

# 3

## Chapter

## Mangrove Cover

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### 3.1 INTRODUCTION

Mangroves are diverse group of salt-tolerant plant community of tropical and subtropical intertidal regions of the world, occurring mainly between latitude  $24^{\circ}$  N and  $38^{\circ}$  S. They exhibit varied morphological and physiological evolutionary adaptations to survive the limiting factors imposed by lack of oxygen, high salinity and diurnal tidal inundation. Succulent leaves, sunken stomata, aerial breathing roots called 'pneumatophores', vivipary, stilt roots, buttresses etc are some of the adaptations exhibited by mangroves.

Remote sensing is an efficient method of mapping and monitoring of mangroves, because of their conspicuous signatures which are easily discernible on the satellite images. The spread of mangroves particularly those occurring in inaccessible areas can be assessed through remote sensing techniques. Satellite data analysis along with the Geographical Information System (GIS) is the most effective way of regular monitoring of mangrove ecosystems.

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### 3.2 IMPORTANCE OF MANGROVES

- a) Mangroves have a complex root system which is very efficient in dissipating the sea wave energy thus protecting the coastal areas from tsunamis, storm surge and soil erosion. Their protective role has been widely recognized especially after the devastating Tsunami of 2004.
- b) Mangrove roots slow down water flows and enhance sediment deposition. Therefore, they act as a zone of land accretion due to trapping of fine sediments including heavy metal contaminants. They also arrest coastal erosion and sea water pollution.
- c) They act as a fertile breeding ground for many fish species and other marine fauna.
- d) They act as an important source of livelihood for the coastal communities dependent on collection of honey, tannins, wax and fishing.
- e) Mangroves are important carbon sink.

### 3.3 GLOBAL STATUS OF MANGROVE COVER

The total Mangrove cover in the world is 15 million ha<sup>1</sup> which is 1% of the Tropical Forests of the World. Mangroves are mostly distributed over 123 countries and territories in the tropical and sub-tropical regions. Asia has the largest extent of the world's mangroves. About 40% of world's Mangrove Cover is found in South East Asia and South Asia followed by South America, North Central America and West and Central Africa. Amongst the remaining six regions (South Asia, Australia/New Zealand, East and South Africa, Pacific Ocean, East Asia, Middle East), South Asia has the highest percentage 6.8% comprising 10,344 sq km mangrove cover. India has about 3% of the total Mangrove cover in South Asia.

### 3.4 CONSERVATION OF MANGROVES

Mangrove ecosystems are under pressure due to increased human population in coastal areas and rising demand for small timber, fodder, fuelwood and other non-wood forest products. Appropriate management and conservation strategies are required for their conservation and sustainably generate the ecosystem benefits along with the forest products to meet the needs of local people.

Mangroves are rich in biodiversity. According to Champion & Seth Classification (1968)<sup>2</sup> Mangroves are included in Type Group-4 Littoral & Swamp Forests and are covered under 4A/L1 Littoral forest, 4B/TS1 Mangrove scrub, 4B/TS2 Mangrove forest, 4B/TS3 Saltwater mixed forest (*Heritiera*), and 4B/TS4 Brackish water mixed forest (*Heritiera*) types. Mangrove bearing States are implementing different measures for conservation and management of mangroves. Some important techniques adopted in Gujarat for restoration of degraded mangrove habitats are direct seed sowing, raised bed plantation and fishbone channel plantation. In Andhra Pradesh, Forest Department has formed Eco-Development Committees and Van Samrakshan Samithis for joint implementation of projects in mangrove areas. Regular, trainings are also being conducted for sustainable mangrove conservation. In Maharashtra, steps have been taken to conserve ecology and biodiversity of mangroves by protection, restoration, regeneration and maintenance. Important species of mangrove ecosystems in India include *Avicennia officinalis*, *Morinda citrifolia*, *Rhizophora mucronata*, *Sonneratia alba*, *Avicennia alba*, *Bruguiera cylindrica*, *Heritiera littoralis*, *Phoenix paludosa*, *Morinda citrifolia* & *Ceriops tagal*.

<sup>1</sup> The world's mangrove 1980-2005 (2007), FAO Forestry Paper 153, Food and Agricultural Organization of the UN

<sup>2</sup> Champion H.G. and Seth S.K. (1968). A revised survey of: The Forest Types of India. Forest Research Institute, Dehradun

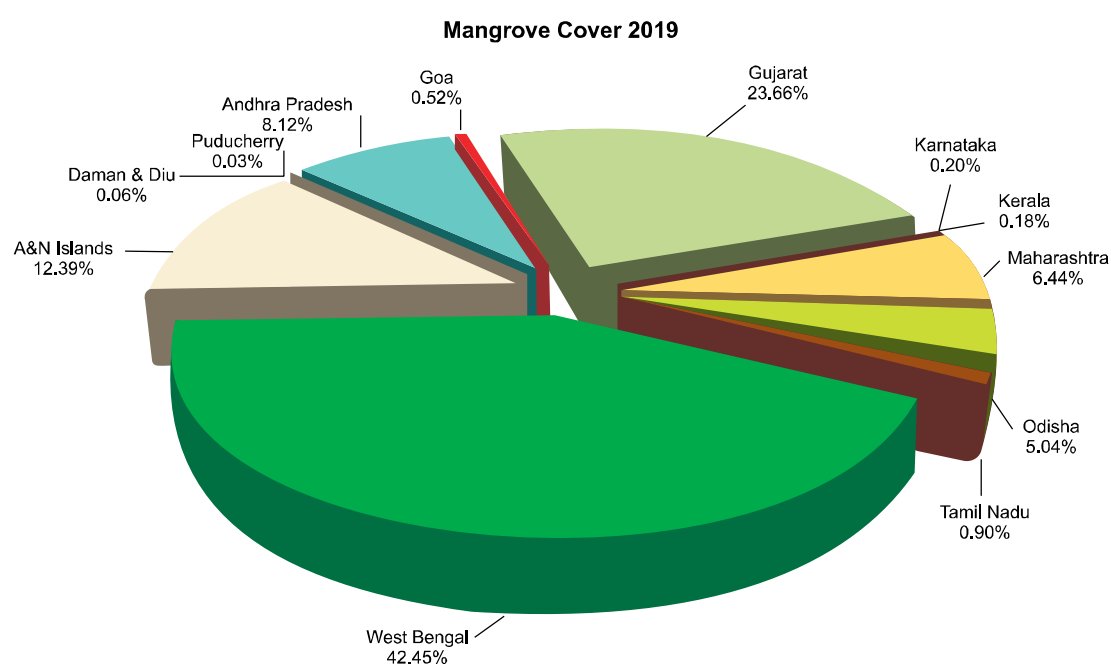
### 3.5 MANGROVE COVER: 2019 ASSESSMENT

Mangrove Cover assessment is part of the country-wide forest cover mapping. Forest cover given in chapter 2 includes mangrove cover, however because of their special ecological significance, district wise mangrove cover in different States/UTs are being presented in this chapter. The current assessment shows that mangrove cover in the country is 4,975 sq km, which is 0.15% of the country's total geographical area. Very Dense mangrove comprises 1476 sq km (29.66%) of the mangrove cover, Moderately Dense mangrove is 1479 sq km (29.73%) while Open mangroves constitute an area of 2020 sq km (40.61%). There has been a net increase of 54 sq km in the mangrove cover of the country as compared to 2017 assessment. The State/UT wise extent of mangrove cover in the three canopy density classes along with the change in comparison to 2017 assessment is presented in the Table 3.1. Mangrove Cover maps of different States/UTs are shown in Fig 3.3 (a) to Fig 3.3 (l).

**TABLE 3.1** Mangrove Cover Assessment 2019

(area in sq km)						
S.No.	State/UT	Very Dense Mangrove	Moderately Dense Mangrove	Open Mangrove	Total	Change with respect to ISFR 2017
1.	Andhra Pradesh	0.00	213.00	191.00	404.00	0.00
2.	Goa	0.00	20.00	6.00	26.00	0.00
3.	Gujarat	0.00	169.00	1,008.00	1,177.00	37.00
4.	Karnataka	0.00	2.00	8.00	10.00	0.00
5.	Kerala	0.00	5.00	4.00	9.00	0.00
6.	Maharashtra	0.00	88.00	232.00	320.00	16.00
7.	Odisha	81.00	94.00	76.00	251.00	8.00
8.	Tamil Nadu	1.00	27.00	17.00	45.00	-4.00
9.	West Bengal	996.00	692.00	424.00	2,112.00	-2.00
10.	A&N Islands	398.00	169.00	49.00	616.00	-1.00
11.	Daman & Diu	0.00	0.00	3.00	3.00	0.00
12.	Puducherry	0.00	0.00	2.00	2.00	0.00
<b>Total</b>		<b>1,476.00</b>	<b>1,479.00</b>	<b>2,020.00</b>	<b>4,975.00</b>	<b>54.00</b>

**FIGURE 3.1** Pie Chart showing Mangrove Cover in different States & UTs



It may be seen that West Bengal has 42.45% of India's mangrove cover, followed by Gujarat 23.66% and A&N Islands 12.39%. Gujarat shows maximum increase of 37 sq km in mangrove cover.

### 3.6 DISTRICT WISE MANGROVE COVER

The district wise mangrove cover in different States/UTs is given in Table 3.2

**TABLE 3.2** District wise Mangrove Cover

(area in sq km)

S. No.	State/UTs and District	Very Dense Mangrove	Moderately Dense Mangrove	Open Mangrove	Total	Change w.r.t. 2017 Assessment
1.	<b>Andhra Pradesh</b>					
	East Godavari	0.00	126.00	62.06	188.06	0.06
	Guntur	0.00	35.00	33.00	68.00	0.00
	Krishna	0.00	50.18	86.90	137.08	0.08
	Sri Potti Sriramalu Nellore	0.00	2.00	8.00	10.00	0.00
	Prakasham	0.00	0.00	1.00	1.00	0.00
	West Godavari	0.00	0.00	0.00	0.00	0.00
	<b>Total</b>	<b>0.00</b>	<b>213.18</b>	<b>190.96</b>	<b>404.14</b>	<b>0.14</b>
2.	<b>Goa</b>					
	North Goa	0.00	17.00	3.00	20.00	0.00
	South Goa	0.00	3.00	3.00	6.00	0.00
	<b>Total</b>	<b>0.00</b>	<b>20.00</b>	<b>6.00</b>	<b>26.00</b>	<b>0.00</b>
3.	<b>Gujarat</b>					
	Ahmedabad	0.00	0.87	30.18	31.05	-0.95
	Amreli	0.00	0.00	2.37	2.37	0.37
	Anand	0.00	0.00	7.25	7.25	-0.75
	Bharuch	0.00	13.35	31.09	44.44	-0.56
	Bhavnagar	0.00	5.90	15.73	21.63	-0.37
	Jamnagar	0.00	28.06	201.44	229.50	45.50
	Junagarh	0.00	0.00	3.33	3.33	0.33
	Kuchchh	0.00	116.41	678.36	794.77	-3.23
	Navsari	0.00	0.00	12.97	12.97	-1.03
	Porbandar	0.00	0.00	1.00	1.00	0.00
	Rajkot	0.00	0.90	2.63	3.53	-0.47
	Surat	0.00	3.87	16.40	20.27	-0.73
	Vadodara	0.00	0.00	3.00	3.00	0.00
	Valsad	0.00	0.00	2.16	2.16	-0.84
	<b>Total</b>	<b>0.00</b>	<b>169.36</b>	<b>1,007.91</b>	<b>1,177.27</b>	<b>37.27</b>
4.	<b>Karnataka</b>					
	Uttar Kannada	0.00	0.28	8.22	8.50	0.00
	Udupi	0.00	1.54	0.00	1.54	0.00
	<b>Total</b>	<b>0.00</b>	<b>1.82</b>	<b>8.22</b>	<b>10.04</b>	<b>0.00</b>
5.	<b>Kerala</b>					
	Ernakulum	0.00	0.79	1.03	1.82	0.00
	Kannur	0.00	3.89	2.35	6.24	0.00
	Kasaragod	0.00	0.01	0.83	0.84	0.00
<b>Total</b>		<b>0.00</b>	<b>4.69</b>	<b>4.21</b>	<b>8.90</b>	<b>0.00</b>

S. No.	State/UTs and District	Very Dense Mangrove	Moderately Dense Mangrove	Open Mangrove	Total	Change w.r.t. 2017 Assessment
6.	<b>Maharashtra</b>					
	Mumbai city	0.00	0.00	2.00	2.00	0.00
	Mumbai Sub-urban	0.00	27.00	37.30	64.30	0.30
	Raigarh	0.00	12.00	108.97	120.97	14.97
	Ratnagiri	0.00	15.00	15.15	30.15	0.15
	Sindhudurg	0.00	5.00	7.19	12.19	0.19
	Thane	0.00	29.00	61.66	90.66	0.66
	<b>Total</b>	<b>0.00</b>	<b>88.00</b>	<b>232.27</b>	<b>320.27</b>	<b>16.27</b>
7.	<b>Odisha</b>					
	Baleshwar	0.00	1.00	4.07	5.07	0.07
	Bhadrak	0.00	8.76	26.11	34.87	2.87
	Jagatsinghpur	0.00	1.01	7.05	8.06	0.06
	Kendrapara	80.45	83.56	37.48	201.49	4.49
	Puri	0.00	0.00	1.15	1.15	0.15
	<b>Total</b>	<b>80.45</b>	<b>94.33</b>	<b>75.86</b>	<b>250.64</b>	<b>7.64</b>
8.	<b>Tamil Nadu</b>					
	Cuddalore	0.00	7.05	0.68	7.73	0.00
	Nagapattinam	0.00	1.10	1.95	3.05	-1.07
	Pudukkottai	0.67	0.46	0.77	1.90	0.00
	Ramanathapuram	0.37	0.71	1.26	2.34	0.16
	Thanjavur	0.00	8.96	3.29	12.25	0.00
	Thiruvallur	0.00	0.00	0.91	0.91	0.00
	Thiruvavur	0.00	8.11	4.74	12.85	-3.04
	Thoothukkudi	0.00	0.85	2.95	3.80	0.00
	<b>Total</b>	<b>1.04</b>	<b>27.24</b>	<b>16.55</b>	<b>44.83</b>	<b>-3.95</b>
9.	<b>West Bengal</b>					
	Purba Medinipur	0.00	1.00	3.00	4.00	0.00
	North 24 Parganas	12.97	10.98	1.99	25.94	-0.06
	South 24 Parganas	982.65	680.02	419.50	2082.17	-1.83
	<b>Total</b>	<b>995.62</b>	<b>692.00</b>	<b>424.49</b>	<b>2,112.11</b>	<b>-1.89</b>
10.	<b>A&amp;N Islands</b>					
	North Andaman	284.76	111.90	27.86	424.52	-0.48
	South Andaman	113.65	54.88	21.20	189.73	-0.27
	Nicobar	0.00	2.00	0.03	2.03	0.03
	<b>Total</b>	<b>398.41</b>	<b>168.78</b>	<b>49.09</b>	<b>616.28</b>	<b>-0.72</b>
11.	<b>Daman &amp; Diu</b>					
	Daman	0.00	0.00	1.02	1.02	0.02
	Diu	0.00	0.00	2.08	2.08	0.08
	<b>Total</b>	<b>0.00</b>	<b>0.00</b>	<b>3.10</b>	<b>3.10</b>	<b>0.10</b>
12.	<b>Puducherry</b>					
	Karaikal	0.00	0.00	0.00	0.00	0.00
	Mahe	0.00	0.00	0.00	0.00	0.00
	Puducherry	0.00	0.00	0.00	0.00	0.00
	Yanam	0.00	0.00	1.64	1.64	0.00
	<b>Total</b>	<b>0.00</b>	<b>0.00</b>	<b>1.64</b>	<b>1.64</b>	<b>0.00</b>
<b>Grand Total</b>		<b>1,475.52</b>	<b>1,479.40</b>	<b>2,020.30</b>	<b>4,975.22</b>	<b>54.86</b>

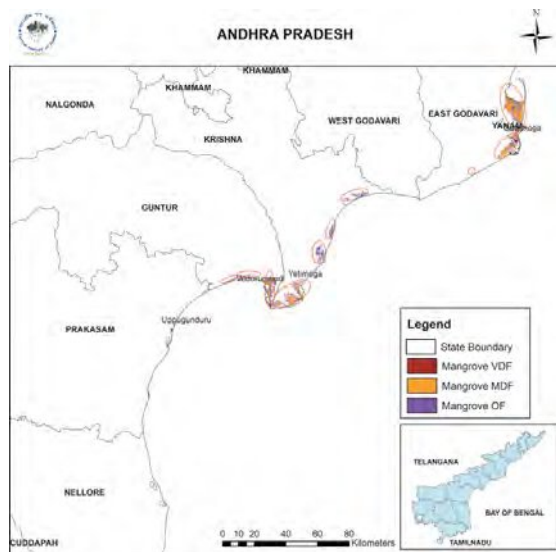
The above table shows that South 24 Parganas district of West Bengal alone accounts for 41.85% mangrove cover of the country.



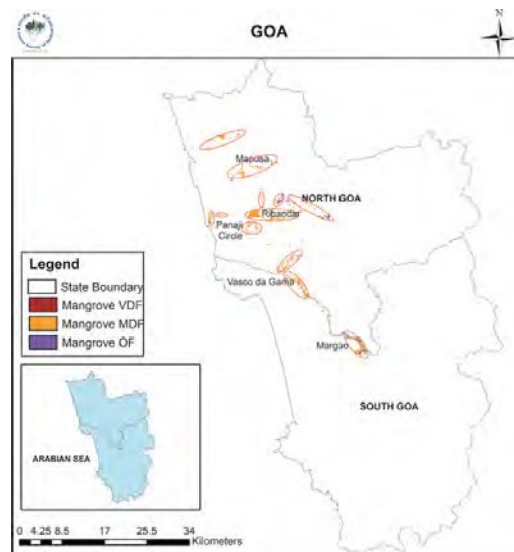
**FIGURE 3.2** Photo showing Mangrove Forest Ecosystem



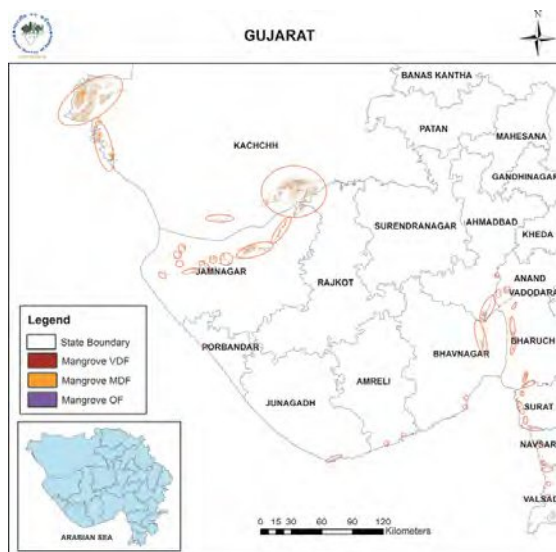
**FIGURE 3.3a** Map showing Mangrove cover in Andhra Pradesh



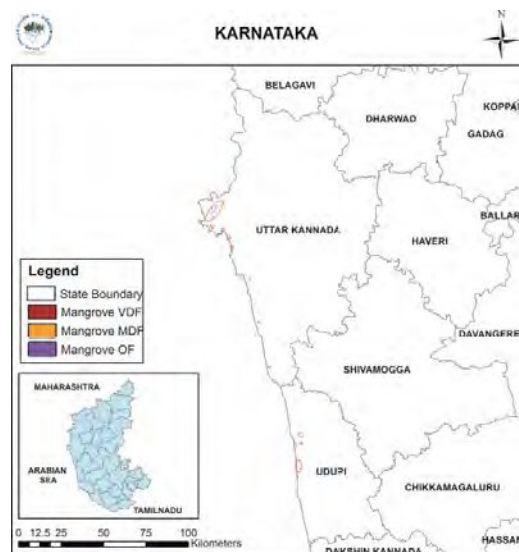
**FIGURE 3.3b** Map showing Mangrove cover in Goa



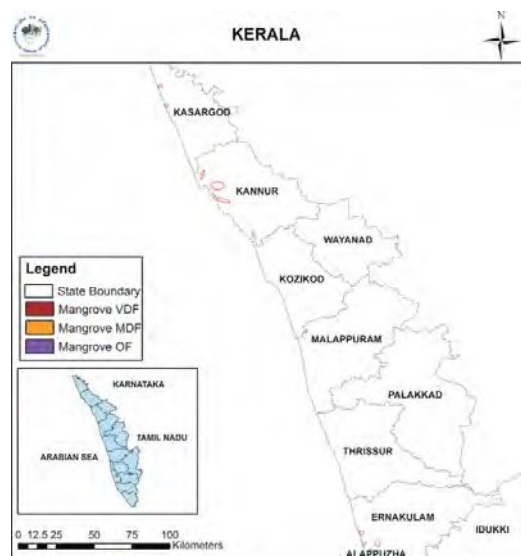
**FIGURE 3.3c** Map showing Mangrove cover in Gujarat



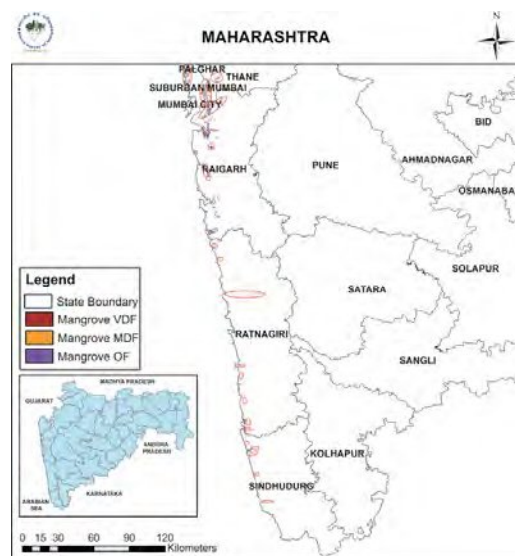
**FIGURE 3.3d** Map showing Mangrove cover in Karnataka



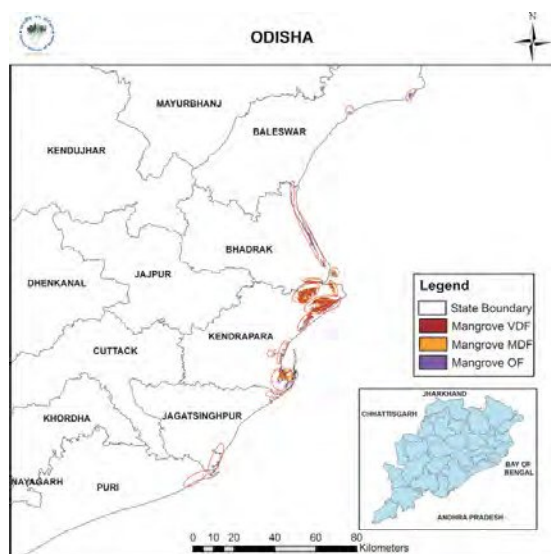
**FIGURE 3.3e** Map showing Mangrove cover in Kerala



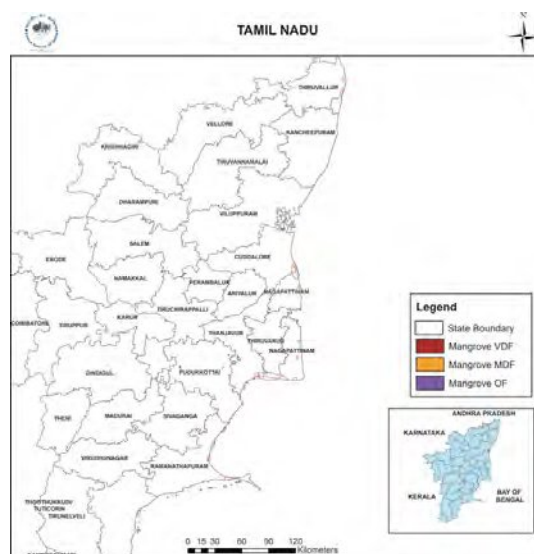
**FIGURE 3.3f** Map showing Mangrove cover in Maharashtra



**FIGURE 3.3g** Map showing Mangrove cover in Odisha

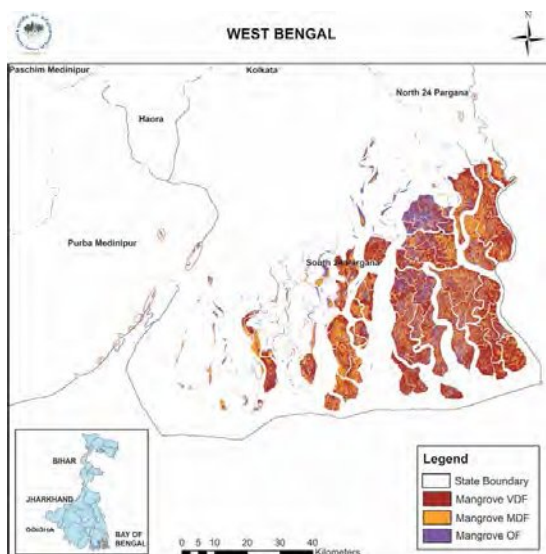


**FIGURE 3.3h** Map showing Mangrove cover in Tamil Nadu

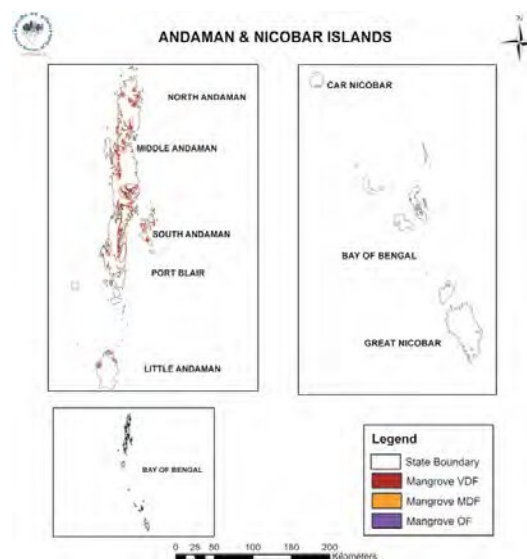




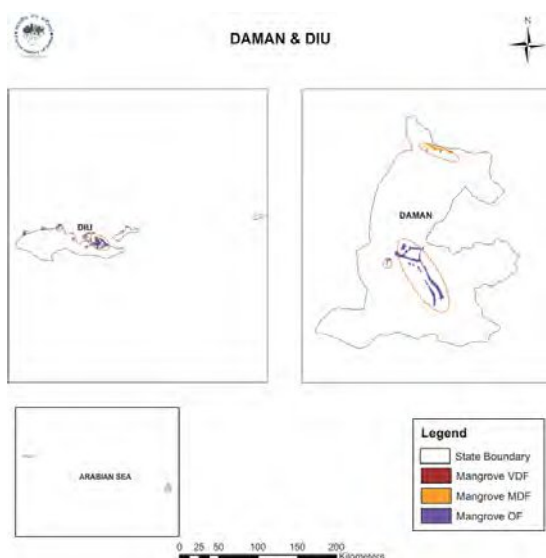
**FIGURE 3.3i** Map showing Mangrove cover in West Bengal



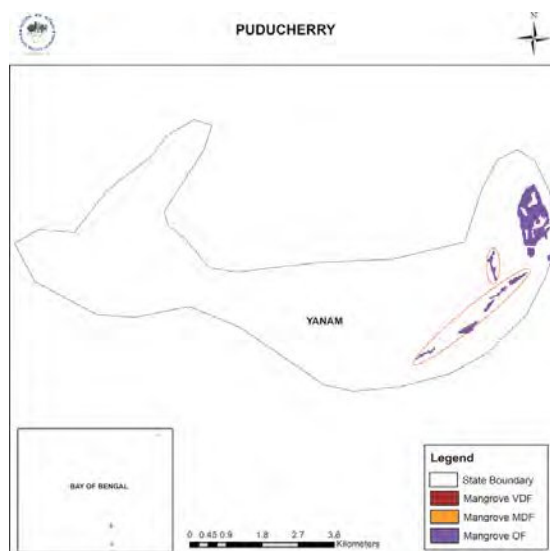
**FIGURE 3.3j** Map showing Mangrove cover in A & N Islands



**FIGURE 3.3k** Map showing Mangrove cover in Daman & Diu



**FIGURE 3.3l** Map showing Mangrove cover in Puducherry









**FIGURE 3.4** Photo showing Mangrove Plantation in Great Nicobar

