

M.Sc. Remote Sensing and GIS

RT-204

**Remote Sensing in Mineral
Exploration and Geotechnical
Engineering**
Unit-IV

**4.3 Coastal and Harbour Studies
– Part 1**

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Introduction (coast, coastal zone):

The coast is a unique environment where land, sea and atmosphere interact and interplay continuously influencing a strip of spatial zone defined as coastal zone

- coastal zones are the areas having the influence of both marine and terrestrial processes.
- Coastal zones are the most fragile, dynamic and productive ecosystem and are quite often under pressure from both anthropogenic activities and natural processes
- Coastal Zone is endowed with a very wide range of habitats such as coral reefs, mangroves, sea grasses, sand dunes, vegetated stungle, mudflats, salt marshes, estuaries, lagoons etc.
- Different countries use different distance criteria for defining the coastal zone. In India, 500 m distance from the high tide line (landward) is taken for demarcating the coastal zone.

High tide line





- **Do you know??**

Total coast line of the world is 35, 6000 km and the coastal area covers more than 10% of the earth surface.

About 40% of the world's population lives within 100 km of the coast

About 10% of the world's population resides in low elevation coastal zone (<10 m) making their lives highly vulnerable to coastal disasters.

About 35% of Indians live within 100 km of the country's coast line measuring 7517 km.

Coastal zones in India assumes importance because of (major issues/problems):

- high productivity of its ecosystems
- concentration of population
- exploitation of renewable and nonrenewable natural resources
- discharge of waste effluents and municipal sewage
- industrialization and spurt in recreational activities
- Coastal zones are continuously changing because of the dynamic interactions between the ocean and land
- Erosion and accretion
- inundation due to sea level rise and storm surge
- shifting of shoreline caused by natural or anthropogenic forces, such as construction of artificial structure, port and harbors leads to changes in the coastal zone and its environment

Remote Sensing (RS) has proved to be extremely useful in providing information on various aspects of the coastal environment, viz. coastal wetlands, coastal landforms, shoreline changes, tidal boundaries (high/low), brackish water areas, suspended sediment dynamics, coastal currents, vital coastal habitats etc.

Coastal habitats of the entire Indian coast were mapped earlier on 1:250,000 /1:50,000 scale using multispectral satellite data.

Implementation of coastal zone management plans require mapping at local/cadastral level i.e. 1:4000/8000. Resourcesat and Cartosat 1 and 2 along with IKONOS can be used for local level mapping.

Coastal zone mapping has been done at two scale: i) on 1:25000 scale for inventory and monitoring of the entire Indian coast and ii) local level mapping at 1:5000 scale for selected areas .

Table 2.1: Classification System for Coastal Wetland and land use mapping

	Level I	Level II	Level III
1	Wetland		
1.1		Mudflat /tidal flat	
1.1.1			Sub - tidal
1.1.2			Inter - tidal
1.1.3			High tidal
1.1.4			High tidal with Salt - encrustation
1.2		Beach / Patch	
1.3		Spit	
1.4		Bar/barrier/ island	
1.5		Shoals	
1.6		Beach ridge	
1.7		Rocky coast	
1.8		Rock exposure	
1.9		Mangrove	
1.9.1			Very Dense
1.9.2			Dense
1.9.3			Sparse
1.9.4			Degraded
1.10		Salt-marsh/Marsh vegetation	
1. 10.1			Dense
1. 10.2			Moderately dense
1. 10.3			Sparse
1.11		Algae	
1.11.1			Dense
1.11.2			Moderately dense
1.11.3			Sparse
1.12			

1.12			Sea grass	
1.12.1				Dense
1.12.2				Moderately dense
1.12.3				Sparse
1.13			Mud with vegetation	
1.14			Sand with vegetation	
1.15			Scrub	
1.15.1				Dense
1.15.2				Sparse
1.15.3				Degraded
1.16			Coral reef	
1.16.1				Fringing
1.16.2				Platform
1.16.3				Patch
1.16.4				Atoll
1.16.5				Coral Lagoon
1.16.6				Coral pinnacle
1.16.7				Coralline shelf
1.16.8				Coral head

Monitoring of coastal Land Use/Land Cover has been done for the following Areas(in India)

Gulf of Kachchh (Selected regions), Gujarat Coast

Dahej, Gujarat Coast

Hazira, Gujarat Coast

Mangalore, Karnataka Coast

Chennai, Tamilnadu Coast

Visakhapatnam, Andhra Pradesh Coast

Details of the satellite data used for this study :

Landsat TM/MSS (at 10 year interval)

IRS LISS III (1996-2001) (Linear Imaging Self-Scanning)

Resourcesat LISS-III (2005-2008)

Resourcesat LISS-IV (2004-2006)

Resourcesat-1 AWiFS, Pre and Post monsoon (2005-2008)

Cartosat/IKNOS (for critical areas)

In addition, other data utilized for this study are:

Climatic, physical and biological parameters collected in the CZIS component

Socio-economic data (past and present)

Past land-use land-cover data from past cadastral/revenue maps