

# Coastal Challenges and its Management in India

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**Abstract**—There are many challenges in protection of ecosystems and sustainable development of people and resources in coastal India. These include providing sustainable livelihood security to the residents of the coastal area, finding strong leadership, widespread environment education and awareness, initiating long-term projects, its continuous monitoring and availing financial resources to conduct various associated activities. Present paper highlights major coastal challenges and current status of its management in India.

**Keywords:** coastal challenges; public participation; land based pollution.

## 1. COASTAL ECOSYSTEM OF INDIA

India lies to the north of equator between 8°4' to 37°6' North and 68°71' to 97°25' East. It is bounded in the south by the Indian Ocean, in the west by Arabian Sea and in the east by Bay of Bengal. India shares its political boundaries with Pakistan and Afganistan in the west, Bangladesh and Myanmar in the east and China, Tibet, Nepal and Bhutan in the North. India is separated from Srilanka by narrow channel of sea connected by Palk Strait and Gulf of Mannar. India consists of 28 states and 7 Union Territories, of which there are 9 Maritime States and 4 Maritime Union Territories.

**Table 1: Types of coastline and rate of erosion, population and district details in different maritime states**

State	Sandy beach %	Rocky coast %	Muddy flats %	Marshy coast %	Mangrove cover (km <sup>2</sup> )	Coral reefs (km <sup>2</sup> )	Total length* (km)	Coastal erosion♦ (km)	Population (census) 2011	Total Districts/ Coastal Districts
Gujarat	28	21	29	22	936	352.50 <sup>1</sup>	1214.7	36.4	60383628	26/13
Maharashtra	17	37	46	-	158	0.028 <sup>2</sup>	652.6	263.0	112372972	36/6
Goa	44	21	35	-	16	-	151.0	10.5	1457723	2/2
Karnataka	75	11	14	-	3	-	280.0	249.6	61130704	29/3
Kerala	80	5	15	-	8	-	569.7	480.0	33387677	14/10
Tamil Nadu	57	5	38	-	35	75.93 <sup>3</sup>	906.9	36.2	72138958	32/13
Andhra Pradesh	38	3	52	7	329	-	973.7	9.2	84655533	23/09

Orissa	57	-	33	10	203	-	476.4	107.6	41947358	30/06
West Bengal	-	-	51	49	2118	-	157.5	49.0	91347736	19/03
Daman & Diu					1	-	9.5	-	242911	02/02
Pondicherry					1	-	30.6	6.4	946600	04/04
Total mainland	43	11	36	10		-	5422.6	1247.9	-	-
Lakshadweep					-	933.70	132.0	132.0	64429	01/01
Andaman & Nicobar					637	-	1962.0	-	356152	03/03
Total						2383.90	7516.6	1379.9	260379417	

<sup>1</sup>Gulf of Kachchh<sup>2</sup>Malvan<sup>3</sup>Gulf of Mannar ♦ Forest Survey of India, 2005 \* Records of Naval Hydrographic Office • Space Application Centre (ISRO), 2010 ♦ Sanil Kumar et.al, 2006

As per Fishery Survey of India (FSI) contribution of fisheries in 2007-08 to Gross Domestic Product (GDP) was 0.75% with worth Rs. 35, 650 crore. As per livestock census 2003 total 14, 485,354 fishermen population was recorded in India. The Indian coastline is about 7,517 kilometres long, of this distance, 5,423 kilometres belong to peninsular India and 2,094 kilometres to the Andaman, Nicobar, and Lakshadweep Islands. According to the Indian naval hydrographic charts, the mainland coast consists of 43% sandy beaches, 11% rocky coast including cliff, and 46% mudflats or marshy coast. As per Sanil Kumar et.al. (2006) at present, 23% of the shoreline along the Indian mainland is affected by erosion (Table 3). Three major environmental threats are identified in the region namely coastal pollution in the form of solid wastes, sewage, industrial waste, agricultural runoff, oil pollution and ship breaking operations; sediment transport and physical alteration of habitats (UNEP, 2001).

## 2. COASTAL COMMUNITIES

About 47 percent of the population lives in the coastal states. 60 per cent of the labor force is occupied in agriculture. The GDP contribution by sector is agriculture 25 per cent, industry 26 per cent and services 49 per cent. Human settlements with large populations and numerous small and medium-scale industries, large industries, as well as power plants are situated along the coast. The combination of discharges of raw sewage

and untreated industrial waste has caused serious degradation of coastal environments. Some of the largest and most dense urban agglomerations are Mumbai, Kolkata, Chennai and Visakhapatnam. Since coastal population survives mainly on marine resources, overexploitation of essential resources has threatened the ecosystem (UNEP, 2003; UNEP/GPA, 2006). There are 3827 fishing villages and 1914 traditional fish landing centres. Men and women in Indian fishing villages were well aware of the overexploitation of fisheries resources and the deterioration of the coastal environment. Over eighty-ninety percent of men and women agreed that the total catch over the past few years has declined because of the increasing number of fishers and fishing boats and the quality of the seawater deteriorated as a result of industrial waste, sewage, household waste and pollution from ships (Tietz et al, 2000).

Regarding fishing as a future occupation for their children, the views of men and women alike are negative due to decline of catches, low earnings etc. Only 38 percent of the men and 34 percent of women in fishing villages would want their children to take up fishing as an occupation. Comparing the main occupations of sons with their fathers, an inter-generational occupational shift out of fisheries into service industries is apparent. Only 70 percent of the men have fishing or boat building as a main occupation, while 30 percent were employed in the service sector or involved in other economic activities. The employment of men in agriculture drastically declined, compared with their fathers. Coastal communities admit their improved status because of increased income, educational level and facilities, health facilities, nutrition and food security. Among the negative trends fisher folk and agriculturists highlight is congested housing conditions and deteriorating sanitary and hygienic conditions (Tietz et al, 2000). The lack of access to alternative income sources for fisher folk, farmers is of major concern to policy makers. It adds to the exploitation of marine natural resources above the level in absence of alternative livelihoods and income sources.

### 3. COASTAL CHALLENGES

From the available literature it becomes evident that, the key physical environment problems are as follows:

- Resource degradation (to be studied through carrying capacity assessment)
- Employment generation
- Land based pollution
- Resource overexploitation
- Protein source
- Sea based pollution
- Capacity building
- Mass mortality of fish and associated fauna and flora

Of these problems Resource degradation, Land Based Pollution (LBP) and Employment generation appear top

priority issues in India followed by resource exploitation and capacity building needs. The root causes of these problems identified are as follows:

- Land based pollution
- Economic development
- Habitat loss
- Unsustainable fishing
- Sea based pollution
- Climate change
- Mining
- Natural disasters

Population, economic issues, law enforcement and lack of policy framework are major causes of environmental degradation. These issues required to be tackled at the local level, whereas the same issues have some remarkable consistent features while dealing at the national level. Land based pollution and economic developments are top root causes followed by unsustainable fishing, climate change and natural disasters is minor cause of environmental degradation.

### 4. ECOSYSTEM MANAGEMENT IN INDIA

Taking into consideration the problems in coastal areas of country, the Ministry of Environment and Forests (MoEF) has initiated the Integrated Coastal Zone Management Project (ICZM) with assistance from the World Bank. This project has a comprehensive agenda that includes hazard mapping of the national coastline, livelihood improvement of coastal communities and coastal ecosystem conservation. The project involves a major investment of Rs. 1156 crore in Phase I, covering the states of Gujarat, Orissa and West Bengal. Phase II of this project covers all other states and UT's. To deal with the problems an expert body has been set up called Society of Integrated Coastal Management (SICOM) and this body will implement and coordinate major national and state components.

The national component includes (1) mapping, delineation and demarcation of the hazard lines and delineation of sediment cells (2) mapping, delineation and demarcation of coastal Ecologically Sensitive Areas (ESAs), (3) capacity building of administrative departments, coastal zone management authorities, research and development institutes, and nationwide training program on integrated coastal zone management; (4) establishing national center for sustainable coastal management and (5) Green Action for National Dandi Heritage Initiative, a small project at Dandi in Gujarat in memory of 80 years of Gandhiji's Dandi March. Various state components are dealt with by the state coastal management units with the support from national expert bodies.

#### Projects

In India, generally coastal project will involve five major components (MoEF, 2011). They include (1) conservation of

coast and coastal resources (2) adopting nature based development of resources (3) promoting integrated Village and community development (4) promoting eco-tourism and environment positive branding of natural and cultural destinations (5) and other activities to be regulated.

#### **Conservation of coast and coastal resources**

For better conservation of biological diversity and coastal resources the project will support measures to (a) coastal features, habitats and wetlands (b) mangrove afforestation and bio-shield along coastal shoreline.

#### **Adopting nature-based development of resources**

This activity will include (a) promoting non-conventional energy sources (b) conservation of water and (c) waste management. Establishing renewable energy sources such as solar units and wind mills. Generated energy will be used as clean energy supply to local communities. Restoration and improvement of traditional water bodies to support household level potable water supply, establish rainwater harvesting and desalination plants. In addition to sewage treatment plant and solid waste management facilities, energy and manure generation from waste to be carried out.

#### **Promoting integrated village and community development**

The concept of (a) carbon neutral village and (b) livelihood improvement will be achieved through eco-friendly income generating activities such as wasteland development (fodder cultivation, salinity tolerant crop cultivation), manufacture of Khadi products, local handicrafts etc.

#### **Promoting eco-tourism and environment-positive natural and cultural destinations**

It will include (a) village development and (b) promoting eco-tourism to promote local Indian cultural values and networking. Develop nature trails, landscape, maintain beach, and provide basic sanitation, street light, drainage and better roads. This will lead to generating employment to the younger generations and capacity building of village communities.

#### **Other activities**

Some of the activities such as (a) industrial units (b) quarrying and mining (c) tourism (d) man-made heritage (e) use of plastics (f) cutting trees (g) noise pollution (e) discharge of sewage and effluents (f) solid waste will be regulated in the area. Activities such as eco-tourism, eco-education, eco-development, small scale service industries such as agriculture, floriculture, horticulture etc., are undertaken with the help of local communities and groups.

## **5. CONCLUSION**

With the introduction of a new CRZ (2011) notification several activities associated with coastal protection are initiated. However these activities are not sufficient in itself. Unless and until there is no involvement of people, no education and awareness these activities have very low impact. To make these activities be successful we need effective interventions such as finding strong leadership, widespread environment education and awareness, long term projects and regular monitoring of these projects and activities.

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