level institutions, State departments.	Data collation and knowledge network and lack of leadership to involve all stakeholders in policies making.
<b>Legal frameworks</b>	MoEF, GoI TNFD,	Lack of intersectoral coordination and participation of local communities in Governance	Conducive environment for Intersectoral coordination and involvement of local communities in Governance	Basic infrastructure available Gulf of Mannar Biosphere Reserve Trust for GoMNP and GoMBR for implementation of management plans for the conservation of marine protected areas	Lack of enforcement of management plans. Lack of funding and skilled staffs for the assessment of socio-economic status of MNP's and fishermen communities.
<b>Implementation strategies</b>	TNFD, MoEF-GoI,	Lack of intersectoral coordination with other stakeholders. Lack of skill to evaluate the management effectiveness.	Conducive environment for Intersectoral coordination and MEE	Available with TNFD & WII	Lack of leadership to have better intersectoral coordination and lack of willingness to accept the importance of intersectoral coordination in better management of MPAs in TN. Lack of adequate skill to self evaluation of Management effectiveness of MPAs.
<b>Financing instruments areas</b>	MoEF-GoI TNFD	Inadequate funds to implement the Management Plans successfully in the sites	Adequate funds required as per the Management Plans of each MPAs in TN	Minimum required funds are available with MoEF-GoI and TNFD	Additional fund gathering capacity of Managers from other sources.
<b>Research and development</b>	National and State Level research Institutions, TNFD,	Lack of funds and state of art infrastructure to conduct research on emerging issues such as climate change, invasive species. Average linkage	Capacity building towards conducting research on emerging issues such as climate change, invasive species. Better linkage between researchers and management of	Certain capacity available with WII, CMFRI, ZSI, CASMB, NCSCM, BNHS, SDMRI, IISC, CMLRE, NIO, MSSRF, State Fisheries Institutes etc	Development of specialized capacity to carry out research on emerging issues such as climate change, invasive species. Establishment of

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Dimensions of capacity	Stakeholders	Problem Statement	Conceptual analysis		
			Required	existing	gaps
		between researchers and management of MPAs, Lack of fund for applied research etc.	MPAs, Adequate fund for applied research etc.		necessary infrastructure with equipment for these research. Development of research framework for conservation of coastal and marine protected areas in TN.
- Education and human resource development	CEE, SDMRI, ICSF, CASMB, DHAN Foundation, OMCAR Foundation, DOCAS-AU, CMFRI, , NCSCM, BNHS, IISC, CMLRE, NIO, MSSRF, State Fisheries Institutes etc	Inadequate capacity among certain stakeholders who are responsible for providing education and training and human resource development with respect to emerging conservation issues and Lack of fund resources for establishing capacity	Enhancement of capacity of certain prime stakeholders with required infrastructure, for education and human resource development fo conservation of MPAs in TN.	Moderate capacity for education and human resource development are already available	Capacity in Participatory Approches and Governance i.e. capacity to promote integrated management of MPAs in TN
Cross- sectoral and cross- stakeholder cooperation	TNFD, TNFisheriesD, TNTourism, TNIndustries, Coast Guard and Indian Navy, Marine Police, ICSF, Site/State/ National Level research and education institutions	Poor understanding or unwilling to accept the participatory approaches in management of MPAs. Very poor intersectoral coordination among stakeholders due to conflirt of interests in their respective mandate.	Capacity training towards iintegrated management of MPAs involving all stakeholders in participatory approaches and Development of leadership for the same.	WII is being organizing such kind of courses only for forest sector at national level but more such training workshops are required at State/site level for all stakeholders with help of other capacity building institutions.	Leadership development for cross-sectoral coordination and resources for training workshop of integrated management of MPAs at site/State level
Organization of capacity development measures	TNFD, TNFisheriesD, Wildlife Institute of India for MPAs Managers, Site/State/Nation al level institutions for other stakeholders	Inadequate capacity among stakeholders who are responsible for providing research and training with respect to emerging conservation issues in successfully manageing	Capacity training towards iintegrated management of MPAs involving all stakeholders in participatory approaches and Development of leadership for the same. Capacity building towards conducting research on emerging issues such as climate	WII is being organizing training programs for forest sector at national level but more such training workshops are required at State/site level for all stakeholders with help of other capacity building institutions to promote integrated management of	Leadership development for cross-sectoral coordination and resources for training workshop of integrated management of MPAs at site/State level. Development of specialized capacity to carry out research on emerging issues



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Dimensions of capacity	Stakeholders	Problem Statement	Conceptual analysis		
			Required	existing	gaps
		MPAs in TN	change, invasive species. Better linkage between researchers and management of MPAs, Adequate fund for applied research etc	MPAs in TN. Certain research capacity available with WII, CMFRI, ZSI, CASMB, NCSCM, BNHS, SDMRI, IISC, CMLRE, NIO, MSSRF, State Fisheries Institutes etc	such as climate change, invasive species. Establishment of necessary infrastructure with equipment for these research. Development of research framework for conservation of coastal and marine protected areas in TN.
Individuals	ICSF, SDMRI, OMCAR Foundation, DOCAS-AU, BNHS, TREE Foundation, MSSRF, State Forest and Fisheries Departments, UNDP, UNEP, IUCN, GREENPEACE, etc	Inadequate skills development of youths from Fishing Community for generating alternate/additional livelihoods due to lack of resources with stakeholders	Adequate resources at least certain stakeholders at sites level for skill development for additional or alternate livelihood generation of youths from fishermen communities such as suba diving, snorkeling, community based biodiversity monitoring, marine tourist guide etc,	Moderate infrastructure and capacity available	Lack of adequate infrastructure, equipment and fund
Other forest departments	WII, SACON, ZSI, SDMRI, State Forest and Fisheries Institutes etc	Inadequate resources with stakeholders who are responsible for providing training with respect to emerging conservation	Adequate resources at least certain stakeholders at sites level for training frontline staff of Forest Staff towards marine biodiversity monitoring and protection, participatory approach, eco-development etc,	Moderate infrastructure and capacity available	Lack of adequate infrastructure, equipment and fund
Other line departments such as fisheries, tourism, etc	SDMRI, ICSF, CASMB, DOCAS-AU, CMFRI, , BNHS, IISC, CMLRE, NIO, MSSRF, State Fisheries Institutes etc	Inadequate capacity among stakeholders who are responsible for providing training with respect to emerging conservation	Adequate resources at least certain stakeholders at sites level for training frontline staff of Forest Staff towards marine biodiversity monitoring and protection, participatory approach, eco-development etc,	Moderate infrastructure and capacity available	Lack of adequate infrastructure, equipment and fund

**Table 23: Conceptual analysis results 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
<b>Policies</b>  Adequate data to develop better policies.  Understanding of function and limits of knowledge management and requires general openness for various interest and their background as well  Sector policies that consider trade-offs and synergies with other sectors/ Common understanding of importance of integrated approaches	Appreciation of the importance of MPA management among leaders  Leadership skills among MPA managers to take forward the conservation agenda at the state or national level  Availability of knowledge management system for MPAs in TN as well as linked to other states/ national/ international for better decision making on policies	Training for leadership development and establishment of knowledge management system and required capacities to use operate and maintain  Consultations of all sectors under the chairmanship of Chief Secretary/ Chief Minister level	Officials of State Forests Department, MOEF and other line departments in TN.	Supra national: GIZ  National: WII, LBSNAA, IIFM  State level: CMFRI, AU, SDMRI, State forest departments, GOMBRT and State fisheries, MSSRF etc  Local: State forests, GOMBRT, State fisheries, NGO's etc	Better leadership and better policies to create conducive environment for participatory management in MPAs in TN	Better environment for Participatory Management of MPAs in TN.
<b>Legal frameworks</b>  Separate guidelines for MPAs in India/  Further elaboration on the biodiversity heritage sites under the BD Act, to facilitate establishment of new coastal and marine PAS under this Act  Recognition of BHS under BD Act as Protected Areas	Integrated management of MPAs and addressing interface between existing legal systems and sustainable resources use of the MPAs.	Training towards integrated management of MPAs	Forest Officials of TN, GOMBRT officials, State fisheries etc.	Supra national: GIZ  National: WII, LBSNAA, IIFM, MoEF	Enabling environment for Participatory Management of MPAs in TN	Better environment for Participatory Management and cross-sectoral coordination for conservation of MPAs in TN.
<b>Implementation strategies</b>  Promoting intersectoral coordination and enhancing skill to self evaluation	Lack of training for Self Evaluation of Management Effectiveness of MPAs in connection with Participatory Approaches	Training for Self Evaluation of Management Effectiveness of MPAs in connection with Participatory Approaches	Forest Officials	National level: WII	Enabling environment for Participatory Management of MPAs in TN	Better environment for Participatory Management and cross-sectoral coordination

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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
of management effectiveness						for conservation of MPAs in TN.
<b>Financing instruments Areas</b>  Adequate funds to implement the Management Plans of MPAs, successfully in the sites	Resource generating skills	Consulation workshop to develop skills for resource mobilization	Managers of MPAs	GIZ	Identification of finance resources institutions and mobilization of adequate fudns for MPAs	Better environment to successfully implement integrated management plans of MPAs
<b>Research and development</b>  In-house capacity in the state to conduct research/ seeking research solutions, on emerging issues such as climate change, and invasive species. An established working level theme-based association between researchers/ research institutions and MPAs. Adequate fundsfor coral or mangrove restoration and sea ranching of target fish groups to enhance fish stocks in the wild	Timeliness in implementation of existing projects and distribution of funds	Capacity building programme (training, study tour, consultation, scientist exchange program etc) to conduct research on emerging issues such as climate change, invasive species, landscape level changes with respect to MPAs in TN. Fund resource mobilization training.	State level: State forest departments, GOMBRT, ZSI, CMFRI, AU, MSSRF etc.	Research Institutions at Germany and other countries	Better knowlde management system in place and better understanding about emerging conservation issues with respect to integrated management of MPAs in TN.	Integrated and scientific management of MPAs with respect to emerging conservation issues
<b>Education and human resource development</b>  Enchance the capacity of certain prime stakeholders who are responsible for environment education and human resource development for	Lack of awareness among communities about ecological services of MPAs due to lack of capacity among stakeholders who are primarily responsible for Environment educaton and human resources development in the region	Environment Education training to school teachers and primary health workhcers of the region towards marine ecosystem.  Training workshop for stakeholders with required	School teachers, primary health workers, youths and adults from local communities especially fishermen.	CPREEC, CEE, SDMRI, ICSF, OMCAR Foundation, DOCAS-AU, BNHS, MSSRF	Better awareness about the ecological services of MPAs in the region and acceptance to conserve MPAs.	Participatory management of MPAs in the State.

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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 conservation of MPAs in TN.		infrastructure, to promote environment education among adults of local communities.				
Cross-sectoral and cross-stakeholder cooperation  Enhance the understanding about the participatory approaches in successful management of MPAs. Improve the intersectoral coordination among stakeholders by promoting integrated management of MPAs with all stakeholders.	Lack of understanding and doubtedness about efficacy of Participatory Management of MPAs in TN.	Exposure visit of stakeholders (Forest, Fisheries, Tourism, etc) to the world's best practiced 'Integrated Management in MPAs'. Capacity training towards integrated management of MPAs involving all stakeholders.  Development of leadership for Participatory Management of MPAs.	State departments of Forest, Fisheries, Tourism, etc	GIZ/MoEF	Better cross-sectoral cooperation and understanding about participatory management of MPAs in TN.	Leadership for cross-sectoral coordination and participatory management of MPAs in TN.
Organization  Enhance the capacity of research and training to all stakeholders towards integrated management of MPAs,	Inadequate capacity of State Forest Department to conduct research, monitoring and management of MPAs in TN.	Capacity building programme (training, study tour, consultation, scientist exchange etc) to conduct research and monitoring with communities for participatory management of MPAs.	WII, Site/State/National level research institutions with more focus on site/State levels.	Research Institutions at Germany and other countries	Better understanding about emerging conservation issues with respect to integrated management of MPAs in TN.	Integrated and scientific management of MPAs with respect to emerging conservation issues
Individual  Establishment of adequate resources with certain stakeholders at sites level for skill development for additional or alternate livelihood	Lack of skills for additional or alternate livelihoods generation of youths from fishermen communities for example, training on suba diving, snorkeling, community based biodiversity monitoring, marine tourist guide, etc,	Skills development /professional training to youths belong to fisherman communities for additional or alternate livelihoods generation.	Youths from fishermen community	ICSF, SDMRI, MSSRF, OMCAR Foundation, DOCAS-AU, BNHS, TREE Foundation, MSSRF, State Forest and Fisheries Departments, UNDP, UNEP, IUCN, GREENPEACE,	Cooperations of local communities in MPAs management and reduction in the dependency of marine biodiversity resources of MPAs.	Successful conservation and management of MPAs and sustainable development of local communities .

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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
generation of youths from fishermen communities such as suba diving, snorkeling, community based biodiversity monitoring, marine tourist guide etc				etc		
Forest Front Line staff  Capable and equipped to monitor the marine biodiversity in the MPAs and skill to involve other stakeholders in the participatory management of MPAs.	Lack of skills for monitoring the marine biodiversity in the MPAs and skill to involve other stakeholders in the participatory management of MPAs.,	Skills development /professional training to monitor marine biodiversity in the MPAs and skill to involve other stakeholders in the participatory management of MPAs	Forest Front Line staff	SDMRI, MSSRF, CASMB, State Forest and Fisheries Departments	Better monitoring system available with Management Authority	Successful conservation and management of MPAs
Other line departments such as fisheries, tourism, etc  Appreciate the importance of ecological services of MPAs and cooperate the Forest Sectors for the successful management of MPAs, therefore, establishment of resources and infrastructure for training programs	Poor understanding and appreciation of importance of ecological services of MPAs and cooperation with the Forest Sectors for the successful management of MPAs	Consultation workshops and exposure visits to best managed MPAs with participation of all stakeholders.	Other line departments such as fisheries, tourism,	GIZ, MoEF, ICSF, SDMRI, MSSRF, State Forest and Fisheries Departments, UNDP, UNEP, IUCN, GREENPEACE, etc	Better understanding about participatory management of MPAs and cross sectoral cooperation.	Successful conservation and management of MPAs

**Table 24: Conceptual analysis results for resource organizations/ individuals (providers)**

Who are they	what level do they operate (local, national or international)?	What are their mandates?	What are their capacities?	What is their focus in relation to the desired actions?	What types of capacity-strengthening programmes do they currently offer?
GIZ	International	International cooperation services for sustainable development	Decentralised structures, intercultural competence and a highly professional workforce	Facilitate capacity building programs by linking relevant agencies at Germany	Human resource development in biodiversity conservation and research.
WII	International but largely national	Nurture the development of wildlife science and promote its application in conservation, in consonance with cultural and socio-economic milieu.	Capacity development towards management of Protected Areas in the region. Research, monitoring and environment education in the field of wildlife.	Facilitate capacity building programs targeting forest sector for participatory management of MPAs. Research and monitoring of marine biodiversity in MPAs.	Capacity development towards management of Protected Areas in the region. Research, monitoring and environment education in the field of wildlife.
LBSNAA	National	Promote good governance, by providing quality training for building a professional and responsive civil service in a caring, ethical and transparent framework	Develop leadership qualities and administrative skill through quality training	Facilitate leadership development programme for cross sectoral cooperation in participatory management of MPAs in India.	Develop leadership qualities and administrative skill through quality training
IIFM,	National	Provide leadership in the field of Forestry, Environment and Natural Resource Management Education, be concerned with pushing the frontiers of knowledge for development of the sector.	Develop leadership qualities and administrative skill through quality training	Facilitate leadership development programme for cross sectoral cooperation in participatory management of MPAs in India.	Develop leadership qualities and administrative skill through quality training
MoEF	National	Nodal agency in the administrative structure of the Central Government for the planning, promotion, co-ordination and overseeing the implementation of India's	Planning, promotion, co-ordination and overseeing the implementation of India's environmental and forestry policies and programmes	Facilitate the planning, promotion, co-ordination and overseeing the implementation of the project and facilitate capacity building programme towards cross sectoral cooperation in participatory management of MPAs in India.	Support capacity strengthening programmes related to conservation and management of biodiversity in India

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Who are they	what level do they operate (local, national or international)?	What are their mandates?	What are their capacities?	What is their focus in relation to the desired actions?	What types of capacity-strengthening programmes do they currently offer?
		environmental and forestry policies and programmes			
CEE	National	Improve public awareness and understanding of the environment with a view to promote the conservation of nature and sustainable use of the natural resources, leading to a better environment and a better quality of life	Environment Education and outreach activities	Facilitate training/capacity building programs related to Environment Education	Public awareness, environment education and outreach activities
SDMRI	State	Integrated management of coastal and marine ecosystem through research and training	Research, environment education and academics activities on coastal and marine ecosystems	Facilitate capacity building programs related to research and monitoring, additional livelihoods etc.	Research, environment education and academics activities on coastal and marine ecosystems
ICSF	National	Establishment of equitable, gender-just, self-reliant and sustainable fisheries, particularly in the small-scale, artisanal sector	Promote equitable, gender-just, self-reliant and sustainable fisheries, particularly in the small-scale, artisanal sector	Stress fisheries development and management of a just, participatory and sustainable nature.	Development of alternatives in the small-scale fisheries sector
CASMB-Annammalai Uni	National	Human resource development in the field of teaching, research and extension activities in Marine Sciences	Teaching, research and extension activities in Marine Sciences	Capacity building programs related to research and monitoring, extension activities, livelihoods etc	Conducting post-graduate, M.Phil, PhD programs on marine sciences, research and extension activities
OMCAR Foundation,	State	Promote conservation awareness and research in Marine Biodiversity Conservation	Research, participatory management, environment awareness and training for biodiversity monitoring	Capacity programs related to research, participatory management, environment awareness and training for biodiversity monitoring	Research, participatory management, environment awareness and training for biodiversity monitoring
DOCAS-AU	State	Human resource development in the field of	Research and technology development in the field of marine	Capacity building related to research and monitoring, livelihoods and fisheries technology	Teaching and research in oceanography and marine sciences

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Who are they	what level do they operate (local, national or international)?	What are their mandates?	What are their capacities?	What is their focus in relation to the desired actions?	What types of capacity-strengthening programmes do they currently offer?
		marine research, technology and industries	resources	development	
BNHS	National	Promote nature conservation through science	Research, Environment Education, Training in the field of biodiversity conservation	Capacity programs related to research, Environment Education, Training in the field of biodiversity conservation	Research, Environment Education, Training in the field of biodiversity conservation
MSSRF	National	To enlist Science and Technology as Allies in the Movement for Sustainable Development	Research, Environment Education, Training in the field of biodiversity conservation	Capacity programs related to research, Environment Education, Training in the field of biodiversity conservation	Research, Environment Education, Training in the field of biodiversity conservation
State Forest Department	State	Nodal agency in the administrative structure of the State Government for the planning, promotion, co-ordination and overseeing the implementation of India's/ State's environmental and forestry policies and programmes	Planning, promotion, co-ordination and overseeing the implementation of India's/State's environmental and forestry policies and programmes	Faciliate all capacity building programs related to Forest Sectors and management of Marine PAs.	Support capacity strengthening programmes related to conservation and management of biodiversity in TN
State Fisheries Department	State	Nodal agency in the administrative structure of the State Government for the planning, promotion, co-ordination and overseeing the implementation of Fisheries related policies	Planning, promotion, co-ordination and overseeing the implementation of India's/State's fisheries policies and programmes	Faciliate all capacity building programs related to Fisheries and Fishing Community	Support capacity strengthening programmes related to Fisheries, Fishing Community and integrated management of MPAs in TN.
TREE Foundation	State	Develop independent and right thinking individuals in the local community who will in turn help nurture a	Participatory programs in the field of biodiversity conservation	Environment education and participation of local communities in monitoring	Participatory programs in the field of biodiversity conservation



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Who are they	what level do they operate (local, national or international)?	What are their mandates?	What are their capacities?	What is their focus in relation to the desired actions?	What types of capacity-strengthening programmes do they currently offer?
		progressive and environment conscious movement among the people			
NIO	National	Research: observing and understanding the special oceanographic features that the North Indian basin offers	research in four traditional branches of oceanography - biological, chemical, geological/geophysical, and physical - and some other areas such as marine instrumentation and archaeology	Capacity building programs related to research and monitoring	Teaching and research in four traditional branches of oceanography - biological, chemical, geological/geophysical, and physical - and some other areas such as marine instrumentation and archaeology
IISc	National	Teaching, research and technology development in the field of science including ecological science	Research and teaching in the field of science	Capacity building programs related to research	Teaching and research in ecological science
NCSCM	National	Support integrated management of coastal and marine environment for livelihood security, sustainable development and hazard risk management by enhancing	Integrated Coastal Zone Management	Capacity building programs related to Integrated Coastal Zone Management	Capacity building programme in Integrated Coastal Zone Management
CMFRI	National	Promote teaching, training, research and technology development in the field of fisheries science in India	Teaching, training, research and technology development in the field of fisheries science.	Capacity building programs related to fisheries sector, Fishing Community, research on fisheries etc	Teaching, training, research and technology development in the field of fisheries science.
CMLRE	National	Develop management strategies for marine living resources through Ecosystem monitoring and modelling	Research and monitoring of marine living resources	Capacity building programs related to research and monitoring of marine living resources	Nil

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Who are they	what level do they operate (local, national or international)?	What are their mandates?	What are their capacities?	What is their focus in relation to the desired actions?	What types of capacity-strengthening programmes do they currently offer?
		efforts and R&D in basic Sciences on Marine Living Resources and Ecology			
CPR Environmental Education Centre (CPREEC)	National	Promote environmental education	Environment education	Capacity building related to environment education	Environment education

**Table 25: Conceptual analysis for Capacity Needs Assessment of stake holders**

Sub-Core area (of Forestry)	Dimensions of capacity	Stakeholders		Target	Issues to be addressed during data collection
		Target group	Providers		
<b>Policies</b>	<ul style="list-style-type: none"> <li>- Leadership development through Training/workshop</li> <li>- Establishment of knowledge management system for MPAs in TN for better policies</li> </ul>	Officials of State Forests Department, MOEF and other line departments in TN.	GIZ, LBSNAA, IIFM, WII	Better leadership and better policies to create conducive environment for participatory management in MPAs in TN	Who are need to be trained? How many people need to be trained? Who will provide training and what are their requirements? More details about leadership development programs of 'Providers' need to be acquired. Feasibility of developing course curriculam for this specialized course needs to be looked into.
<b>Legal frameworks</b>	Training towards integrated management of MPAs and addressing interface between existing legal systems and sustainable resources use of the MPAs.	Forest Officials	GIZ/WII/MoEF	Enabling environment for Participatory Management of MPAs in TN	How many people and in what capacity need to be trained? Who will train and what are their requirements? Feasibility of organizing a workshop to review the existing legal and policies instruments available for management of MPAs for Integrated Management of MPAs in TN. What would be expected outcomes of the training?
<b>Implementation strategies</b>	<p>Training for Selef Evaluation of Management Effectiveness of MPAs in connection with Participatory Approaches</p> <p>Strengthening the capacity of management including necessary infrastructure for implementation of stragies/management plans of MPAs in TN.</p>	Forest Officials	WII	Enabling environment for Participatory Management of MPAs in TN	<p>Review the existing capacity and resources with WII to conduct this training program</p> <p>Details about existing and required capacity for the management including necessary infrastructure for implementation of stragies.</p>
<b>Financing instruments Areas</b>	Resource mobilization skills	Managers of MPAs	GIZ	Identification of finance resources institutions and mobilization of adequate funds	What are existing hurdles to access adequate fund for successful implementation of management plans of MPAs in the State?

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Sub-Core area (of Forestry)	Dimensions of capacity	Stakeholders		Target	Issues to be addressed during data collection
		Target group	Providers		
				for MPAs	Who are potential funding agencies to support participatory management of MPAs in TN.
<b>Research and development</b>	Capacity building programs to conduct research on emerging issues such as climate change, invasive species, landscape level changes with respect to MPAs in TN through exposure visits, training, scientific cooperation etc	Site/State/National level research institutions with more focus on site/State levels.	Research Institutions at Germany and other countries	Better knowledge management system in place and better understanding about emerging conservation issues with respect to integrated management of MPAs in TN.	Identification of target groups in TN and service providers at Germany
<b>Education and human resource development</b>	Training for conducting environment education/awareness programs  Training for monitoring biodiversity	School teachers, primary health workers, youths and adults from local communities especially fishermen.  Fishermen Youths Forest staff (divers)	CPRCCE, CEE, SDMRI, ICSF, OMCAR Foundation, DOCAS-AU, BNHS, MSSRF	Better awareness about the ecological services of MPAs in the region and acceptance to conserve MPAs.	Feasibility of organizing training programs? Assess the existing capacity of 'Providers' in this regard. Assess the requirements for organizing such kind of training programs.
<b>Cross-sectoral and cross-stakeholder cooperation</b>	Conduct of workshop/training/course to understand the importance and efficacy of Participatory Management of MPAs in TN.	State departments of Forest, Fisheries, Tourism, etc	GIZ/MoEF	Better cross-sectoral cooperation and understanding about participatory management of MPAs in TN.	Review the feasibility of organizing such kind of workshops? What about course curriculum? Who would support this program and how? Who would provide the technical inputs in this capacity programs and how? What is the frequency of capacity programs?
<b>Organization</b>	Building capacity of State Forest Department and other research institutions to conduct research, monitoring and management of MPAs in TN.	State Forests Department, WII, Site/State/National level research institutions with more focus on site/State levels.	Research Institutions at Germany and other countries	Better understanding about emerging conservation issues with respect to integrated management of MPAs in TN.	Review the feasibility of organizing such kind of workshops? What about course curriculum? Who would support this program and how? Who would provide the technical inputs in this capacity programs and how? What is the frequency of capacity

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Sub-Core area (of Forestry)	Dimensions of capacity	Stakeholders		Target	Issues to be addressed during data collection
		Target group	Providers		
<b>Individual Youth from Fishermen Communities</b>	Skill development trainings/ workshops for additional or alternate livelihoods generation of youths from fishing communities (for example, training on suba diving, snorkeling, community based biodiversity monitoring, marine tourist guide, etc.)	Youths from fishing community	ICSF, SDMRI, MSSRF, OMCAR Foundation, DOCAS-AU, BNHS, TREE Foundation, MSSRF, State Forest and Fisheries Departments, UNDP, UNEP, IUCN, GREENPEACE, etc	Cooperations of local communities in MPAs management and reduction in the dependency of marine biodiversity resources of MPAs.	Analysis the actual requirements and attitude of youths from fishing communities for generating alternate or additional livelihoods. How many people need to be trained and how? Who will provide the training programs and what are their requirements? After training, what would be the requirement of youths to practice the skills acquired?
<b>Individual Forest Front Line staff</b>	Skill development for monitoring the marine biodiversity in the MPAs and skill to involve other stakeholders in the participatory management of MPAs.,	Forest Front Line staff	SDMRI, MSSRF, CASMB, State Forest and Fisheries Departments	Better monitoring system available with Management Authority	Analysis the actual requirements, existing skill and attitude of frontline staff to acquire this training program. How many people need to be trained and how? Who will provide the training programs and what are their requirements? After training, what would be the requirement of management to successfully use their skills?
<b>Individual Other line departments such as fisheries, tourism, etc</b>	Refresher course to understand and appreciate the importance of ecological services of MPAs and cooperation with the Forest Sectors for the successful management of MPAs	Other line departments such as fisheries, tourism,	GIZ, MoEF, ICSF, SDMRI, MSSRF, State Forest and Fisheries Departments, UNDP, UNEP, IUCN, GREENPEACE, etc	Better understanding about participatory management of MPAs and cross sectoral cooperation.	Analysis the actual requirements, existing skill and attitude of officials from line departments to acquire this training program. How many people need to be trained and how? Who will provide the training programs and what are their requirements? What would be course curriculum?

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## Annexure I

### Further requirements of stakeholders to strengthen the Capacity for Participatory Management of Coastal and Marine Protected Areas in various States of India

#### 1. Tamilnadu (Chennai and Mandapam)

Institutions visited: PCCF (Chennai), GOMBRT, Office of CWLW, Office of ADF and CMFRI

Sector	Existing facilities/projects/schemes	Gaps	Issues	Required	Stake holders	Existing alternate livelihoods available/provided for fishermen community
<b>Forest departments (including Gulf of Mannar Marine Biosphere Reserve Trust)</b>	Eco-development committee (EDC) and self-help groups (SHG) for fisherwomen. State and central funds for fisher-folks are generated through EDC and SHG. Trawl operations are not allowed up to 3 na. miles from the shore to reduce the coral damage and fishing pressure. 3 groups of fishermen were categorized based on livelihood priorities: High-Fully depends on fishing for livelihoods; medium-partial depends on fishing combined with some inland activities; low-<25% depends on fishing for livelihood.	Assessing the livelihoods/economic status of fisher folk involved in direct or partial fishing. Lack of enforcement of fishing policies, Development of mariculture techniques and its sustainable practice. Assessing the core-zone of fishery potential for fishing. Assessing the socio-economic status of Marine National Parks (MNP's). Trained staffs on conserving the marine biodiversity and assessing the fishery potential of MNP's are not available with the forest departments.	Collection of early by-catches of fish and crab species. Lack of recruitment in target fisheries due to usage of trawlers. Lack of staffs for management. Timeliness in implementation of schemes and availability of funds.	State or central funds need to be generated. Need of manpower for assessing the potential fishing zones as well as socio-economic status of fishermen and MNP's. Development of Eco-tourism. Conservation of corals and mangrove restoration. Timeliness in implementation of schemes and availability of funds. Training for forest officers of all grades. <u>Course curriculum:</u> Conservation of marine biodiversity, coastal zone management, species identification, Wildlife protection, coastal regulation zone, endangered species management, mariculture and other alternate livelihoods.	MoEn&F, GOMBRT, Divisional forest officers, eco-development officers, biodiversity program officers, Wildlife wardens, forest rangers and guards etc.	Mat weaving and selling, coconut thatch, jasmine cultivation, fish marketing as value added products, cultivation, harvesting of beetle leaves, goat rearing, coir making and charcoal manufacture.
<b>Fisheries</b>	Trawler operations are restricted within the MNP's. Free housing schemes. National fishermen saving schemes. Subsidies for fishermen during off season and fishing ban. Biometric	Lack of resource persons in developing the participatory management of MPA's	Lack of recruitment in target fisheries due to usage of trawlers.	Need adequate funds for implementing the existing schemes available with the fisheries sector	Directorate of Fisheries, ADF's and field staffs	Seaweed culture and private sea food processing industries

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	guarding. Skilled staffs are available with the fisheries department for assessing the socio-economic status of fishermen as well as the MNP's					
<b>R &amp; D Institutions</b>	Basic infrastructure facilities available for the identified capacity needs such as marine biodiversity conservation, coastal zone management, coral transplantation, mangrove restoration, mariculture (finfish and crustaceans) and marine ornamental fish culture.	Timeliness in implementation of existing projects and distribution of funds		Adequate funds for monitoring the marine biodiversity, stock assessment studies of target fishery, capacity building programs in the emerging issues such as climate change, endangered species management, mariculture, fishery resource and coastal zone management. Sea ranching of targeted fish groups for improving the fish stocks in the wild.	Heads of institutions such as CMFRI (Chennai and Mandapam), CIBA, ZSI, SDMRI, NCSCM, MSSRF, RGCA, TREE foundation, CSMCRI, Annamalai University, Tuticorin Fisheries college etc.	Mariculture of fishes and crustaceans, marine ornamental fish culture, sea weed culture and turtle conservation
<b>Fishermen Youths</b>	Availability of basic facilities (boats, trawlers, engines, fishing nets, ice boxes etc.) for sustaining the livelihood	Lack of knowledge on marine biodiversity conservation, mariculture and other basic infra structure facilities.	Lack of funds for buying/repairing boats and trawlers. Lack of income for buying ice boxes, fishing nets and other basic equipments. Lack of primary education for children	Life saving equipments such as life jackets, buoys and life boats. Subsidies on boats, trawlers and fishing nets without repayment. Echosounders, Radiotransmitters and GPS. Awareness training on livelihood development and management issues for marine biodiversity conservation and its importance. Training on mariculture aspects and other alternate livelihoods. Sea ranching of target fishery for improving the stocks in the wild.	Heads of Eco-development committee, presidents of Village municipal councils (VMC), fishermen youths and fisherwomen etc.	Mat weaving and selling, coconut thatch, jasmine cultivation, fish marketing as value added products, cultivation, harvesting of beetle leaves, goat rearing, coir making and charcoal manufacture, sea weed culture and sea weed collection from the wild

## 2. Karnataka (Bangalore)

Institutions visited: PCCF (Bangalore) and Karnataka State Biodiversity Board (Bangalore)

Sector	Existing facilities/projects/schemes	Gaps	Issues	Required	Stake holders	Existing alternate livelihoods available/provided for fishermen community
<b>Forest departments (including Karnataka State Biodiversity Board)</b>	Adequate infrastructure facilities available with forest departments and biodiversity board to assess the sustainability issues and management needs	Lack of skilled staffs to make a participatory management of stake holders in and around the sectors. No proper schemes available with the forest departments in conserving the coastal marine biodiversity. Lack of manpower, funds & infrastructure in implementation of proposed MPA's		Training for forest officials of all grades related to marine biodiversity conservation, MPA's, resource management, ICZM and mariculture aspects. Capacity building training to initiate the participatory management of MPA's along with the fisher folks.	MoEn&F, PCCF, CCF, CWLS's, forest rangers, guards etc.	Coconut tree plantation.
<b>R &amp; D Institutions</b>	Adequate infrastructure facilities for fishery, biology and stock assessment of pelagic, demersal, crustacean and molluscan resources. Mariculture facilities for finfish, crustaceans, bivalves and ornamental fishes.	Timeliness in implementation of existing projects and distribution of funds		Adequate funds for damage assessment in marine fishes, development of knowledge based information system for marine fisheries sustainability, biodiversity assessment, health management in cultured finfishes & crustaceans, captive production of selected food fishes and sea ranching in improving the wild stocks.	Heads of Institutions such as CMFRI (Mangalore and Karwar), Bangalore University, Dakshin foundation, Marine Fisheries Research and Information Center (Karwar).	Mariculture of fin fishes and crustaceans, capture based aquaculture of finfishes, marine ornamental fish culture, oyster and bivalve culture.
<b>Fishermen Youths</b>	Availability of basic facilities (boats, trawlers, engines, fishing nets, ice boxes etc.) for sustaining the livelihood	Lack of knowledge on fishery resource management and other alternate livelihoods	Lack of income for buying boats, fishing nets etc. Lack of life saving equipments.	Subsidies for buying boats and other basic equipments for livelihood sustainability. Awareness training programs on marine biodiversity conservation, mariculture and other alternate livelihoods	Fishermen youths and fishermen	Coconut tree plantation



### 3. Maharashtra (Mumbai and Ratnagiri)

Institutions visited: PCCF (Nagpur), CCF (Mumbai), BNHS, CMFRI, CIFE, National Fish Workers Forum (NFWF) (Mumbai)

Sector	Existing facilities/projects/schemes	Gaps	Issues	Required	Stake holders	Existing alternate livelihoods available/ provided for fishermen community
Forest departments	GIZ-UNDP program on coastal environment safety, Malvan Marine Sanctuary, Turtle conservation, coral restoration and artificial reef building, stock assessment of marine mammals, marine ornamental fish culture etc.	Lack of skilled staffs on marine conservation. Lack of capacity building in implementing the participatory management programs for Marine protected areas		State or central funds. Need of manpower in contractual basis for monitoring the biodiversity in long term basis. Development of Eco-tourism. Training for all grades. <u>Course curriculum:</u> Coastal zone management, marine biodiversity conservation, conservation of corals and mangroves, turtle migration, ornamental fish breeding. Awareness training program for fishermen youths and fisherwomen of SHG. Mariculture and other alternate livelihoods.	MoEn&F, Divisional forest officers, Wildlife wardens, District conservator of forests, forest range officers and guards. President of Sahyadri Nisarg Mitra (NGO).	Beach cleaning and solid waste management, cage fish farming, mussel and oyster culture, Mangrove restoration/ plantation, mud crab culture, eco-tourism (snorkeling and SCUBA diving)
R & D Institutions	Inventorization of corals and other associated fauna, Stock assessment of marine fishery and resource management, DNA barcoding of finfish and shell fish, ex-situ conservation,	Timeliness in implementation of projects and funds		Capacity building programs in the emerging issues such as climate change, endangered species	BNHS, ZSI, CIFT, CMFRI, CIFE,	Value added fish products, Marine ornamental fish breeding, Mussel and oyster culture, cage farming

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				management, mariculture, fishery resource and coastal zone management. Sea ranching of targeted fish groups for improving the fish stocks in the wild.		
Fishermen Youths	Availability of basic facilities (boats, trawlers, engines, fishing nets, ice boxes etc.) for sustaining the livelihood	Non-regulation of fishing efforts. Lack of licensing to limit the entry and fishing, lack of marketing, lack of knowledge on value added products. Lack of knowledge on fish migration patterns and potential fishing zones.	Increased usage of trawlers (hours) within 12 na. miles from the coast and night fishing. Harvesting of berried fishes as well as small fry.	Maintenance of log book for fishing vessels, effective licensing for TAC, seasonal closure of fishing activities, development of MPA's and sanctuaries for endangered species, usage of FAD's. Awareness programs on marine biodiversity conservation, fishery resource management, mariculture, ornamental fish culture. Training on navigational strategies. Sea ranching of target fisheries to improve the stocks in the wild.	Presidents of NFWF, World forum of fishery people (WFFP), Members of International collective in support of Fisheries (ICF), fishermen youths and fisherwomen SHG	Fish drying and value added products

#### 4. Gujarat (Gandhinagar and Jamnagar)

Institutions visited: PCCF (Gandhinagar), CCF (Jamnagar), Office of ADF (Jamnagar), GMB, ZSI

Sector	Existing facilities/projects/schemes	Gaps	Required	Stake holders	Existing alternate livelihoods available/ provided for fishermen community
<b>Forest departments (including Gulf of Kutchh Marine National Park)</b>	Integrated Coastal Zone Management in coral restoration or transplantation in Gujarat Marine National Park. Coastal cleanup and mangrove plantations along the MNP's. Construction of toilets, fruit tree plantation and supply of solar cookers for fishermen community.	Lack of funds and manpower. Timeliness in implementation of projects. Lack of long term conservation strategies of MNP's. No demarcation in zones (core, buffer and multiple zones). Lack of enforcement of laws.	Basic infrastructure and facilities for assessing the socio-economic status on MNP's. Skilled staffs for monitoring the marine biodiversity conservation and capacity building in participatory management of marine protected areas. Sea ranching of endangered fish species. Training programs for the officials of all grades and fishermen on alternate livelihoods. <u>Course curriculum:</u> Marine biodiversity conservation, coral transplantation and mangrove conservation. ICZM, CRZ and Fishery resource management and mariculture.	MoEn&F, chief and deputy conservator of forests, wild life wardens, range officers and guards. Coast guards, Gujarat Maritime Board, Kandla port trust	Rain water harvesting, Agriculture, sanitation methods.
<b>Fisheries</b>	Subsidies for diesel, boats, trawlers, fishing nets, ice plants and processing industries. Supply of life saving equipments onboard.	Lack of funds and timeliness on implementation of projects and distribution of funds.	Awareness training on marine conservation, interactive sessions between coast guards, coastal police officials and fishermen, subsidies for SC communities, Insurance policies for fishermen, supply of boats	Directorate of fisheries, ADF's.	Crab collection during low tides, sea weed collection.

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			and fishing nets to the traditional or small fishermen		
<b>Industries</b>	Coastal cleanup and mangrove plantation.			Eco-development or environment officers from Petrochemical industries: IOCL, BOREL, Reliance and ESSAR. Thermal: Sikka thermal power station, ESSAR power plants, Gujarat State Fertilizers limited, Tata chemicals etc.	
<b>R &amp; D Institutions</b>	Corals and transplantation and growth monitoring, fishery resource assessment, mariculture including cage farming	Lack of funds and manpower for implementation and monitoring	Capacity building programs for the participatory management of marine protected areas.	CSMCRI (Bhavnagar), CMFRI (veraval) and Field center at Jamnagar, ZSI, GEC, Fisheries Research Station (Okha), Agricultural University (Junagadh), GEER.	Cage farming of finfishes and ornamental fish culture.
<b>Fishermen Youths</b>	Availability of basic facilities (boats, trawlers, engines, fishing nets, ice boxes etc.) for sustaining the livelihood	Lack of knowledge on marine biodiversity conservation, corals and mangroves.	Primary education for children of fishermen community. Awareness programs on marine biodiversity conservation, alternate livelihoods and cleanliness education. Management policies should be in local language for better understanding.	President of 56 fishermen villages, fishermen youths and fisherwomen	Rain water harvesting, agriculture, crab collection during low tides, sea weed collection.

## Annexure II

### Guiding Questions for field work

#### i) Guiding Questions for Forest Sectors

1. What are the basic requirements (facilities) of the forest sector for developing better management of protected areas?
2. What are all the requirements (facilities/training) of the forest officials at each level in participatory management of Marine Protected Areas (MPA's)?
3. Who are all the potential officials (rank/grade wise) need to be trained?
4. Who can offer training (National institutes/NGO) to the forest officials?
5. How many people need to be trained, duration as well as the course curriculum?
6. What are all the existing policies or management plans available with the forest sector in managing the protected areas?
7. What are all the existing facilities available with the forest sector in implementing the management plans?
8. Feasibility of the existing plans and its usage?
9. Who are all get benefitted from the participatory management of MPA's?
10. Current status of MPA's?
11. Who are all involved so far in managing the protected areas (research institutes/NGO's etc)?
12. Current status of availability of funds in managing the plans?
13. What are all the current issues in managing the protected areas?
14. Whether adequate funds are available in implementing the new or existing plans?
15. If not, who are all the potential funding agencies to support the management of MPA's?
16. Feasibility of conducting workshops and expected outcomes.

**ii) Guiding Questions for individual youths of fishermen communities**

1. What are the basic requirements of a fishermen individual?
2. How they are generating income in daily life?
3. What is the current status and issues of individuals?
4. Existing livelihood options available in the fishermen communities and its feasibility?
5. Who are all funding or contributing for the existing livelihoods?
6. What are all the alternative livelihood options required by the individual for their sustainable development?
7. In what way, training can be offered and how many people need to be trained?
8. Who can offer the training (National institutes/NGO's), the requirements of the training program and course curriculum?
9. Requirements of the fishermen youths to practice the livelihoods after training.
10. Who can provide funds for implementing the sustainable livelihood development plans, after training?



### About the Study

The study, conducted by the Wildlife Institute of India, customized the existing Capacity Needs Assessment (CNA) tool developed by CMPA project. A situation analysis of the capacity development systems, structures and tools relevant to marine protected areas (MPA's) in India was carried out using conceptual analysis as well as field visits and interviews. The assessment was carried out in the four coastal states Gujarat, Maharashtra, Karnataka and Tamil Nadu to understand the existing capacities available with the forest sector as well as their requirements/needs to participate in the effective management and conservation of coastal and marine protected areas. In addition, the Conservation and Sustainable Management of Existing and Potential Coastal and Marine Protected Areas in India Capacity Needs Assessment for Participatory Management of Coastal and Marine Protected Areas capacity needs of the youths of local populations and fishermen to know the socio-economic status in sustaining the livelihoods.

### 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.



# Capacity Needs Assessment for participatory management of coastal and marine protected areas in India with special reference to Forest Sector and Youth

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