

11.31

ANDAMAN & NICOBAR ISLANDS

11.31.1 Introduction

Andaman & Nicobar Islands comprise 572 Islands (including islets & rocks) and has a geographical area of 8,249 sq km, constituting 0.25% of the total geographical area of the country. The Andaman Sea and the Bay of Bengal are to the eastern and western sides of the Islands. The Union Territory lies between 6°N to 14°N latitude and 92°E to 94°E longitudes. It comprises the Andaman and the Nicobar groups of Islands, which are separated by the 10°N channel. The islands lie along an arc in a long and narrow broken chain, approximately extending North-South over a distance more than 700 km and have a coastline of 1,962 km. The climate is humid and tropical and the humidity ranges between 70% to 90%. The average annual rainfall ranges between 1,400 mm to 3,000 mm. The weather is generally pleasant and annual temperature varies from 24°C and 28°C. The territory is drained by several small rivulets which end up as creeks often lined with dense mangroves. Kalpong is an important river in Diglipur Island. Saddle peak is the highest hill in the Islands. The only active volcano of the country, the Barren Island is located in A&N Islands. As per Census 2011, the UT is divided into 3 districts and has a total population of 0.38 million which constitute 0.03% of the country's population. The urban & rural population constitutes 62.30% and 37.70% respectively. The Tribal population is 7.61%. The Islands are home to six indigenous aboriginal tribal groups viz Jarawa, Sentinelese, Great Andamanese, Onge, Nicobarese and Shompen. Population density is 46 persons per sq km which is much lower than the national average. The 19th Livestock census 2012 has reported a total livestock population of 0.15 million.

TABLE 11.31.1 Land Use Pattern

Land Use Types	Area (in 000' ha)	Percentage
Geographical Area	825	
Reporting area for land utilization	757	100.00
Forests	716	94.68
Not available for land cultivation	9	1.16
Permanent pastures and other grazing lands	4	0.49
Land under misc. tree crops and groves	4	0.54
Culturable wasteland	3	0.41
Fallow land other than current fallows	3	0.43
Current fallows	3	0.35
Net area sown	15	1.94

Source: Land Use Statistics, Ministry of Agriculture, GOI, (2014-15)

11.31.1.1 A Brief Overview of Forestry Scenario

Andaman & Nicobar Islands support very luxuriant and rich vegetation due to tropical hot and humid climate with abundant rains. As per the Champion & Seth Classification of Forest Types (1968), the forests in Andaman & Nicobar Islands belong to four Type Groups i.e. Tropical Wet Evergreen, Tropical Semi Evergreen, Tropical Moist Deciduous and Littoral & Swamp Forests which are further categorized into 13 Forest Types. Nature has provided these islands with a unique and varied flora and fauna. The surrounding seas are equally rich in marine biodiversity. Due to the geographic isolation of these islands, a large degree of endemism exists which means that the ecosystems of these islands are vulnerable to disturbances. The forestry practices in these islands have undergone significant changes in the last more than 125 years of scientific forestry, influenced by major policy changes and socio-economic situations. The current focus of forest management in the islands is towards biodiversity conservation along with sustainable use of forest produce for local inhabitants, to protect the environment for future generations.

The forests in these islands have a tropical rainforest canopy, made of a mixed flora with elements from Indo-Myanmar and Indo-Malayan floral realms. About 2,200 varieties of plants have been recorded in the Islands, out of which 200 are endemic and 1,300 do not occur in mainland India.

Forests in the South Andaman's have a profuse growth of epiphytic vegetation, mostly ferns, and orchids. The Middle & North Andaman are characterized by Moist Deciduous & Wet Evergreen forests respectively. The Evergreen forests are dominant in the Central & Southern Islands of the Nicobar group. The moist deciduous forests are common in the Andamans, they are almost absent in the Nicobar islands. Grasslands occur only in the Nicobars.

In the Union Territory, RFA is 7,171 sq km of which 5,613 sq km is Reserved Forest and 1,558 sq km is Protected Forest. In Andaman & Nicobar Islands, during the period 1st January 2015 to 5th February 2019, a total of 20.14 hectares of forest land was diverted for non-forestry purposes under the Forest Conservation Act, 1980 (MoEF&CC, 2019).

Nine National Parks, 96 Wildlife Sanctuaries and one Biosphere Reserves constitute the Protected Area network of the UT covering 18.71% of its geographical area.

11.31.2 Forest Cover

Based on the interpretation of IRS Resourcesat-2 LISS III satellite data of the period Apr 2017 to Mar 2018, the Forest Cover in the UT is 6,742.78 sq km which is 81.74 % of the UT's geographical area. In terms of forest canopy density classes, the UT has 5,677.52 sq km under Very Dense Forest (VDF), 683.89 sq km under Moderately Dense Forest (MDF) and 381.37sq km under Open Forest (OF). Forest Cover in the UT has increased by 0.78 sq km as compared to the previous assessment reported in ISFR 2017.

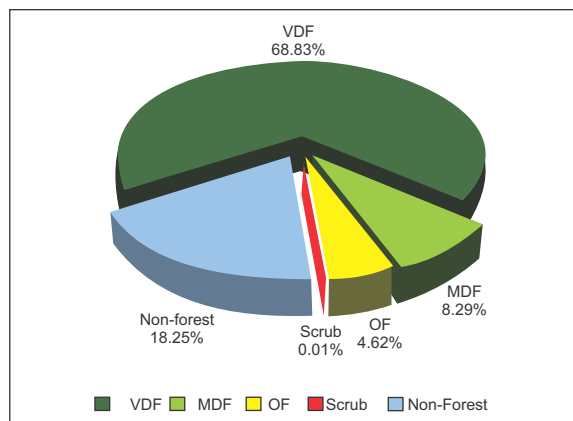


TABLE 11.31.2 Forest Cover of Andaman & Nicobar Islands

(in sq km)

Class	Area	% of GA
VDF	5,677.52	68.83
MDF	683.89	8.29
OF	381.37	4.62
Total	6,742.78	81.74
Scrub	1.13	0.01

FIGURE 11.31.1 Forest Cover of Andaman & Nicobar Islands



11.31.2.1 Forest Cover inside and outside Recorded Forest Area (or Green Wash)

The UT has reported extent of recorded forest area (RFA) 7,171 sq km which is 86.93% of its geographical area. The reserved and protected forests are 78.27% and 21.73% of the recorded forest area in the UT respectively. However, as the digitized boundary of RFA from the UT covers only an area 6,747.11 sq km, the analysis of forest cover inside and outside this area is given below.

Table 11.31.3 Forest Cover inside and outside Recorded Forest Area or (Green Wash) in Andaman & Nicobar Islands

(in sq km)

Forest Cover inside the Recorded Forest Area (or Green Wash)				Forest Cover outside the Recorded Forest Area (or Green Wash)			
VDF	MDF	OF	Total	VDF	MDF	OF	Total
5,408	560	254	6,222	270	124	127	521
86.91%	9.00%	4.09%		51.83%	23.73%	24.44%	

**in case of A&N Islands RFA boundaries have been used*

FIGURE 11.31.2 Forest Cover inside and outside RFA in Andaman & Nicobar Islands

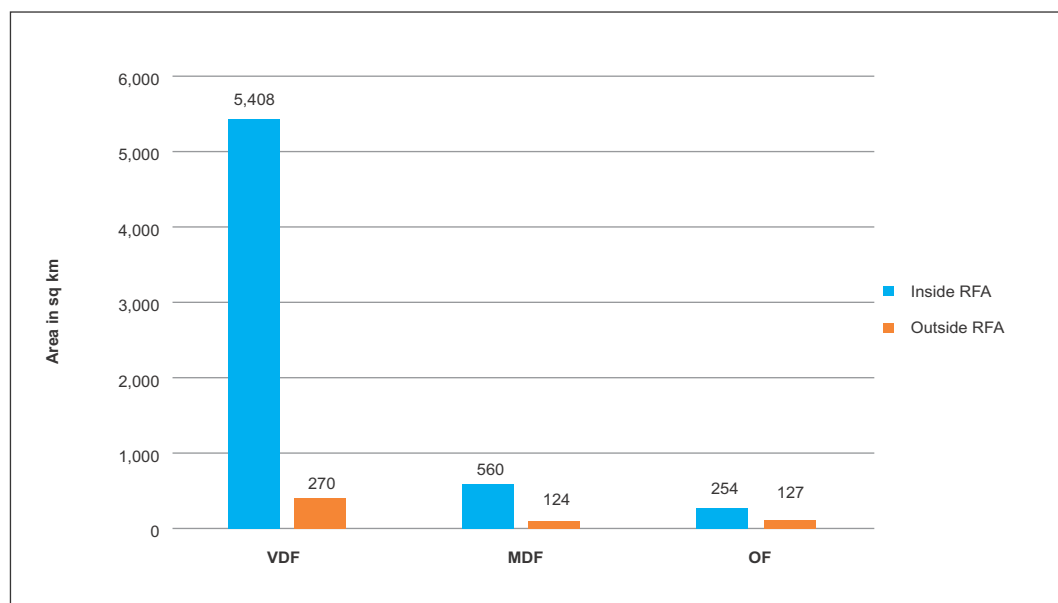


TABLE 11.31.4 District-wise Forest Cover in Andaman & Nicobar Islands (in sq km)

District	Geographical Area (GA)	2019 Assessment				% of GA	Change wrt 2017 assessment	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Nicobars ^T	1,841	1,147.99	104.99	153.19	1,406.17	76.38	0.17	1.00
North & Middle Andaman ^T	3,736	2,670.81	326.90	72.82	3,070.53	82.19	-0.47	0.00
South Andaman ^T	2,672	1,858.72	252.00	155.36	2,266.08	84.81	1.08	0.13
Grand Total	8,249	5,677.52	683.89	381.37	6,742.78	81.74	0.78	1.13

TABLE 11.31.5 Forest Cover Change Matrix for Andaman & Nicobar Islands (in sq km)

Class	2019 Assessment					Total ISFR 2017
	VDF	MDF	OF	Scrub	NF	
Very Dense Forest	5,678	0	0	0	0	5,678
Moderately Dense Forest	0	684	0	0	0	684
Open Forest	0	0	380	0	0	380
Scrub	0	0	0	1	0	1
Non Forest	0	0	1	0	1,505	1,506
Total ISFR 2019	5,678	684	381	1	1,505	8,249
Net Change	0	0	1	0	-1	

Main reasons for the increase in forest cover in the UT is plantation and conservation activities as well as improvement in interpretation.

TABLE 11.31.6 Altitude-wise Forest Cover in Andaman & Nicobar Islands (in sq km)

Altitude Zone (m)	Geographical Area	VDF	MDF	OF	Total	Scrub
0-500	8,238	5,667	684	381	6,732 (99.84 %)	1
500-1000	11	11	0	0	11 (0.16 %)	0
Total	8,249	5,678	684	381	6,743	1

(based on SRTM, Digital Elevation Model, 30 m, 2016)

TABLE 11.31.7 Forest Cover in different slope classes in Andaman & Nicobar Islands (in sq km)

Slope (in degrees)	Geographical Area	VDF	MDF	OF	Total	Scrub
0-5	3,983	2,339	391	262	2,992 (44.37 %)	1
5-10	1,999	1,460	187	76	1,723 (25.55 %)	0
10-15	1,185	949	74	28	1,051 (15.59 %)	0
15-20	651	555	22	10	587 (8.71 %)	0
20-25	299	262	7	3	272 (4.03 %)	0
25-30	101	88	2	1	91 (1.35 %)	0
>30	31	25	1	1	27 (0.40 %)	0
Total	8,249	5,678	684	381	6,743	1

(based on SRTM, Digital Elevation Model, 30 m, 2016)

FIGURE 11.31.3 Forest Cover Map of Andaman & Nicobar Islands

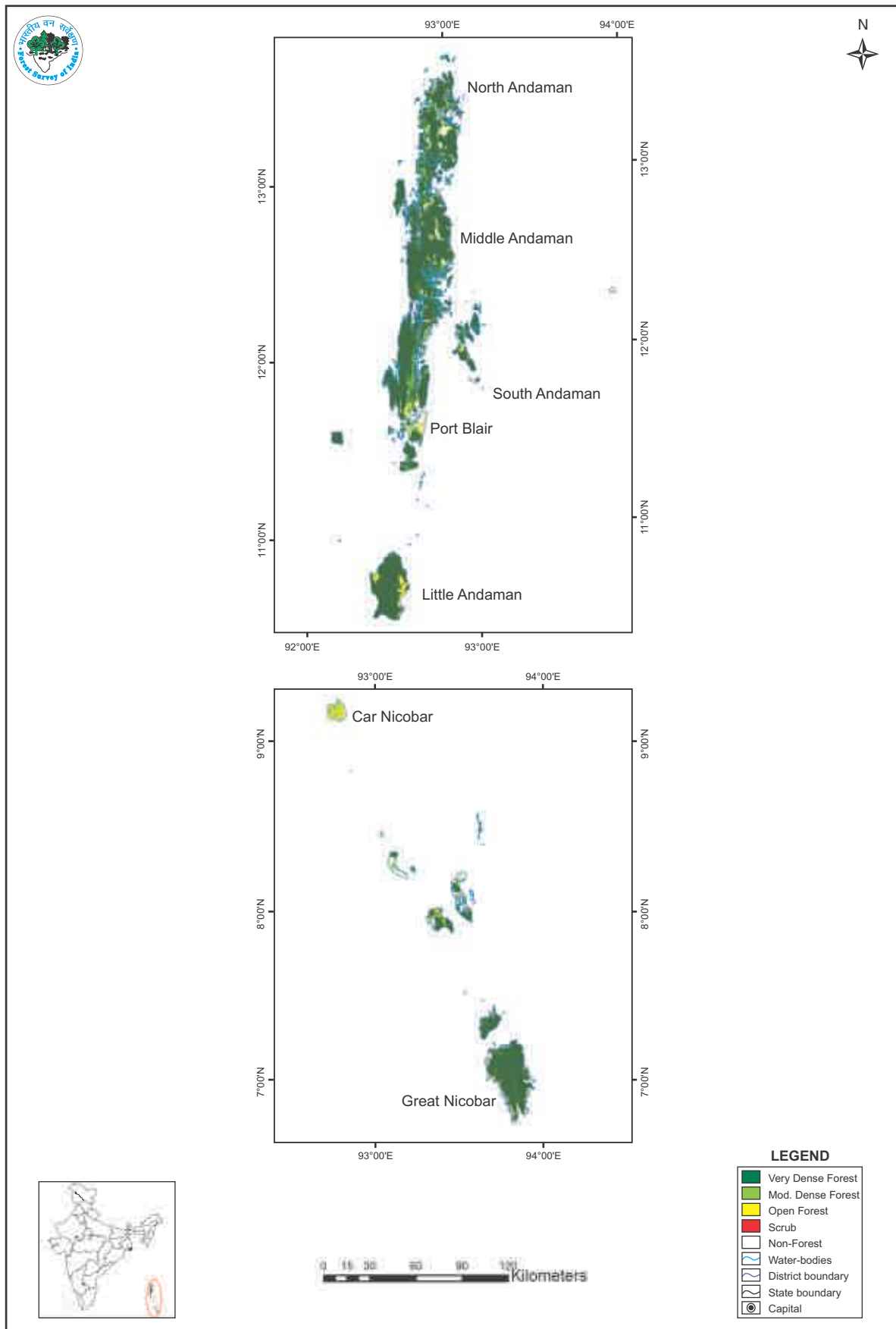


TABLE 11.31.8 Wetlands inside the Recorded Forest Area (or Green Wash) in Andaman & Nicobar Islands (in ha)

Wetland Category	No. of Wetlands	Total Wetland Area
Inland Wetlands - Natural		
Lake/Pond	6	44
River/Stream	41	1,592
Sub - Total	47	1,636
Inland Wetlands - Man-made		
Reservoir/Barrage	7	278
Sub - Total	7	278
Coastal Wetlands – Natural		
Lagoon	2	11
Creek	118	615
Sand/Beach	336	3,883
Intertidal mud flat	354	8,372
Salt Marsh	315	5,546
Mangrove	653	60,576
Coral Reef	375	8,045
Sub -Total	2,153	87,048
Wetlands (<2.25 ha)	60	60
Total	2,267	89,022
Total Recorded Forest (or Green Wash) Area (in ha)		6,74,711
% of Wetland area inside Recorded Forest (or Green Wash) Area		13.19%

(analysis based on the National Wetland Atlas: India, 2011)

11.31.3 Forest Types & Biodiversity

Forest Type Maps of 2011 have been refined in the recently completed exercise by FSI. Percentage area under different forest types of Andaman & Nicobar Islands as per the Champion & Seth classification (1968), according to the latest exercise are presented in the following table.

TABLE 11.31.9 Percentage area under different forest types in Andaman & Nicobar Islands

Sl.No.	Forest Type	% of Forest cover
1.	1A/C1 Giant Evergreen Forest	0.58
2.	1A/C2 Andamans Tropical Evergreen Forest	43.70
3.	1A/C3 Southern Hilltop Tropical Evergreen Forest	1.20
4.	1A/E1 Andamans Moist Deciduous Forest	2.31
5.	1/E1 Cane Brakes	0.00
6.	1/E2 Wet Bamboo Brakes	0.33
7.	1/2S1 Pioneer Euphorbiaceous Scrub	0.03
8.	2A/C1 Andamans Semi-Evergreen Forest	29.30
9.	2/E2 (Wet Bamboo Brakes)	0.18
10.	3A/C1 Andamans Moist Deciduous Forest	8.12
11.	3A/2S1 Andamans Secondary Moist Deciduous Forest	0.12
12.	4A/L1 Littoral Forest	0.14
13.	4B/TS2 Mangrove Forest	10.96
14.	Plantation/TOF	3.03
	Total	100.00

11.31.3.1 Assessment of Biodiversity

Findings of the Rapid Assessment of Biodiversity carried out at the national level for natural forests during September 2018 to May 2019 as part of the forest type mapping exercise is summarized below in table 11.31.10 and table 11.31.11 in respect of Andaman & Nicobar Islands.

TABLE 11.31.10 No. of species observed during the rapid assessment

Plant Type	Number of Species
Tree	89
Shrub	102
Herb	79

TABLE 11.31.11 Shannon-Wiener Index of Tree, Shrub and Herb species in different Type Groups of Andaman & Nicobar Islands

Sl. No.	Forest Type Group	Shannon-Wiener Index		
		Tree	Shrub	Herb
1	Group 1-Tropical Wet Evergreen Forests	3.01	3.34	3.28
2	Group 2-Tropical Semi-Evergreen Forests	3.19	3.31	3.21
3	Group 3-Tropical Moist Deciduous Forests	2.67	3.10	2.85
4	Group 4-Littoral and Swamp Forests	*	2.29	2.11

*adequate number of sample plots were not available

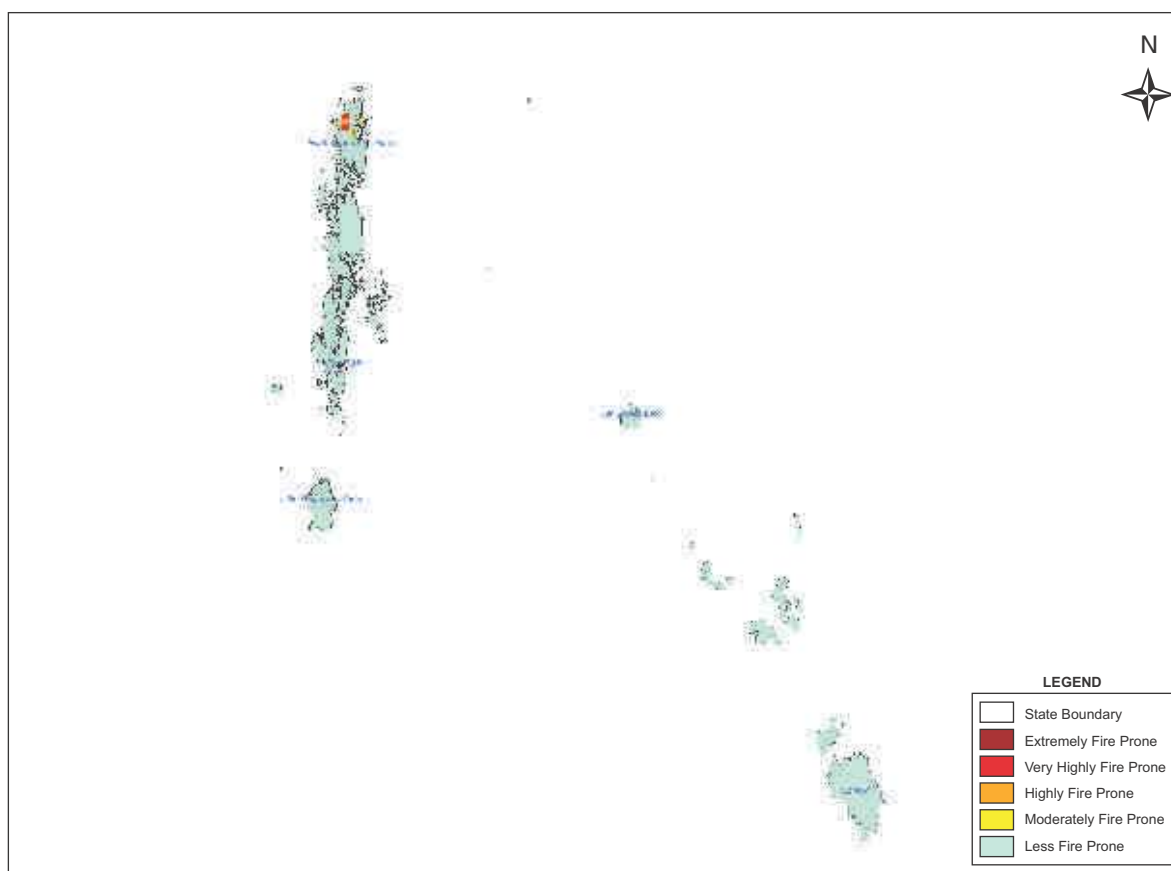
11.31.4 Fire Prone Forest Areas

Geographical area under different classes of forest fire proneness are given in the following table.

TABLE 11.31.12 Forest Fire Prone Classes (in sq km)

Sl. No.	Forest Fire Prone Classes	Geographical Area	% of Total forest cover
1.	Extremely fire prone	0.00	0.00
2.	Very Highly fire prone	52.82	0.52
3.	Highly fire prone	47.84	0.42
4.	Moderately fire prone	51.44	0.38
5.	Less fire prone	8,092.41	98.68
	Total	8,244.51	100.00



FIGURE 11.31.4 Fire prone forest areas under different fire prone classes

11.31.5 Tree Cover

Forest cover presented in the section 11.31.2 accounts for tree patches of size 1 ha and more having canopy density more than 10%. However, trees occurring in patches of size less than 1 ha including scattered trees are assessed through sampling based methodology. Tree cover in Andaman & Nicobar Islands has been estimated as given in table 11.31.13.

TABLE 11.31.13 Tree Cover in Andaman & Nicobar Islands
(in sq km)

Tree Cover	Area
	41

Tree cover of Andaman & Nicobar Islands has increased by 6 sq km as compared to the previous assessment reported in ISFR 2017.

11.31.6 Extent of Trees Outside Forest (TOF)

Trees outside Forests (TOF) refer to tree resources found outside the forests as defined in the Government records. FSI maps forest cover using satellite data and assesses tree cover outside forests using sampling based method. Forest Cover outside the recorded forest area is derived using boundaries of RFA or Green Wash. Extent of TOF therefore may be estimated as the sum of extent of forest cover outside the recorded forest areas (RFA) and tree cover as given in the preceding section.

TABLE 11.31.14 Extent of TOF in Andaman & Nicobar Islands (in sq km)

Forest Cover outside the RFA/GW	Tree Cover	Extent of TOF
521	41	562

11.31.7 Growing Stock in Forest

Growing stock in the recorded forest areas (RFA) in Andaman & Nicobar Islands is given in the table 11.31.15. Diameter class-wise distribution of top 5 species in numbers derived from the forest inventory data is presented in the table 11.31.16

TABLE 11.31.15 Growing Stock in Andaman & Nicobar Islands (in m cum)

Growing Stock (GS)		% of Country's GS
Growing Stock in Recorded Forest Area	90.82	2.13
Growing Stock in TOF	2.75	0.17

TABLE 11.31.16 Diameter class distribution of top five species inside RFA in Andaman & Nicobar Islands (in '000)

Sl.No.	Species	Dia class (cm)		
		10-30	30-60	>60
1.	<i>Canarium euphyllum</i>	2,602	2,417	1,301
2.	<i>Dipterocarpus turbinatus</i>	8,687	3,370	502
3.	<i>Dipterocarpus species</i>	3,532	1,859	558
4.	<i>Myristica species</i>	15,837	688	0
5.	<i>Pterocymbium tinctorium</i>	2,993	3,662	558

11.31.8 Carbon Stock in Forest

The total Carbon stock of forests in the UT including the TOF patches which are more than 1 ha in size is 112.67 million tonnes (413.12 million tonnes of CO₂ equivalent) which is 1.58% of total forest carbon of the country. Pool wise forest carbon in Andaman & Nicobar Islands is given in the following table.

TABLE 11.31.17 Forest Carbon in Andaman & Nicobar Islands in different pools (in '000 tonnes)

AGB	BGB	Dead wood	Litter	SOC	Total
49,468	15,823	1,116	2,912	43,347	1,12,666

11.31.9 Growing Stock of Bamboo

Bamboo bearing area and growing stock inside the recorded forest area (RFA)/ Green Wash in the UT which include culms of 1 year age and above are given in the table 11.31.18

TABLE 11.31.18 Growing Stock of Bamboo in Andaman & Nicobar Islands

Growing Stock (GS)		% of Country's GS of Bamboo
Bamboo bearing area inside RFA/Green Wash (in sq km)	1,814	1.13
Total number of culms (in millions)	803	2.04
Total equivalent green weight (in '000' tonnes)	7,199	2.59

11.31.10 Dominant tree species in Trees Outside Forests (TOF)

Top five species in numbers in Trees Outside Forests in Andaman & Nicobar Islands in Rural and Urban areas are given in the table 11.31.19 and table 11.31.20 respectively

TABLE 11.31.19 Top five tree species in TOF (Rural) in Andaman & Nicobar Islands

Sl. No.	Species	Relative Abundance (%)
1.	<i>Cocos nucifera</i>	45.69
2.	<i>Anacardium occidentale</i>	16.80
3.	<i>Ficus carica</i>	12.00
4.	<i>Pandanus odoratissimus</i>	7.86
5.	<i>Areca catechu</i>	6.86

TABLE 11.31.20 Top five tree species in TOF (Urban) in Andaman & Nicobar Islands

Sl. No.	Species	Relative Abundance (%)
1.	<i>Areca catechu</i>	37.22
2.	<i>Cocos nucifera</i>	17.28
3.	<i>Mangifera andamanica</i>	6.15
4.	<i>Artocarpus heterophyllus</i>	5.71
5.	<i>Lagerstroemia hypoleuca</i>	3.58

11.31.11 Major NTFP Species

Major NTFP species as assessed from forest inventory data are presented in the table 11.31.21.

TABLE 11.31.21 Major NTFP species in the UT of Andaman & Nicobar Islands

Sl. No.	Species	Plant Type	Relative Abundance (%)
1.	<i>Calamus longisetus</i>	Shrub	44.85
2.	<i>Calamus palustris</i>	Shrub	25.00
3.	<i>Curcuma aromatica</i>	Herb	25.00
4.	<i>Diplagium species</i>	Herb	4.78
5.	<i>Heritiera littoralis</i>	Tree	0.37

Major NTFP species are given in terms of relative abundance

11.31.12 Quantified estimation of Dependence of People living in forest fringe villages on forests in Andaman & Nicobar Islands

Through a nation-wide study, FSI has done estimation of dependence of people living in the villages close to forest for fuel wood, fodder, small timber and bamboo in quantified terms for each State & UT of the country (Please refer to Chapter 10 in Vol. I for details). The estimated quantities of the four produce for Andaman & Nicobar Islands is given in the table 11.31.22

Table 11.31.22 Estimation of Dependence of People in Forest Fringe Village Forests in Andaman & Nicobar Islands

Fuelwood (tonnes)	Fodder (tonnes)	Bamboo (tonnes)	Small Timber (cum)
22,038	83,405	3,737	2,506

