Chapter 3 | Mangroves

3.1 Introduction

Mangroves are salt tolerant plant communities which are circumtropical in distribution and are found along the tropical and sub-tropical intertidal regions of the world between 24^0 N to 38^0 S. These areas, on an average, receive 1,000 mm - 3,000 mm rainfall and have temperatures ranging between 26^0 c and 35^0c. They exhibit a number of morphological and physiological adaptations in order to survive in such a harsh physical environment on account of lack of oxygen, high salinity and frequent tidal inundation. These adaptations include presence of fleshy leaves, breathing roots called as 'pneumatophores', buttress formation, stilt roots, 'vivipary', sunken stomata, and increased concentration of salt in the cells etc.

Mangrove ecosystems are rich in biodiversity and harbour a number of floral and faunal species (both terrestrial and aquatic) many of which, e.g. the tiger, gangetic dolphin, estuarine crocodiles etc. are critically endangered. They also act as nurseries for fin fish, shell fish, crustaceans and molluscs. Mangrove forests are regarded as the most productive wetlands in the world on account of the large quantities of organic and inorganic nutrients released in the coastal waters by these ecosystems.

The mangroves besides providing a number of ecological services, also play a major role in protecting coastal areas from erosion, tidal storms and surges (tsunamis). They help in land accretion by trapping the fine debris particles. They are also important source of honey, tannins, wax, besides fish. Presently, these are one of the most threatened ecosystems on account of both anthropogenic factors (reclamation of land, discharge of waste etc) and natural factors like global warming.

3.2 Status of Mangrove Cover in India

Mangroves in India account for about 3% of the world's mangrove vegetation and are spread over an area of 4,661.56 km^2 along the coastal areas of the country. Sundarbans in West Bengal accounts for almost half of the total area under mangroves in India. The Forest Survey of India has been assessing the mangrove cover using remote sensing since 1987. In the first assessment, the estimated extent of the mangrove cover was 4,046 km^2 which was carried out at 1:1 million scale. Subsequently, from 1989 to 1999 the mangrove covers were assessed regularly on a two-years cycle at 1:250,000 scale. Assessment from 2001 onwards has been carried out at 1:50,000 scale. State/UT-wise mangrove cover as assessed by FSI in different assessments is given in Table 3.2.1.

Table 3.2.1 Mangrove Cover Assessment in Coastal States/UTs (Area in km^2)

Sl. No.	State/UT	Assessment Year										
		1987	1989	1991	1993	1995	1997	1999	2001	2003	2005	2009
1.	Andhra Pradesh	495	405	399	378	383	383	397	333	329	354	353
2.	Goa	0	3	3	3	3	5	5	5	16	16	17
3.	Gujarat	427	412	397	419	689	901	1031	911	916	991	1046
4.	Karnataka	0	0	0	0	2	3	3	2	3	3	3
5.	Maharashtra	140	114	113	155	155	124	108	118	158	186	186
6.	Orissa	199	192	195	195	195	211	215	219	203	217	221
7.	Tamil Nadu	23	47	47	21	21	21	21	23	35	36	39
8.	West Bengal*	2076	2109	2119	2119	2119	2123	2125	2081	2120	2136	2152
9.	A&N Islands	686	973	971	966	966	966	966	789	658	635	615
10	Puducherry	0	0	0	0	0	0	0	1	1	1	1
11	Kerala	0	0	0	0	0	0	0	0	8	5	5
12	Daman & Diu	0	0	0	0	0	0	0	0	1	1	1
	Total	4046	4255	4244	4256	4533	4737	4871	4482	4448	4581	4639

* *This assessment pertains only to the mangrove cover and does not include the tidal creeks and water bodies within the mangrove forests.*

3.3 Mangrove Cover as per Present Assessment

Mangroves show conspicuous tone and texture on the satellite image, which has been used in the mapping of mangrove cover of the country. Mangrove cover has been categorized into very dense (canopy density of more than 70%), moderately dense (canopy density between 40-70%) and open mangrove cover (canopy density between 10-40%). Table 3.3.1 presents State/UT-wise status of mangrove cover as estimated in 2011 assessment and also the change with respect to previous assessment.

Table 3.3.1: Mangrove Cover Assessment 2011 (Area in km^2)

Sl. No.	State/UT	Very Dense Mangrove	Moderately Dense Mangrove	Open Mangrove	Total	Change w.r.t. 2009 assessment
1.	Andhra Pradesh	0	126	226	352	-1
2.	Goa	0	20	2	22	5
3.	Gujarat	0	182	876	1058	12
4.	Karnataka	0	3	0	3	0
5.	Kerala	0	3	3	6	1
6.	Maharashtra	0	69	117	186	0
7.	Orissa	82	97	43	222	1
8.	Tamil Nadu	0	16	23	39	0
9.	West Bengal	1038	881	236	2155	3

Sl. No.	State/UT	Very Dense Mangrove	Moderately Dense Mangrove	Open Mangrove	Total	Change w.r.t. 2009 assessment
10.	A & N Islands	283	261	73	617	2
11.	Daman & Diu	0	0.12	1.44	1.56	0.34
12.	Puducherry	0	0	1	1	0
	Total	**1403**	**1658.12**	**1601.44**	**4662.56**	**23.34**

The current assessment shows that mangrove cover in the country is 4,662.56 km^2, which is 0.14 percent of the country's total geographical area. The very dense mangrove comprises 1,403 km^2 (30.10 % of the mangrove cover), moderately dense mangrove is 1,658.12 km^2 (35.57 %) while open mangroves cover an area of 1,600.44 km^2 (34.33%). Compared with 2009 assessment, there has been a net increase of 23.34 km^2 in the mangrove cover of the country. This can be attributed to increased plantations particularly in Gujarat state and regeneration of natural mangrove areas.

3.4 District-wise Mangrove Cover

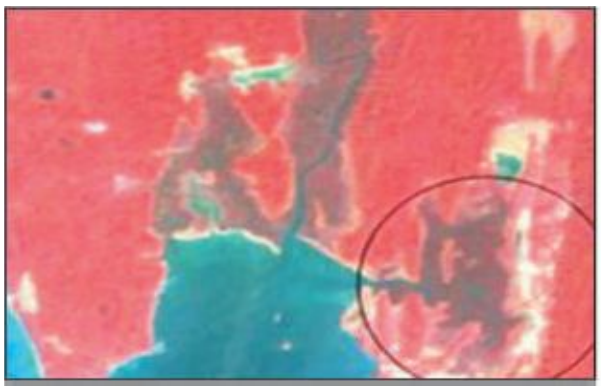
The district-wise mangrove cover in coastal States/UTs is given in Table 3.4.1.

Table 3.4.1: District-wise Mangrove Cover (Area in km^2)

Sl. No.	State/UT and District	Very Dense Mangrove	Moderately Dense Mangrove	Open Mangrove	Total	Change w.r.t. 2009 assessment
1.	Andhra Pradesh					
	East Godavari	0	63	125	188	-1
	Guntur	0	28	21	49	0
	Krishna	0	35	74	109	0
	Nellore	0	0	5	5	0
	Prakasham	0	0	1	1	0
	Total	0	126	226	352	-1
2.	Goa					
	North Goa	0	16	1	17	5
	South Goa	0	4	1	5	0
	Total	0	20	2	22	5
3.	Gujarat					
	Ahmedabad	0	1	29	30	3
	Amreli	0	0	1	1	1
	Anand	0	0	0	0	-3
	Bharuch	0	21	22	43	1
	Bhavnagar	0	6	13	19	6
	Jamnagar	0	28	131	159	2
	Junagarh	0	0	1	1	1

Sl. No.	State/UT and District	Very Dense Mangrove	Moderately Dense Mangrove	Open Mangrove	Total	Change w.r.t. 2009 assessment
	Kuchchh	0	118	660	778	3
	Navsari	0	0	1	1	0
	Porbandar	0	0	0	0	0
	Rajkot	0	1	1	2	0
	Surat	0	7	13	20	3
	Vadodara	0	0	2	2	-2
	Valsad	0	0	2	2	-3
	Total	0	182	876	1058	12
4.	Karnataka					
	Uttar Kannada	0	1	0	1	0
	Udipi	0	2	0	2	0
	Total	0	3	0	3	0
5.	Kerala					
	Kannur	0	3	2	5	0
	Kasaragod	0	0	1	1	1
	Total	0	3	3	6	1
6.	Maharashtra					
	Mumbai city	0	0	2	2	0
	Mumbai Suburb	0	23	20	43	0
	Raigarh	0	10	52	62	0
	Ratnagiri	0	12	11	23	0
	Sindhudurg	0	2	1	3	0
	Thane	0	22	31	53	0
	Total	0	69	117	186	0
7.	Orissa					
	Baleshwar	0	2	2	4	1
	Bhadrak	1	9	13	23	0
	Jagatsinghpur	0	2	5	7	0
	Kendrapara	81	83	23	187	0
	Puri	0	1	0	1	0
	Total	82	97	43	222	1
8.	Tamil Nadu					
	Cuddalore	0	0	7	7	0
	Nagapattinam	0	9	10	19	0
	Ramanathapuram	0	2	1	3	0
	Thanjavur	0	5	3	8	0
	Toothukudi	0	0	2	2	0
	Total	0	16	23	39	0

Sl. No.	State/UT and District	Very Dense Mangrove	Moderately Dense Mangrove	Open Mangrove	Total	Change w.r.t. 2009 assessment
9.	West Bengal					
	Medinipur	4	2	5	11	1
	North 24 Pargana	20	6	0	26	0
	South 24 Pargana	1014	873	231	2118	2
	Total	1038	881	236	2155	3
10.	A&N Islands					
	Andaman	283	259	72	614	2
	Nicobar	0	2	1	3	0
	Total	283	261	73	617	2
11.	Daman & Diu					
	Diu	0	0.12	1.44	1.56	0.34
	Total	0	0.12	1.44	1.56	0.34
12.	Puducherry					
	Yanam	0	0	1	1	0
	Total	0	0	1	1	0
	Grand Total	**1403**	**1658.12**	**1601.44**	**4662.56**	**23.34**



Satellite Imagery showing mangrove forest

A mangrove forest