



INDIA STATE OF FOREST REPORT 2023

VOLUME II



FOREST SURVEY OF INDIA
Ministry of Environment, Forest & Climate Change



Photo: Subharanjan Sen, IFS



सत्यमेव जयते

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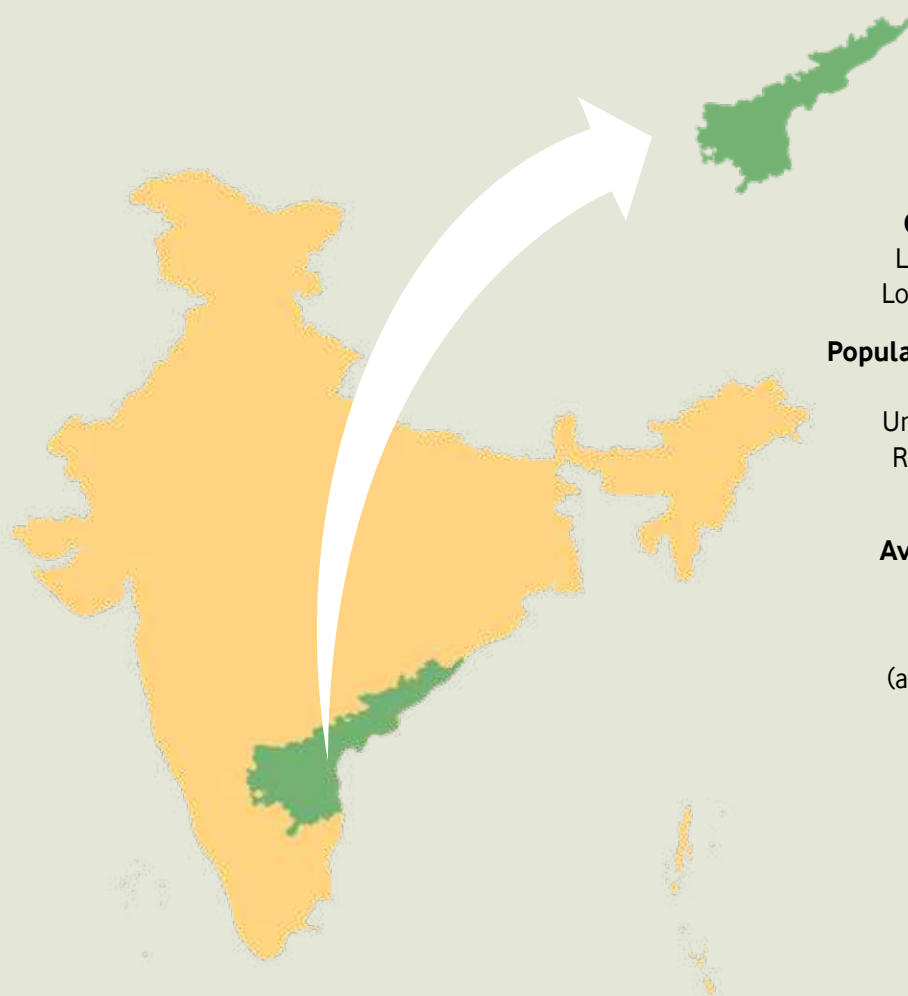
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ANDHRA PRADESH

**Geographical Area**1,62,923 km²**Geographical Coordinates**

Latitude 12°37' N to 19°55' N

Longitude 76°45' E to 84°46' E

Population (as per Census 2011)

49.39 million

Urban 14.61 million (29.58 %)

Rural 34.78 million (70.42 %)

Tribal 2.63 million (5.32 %)

Average Population Density308 per km²**Livestock Population**(as per 19th Livestock Census)

56.10 million

No. of Districts

26

No. of Hill Districts

0

No. of Tribal Districts

5

Table 10.1.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	16,297	
Reporting area for land utilization	16,296.69	100.00
Forests	3,688.22	22.63
Not available for land cultivation	3,417.45	20.97
Permanent pastures and other grazing lands	203.58	1.25
Land under misc. tree crops and groves	154.29	0.95
Culturable wasteland	402.03	2.47
Fallow land other than current fallows	893.86	5.48
Current fallows	1,499.31	9.20
Net area sown	6,037.95	37.05

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.1.1 Forest Cover

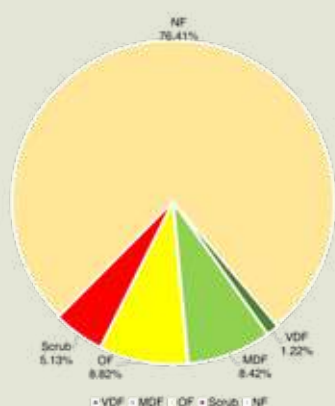


Table 10.1.2 Forest Cover of Andhra Pradesh

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	1,995.71	1.22
MDF	13,725.75	8.42
OF	14,363.50	8.82
Total	30,084.96	18.46
Scrub	8,351.62	5.13

Figure 10.1.1 Forest Cover of Andhra Pradesh

Table 10.1.3 District- wise Forest Cover in Andhra Pradesh

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Alluri Sitharama Raju	12,446.54	1,183.18	3,781.97	1,952.17	6,917.32	55.58	-101.69	726.83
Anakapalli	3,847.88	0.00	155.02	551.29	706.31	18.36	-9.62	257.93
Ananthapuramu	10,184.85	0.00	22.55	222.90	245.45	2.41	-0.68	551.84
Annamayya	9,111.77	28.51	1,277.28	1,050.56	2,356.35	25.86	-5.16	568.49
Bapatla	3,884.29	0.00	41.28	72.58	113.86	2.93	2.10	29.03
Chittoor	6,632.71	0.00	457.98	788.33	1,246.31	18.79	-5.44	625.25
East Godavari	2,592.80	0.00	116.80	286.37	403.17	15.55	-6.07	6.37
Eluru	6,603.62	366.19	488.08	835.27	1,689.54	25.59	-8.38	24.36
Guntur	2,413.66	0.00	0.06	13.28	13.34	0.55	0.25	9.62
Kakinada	3,080.32	0.02	184.33	359.78	544.13	17.66	4.12	113.00
Konaseema	2,380.59	0.00	67.32	353.68	421.00	17.68	10.68	2.37
Krishna	3,813.89	0.00	50.25	124.35	174.60	4.58	9.34	3.45
Kurnool	7,940.12	0.00	0.75	70.73	71.48	0.90	-2.20	145.21
Nandyal	9,717.88	86.01	1,506.01	506.74	2,098.76	21.60	-6.30	536.45
NTR	3,289.04	35.21	77.49	250.67	363.37	11.05	-8.96	22.65
Palnadu	7,291.26	0.99	247.18	521.37	769.54	10.55	-12.00	447.82
Parvathipuram Manyam	3,801.94	0.00	229.84	776.62	1,006.46	26.47	-29.19	290.96
Prakasam	14,279.49	256.87	1,780.29	1,213.77	3,250.93	22.77	-6.97	1,139.54
Sri Potti Sriramulu Nellore	10,299.69	22.19	474.56	663.76	1,160.51	11.27	17.77	671.83
Sri Sathya Sai	8,945.15	0.00	187.17	568.60	755.77	8.45	0.78	550.33
Srikakulam	4,430.10	0.00	77.54	500.36	577.90	13.04	6.04	315.61
Tirupati	8,692.82	6.38	888.26	1,209.39	2,104.03	24.20	-21.45	509.69
Visakhapatnam	952.40	0.00	99.03	173.42	272.45	28.61	-4.76	4.21
Vizianagaram	4,143.96	0.00	43.38	370.44	413.82	9.99	35.35	90.64
West Godavari	2,147.50	0.00	0.33	60.63	60.96	2.84	9.16	0.02
YSR Kadapa	9,998.30	10.16	1,471.00	866.44	2,347.60	23.48	-5.38	708.12
Grand Total	1,62,922.57	1,995.71	13,725.75	14,363.50	30,084.96	18.46	-138.66	8,351.62

*Area figure calculated without normalization factor.

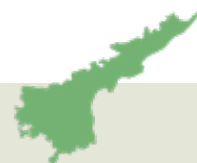


Table 10.1.4 Division-wise Forest Cover in Andhra Pradesh

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Anakapalli	4,115.77	0.00	229.31	611.89	841.20	20.44	-8.50	268.22
Anantapur	10,205.40	0.00	23.17	217.97	241.14	2.36	-0.68	543.04
Annamayya	9,072.54	28.48	1,294.69	1,057.85	2,381.02	26.24	-5.17	571.78
Bapatla	3,762.32	0.00	12.42	45.51	57.93	1.54	0.54	29.00
Bhimavaram	2,142.36	0.00	0.33	61.14	61.47	2.87	9.20	0.01
Chintapalli	2,600.31	71.52	1,025.62	451.79	1,548.93	59.57	-16.69	80.04
Chintur	2,082.04	558.51	504.55	74.70	1,137.76	54.65	-24.55	10.89
Chittoor	6,783.63	0.00	471.07	805.36	1,276.43	18.82	-6.36	627.07
DD Giddalur	1,735.20	118.34	601.01	207.77	927.12	53.43	-3.58	107.75
DD Markapur	4,387.00	137.84	832.15	633.10	1,603.09	36.54	-10.16	538.82
DDPT Atmakur	2,833.62	39.57	703.10	234.58	977.25	34.49	-3.13	86.05
Dr.B.R.Ambedkar Konasema	2,319.16	0.00	59.35	345.25	404.60	17.45	10.57	0.92
East Godavari	2,621.60	0.00	119.04	290.71	409.75	15.63	-6.24	6.42
Eluru	6,789.16	366.70	485.22	826.19	1,678.11	24.72	-6.88	23.68
Guntur	2,508.14	0.00	2.30	34.63	36.93	1.47	-0.67	14.34
Kadapa	10,109.30	10.11	1,459.90	861.28	2,331.29	23.06	-5.40	704.99
Kakinada	7,277.09	552.32	1,840.81	999.29	3,392.42	46.62	-47.10	170.00
Krishna	3,544.01	0.00	5.46	92.82	98.28	2.77	4.29	3.56
Kurnool	7,975.69	0.00	0.93	77.70	78.63	0.99	-2.52	154.30
Nandyal	6,884.90	46.42	797.10	266.14	1,109.66	16.12	-2.84	442.63
NTR	3,292.14	34.93	77.35	250.88	363.16	11.03	-8.96	22.63
Paderu	3,734.94	0.00	507.03	712.36	1,219.39	32.65	-8.20	572.09
Palnadu	6,567.67	0.96	221.77	431.42	654.15	9.96	-5.64	357.40
Parvathipuram Manyam	3,591.12	0.00	227.79	770.37	998.16	27.80	-28.06	294.18
Prakasam	8,891.98	0.00	369.13	438.76	807.89	9.09	1.30	574.30
SPSR Nellore	10,412.20	21.69	466.06	663.01	1,150.76	11.05	18.17	674.25
Sri Sathya Sai	8,952.92	0.00	186.68	571.24	757.92	8.47	0.74	552.36
Srikakulam	4,463.59	0.00	81.16	504.06	585.22	13.11	6.81	318.41
Tirupati	8,311.63	1.60	816.94	1,138.90	1,957.44	23.55	-17.68	491.56
Visakhapatnam	1,174.60	0.00	112.76	202.49	315.25	26.84	-6.51	5.08
Vizianagaram	3,866.68	0.00	34.69	341.51	376.20	9.73	34.71	77.29
WLM Eluru	268.32	0.00	44.13	38.79	82.92	30.90	5.87	0.07
Area which does not fall in any Division	748.30	6.72	112.73	104.04	223.49	29.87	-5.34	28.49
Grand Total	1,64,025.33	1,995.71	13,725.75	14,363.50	30,084.96	18.34	-138.66	8,351.62

#As per the division boundary shapefile provided by State Forest Department.

*Area figure calculated without normalization factor.

Table 10.1.5 Forest Cover in Municipal Areas of Andhra Pradesh(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
1	Addanki	28.37	0.00	0.00	0.07	0.07	0.25	0.10
2	Adoni	79.70	0.00	0.00	0.30	0.30	0.38	0.88
3	Akivedu	11.24	0.00	0.00	0.00	0.00	0.00	0.00
4	Allagadda	63.48	0.00	0.00	0.00	0.00	0.00	0.00
5	Allur	94.51	0.00	0.05	0.47	0.52	0.55	0.00
6	Amalapuram	6.99	0.00	0.00	0.55	0.55	7.87	0.00
7	Ammudavalsa	27.26	0.00	0.00	0.39	0.39	1.43	0.30
8	Ananthapur	16.58	0.00	0.00	0.25	0.25	1.51	0.01
9	Atmakur-Kurnool	30.27	0.00	0.00	0.10	0.10	0.33	0.00
10	Atmakur-Nellore	58.61	0.00	0.00	0.36	0.36	0.61	2.28
11	B.Kothakota	40.93	0.00	0.00	0.08	0.08	0.20	0.00
12	Badvel	51.01	0.00	0.00	0.02	0.02	0.04	1.54
13	Bapatla	110.87	0.00	2.75	9.04	11.79	10.63	1.18
14	Betamcherla	10.49	0.00	0.00	0.00	0.00	0.00	0.17
15	Bhimavaram	45.26	0.00	0.00	0.00	0.00	0.00	0.00
16	Bobbili	26.04	0.00	0.00	0.00	0.00	0.00	0.12
17	Buchireddypalem	35.00	0.00	0.00	0.11	0.11	0.31	0.40
18	Chilakaluripeta	18.63	0.00	0.00	0.00	0.00	0.00	0.00
19	Chimakurthy	29.67	0.00	0.01	0.09	0.10	0.34	0.66
20	Chintalapudi	39.35	0.00	0.23	3.96	4.19	10.65	0.57
21	Chirala	13.74	0.00	0.00	0.09	0.09	0.66	0.00
22	Chittoor	113.07	0.00	0.02	2.67	2.69	2.38	18.48
23	Dachepalli	53.30	0.00	0.00	0.14	0.14	0.26	0.20
24	Darsi	28.53	0.00	0.00	0.08	0.08	0.28	0.70
25	Dharmavaram	44.14	0.00	0.00	0.00	0.00	0.00	0.06
26	Dhone	9.93	0.00	0.00	0.02	0.02	0.20	0.58
27	Eluru	60.96	0.00	0.00	1.89	1.89	3.10	0.00
28	Giddalur	32.41	0.00	0.00	0.05	0.05	0.15	0.33
29	Gollaprolu	14.55	0.00	0.00	0.00	0.00	0.00	0.00
30	Gooty	35.32	0.00	0.00	0.31	0.31	0.88	4.43
31	Gudivada	45.58	0.00	0.00	0.00	0.00	0.00	0.00
32	Gudur-kurnool	47.55	0.00	0.00	0.00	0.00	0.00	0.00
33	Gudur-Nellore	98.92	0.00	1.28	4.49	5.77	5.83	3.19
34	Guntakal	39.76	0.00	0.00	0.00	0.00	0.00	0.00
35	Guntur	165.50	0.00	0.00	0.00	0.00	0.00	0.21
36	Gurajala	43.66	0.00	0.00	0.00	0.00	0.00	0.00
37	GVMC	615.53	0.00	68.59	114.10	182.69	29.68	4.31
38	Hindupur	38.78	0.00	0.00	0.01	0.01	0.03	0.41
39	Ichhapuram	21.08	0.00	0.00	1.05	1.05	4.98	0.09
40	Jaggiahpet	17.54	0.00	0.00	0.09	0.09	0.51	0.00
41	Jammalamadugu	26.26	0.00	0.00	0.00	0.00	0.00	0.00

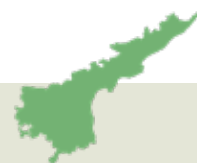


Table 10.1.5 Forest Cover in Municipal Areas of Andhra Pradesh

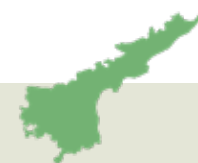
(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
42	Jangareddigudem	25.07	0.00	0.00	1.84	1.84	7.34	0.00
43	Kadapa	164.14	0.00	32.05	11.15	43.20	26.32	1.58
44	Kadiri	43.44	0.00	0.00	0.08	0.08	0.18	0.74
45	Kakinada	31.58	0.00	0.00	3.25	3.25	10.29	0.00
46	Kalyanadurgam	55.85	0.00	0.00	2.28	2.28	4.08	1.55
47	Kamalapuram	21.57	0.00	0.00	0.00	0.00	0.00	0.20
48	Kandukur	72.49	0.00	0.00	1.11	1.11	1.53	0.75
49	Kanigiri	46.71	0.00	0.00	0.16	0.16	0.34	0.61
50	Kavali	75.52	0.00	1.03	4.89	5.92	7.84	2.45
51	Kondapalli	30.30	0.08	0.00	1.58	1.66	5.48	0.04
52	Kovvur	14.85	0.00	0.00	0.00	0.00	0.00	0.00
53	Kuppam	46.33	0.00	0.00	0.00	0.00	0.00	0.00
54	Kurnool	114.75	0.00	0.00	0.46	0.46	0.40	0.04
55	Macharla	36.57	0.00	0.00	0.00	0.00	0.00	0.63
56	Machilipatnam	29.42	0.00	0.00	0.09	0.09	0.31	0.00
57	Madakasira	35.42	0.00	1.72	3.13	4.85	13.69	2.11
58	Madanapalle	15.22	0.00	0.00	0.01	0.01	0.07	0.04
59	Mandapeta	21.33	0.00	0.00	0.00	0.00	0.00	0.00
60	Mangalagiri-Tadepa	191.46	0.00	0.00	1.28	1.28	0.67	6.34
61	Markapur	24.11	0.00	0.00	0.00	0.00	0.00	0.05
62	Mummadivaram	25.80	0.00	0.00	8.72	8.72	33.80	0.00
63	Mydakur	61.80	0.00	0.00	1.38	1.38	2.23	3.35
64	Nagari	27.14	0.00	0.00	0.15	0.15	0.55	1.73
65	Naidupet	17.42	0.00	0.00	0.00	0.00	0.00	0.04
66	Nandigama	31.06	0.00	0.00	0.05	0.05	0.16	0.79
67	Nandikotkur	22.88	0.00	0.00	0.00	0.00	0.00	0.00
68	Nandyal	59.17	0.00	0.00	0.00	0.00	0.00	0.00
69	Narasaraopet	15.02	0.00	0.00	0.00	0.00	0.00	0.00
70	Narsapuram	11.81	0.00	0.00	0.12	0.12	1.02	0.00
71	Narsipatnam	32.42	0.00	0.00	0.65	0.65	2.00	0.30
72	Nellimarla	19.84	0.00	0.44	2.48	2.92	14.72	1.84
73	Nellore	145.65	0.00	0.00	0.85	0.85	0.58	0.22
74	Nidadavole	14.09	0.00	0.00	0.12	0.12	0.85	0.00
75	Nuzvid	30.12	0.00	0.00	2.79	2.79	9.26	0.10
76	Ongole	131.18	0.00	0.00	0.07	0.07	0.05	0.00
77	Palakollu	28.30	0.00	0.00	2.29	2.29	8.09	0.00
78	Palakonda	11.46	0.00	0.00	0.00	0.00	0.00	0.18
79	Palamaneru	17.58	0.00	0.00	0.03	0.03	0.17	0.15
80	Palasa Kasibugga	31.45	0.00	0.00	0.33	0.33	1.05	2.05
81	Parvathipuram	13.20	0.00	0.00	0.00	0.00	0.00	0.00
82	Pedana	12.57	0.00	0.00	0.02	0.02	0.16	0.00
83	Peddapuram	42.14	0.00	0.00	2.25	2.25	5.34	0.00

Table 10.1.5 Forest Cover in Municipal Areas of Andhra Pradesh(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
84	Penukonda	68.35	0.00	0.00	13.96	13.96	20.42	14.32
85	Piduguralla	31.82	0.00	0.00	0.00	0.00	0.00	0.00
86	Pithapuram	19.96	0.00	0.00	0.00	0.00	0.00	0.00
87	Podili	70.36	0.00	0.01	0.10	0.11	0.16	0.96
88	Ponnur	57.43	0.00	0.00	0.00	0.00	0.00	0.00
89	Proddutur	7.16	0.00	0.00	0.00	0.00	0.00	0.00
90	Pullivendula	83.49	0.00	0.00	0.00	0.00	0.00	0.67
91	Punganur	24.52	0.00	0.00	0.00	0.00	0.00	0.00
92	Puttaparthi	58.76	0.00	0.34	1.76	2.10	3.57	2.34
93	Puttur	37.13	0.00	0.01	1.69	1.70	4.58	5.06
94	Rajahmundry	79.04	0.00	0.22	3.75	3.97	5.02	0.00
95	Rajam	26.88	0.00	0.00	0.19	0.19	0.71	0.06
96	Rajampet	5.75	0.00	0.00	0.00	0.00	0.00	0.00
97	Ramchandrapuram	14.05	0.00	0.00	0.00	0.00	0.00	0.00
98	Rayachoti	26.97	0.00	0.00	0.05	0.05	0.19	0.00
99	Rayadurgam	38.94	0.00	0.05	1.08	1.13	2.90	4.51
100	Repalle	10.41	0.00	0.00	0.00	0.00	0.00	0.00
101	Saluru	20.19	0.00	0.00	0.35	0.35	1.73	0.04
102	Samarlakota	40.31	0.00	0.00	0.00	0.00	0.00	0.00
103	Sattenapalle	22.14	0.00	0.00	0.00	0.00	0.00	0.00
104	Srikakulam	49.71	0.00	0.50	0.29	0.79	1.59	0.00
105	Srikalhasti	58.87	0.00	0.00	6.89	6.89	11.70	7.35
106	Sullurpet	20.77	0.00	0.00	0.10	0.10	0.48	0.15
107	Tadepalligudem	55.11	0.00	0.00	2.09	2.09	3.79	0.00
108	Tadipatri	7.82	0.00	0.00	0.00	0.00	0.00	0.00
109	Tanuku	24.96	0.00	0.00	0.00	0.00	0.00	0.00
110	Tenali	16.36	0.00	0.00	0.09	0.09	0.55	0.00
111	Tirupati	28.33	0.00	0.27	4.59	4.86	17.15	0.30
112	Tiruvuru	27.24	0.00	0.85	0.44	1.29	4.74	0.00
113	Tuni	8.06	0.00	0.00	0.14	0.14	1.74	1.42
114	Venkatagiri	23.78	0.00	0.00	0.00	0.00	0.00	1.45
115	Vijayawada	61.15	0.00	0.00	0.41	0.41	0.67	0.67
116	Vinukonda	24.72	0.00	0.00	0.19	0.19	0.77	0.43
117	Vizianagaram	51.28	0.00	0.74	1.75	2.49	4.86	1.04
118	Vuyyuru	11.96	0.00	0.00	0.00	0.00	0.00	0.00
119	Yelamanchili	39.33	0.00	0.00	1.64	1.64	4.17	0.52
120	Yeleswaram	6.10	0.00	0.00	0.09	0.09	1.48	0.00
121	Yemmiganur	17.05	0.00	0.00	0.00	0.00	0.00	0.00
122	Yerraguntla	13.69	0.00	0.00	0.00	0.00	0.00	0.00
123	YSR Tadigadapa	30.75	0.00	0.00	0.03	0.03	0.10	0.00
Grand Total		5,609.30	0.08	111.16	236.06	347.30	6.19	110.37

*Shapefile of digitized boundary as provided by Directorate of Town & Country Planning.



10.1.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below

Table 10.1.6 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Andhra Pradesh

(km ²)							
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
1,925.32	12,469.70	9,472.74	23,867.76	70.39	1,256.05	4,890.76	6,217.20
8.07%	52.24%	39.69%		1.13%	20.20%	78.67%	

*In case of Andhra Pradesh, RFA boundaries have been used.

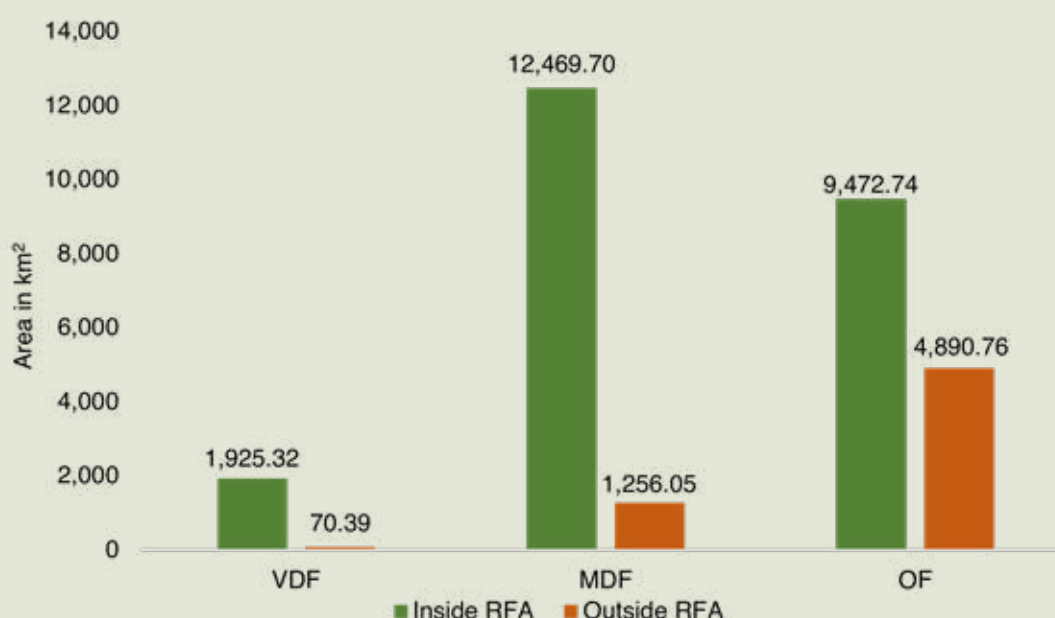


Figure 10.1.2 Forest Cover Inside and Outside of RFA in Andhra Pradesh

Table 10.1.7 Forest Cover Change Matrix Inside RFA/GW for Andhra Pradesh between 2021 Raster based and 2023 Assessments

(km ²)						
Class	2023 Assessment inside RFA/GW				NF	Total ISFR 2021 inside RFA / GW Raster based*
	VDF	MDF	OF	Scrub		
VDF	1,903.86	5.64	3.51	1.78	10.43	1,925.22
MDF	21.46	12,398.54	58.79	32.05	77.42	12,588.26
OF	0.00	62.14	9,216.42	79.46	79.73	9,437.75
Scrub	0.00	0.36	111.82	4,568.24	34.61	4,715.03
NF	0.00	3.02	82.20	117.86	8,226.12	8,429.20
Total ISFR 2023 inside RFA/GW	1,925.32	12,469.70	9,472.74	4,799.39	8,428.31	37,095.46
Net Change	0.10	-118.56	34.99	84.36	-0.89	

*Area figure calculated without normalization factor.



Table 10.1.8 Forest Cover Change Matrix Outside RFA/GW for Andhra Pradesh between 2021 Raster based and 2023 Assessments

(km ²)						
Class	2023 Assessment outside RFA/GW				NF	Total ISFR 2021 outside RFA / GW Raster based*
	VDF	MDF	OF	Scrub		
VDF	70.12	0.79	0.46	0.20	0.88	72.45
MDF	0.24	1,253.63	26.29	11.53	33.07	1,324.76
OF	0.00	1.28	4,627.17	46.38	200.35	4,875.18
Scrub	0.00	0.07	24.17	3,389.98	90.37	3,504.59
NF	0.03	0.28	212.67	104.14	1,15,733.01	1,16,050.13
Total ISFR 2023 outside RFA/GW	70.39	1,256.05	4,890.76	3,552.23	1,16,057.68	1,25,827.11
Net Change	-2.06	-68.71	15.58	47.64	7.55	

*Area figure calculated without normalization factor.

Table 10.1.9 Altitude-wise Forest Cover in Andhra Pradesh

(km ²)						
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	1,35,054.81	1,101.46	8,388.26	10,675.76	20,165.48	6,335.32
500-1000	25,763.86	874.48	4,969.76	3,319.42	9,163.66	1,664.63
1000-2000	2,103.90	19.77	367.73	368.32	755.82	351.67
Total	1,62,922.57	1,995.71	13,725.75	14,363.50	30,084.96	8,351.62

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

Table 10.1.10 Forest Cover in Different Slope Classes in Andhra Pradesh

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	1,31,222.88	510.62	4,094.95	6,874.54	11,480.11	4,343.94
5-10	10,693.95	375.44	2,286.12	1,917.01	4,578.57	1,328.42
10-15	6,736.97	327.02	2,045.11	1,597.66	3,969.79	926.92
15-20	5,498.98	291.96	1,878.89	1,435.10	3,605.95	728.53
20-25	4,284.94	242.79	1,591.90	1,191.12	3,025.81	535.22
25-30	2,717.92	157.46	1,073.67	808.22	2,039.35	315.24
>30	1,766.93	90.42	755.11	539.85	1,385.38	173.35
Total	1,62,922.57	1,995.71	13,725.75	14,363.50	30,084.96	8,351.62

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

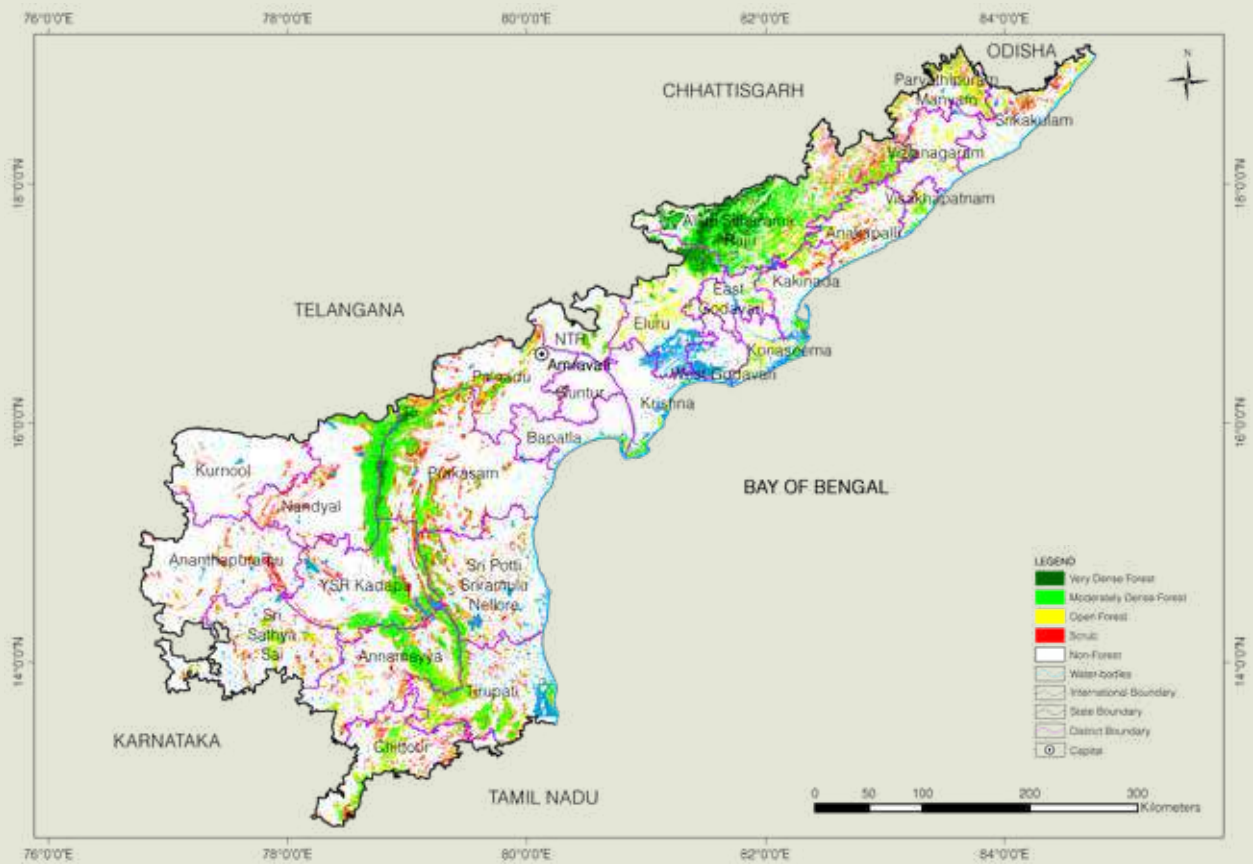


Figure 10.1.3 Forest Cover Map of Andhra Pradesh



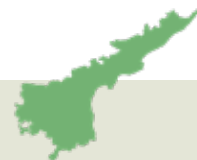
10.1.3 Forest Types

The area under different Forest Types in Andhra Pradesh (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.1.11 Area Statistics of the Forest Types Found in Andhra Pradesh

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	3B/C2 Southern moist mixed deciduous forest	1,733.76	4.47
2	4A/L1 Littoral forest	66.42	0.17
3	4B/TS2 Mangrove forest	418.07	1.08
4	5A/C1b Dry teak forest	546.16	1.41
5	5A/C2 Dry red sanders-bearing forest	1,115.87	2.88
6	5A/C3 Southern dry mixed deciduous forest	15,128.05	39.00
7	5B/C1c Dry peninsular sal forest	0.55	0.00
8	5B/C2 Northern dry mixed deciduous forest	0.69	0.00
9	5/DS1 Dry deciduous scrub	12,551.35	32.36
10	5/DS2 Dry savannah forest	34.61	0.09
11	5/E4 <i>Hardwickia</i> forest	9.04	0.02
12	5/E9 Dry bamboo brake	304.51	0.79
13	5/2S1 Secondary dry deciduous forest	727.89	1.88
14	6A/C1 Southern thorn forest	1,677.28	4.32
15	6A/C2 Carnatic umbrella thorn forest	21.44	0.06
16	6A/DS1 Southern thorn scrub	11.64	0.03
17	6A/DS2 Southern <i>Euphorbia</i> scrub	0.27	0.00
18	7/C1 Tropical dry evergreen forest	426.73	1.10
19	7/DS1 Tropical dry evergreen scrub	17.16	0.04
Sub Total		34,791.49	89.70
20	TOF/Plantation	3,645.09	9.39
Total (Forest Cover & Scrub)		38,436.58	99.09
Grassland forest type (outside forest cover)			
21	5/DS4 Dry grassland	352.08	0.91
Sub Total		352.08	0.91
Grand Total		38,788.66	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest type outside forest cover has also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).



10.1.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) for fire season 2022-23 & 2023-24..

Table 10.1.12 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Alluri Sitharama Raju	3,639	6,399
2	Anakapalli	194	126
3	Ananthapuramu	261	138
4	Annamayya	2,434	1,141
5	Bapatla	6	7
6	Chittoor	782	1,075
7	East Godavari	10	19
8	Eluru	256	834
9	Guntur	2	1
10	Kakinada	91	93
11	Konaseema	0	0
12	Krishna	0	5
13	Kurnool	104	47
14	Nandyal	2,494	1,934
15	NTR	45	18
16	Palnadu	117	159
17	Parvathipuram Manyam	389	653
18	Prakasam	2,958	2,226
19	Sri Potti Sriramulu Nellore	449	211
20	Sri Sathya Sai	1,324	704
21	Srikakulam	181	102
22	Tirupati	570	760
23	Visakhapatnam	3	4
24	Vizianagaram	52	44
25	West Godavari	0	0
26	YSR Kadapa	3,006	1,474
Total		19,367	18,174

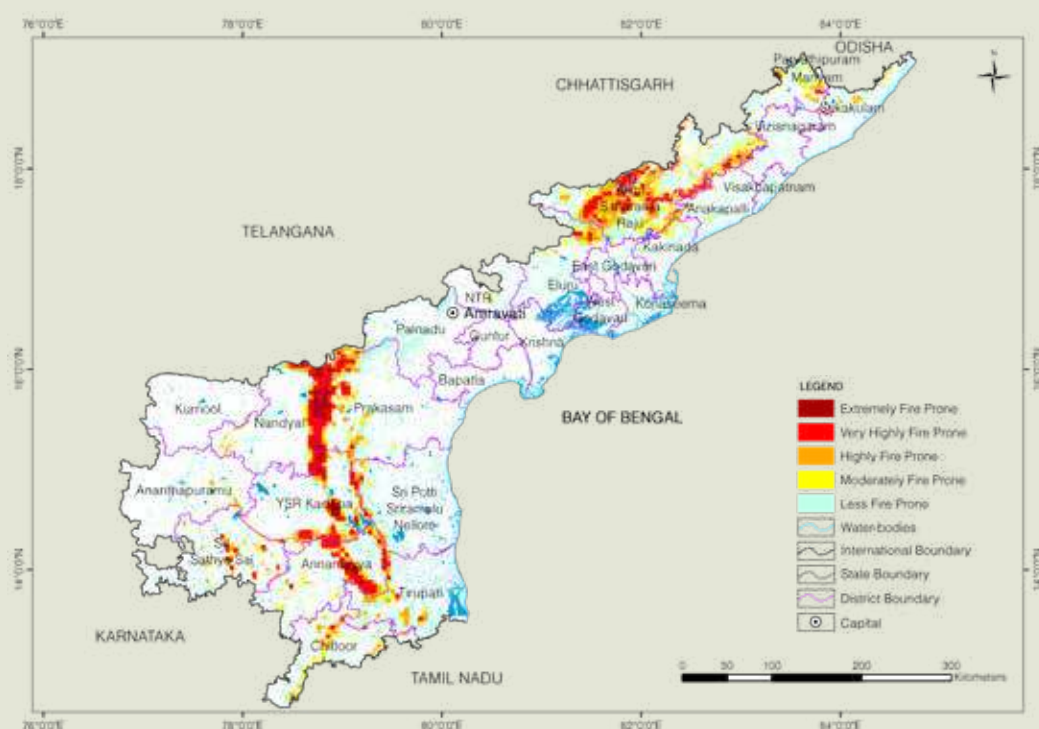
10.1.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.1.13 Forest Fire Prone Classes(km²)

Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	1,055.83	2.75
2	Very highly fire prone	5,935.11	15.44
3	Highly fire prone	7,360.94	19.15
4	Moderately fire prone	5,602.78	14.58
5	Less fire prone	18,481.92	48.08
Total		38,436.58	100.00

*Forest Cover including Scrub.

**Figure 10.1.4 Fire Prone Forest Areas under Different Fire Prone Classes****10.1.6 Results Derived from NFI for Andhra Pradesh****Table 10.1.14 Number of Trees and their Volume for Top 5 Species in RFA**

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Anogeissus latifolia/ Terminalia anogeissiana</i>	69,108	10.53
2	<i>Xylia xylocarpa</i>	46,383	12.90
3	<i>Chloroxylon swietenia</i>	41,809	3.87
4	<i>Pterocarpus santalinus</i>	32,804	2.61
5	<i>Lannea coromandelica</i>	25,883	4.53

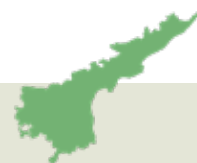


Table 10.1.15 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Mangifera indica</i>	1,16,022	17.110
2	<i>Prosopis juliflora/ Neltuma juliflora</i>	1,11,773	1.574
3	<i>Azadirachta indica</i>	43,488	4.865
4	<i>Borassus flabellifer/ Borassus flabelliformis</i>	26,710	9.195
5	<i>Cocos nucifera</i>	25,116	5.019

Table 10.1.16 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Azadirachta indica</i>	1,542	0.461
2	<i>Cocos nucifera</i>	1,207	0.303
3	<i>Prosopis juliflora/ Neltuma juliflora</i>	1,082	0.041
4	<i>Psidium guajava</i>	990	0.031
5	<i>Pongamia pinnata/ Pongamia glabra</i>	968	0.209

Table 10.1.17 Major NTFP Species in Andhra Pradesh

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Anogeissus latifolia/ Terminalia anogeissiana</i>	Tree	18,32,218
2	<i>Buchanania Lanza</i>	Tree	2,18,903
3	<i>Syzygium cumini</i>	Tree	1,45,318
4	<i>Anacardium occidentale</i>	Tree	77,640
5	<i>Hemidesmus indicus</i>	Climbers	68,28,083
6	<i>Asparagus species</i>	Climbers	3,32,065
7	<i>Gloriosa superba</i>	Climbers	41,508
8	<i>Solanum nigrum</i>	Herbs	5,00,03,499
9	<i>Andrographis paniculata</i>	Herbs	11,13,250
10	<i>Achyranthes aspera</i>	Herbs	3,71,083

Table 10.1.18 Major Invasive Species in the State Inside the RFA in Andhra Pradesh

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Lantana camara</i>	1,055.77
2	<i>Chromolaena odorata</i>	866.67
3	<i>Ageratum conyzoides</i>	261.17
4	<i>Achyranthes aspera</i>	102.87
5	<i>Triumfetta rhomboidea</i>	86.24



Photo: FSI Repository

ARUNACHAL PRADESH

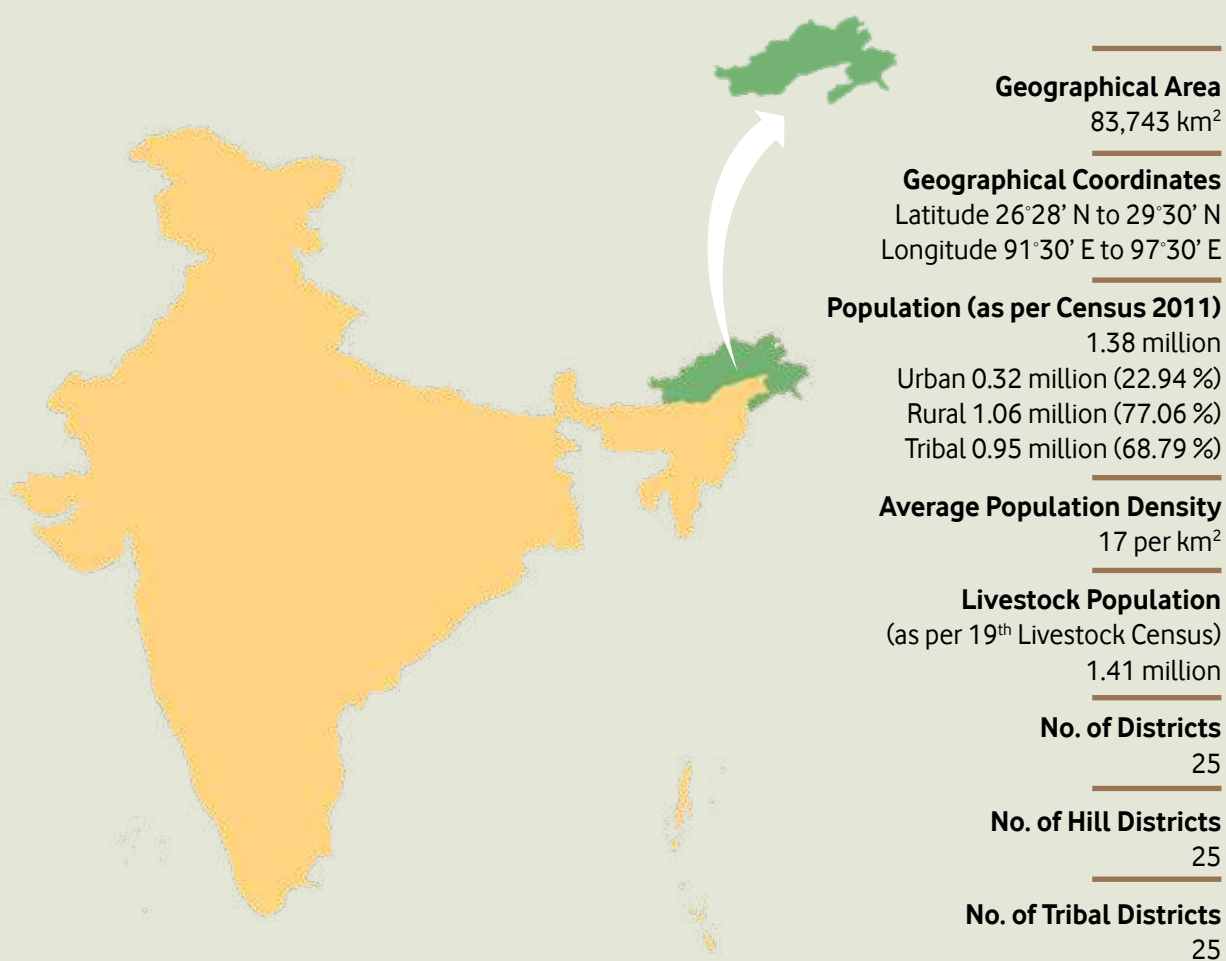


Table 10.2.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	8,374	
Reporting area for land utilization	7,153.64	100.00
Forests	6,643.10	92.86
Not available for land cultivation	61.98	0.87
Permanent pastures and other grazing lands	17.74	0.25
Land under misc. tree crops and groves	33.75	0.47
Culturable wasteland	60.88	0.85
Fallow land other than current fallows	60.65	0.85
Current fallows	32.94	0.46
Net area sown	242.60	3.39

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.2.1 Forest Cover

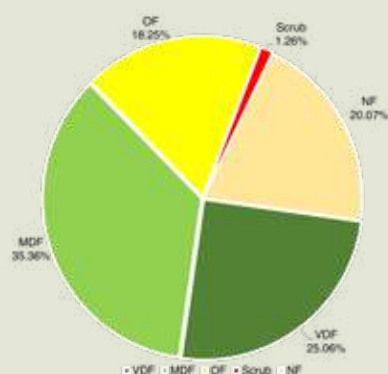


Table 10.2.2 Forest Cover of Arunachal Pradesh

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	20,985.32	25.06
MDF	29,615.09	35.36
OF	15,281.16	18.25
Total	65,881.57	78.67
Scrub	1,058.98	1.26

Figure 10.2.1 Forest Cover of Arunachal Pradesh

Table 10.2.3 District-wise Forest Cover in Arunachal Pradesh

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Anjaw ^H	6,175.48	1,221.83	2,092.55	923.05	4,237.43	68.62	-8.00	74.65
Changlang ^H	5,247.74	2,001.01	1,488.32	944.54	4,433.87	84.49	50.16	16.45
Dibang Valley ^H	9,706.04	1,127.79	3,405.24	1,922.05	6,455.08	66.51	-7.44	70.68
East Kameng ^H	4,420.73	1,347.87	1,598.42	867.95	3,814.24	86.28	-29.33	75.63
**East Siang ^H & Siang ^H	4,857.31	1,212.11	1,942.18	1,034.86	4,189.15	86.24	-1.75	54.48
Kamle ^H	1,339.33	415.77	536.95	364.88	1,317.60	98.38	-5.63	1.00
Kra Daadi ^H	2,394.28	602.37	822.66	241.14	1,666.17	69.59	-4.27	11.71
Kurung Kumey ^H	4,580.70	1,363.71	1,650.30	534.61	3,548.62	77.47	-21.70	52.18
Lepa Rada ^H	793.38	262.97	280.83	154.92	698.72	88.07	-10.66	1.91
Lohit ^H	3,179.69	651.54	1,208.44	533.17	2,393.15	75.26	-2.54	18.10
Longding ^H	963.82	159.63	247.26	223.19	630.08	65.37	-9.80	28.75
Lower Dibang Valley ^H	3,700.43	568.59	1,403.75	619.00	2,591.34	70.03	12.66	28.96
Lower Siang ^H	1,937.79	622.49	579.06	517.16	1,718.71	88.69	-9.02	1.71
Lower Subansiri ^H	1,961.20	778.50	736.78	247.99	1,763.27	89.91	-14.99	5.82
Namsai ^H	1,160.22	112.64	344.73	282.97	740.34	63.81	7.84	12.52
Pakke Kessang ^H	1,971.76	657.15	817.57	308.63	1,783.35	90.44	-11.46	9.67
Papum Pare ^H	3,451.19	971.56	1,436.02	769.59	3,177.17	92.06	-5.40	5.53
Shi Yomi ^H	2,992.06	939.23	863.57	428.18	2,230.98	74.56	35.45	42.07
Tawang ^H	2,460.79	328.64	421.98	405.36	1,155.98	46.98	-6.84	263.15
Tirap ^H	1,056.44	421.02	257.92	161.23	840.17	79.53	-37.78	21.85
Upper Siang ^H	6,702.54	1,607.91	2,520.93	1,279.73	5,408.57	80.69	2.54	127.20
Upper Subansiri ^H	5,992.05	1,856.39	2,508.89	1,187.40	5,552.68	92.67	16.23	57.18
West Kameng ^H	5,036.98	1,418.12	1,919.89	974.47	4,312.48	85.62	-9.43	77.07
West Siang ^H	1,661.27	336.48	530.85	355.09	1,222.42	73.58	-20.01	0.71
Grand Total	83,743.22	20,985.32	29,615.09	15,281.16	65,881.57	78.67	-91.17	1,058.98

* Area figure calculated without normalization factor.

** Combined forest cover is provided for East Siang & Siang.



10.2.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.2.4 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Arunachal Pradesh

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
19,637.05	26,699.94	11,836.97	58,173.96	1,348.27	2,915.15	3,444.19	7,707.61
33.75%	45.90%	20.35%		17.49%	37.82%	44.69%	

**In case of Arunachal Pradesh, Green Wash boundaries have been used.*

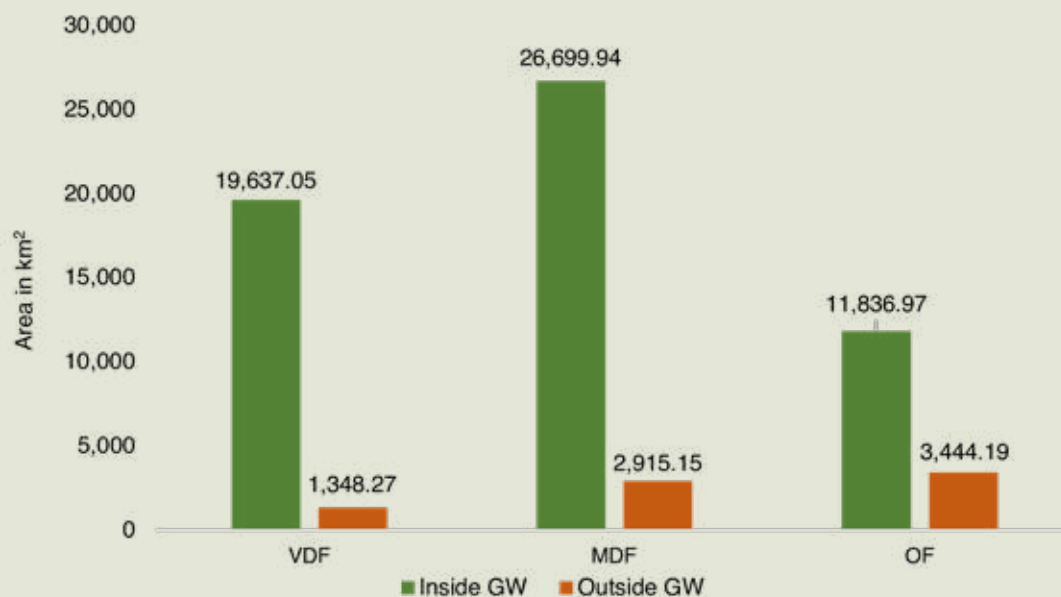


Figure 10.2.2 Forest Cover Inside and Outside of Green Wash in Arunachal Pradesh

Table 10.2.5 Forest Cover Change Matrix Inside RFA/GW for Arunachal Pradesh between 2021 Raster based and 2023 Assessments

(km ²)						
Class	2023 Assessment inside RFA/GW					Total ISFR 2021 inside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	18,811.88	644.64	105.40	0.68	70.41	19,633.01
MDF	687.69	25,540.34	399.37	5.31	234.51	26,867.22
OF	137.48	514.96	10,643.77	47.90	375.47	11,719.58
Scrub	0.00	0.00	67.43	315.45	28.00	410.88
NF	0.00	0.00	621.00	75.64	4,424.67	5,121.31
Total ISFR 2023 inside RFA/GW	19,637.05	26,699.94	11,836.97	444.98	5,133.06	63,752.00
Net Change	4.04	-167.28	117.39	34.10	11.75	

*Area figure calculated without normalization factor.

Table 10.2.6 Forest Cover Change Matrix Outside RFA/GW for Arunachal Pradesh between 2021 Raster based and 2023 Assessments

(km ²)						
Class	2023 Assessment outside RFA/GW					Total ISFR 2021 outside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	1,308.43	30.27	13.43	0.63	20.11	1,372.87
MDF	33.39	2,812.09	41.52	8.14	76.15	2,971.29
OF	6.45	72.79	3,047.17	50.87	231.49	3,408.77
Scrub	0.00	0.00	45.41	458.65	30.52	534.58
NF	0.00	0.00	296.66	95.71	11,311.34	11,703.71
Total ISFR 2023 outside RFA/GW	1,348.27	2,915.15	3,444.19	614.00	11,669.61	19,991.22
Net Change	-24.60	-56.14	35.42	79.42	-34.10	

*Area figure calculated without normalization factor.

Table 10.2.7 Altitude-wise Forest Cover in Arunachal Pradesh

(km ²)						
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	10,586.00	1,513.41	2,974.68	2,604.76	7,092.85	104.38
500-1000	10,945.39	3,052.87	4,135.03	2,510.73	9,698.63	42.48
1000-2000	23,601.17	8,003.61	9,686.40	4,149.84	21,839.85	61.69
2000-3000	18,023.58	5,909.68	7,880.78	2,600.41	16,390.87	104.85
3000-4000	13,557.10	2,223.54	4,122.52	2,624.96	8,971.02	340.19
> 4000	7,029.98	282.21	815.68	790.46	1,888.35	405.39
Total	83,743.22	20,985.32	29,615.09	15,281.16	65,881.57	1,058.98

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



Table 10.2.8 Forest Cover in Different Slope Classes in Arunachal Pradesh

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	7,415.45	753.85	1,832.36	1,575.49	4,161.70	110.46
5-10	5,576.63	1,408.48	1,905.15	1,034.53	4,348.16	69.35
10-15	8,572.66	2,367.13	3,012.14	1,541.01	6,920.28	103.94
15-20	11,261.99	3,150.70	4,028.99	2,007.33	9,187.02	136.22
20-25	12,496.47	3,442.61	4,528.12	2,226.78	10,197.51	155.41
25-30	12,206.77	3,277.63	4,477.54	2,188.47	9,943.64	153.86
>30	26,213.25	6,584.92	9,830.79	4,707.55	21,123.26	329.74
Total	83,743.22	20,985.32	29,615.09	15,281.16	65,881.57	1,058.98

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

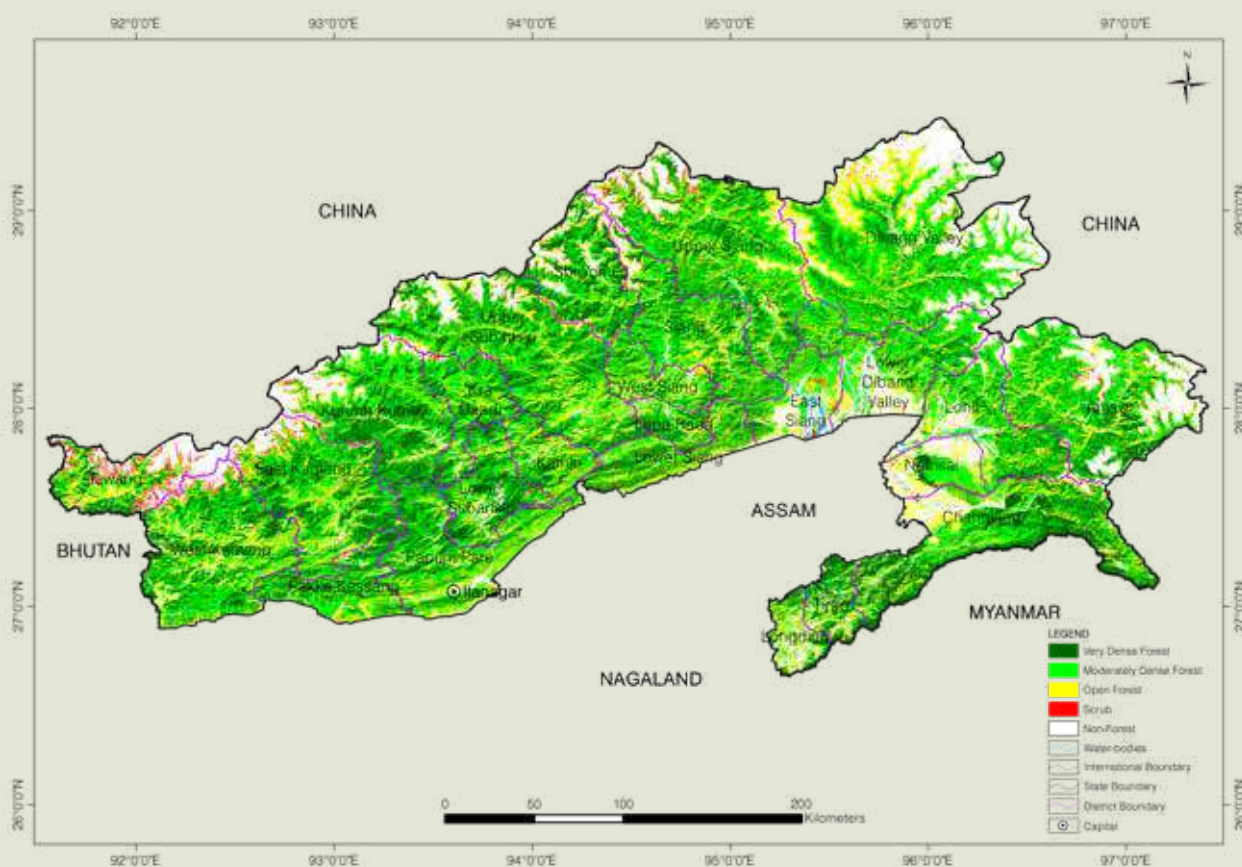


Figure 10.2.3 Forest Cover Map of Arunachal Pradesh



10.2.3 Forest Types

The area under different Forest Types in Arunachal Pradesh (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.2.9 Area Statistics of the Forest Types Found in Arunachal Pradesh

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	1B/C1 Assam Valley tropical wet evergreen forest (<i>Dipterocarpus</i>)	1,453.35	2.03
2	1B/C2a Kayea forest	751.37	1.05
3	1/2S1 Pioneer Euphorbiaceous scrub	238.23	0.33
4	2B/ C1a Assam alluvial plains semi-evergreen forest	4,010.17	5.61
5	2B/C1b Eastern sub-montane semi-evergreen forest	2,430.47	3.40
6	2B/C1/1S1 Sub-Himalayan light alluvial semi-evergreen forest	3,996.57	5.59
7	2B/C1/2S2 Eastern alluvial secondary semi-evergreen forest	3,773.66	5.28
8	2/2S1 Secondary moist bamboo brakes	1,114.03	1.56
9	3C/C3/2S2 Secondary Euphorbiaceous scrub	28.34	0.04
10	3/1S2b <i>Terminalia-Duabanga</i>	911.97	1.28
11	8B/C1 East Himalayan subtropical wet hill forest	15,259.14	21.36
12	8B/C2 <i>Khasi</i> subtropical wet hill forest	1,210.22	1.69
13	9/C2 Assam subtropical pine forest	744.38	1.04
14	11B/C1 East Himalayan wet temperate forest	15,681.90	21.95
15	12/C1f Low-level blue pine forest (<i>P. wallichiana</i>)	243.61	0.33
16	12/C3a East Himalayan mixed coniferous forest	5,165.02	7.23
17	12/DS1 Montane bamboo brakes	138.03	0.19
18	13/C6 East Himalayan dry temperate coniferous forest	663.89	0.93
19	14/C2 East Himalayan sub-alpine birch/fir forest	7,576.68	10.61
20	15/C1 Birch/ <i>Rhododendron</i> scrub forest	494.39	0.70
21	16/C1 Dry alpine scrub	491.22	0.69
Sub Total		66,376.64	92.89
22	TOF/ Plantation	563.91	0.79
Total (Forest Cover & Scrub)		66,940.55	93.68
Grassland forest type (outside forest cover)			
23	9/C2/DS1 Assam subtropical pine savannah	17.48	0.03
24	12/DS3 Himalayan temperate pastures	256.30	0.36
25	15/C3 Alpine pastures	4,231.29	5.93
Sub Total		4,505.07	6.32
Grand Total		71,445.62	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest types outside forest cover have also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).



10.2.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.2.10 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Anjaw	107	57
2	Changlang	426	290
3	Dibang Valley	79	137
4	East Kameng	90	42
5	East Siang	86	84
6	Kamle	13	16
7	Kra Daadi	17	12
8	Kurung Kumey	5	10
9	Lepa Rada	41	22
10	Lohit	153	130
11	Longding	250	132
12	Lower Dibang Valley	76	94
13	Lower Siang	29	32
14	Lower Subansiri	90	83
15	Namsai	211	120
16	Pakke Kessang	48	54
17	Papum Pare	141	116
18	Shi Yomi	16	6
19	Siang	23	19
20	Tawang	20	42
21	Tirap	88	105
22	Upper Siang	16	24
23	Upper Subansiri	27	32
24	West Kameng	317	337
25	West Siang	78	57
Total		2,447	2,053

10.2.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.2.11 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	26.52	0.04
2	Very highly fire prone	122.04	0.18
3	Highly fire prone	1,074.78	1.61
4	Moderately fire prone	3,007.80	4.49
5	Less fire prone	62,709.41	93.68
Total		66,940.55	100.00

* Forest Cover including Scrub.

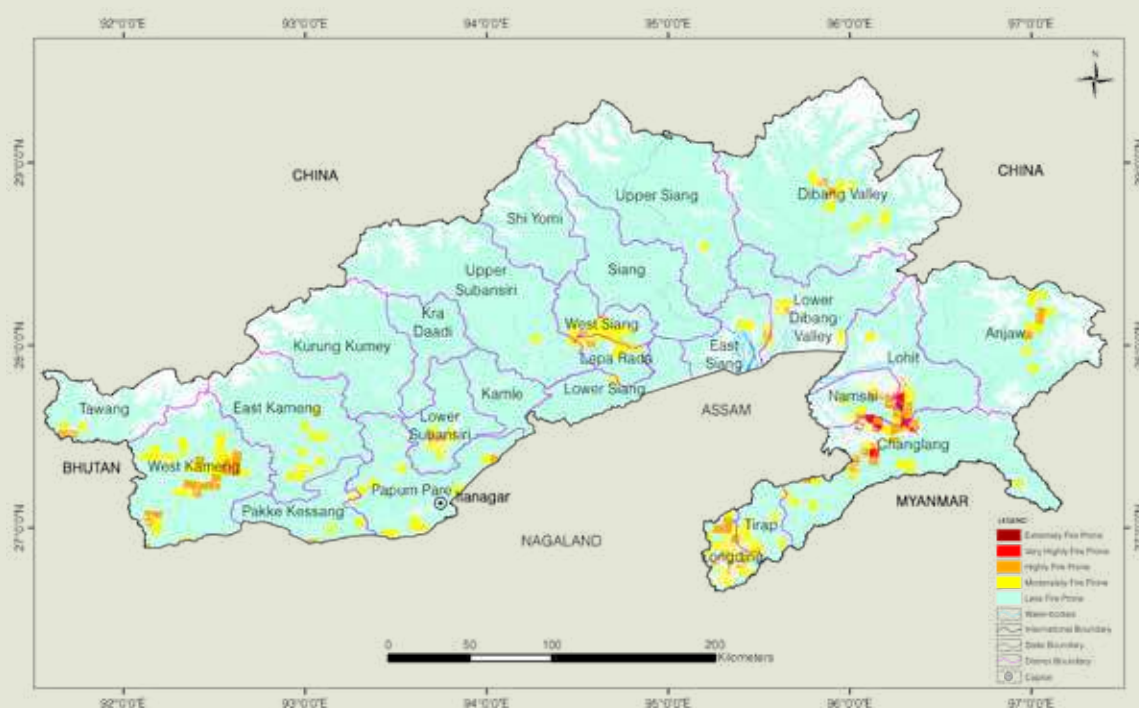


Figure 10.2.4 Fire Prone Forest Areas under Different fire Prone Classes



10.2.6 Results Derived from NFI for Arunachal Pradesh

Table 10.2.12 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Castanopsis species</i>	81,536	51.34
2	<i>Macaranga species</i>	53,663	10.45
3	<i>Ficus species</i>	35,333	11.14
4	<i>Quercus species</i>	34,432	20.41
5	<i>Castanopsis indica</i>	26,233	8.94

Table 10.2.13 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Castanopsis species</i>	40,446	5.936
2	<i>Macaranga species</i>	24,790	1.602
3	<i>Pinus wallichiana/ Pinus excelsa</i>	19,831	11.563
4	<i>Citrus species</i>	18,884	0.667
5	<i>Areca catechu</i>	15,557	0.334

Table 10.2.14 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Areca catechu</i>	3	0.0001
2	<i>Mangifera indica</i>	3	0.001
3	<i>Gmelina arborea</i>	2	0.001
4	<i>Psidium guajava</i>	2	0.0001
5	<i>Artocarpus heterophyllus/ Artocarpus integrifolia</i>	2	0.001

Table 10.2.15 Major NTFP Species in Arunachal Pradesh

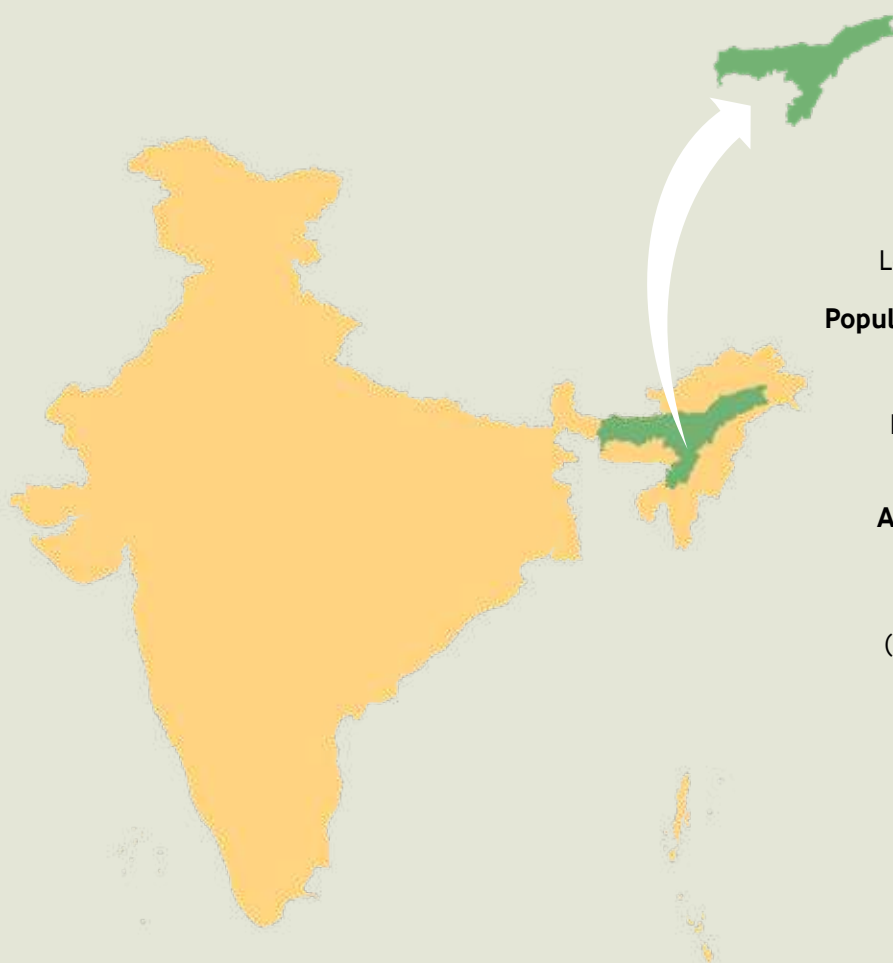
Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Cinnamomum tamala</i>	Tree	2,61,323
2	<i>Oroxylum indicum</i>	Tree	1,37,649
3	<i>Aquilaria malaccensis/Aquilaria agallocha</i>	Tree	26,261
4	<i>Azadirachta indica</i>	Tree	22,566
5	<i>Clerodendrum colebrookeanum</i>	Shrubs	43,73,959
6	<i>Berberis aristata</i>	Shrubs	4,68,638
7	<i>Piper species/ Piper longum/ Piper mullesua/ Piper peepuloides</i>	Climbers	1,27,66,618
8	<i>Rubia cordifolia</i>	Climbers	1,13,380
9	<i>Acorus calamus</i>	Herbs	3,27,30,490
10	<i>Swertia chirayita/ Swertia chirata</i>	Herbs	2,59,58,665

Table 10.2.16 Major Invasive Species in the State Inside the RFA in Arunachal Pradesh

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Chromolaena odorata</i>	2,988.72
2	<i>Mikania micrantha</i>	2,418.45
3	<i>Lantana camara</i>	532.81
4	<i>Imperata cylindrica</i>	437.07
5	<i>Ageratum conyzoides</i>	378.79

**Photo: FSI Repository**

Forest Survey of India



Geographical Area
78,438 km²

Geographical Coordinates
Latitude 24°07' N to 28°00' N
Longitude 89°42' E to 96°02' E

Population (as per Census 2011)
31.21 million
Urban 4.40 million (14.10 %)
Rural 26.81 million (85.90 %)
Tribal 3.88 million (12.45 %)

Average Population Density
398 per km²

Livestock Population
(as per 19th Livestock Census)
19.08 million

No. of Districts
33

No. of Hill Districts
5

No. of Tribal Districts
19

Table 10.3.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	7,844	
Reporting area for land utilization	7,831.03	100.00
Forests	1,828.94	23.36
Not available for land cultivation	2,507.17	32.01
Permanent pastures and other grazing lands	173.85	2.22
Land under misc. tree crops and groves	212.41	2.71
Culturable wasteland	149.79	1.91
Fallow land other than current fallows	95.66	1.22
Current fallows	114.09	1.46
Net area sown	2,749.12	35.11

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.3.1 Forest Cover

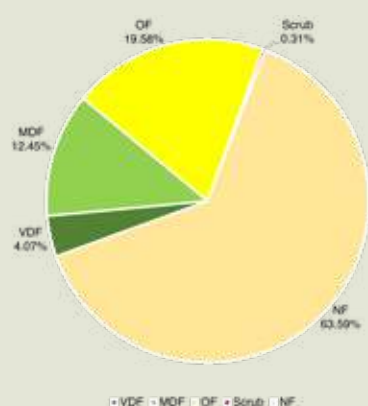


Table 10.3.2 Forest Cover of Assam

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	3,189.71	4.07
MDF	9,764.54	12.45
OF	15,359.30	19.58
Total	28,313.55	36.10
Scrub	240.93	0.31

Figure 10.3.1 Forest Cover of Assam

Table 10.3.3 District-wise Forest Cover in Assam

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Baksa	2,444	165.45	135.35	285.71	586.51	24.00	7.43	8.09
Barpeta	2,282	0.00	34.18	85.40	119.58	5.24	-0.77	0.70
Biswanath	2,224	26.24	52.40	279.68	358.32	16.11	5.21	9.92
Bongaigaon	1,140	0.00	58.36	178.32	236.68	20.76	-1.47	1.15
Cachar	3,780	191.71	960.90	1,031.90	2,184.51	57.79	-16.77	12.00
Charaideo	1,015	8.97	84.77	266.97	360.71	35.54	0.47	4.43
Chirang	1,911	361.20	126.69	219.47	707.36	37.02	-14.38	7.81
Darrang	1,586	0.00	14.43	99.48	113.91	7.18	2.61	2.28
Dhemaji	2,513	53.67	88.36	152.00	294.03	11.70	15.36	6.83
Dhubri	1,632	1.45	14.73	72.31	88.49	5.42	1.94	3.40
Dibrugarh	3,397	106.03	68.70	591.86	766.59	22.57	0.64	11.30
Dima Hasao ^H	4,880	295.97	1,404.33	2,334.61	4,034.91	82.68	-93.27	9.66
Goalpara	1,913	14.80	144.88	275.18	434.86	22.73	11.60	1.94
Golaghat	3,215	23.39	117.97	519.34	660.70	20.55	36.06	12.81
Hailakandi	1,328	17.25	364.08	391.85	773.18	58.22	-16.60	0.88
Hojai ^H	1,460	24.32	230.59	193.78	448.69	30.73	0.52	2.67
Jorhat	1,865	13.36	110.27	474.90	598.53	32.09	18.79	11.75
Kamrup	3,127	50.83	446.14	485.80	982.77	31.43	6.30	5.20
Kamrup Metropolitan	971	0.00	229.98	241.05	471.03	48.51	-2.11	1.21
Karbi Anglong ^H	7,319	524.86	2,932.74	2,167.02	5,624.62	76.85	22.88	42.74
Karimganj	1,813	3.33	292.83	544.79	840.95	46.38	-2.70	1.33
Kokrajhar	3,111	545.76	206.96	389.97	1,142.69	36.73	-3.16	5.00
Lakhimpur	2,926	40.44	116.05	269.56	426.05	14.56	11.05	2.49
Majuli	1,278	0.00	3.84	30.92	34.76	2.72	4.24	1.29
Morigaon	1,512	16.03	54.21	125.46	195.70	12.94	3.25	1.76
Nagaon ^H	2,569	36.16	129.61	320.66	486.43	18.93	-0.02	7.49
Nalbari	1,052	0.00	31.05	82.69	113.74	10.81	0.08	0.02



Table 10.3.3 District-wise Forest Cover in Assam

District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Sivasagar	1,628	0.00	61.65	276.55	338.20	20.77	3.90	4.22
Sonitpur	3,018	83.70	201.21	435.19	720.10	23.86	-2.02	9.77
South Salmara-Mankachar	605	0.00	6.65	17.49	24.14	3.99	-1.94	0.07
Tinsukia	3,840	405.45	341.23	832.08	1,578.76	41.11	3.65	21.52
Udalguri	2,013	7.47	78.69	325.69	411.85	20.46	-3.33	5.85
West Karbi Anglong ^H	3,071	171.87	620.71	1,361.62	2,154.20	70.15	-9.20	23.35
Grand Total	78,438	3,189.71	9,764.54	15,359.30	28,313.55	36.10	-11.76	240.93

*Area figure calculated without normalization factor.

Table 10.3.4 Forest Cover in Municipal Areas of Assam

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
1	Abhayapuri	5.28	0.00	0.00	0.98	0.98	18.56	0.00
2	Amguri	1.93	0.00	0.02	0.14	0.16	8.29	0.00
3	Badarpur	4.04	0.00	0.00	1.34	1.34	33.17	0.00
4	Baithalangso	25.77	1.56	1.18	5.94	8.68	33.68	2.04
5	Bakalia	16.04	0.00	0.06	1.28	1.34	8.35	0.00
6	Barpathar	3.32	0.00	0.00	0.25	0.25	7.53	0.00
7	Barpeta Road	4.09	0.00	0.00	0.12	0.12	2.93	0.00
8	Barpeta Town	23.15	0.00	0.00	0.93	0.93	4.02	0.00
9	Basugaon	3.90	0.00	0.05	0.54	0.59	15.13	0.00
10	Bihpuria	5.44	0.00	0.00	0.37	0.37	6.80	0.00
11	Bijni	2.94	0.00	0.02	0.27	0.29	9.86	0.00
12	Bilasipara	3.03	0.00	0.00	0.09	0.09	2.97	0.00
13	Biswanath Chariali	57.68	0.00	0.56	9.97	10.53	18.26	0.11
14	Bokajan	9.72	0.00	0.00	0.65	0.65	6.69	0.00
15	Bokakhat	30.41	0.00	0.03	6.53	6.56	21.57	0.20
16	Bongaigaon	11.89	0.00	0.59	1.25	1.84	15.48	0.00
17	Chabua	0.92	0.00	0.00	0.02	0.02	2.17	0.00
18	Chapor	10.21	0.14	0.66	0.11	0.91	8.91	0.00
19	Chopakhowa	5.30	0.00	0.00	0.11	0.11	2.08	0.17
20	Demow	4.67	0.00	0.00	0.51	0.51	10.92	0.00
21	Dergaon	1.43	0.00	0.00	0.32	0.32	22.38	0.00
22	Dhakuakhana	5.18	0.00	0.00	0.67	0.67	12.93	0.00
23	Dhekiajuli	4.23	0.00	0.02	0.40	0.42	9.93	0.00
24	Dhemaji	18.81	0.00	0.13	1.71	1.84	9.78	0.00
25	Dhing	10.77	0.00	0.00	2.53	2.53	23.49	0.00

Table 10.3.4 Forest Cover in Municipal Areas of Assam

(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
26	Dhubri	0.61	0.00	0.00	0.00	0.00	0.00	0.00
27	Dibrugarh	13.96	0.00	0.01	0.80	0.81	5.80	0.00
28	Digboi	4.46	0.00	0.04	0.03	0.07	1.57	0.00
29	Diphu	9.61	0.00	0.01	0.86	0.87	9.05	0.00
30	Doboka	2.79	0.00	0.00	0.68	0.68	24.37	0.00
31	Dokmoka	22.43	0.00	0.03	2.03	2.06	9.18	0.00
32	Donkamokam	10.76	0.00	0.47	2.59	3.06	28.44	0.00
33	Doomdooma	2.22	0.00	0.00	0.15	0.15	6.76	0.00
34	Fakiragram	8.26	0.00	0.29	0.38	0.67	8.11	0.00
35	Gauripur Town	123.50	0.00	0.22	3.75	3.97	3.21	0.00
36	Goalpara MP	83.65	2.59	5.45	17.30	25.34	30.29	0.00
37	Gohpur	14.82	0.00	0.10	1.22	1.32	8.91	0.00
38	Golaghat	7.14	0.00	0.00	0.56	0.56	7.84	0.00
39	Golakganj	5.00	0.00	0.01	0.32	0.33	6.60	0.00
40	Goreswar	6.99	0.00	0.17	0.49	0.66	9.44	0.00
41	Gossaigaon	21.83	0.00	0.30	0.82	1.12	5.13	0.00
42	Guwahati	176.22	0.00	12.40	17.01	29.41	16.69	0.36
43	Haflong	16.96	0.00	2.05	3.24	5.29	31.19	0.01
44	Hailakandi	7.17	0.00	0.00	1.08	1.08	15.06	0.00
45	Hamren1	1.57	0.00	0.00	0.49	0.49	31.21	0.00
46	Hamren3	0.29	0.00	0.00	0.03	0.03	10.34	0.00
47	Hamren4	0.25	0.00	0.00	0.07	0.07	28.00	0.00
48	Hamren5	0.38	0.00	0.00	0.24	0.24	63.16	0.00
49	Hamren6	0.45	0.00	0.00	0.02	0.02	4.44	0.00
50	Hojai	4.78	0.00	0.00	0.00	0.00	0.00	0.00
51	Howly	5.41	0.00	0.27	0.39	0.66	12.20	0.00
52	Howraghat	2.37	0.00	0.00	0.23	0.23	9.70	0.00
53	Jamugurighat	8.39	0.00	0.41	0.95	1.36	16.21	0.00
54	Jorhat	9.69	0.00	0.01	0.15	0.16	1.65	0.00
55	Kajalgaon1	4.59	0.00	0.00	0.63	0.63	13.73	0.00
56	Kajalgaon2	1.71	0.00	0.00	0.16	0.16	9.36	0.00
57	Kajalgaon3	1.60	0.00	0.27	0.05	0.32	20.00	0.00
58	Kajalgaon4	6.37	0.00	0.19	0.87	1.06	16.64	0.00
59	Kampur	6.10	0.00	0.09	0.67	0.76	12.46	0.00
60	Karimganj	6.11	0.00	0.00	0.29	0.29	4.75	0.00
61	Kokrajhar	6.29	0.00	0.00	0.20	0.20	3.18	0.00
62	Lakhipur	5.24	0.00	0.00	0.14	0.14	2.67	0.00
63	Lakhipur2	4.05	0.00	0.00	0.21	0.21	5.19	0.00
64	Lala	2.93	0.00	0.13	0.78	0.91	31.06	0.00
65	Langhin	8.78	0.00	0.00	0.86	0.86	9.79	0.00
66	Lanka	10.26	0.00	0.00	0.27	0.27	2.63	0.00
67	Lumding	4.58	0.00	0.00	0.23	0.23	5.02	0.00


Table 10.3.4 Forest Cover in Municipal Areas of Assam

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
68	Mahur	2.13	0.00	0.30	0.37	0.67	31.46	0.00
69	Maibang	8.25	0.00	0.85	1.23	2.08	25.21	0.00
70	Makum	3.04	0.00	0.08	0.10	0.18	5.92	0.00
71	Mangaldoi	5.30	0.00	0.00	0.41	0.41	7.74	0.00
72	Margherita	18.49	0.00	0.09	3.72	3.81	20.61	0.00
73	Mariani	3.35	0.00	0.00	0.50	0.50	14.93	0.06
74	Moran	1.57	0.00	0.00	0.09	0.09	5.73	0.00
75	Morigaon	6.66	0.00	0.00	0.51	0.51	7.66	0.00
76	Nagaon	12.56	0.00	0.00	0.27	0.27	2.15	0.00
77	Naharkatiya	28.51	0.00	0.13	9.07	9.20	32.27	0.64
78	Nalbari	13.54	0.00	0.04	0.88	0.92	6.79	0.00
79	Namrup	31.57	0.00	0.00	8.34	8.34	26.42	0.03
80	Narayanpur	7.82	0.00	0.00	0.63	0.63	8.06	0.00
81	Nazira	2.78	0.00	0.02	0.12	0.14	5.04	0.00
82	North Lakhimpur	14.46	0.00	0.29	0.89	1.18	8.16	0.00
83	Palashbari Town	1.93	0.00	0.00	0.00	0.00	0.00	0.00
84	Patarkuchi	2.31	0.00	0.09	0.48	0.57	24.68	0.00
85	Pathchala	10.57	0.00	0.30	0.62	0.92	8.70	0.00
86	Raha	5.04	0.00	0.00	1.05	1.05	20.83	0.00
87	Ramkrishna Nagar	45.62	0.00	0.33	13.93	14.26	31.26	0.00
88	Rangia Town	8.28	0.00	0.02	0.31	0.33	3.99	0.00
89	Sarthebari	2.99	0.00	0.13	0.52	0.65	21.74	0.00
90	Sarupathar	9.88	0.00	0.04	1.64	1.68	17.00	0.00
91	Silapthar	10.58	0.00	0.13	1.20	1.33	12.57	0.00
92	Silchar	14.48	0.00	0.00	0.46	0.46	3.18	0.00
93	Simaluguri	3.40	0.00	0.20	0.13	0.33	9.71	0.00
94	Sipajhar	8.18	0.00	0.00	1.18	1.18	14.43	0.00
95	Sivsagar	7.41	0.00	0.05	0.04	0.09	1.21	0.00
96	Sonai	10.34	0.00	0.43	1.58	2.01	19.44	0.00
97	Sonari	22.25	0.00	0.22	8.97	9.19	41.30	0.12
98	Sootea	10.67	0.00	0.14	1.62	1.76	16.49	0.00
99	Sorbhog	3.28	0.00	0.00	1.04	1.04	31.71	0.00
100	Tangla	3.19	0.00	0.00	0.26	0.26	8.15	0.00
101	Teok	6.92	0.00	0.18	1.17	1.35	19.51	0.03
102	Tezpur	140.30	0.66	2.22	12.33	15.21	10.84	0.00
103	Tihu	7.38	0.00	0.37	0.74	1.11	15.04	0.00
104	Tinsukia	11.08	0.00	0.00	0.09	0.09	0.81	0.00
105	Titabar	10.42	0.00	0.40	1.00	1.40	13.44	0.00
106	Udalguri	35.06	0.00	0.44	3.82	4.26	12.15	0.00
107	Umrangshu	12.71	0.00	0.00	5.56	5.56	43.75	0.15
Grand Total		1,475.02	4.95	33.73	185.14	223.82	15.17	3.92

*Shapefile of digitized boundary as provided by Department of Housing & Urban Affairs.

10.3.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.3.5 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Assam

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
2,833.31	8,333.78	8,529.64	19,696.73	356.40	1,430.76	6,829.66	8,616.82
14.38%	42.31%	43.31%		4.14%	16.60%	79.26%	

**In case of Assam, GW boundaries have been used.*

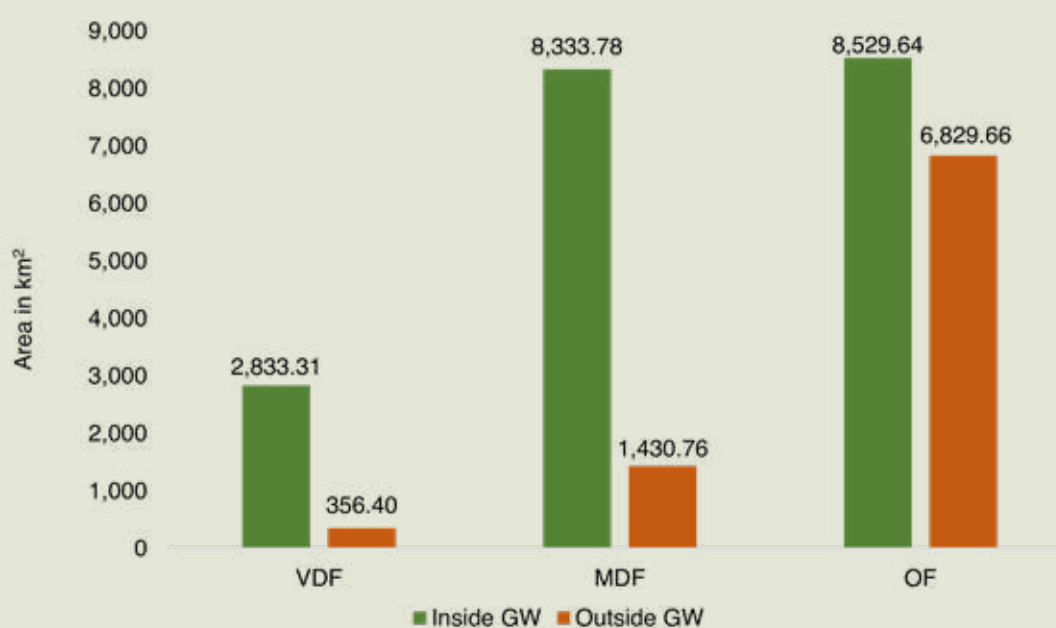


Figure 10.3.2 Forest Cover Inside and Outside of GW in Assam



Table 10.3.6 Forest Cover Change Matrix Inside RFA/GW for Assam between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 inside RFA / GW Raster based*
VDF	2,745.46	14.06	1.58	0.09	28.49	2,789.68
MDF	86.21	8,251.43	12.87	1.74	115.85	8,468.10
OF	0.83	53.89	8,175.69	13.59	281.61	8,525.61
Scrub	0.11	0.16	47.22	63.22	10.25	120.96
NF	0.70	14.24	292.28	23.91	7,310.02	7,641.15
Total ISFR 2023 inside RFA/GW	2,833.31	8,333.78	8,529.64	102.55	7,746.22	27,545.50
Net Change	43.63	-134.32	4.03	-18.41	105.07	

*Area figure calculated without normalization factor.

Table 10.3.7 Forest Cover Change Matrix Outside RFA/GW for Assam between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	354.37	0.57	0.00	0.00	2.21	357.15
MDF	1.56	1,409.16	7.73	0.11	12.73	1,431.29
OF	0.11	17.42	6,599.16	10.23	126.56	6,753.48
Scrub	0.00	0.02	14.07	88.59	12.23	114.91
NF	0.36	3.59	208.70	39.45	41,983.57	42,235.67
Total ISFR 2023 outside RFA/GW	356.40	1,430.76	6,829.66	138.38	42,137.30	50,892.50
Net Change	-0.75	-0.53	76.18	23.47	-98.37	

*Area figure calculated without normalization factor.

Table 10.3.8 Altitude-wise Forest Cover in Assam

Altitude Zone (m)	Calculated Area by Sol						(km ²)
		VDF	MDF	OF	Total	Scrub	
0-500	72,348	2,476.80	7,617.87	12,891.33	22,986.00	200.61	
500-1000	5,315	523.42	1,905.44	2,205.92	4,634.78	37.24	
1000-2000	775	189.49	241.23	262.05	692.77	3.08	
Total	78,438	3,189.71	9,764.54	15,359.30	28,313.55	240.93	

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

Table 10.3.9 Forest Cover in Different Slope Classes in Assam

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	61,901	1,822.49	3,750.68	8,944.72	14,517.89	179.01
5-10	6,929	428.75	2,220.90	2,448.12	5,097.77	28.24
10-15	4,156	290.04	1,610.51	1,728.53	3,629.08	16.39
15-20	2,643	235.20	1,059.73	1,121.95	2,416.88	9.67
20-25	1,511	176.82	609.15	629.02	1,414.99	4.80
25-30	759	116.33	302.55	301.20	720.08	1.96
>30	539	120.08	211.02	185.76	516.86	0.86
Total	78,438	3,189.71	9,764.54	15,359.30	28,313.55	240.93

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

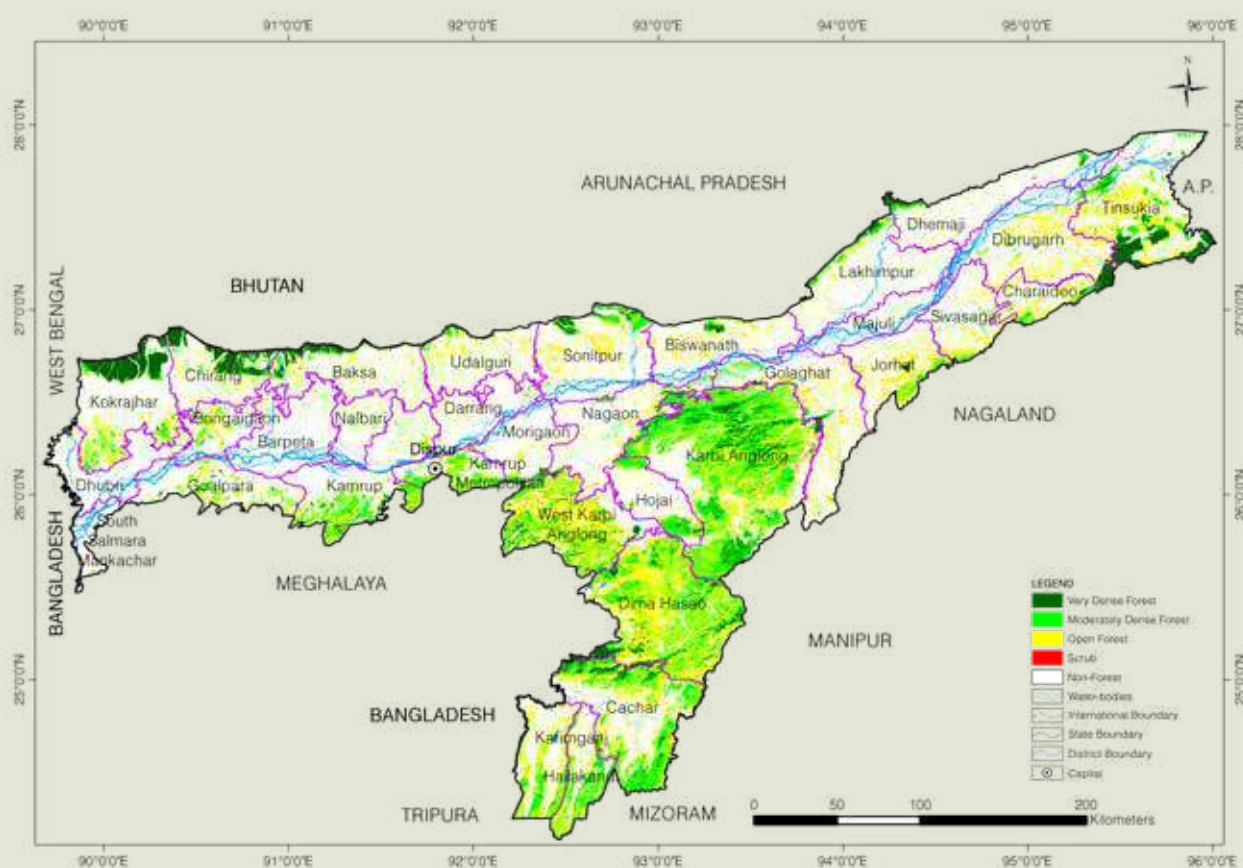


Figure 10.3.3 Forest Cover Map of Assam



10.3.3 Forest Types

The area under different Forest Types in Assam (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.3.10 Area Statistics of the Forest Types Found in Assam

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	1B/C1 Assam Valley tropical wet evergreen forest (<i>Dipterocarpus</i>)	1,008.38	3.52
2	1B/C2a <i>Kayea</i> forest	210.11	0.73
3	1B/C2b <i>Mesua</i> forest	5.57	0.02
4	1B/C3 Cachar tropical evergreen forest	893.32	3.11
5	2B/C1a Assam alluvial plains semi-evergreen forest	444.74	1.55
6	2B/C1/1S1 Sub-Himalayan light alluvial semi-evergreen forest	364.48	1.27
7	2B/C1/1S2 <i>Syzygium</i> parkland	17.79	0.06
8	2B/C1/2S1 Pioneer Euphorbiaceous scrub	83.47	0.29
9	2B/C1/2S2 Eastern alluvial secondary semi-evergreen forest	344.83	1.20
10	2B/C2 Cachar semi-evergreen forest	10,389.59	36.20
11	2/2S1 Secondary moist bamboo brakes	832.53	2.90
12	3C/C1a(ii) Khasi hill sal	41.18	0.15
13	3C/C1b(i) East Himalayan upper <i>bhabar sal</i>	632.77	2.21
14	3C/C2d (iv) App. Kamrup sal	771.94	2.69
15	3C/C3b East Himalayan moist mixed deciduous forest	5,106.98	17.80
16	3C/C3/2S1 Northern Secondary moist mixed deciduous forest	508.50	1.77
17	3C/1S1 Low alluvial savannah woodland (<i>Salmania-Albizia</i>)	12.84	0.04
18	3/1S2(a) <i>Terminalia-Lagerstroemia</i>	2.84	0.01
19	4C/FS3 Creeper swamp forest	0.06	0.00
20	4D/SS1 Eastern seasonal swamp forest	0.83	0.00
21	5/1S2 <i>Khair-sissu</i> forest	23.20	0.08
22	8B/DS1 Assam subtropical hill savannah woodland	9.13	0.03
23	9/C2 Assam subtropical pine forest	131.95	0.46
Sub Total		21,837.03	76.09
24	TOF/ Plantation	6,717.45	23.41
Total (Forest Cover & Scrub)		28,554.48	99.50
Grassland forest types (outside forest cover)			
25	4D/2S1 <i>Syzygium</i> parkland	0.63	0.00
26	4D/2S2 Eastern wet alluvial grassland	144.36	0.50
Sub Total		144.99	0.50
Grand Total		28,699.47	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest types outside forest cover have also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).



10.3.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires). during the fire season 2022-23 and 2023-24.

Table 10.3.11 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Baksa	131	252
2	Barpeta	0	0
3	Biswanath	38	32
4	Bongaigaon	4	15
5	Cachar	449	198
6	Charaideo	23	15
7	Chirang	227	376
8	Darrang	47	60
9	Dhemaji	1	2
10	Dhubri	4	3
11	Dibrugarh	48	38
12	Dima Hasao	2,315	1,843
13	Goalpara	36	43
14	Golaghat	144	143
15	Hailakandi	458	159
16	Hojai	38	43
17	Jorhat	43	53
18	Kamrup	381	316
19	Kamrup Metropolitan	126	95
20	Karbi Anglong	2,844	1,479
21	Karimganj	124	77
22	Kokrajhar	101	275
23	Lakhimpur	9	19
24	Majuli	0	0
25	Morigaon	8	36
26	Nagaon	33	51
27	Nalbari	0	0
28	Sivasagar	26	67
29	Sonitpur	41	25
30	South Salmara-Mankachar	0	0
31	Tinsukia	130	125
32	Udalguri	31	33
33	West Karbi Anglong	1,970	1,766
Total		9,830	7,639



10.3.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.3.12 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	400.95	1.40
2	Very highly fire prone	3,352.77	11.74
3	Highly fire prone	4,798.75	16.81
4	Moderately fire prone	3,521.25	12.33
5	Less fire prone	16,480.76	57.72
Total		28,554.48	100.00

*Forest Cover including Scrub.

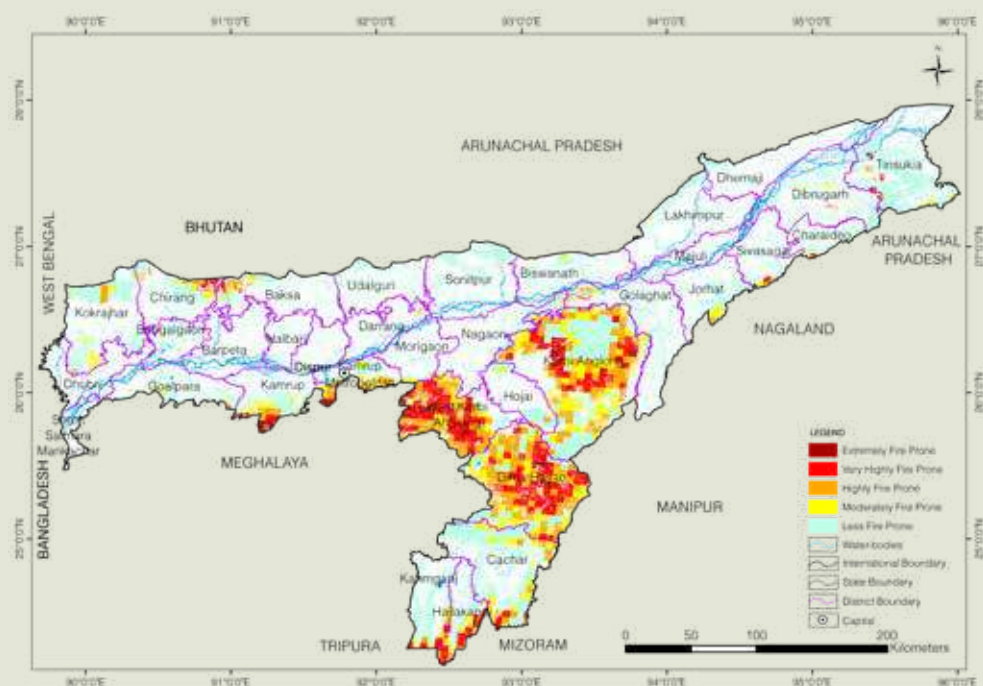


Figure 10.3.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.3.6 Results Derived from NFI for Assam

Table 10.3.13 Number of Trees and their Volume for Top 5 species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Shorea robusta</i>	34,562	6.54
2	<i>Schima wallichii</i>	17,053	3.25
3	<i>Tectona grandis</i>	16,720	5.87
4	<i>Lannea coromandelica</i>	12,034	3.81
5	<i>Albizia species</i>	10,083	2.83

Table 10.3.14 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Areca catechu</i>	59,812	1.039
2	<i>Tectona grandis</i>	7,538	1.029
3	<i>Gmelina arborea</i>	6,417	1.533
4	<i>Mangifera indica</i>	5,081	1.178
5	<i>Albizia species</i>	4,390	1.708

Table 10.3.15 Number of Trees and their Volume for Top 5 Species in Urban Area

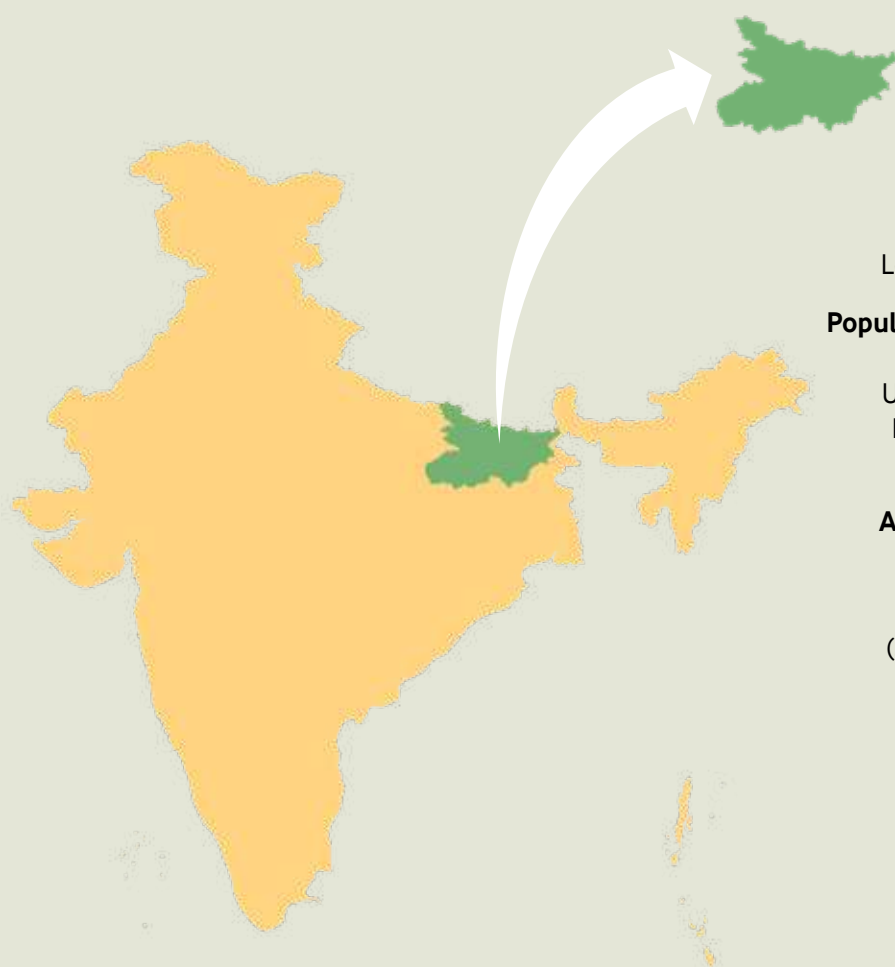
Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Areca catechu</i>	3,699	0.07
2	<i>Cocos nucifera</i>	698	0.177
3	<i>Mangifera indica</i>	672	0.198
4	<i>Tectona grandis</i>	319	0.063
5	<i>Artocarpus heterophyllus/ Artocarpus integrifolia</i>	261	0.082

Table 10.3.16 Major NTFP Species in Assam

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Shorea robusta</i>	Tree	15,83,818
2	<i>Bombax species/ Bombax ceiba</i>	Tree	1,52,808
3	<i>Terminalia bellirica</i>	Tree	91,932
4	<i>Azadirachta indica</i>	Tree	26,227
5	<i>Thysanolaena latifolia/ Thysanolaena maxima</i>	Shrubs	1,26,81,682
6	<i>Calamus guruba</i>	Shrubs	7,99,746
7	<i>Piper species/ Piper longum/ Piper mullesua/ Piper pee-puloides</i>	Climbers	52,55,472
8	<i>Smilax china</i>	Climbers	21,93,588
9	<i>Curcuma caesia</i>	Herbs	11,45,62,710
10	<i>Imperata cylindrica</i>	Herbs	95,05,203

Table 10.3.17 Major Invasive Species in the State Inside The RFA in Assam

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Chromolaena odorata</i>	1,925.29
2	<i>Mikania micrantha</i>	1,082.16
3	<i>Lantana camara</i>	605.30
4	<i>Imperata cylindrica</i>	96.32
5	<i>Saccharum spontaneum</i>	85.62

**Geographical Area**94,163 km²**Geographical Coordinates**

Latitude 24°16' N to 27°45' N

Longitude 83°16' E to 88°30' E

Population (as per Census 2011)

104.10 million

Urban 11.76 million (11.29 %)

Rural 92.34 million (88.71 %)

Tribal 1.34 million (1.28 %)

Average Population Density1,106 per km²**Livestock Population**(as per 19th Livestock Census)

32.93 million

No. of Districts

38

No. of Hill Districts

0

No. of Tribal Districts

0

Table 10.4.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	9,416	
Reporting area for land utilization	9,359.57	100.00
Forests	621.63	6.64
Not available for land cultivation	2,181.11	23.30
Permanent pastures and other grazing lands	14.91	0.16
Land under misc. tree crops and groves	250.98	2.68
Culturable wasteland	43.58	0.47
Fallow land other than current fallows	174.01	1.86
Current fallows	1,002.96	10.72
Net area sown	5,070.39	54.17

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.4.1 Forest Cover

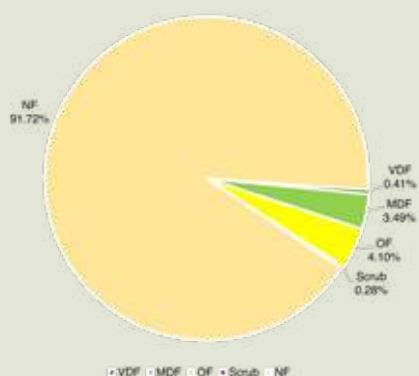


Figure 10.4.1 Forest Cover of Bihar

Table 10.4.2 Forest Cover of Bihar

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	387.00	0.41
MDF	3,284.21	3.49
OF	3,861.24	4.10
Total	7,532.45	8.00
Scrub	260.80	0.28

Table 10.4.3 District-wise Forest Cover in Bihar

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Araria	2,830	0.00	7.87	138.77	146.64	5.18	-1.64	0.40
Arwal	638	0.00	1.44	2.58	4.02	0.63	0.00	0.00
Aurangabad	3,305	0.00	65.56	92.22	157.78	4.77	3.97	14.01
Banka	3,020	0.09	100.62	194.81	295.52	9.79	19.16	32.45
Begusarai	1,918	0.00	28.03	51.47	79.50	4.14	-5.31	0.00
Bhagalpur	2,569	0.00	64.53	38.78	103.31	4.02	33.82	0.00
Bhojpur	2,395	0.00	19.23	12.34	31.57	1.32	-0.98	0.53
Buxar	1,703	0.00	3.04	2.97	6.01	0.35	-0.11	0.00
Darbhanga	2,279	0.00	44.17	100.06	144.23	6.33	6.69	0.00
East Champaran	3,968	0.00	66.48	120.94	187.42	4.72	19.44	0.00
Gaya	4,976	0.00	134.25	488.24	622.49	12.51	10.76	63.08
Gopalganj	2,033	0.00	4.68	6.62	11.30	0.56	2.64	0.00
Jamui	3,098	27.78	352.66	290.40	670.84	21.65	5.24	14.79
Jehanabad	931	0.00	0.06	6.04	6.10	0.66	1.30	3.07
Kaimur (Bhabua)	3,362	0.00	526.00	499.68	1,025.68	30.51	-35.35	38.50
Katihar	3,057	0.00	6.50	58.89	65.39	2.14	3.63	0.00
Khagaria	1,486	0.00	2.81	14.81	17.62	1.19	-0.50	0.00
Kishanganj	1,884	0.00	12.28	82.99	95.27	5.06	-7.56	0.00
Lakhisarai	1,228	16.16	126.61	26.77	169.54	13.81	1.38	4.18
Madhepura	1,788	0.00	1.38	58.63	60.01	3.36	6.17	0.00
Madhubani	3,501	0.00	42.19	189.99	232.18	6.63	25.71	0.00
Munger	1,419	39.19	240.65	26.17	306.01	21.57	3.30	9.04
Muzaffarpur	3,172	0.00	53.48	122.28	175.76	5.54	6.31	0.00
Nalanda	2,355	0.00	10.37	34.44	44.81	1.90	5.41	5.59
Nawada	2,494	0.00	199.53	306.77	506.30	20.30	-9.76	21.47
Patna	3,202	0.00	19.90	8.47	28.37	0.89	0.00	0.09
Purnia	3,229	0.00	5.34	55.34	60.68	1.88	5.09	0.00
Rohtas	3,851	0.00	350.25	317.81	668.06	17.35	1.66	43.42



Table 10.4.3 District-wise Forest Cover in Bihar

District	Calculated Area by Sol	2023 Assessment				% of Cal- culated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Saharsa	1,687	0.00	3.98	31.85	35.83	2.12	2.86	0.00
Samastipur	2,904	0.00	101.81	47.43	149.24	5.14	-4.00	0.00
Saran	2,641	0.00	25.53	37.26	62.79	2.38	3.40	0.00
Sheikhpura	689	0.00	0.64	0.18	0.82	0.12	0.00	0.00
Sheohar	349	0.00	2.21	28.22	30.43	8.72	3.84	0.00
Sitamarhi	2,294	0.00	37.81	114.09	151.90	6.62	12.99	0.00
Siwan	2,219	0.00	2.51	6.90	9.41	0.42	2.00	0.00
Supaul	2,425	0.00	4.26	138.20	142.46	5.87	6.19	0.00
Vaishali	2,036	0.00	88.30	30.63	118.93	5.84	0.05	0.00
West Champaran	5,228	303.78	527.25	77.20	908.23	17.37	1.39	10.18
Grand Total	94,163	387.00	3,284.21	3,861.24	7,532.45	8.00	129.19	260.80

*Area figure calculated without normalization factor.

Table 10.4.4 Division-wise Forest Cover in Bihar

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Araria	4,779.62	0.00	19.15	221.04	240.19	5.03	-9.06	0.86
Aurangabad	3,947.40	0.00	66.91	95.04	161.95	4.10	3.95	12.89
Banka	3,026.70	0.09	100.59	195.82	296.50	9.80	18.90	26.51
Begusarai	3,411.95	0.00	30.66	65.96	96.62	2.83	-5.78	0.00
Bettiah	4,217.80	4.35	62.49	38.92	105.76	2.51	-1.07	2.36
Bhagalpur	2,551.31	0.00	66.75	39.75	106.50	4.17	33.45	0.00
Bhojpur	4,119.28	0.00	22.25	15.34	37.59	0.91	-1.09	0.46
Gaya	5,903.12	0.00	128.69	486.89	615.58	10.43	11.62	63.90
Gopalganj	4,292.59	0.00	7.16	13.37	20.53	0.48	4.55	0.00
Jamui	3,290.58	0.00	214.93	260.79	475.72	14.46	3.62	14.17
Kaimur (Bhabua)	3,353.17	0.00	518.10	493.55	1,011.65	30.17	-33.96	40.31
Mithila	6,016.19	0.00	88.01	298.94	386.95	6.43	31.70	0.00
Motihari	3,970.77	0.00	66.17	121.74	187.91	4.73	19.43	0.00
Munger	3,098.74	83.13	504.01	80.46	667.60	21.54	6.27	12.59
Nalanda	2,365.50	0.00	10.43	34.31	44.74	1.89	5.41	5.46
Nawada	2,484.75	0.00	189.72	300.42	490.14	19.73	-9.44	21.82
Patna	3,217.18	0.00	19.91	8.50	28.41	0.88	0.00	1.34
Purnia	6,267.56	0.00	11.78	112.21	123.99	1.98	8.72	0.00
Rohtas	3,848.97	0.00	355.18	318.03	673.21	17.49	1.66	41.91
Saharsa	3,464.26	0.00	5.34	90.16	95.50	2.76	8.95	0.00
Samastipur	2,681.62	0.00	102.15	47.77	149.92	5.59	-3.94	0.00
Saran	2,681.43	0.00	25.39	37.50	62.89	2.35	3.49	0.00
Sitamarhi	2,623.24	0.00	40.28	143.35	183.63	7.00	16.92	0.00
Supaul	2,417.75	0.00	4.29	138.30	142.59	5.90	6.21	0.00

Table 10.4.4 Division-wise Forest Cover in Bihar

(km²)

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Tirhut	3,177.05	0.00	53.26	122.62	175.88	5.54	6.25	0.00
Vaishali	1,989.48	0.00	88.09	30.45	118.54	5.96	0.04	0.00
VTR Ramnagar (VTP-1)	435.48	115.82	240.71	15.89	372.42	85.52	2.04	0.00
VTR Valmikinagar (VTP-2)	589.44	182.86	219.20	22.98	425.04	72.11	0.35	7.24
Area which does not fall in any Division	368.41	0.75	22.61	11.14	34.50	9.36	0.00	8.98
Grand Total	94,591.34	387.00	3,284.21	3,861.24	7,532.45	7.96	129.19	260.80

#As per the division boundary shape file provided by State Forest Department.

*Area figure calculated without normalization factor.





10.4.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.4.5 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Bihar

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
375.79	2,445.25	2,044.70	4,865.74	11.21	838.96	1,816.54	2,666.71
7.72%	50.26%	42.02%		0.42%	31.46%	68.12%	

(km²)

**In case of Bihar, RFA boundaries have been used.*

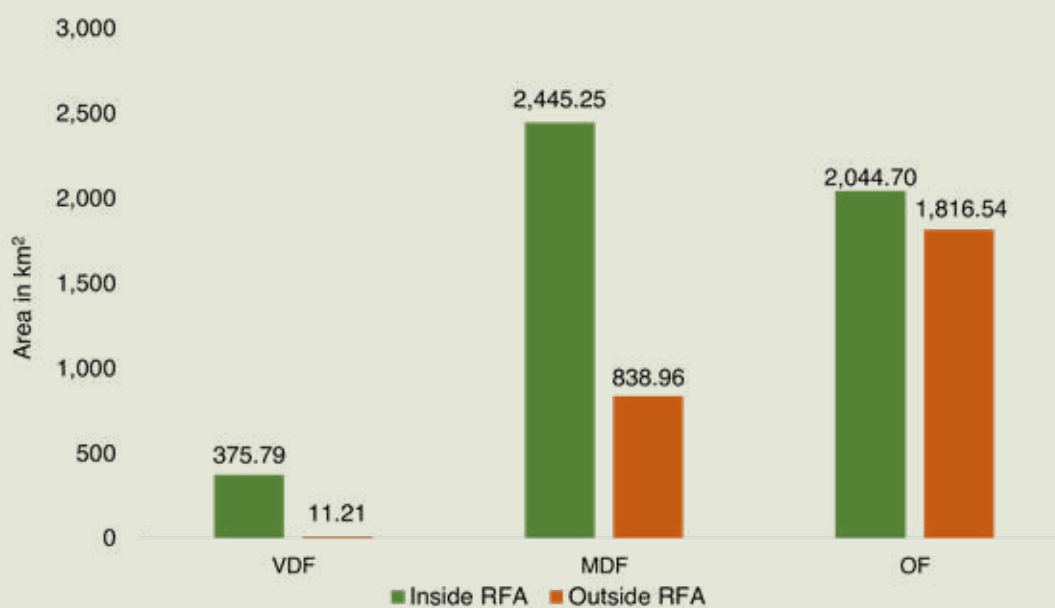


Figure 10.4.2 Forest Cover Inside and Outside of RFA in Bihar



Table 10.4.6 Forest Cover Change Matrix Inside RFA/GW for Bihar between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 inside RFA / GW Raster based*
VDF	305.55	12.86	0.40	0.00	0.51	319.32
MDF	69.24	2,386.65	9.06	4.61	7.72	2,477.28
OF	0.60	39.15	1,941.17	31.51	34.37	2,046.80
Scrub	0.00	0.92	37.65	163.74	9.18	211.49
NF	0.40	5.67	56.42	14.99	1,245.69	1,323.17
Total ISFR 2023 inside RFA/GW	375.79	2,445.25	2,044.70	214.85	1,297.47	6,378.06
Net Change	56.47	-32.03	-2.10	3.36	-25.70	

*Area figure calculated without normalization factor.

Table 10.4.7 Forest Cover Change Matrix Outside RFA/GW for Bihar between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	10.41	1.12	0.00	0.00	0.08	11.61
MDF	0.80	773.62	5.75	0.65	38.20	819.02
OF	0.00	9.70	1,618.53	5.83	95.17	1,729.23
Scrub	0.00	0.00	4.04	30.40	3.57	38.01
NF	0.00	54.52	188.22	9.07	84,935.26	85,187.07
Total ISFR 2023 outside RFA/GW	11.21	838.96	1,816.54	45.95	85,072.28	87,784.94
Net Change	-0.40	19.94	87.31	7.94	-114.79	

*Area figure calculated without normalization factor.

Table 10.4.8 Altitude-wise Forest Cover in Bihar

Altitude Zone (m)	Calculated Area by Sol						(km ²)
		VDF	MDF	OF	Total	Scrub	
0-500	93,821	384.67	3,140.33	3,750.18	7,275.18	257.70	
500-1000	342	2.33	143.88	111.06	257.27	3.10	
Total	94,163	387.00	3,284.21	3,861.24	7,532.45	260.80	

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


Table 10.4.9 Forest Cover in Different Slope Classes in Bihar

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0 to 5	91,177	230.27	2,091.94	3,055.71	5,377.92	169.74
5 to 10	1,576	71.91	498.20	373.06	943.17	37.70
10 to 15	594	38.68	286.15	174.89	499.72	19.89
15 to 20	363	24.09	182.17	108.54	314.80	13.78
20 to 25	222	13.28	111.11	68.64	193.03	9.22
25 to 30	122	6.00	60.00	40.95	106.95	5.79
> 30	109	2.77	54.64	39.45	96.86	4.68
Total	94,163	387.00	3,284.21	3,861.24	7,532.45	260.80

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


Figure 10.4.3 Forest Cover Map of Bihar



10.4.3 Forest Types

The area under different Forest Types in Bihar (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.4.10 Area statistics of the Forest Types found in Bihar

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	2/E1 Cane brakes	2.58	0.03
2	3B/C1b Moist teak forest	4.19	0.05
3	3C/C2b(i) <i>Bhabar-dun sal</i>	268.68	3.44
4	3C/C3a West Gangetic moist mixed deciduous forest	179.14	2.30
5	4D/SS2 <i>Barringtonia</i> swamp forest	2.10	0.03
6	5B/C1a Dry Siwalik sal forest	384.43	4.93
7	5B/C1c Dry peninsular sal forest	1,571.67	20.14
8	5B/C2 Northern dry mixed deciduous forest	2,335.80	29.94
9	5/DS1 Dry deciduous scrub	291.49	3.74
10	5/E2 <i>Boswellia</i> forest	317.79	4.07
11	5/E9 Dry bamboo brakes	68.98	0.88
12	5/1S2 <i>Khair-sissu</i> forest	2.38	0.03
Sub Total		5,429.23	69.58
13	TOF/ Plantation	2,364.02	30.30
Total (Forest Cover & Scrub)		7,793.25	99.88
Grassland forest type (outside forest cover)			
14	4D/2S2 Eastern wet alluvial grassland	9.46	0.12
Grand Total		7,802.71	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest type outside forest cover has also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).



10.4.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.4.11 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Araria	0	0
2	Arwal	0	0
3	Aurangabad	53	89
4	Banka	165	50
5	Begusarai	0	0
6	Bhagalpur	0	0
7	Bhojpur	0	0
8	Buxar	2	0
9	Darbhanga	0	0
10	East Champaran	0	0
11	Gaya	178	69
12	Gopalganj	0	0
13	Jamui	531	354
14	Jehanabad	6	0
15	Kaimur (Bhabua)	314	106
16	Katihar	0	0
17	Khagaria	0	0
18	Kishanganj	0	0
19	Lakhisarai	212	121
20	Madhepura	0	0
21	Madhubani	0	0
22	Munger	339	233
23	Muzaffarpur	0	0
24	Nalanda	19	1
25	Nawada	321	173
26	Patna	1	0
27	Purnia	1	0
28	Rohtas	155	164
29	Saharsa	0	0
30	Samastipur	0	0
31	Saran	0	0
32	Sheikhpura	0	0
33	Sheohar	0	0
34	Sitamarhi	0	0
35	Siwan	0	0
36	Supaul	0	0
37	Vaishali	0	0
38	West Champaran	1,496	1,403
Total		3,793	2,763

10.4.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.4.12 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	343.30	4.41
2	Very highly fire prone	1,217.02	15.62
3	Highly fire prone	1,362.32	17.48
4	Moderately fire prone	986.21	12.65
5	Less fire prone	3,884.40	49.84
Total		7,793.25	100.00

*Forest Cover including Scrub.

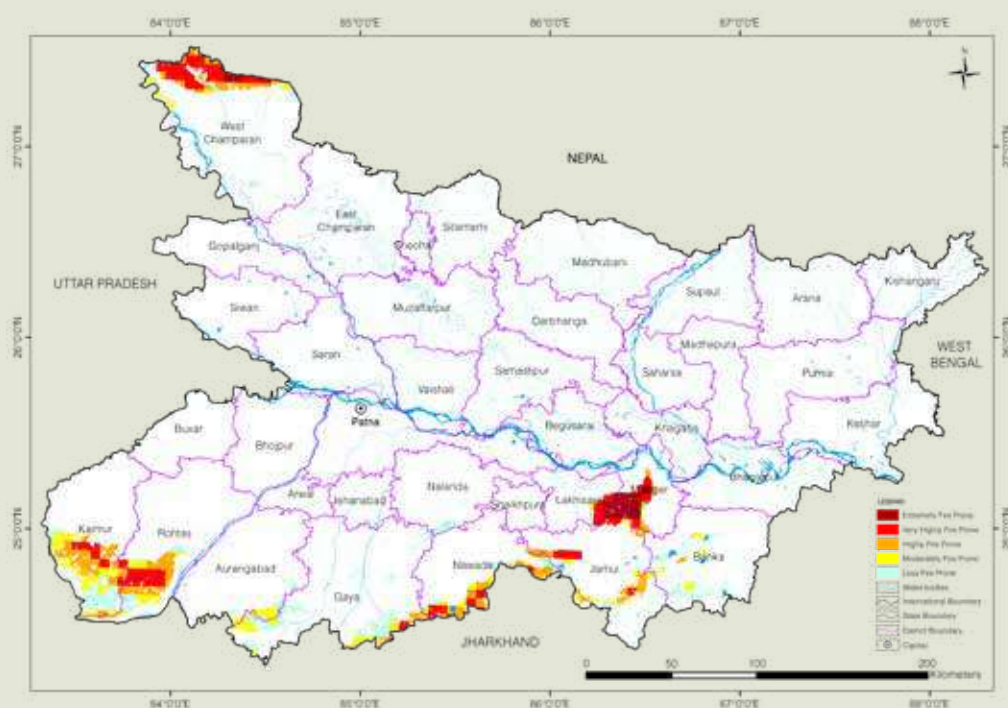


Figure 10.4.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.4.6 Results derived from NFI for Bihar

Table 10.4.13 Number of Trees and their volume for Top 5 species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Shorea robusta</i>	23,780	8.88
2	<i>Lannea coromandelica</i>	10,083	1.89
3	<i>Madhuca longifolia</i> / <i>M. latifolia</i> / <i>M. indica</i>	8,189	1.82
4	<i>Buchanania lanzan</i> / <i>Buchanania latifolia</i>	6,647	0.59
5	<i>Terminalia elliptica</i> / <i>Terminalia crenulata</i>	5,701	1.64



Table 10.4.14 Number of Trees and their volume for Top 5 species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Mangifera indica</i>	52,160	17.986
2	<i>Dalbergia sissoo</i>	16,548	3.474
3	<i>Borassus flabellifer</i> / <i>Borassus flabelliformis</i>	7,898	5.695
4	<i>Syzygium cumini</i> / <i>Eugenia jambolana</i>	5,395	1.160
5	<i>Litchi chinensis</i> / <i>Litchi sinensis</i>	5,074	0.499

Table 10.4.15 Number of Trees and their volume for Top 5 species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Mangifera indica</i>	1,643	0.267
2	<i>Psidium guajava</i>	726	0.017
3	<i>Litchi chinensis</i> / <i>Litchi sinensis</i>	701	0.045
4	<i>Dalbergia sissoo</i>	528	0.090
5	<i>Bombax ceiba</i>	500	0.101

Table 10.4.16 Major invasive species in the State inside the RFA in Bihar

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Lantana camara</i>	550.09
2	<i>Chromolaena odorata</i>	248.80
3	<i>Senna tora</i>	36.37
4	<i>Senna occidentalis</i>	18.18
5	<i>Ageratum conyzoides</i>	17.77

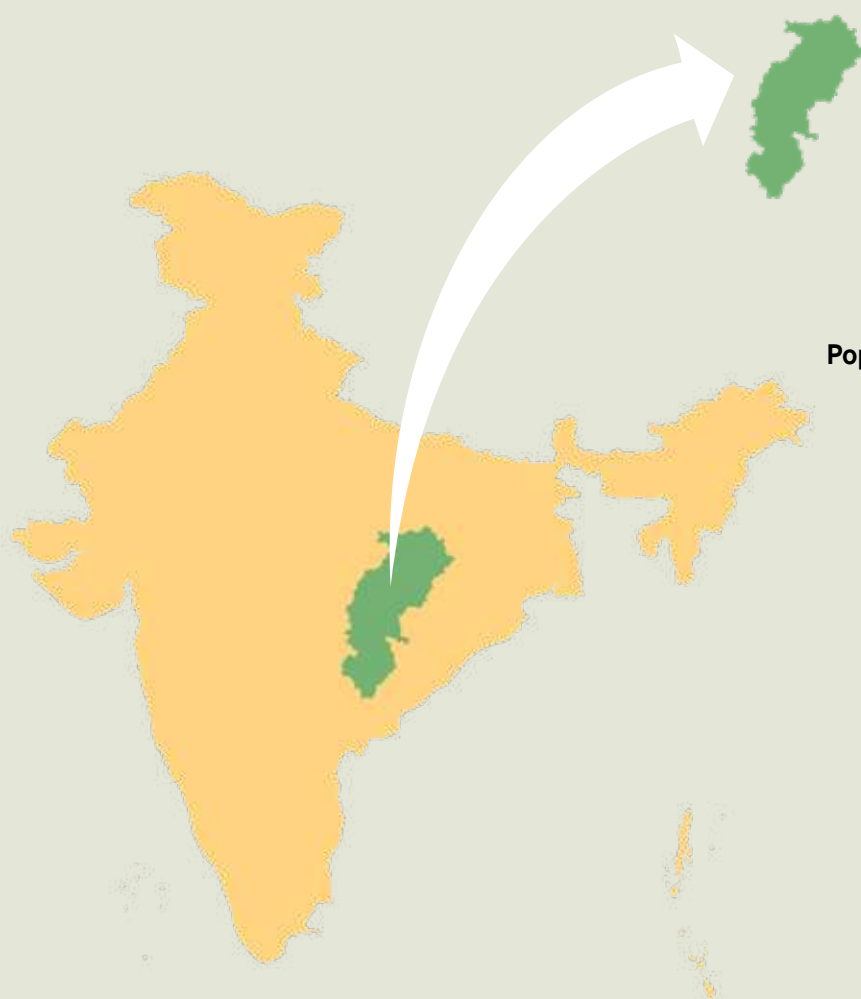
Table 10.4.17 Major NTFP species in Bihar

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Shorea robusta</i>	Tree	7,42,329
2	<i>Diospyros melanoxylon</i>	Tree	6,27,766
3	<i>Butea monosperma</i>	Tree	2,07,074
4	<i>Buchanania Lanza</i>	Tree	1,77,230
5	<i>Madhuca longifolia</i> / <i>M. latifolia</i> / <i>M. indica</i>	Tree	1,05,815
6	<i>Aegle marmelos</i>	Tree	85,703
7	<i>Acacia catechu</i> / <i>Senegalia catechu</i>	Tree	50,321
8	<i>Terminalia bellirica</i>	Tree	25,207
9	<i>Boswellia serrata</i>	Tree	9,335



Photo: FSI Repository

CHHATTISGARH



Geographical Area
1,35,192 km²

Geographical Coordinates
Latitude 17°47' N to 24°06' N
Longitude 80°15' E to 84°24' E

Population (as per Census 2011)
25.55 million
Urban 5.94 million (23.24 %)
Rural 19.61 million (76.76 %)
Tribal 7.82 million (30.62 %)

Average Population Density
189 per km²

Livestock Population
(as per 19th Livestock Census)
15.04 million

No. of Districts
28

No. of Hill Districts
0

No. of Tribal Districts
11

Table 10.5.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	13,519	
Reporting area for land utilization	14,090.27	100.00
Forests	6,607.43	46.89
Not available for land cultivation	1,038.11	7.37
Permanent pastures and other grazing lands	892.82	6.34
Land under misc. tree crops and groves	2.54	0.02
Culturable wasteland	382.97	2.72
Fallow land other than current fallows	255.74	1.81
Current fallows	279.69	1.98
Net area sown	4,630.97	32.87

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.5.1 Forest Cover

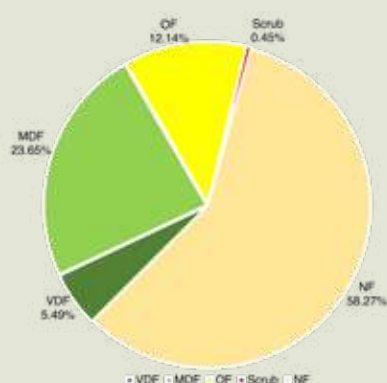


Table 10.5.2 Forest Cover of Chhattisgarh

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	7,416.57	5.49
MDF	31,983.80	23.65
OF	16,411.38	12.14
Total	55,811.75	41.28
Scrub	610.41	0.45

Figure 10.5.1 Forest Cover of Chhattisgarh

Table 10.5.3 District- wise Forest Cover in Chhattisgarh

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Balod	3,372.23	45.21	505.84	192.66	743.71	22.05	4.27	18.17
Balodabazar Bhatapara	4,635.49	151.94	660.46	207.08	1,019.48	21.99	1.56	34.78
Balrampur	6,253.07	450.29	1,514.96	1,169.21	3,134.46	50.13	-6.45	16.24
Bastar	5,394.84	604.45	841.72	653.74	2,099.91	38.92	19.20	43.70
Bemetara	2,866.01	0.00	0.00	7.51	7.51	0.26	-0.90	0.40
Bijapur	8,529.50	2,261.46	3,232.24	1,599.07	7,092.77	83.16	10.12	4.40
Bilaspur	3,541.04	19.57	438.71	222.19	680.47	19.22	8.04	19.02
Gaurela-Pendra-Marwahi	1,991.36	5.37	548.82	201.78	755.97	37.96	8.25	25.70
Dantewada	2,822.25	80.07	653.98	561.35	1,295.40	45.90	6.86	3.81
Dhamtari	4,084.00	101.06	1,332.73	427.28	1,861.07	45.57	0.47	11.13
Durg	2,297.01	0.00	3.43	22.00	25.43	1.11	-1.81	1.70
Gariaband	4,844.19	5.64	1,718.81	852.70	2,577.15	53.20	-11.02	13.93
Janjgir - Champa	3,852.75	4.93	21.39	126.29	152.61	3.96	-2.42	14.97
Jashpur	5,837.75	228.47	1,314.76	583.86	2,127.09	36.44	-1.68	20.38
Kawardha (Kabirdham)	4,235.00	80.72	1,059.32	392.54	1,532.58	36.19	-8.44	12.62
Kondagaon	5,074.66	326.20	1,258.34	580.96	2,165.50	42.67	-7.54	7.35
Korba	6,598.50	265.48	2,243.79	887.04	3,396.31	51.47	-3.66	88.95
Korea	6,604.25	88.94	2,571.52	1,447.58	4,108.04	62.20	-3.24	59.34
Mahasamund	4,789.75	3.75	513.31	429.85	946.91	19.77	-5.05	28.50
Mungeli	2,739.10	374.68	585.74	78.10	1,038.52	37.91	-17.27	5.38
Narayanpur	4,653.50	952.91	1,409.30	819.75	3,181.96	68.38	1.73	12.72
Raigarh	7,086.00	309.08	1,512.32	796.50	2,617.90	36.94	-1.03	26.75
Raipur	2,903.32	0.00	11.39	35.32	46.71	1.61	0.13	7.03

**Table 10.5.3 District- wise Forest Cover in Chhattisgarh**

District	Calculated Area by Sol	2023 Assessment				% of Cal- culated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Rajnandgaon	8,070.25	41.59	1,747.65	751.71	2,540.95	31.49	-4.38	47.14
Sukma	5,476.00	215.52	1,689.31	1,345.38	3,250.21	59.35	-2.27	27.09
Surajpur	5,472.72	182.38	1,484.38	860.93	2,527.69	46.19	-3.10	24.62
Surguja	4,005.96	87.34	907.29	435.45	1,430.08	35.70	-1.75	24.73
Uttar Bastar Kanker (Kanker)	7,161.50	529.52	2,202.29	723.55	3,455.36	48.25	2.25	9.86
Grand Total	1,35,192.00	7,416.57	31,983.80	16,411.38	55,811.75	41.28	-19.13	610.41

*Area figure calculated without normalization factor.

10.5.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.5.4 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Chhattisgarh

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
5,796.08	26,070.85	10,553.46	42,420.39	1,620.49	5,912.95	5,857.92	13,391.36
13.66%	61.46%	24.88%		12.10%	44.16%	43.74%	

*In case of Chhattisgarh, RFA boundaries have been used.

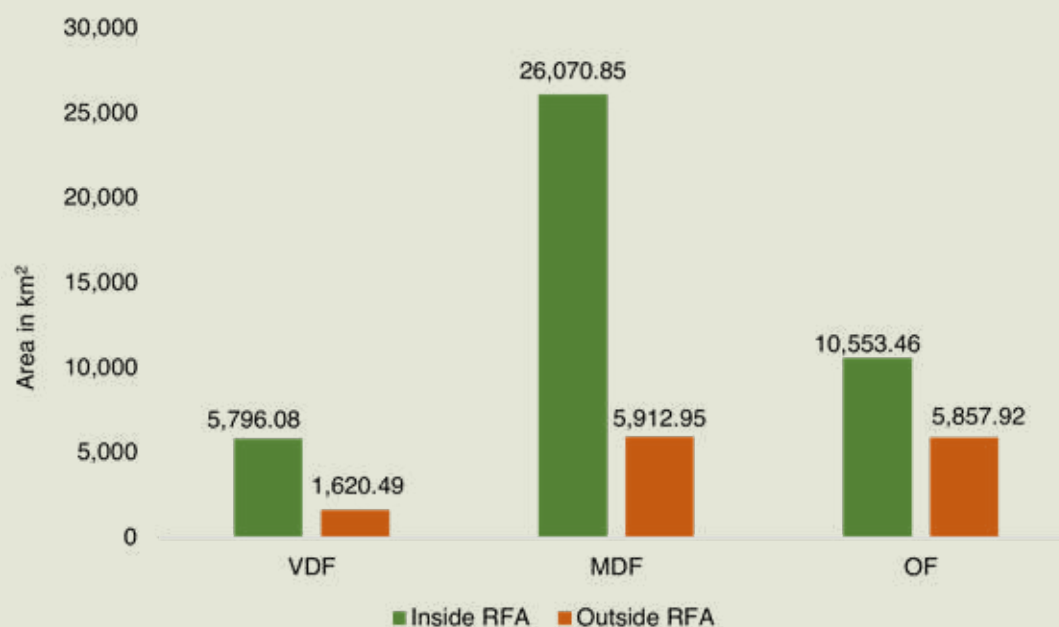


Figure 10.5.2 Forest Cover Inside and Outside of RFA in Chhattisgarh

Table 10.5.5 Forest Cover Change Matrix Inside RFA/GW for Chhattisgarh between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					(km²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 inside RFA / GW Raster based*
VDF	5,400.36	28.90	16.08	0.00	4.10	5,449.44
MDF	392.45	25,785.37	182.88	1.06	6.00	26,367.76
OF	3.27	256.58	10,208.00	103.75	45.00	10,616.60
Scrub	0.00	0.00	68.59	220.82	78.28	367.69
NF	0.00	0.00	77.91	21.97	10,133.17	10,233.05
Total ISFR 2023 inside RFA /GW	5,796.08	26,070.85	10,553.46	347.60	10,266.55	53,034.54
Net Change	346.64	-296.91	-63.14	-20.09	33.50	

*Area figure calculated without normalization factor.



Table 10.5.6 Forest Cover Change Matrix Outside RFA/GW for Chhattisgarh between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	1,585.66	8.50	2.10	0.12	8.95	1,605.33
MDF	34.83	5,870.80	23.40	2.31	3.77	5,935.11
OF	0.00	33.65	5,811.21	5.77	6.01	5,856.64
Scrub	0.00	0.00	13.85	230.97	1.13	245.95
NF	0.00	0.00	7.36	23.64	68,483.43	68,514.43
Total ISFR 2023 outside RFA/GW	1,620.49	5,912.95	5,857.92	262.81	68,503.29	82,157.46
Net Change	15.16	-22.16	1.28	16.86	-11.14	

*Area figure calculated without normalization factor.

Table 10.5.7 Altitude-wise Forest Cover in Chhattisgarh

Altitude Zone (m)	Calculated Area by Sol						(km ²)
		VDF	MDF	OF	Total	Scrub	
0-500	88,516	3,528.97	15,873.24	9,661.05	29,063.26	407.70	
500-1000	45,491	3,824.63	15,799.38	6,519.34	26,143.35	182.59	
1000-2000	1,185	62.97	311.18	230.99	605.14	20.12	
Total	1,35,192	7,416.57	31,983.80	16,411.38	55,811.75	610.41	

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

Table 10.5.8 Forest Cover in Different Slope Classes in Chhattisgarh

Slope (in degrees)	Calculated Area by Sol						(km ²)
		VDF	MDF	OF	Total	Scrub	
0-5	1,06,433	4,164.44	17,502.08	11,072.56	32,739.08	345.48	
5-10	16,248	1,606.59	6,994.47	2,739.32	11,340.38	126.87	
10-15	6,477	900.10	3,777.67	1,240.42	5,918.19	75.80	
15-20	3,345	450.98	2,052.57	702.67	3,206.22	38.86	
20-25	1,638	195.84	1,006.85	391.80	1,594.49	16.31	
25-30	696	70.07	421.88	180.02	671.97	5.99	
>30	355	28.55	228.28	84.59	341.42	1.10	
Total	1,35,192	7,416.57	31,983.80	16,411.38	55,811.75	610.41	

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

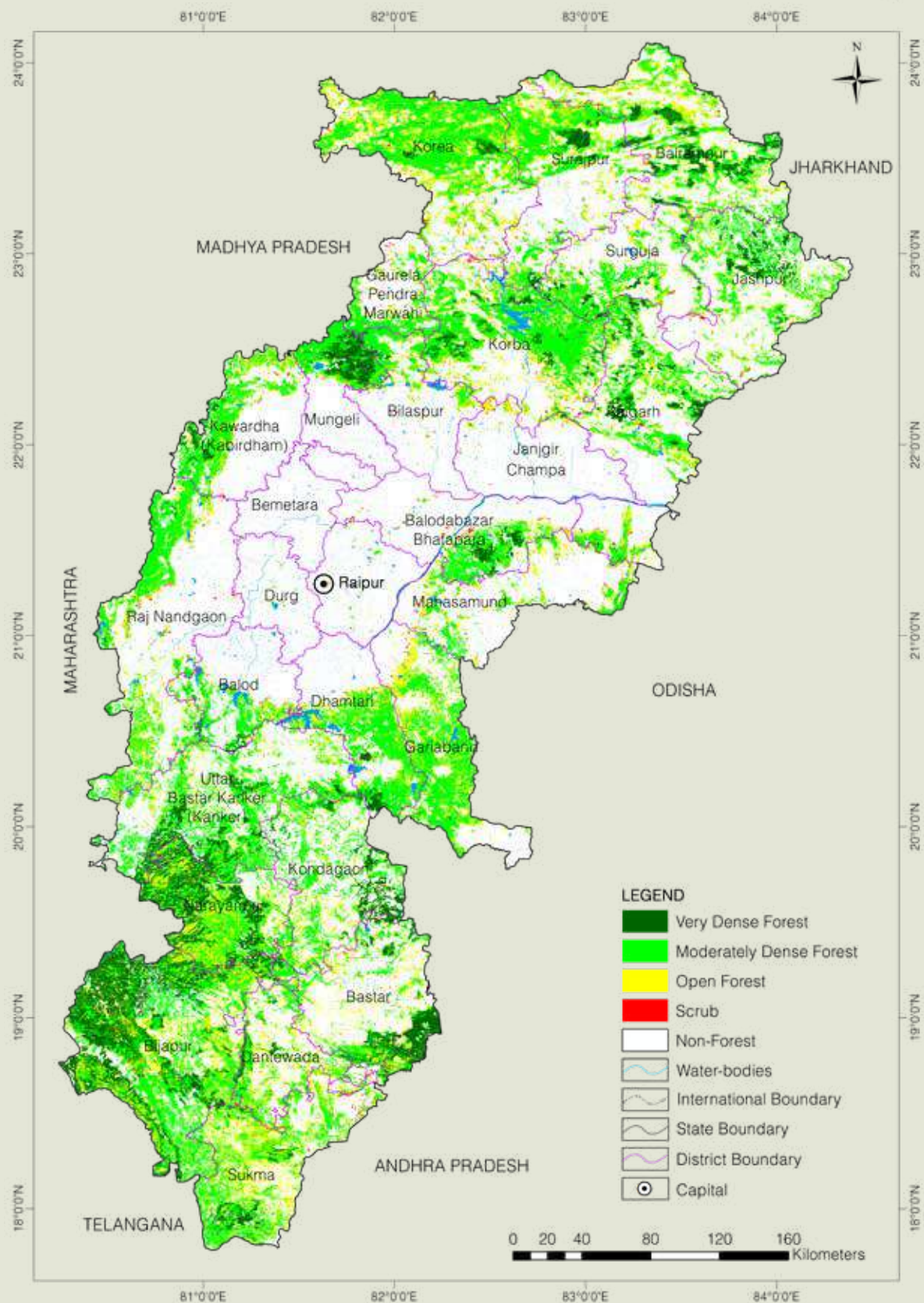


Figure 10.5.3 Forest Cover Map of Chhattisgarh



10.5.3 Forest Types

The area under different Forest Types in Chhattisgarh (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.5.9 Area Statistics of the Forest Types Found in Chhattisgarh

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	3B/C1c Slightly moist teak forest	3,716.66	6.59
2	3B/C2 Southern moist mixed deciduous forest	8,755.37	15.52
3	3C/C2e (i) Moist peninsular high level sal	832.76	1.48
4	3C/C2e (ii) Moist peninsular low level sal	9,296.76	16.48
5	3/E1 <i>Terminalia tomentosa</i> forest	18.97	0.03
6	3/2S1 Dry bamboo brakes	3.77	0.01
7	5A/C1b Dry teak forest	284.98	0.51
8	5A/C3 Southern dry mixed deciduous forest	15,384.67	27.26
9	5B/C1c Dry peninsular sal forest	8,692.08	15.40
10	5B/C2 Northern dry mixed deciduous forest	7,387.48	13.09
11	5/DS1 Dry deciduous scrub	610.41	1.08
12	5/E9 Dry bamboo brakes	828.94	1.47
Sub Total		55,812.85	98.92
13	TOF/ Plantation	609.31	1.08
Total (Forest Cover & Scrub)		56,422.16	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). The total mapped area, therefore, is sum of forest cover and scrub.

10.5.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.5.10 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Balod	99	119
2	Balodabazar Bhatapara	353	160
3	Balrampur	1,470	1,012
4	Bastar	426	683
5	Bemetara	0	0
6	Bijapur	2,940	5,018
7	Bilaspur	268	411
8	Dantewada	68	551
9	Dhamtari	511	463
10	Durg	0	0
11	Gariaband	1,233	699
12	Gaurela Pendra Marwahi	148	49
13	Janjgir Champa	228	80
14	Jashpur	1,111	405
15	Kawardha (Kabirdham)	449	180
16	Kondagaon	378	173
17	Korba	1,413	772
18	Korea	1,884	719
19	Mahasamund	830	428
20	Mungeli	158	136
21	Narayanpur	1,466	2,316
22	Raigarh	1,275	506
23	Raipur	28	17
24	Raj Nandgaon	901	623
25	Sukma	335	1,671
26	Surajpur	789	543
27	Surguja	408	110
28	Uttar Bastar Kanker (Kanker)	1,137	1,106
Total		20,306	18,950



10.5.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.5.11 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	2,265.19	4.01
2	Very highly fire prone	10,453.80	18.53
3	Highly fire prone	16,324.65	28.93
4	Moderately fire prone	13,239.33	23.47
5	Less fire prone	14,139.19	25.06
Total		56,422.16	100.00

*Forest Cover including Scrub.

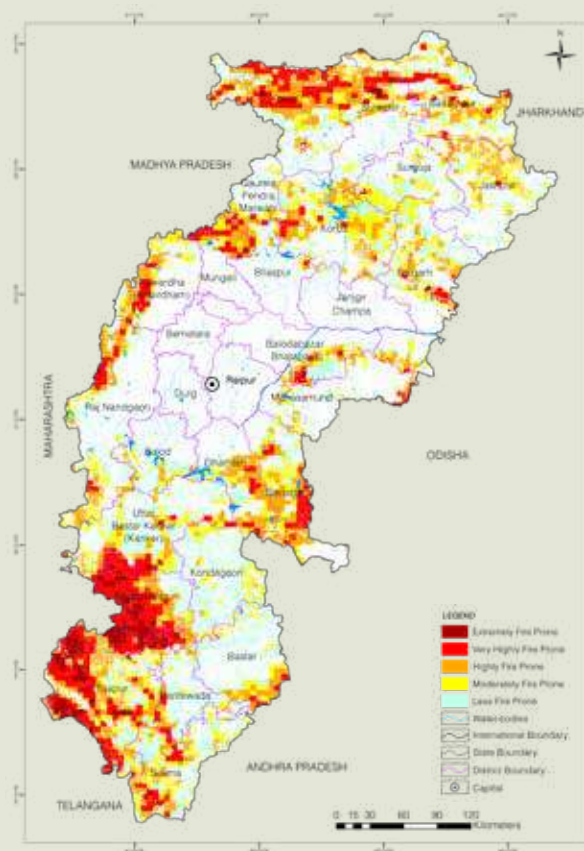


Figure 10.5.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.5.6 Results Derived from NFI for Chhattisgarh

Table 10.5.12 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Shorea robusta</i>	3,58,166	135.49
2	<i>Cleistanthus collinus</i>	1,07,787	10.60
3	<i>Terminalia elliptica/ Terminalia crenulata</i>	91,627	30.53
4	<i>Buchanania lanzan/ Buchanania latifolia</i>	80,170	7.46
5	<i>Anogeissus latifolia/ Terminalia anogeissiana</i>	71,257	24.24


Table 10.5.13 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Shorea robusta</i>	84,852	20.454
2	<i>Butea monosperma</i> / <i>Butea frondosa</i>	39,090	4.843
3	<i>Acacia Arabica</i> / <i>Vachellia nilotica</i>	25,245	2.994
4	<i>Mangifera indica</i>	24,428	26.138
5	<i>Madhuca longifolia</i> / <i>M. latifolia</i> / <i>M. indica</i>	22,595	18.911

Table 10.5.14 Number of Trees and their Volume for Top 5 Species in Urban Area

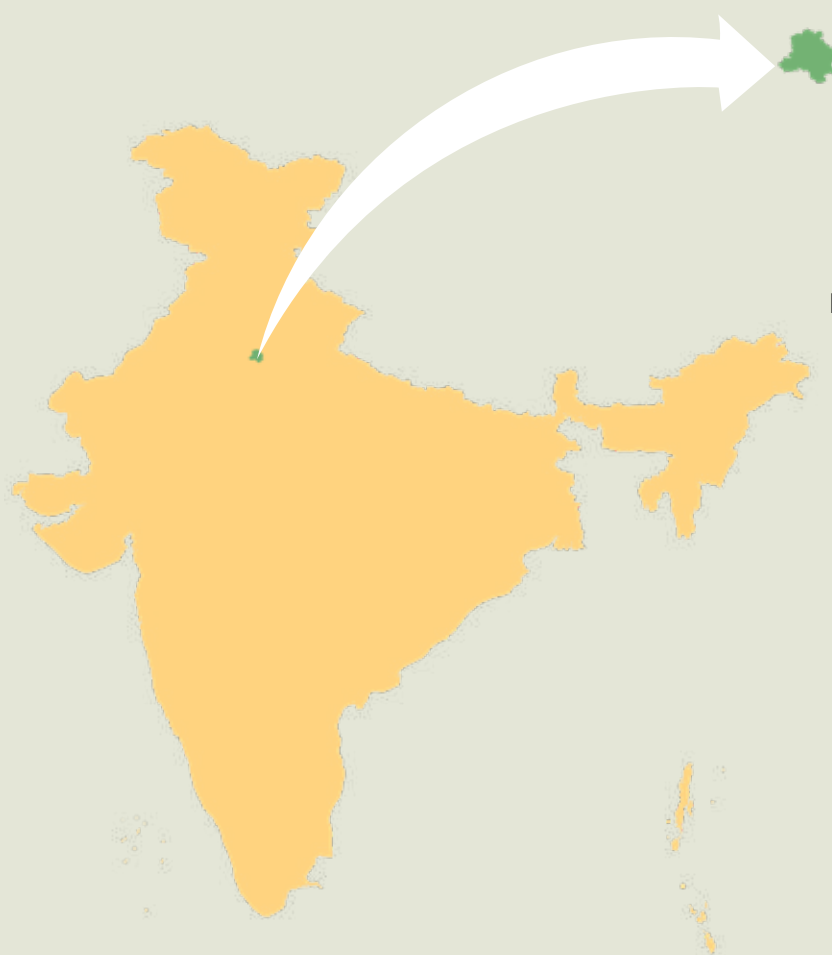
Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Mangifera indica</i>	1,115	0.812
2	<i>Psidium guajava</i>	819	0.03
3	<i>Moringa species</i>	775	0.143
4	<i>Annona squamosa</i>	615	0.009
5	<i>Azadirachta indica</i>	533	0.316

Table 10.5.15 Major NTFP Species in Chhattisgarh

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Diospyros melanoxylon</i>	Tree	3,51,08,100
2	<i>Shorea robusta</i>	Tree	3,18,86,112
3	<i>Buchanania Lanza</i>	Tree	59,89,006
4	<i>Anogeissus latifolia</i> / <i>Terminalia anogeissiana</i>	Tree	50,47,201
5	<i>Woodfordia fruticosa</i>	Shrubs	3,20,51,057
6	<i>Bauhinia vahlii</i> / <i>Phanera vahlii</i>	Climbers	58,10,850
7	<i>Tinospora cordifolia</i>	Climbers	12,36,351
8	<i>Celastrus paniculatus</i>	Climbers	8,65,446
9	<i>Ocimum species</i> (<i>Ocimum gratissimum</i> / <i>Ocimum sanctum</i> / <i>Ocimum tenuiflorum</i> / <i>Ocimum americanum</i>)	Herbs	48,81,14,810
10	<i>Andrographis paniculata</i>	Herbs	1,70,96,073

Table 10.5.16 Major Invasive Species in the State Inside the RFA in Chhattisgarh

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Lantana camara</i>	2,117.14
2	<i>Ageratum conyzoides</i>	1,906.15
3	<i>Cassia tora</i> / <i>Senna tora</i>	1,573.30
4	<i>Chromolaena odorata</i>	694.80
5	<i>Triumfetta rhomboidea</i>	692.98

**Geographical Area**1,483 km²**Geographical Coordinates**

Latitude 28°22' N to 28°54' N

Longitude 76°48' E to 77°23' E

Population (as per Census 2011)

16.79 million

Urban 16.37 million (97.50 %)

Rural 0.42 million (2.50 %)

Tribal Nil

Average Population Density11,320 per km²**Livestock Population**(as per 19th Livestock Census)

0.36 million

No. of Districts

11

No. of Hill Districts

0

No. of Tribal Districts

0

Table 10.6.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	148	
Reporting area for land utilization	165.51	100.00
Forests	19.50	11.78
Not available for land cultivation	93.19	56.30
Permanent pastures and other grazing lands	0.06	0.04
Land under misc. tree crops and groves	1.18	0.71
Culturable wasteland	9.89	5.98
Fallow land other than current fallows	8.07	4.88
Current fallows	11.73	7.09
Net area sown	21.89	13.22

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.6.1 Forest Cover

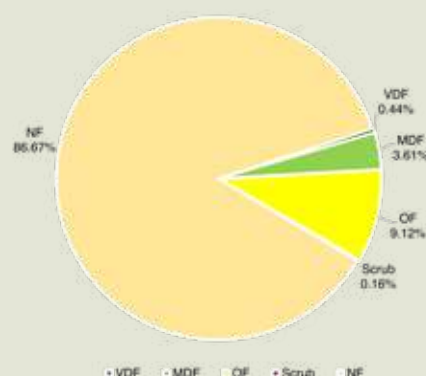


Figure 10.6.1 Forest Cover of Delhi

Table 10.6.2 Forest Cover of Delhi

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	6.47	0.44
MDF	53.55	3.61
OF	135.26	9.12
Total	195.28	13.17
Scrub	2.39	0.16

Table 10.6.3 District-wise Forest Cover in Delhi

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Central Delhi	107	0.01	5.11	7.05	12.17	11.37	0.06	0.14
East Delhi	32	0.00	0.29	1.64	1.93	6.03	-0.05	0.00
New Delhi	156	2.71	13.84	32.09	48.64	31.18	-0.91	0.47
North Delhi	291	0.02	5.34	6.36	11.72	4.03	0.60	0.05
North-East Delhi	35	0.00	0.36	2.02	2.38	6.80	0.15	0.05
North-West Delhi	154	0.08	2.88	2.76	5.72	3.71	-0.29	0.00
Shahdara	34	0.00	0.25	0.65	0.90	2.65	-0.01	0.00
South Delhi	159	2.99	13.95	53.95	70.89	44.58	0.90	1.60
South-East Delhi	101	0.66	4.65	14.23	19.54	19.35	-0.44	0.00
South-West Delhi	283	0.00	3.24	9.41	12.65	4.47	0.50	0.08
West Delhi	131	0.00	3.64	5.10	8.74	6.67	-0.59	0.00
Grand Total	1,483	6.47	53.55	135.26	195.28	13.17	-0.08	2.39

*Area figure calculated without normalization factor.



10.6.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.6.4 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Delhi

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
4.02	18.24	49.94	72.20	2.45	35.31	85.32	123.08
5.57%	25.26%	69.17%		1.99%	28.69%	69.32%	

(km²)

*In case of Delhi, RFA boundaries have been used.

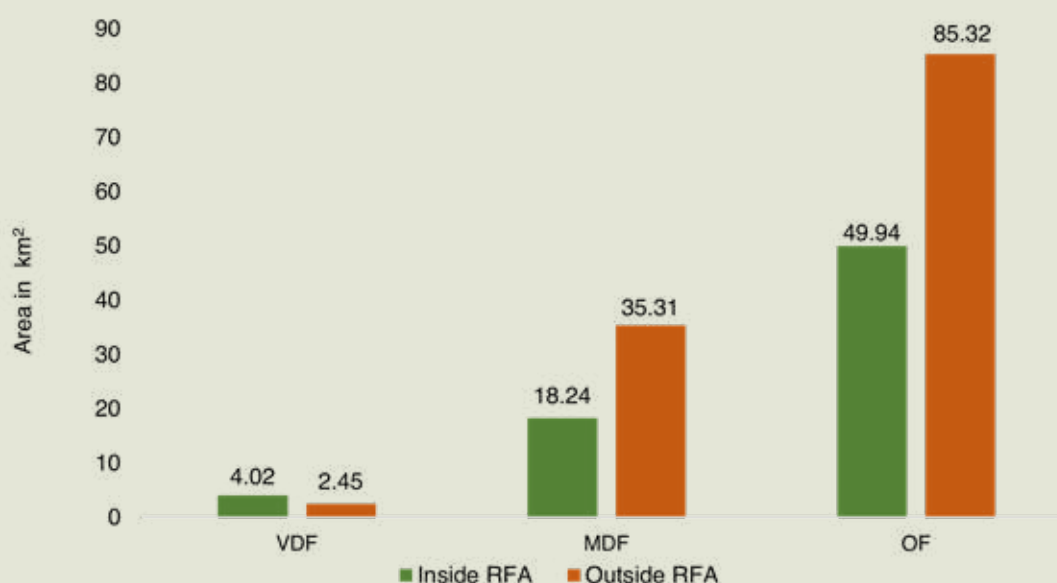


Figure 10.6.2 Forest Cover Inside and Outside of RFA in Delhi

Table 10.6.5 Forest Cover Change Matrix Inside RFA/GW for Delhi between 2021 Raster based & 2023 Assessments

Class	2023 Assessment inside RFA/GW					Total ISFR 2021 inside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	4.02	0.04	0.00	0.00	0.00	4.06
MDF	0.00	18.20	0.55	0.00	0.00	18.75
OF	0.00	0.00	47.65	0.00	0.00	47.65
Scrub	0.00	0.00	0.00	0.30	0.00	0.30
NF	0.00	0.00	1.74	1.21	23.26	26.21
Total ISFR 2023 inside RFA / GW	4.02	18.24	49.94	1.51	23.26	96.97
Net Change	-0.04	-0.51	2.29	1.21	-2.95	

*Area figure calculated without normalization factor.

Table 10.6.6 Forest Cover Change Matrix Outside RFA/GW for Delhi between 2021 Raster based & 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	2.37	0.29	0.00	0.00	0.00	2.66
MDF	0.08	35.02	1.73	0.00	0.91	37.74
OF	0.00	0.00	83.59	0.03	0.88	84.50
Scrub	0.00	0.00	0.00	0.18	0.00	0.18
NF	0.00	0.00	0.00	0.67	1,260.28	1,260.95
Total ISFR 2023 outside RFA/GW	2.45	35.31	85.32	0.88	1,262.07	1,386.03
Net Change	-0.21	-2.43	0.82	0.70	1.12	

*Area figure calculated without normalization factor.

Table 10.6.7 Altitude-wise Forest Cover in Delhi

Altitude Zone (m)	Calculated Area by Sol						(km ²)
		VDF	MDF	OF	Total	Scrub	
0-500	1,483	6.47	53.55	135.26	195.28	2.39	
Total	1,483	6.47	53.55	135.26	195.28	2.39	

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

Table 10.6.8 Forest Cover in Different Slope Classes in Delhi

Slope (in degrees)	Calculated Area by Sol						(km ²)
		VDF	MDF	OF	Total	Scrub	
0-5	1,407	6.47	50.20	124.14	180.81	1.28	
5-10	70	0.00	3.35	10.14	13.49	0.73	
10-15	5	0.00	0.00	0.98	0.98	0.38	
15-20	1	0.00	0.00	0.00	0.00	0.00	
Total	1,483	6.47	53.55	135.26	195.28	2.39	

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

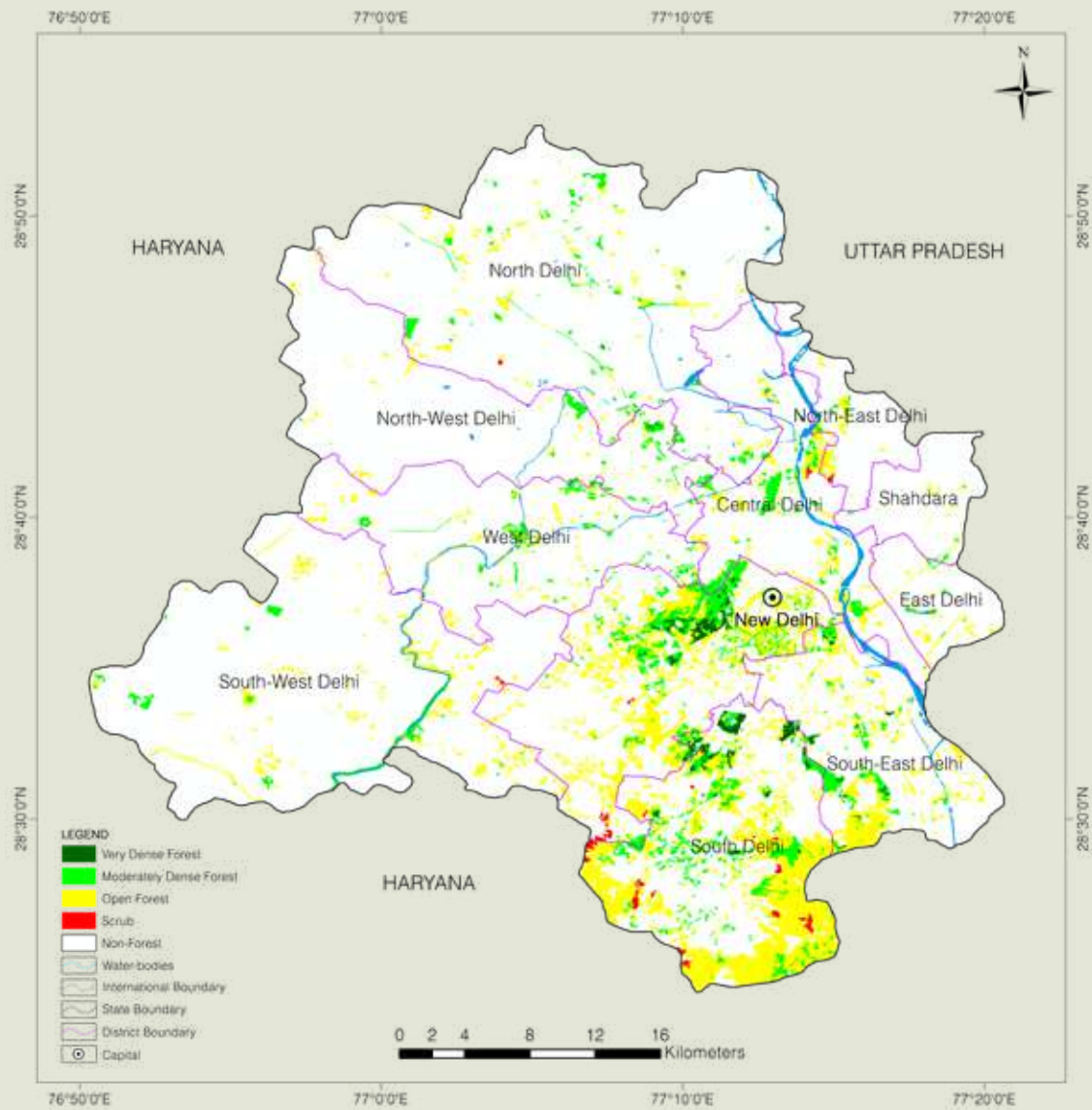


Figure 10.6.3 Forest Cover Map of Delhi



10.6.3 Forest Types

The area under different Forest Types in Delhi (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.6.9 Area Statistics of the Forest Types Found in Delhi

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	5B/C2 Northern dry mixed deciduous forest	20.41	10.33
2	6B/C2 Ravine thorn forest	64.48	32.62
Sub Total		84.89	42.95
3	TOF/ Plantation	112.78	57.05
Total (Forest Cover & Scrub)		197.67	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). The total mapped area, therefore, is sum of forest cover and scrub.

10.6.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 and 2023-24.

Table 10.6.10 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Central Delhi	1	0
2	East Delhi	2	0
3	New Delhi	1	3
4	North Delhi	2	1
5	North-East Delhi	0	1
6	North-West Delhi	0	0
7	Shahdara	0	0
8	South Delhi	0	9
9	South-East Delhi	0	1
10	South-West Delhi	1	1
11	West Delhi	0	0
Total		7	16



10.6.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.6.11 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	0.00	0.00
2	Very highly fire prone	0.00	0.00
3	Highly fire prone	0.00	0.00
4	Moderately fire prone	0.00	0.00
5	Less fire prone	197.67	100.00
Total		197.67	100.00

*Forest Cover including Scrub.

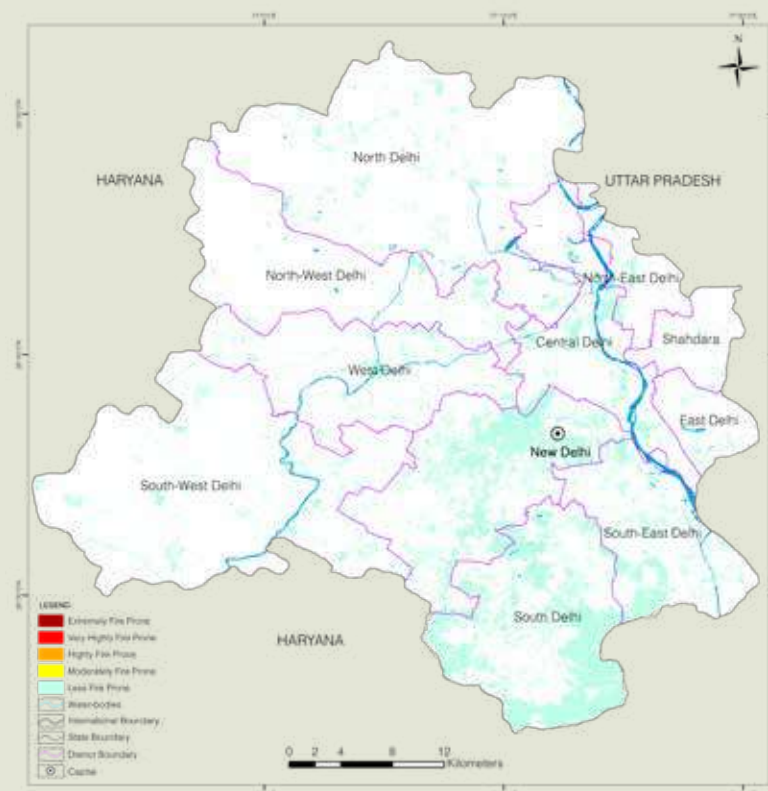


Figure 10.6.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.6.6 Results Derived from NFI for Delhi

Table 10.6.12 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Prosopis juliflora</i> / <i>Neltuma juliflora</i>	544	0.20
2	<i>Acacia lenticularis</i> / <i>Senegalia lenticularis</i>	139	0.01
3	<i>Azadirachta indica</i>	62	0.03
4	<i>Cassia fistula</i>	55	0.02
5	<i>Leucaena leucocephala</i>	55	0.01


Table 10.6.13 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Prosopis juliflora/ Neltuma juliflora</i>	1,136	0.060
2	<i>Azadirachta indica</i>	257	0.056
3	<i>Leucaena leucocephala</i>	241	0.015
4	<i>Ficus species</i>	110	0.006
5	<i>Morus species</i>	106	0.013

Table 10.6.14 Number of Trees and their Volume for Top 5 Species in Urban Area

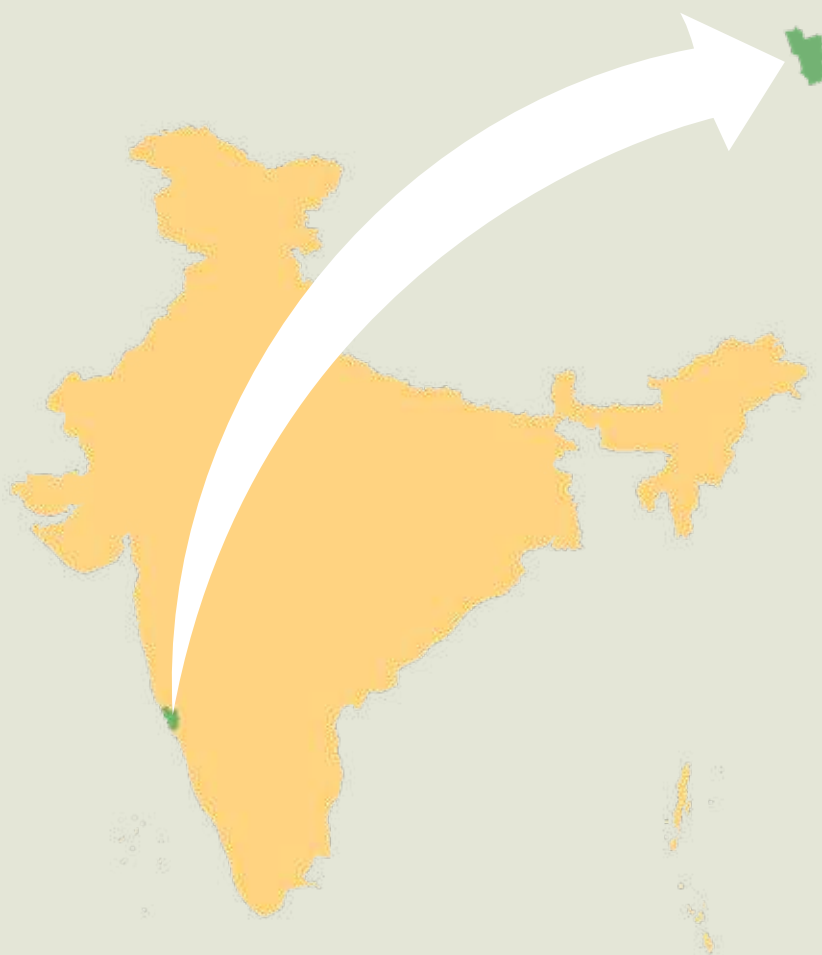
Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Leucaena leucocephala</i>	817	0.091
2	<i>Prosopis juliflora/ Neltuma juliflora</i>	709	0.055
3	<i>Polyalthia longifolia/ Monoon longifolium</i>	626	0.041
4	<i>Azadirachta indica</i>	505	0.212
5	<i>Ficus species</i>	397	0.028

Table 10.6.15 Major NTFP Species in Delhi

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Azadirachta indica</i>	Tree	62
2	<i>Flacourtia indica</i>	Tree	5
3	<i>Lantana camara</i>	Shrubs	28,350
4	<i>Carissa spinarum/ Carissa opaca</i>	Shrubs	15,593
5	<i>Grewia tenax</i>	Shrubs	1,418
6	<i>Cassia tora/ Senna tora</i>	Herbs	1,47,932
7	<i>Parthenium hysterophorus</i>	Herbs	56,897

Table 10.6.16 Major Invasive Species in the State inside the RFA in Delhi

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Prosopis juliflora</i>	9.21
2	<i>Lantana camara</i>	6.22
3	<i>Cassia tora/ Senna tora</i>	1.35
4	<i>Triumfetta rhomboidea</i>	1.35
5	<i>Parthenium hysterophorus</i>	0.69



Geographical Area
3,702 km²

Geographical Coordinates
Latitude 14°53' N to 15°40' N
Longitude 73°40' E to 74°21' E

Population (as per Census 2011)
1.46 million
Urban 0.91 million (62.17 %)
Rural 0.55 million (37.83 %)
Tribal 0.15 million (10.23 %)

Average Population Density
394 per km²

Livestock Population
(as per 19th Livestock Census)
0.15 million

No. of Districts
2

No. of Hill Districts
0

No. of Tribal Districts
0

Table 10.7.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	370	
Reporting area for land utilization	361.11	100.00
Forests	125.47	34.75
Not available for land cultivation	93.83	25.99
Permanent pastures and other grazing lands	1.30	0.36
Land under misc. tree crops and groves	0.58	0.16
Culturable wasteland	4.78	1.32
Fallow land other than current fallows	3.77	1.04
Current fallows	4.71	1.30
Net area sown	126.67	35.08

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.7.1 Forest Cover

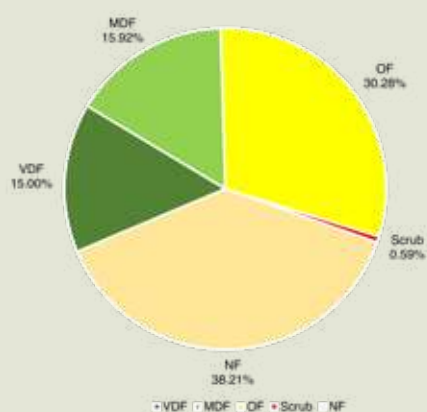


Figure 10.7.1 Forest Cover of Goa

Table 10.7.2 Forest Cover of Goa

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	555.46	15.00
MDF	589.43	15.92
OF	1,120.83	30.28
Total	2,265.72	61.20
Scrub	21.69	0.59

Table 10.7.3 District- wise Forest Cover in Goa

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
North Goa	1,736	132.02	237.42	580.75	950.19	54.73	-0.90	11.57
South Goa	1,966	423.44	352.01	540.08	1,315.53	66.91	-0.60	10.12
Grand Total	3,702	555.46	589.43	1,120.83	2,265.72	61.20	-1.50	21.69

*Area figure calculated without normalization factor.

Table 10.7.4 Forest Cover in Municipal Areas of Goa

(km ²)								
Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
1.	Canacon	17.93	0.00	3.15	6.68	9.83	54.82	0.00
2.	Panjim	8.13	0.00	0.28	0.88	1.16	14.27	0.00
3.	Ponda	3.16	0.00	0.16	0.65	0.81	25.63	0.00
4.	Quepem	19.68	0.00	1.56	5.14	6.70	34.04	0.59
	Grand Total	48.90	0.00	5.15	13.35	18.50	37.83	0.59

*Shapefile of digitized boundary as provided by Directorate Municipal Administration / Urban Development.



10.7.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.7.5 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Goa

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
532.61	340.31	351.01	1,223.93	22.85	249.12	769.82	1,041.79
43.52%	27.80%	28.68%		2.19%	23.91%	73.90%	

**In case of Goa, RFA boundaries have been used.*

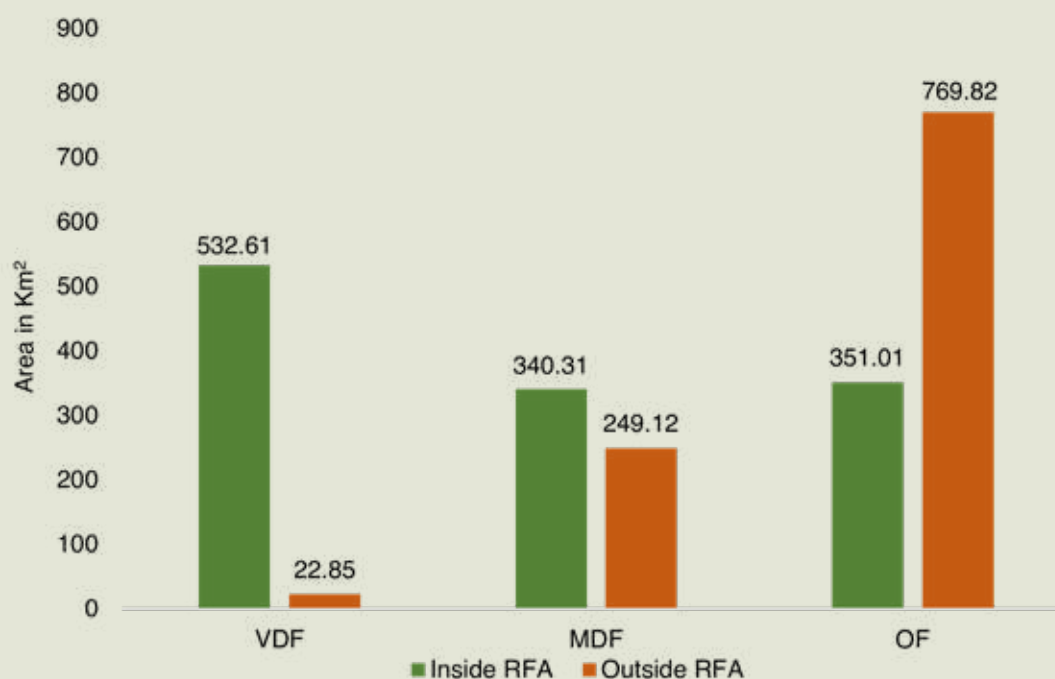


Figure 10.7.2 Forest Cover Inside and Outside of RFA in Goa



Table 10.7.6 Forest Cover Change Matrix Inside RFA/GW for Goa between 2021 Raster based and 2023 Assessments

(km²)

Class	2023 Assessment inside RFA/GW					Total ISFR 2021 inside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	505.30	12.42	0.32	0.00	0.15	518.19
MDF	25.81	294.91	5.04	0.00	0.09	325.85
OF	1.48	32.97	344.61	0.39	0.58	380.03
Scrub	0.00	0.00	0.00	0.00	0.00	0.00
NF	0.02	0.01	1.04	4.30	97.04	102.41
Total ISFR 2023 inside RFA / GW	532.61	340.31	351.01	4.69	97.86	1,326.48
Net Change	14.42	14.46	-29.02	4.69	-4.55	

*Area figure calculated without normalization factor.

Table 10.7.7 Forest Cover Change Matrix Outside RFA/GW for Goa between 2021 Raster based and 2023 Assessments

(km²)

Class	2023 Assessment outside RFA/GW					Total ISFR 2021 outside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	20.21	2.34	0.01	0.00	0.00	22.56
MDF	2.64	225.15	9.11	0.00	0.71	237.61
OF	0.00	21.40	756.02	0.68	4.88	782.98
Scrub	0.00	0.00	0.00	0.00	0.00	0.00
NF	0.00	0.23	4.68	16.32	1,311.14	1,332.37
Total ISFR 2023 outside RFA/GW	22.85	249.12	769.82	17.00	1,316.73	2,375.52
Net Change	0.29	11.51	-13.16	17.00	-15.64	

*Area figure calculated without normalization factor.

Table 10.7.8 Altitude-wise Forest Cover in Goa

(km²)

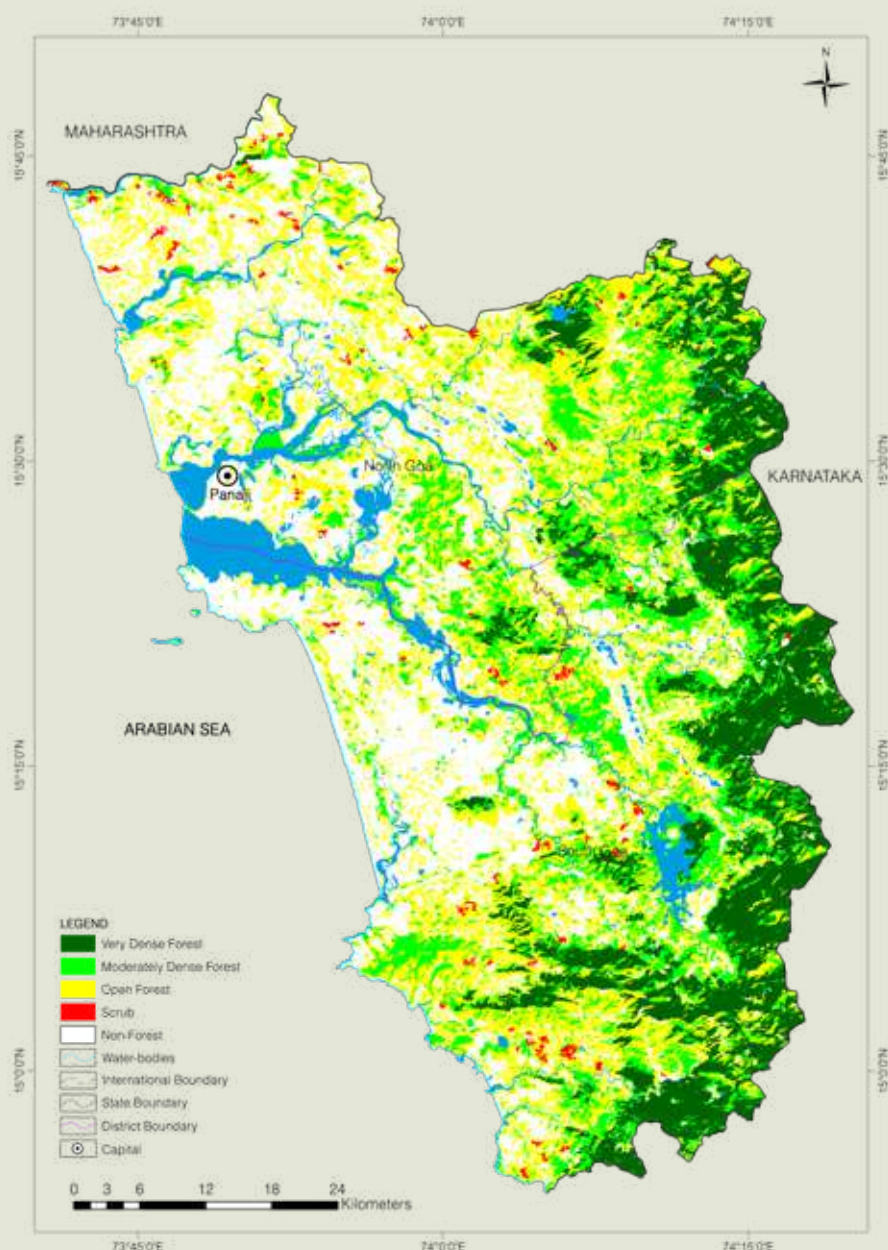
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	3,549	463.69	568.05	1,091.01	2,122.75	21.39
500-1000	153	91.77	21.38	29.82	142.97	0.30
Total	3,702	555.46	589.43	1,120.83	2,265.72	21.69

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


Table 10.7.9 Forest Cover in Different Slope Classes in Goa

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	1,918	96.52	209.41	482.53	788.46	13.24
5-10	795	124.55	153.10	297.75	575.40	6.05
10-15	463	122.86	110.34	168.76	401.96	1.68
15-20	273	97.51	68.22	89.35	255.08	0.39
20-25	136	58.14	30.73	42.53	131.40	0.07
25-30	64	30.12	11.42	21.09	62.63	0.06
>30	53	25.76	6.21	18.82	50.79	0.20
Total	3,702	555.46	589.43	1,120.83	2,265.72	21.69

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


Figure 10.7.3 Forest Cover Map of Goa

10.7.3 Forest Types

The area under different Forest Types in Goa (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.7.10 Area Statistics of the Forest Types Found in Goa

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	1A/C4 West Coast tropical evergreen forest	499.22	21.83
2	2A/C2 West Coast semi-evergreen forest	480.17	20.99
3	3B/C2 Southern moist mixed deciduous forest	941.90	41.18
4	4B/TS2 Mangrove forest	29.12	1.27
5	5/E7 Laterite thorn forest	0.52	0.02
Sub Total		1,950.93	85.29
6	TOF/ Plantation	336.48	14.71
Total (Forest Cover & Scrub)		2,287.41	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). The total mapped area, therefore, is sum of forest cover and scrub.

10.7.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.7.11 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	North Goa	24	5
2	South Goa	123	31
Total		147	36



10.7.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.7.12 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	0.73	0.03
2	Very highly fire prone	0.00	0.00
3	Highly fire prone	0.00	0.00
4	Moderately fire prone	68.09	2.98
5	Less fire prone	2,218.59	96.99
Total		2,287.41	100.00

*Forest Cover including Scrub.

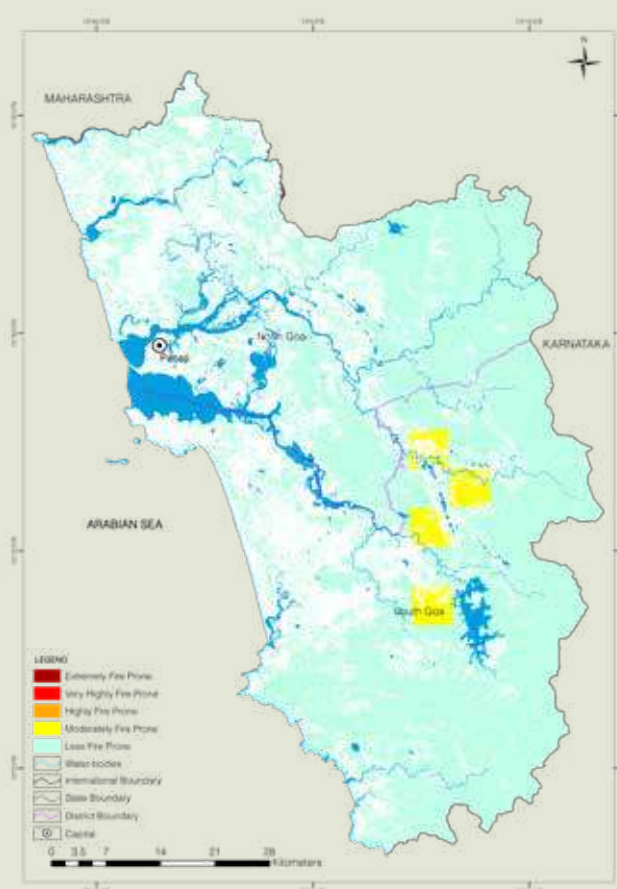


Figure 10.7.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.7.6 Results Derived from NFI for Goa

Table 10.7.13 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Terminalia paniculata</i>	10,066	4.66
2	<i>Xylia xylocarpa</i>	4,230	1.14
3	<i>Terminalia elliptica/ Terminalia crenulata</i>	4,038	1.43
4	<i>Anacardium occidentale</i>	2,955	0.29
5	<i>Careya arborea</i>	2,363	0.81


Table 10.7.14 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Areca triandra</i>	10,138	0.274
2	<i>Anacardium occidentale</i>	4,674	0.415
3	<i>Cocos nucifera</i>	3,922	0.624
4	<i>Acacia auriculiformis</i>	2,117	0.085
5	<i>Terminalia paniculata</i>	1,221	0.169

Table 10.7.15 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Cocos nucifera</i>	1,502	0.303
2	<i>Mangifera indica</i>	434	0.302
3	<i>Areca triandra</i>	217	0.007
4	<i>Tectona grandis</i>	211	0.048
5	<i>Artocarpus heterophyllus/ Artocarpus integrifolia</i>	174	0.107

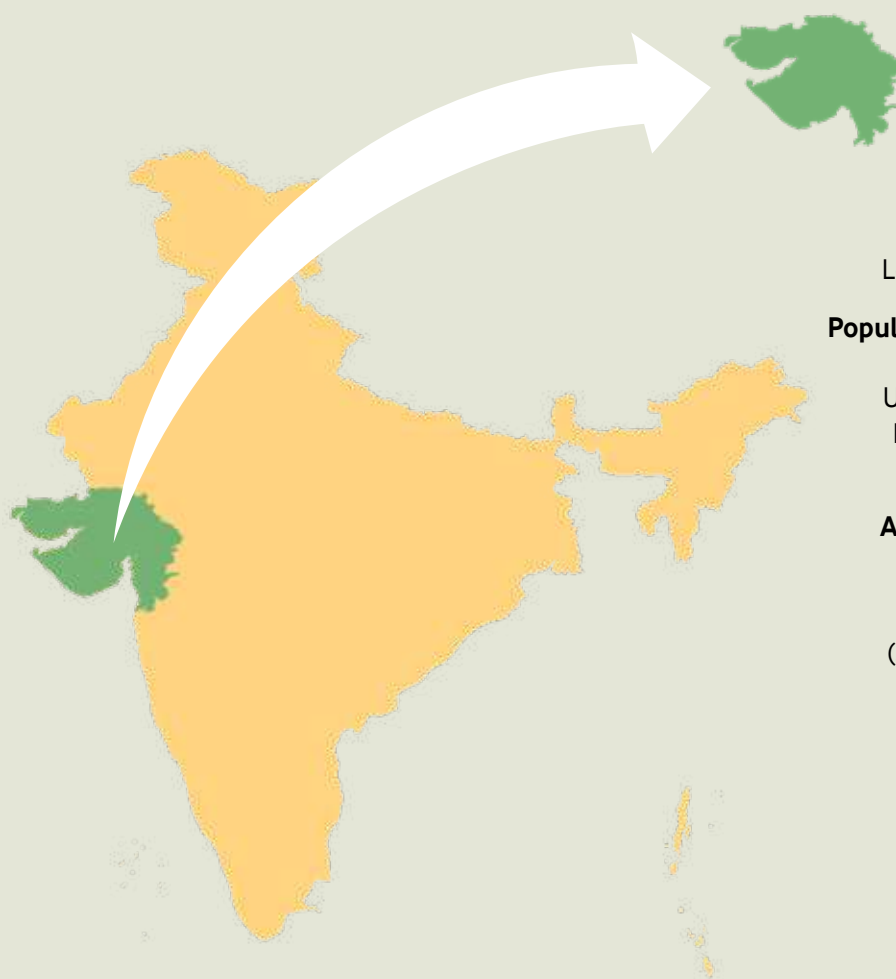
Table 10.7.16 Major NTFP Species in Goa

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Terminalia bellirica</i>	Tree	20,172
2	<i>Syzygium cumini</i>	Tree	19,644
3	<i>Anacardium occidentale</i>	Tree	15,025
4	<i>Terminalia paniculata</i>	Tree	10,066
5	<i>Garcinia indica</i>	Tree	9,640
6	<i>Cassia fistula/ Sp.</i>	Tree	7,585
7	<i>Emblica officinalis/ Phyllanthus emblica</i>	Tree	7,272
8	<i>Xylia xylocarpa</i>	Tree	4,230
9	<i>Buchanania Lanza</i>	Tree	4,112
10	<i>Terminalia elliptica/ Terminalia crenulata/ Terminalia tomentosa</i>	Tree	4,038

Table 10.7.17 Major Invasive Species in the State inside the RFA in Goa

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Chromolaena odorata</i>	73.99
2	<i>Ageratum conyzoides</i>	11.99
3	<i>Acacia farnesiana/ Vachellia farnesiana</i>	11.78
4	<i>Triumfetta rhomboidea</i>	4.55
5	<i>Ageratina adenophora</i>	2.27

GUJARAT



Geographical Area
1,96,244 km²

Geographical Coordinates
Latitude 20°07' N to 24°43' N
Longitude 68°10' E to 74°29' E

Population (as per Census 2011)
60.44 million
Urban 25.74 million (42.60 %)
Rural 34.70 million (57.40 %)
Tribal 8.92 million (14.75 %)

Average Population Density
308 per km²

Livestock Population
(as per 19th Livestock Census)
27.12 million

No. of Districts
33

No. of Hill Districts
0

No. of Tribal Districts
9

Table 10.8.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	19,624	
Reporting area for land utilization	18,810.21	100.00
Forests	2,051.60	10.91
Not available for land cultivation	3,542.16	18.83
Permanent pastures and other grazing lands	788.22	4.19
Land under misc. tree crops and groves	10.02	0.05
Culturable wasteland	1,917.35	10.19
Fallow land other than current fallows	119.82	0.65
Current fallows	660.91	3.51
Net area sown	9,720.13	51.67

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.8.1 Forest Cover

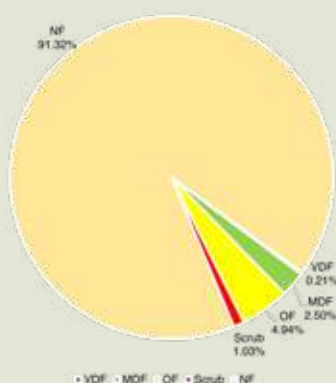


Figure 10.8.1 Forest Cover of Gujarat

Table 10.8.2 Forest Cover of Gujarat

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	419.71	0.21
MDF	4,902.20	2.50
OF	9,694.73	4.94
Total	15,016.64	7.65
Scrub	2,029.95	1.03

Table 10.8.3 District-wise Forest Cover in Gujarat

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Ahmedabad	7,250	0.00	9.00	106.20	115.20	1.59	20.97	28.37
Amreli	7,320	0.12	68.51	212.11	280.74	3.84	23.55	66.04
Anand	3,177	0.00	8.49	47.52	56.01	1.76	22.68	1.77
Arvali	3,151	0.86	63.13	215.55	279.54	8.87	17.13	32.57
Banaskantha	10,775	0.00	343.49	469.02	812.51	7.54	-4.67	133.25
Bharuch	6,507	0.00	51.27	247.71	298.98	4.59	11.93	17.83
Bhavnagar	8,501	0.00	46.87	256.12	302.99	3.56	44.80	82.68
Botad	2,482	0.00	0.26	12.32	12.58	0.51	-1.14	5.51
Chhotaudepur	3,454	0.00	121.01	332.80	453.81	13.14	-13.02	8.07
Dahod	3,645	0.43	105.34	336.77	442.54	12.14	-30.52	25.38
Dang	1,770	209.76	703.05	352.28	1,265.09	71.47	-88.94	9.00
Devbhumi Dwarka	6,347	0.00	28.05	172.69	200.74	3.16	19.18	41.19
Gandhinagar	2,104	0.00	17.38	97.37	114.75	5.45	23.09	15.05
Gir Somnath	2,646	0.01	35.47	227.35	262.83	9.93	14.50	19.85
Jamnagar	7,608	0.00	51.62	257.35	308.97	4.06	-6.19	88.57
Junagadh	6,148	61.92	881.83	582.78	1,526.53	24.83	7.74	71.85
Kachchh	45,646	0.04	278.38	2,453.48	2,731.90	5.98	237.78	958.59
Kheda	3,442	0.00	6.95	54.66	61.61	1.79	12.11	19.92
Mahesana	4,422	0.00	12.96	168.66	181.62	4.11	26.60	22.15
Mahisagar	2,512	0.03	69.65	224.15	293.83	11.70	-10.13	28.45
Morbi	4,983	0.00	3.44	142.99	146.43	2.94	10.16	25.09
Narmada	2,818	19.74	417.48	416.96	854.18	30.31	-68.46	23.00
Navsari	2,230	17.07	110.90	205.65	333.62	14.96	-1.90	9.41
Panchmahals	3,282	0.00	119.10	273.01	392.11	11.95	-27.31	21.15
Patan	5,789	0.00	11.62	100.95	112.57	1.94	21.89	41.94
Porbandar	2,312	0.00	21.56	122.29	143.85	6.22	16.97	38.74

**Table 10.8.3 District-wise Forest Cover in Gujarat**

District	Calculated Area by Sol	2023 Assessment				% of Cal- culated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Rajkot	7,677	0.00	1.02	59.05	60.07	0.78	6.26	21.96
Sabarkantha	4,254	27.83	251.42	280.42	559.67	13.16	18.41	77.01
Surat	4,565	4.62	277.32	213.92	495.86	10.86	-1.36	13.07
Surendranagar	9,186	0.00	10.58	134.75	145.33	1.58	11.24	36.60
Tapi	3,139	77.28	431.39	208.77	717.44	22.86	-79.60	5.57
Vadodara	4,094	0.00	19.70	131.32	151.02	3.69	28.31	19.38
Valsad	3,008	0.00	323.96	577.76	901.72	29.98	-81.99	20.94
Grand Total	1,96,244	419.71	4,902.20	9,694.73	15,016.64	7.65	180.07	2,029.95

*Area figure calculated without normalization factor.

Table 10.8.4 Forest Cover in Municipal Areas of Gujarat

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
1.	Gandhinagar	195.74	0.00	6.21	19.37	25.58	13.07	1.14
2.	Surat	461.64	0.00	0.76	13.12	13.88	3.01	2.84
3.	Rajkot	160.97	0.00	0.00	2.09	2.09	1.30	0.00
	Grand Total	818.35	0.00	6.97	34.58	41.55	5.08	3.98

*Shapefile of digitized boundary as provided by Directorate of Municipal / Urban Development Gujarat.

10.8.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.8.5 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Gujarat

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
400.31	3,948.17	5,041.39	9,389.87	19.40	954.03	4,653.34	5,626.77
4.26%	42.05%	53.69%		0.34%	16.96%	82.70%	

*In case of Gujarat, RFA boundaries have been used.

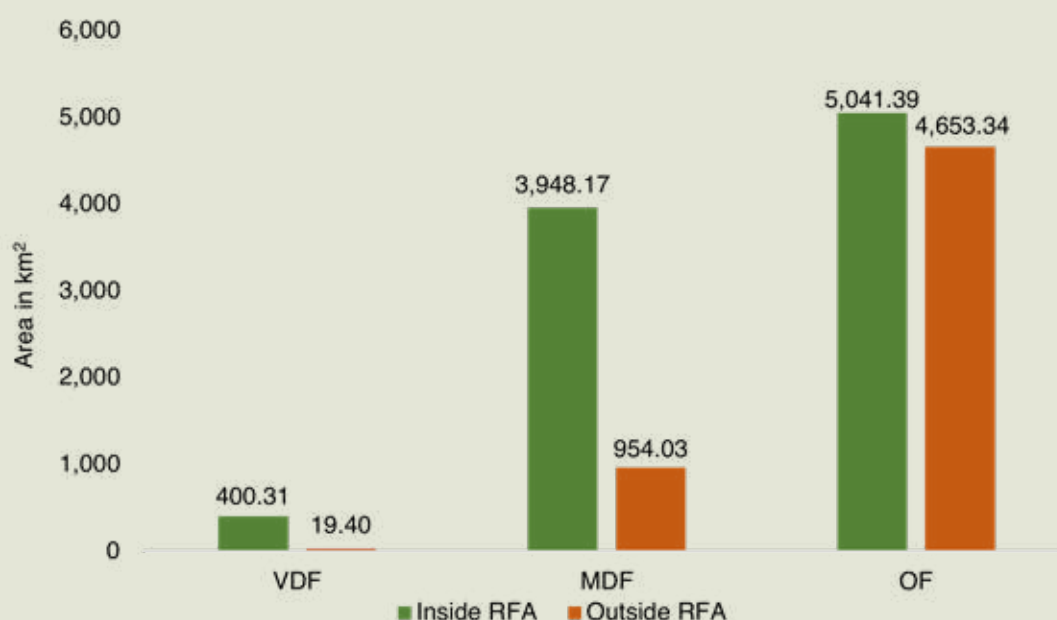


Figure 10.8.2 Forest Cover Inside and Outside of RFA in Gujarat

Table 10.8.6 Forest Cover Change Matrix Inside RFA/GW for Gujarat between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					Total ISFR 2021 inside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	351.16	1.36	1.07	0.00	2.64	356.23
MDF	44.63	3,788.02	54.00	5.08	69.75	3,961.48
OF	4.48	150.84	4,523.04	60.31	394.71	5,133.38
Scrub	0.00	3.44	250.47	697.05	179.17	1,130.13
NF	0.04	4.51	212.81	76.89	19,478.53	19,772.78
Total ISFR 2023 inside RFA / GW	400.31	3,948.17	5,041.39	839.33	20,124.80	30,354.00
Net Change	44.08	-13.31	-91.99	-290.80	352.02	

*Area figure calculated without normalization factor.



Table 10.8.7 Forest Cover Change Matrix Outside RFA/GW for Gujarat between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	18.14	0.03	0.05	0.00	0.40	18.62
MDF	1.08	871.88	16.73	9.50	56.33	955.52
OF	0.18	47.65	3,623.80	84.94	654.77	4,411.34
Scrub	0.00	4.09	354.69	893.61	498.38	1,750.77
NF	0.00	30.38	658.07	202.57	1,57,862.73	1,58,753.75
Total ISFR 2023 outside RFA/GW	19.40	954.03	4,653.34	1,190.62	1,59,072.61	1,65,890.00
Net Change	0.78	-1.49	242.00	-560.15	318.86	

*Area figure calculated without normalization factor.

Table 10.8.8 Altitude-wise Forest Cover in Gujarat

(km ²)						
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	1,95,407.00	369.29	4,611.90	9,571.32	14,552.51	2,018.22
500-1000	830.00	50.39	289.52	123.25	463.16	11.45
1000-2000	7.00	0.03	0.78	0.16	0.97	0.28
Total	1,96,244.00	419.71	4,902.20	9,694.73	15,016.64	2,029.95

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

Table 10.8.9 Forest Cover in Different Slope Classes in Gujarat

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	1,85,312.00	125.44	2,271.65	6,943.83	9,340.92	1,675.57
5-10	6,265.00	82.22	997.22	1,261.39	2,340.83	221.24
10-15	2,322.00	77.02	697.68	714.08	1,488.78	74.96
15-20	1,257.00	64.26	468.66	422.87	955.79	33.22
20-25	659.00	41.68	274.37	223.18	539.23	14.55
25-30	291.00	19.69	129.05	93.64	242.38	6.57
>30	138.00	9.40	63.57	35.74	108.71	3.84
Total	1,96,244.00	419.71	4,902.20	9,694.73	15,016.64	2,029.95

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

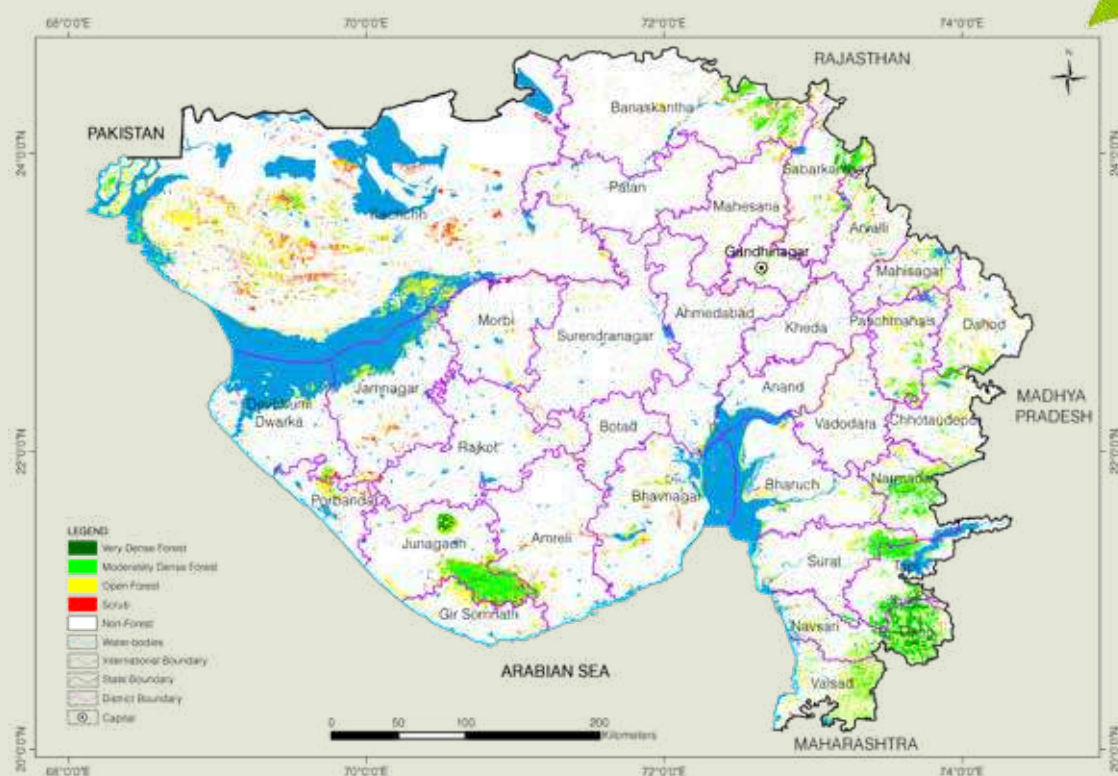


Figure 10.8.3 Forest Cover Map of Gujarat

10.8.3 Forest Types

The area under different Forest Types in Gujarat (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.8.10 Area Statistics of the Forest Types Found in Gujarat

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	3B/C1b Moist teak forest	793.43	4.65
2	3B/C1c Slightly moist teak forest	661.71	3.88
3	3B/C2 Southern moist mixed deciduous forest	998.09	5.86
4	4B/TS1 Mangrove scrub	646.55	3.79
5	4B/TS2 Mangrove forest	630.76	3.70
6	5A/C1a Very dry teak forest	3.06	0.02
7	5A/C1b Dry teak forest	26.38	0.15
8	5A/C3 Southern dry mixed deciduous forest	718.60	4.22
9	5B/C2 Northern dry mixed deciduous forest	351.17	2.06
10	5/DS1 Dry deciduous scrub	72.99	0.43


Table 10.8.10 Area Statistics of the Forest Types Found in Gujarat

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
11	5/DS4 Dry grass land	2.73	0.02
12	5/E1 <i>Anogeissus pendula</i> forest	58.02	0.34
13	5/E2 <i>Boswellia</i> forest	91.11	0.53
14	5/E3 <i>Babul</i> forest	142.84	0.84
15	5/E5 <i>Butea</i> forest	120.85	0.71
16	5/E8c <i>Salvadora-Tamarix</i> scrub	740.20	4.34
17	5/E9 Dry bamboo brakes	1,618.39	9.49
18	5/1S1 Dry tropical riverain forest	1,997.42	11.72
19	5/2S1 Secondary dry deciduous forest	911.13	5.34
20	6A/C1 Southern thorn forest	915.92	5.37
21	6B/C1 Desert thorn forest	510.52	2.99
22	6B/DS2 Tropical <i>Euphorbia</i> scrub	23.74	0.14
23	6/E2 <i>Acacia senegal</i> forest	42.06	0.25
24	6/E3 Rann saline thorn forest	1,277.59	7.49
25	6/E4 <i>Salvadora</i> scrub	831.81	4.90
Sub Total		14,187.07	83.23
26	TOF/ Plantation	2,859.52	16.77
Total (Forest Cover & Scrub)		17,046.59	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). The total mapped area, therefore, is sum of forest cover and scrub.

10.8.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.8.11 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1.	Ahmedabad	0	0
2.	Amreli	25	23
3.	Anand	0	0
4.	Arvali	18	210
5.	Banaskantha	23	65
6.	Bharuch	110	82
7.	Bhavnagar	68	44
8.	Botad	2	0
9.	Chhotaudepur	255	232
10.	Dahod	122	135
11.	Dang	417	478
12.	Devbhumi Dwarka	31	8

**Table 10.8.11 District-wise Number of Forest Fire Detected**

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
13.	Gandhinagar	2	2
14.	Gir Somnath	30	25
15.	Jamnagar	20	25
16.	Junagadh	77	118
17.	Kachchh	133	237
18.	Kheda	0	0
19.	Mahesana	2	0
20.	Mahisagar	53	161
21.	Morbi	6	29
22.	Narmada	270	239
23.	Navsari	67	98
24.	Panchmahals	66	116
25.	Patan	7	14
26.	Porbandar	14	10
27.	Rajkot	8	9
28.	Sabarkantha	45	201
29.	Surat	133	102
30.	Surendranagar	22	33
31.	Tapi	222	323
32.	Vadodara	9	20
33.	Valsad	85	143
Total		2,342	3,182



10.8.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.8.12 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	11.10	0.07
2	Very highly fire prone	705.82	4.14
3	Highly fire prone	1,224.97	7.19
4	Moderately fire prone	1,492.81	8.76
5	Less fire prone	13,611.89	79.84
Total		17,046.59	100.00

*Forest Cover including Scrub.

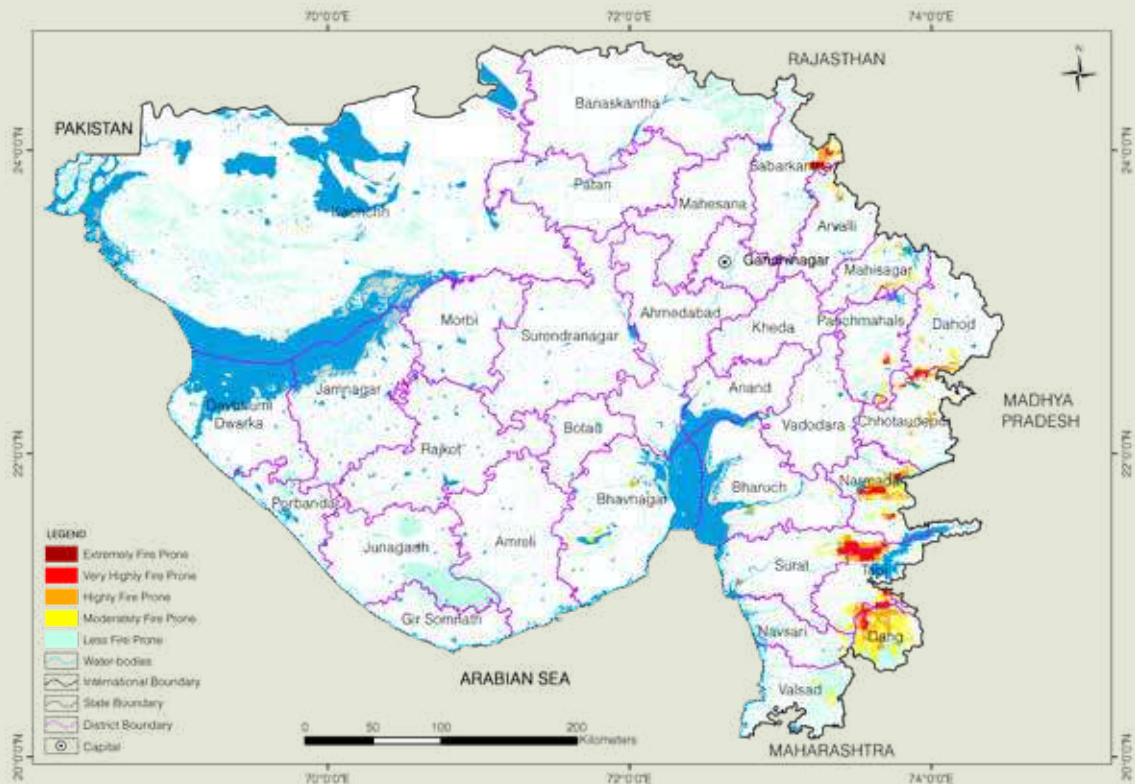


Figure 10.8.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.8.6 Results Derived from NFI for Gujarat

Table 10.8.13 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Tectona grandis</i>	52,520	9.34
2	<i>Wrightia tinctoria</i>	20,248	1.75
3	<i>Prosopis juliflora/ Neltuma juliflora</i>	15,022	0.97
4	<i>Butea monosperma</i>	14,567	1.94
5	<i>Terminalia elliptica/ Terminalia crenulata</i>	11,484	2.98


Table 10.8.14 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Azadirachta indica</i>	99,236	25.030
2	<i>Prosopis juliflora</i> / <i>Neltuma juliflora</i>	87,795	2.082
3	<i>Mangifera indica</i>	29,032	5.461
4	<i>Acacia Arabica</i> / <i>Vachellia nilotica</i>	22,254	3.197
5	<i>Ziziphus species</i>	18,025	0.730

Table 10.8.15 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Azadirachta indica</i>	3,255	1.615
2	<i>Prosopis juliflora</i> / <i>Neltuma juliflora</i>	1,453	0.059
3	<i>Polyalthia species</i>	1,005	0.080
4	<i>Mangifera indica</i>	815	0.275
5	<i>Peltophorum pterocarpum</i>	711	0.226

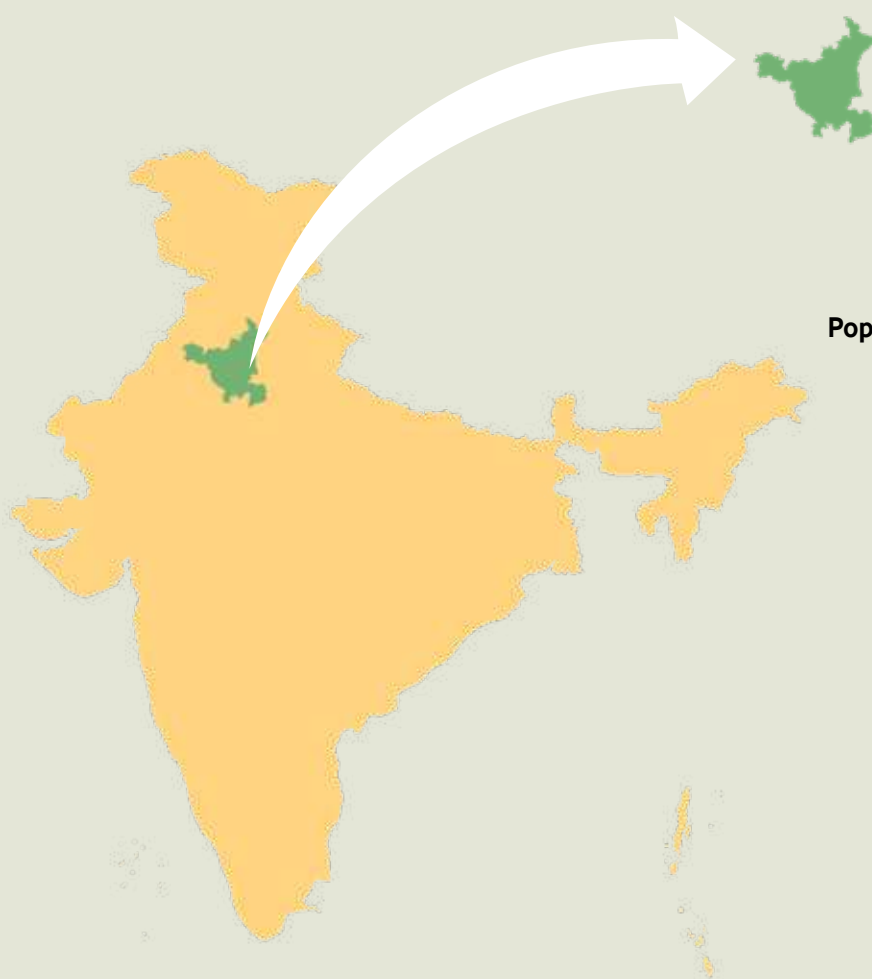
Table 10.8.16 Major NTFP Species in Gujarat

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Diospyros melanoxylon</i>	Tree	5,51,302
2	<i>Butea monosperma</i>	Tree	3,88,314
3	<i>Anogeissus latifolia</i> / <i>Terminalia anogeissiana</i>	Tree	3,10,613
4	<i>Acacia catechu</i> / <i>Senegalia catechu</i>	Tree	1,47,441
5	<i>Acacia nilotica</i> / <i>Acacia arabica</i> / <i>Vachellia nilotica</i>	Tree	1,42,767
6	<i>Azadirachta indica</i>	Tree	1,28,945
7	<i>Madhuca longifolia</i> / <i>M. latifolia</i> / <i>M. indica</i>	Tree	53,869
8	<i>Cassia tora</i> / <i>Senna tora</i>	Shrubs	1,98,16,580
9	<i>Ocimum species</i> (<i>Ocimum gratissimum</i> / <i>Ocimum sanctum</i> / <i>Ocimum tenuiflorum</i> / <i>Ocimum americanum</i>)	Herbs	19,20,22,148
10	<i>Eclipta prostrata</i> / <i>Eclipta alba</i>	Herbs	4,14,436

Table 10.8.17 Major invasive Species in the State inside the RFA in Gujarat

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Cassia tora</i> / <i>Senna tora</i>	949.34
2	<i>Lantana camara</i>	696.19
3	<i>Senna occidentalis</i>	145.94
4	<i>Ageratum conyzoides</i>	134.14
5	<i>Triumfetta rhomboidea</i>	133.19

HARYANA



Geographical Area
44,212 km²

Geographical Coordinates
Latitude 27°39' N to 30°55' N
Longitude 74°27' E to 77°36' E

Population (as per Census 2011)
25.35 million
Urban 8.84 million (34.87 %)
Rural 16.51 million (65.13 %)
Tribal Nil

Average Population Density
573 per km²

Livestock Population
(as per 19th Livestock Census)
8.82 million

No. of Districts
22

No. of Hill Districts
0

No. of Tribal Districts
0

Table 10.9.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	4,421	
Reporting area for land utilization	4,371.49	100.00
Forests	32.45	0.74
Not available for land cultivation	339.19	7.76
Permanent pastures and other grazing lands	152.72	3.49
Land under misc. tree crops and groves	37.37	0.85
Culturable wasteland	64.62	1.48
Fallow land other than current fallows	49.18	1.13
Current fallows	85.23	1.95
Net area sown	3,610.73	82.60

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.9.1 Forest Cover

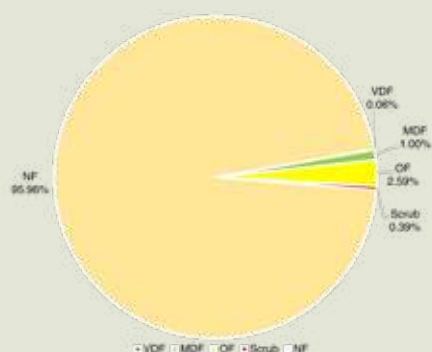


Table 10.9.2 Forest Cover of Haryana

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	27.17	0.06
MDF	441.18	1.00
OF	1,145.91	2.59
Total	1,614.26	3.65
Scrub	174.38	0.39

Figure 10.9.1 Forest Cover of Haryana

Table 10.9.3 District- wise Forest Cover in Haryana

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Ambala	1,574	0.00	17.31	39.36	56.67	3.60	4.08	0.09
Bhiwani	3,386	0.00	4.08	58.53	62.61	1.85	-1.89	7.15
Charkhi Dadri	1,382	0.00	3.56	42.36	45.92	3.32	-1.24	9.00
Faridabad	741	0.00	25.98	52.45	78.43	10.58	-1.08	20.20
Fatehabad	2,538	0.00	2.96	18.35	21.31	0.84	-0.32	1.07
Gurugram	1,258	0.00	31.85	81.26	113.11	8.99	0.15	20.42
Hisar	3,993	0.00	10.75	47.79	58.54	1.47	-1.92	6.28
Jhajjar	1,834	0.00	0.23	25.33	25.56	1.39	0.65	6.43
Jind	2,701	0.00	4.79	21.64	26.43	0.98	0.26	0.08
Kaithal	2,318	0.00	21.51	32.81	54.32	2.34	-1.26	0.95
Karnal	2,494	0.00	4.16	28.79	32.95	1.32	0.04	0.67
Kurukshetra	1,536	0.00	19.94	26.09	46.03	3.00	-1.63	1.69
Mahendragarh	1,899	0.00	21.74	89.57	111.31	5.86	-1.72	40.09
Mewat	1,507	0.00	13.58	95.38	108.96	7.23	-4.05	27.15
Palwal	1,359	0.00	2.43	11.39	13.82	1.02	-0.21	0.20
Panchkula	898	5.70	147.59	236.83	390.12	43.44	-1.43	20.33
Panipat	1,288	0.00	3.10	12.87	15.97	1.24	-0.47	0.64
Rewari	1,594	0.00	11.90	49.55	61.45	3.86	-0.52	9.11
Rohtak	1,704	0.00	1.36	13.18	14.54	0.85	-4.28	1.02
Sirsa	4,277	0.00	3.54	61.04	64.58	1.51	1.05	0.15
Sonipat	2,163	0.00	2.66	19.98	22.64	1.05	-0.09	0.84
Yamunanagar	1,768	21.47	86.16	81.36	188.99	10.69	1.92	0.82
Grand Total	44,212	27.17	441.18	1,145.91	1,614.26	3.65	-13.96	174.38

*Area figure calculated without normalization factor.



Table 10.9.4 Forest Cover in Municipal Areas of Haryana

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
1	Adampur	9.15	0.00	0.00	0.21	0.21	2.30	0.11
2	Ambala City	67.56	0.00	0.11	1.38	1.49	2.21	0.00
3	Ambala Sadar	56.27	0.00	1.44	0.82	2.26	4.02	0.00
4	Assandh	7.54	0.00	0.00	0.07	0.07	0.93	0.00
5	Ateli Mandi	2.03	0.00	0.00	0.00	0.00	0.00	0.00
6	Bahadurgarh	29.29	0.00	0.00	0.37	0.37	1.26	0.00
7	Barara	13.89	0.00	0.00	0.21	0.21	1.51	0.00
8	Barwala	9.34	0.00	0.00	0.06	0.06	0.64	0.02
9	Bawal	3.76	0.00	0.00	0.11	0.11	2.93	0.00
10	Bawani Khera	9.87	0.00	0.00	0.24	0.24	2.43	0.00
11	Beri	1.29	0.00	0.00	0.00	0.00	0.00	0.00
12	Bhiwani	40.52	0.00	0.00	0.73	0.73	1.80	0.05
13	Bhuna	4.25	0.00	0.00	0.01	0.01	0.24	0.00
14	Charkhi Dadri	15.80	0.00	0.19	0.55	0.74	4.68	0.30
15	Cheeka	31.05	0.00	0.00	0.44	0.44	1.42	0.00
16	Daruheda	11.51	0.00	0.00	0.06	0.06	0.52	0.00
17	Ellenabad	5.91	0.00	0.00	0.14	0.14	2.37	0.00
18	Faridabad	285.89	0.00	12.40	32.81	45.21	15.81	17.07
19	Farukh Nagar	20.21	0.00	0.01	0.13	0.14	0.69	0.00
20	Fatehabad	28.15	0.00	0.00	0.00	0.00	0.00	0.00
21	Ferozepur Jhirka	5.69	0.00	0.00	0.12	0.12	2.11	0.00
22	Gannaur	10.36	0.00	0.00	0.16	0.16	1.54	0.00
23	Gharunda	12.96	0.00	0.02	0.06	0.08	0.62	0.00
24	Gohana	12.31	0.00	0.07	0.02	0.09	0.73	0.00
25	Gurugram	297.99	0.00	8.73	28.78	37.51	12.59	7.01
26	Hansi	13.53	0.00	0.00	0.52	0.52	3.84	0.00
27	Hathin	4.10	0.00	0.00	0.08	0.08	1.95	0.00
28	Hisar	92.92	0.00	1.66	2.26	3.92	4.22	0.28
29	Hodal	10.80	0.00	0.09	0.00	0.09	0.83	0.00
30	Indri	1.88	0.00	0.00	0.07	0.07	3.72	0.00
31	Ismailabad	11.98	0.00	0.00	0.00	0.00	0.00	0.00
32	Jakhal Mandi	2.67	0.00	0.00	0.00	0.00	0.00	0.00
33	Jhajjar	35.57	0.00	0.00	0.66	0.66	1.86	0.12
34	Jind	37.50	0.00	0.60	0.55	1.15	3.07	0.00
35	Julana	13.85	0.00	0.00	0.03	0.03	0.22	0.00
36	Kaithal	39.87	0.00	0.69	0.08	0.77	1.93	0.00
37	Kalanaur	6.92	0.00	0.00	0.01	0.01	0.14	0.00
38	Kalanwali	7.96	0.00	0.35	0.11	0.46	5.78	0.00
39	Kalayath	12.68	0.00	0.00	0.36	0.36	2.84	0.00
40	Kalka	56.94	0.00	5.64	11.07	16.71	29.35	0.46
41	Kanina	4.39	0.00	0.00	0.00	0.00	0.00	0.00

Table 10.9.4 Forest Cover in Municipal Areas of Haryana(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
42	Karnal	90.92	0.00	0.23	4.21	4.44	4.88	0.00
43	Kharkhoda	4.41	0.00	0.00	0.00	0.00	0.00	0.00
44	Kundli	7.85	0.00	0.02	0.00	0.02	0.25	0.00
45	Ladwa	7.98	0.00	0.00	0.03	0.03	0.38	0.00
46	Loharu	9.95	0.00	0.00	0.71	0.71	7.14	0.27
47	Mahendergarh	8.97	0.00	0.27	0.87	1.14	12.71	0.00
48	Mandi Dabwali	15.85	0.00	0.00	0.06	0.06	0.38	0.00
49	Manesar	138.18	0.00	6.37	9.70	16.07	11.63	1.16
50	Meham	3.33	0.00	0.04	0.00	0.04	1.20	0.00
51	Nagal Chaudhary	14.60	0.00	0.00	0.32	0.32	2.19	0.19
52	Naraingarh	8.95	0.00	0.13	0.00	0.13	1.45	0.00
54	Narnaul	63.36	0.00	0.19	1.78	1.97	3.11	0.92
53	Narnaund	6.39	0.00	0.00	0.00	0.00	0.00	0.00
55	Narwana	9.53	0.00	0.10	0.02	0.12	1.26	0.00
56	Nilokehri	5.08	0.00	0.00	0.44	0.44	8.66	0.00
57	Nissing	4.70	0.00	0.00	0.00	0.00	0.00	0.00
58	Nuh	7.21	0.00	0.00	0.00	0.00	0.00	0.00
59	Palwal	59.17	0.00	0.28	0.61	0.89	1.50	0.00
60	Panchkula	96.21	0.00	4.87	6.59	11.46	11.91	0.24
61	Panipat	60.47	0.00	0.27	0.34	0.61	1.01	0.20
62	Pataudi Mandi	62.99	0.00	0.00	0.62	0.62	0.98	0.00
63	Pehowa	13.10	0.00	0.00	0.20	0.20	1.53	0.00
64	Pundri	27.68	0.00	0.00	0.09	0.09	0.33	0.00
65	Punhana	10.19	0.00	0.00	0.02	0.02	0.20	0.00
66	Radaur	10.14	0.00	0.00	0.14	0.14	1.38	0.00
67	Rajound	39.37	0.00	0.14	0.47	0.61	1.55	0.00
68	Rania	6.63	0.00	0.00	0.07	0.07	1.06	0.00
69	Ratia	8.52	0.00	0.00	0.00	0.00	0.00	0.00
70	Rewari	25.78	0.00	0.00	0.78	0.78	3.03	0.00
71	Rohtak	139.29	0.00	0.05	2.59	2.64	1.90	0.42
72	Sadhaura	6.77	0.00	0.01	0.06	0.07	1.03	0.00
73	Safidon	8.38	0.00	0.09	0.04	0.13	1.55	0.00
74	Samalkha	4.65	0.00	0.00	0.00	0.00	0.00	0.00
75	Sampla	6.72	0.00	0.00	0.00	0.00	0.00	0.00
76	Shahabad	11.83	0.00	0.28	0.29	0.57	4.82	0.00
77	Sirsa	43.88	0.00	0.00	0.04	0.04	0.09	0.00
78	Siwan	41.77	0.00	0.16	2.12	2.28	5.46	0.00
79	Siwani	4.49	0.00	0.00	0.06	0.06	1.34	0.00
80	Sohna	70.48	0.00	4.57	11.94	16.51	23.43	0.20
81	Sonipat	104.07	0.00	0.43	1.16	1.59	1.53	0.00
82	Tarori	5.81	0.00	0.00	0.00	0.00	0.00	0.00

**Table 10.9.4 Forest Cover in Municipal Areas of Haryana**

(km ²)								
Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
83	Tauru	6.77	0.00	0.00	0.09	0.09	1.33	0.00
84	Thanesar	32.50	0.00	1.41	1.47	2.88	8.86	0.00
85	Tohana	13.76	0.00	0.00	0.13	0.13	0.94	0.00
86	Uchana	4.27	0.00	0.00	0.00	0.00	0.00	0.00
87	Uklana	3.86	0.00	0.00	0.01	0.01	0.26	0.00
88	Yamuna Nagar	111.87	0.00	0.82	3.54	4.36	3.90	0.15
Grand Total		2,794.83	0.00	52.73	134.89	187.62	6.71	29.17

*Shapefile of digitized boundary as provided by IT Cell, Department of Urban Local Bodies.

10.9.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.9.5 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Haryana

(km ²)							
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
23.99	258.77	446.17	728.93	3.18	182.41	699.74	885.33
3.29%	35.50%	61.21%		0.36%	20.60%	79.04%	

*In case of Haryana, RFA boundaries have been used.

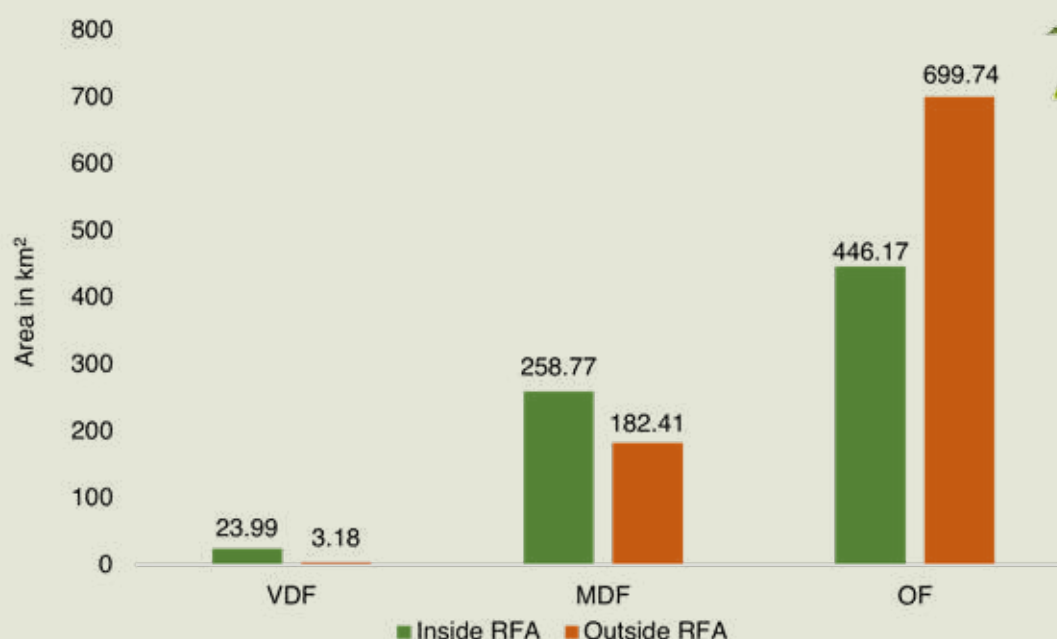


Figure 10.9.2 Forest Cover Inside and Outside of RFA in Haryana

Table 10.9.6 Forest Cover Change Matrix Inside RFA/GW for Haryana Between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					(km²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 inside RFA / GW Raster based*
VDF	23.99	0.00	0.00	0.00	0.00	23.99
MDF	0.00	257.68	0.15	0.13	1.12	259.08
OF	0.00	0.91	442.31	1.40	4.01	448.63
Scrub	0.00	0.03	1.88	56.42	0.83	59.16
NF	0.00	0.15	1.83	2.91	832.59	837.48
Total ISFR 2023 inside RFA /GW	23.99	258.77	446.17	60.86	838.55	1,628.34
Net Change	0.00	-0.31	-2.46	1.70	1.07	

*Area figure calculated without normalization factor.

Table 10.9.7 Forest Cover Change Matrix Outside RFA/GW for Haryana Between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	3.18	0.00	0.00	0.00	0.00	3.18
MDF	0.00	180.33	1.60	0.34	3.71	185.98
OF	0.00	1.43	674.54	5.72	25.67	707.36
Scrub	0.00	0.03	2.90	95.16	6.13	104.22
NF	0.00	0.62	20.70	12.30	41,549.30	41,582.92
Total ISFR 2023 outside RFA/GW	3.18	182.41	699.74	113.52	41,584.81	42,583.66
Net Change	0.00	-3.57	-7.62	9.30	1.89	

*Area figure calculated without normalization factor.



Table 10.9.8 Altitude-wise Forest Cover in Haryana

(km ²)						
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	43,838	15.08	323.29	990.82	1,329.19	165.69
500-1000	330	12.09	97.58	134.36	244.03	8.29
1000-2000	44	0.00	20.31	20.73	41.04	0.40
Total	44,212	27.17	441.18	1,145.91	1,614.26	174.38

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

Table 10.9.9 Forest Cover in Different Slope Classes in Haryana

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	42,615	13.88	232.96	804.59	1,051.43	110.82
5-10	1,104	6.47	75.32	129.27	211.06	26.21
10-15	228	3.86	56.10	83.87	143.83	14.91
15-20	126	2.11	36.73	58.23	97.07	9.97
20-25	74	0.68	21.67	36.54	58.89	6.61
25-30	41	0.15	12.09	20.69	32.93	3.67
>30	24	0.02	6.31	12.72	19.05	2.19
Total	44,212	27.17	441.18	1,145.91	1,614.26	174.38

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

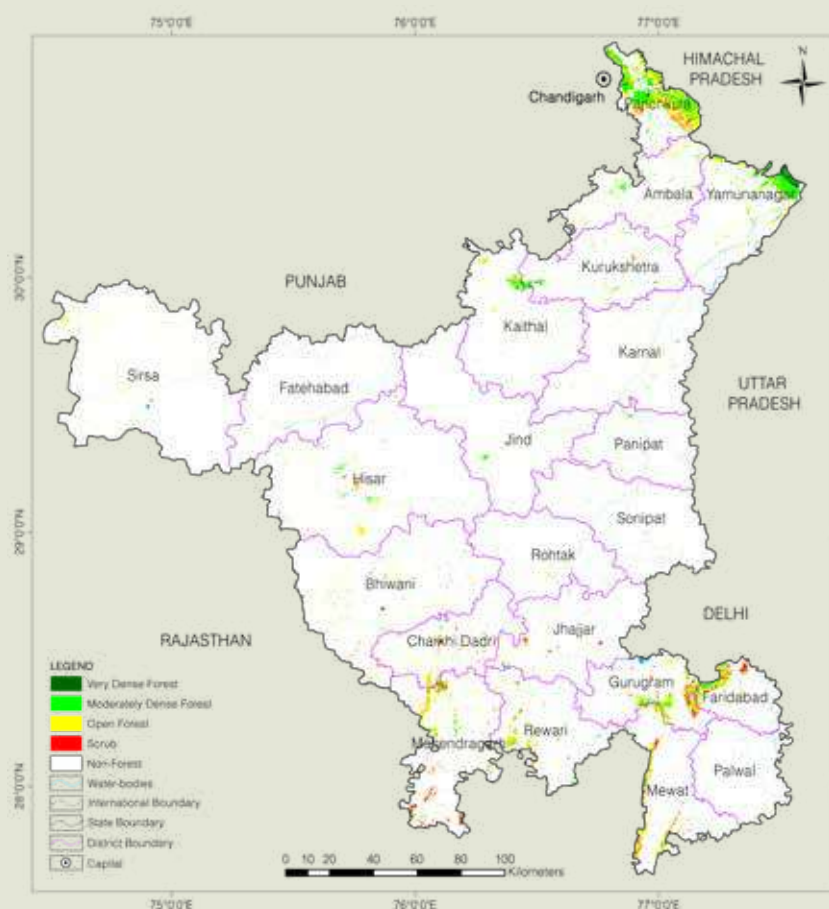


Figure 10.9.3 Forest Cover Map of Haryana

10.9.3 Forest Types

The area under different Forest Types in Haryana (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.9.10 Area Statistics of the Forest Types found in Haryana

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	5B/C1a Dry Siwalik sal forest	46.40	2.59
2	5B/C2 Northern dry mixed deciduous forest	526.58	29.44
3	5/DS1 Dry deciduous scrub	27.27	1.52
4	5/E1 <i>Anogeissus pendula</i> forest	96.70	5.41
5	5/E1/DS1 <i>Anogeissus pendula</i> scrub	16.83	0.94
6	5/E9 Dry bamboo brakes	7.31	0.41
7	6B/C1 Desert thorn forest	90.09	5.04
8	6B/C2 Ravine thorn forest	245.62	13.73
9	6/1S1 Desert dune scrub	103.74	5.80
10	9/C1a Lower or Siwalik chir pine forest	13.00	0.73
Sub Total		1,173.54	65.61
11	TOF/ Plantation	615.10	34.39
Total (Forest Cover & Scrub)		1,788.64	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). The total mapped area, therefore, is sum of forest cover and scrub.

10.9.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.9.11 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Ambala	6	19
2	Bhiwani	0	0
3	Charkhi Dadri	0	0
4	Faridabad	0	12
5	Fatehabad	4	0
6	Gurugram	0	4
7	Hisar	2	0
8	Jhajjar	0	1
9	Jind	0	0
10	Kaithal	8	5
11	Karnal	3	1


Table 10.9.11 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
12	Kurukshetra	3	3
13	Mahendragarh	0	2
14	Mewat	0	0
15	Palwal	0	0
16	Panchkula	5	29
17	Panipat	32	16
18	Rewari	0	1
19	Rohtak	0	0
20	Sirsa	0	0
21	Sonapat	0	0
22	Yamunanagar	19	73
Grand Total		82	166

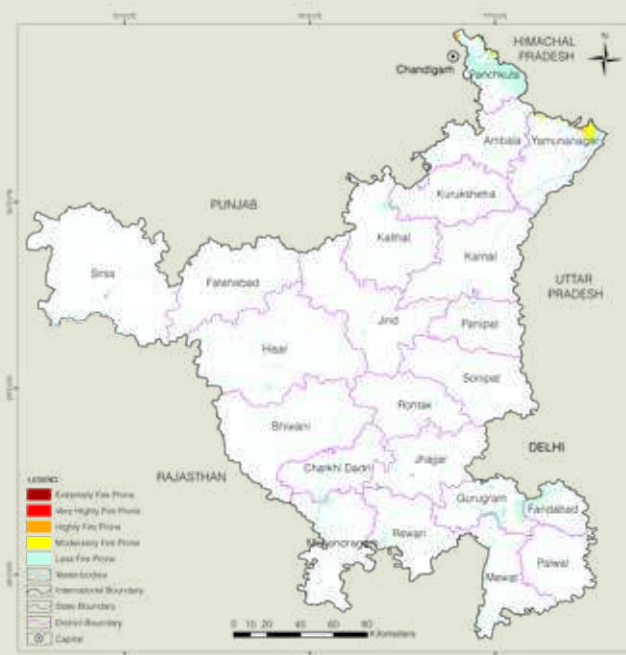
10.9.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.9.12 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	0.00	0.00
2	Very highly fire prone	0.00	0.00
3	Highly fire prone	28.89	1.62
4	Moderately fire prone	79.71	4.46
5	Less fire prone	1,680.04	93.92
Total		1,788.64	100.00

*Forest Cover including Scrub


Figure 10.9.4 Fire Prone Forest Areas under Different Fire Prone Classes



10.9.6 Results Derived from NFI for Haryana

Table 10.9.13 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in'000)	Volume (M m ³)
1	<i>Eucalyptus species</i>	3,750	1.25
2	<i>Prosopis juliflora/ Neltuma juliflora</i>	2,640	0.41
3	<i>Acacia tortilis/ Vachellia tortilis</i>	2,617	0.37
4	<i>Acacia catechu/ Senegalia catechu</i>	1,846	0.25
5	<i>Anogeissus latifolia/ Terminalia anogeissiana</i>	781	0.25

Table 10.9.14 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in'000)	Volume (M m ³)
1	<i>Eucalyptus species</i>	23,968	4.940
2	<i>Dalbergia sissoo</i>	8,849	3.166
3	<i>Prosopis juliflora/ Neltuma juliflora</i>	7,254	0.411
4	<i>Prosopis cineraria</i>	6,588	3.428
5	<i>Azadirachta indica</i>	6,521	1.266

Table 10.9.15 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in'000)	Volume (M m ³)
1	<i>Eucalyptus species</i>	1,333	0.215
2	<i>Azadirachta indica</i>	677	0.189
3	<i>Prosopis juliflora/ Neltuma juliflora</i>	627	0.046
4	<i>Melia azedarach</i>	486	0.065
5	<i>Morus species</i>	448	0.063

Table 10.9.16 Major NTFP Species in Haryana

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Acacia nilotica/ Acacia arabica/ Vachellia nilotica</i>	Tree	9,994
2	<i>Acacia catechu/ Senegalia catechu</i>	Tree	6,897
3	<i>Anogeissus latifolia/ Terminalia anogeissiana</i>	Tree	6,393
4	<i>Adhatoda vasica/ Justicia adhatoda</i>	Shrubs	3,34,991
5	<i>Asparagus adscendens</i>	Shrubs	13,958
6	<i>Abrus precatorius</i>	Climbers	26,171
7	<i>Cucumis melo/ Cucumis pubescens</i>	Climbers	20,937
8	<i>Cassia tora/ Senna tora</i>	Herbs	23,53,082
9	<i>Achyranthes aspera</i>	Herbs	15,46,311



Table 10.9.17 Major Invasive Species in the State inside the RFA in Haryana

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Lantana camara</i>	89.05
2	<i>Prosopis juliflora</i> / <i>Neltuma juliflora</i>	61.30
3	<i>Saccharum spontaneum</i>	31.18
4	<i>Ageratum houstonianum</i>	11.63
5	<i>Leucaena leucocephala</i>	8.46



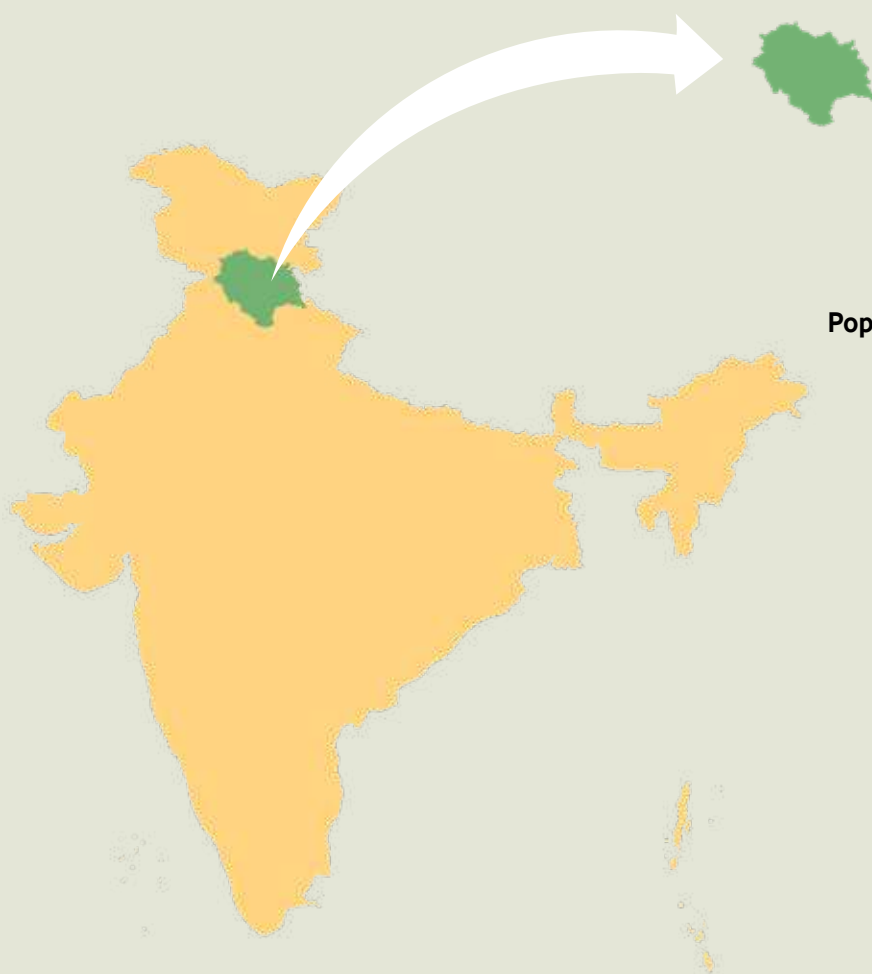
Photo: FSI Repository

Forest Survey of India



Photo: FSI Repository

HIMACHAL PRADESH



Geographical Area
55,673 km²

Geographical Coordinates
Latitude 30°22' N to 33°12' N
Longitude 75°45' E to 79°04' E

Population (as per Census 2011)
6.86 million
Urban 0.69 million (10.03 %)
Rural 6.17 million (89.97 %)
Tribal 0.39 million (5.71 %)

Average Population Density
123 per km²

Livestock Population
(as per 19th Livestock Census)
4.84 million

No. of Districts
12

No. of Hill Districts
12

No. of Tribal Districts
3

Table 10.10.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	5,567	
Reporting area for land utilization	4,577.12	100.00
Forests	1,144.10	24.99
Not available for land cultivation	1,136.60	24.83
Permanent pastures and other grazing lands	1,465.53	32.02
Land under misc. tree crops and groves	70.03	1.53
Culturable wasteland	129.85	2.84
Fallow land other than current fallows	25.57	0.56
Current fallows	77.74	1.70
Net area sown	527.70	11.53

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.10.1 Forest Cover

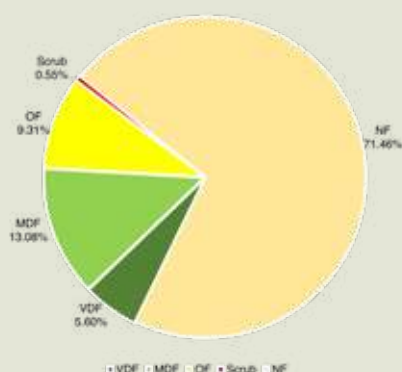


Table 10.10.2 Forest Cover of Himachal Pradesh

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	3,117.60	5.60
MDF	7,280.29	13.08
OF	5,182.46	9.31
Total	15,580.35	27.99
Scrub	308.69	0.55

Figure 10.10.1 Forest Cover of Himachal Pradesh

Table 10.10.3 District- wise Forest Cover in Himachal Pradesh

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Bilaspur ^H	1,167	22.65	165.85	185.30	373.80	32.03	2.12	3.30
Chamba ^H	6,522	596.72	1,221.92	637.51	2,456.15	37.66	-1.82	21.27
Hamirpur ^H	1,118	42.41	101.95	217.17	361.53	32.34	0.00	12.40
Kangra ^H	5,739	229.24	1,301.44	869.52	2,400.20	41.82	5.70	12.81
Kinnaur ^H	6,401	84.24	325.72	238.11	648.07	10.12	-0.51	61.34
Kullu ^H	5,503	634.95	852.20	508.21	1,995.36	36.26	0.22	25.02
Lahaul & Spiti ^H	13,841	11.95	34.03	100.03	146.01	1.05	0.17	16.69
Mandi ^H	3,950	412.59	730.22	647.36	1,790.17	45.32	9.11	18.67
Shimla ^H	5,131	778.96	1,150.66	514.97	2,444.59	47.64	4.22	28.29
Sirmaur ^H	2,825	238.40	646.70	530.78	1,415.88	50.12	20.46	49.60
Solan ^H	1,936	45.84	439.72	423.19	908.75	46.94	12.08	46.55
Una ^H	1,540	19.65	309.88	310.31	639.84	41.55	2.98	12.75
Grand Total	55,673	3,117.60	7,280.29	5,182.46	15,580.35	27.99	54.73	308.69

*Area figure calculated without normalization factor.



Table 10.10.4 Division-wise Forest Cover in Himachal Pradesh

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Anni	714.59	70.71	161.44	100.31	332.46	46.52	-0.06	2.49
Banjar	356.91	83.50	89.51	30.26	203.27	56.95	0.13	1.40
Bharmour	952.77	102.46	117.84	142.44	362.74	38.07	0.42	5.04
Bilaspur	1,167.39	22.05	189.43	163.18	374.66	32.09	2.05	1.91
Chamba	1,473.05	372.98	281.15	133.43	787.56	53.46	-2.03	0.87
Chamba WL	1,309.67	50.53	90.21	73.35	214.09	16.35	-0.34	5.98
Chopal	810.96	129.16	238.72	61.58	429.46	52.96	0.20	5.14
Churah	884.79	112.97	210.67	95.83	419.47	47.41	0.66	1.31
Dalhousie	714.27	100.50	277.91	80.54	458.95	64.25	0.00	0.22
Dehra	970.26	29.62	199.45	234.10	463.17	47.74	5.07	10.42
Dharamshala	1,066.49	110.46	343.63	83.08	537.17	50.37	-0.04	0.85
Excluded Area from Majathal WL Sanctuary	8.80	0.00	0.35	1.78	2.13	24.20	0.01	0.21
Excluded Area From Shikari Devi WL Sanctuary	80.85	22.13	37.55	0.35	60.03	74.25	0.00	0.00
Excluded Area From Chail WL Sanctuary	91.51	6.25	17.87	12.00	36.12	39.47	0.73	1.78
Excluded Area From Churdhar WL Sanctuary	7.92	0.28	1.05	0.56	1.89	23.86	0.13	0.00
Excluded Area From Darlaghat Conservation	13.47	0.38	2.91	1.55	4.84	35.93	-0.01	0.00
Excluded Area From Gamgul Siyabehi WL Sanctuary	19.13	0.77	5.60	1.27	7.64	39.94	0.00	0.37
Excluded Area From Kalatop Khajjiar WL Sanctuary	21.07	7.55	2.31	2.66	12.52	59.42	-0.02	0.00
Excluded Area From Kanawar WL Sanctuary	14.58	2.68	7.41	0.95	11.04	75.72	0.00	0.00
Excluded Area From Kugti WL Sanctuary	71.92	0.81	1.80	7.14	9.75	13.56	0.11	0.01
Excluded Area From Nagru WL Sanctuary	5.10	2.34	0.99	0.00	3.33	65.29	0.00	0.02
Excluded Area From Nargu WL	99.22	26.26	29.90	9.40	65.56	66.08	0.00	0.08
Excluded Area From Sechu-Tuan Nala WL Sanctuary	44.42	0.00	0.00	10.35	10.35	23.30	-0.04	0.56

Table 10.10.4 Division-wise Forest Cover in Himachal Pradesh(km²)

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Ghnp	980.82	58.68	96.77	40.98	196.43	20.03	0.00	2.99
Hamirpur	1,118.40	37.38	119.89	208.83	366.10	32.73	0.06	11.72
Hamirpur WL	868.13	17.84	48.15	12.76	78.75	9.07	0.00	1.63
Hamirpur WL North	230.64	0.00	1.67	2.19	3.86	1.67	0.00	0.90
Joginder Nagar	657.50	52.53	80.76	186.70	319.99	48.67	1.23	3.23
Karsog	602.12	26.63	129.24	103.46	259.33	43.07	2.14	6.12
Kinnaur	5,690.40	61.21	281.09	207.12	549.42	9.66	-0.51	53.60
Kotgarh	273.29	55.33	52.62	21.50	129.45	47.37	0.00	0.28
Kullu	1,156.62	108.61	243.88	146.91	499.40	43.18	0.00	4.04
Kullu WL	1,495.01	192.07	208.32	85.00	485.39	32.47	0.18	4.16
Kunihar	543.76	5.68	161.46	105.82	272.96	50.20	0.84	6.49
Lahaul	6,574.85	14.18	31.29	98.50	143.97	2.19	0.17	11.16
Mandi	820.26	46.30	132.00	148.43	326.73	39.83	0.42	3.25
Nachan	619.51	112.68	195.59	48.01	356.28	57.51	0.46	0.03
Nahan	518.67	21.76	182.88	175.55	380.19	73.30	7.98	1.19
Nalagarh	703.49	26.99	145.13	133.38	305.50	43.43	0.97	11.82
Nurpur	1,434.31	23.23	401.66	284.82	709.71	49.48	-0.21	1.14
Palampur	1,167.86	115.22	306.42	191.40	613.04	52.49	1.30	1.32
Pangi	1,011.19	9.86	27.41	135.36	172.63	17.07	-0.58	5.43
Paonta Sahib	481.67	77.03	143.53	52.02	272.58	56.59	1.59	0.70
Parvati	929.98	108.12	134.74	133.72	376.58	40.49	-0.03	8.29
Rajgarh	761.22	23.87	196.33	160.25	380.45	49.98	5.85	19.03
Rampur	819.42	160.87	157.56	71.89	390.32	47.63	0.25	3.70
Renuka Ji	985.89	4.73	154.94	153.72	313.39	31.79	4.72	29.39
Rohru	1,589.07	176.00	345.01	162.58	683.59	43.02	0.64	6.85
Sarahan WL	962.65	79.96	76.93	38.65	195.54	20.31	0.00	6.31
Shimla	689.80	35.80	160.19	144.97	340.96	49.43	2.43	8.15
Shimla (Urban)	18.33	0.12	7.71	2.20	10.03	54.72	0.00	0.00
Shimla WL	186.73	67.20	79.75	16.74	163.69	87.66	1.58	0.18
Solan	553.93	0.40	108.64	155.91	264.95	47.83	8.51	29.05
Spiti WL	7,366.48	0.00	0.00	2.42	2.42	0.03	0.00	4.18
Suket	920.74	22.66	115.45	148.54	286.65	31.13	4.59	8.52
Theog	670.35	101.11	132.92	48.29	282.32	42.12	0.24	0.47
Una	1,538.63	19.15	312.21	307.71	639.07	41.54	2.92	14.71
Area which does not fall in any Division	31.00	0.01	0.45	0.02	0.48	1.55	0.02	0.00
Grand Total	55,871.86	3,117.60	7,280.29	5,182.46	15,580.35	27.89	54.73	308.69

As per the division boundary shapefile provided by State Forest Department.

*Area figure calculated without normalization factor.



Table 10.10.5 Forest Cover in Municipal Areas of Himachal Pradesh

(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
1	Amb Nagar Panchayat	14.08	0.00	0.00	2.83	2.83	20.10	0.00
2	Nagar Panchayat Anni	0.62	0.00	0.00	0.09	0.09	14.52	0.00
3	Arki	1.97	0.00	0.43	0.06	0.49	24.87	0.00
4	Baddi	7.91	0.00	0.00	0.07	0.07	0.88	0.00
5	Baijnath	7.30	0.00	0.05	0.76	0.81	11.10	0.00
6	Nagara Panchayat Banjar	0.50	0.00	0.01	0.01	0.02	4.00	0.00
7	Bhota	2.48	0.66	0.20	0.09	0.95	38.31	0.00
8	Nagar Panchayat Bhunter	0.68	0.00	0.00	0.05	0.05	7.35	0.00
9	Bilaspur	3.60	0.00	0.00	0.08	0.08	2.22	0.00
10	Chamba	3.56	0.00	0.31	0.66	0.97	27.25	0.00
11	Chirgaon	2.06	0.00	0.00	0.02	0.02	0.97	0.05
12	Chpopal	0.34	0.04	0.02	0.00	0.06	17.65	0.00
13	Chowari	2.15	0.00	0.01	0.20	0.21	9.77	0.00
14	Dalhousie	6.03	1.01	3.24	0.30	4.55	75.46	0.00
15	Daulatpur(NP)	4.79	0.00	3.25	0.00	3.25	67.85	0.00
16	Dehra	3.09	0.00	0.10	0.55	0.65	21.04	0.09
17	Dharamshala	28.36	3.36	5.49	1.96	10.81	38.12	0.00
18	Gagret(NP)	1.72	0.00	0.00	0.04	0.04	2.33	0.00
19	Ghumarwin	4.61	0.00	0.00	0.01	0.01	0.22	0.00
20	Hamirpur	5.79	0.00	0.00	0.66	0.66	11.40	0.00
21	Jawlamukhi	2.75	0.29	0.62	0.45	1.36	49.45	0.00
22	Joginder Nagar	2.21	0.03	0.01	0.04	0.08	3.62	0.06
23	Jubbal	0.29	0.00	0.00	0.02	0.02	6.90	0.00
24	Kandaghat	0.76	0.00	0.00	0.08	0.08	10.53	0.00
25	Kangra	2.60	0.00	0.00	0.60	0.60	23.08	0.00
26	Karsog	0.87	0.00	0.00	0.04	0.04	4.60	0.00
27	Kotkhai	0.56	0.00	0.00	0.16	0.16	28.57	0.00
28	Municipal Council Kullu	2.71	0.00	0.00	0.25	0.25	9.23	0.00
29	Municipal Council Manali	1.85	0.68	0.03	0.00	0.71	38.38	0.00
30	Mandi	26.03	0.00	0.09	5.48	5.57	21.40	0.00
31	Mehatpur Basdehra	3.30	0.00	0.00	0.01	0.01	0.30	0.00
32	Nadaun	1.64	0.00	0.00	0.08	0.08	4.88	0.00
33	Nagrota Bagwan	1.59	0.00	0.00	0.10	0.10	6.29	0.00
34	Nahan	10.56	0.00	3.27	3.90	7.17	67.90	0.00
35	Nalagarh	1.98	0.03	0.46	0.06	0.55	27.78	0.00
36	Narkanda	0.42	0.06	0.05	0.00	0.11	26.19	0.00
37	Nerchowk	6.48	0.00	0.00	0.00	0.00	0.00	0.00

Table 10.10.5 Forest Cover in Municipal Areas of Himachal Pradesh(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
38	Nerwa	0.63	0.00	0.03	0.07	0.10	15.87	0.00
39	Nagar Panchayat Nirmand	0.65	0.00	0.00	0.00	0.00	0.00	0.00
40	Nurpur	3.95	0.00	0.00	1.10	1.10	27.85	0.00
41	Parwanoo	1.83	0.00	0.03	0.16	0.19	10.38	0.00
42	Poanta Sahib	5.96	0.00	0.00	0.09	0.09	1.51	0.00
43	Rajgarh	1.27	0.00	0.10	0.13	0.23	18.11	0.00
44	Rampur	3.35	0.00	0.00	1.12	1.12	33.43	0.00
45	Rewalsar	0.63	0.00	0.00	0.03	0.03	4.76	0.00
46	Rohru	1.40	0.00	0.00	0.06	0.06	4.29	0.05
47	Santokhgarh	6.84	0.00	0.00	0.00	0.00	0.00	0.10
48	Sarkaghat	3.79	0.00	0.00	1.38	1.38	36.41	0.02
49	Shahpur	6.34	0.00	0.76	0.62	1.38	21.77	0.00
50	Naina Devi Ji	0.70	0.00	0.24	0.09	0.33	47.14	0.00
51	Solan	11.94	0.00	0.32	1.36	1.68	14.07	0.19
52	Sujanpur	2.43	0.00	0.00	0.04	0.04	1.65	0.00
53	Sundernagar	10.31	0.00	0.00	0.96	0.96	9.31	0.00
54	Sunni	0.87	0.00	0.00	0.02	0.02	2.30	0.13
55	Tahliwal	7.56	0.00	0.00	0.03	0.03	0.40	0.18
56	Talai	3.00	0.21	0.70	0.02	0.93	31.00	0.00
57	Theog	1.19	0.03	0.15	0.00	0.18	15.13	0.00
58	UNA(MC)	4.70	0.00	0.02	0.08	0.10	2.13	0.00
59	Jawali	3.69	0.00	0.00	0.46	0.46	12.47	0.00
60	Palampur	28.81	0.00	1.47	9.13	10.60	36.79	0.00
61	Shimla (MC)	27.80	0.29	11.11	2.10	13.50	48.56	0.00
Grand Total		307.88	6.69	32.57	38.76	78.02	25.34	0.87

*Shapefile of digitized boundary as provided by Directorate of Urban Development.

10.10.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.10.6 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Himachal Pradesh(km²)

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
2,791.82	5,431.88	2,483.27	10,706.97	325.78	1,848.41	2,699.19	4,873.38
26.08%	50.73%	23.19%		6.68%	37.93%	55.39%	

*In case of Himachal Pradesh, Green Wash boundaries have been used.

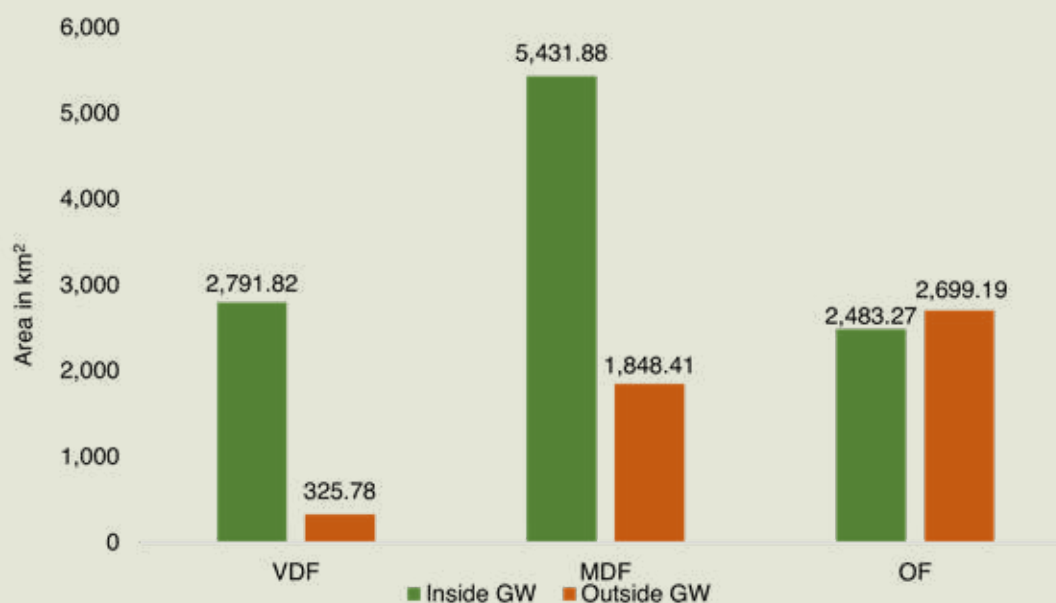


Figure 10.10.2 Forest Cover Inside and Outside of Green Wash in Himachal Pradesh

Table 10.10.7 Forest Cover Change Matrix Inside RFA/GW for Himachal Pradesh between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					(km²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 inside RFA / GW Raster based*
VDF	2,469.05	366.83	0.00	0.00	0.05	2,835.93
MDF	322.77	4,889.37	183.33	0.00	0.32	5,395.79
OF	0.00	175.68	2,263.25	0.00	1.25	2,440.18
Scrub	0.00	0.00	7.31	56.83	0.15	64.29
NF	0.00	0.00	29.38	0.18	3,259.23	3,288.79
Total ISFR 2023 inside RFA / GW	2,791.82	5,431.88	2,483.27	57.01	3,261.00	14,024.98
Net Change	-44.11	36.09	43.09	-7.28	-27.79	

*Area figure calculated without normalization factor.

Table 10.10.8 Forest Cover Change Matrix Outside RFA/GW for Himachal Pradesh between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	303.74	58.00	0.00	0.00	0.01	361.75
MDF	22.04	1,710.13	96.00	0.00	0.39	1,828.56
OF	0.00	80.28	2,579.52	0.38	3.23	2,663.41
Scrub	0.00	0.00	19.73	247.58	1.23	268.54
NF	0.00	0.00	3.94	3.72	36,518.10	36,525.76
Total ISFR 2023 outside RFA/GW	325.78	1,848.41	2,699.19	251.68	36,522.96	41,468.02
Net Change	-35.97	19.85	35.78	-16.86	-2.80	

*Area figure calculated without normalization factor.

Table 10.10.9 Altitude-wise Forest Cover in Himachal Pradesh(km²)

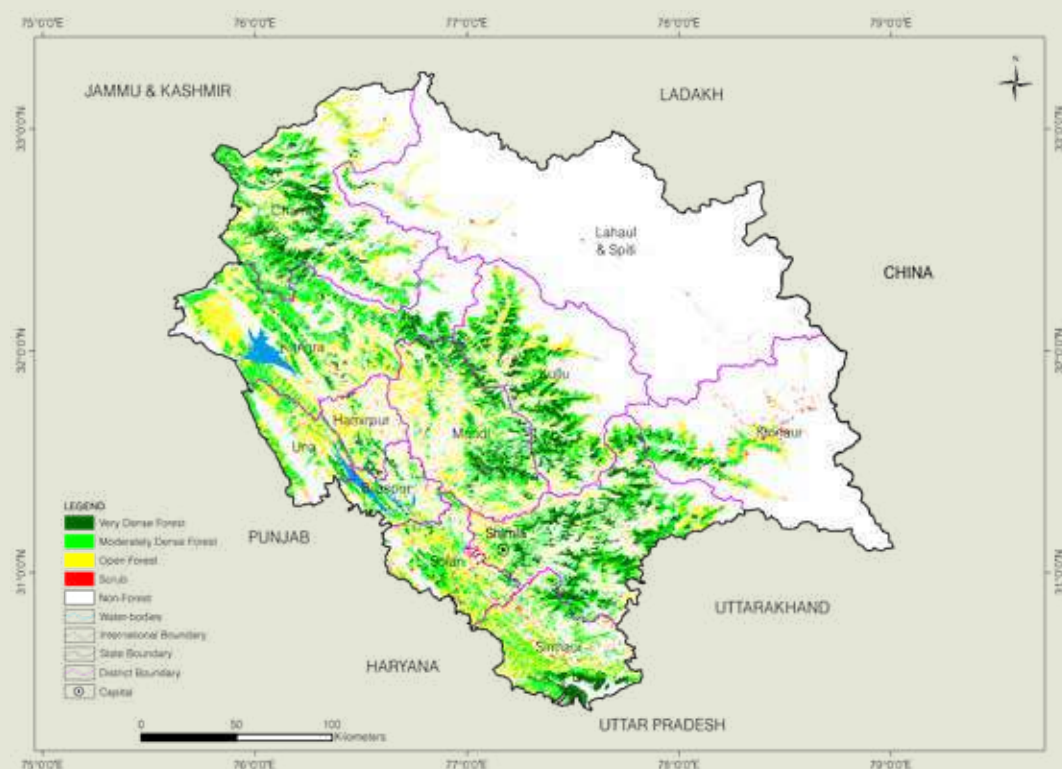
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	2,980	68.88	335.39	433.81	838.08	16.75
500-1000	7,615	324.28	1,579.56	1,717.23	3,621.07	55.93
1000-2000	9,285	420.80	1,848.26	1,636.30	3,905.36	107.91
2000-3000	7,745	1,926.22	2,457.36	688.94	5,072.52	24.46
3000-4000	6,943	377.41	1,057.41	687.30	2,122.12	94.26
> 4000	2,1105	0.01	2.31	18.88	21.20	9.38
Total	55,673	3,117.60	7,280.29	5,182.46	15,580.35	308.69

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

Table 10.10.10 Forest Cover in Different Slope Classes in Himachal Pradesh(km²)

Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	6,351	134.77	437.84	603.56	1,176.17	26.41
5-10	5,614	212.76	741.65	717.11	1,671.52	25.11
10-15	6,416	325.91	941.26	725.02	1,992.19	33.02
15-20	7,268	439.48	1,066.73	721.28	2,227.49	40.93
20-25	7,577	496.88	1,097.07	677.78	2,271.73	46.03
25-30	7,230	493.93	1,038.49	600.43	2,132.85	45.54
>30	15,217	1,013.87	1,957.25	1,137.28	4,108.40	91.65
Total	55,673	3,117.60	7,280.29	5,182.46	15,580.35	308.69

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

**Figure 10.10.3 Forest Cover Map of Himachal Pradesh**



10.10.3 Forest Types

The area under different Forest Types in Himachal Pradesh (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.10.11 Area Statistics of the Forest Types Found in Himachal Pradesh

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	3C/C2b(i) <i>Bhabar-dun sal</i>	210.65	1.03
2	5B/C1a Dry Siwalik sal forest	96.99	0.47
3	5B/C2 Northern dry mixed deciduous forest	2,604.66	12.75
4	5/DS1 Dry deciduous scrub	137.34	0.67
5	5/DS3 <i>Euphorbia scrub</i>	5.20	0.03
6	5/E9 Dry bamboo brakes	75.94	0.37
7	5/1S2 <i>Khair-sissu</i> forest	1.26	0.01
8	9/C1a Lower or Siwalik chir pine forest	1,532.58	7.50
9	9/C1b Upper or Himalayan chir pine forest	1,414.32	6.93
10	9/C1/DS1 Himalayan subtropical scrub	69.94	0.34
11	12/C1a <i>Ban oak forest (Q. incana)</i>	821.92	4.02
12	12/C1b <i>Moru oak forest (Q. dilatata)</i>	11.91	0.06
13	12/C1c Moist deodar forest (<i>Cedrus</i>)	2,168.03	10.62
14	12/C1d Western mixed coniferous forest (spruce, blue pine, silver fir)	2,902.25	14.21
15	12/C1e Moist temperate deciduous forest	102.96	0.50
16	12/C1f Low-level blue pine forest (<i>P. wallichiana</i>)	450.63	2.21
17	12/C1/DS1 Oak scrub	219.09	1.07
18	12/C1/DS2 Himalayan temperate secondary scrub	117.95	0.58
19	12/C2a <i>Kharsu oak forest (Q. semecarpifolia)</i>	151.23	0.74
20	12/C2b West Himalayan upper oak/fir forest	139.98	0.69
21	12/DS1 Montane bamboo brakes	11.40	0.06
22	12/E1 Cypress forest	9.14	0.04
23	12/1S1 Alder forest	3.84	0.02
24	13/C1 Dry broadleaved and coniferous forest (<i>Q. ilex-P. gerardiana</i>)	6.86	0.03
25	13/C2a Neoza pine forest (<i>P. gerardiana</i>)	126.11	0.62
26	13/C2b Dry deodar forest (<i>Cedrus</i>)	224.40	1.10
27	13/C3 West Himalayan dry temperate deciduous forest	0.08	0.00
28	13/C4 West Himalayan high-level dry blue pine forest (<i>P. wallichiana</i>)	65.44	0.32
29	13/C5 West Himalayan dry juniper forest (<i>J. macropoda</i>)	55.43	0.27
30	13/1S2 <i>Populus/Salix</i> forest	3.64	0.02
31	14/C1a West Himalayan sub-alpine fir forest	112.02	0.55
32	14/C1b West Himalayan sub-alpine birch/fir forest	508.67	2.49
33	15/C1 Birch/ <i>Rhododendron</i> scrub forest	37.37	0.18



Table 10.10.11 Area Statistics of the Forest Types Found in Himachal Pradesh

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
34	15/C2 Deciduous alpine scrub	4.82	0.02
35	15/E1 Dwarf <i>Rhododendron</i> scrub	1.58	0.01
36	16/C1 Dry alpine scrub	108.74	0.53
37	16/E1 Dwarf juniper scrub	163.06	0.80
Sub Total		14,677.43	71.86
38	TOF/ Plantation	1,211.61	5.93
Total (Forest Cover & Scrub)		15,889.04	77.79
Grassland Forest Types (outside forest cover)			
39	12/DS3 Himalayan temperate pastures	914.50	4.49
40	15/C3 Alpine pastures	3,619.78	17.72
Sub Total		4,534.28	22.21
Grand Total		20,423.32	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest types outside forest cover have also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).

10.10.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.10.12 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Bilaspur	10	428
2	Chamba	31	784
3	Hamirpur	23	507
4	Kangra	32	1,547
5	Kinnaur	23	121
6	Kullu	147	764
7	Lahaul & Spiti	0	4
8	Mandi	128	1,167
9	Shimla	199	1,823
10	Sirmaur	45	1,055
11	Solan	19	1,078
12	Una	47	858
Total		704	10,136



10.10.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.10.13 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	0.00	0.00
2	Very highly fire prone	69.77	0.44
3	Highly fire prone	1,100.12	6.92
4	Moderately fire prone	2,545.35	16.02
5	Less fire prone	12,173.80	76.62
Total		15,889.04	100.00

*Forest Cover including Scrub.

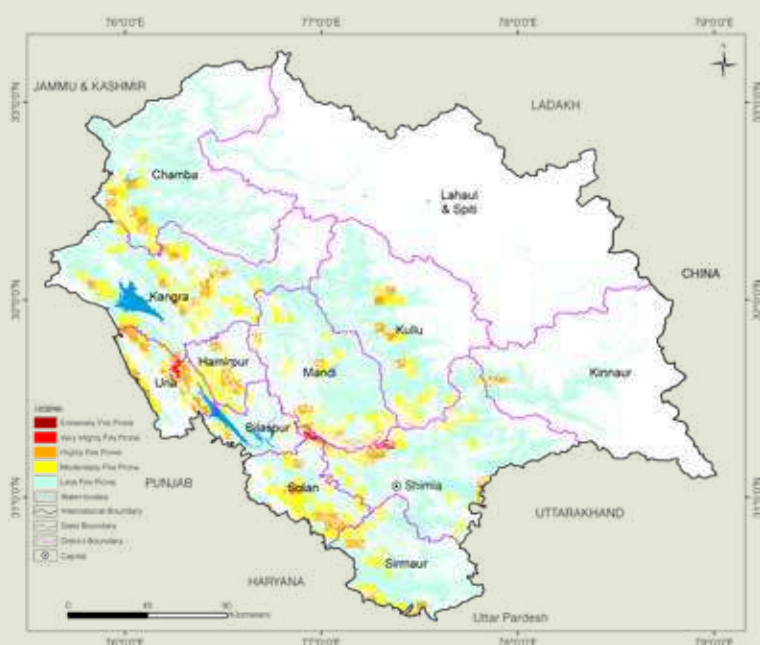


Figure 10.10.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.10.6 Results Derived from NFI for Himachal Pradesh

Table 10.10.14 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Quercus leucotrichophora</i>	83,194	17.55
2	<i>Pinus roxburghii</i>	81,563	37.98
3	<i>Cedrus deodara</i>	45,851	36.95
4	<i>Pinus wallichiana/ Pinus excelsa</i>	38,713	35.74
5	<i>Mallotus philippensis</i>	37,987	2.11



Table 10.10.15 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Pinus roxburghii</i> / <i>Pinus longifolia</i>	26,934	7.908
2	<i>Grewia optiva</i> / <i>Grewia oppositifolia</i>	17,617	1.308
3	<i>Pyrus species</i>	15,405	0.287
4	<i>Acacia catechu</i> / <i>Senegalia catechu</i>	11,853	0.784
5	<i>Mallotus philippensis</i>	10,610	0.630

Table 10.10.16 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Grewia optiva</i> / <i>Grewia oppositifolia</i>	239	0.017
2	<i>Pinus roxburghii</i>	166	0.057
3	<i>Morus species</i>	141	0.012
4	<i>Leucaena leucocephala</i>	128	0.011
5	<i>Acacia catechu</i> / <i>Senegalia catechu</i>	105	0.012

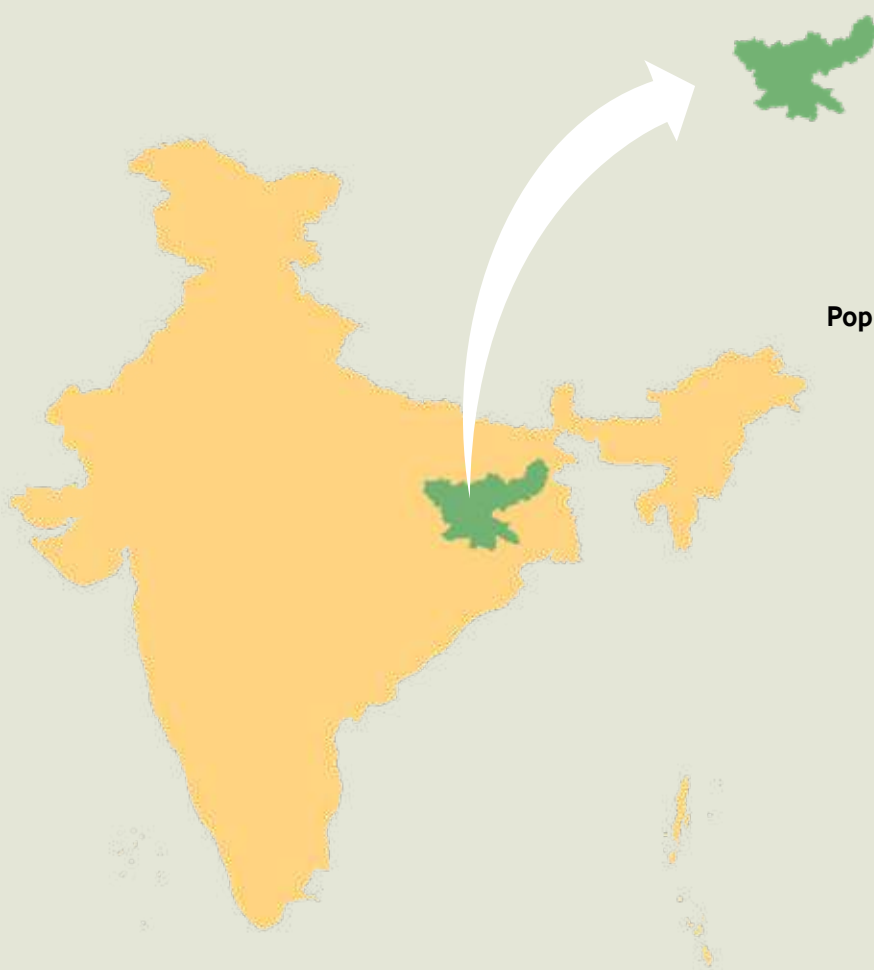
Table 10.10.17 Major NTFP Species in Himachal Pradesh

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Acacia catechu</i> / <i>Senegalia catechu</i>	Tree	3,62,736
2	<i>Pinus wallichiana</i> / <i>Pinus excelsa</i>	Tree	38,713
3	<i>Berberis aristata</i>	Shrubs	92,47,067
4	<i>Skimmia laureola</i>	Shrubs	10,99,580
5	<i>Zanthoxylum armatum</i>	Shrubs	3,70,943
6	<i>Bauhinia vahlii</i> / <i>Phanera vahlii</i>	Climbers	25,64,214
7	<i>Tinospora cordifolia</i>	Climbers	1,97,247
8	<i>Trillidium govanianum</i> / <i>Trillium govanianum</i>	Herbs	4,80,97,498
9	<i>Aconitum heterophyllum</i>	Herbs	1,78,13,888
10	<i>Jurinea dolomiaea</i> / <i>Dolomiaea macrocephala</i>	Herbs	71,25,555

Table 10.10.18 Major Invasive Species in the State Inside the RFA in Himachal Pradesh

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Lantana camara</i>	3,252.82
2	<i>Ageratum conyzoides</i>	331.71
3	<i>Ageratum houstonianum</i>	289.28
4	<i>Ageratina adenophora</i>	118.28
5	<i>Saccharum spontaneum</i>	78.43

JHARKHAND

**Geographical Area**79,716 km²**Geographical Coordinates**

Latitude 22°00' N to 24°37' N

Longitude 83°15' E to 87°01' E

Population (as per Census 2011)

32.99 million

Urban 7.93 million (24.05 %)

Rural 25.06 million (75.95 %)

Tribal 8.65 million (26.21 %)

Average Population Density414 per km²**Livestock Population**(as per 19th Livestock Census)

18.05 million

No. of Districts

24

No. of Hill Districts

0

No. of Tribal Districts

17

Table 10.11.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	7,972	
Reporting area for land utilization	7,970.08	100.00
Forests	2,239.48	28.10
Not available for land cultivation	1,275.84	16.01
Permanent pastures and other grazing lands	131.13	1.64
Land under misc. tree crops and groves	126.18	1.58
Culturable wasteland	382.44	4.80
Fallow land other than current fallows	1,068.00	13.40
Current fallows	1,368.44	17.17
Net area sown	1,378.57	17.30

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.11.1 Forest Cover

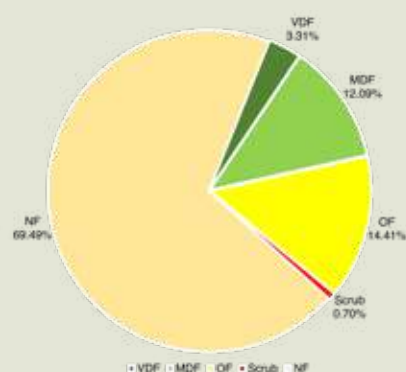


Table 10.11.2 Forest Cover of Jharkhand

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	2,635.35	3.31
MDF	9,640.99	12.09
OF	11,489.44	14.41
Total	23,765.78	29.81
Scrub	558.32	0.70

Figure 10.11.1 Forest Cover of Jharkhand

Table 10.11.3 District- wise Forest Cover in Jharkhand

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Bokaro	2,883	59.04	231.40	281.97	572.41	19.85	2.33	29.09
Chatra	3,718	254.32	838.17	706.90	1,799.39	48.40	-15.23	34.45
Deoghar	2,477	0.03	13.18	192.45	205.66	8.30	0.38	13.94
Dhanbad	2,040	0.00	43.62	177.58	221.20	10.84	2.19	14.13
Dumka	3,761	0.02	252.54	336.28	588.84	15.66	11.34	31.00
East Singhbhum	3,562	53.52	587.20	428.26	1,068.98	30.01	-3.43	22.79
Garhwa	4,093	129.75	419.54	906.31	1,455.60	35.56	22.93	41.54
Giridih	4,962	77.20	333.39	489.61	900.20	18.14	0.77	31.07
Godda	2,266	13.52	275.09	141.87	430.48	19.00	1.62	13.56
Gumla	5,360	308.47	587.15	559.79	1,455.41	27.15	5.50	7.75
Hazaribagh	3,555	233.20	467.06	941.28	1,641.54	46.18	4.33	21.62
Jamtara	1,811	0.00	20.28	87.21	107.49	5.94	1.09	4.00
Khunti	2,535	77.18	358.61	515.92	951.71	37.54	0.92	4.05
Kodarma	2,540	76.98	359.87	258.89	695.74	27.39	-1.79	7.83
Latehar	4,291	485.48	1,291.23	606.49	2,383.20	55.54	-2.37	7.39
Lohardaga	1,502	170.65	219.34	113.18	503.17	33.50	0.82	5.44
Pakur	1,811	2.83	168.77	114.53	286.13	15.80	1.08	21.87
Palamu	4,393	68.02	544.14	605.76	1,217.92	27.72	6.33	82.92
Ramgarh	1,341	31.18	113.29	197.09	341.56	25.47	1.10	15.20
Ranchi	5,097	63.57	349.76	727.13	1,140.46	22.38	4.58	21.52
Sahibganj	2,063	18.12	262.43	311.90	592.45	28.72	0.08	57.16
Saraikela Kharsawan	2,657	22.47	213.75	345.82	582.04	21.91	3.09	18.09
Simdega	3,774	22.37	342.69	881.45	1,246.51	33.03	-3.51	17.57
West Singhbhum	7,224	467.43	1,348.49	1,561.77	3,377.69	46.76	14.66	34.34
Grand Total	79,716	2,635.35	9,640.99	11,489.44	23,765.78	29.81	58.81	558.32

*Area figure calculated without normalization factor.



Table 10.11.4 Division-wise Forest Cover in Jharkhand

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Bokaro	2,686.78	42.01	195.35	250.61	487.97	18.16	2.14	27.29
Chaibasa	2,846.32	1.80	185.70	471.67	659.17	23.16	4.30	11.13
Chatra North	1,472.96	58.29	375.66	291.14	725.09	49.23	-19.14	11.34
Chatra South	1,925.06	128.95	331.85	378.57	839.37	43.60	-0.48	9.55
Deoghar	2,468.45	0.00	13.73	190.19	203.92	8.26	0.44	12.56
Dhalbhum	3,253.39	36.80	490.93	379.34	907.07	27.88	-3.66	18.09
Dhanbad	2,023.38	0.00	43.30	167.19	210.49	10.40	0.76	15.57
Dumka	3,735.27	0.02	253.61	329.33	582.96	15.61	8.95	34.82
Elephant Sanctuary Dalma	411.66	27.82	132.19	65.32	225.33	54.74	0.00	4.01
Garhwa North	2,445.14	39.89	54.40	417.03	511.32	20.91	11.58	35.59
Garhwa South	1,487.37	35.26	266.75	485.72	787.73	52.96	2.44	5.15
Giridih East	3,089.69	76.05	275.68	351.87	703.60	22.77	-0.32	16.16
Giridih West	1,205.94	0.07	24.64	48.43	73.14	6.06	-0.47	8.58
Godda	2,223.51	12.16	262.91	132.79	407.86	18.34	1.53	13.39
Gumla	4,203.24	191.82	330.86	402.33	925.01	22.01	2.19	6.97
Hazaribag East	1,717.11	85.72	169.88	277.29	532.89	31.03	-0.06	4.00
Hazaribag West	2,768.79	116.67	240.66	595.39	952.72	34.41	-0.79	18.04
Hazaribag WL	1,019.45	135.06	340.23	247.50	722.79	70.90	-1.24	3.75
Jamtara	1,794.22	0.00	20.11	85.27	105.38	5.87	0.72	4.63
Khunti	3,943.36	80.83	447.30	690.59	1,218.72	30.91	0.49	16.72
Koderma	1,439.24	53.49	270.87	212.98	537.34	37.33	-2.11	6.42
Kolhan	1,123.00	34.28	329.12	372.64	736.04	65.54	3.01	13.03
Latehar	2,700.30	160.66	745.30	377.58	1,283.54	47.53	-3.07	6.31
Lohardaga	1,878.08	225.99	345.49	147.30	718.78	38.27	0.67	4.78
Medani Nagar	4,302.48	65.50	521.59	571.45	1,158.54	26.93	2.36	80.73
Pakur	1,806.53	2.84	176.82	117.88	297.54	16.47	1.06	22.06
Porahat	2,277.39	134.69	454.56	586.50	1,175.75	51.63	2.28	14.72
PTR Buffer	1,168.51	303.40	329.31	190.36	823.07	70.44	0.00	0.91
PTR Core	807.14	129.27	386.28	97.49	613.04	75.95	0.00	0.00
Ramgarh	1,630.38	35.87	124.98	250.84	411.69	25.25	1.09	16.46
Ranchi	3,681.33	57.20	258.41	544.16	859.77	23.35	2.27	13.14
Ranchi WL	587.42	7.40	67.63	91.84	166.87	28.41	0.03	1.09
Sahibganj	2,021.65	19.72	267.67	317.45	604.84	29.92	0.16	58.40
Saraikela	2,513.85	11.82	178.69	330.63	521.14	20.73	2.45	18.35
Saranda	952.24	297.36	379.31	124.60	801.27	84.15	-0.22	4.82
Simdega	3,755.14	22.03	337.17	877.95	1,237.15	32.95	-5.70	17.57
Area which Does not fall in any division	364.91	4.61	12.05	20.22	36.88	10.11	0.05	2.19
Grand Total	79,730.68	2,635.35	9,640.99	11,489.44	23,765.78	29.81	13.71	558.32

#As per the division boundary shapefile provided by State Forest Department.

*Area figure calculated without normalization factor.

Table 10.11.5 Forest Cover in Municipal Areas of Jharkhand(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
1	Dhanbad	227.28	0.00	0.73	6.90	7.63	3.36	0.38
2	Jamshedpur	219.55	0.00	5.05	6.58	11.63	5.30	0.11
3	Deoghar	161.33	0.00	0.06	11.45	11.51	7.13	0.00
4	Ramgarh	138.17	0.70	5.42	14.30	20.42	14.78	4.11
5	Chas	83.37	0.00	0.00	1.06	1.06	1.27	0.59
6	Vishrampur	58.39	0.00	0.19	6.72	6.91	11.83	1.69
7	Jumritelaiya	51.13	0.06	2.39	12.78	15.23	29.79	0.08
8	Simdega	40.38	0.00	0.05	1.11	1.16	2.87	0.08
9	Chhatarpur	30.18	0.00	0.00	0.21	0.21	0.70	0.00
10	Manjhiyaon	27.62	0.00	0.00	0.91	0.91	3.29	0.62
11	Khunti	26.60	0.00	0.06	0.92	0.98	3.68	0.00
12	Lohardaga	23.24	0.00	0.11	0.04	0.15	0.65	0.00
13	Medininagar	23.20	0.00	0.00	0.22	0.22	0.95	0.00
14	Nagar Untari	20.77	0.00	0.34	1.65	1.99	9.58	0.00
15	Hazaribag	19.33	0.00	0.13	0.67	0.80	4.14	0.00
16	Phusro	19.28	0.00	0.45	3.41	3.86	20.02	0.01
17	Chakuliya	19.16	0.00	0.67	3.61	4.28	22.34	0.39
18	Basukainath	17.12	0.00	0.16	0.06	0.22	1.29	0.00
19	Giridih	16.47	0.00	0.11	1.35	1.46	8.86	0.00
20	Kodarma	14.96	0.14	1.63	6.54	8.31	55.55	0.00
21	Latehar	14.46	0.00	0.41	0.35	0.76	5.26	0.00
22	Jamtara	14.00	0.00	0.00	0.04	0.04	0.29	0.00
23	Dumka	13.34	0.00	0.83	0.47	1.30	9.75	0.00
24	Chatra	13.12	0.00	0.02	1.43	1.45	11.05	0.00
25	Hussainabad	12.98	0.00	0.00	0.00	0.00	0.00	0.00
26	Garhwa	12.63	0.00	0.00	0.02	0.02	0.16	0.28
27	Gumla	12.31	0.00	0.00	0.11	0.11	0.89	0.00
28	Mihijam	12.17	0.00	0.00	0.03	0.03	0.25	0.00
29	Chakradharpur	9.90	0.00	0.00	1.46	1.46	14.75	0.00
30	Pakur	8.92	0.00	0.00	0.04	0.04	0.45	0.00
31	Godda	8.76	0.00	0.00	0.00	0.00	0.00	0.00
32	Madhupur	8.14	0.00	0.01	1.26	1.27	15.60	0.00
33	Kapali	7.05	0.00	0.00	0.00	0.00	0.00	0.00
34	Seraikela	6.85	0.00	0.00	0.00	0.00	0.00	0.00
35	Chirkunda	6.52	0.00	0.00	0.20	0.20	3.07	0.00
36	Sahibganj	5.14	0.00	0.00	0.14	0.14	2.72	0.00
37	Chaibasa	4.40	0.00	0.00	0.07	0.07	1.59	0.00
38	Rajmahal	4.42	0.00	0.00	0.23	0.23	5.20	0.00
Grand Total		1,412.64	0.90	18.82	86.34	106.06	7.51	8.34

*Shapefile of digitized boundary as provided by Urban Development & Housing Department.



10.11.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.11.6 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Jharkhand

(km ²)							
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
1,447.53	5,261.05	5,793.95	12,502.53	1,187.82	4,379.94	5,695.49	11,263.25
11.58%	42.08%	46.34%		10.54%	38.89%	50.57%	

*In case of Jharkhand, RFA boundaries have been used.

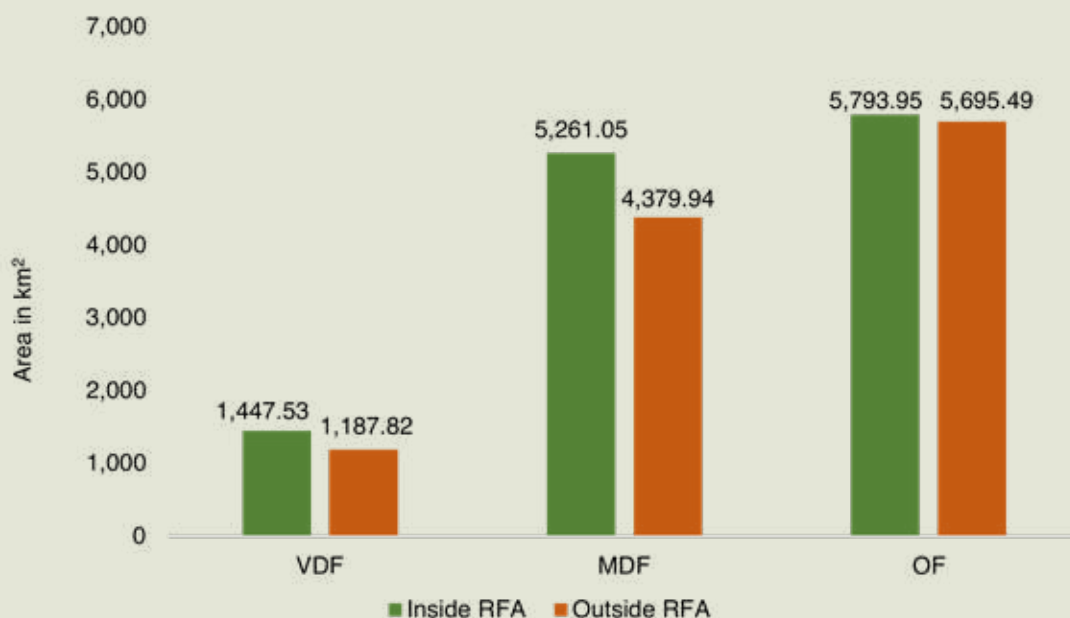


Figure 10.11.2 Forest Cover Inside and Outside of RFA in Jharkhand

Table 10.11.7 Forest Cover Change Matrix inside RFA/GW for Jharkhand between 2021 Raster based and 2023 Assessments

(km ²)						
Class	2023 Assessment inside RFA/GW					Total ISFR 2021 inside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	1,443.53	0.58	0.06	0.27	0.49	1,444.93
MDF	3.95	5,250.61	0.80	0.42	5.10	5,260.88
OF	0.05	8.09	5,694.56	22.52	18.78	5,744.00
Scrub	0.00	0.24	55.95	226.50	5.28	287.97
NF	0.00	1.53	42.58	2.48	6,312.15	6,358.74
Total ISFR 2023 inside RFA/GW	1,447.53	5,261.05	5,793.95	252.19	6,341.80	19,096.52
Net Change	2.60	0.17	49.95	-35.78	-16.94	

*Area figure calculated without normalization factor.



Table 10.11.8 Forest Cover Change Matrix outside RFA/GW for Jharkhand between 2021 Raster based and 2023 Assessments

(km²)

Class	2023 Assessment outside RFA/GW					Total ISFR 2021 outside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	1,182.44	0.07	0.01	0.06	0.80	1,183.38
MDF	5.36	4,366.85	0.36	0.36	7.95	4,380.88
OF	0.02	11.64	5,639.44	8.14	33.66	5,692.90
Scrub	0.00	0.40	25.06	287.33	6.55	319.34
NF	0.00	0.98	30.62	10.24	49,001.14	49,042.98
Total ISFR 2023 outside RFA/GW	1,187.82	4,379.94	5,695.49	306.13	49,050.10	60,619.48
Net Change	4.44	-0.94	2.59	-13.21	7.12	

*Area figure calculated without normalization factor.

Table 10.11.9 Altitude-wise Forest Cover in Jharkhand

(km²)

Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	61,272	1,069.69	6,670.64	8,461.18	16,201.51	530.25
500-1000	18,051	1,499.42	2,843.43	2,989.98	7,332.83	27.67
1000-2000	393	66.24	126.92	38.28	231.44	0.40
Total	79,716	2,635.35	9,640.99	11,489.44	23,765.78	558.32

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

Table 10.11.10 Forest Cover in Different Slope Classes in Jharkhand

(km²)

Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	65,120	1,222.03	4,726.39	6,927.89	12,876.31	327.79
5-10	8,083	687.55	2,245.60	2,240.78	5,173.93	102.53
10-15	3,260	390.09	1,272.05	1,111.02	2,773.16	56.60
15-20	1,790	205.94	755.78	643.93	1,605.65	35.35
20-25	915	88.10	395.47	352.64	836.21	21.63
25-30	390	30.51	169.96	156.77	357.24	10.52
>30	158	11.13	75.74	56.41	143.28	3.90
Total	79,716	2,635.35	9,640.99	11,489.44	23,765.78	558.32

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

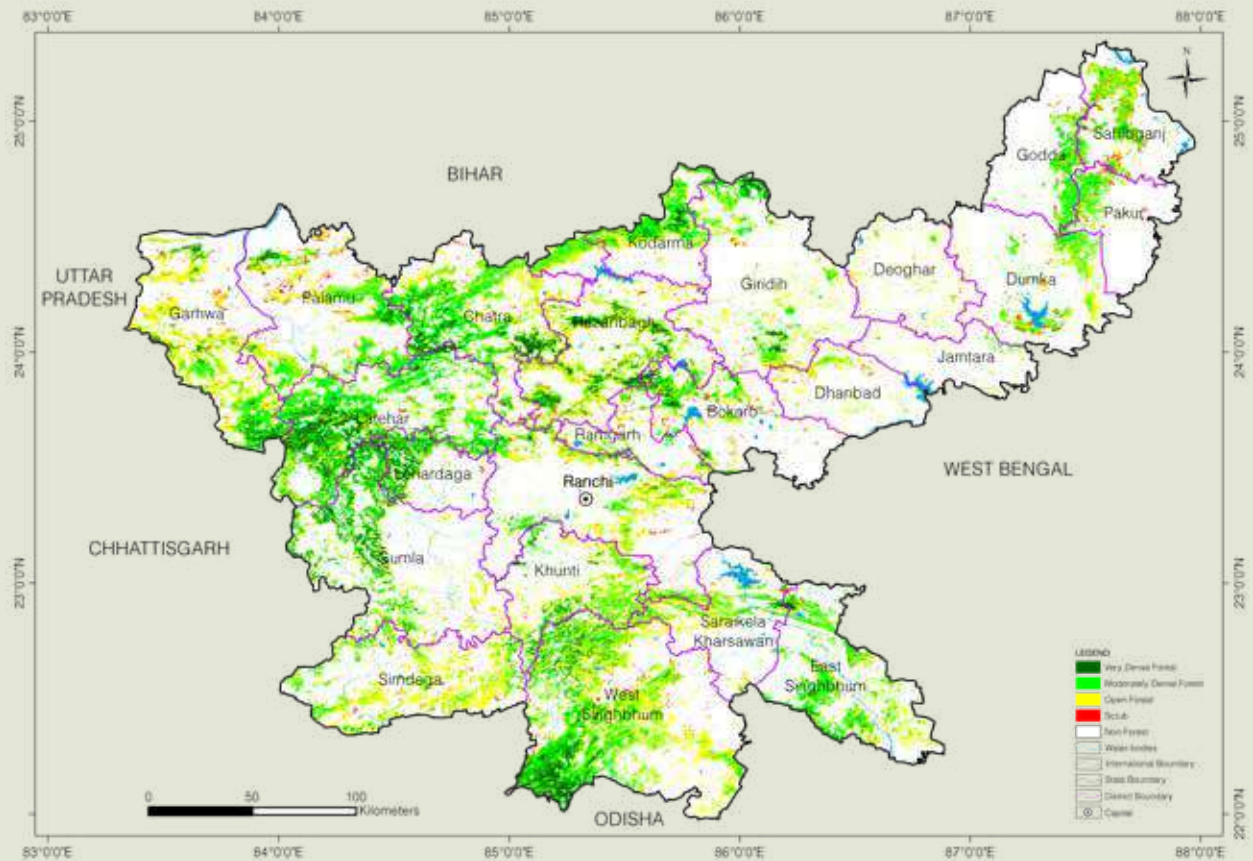


Figure 10.11.3 Forest Cover Map of Jharkhand

10.11.3 Forest Types

The area under different Forest Types in Jharkhand (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.11.11 Area Statistics of the Forest Types Found in Jharkhand

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	3C/C2e (ii) Moist peninsular low level sal	573.13	2.35
2	3C/C2e (iii) Moist peninsular valley sal	65.09	0.27
3	5B/C1c Dry peninsular sal forest	13,183.65	54.20
4	5B/C2 Northern dry mixed deciduous forest	8,308.01	34.16
5	5/DS1 Dry deciduous scrub	779.20	3.20
6	5/E2 <i>Boswellia</i> forest	11.62	0.05
7	5/E5 <i>Butea</i> forest	1.08	0.00
8	5/E9 Dry bamboo brakes	137.95	0.57
Sub Total		23,059.73	94.80
9	TOF/ Plantation	1,264.37	5.20
Total (Forest Cover & Scrub)		24,324.10	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). The total mapped areas, therefore, is sum of forest cover and scrub.

10.11.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.11.12 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Bokaro	458	242
2	Chatra	489	329
3	Deoghar	28	31
4	Dhanbad	204	176
5	Dumka	420	246
6	East Singhbhum	977	407
7	Garhwa	225	284
8	Giridih	361	231
9	Godda	451	306
10	Gumla	468	260
11	Hazaribagh	682	513
12	Jamtara	32	22
13	Khunti	198	73
14	Kodarma	407	278
15	Latehar	802	710
16	Lohardaga	281	135


Table 10.11.12 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
17	Pakur	180	63
18	Palamu	305	271
19	Ramgarh	320	238
20	Ranchi	480	252
21	Sahibganj	468	278
22	Saraikela Kharsawan	287	318
23	Simdega	542	27
24	West Singhbhum	2,858	1,835
Total		11,923	7,525

10.11.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.11.13 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	109.46	0.45
2	Very highly fire prone	2,756.20	11.33
3	Highly fire prone	6,926.56	28.48
4	Moderately fire prone	5,948.19	24.45
5	Less fire prone	8,583.69	35.29
Total		24,324.10	100.00

* Forest Cover including Scrub.

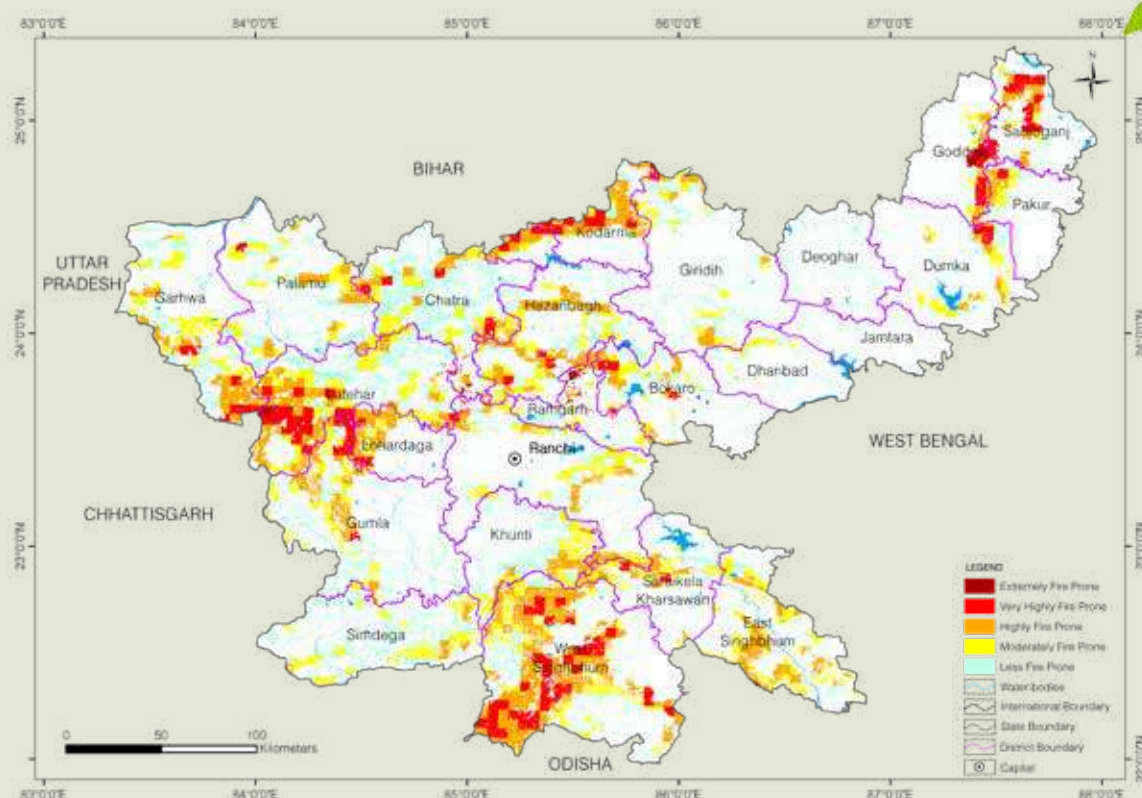


Figure 10.11.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.11.6 Results Derived from NFI for Jharkhand

Table 10.11.14 Number of Trees and their Volume for Top 5 species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Shorea robusta</i>	2,21,383	48.95
2	<i>Buchanania lanzan/ Buchanania latifolia</i>	25,799	2.46
3	<i>Terminalia elliptica/ Terminalia crenulata</i>	25,190	6.26
4	<i>Anogeissus latifolia/ Terminalia anogeissiana</i>	22,574	3.65
5	<i>Madhuca longifolia/ M. latifolia/ M. indica</i>	19,403	6.86

Table 10.11.15 Number of Trees and their Volume for Top 5 species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Butea monosperma</i>	24,975	4.867
2	<i>Acacia auriculiformis</i>	24,665	0.723
3	<i>Shorea robusta</i>	22,817	8.666
4	<i>Mangifera indica</i>	14,974	13.449
5	<i>Phoenix sylvestris</i>	10,238	1.865



Table 10.11.16 Number of Trees and their Volume for Top 5 species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Mangifera indica</i>	1,091	0.578
2	<i>Azadirachta indica</i>	888	0.285
3	<i>Moringa species</i>	862	0.125
4	<i>Psidium guajava</i>	656	0.029
5	<i>Cassia siamea/ Senna siamea</i>	654	0.118

Table 10.11.17 Major NTFP species in Jharkhand

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Shorea robusta</i>	Tree	1,09,04,901
2	<i>Diospyros melanoxylon</i>	Tree	38,82,847
3	<i>Buchanania Lanzan</i>	Tree	11,19,332
4	<i>Syzygium cumini</i>	Tree	3,15,476
5	<i>Butea monosperma</i>	Tree	3,09,100
6	<i>Woodfordia fruticosa</i>	Shrubs	34,06,100
7	<i>Asparagus racemosus</i>	Climbers	20,11,476
8	<i>Embelia ribes</i>	Climbers	2,79,372
9	<i>Andrographis paniculata</i>	Herbs	5,57,47,956
10	<i>Rauvolfia serpentina</i>	Herbs	42,29,155

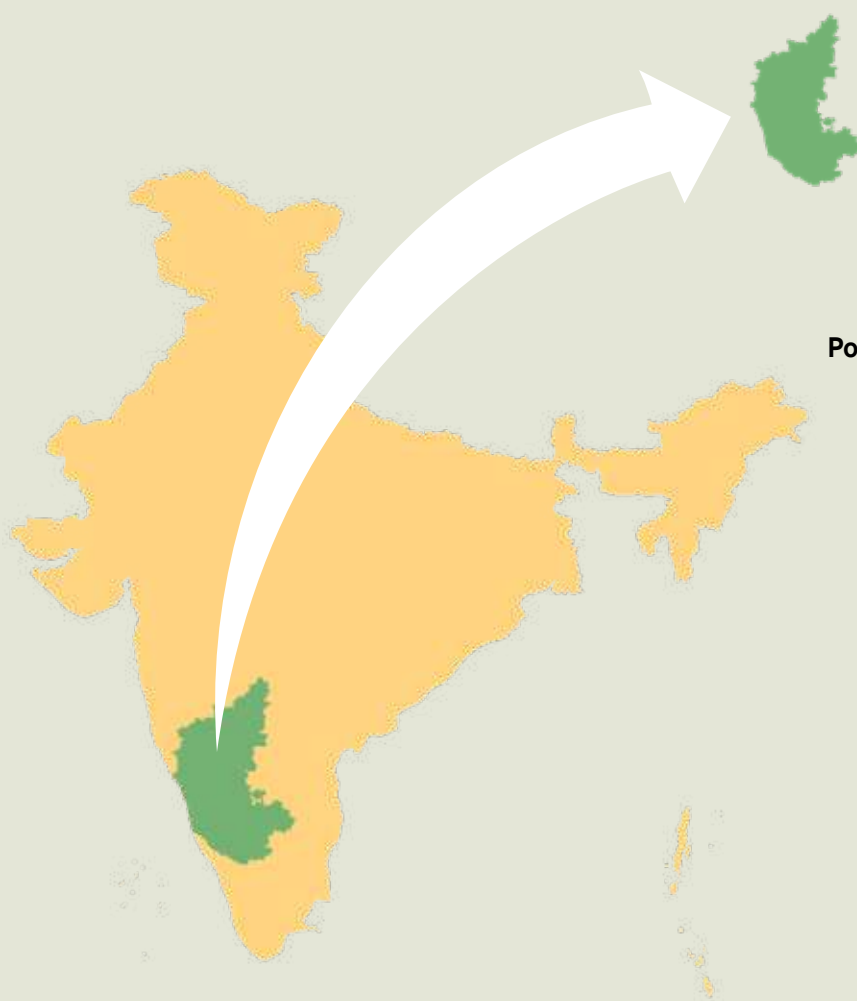
Table 10.11.18 Major Invasive Species in the State inside the RFA in Jharkhand

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Lantana camara</i>	1,912.27
2	<i>Chromolaena odorata</i>	887.52
3	<i>Cassia tora/ Senna tora</i>	92.17
4	<i>Ageratum conyzoides</i>	58.03
5	<i>Mikania micrantha</i>	41.65



Photo: FSI Repository

KARNATAKA

**Geographical Area**1,91,791 km²**Geographical Coordinates**

Latitude 11°30' N to 18°30' N

Longitude 74°00' E to 78°30' E

Population (as per Census 2011)

61.10 million

Urban 23.63 million (38.67 %)

Rural 37.47 million (61.33 %)

Tribal 4.25 million (6.96 %)

Average Population Density319 per km²**Livestock Population**(as per 19th Livestock Census)

27.70 million

No. of Districts

30

No. of Hill Districts

6

No. of Tribal Districts

5

Table 10.12.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	19,179	
Reporting area for land utilization	19,050.07	100.00
Forests	3,073.62	16.13
Not available for land cultivation	2,266.43	11.90
Permanent pastures and other grazing lands	873.53	4.59
Land under misc. tree crops and groves	211.42	1.11
Culturable wasteland	394.32	2.07
Fallow land other than current fallows	386.32	2.03
Current fallows	678.40	3.56
Net area sown	11,166.03	58.61

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.12.1 Forest Cover

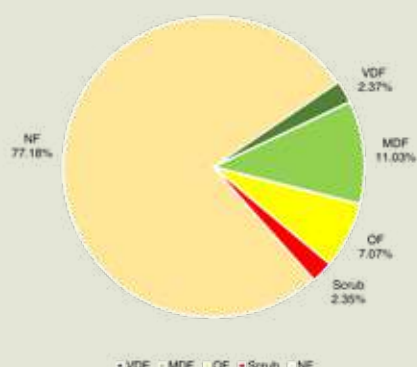


Table 10.12.2 Forest Cover of Karnataka

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	4,537.79	2.37
MDF	21,151.75	11.03
OF	13,564.73	7.07
Total	39,254.27	20.47
Scrub	4,513.15	2.35

Figure 10.12.1 Forest Cover of Karnataka

Table 10.12.3 District-wise Forest Cover in Karnataka

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Bagalkot	6,552	0.00	19.32	244.24	263.56	4.02	2.23	390.29
Ballari	8,461	0.00	109.10	618.52	727.62	8.60	-2.81	477.91
Belagavi ^H	13,433	35.30	724.61	394.38	1,154.29	8.59	4.75	666.12
Bengaluru	2,196	0.00	25.65	258.63	284.28	12.95	-0.56	24.09
Bengaluru Rural	2,298	0.00	22.92	121.00	143.92	6.26	-5.51	12.25
Bidar	5,448	0.00	21.81	79.81	101.62	1.87	1.58	47.41
Chamarajanagar	5,648	93.00	1,517.81	1,121.00	2,731.81	48.37	17.28	125.27
Chikkamagaluru ^H	7,202	900.78	2,609.11	548.07	4,057.96	56.34	22.27	76.72
Chikkballapura	4,244	0.00	19.58	258.61	278.19	6.55	1.57	181.51
Chitradurga	8,436	0.00	47.29	570.90	618.19	7.33	10.50	578.94
Dakshina Kannada ^H	4,861	546.31	1,605.51	1,149.57	3,301.39	67.92	3.03	2.69
Davanagere	5,924	10.63	163.52	533.89	708.04	11.95	3.42	303.34
Dharwad	4,260	0.00	223.91	158.64	382.55	8.98	3.88	3.84
Gadag	4,657	0.00	0.58	140.59	141.17	3.03	0.23	119.04
Hassan	6,814	147.24	785.19	572.74	1,505.17	22.09	4.16	71.75
Haveri	4,823	0.00	145.88	212.70	358.58	7.43	9.51	94.84
Kalaburagi	10,954	0.00	91.83	104.04	195.87	1.79	2.67	39.39
Kodagu ^H	4,102	788.51	1,871.04	574.56	3,234.11	78.84	6.98	0.87
Kolar	3,979	0.00	57.63	339.55	397.18	9.98	7.36	66.88
Koppal	5,570	0.00	0.47	36.41	36.88	0.66	1.19	167.24
Mandya	4,962	0.01	109.64	432.04	541.69	10.92	1.19	105.46
Mysuru	6,307	121.21	573.10	348.75	1,043.06	16.54	12.51	34.34
Raichur	8,442	0.00	1.08	47.30	48.38	0.57	1.05	189.06
Ramanagara	3,516	0.00	196.15	494.50	690.65	19.64	12.93	170.11
Shivamogga ^H	8,478	495.44	2,870.65	925.34	4,291.43	50.62	10.65	21.27
Tumakuru	10,597	0.00	73.43	1,347.47	1,420.90	13.41	13.08	399.50
Udupi	3,582	232.84	1,385.61	661.20	2,279.65	63.64	-4.04	0.00
Uttara Kannada ^H	10,277	1,166.52	5,861.39	1,115.62	8,143.53	79.24	7.00	3.26
Vijayapura	10,498	0.00	0.68	25.45	26.13	0.25	-0.43	7.81
Yadgir	5,270	0.00	17.26	129.21	146.47	2.78	0.03	131.95
Grand Total	1,91,791	4,537.79	21,151.75	13,564.73	39,254.27	20.47	147.70	4,513.15

*Area figure calculated without normalization factor.



Table 10.12.4 Division-wise Forest Cover in Karnataka

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Adichunchanagri Peacock Sanctuary	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anshi National Park	17.52	3.70	12.19	1.15	17.04	97.26	1.22	0.00
Anshi NP/Dandeli	894.45	192.65	606.64	49.16	848.45	94.86	0.00	0.46
Arabhithittu WLS	16.91	0.00	0.66	14.39	15.05	89.00	0.05	0.13
Attiveri Bird Sanctuary	2.27	0.00	0.88	0.00	0.88	38.77	0.00	0.00
Bagalkote	6,570.21	0.00	19.25	246.53	265.78	4.05	2.32	434.49
Bandipur NP	868.68	63.73	450.84	311.66	826.23	95.11	-0.60	5.17
Bangalore Urban	2,161.83	0.00	15.92	113.40	129.32	5.98	-0.89	18.85
Bangalore Rural	2,336.19	0.00	26.77	255.31	282.08	12.07	-5.58	12.25
Bannerghatta Wildlife	103.52	0.00	24.09	48.53	72.62	70.15	1.00	6.45
Belgaum	4,504.83	34.55	721.13	339.54	1,095.22	24.31	2.84	223.33
Bellary	8,405.73	0.00	108.78	613.39	722.17	8.59	-2.62	445.94
Bhadra WLS	455.02	219.25	183.16	3.68	406.09	89.25	0.00	0.00
Bhadravathi	3,696.92	67.60	570.30	613.38	1,251.28	33.85	25.29	73.56
Bidar	5,818.79	0.00	21.82	86.06	107.88	1.85	3.11	52.43
Bijapur	10,495.30	0.00	0.93	26.56	27.49	0.26	-0.05	10.61
Biligiri Ranganatha Swamy temple WLS	1,803.93	22.00	424.38	154.24	600.62	33.30	3.42	22.82
Bramhagiri WLS	180.46	96.38	52.46	9.41	158.25	87.69	2.43	0.04
Cauvery WLS	579.57	0.94	306.99	214.13	522.06	90.08	0.37	10.90
Chikballapur	3,580.10	0.00	14.57	201.16	215.73	6.03	3.46	168.62
Chikmagalur	3,199.01	170.01	983.17	257.46	1,410.64	44.10	2.72	64.11
Chitradurga	8,264.61	0.00	45.49	553.65	599.14	7.25	10.52	556.75
Daroji WLS	50.48	0.00	0.03	4.98	5.01	9.92	0.02	38.59
Davanagere	4,533.94	0.00	23.43	295.81	319.24	7.04	2.29	266.22
Dharwad	5,321.26	0.00	290.95	185.21	476.16	8.95	2.50	9.61
Gadag	4,652.68	0.00	0.59	140.69	141.28	3.04	0.21	129.98
Ghata Prabha Bird Sanctuary	14.22	0.00	0.29	0.44	0.73	5.13	-0.14	0.05
Gokak	8,887.38	0.00	0.88	54.39	55.27	0.62	2.15	467.28
Gudavi Bird Sanctuary	0.60	0.00	0.33	0.03	0.36	60.00	0.00	0.00
Gulbarga	9,629.76	0.00	90.40	79.87	170.27	1.77	0.40	30.99
Haliyal	1,491.49	35.88	909.83	106.83	1,052.54	70.57	1.27	2.02
Hassan	6,819.30	147.24	785.19	572.74	1,505.17	22.07	2.03	73.90
Haveri	3,652.16	0.00	70.98	111.50	182.48	5.00	6.02	69.64
Honnavar	1,921.89	313.16	900.08	242.07	1,455.31	75.72	2.04	1.32
Hunsur	2,194.14	3.87	77.52	80.93	162.32	7.40	10.18	11.71
Karwar	1,780.64	274.78	898.19	215.88	1,388.85	78.00	-2.22	0.15

Table 10.12.4 Division-wise Forest Cover in Karnataka

(km²)

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Kolar	4,668.45	0.00	59.67	399.84	459.51	9.84	5.77	76.39
Kollegal	2,880.42	33.92	603.26	590.55	1,227.73	42.62	13.99	69.92
Koppa	1,818.79	321.99	1,097.11	105.91	1,525.01	83.85	1.95	0.00
Koppal	5,575.72	0.00	0.53	37.32	37.85	0.68	1.20	189.27
Kudremukh WLS	787.22	256.54	321.36	44.85	622.75	79.11	0.64	0.03
Kundapur	3,617.52	117.22	1,296.90	668.70	2,082.82	57.58	-6.46	0.08
Mandya	4,872.06	0.01	91.49	389.87	481.37	9.88	1.83	92.48
Mangalore	3,973.92	506.12	1,213.60	1,046.07	2,765.79	69.60	2.38	2.38
Melukote WLS	42.30	0.00	0.87	26.65	27.52	65.06	0.42	11.71
Mercara	1,970.51	267.69	926.43	315.63	1,509.75	76.62	6.53	0.73
Mookambika WLS	399.51	40.02	234.91	66.44	341.37	85.45	1.69	0.00
Muthodi WLS	38.98	3.46	5.00	0.26	8.72	22.37	0.00	0.00
Mysore	3,266.02	2.44	20.16	81.04	103.64	3.17	2.94	21.11
Nagarhole (Rajiv Gandhi) NP	704.18	147.90	450.99	55.72	654.61	92.96	-0.12	0.01
Nugu WLS	27.68	0.00	1.86	15.28	17.14	61.92	0.00	1.89
Pushpagiri WLS	120.54	84.42	18.78	5.64	108.84	90.29	0.00	0.00
Raichur	8,445.48	0.00	1.14	47.93	49.07	0.58	1.05	196.81
Ramanagaram	3,351.03	0.00	148.27	436.03	584.30	17.44	12.25	144.84
Ranganathittu Bird Sanctuary	1.41	0.00	0.00	0.12	0.12	8.51	0.00	0.00
Ranibennur black buck Sanctuary	103.94	0.00	4.42	74.18	78.60	75.62	4.89	16.35
Sagar	4,824.01	126.91	1,458.35	433.57	2,018.83	41.85	0.38	10.69
Sharavathy WLS	430.65	83.41	185.76	24.13	293.30	68.11	0.02	0.52
Shettihalli WLS	691.31	115.65	302.91	63.51	482.07	69.73	1.08	0.38
Shimoga	1,644.13	143.22	722.45	181.97	1,047.64	63.72	2.76	5.44
Sirsi	2,194.47	249.20	1,139.68	379.04	1,767.92	80.56	1.62	1.57
Someswara WLS	62.22	13.89	40.01	4.06	57.96	93.15	0.05	0.00
Talacauvery WLS	117.66	75.69	24.87	3.89	104.45	88.77	11.75	0.00
Tumkur	10,606.60	0.00	73.46	1,357.80	1,431.26	13.49	1.57	289.24
Virajpet	1,418.99	196.48	643.69	228.50	1,068.67	75.31	-1.74	0.43
Yadgir	6,238.16	0.00	17.99	142.99	160.98	2.58	0.76	136.31
Yellapur	1,968.00	97.03	1,378.99	115.28	1,591.30	80.86	2.74	0.00
Area which does not fall in any Division	389.84	8.84	27.73	17.80	54.37	13.95	0.00	36.20
Grand Total	1,92,158.48	4,537.79	21,151.75	13,564.73	39,254.27	20.43	147.70	4,513.15

#As per the division boundary shapefile provided by State Forest Department.

*Area figure calculated without normalization factor.



Table 10.12.5 Forest Cover in Municipal Areas of Karnataka

(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
1	Afzalpura	68.94	0.00	0.00	0.00	0.00	0.00	0.00
2	Ainapur	59.92	0.00	0.00	0.20	0.20	0.33	0.03
3	Aland	14.67	0.00	0.00	0.00	0.00	0.00	0.00
4	Almel	62.88	0.00	0.00	0.02	0.02	0.03	0.00
5	Alnavara	8.35	0.00	0.00	0.09	0.09	1.08	0.00
6	Alur	2.37	0.00	0.00	0.07	0.07	2.95	0.00
7	Aminagad	16.37	0.00	0.29	1.45	1.74	10.63	3.26
8	Anavatti	35.13	0.00	2.33	4.02	6.35	18.08	0.01
9	Anekal	6.36	0.00	0.01	0.03	0.04	0.63	0.00
10	Ankola	10.24	0.00	0.18	3.56	3.74	36.52	0.00
11	Annigeri	6.84	0.00	0.00	0.00	0.00	0.00	0.00
12	Arabhavi	27.06	0.00	0.00	0.00	0.00	0.00	0.57
13	Arkalgudu	6.62	0.00	0.15	0.11	0.26	3.93	0.00
14	Arsikere	8.34	0.00	0.01	0.36	0.37	4.44	0.00
15	Athani	8.76	0.00	0.00	0.00	0.00	0.00	0.27
16	Attibele	4.28	0.00	0.00	0.00	0.00	0.00	0.00
17	Aurad	8.74	0.00	0.00	0.00	0.00	0.00	0.00
18	Badami	7.41	0.00	0.00	0.02	0.02	0.27	0.16
19	Bagalkote	49.40	0.00	0.00	0.45	0.45	0.91	0.57
20	Bagepalli	2.27	0.00	0.00	0.00	0.00	0.00	0.09
21	Bailahongal	11.81	0.00	0.00	0.00	0.00	0.00	0.00
22	Bajape	20.08	0.00	0.29	2.72	3.01	14.99	0.00
23	Balaganur	16.78	0.00	0.00	0.00	0.00	0.00	0.00
24	Ballari	87.72	0.00	0.00	0.38	0.38	0.43	0.00
25	Bangarpet	8.61	0.00	0.00	0.00	0.00	0.00	0.00
26	Bankapura	3.34	0.00	0.00	0.34	0.34	10.18	0.00
27	Bannur	5.36	0.00	0.00	0.00	0.00	0.00	0.00
28	Bantwal	25.94	0.00	3.20	4.35	7.55	29.11	0.00
29	Basavakalyan	23.51	0.00	0.00	0.12	0.12	0.51	0.44
30	Basavanabagewadi	124.40	0.00	0.00	0.00	0.00	0.00	0.00
31	Bashettihalli	20.05	0.00	0.08	0.73	0.81	4.04	0.03
32	BBMP	710.69	0.00	5.49	30.55	36.04	5.07	4.67
33	Belagali	38.98	0.00	0.00	0.00	0.00	0.00	0.00
34	Belagavi	92.10	0.00	1.48	5.70	7.18	7.80	1.01
35	Belluru	20.09	0.00	0.55	5.38	5.93	29.52	0.00
36	Belthangadi	8.88	0.03	1.47	2.71	4.21	47.41	0.00
37	Belur	5.03	0.00	0.00	0.00	0.00	0.00	0.00
38	Bhadravathi	56.19	0.00	0.34	5.52	5.86	10.43	0.00
39	Bhagyanagar	7.76	0.00	0.00	0.00	0.00	0.00	0.00
40	Bhalki	14.50	0.00	0.00	0.00	0.00	0.00	0.00
41	Bhatkal	5.17	0.00	0.04	0.64	0.68	13.15	0.00
42	Bidadi	44.14	0.00	0.04	1.33	1.37	3.10	0.14

Table 10.12.5 Forest Cover in Municipal Areas of Karnataka(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
43	Bidar	48.10	0.00	0.87	1.96	2.83	5.88	0.72
44	Bilagi	4.57	0.00	0.00	0.00	0.00	0.00	0.01
45	Birur	7.56	0.00	0.00	0.03	0.03	0.40	0.00
46	Bommasandra	7.10	0.00	0.01	0.04	0.05	0.70	0.00
47	Boragaon	34.32	0.00	0.00	0.00	0.00	0.00	0.00
48	Byadagi	18.04	0.00	0.00	0.03	0.03	0.17	0.19
49	Bynduru	107.42	2.58	48.52	23.91	75.01	69.83	0.08
50	Chadachana	44.23	0.00	0.00	0.04	0.04	0.09	0.00
51	Challakere	33.09	0.00	0.00	1.74	1.74	5.26	0.74
52	Chamarajanagara	17.30	0.00	0.00	0.00	0.00	0.00	0.00
53	Chandapura	14.19	0.00	0.01	0.23	0.24	1.69	0.00
54	Channagiri	1.81	0.00	0.00	0.01	0.01	0.55	0.00
55	Channapatna	10.45	0.00	0.00	0.36	0.36	3.44	0.00
56	Channarayanaapatna	9.01	0.00	1.60	0.55	2.15	23.86	0.00
57	Chennamma kittur	5.50	0.00	0.00	0.17	0.17	3.09	0.06
58	Chickamagaluru	29.20	0.00	0.84	1.41	2.25	7.71	0.73
59	Chikkaballapur	11.18	0.00	0.00	0.04	0.04	0.36	0.00
60	Chikkanayakanahalli	9.34	0.00	0.00	1.54	1.54	16.49	0.00
61	Chikkodi	22.31	0.00	0.00	0.13	0.13	0.58	0.13
62	Chinchali	32.08	0.00	0.00	0.00	0.00	0.00	0.00
63	Chincholi	31.09	0.00	0.00	0.00	0.00	0.00	0.00
64	Chintamani	13.56	0.00	0.00	0.00	0.00	0.00	0.15
65	Chitradurga	20.74	0.00	0.00	0.20	0.20	0.96	0.43
66	Chittaguppa	33.75	0.00	0.00	0.86	0.86	2.55	0.01
67	Chittapura	73.63	0.00	0.00	0.34	0.34	0.46	0.00
68	Dandeli	8.46	0.00	1.34	1.55	2.89	34.16	0.09
69	Davanagere	76.02	0.00	0.13	1.99	2.12	2.79	0.00
70	Devadurga	29.56	0.00	0.00	0.00	0.00	0.00	2.29
71	Devanahalli	16.51	0.00	0.13	0.91	1.04	6.30	0.00
72	Devarahippuragi	34.46	0.00	0.00	0.00	0.00	0.00	0.00
73	Doddaballapur	11.04	0.00	0.13	0.00	0.13	1.18	0.00
74	Examba	27.09	0.00	0.00	0.02	0.02	0.07	0.00
75	Gadag betageri	53.26	0.00	0.13	0.06	0.19	0.36	0.00
76	Gajendragada	18.89	0.00	0.00	0.45	0.45	2.38	0.16
77	Gangavathi	18.74	0.00	0.00	0.00	0.00	0.00	0.00
78	Ghataprabha	24.69	0.00	0.00	0.00	0.00	0.00	0.00
79	Gokak	20.71	0.00	0.11	0.03	0.14	0.68	0.43
80	Gowribidanur	33.63	0.00	0.00	0.17	0.17	0.51	0.00
81	Gubbi	7.14	0.00	0.09	1.68	1.77	24.79	0.00
83	Guledagudda	5.92	0.00	0.00	0.01	0.01	0.17	0.22
84	Gurumatkal	11.88	0.00	0.00	0.21	0.21	1.77	0.00
85	Guttal	5.00	0.00	0.00	0.00	0.00	0.00	0.00



Table 10.12.5 Forest Cover in Municipal Areas of Karnataka

(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
86	Hagaribommanahalli	21.52	0.00	0.00	0.00	0.00	0.00	0.00
87	Haliyala	16.08	0.00	0.03	0.27	0.30	1.87	0.00
88	Hallikhed	2.43	0.00	0.00	0.00	0.00	0.00	0.00
89	Hanagal	18.99	0.00	0.33	2.24	2.57	13.53	0.00
90	Hannur	1.79	0.00	0.00	0.00	0.00	0.00	0.00
91	Harapanahalli	27.10	0.00	0.00	0.00	0.00	0.00	0.50
92	Harihar	31.77	0.00	0.00	0.84	0.84	2.64	0.00
93	Harugeri	48.81	0.00	0.00	0.00	0.00	0.00	0.00
94	Hassan	14.34	0.00	0.05	0.19	0.24	1.67	0.02
95	Hatti	13.56	0.00	0.00	0.19	0.19	1.40	0.11
96	Hatti gold mines	5.88	0.00	0.00	0.34	0.34	5.78	0.11
97	Haveri	20.40	0.00	0.00	0.00	0.00	0.00	0.00
98	Hebbagodi	9.07	0.00	0.00	0.07	0.07	0.77	0.00
99	Hirekerur	13.17	0.00	0.00	0.03	0.03	0.23	0.00
100	Hiriyur	30.26	0.00	0.00	4.97	4.97	16.42	0.00
101	Holalkere	3.29	0.00	0.00	0.03	0.03	0.91	0.00
102	Holehonnuru	21.63	0.00	0.00	9.07	9.07	41.93	0.00
103	Holenarsipura	8.27	0.00	0.00	0.64	0.64	7.74	0.00
104	Honnali	1.99	0.00	0.00	0.00	0.00	0.00	0.00
105	Honnagara	7.69	0.00	0.08	2.37	2.45	31.86	0.00
106	Hootagalli	29.67	0.01	0.00	1.25	1.26	4.25	0.00
107	Hoovina hadagali	19.74	0.00	0.00	0.10	0.10	0.51	0.00
108	Hosadurga	7.19	0.00	0.00	0.46	0.46	6.40	1.47
109	Hosanagara	1.39	0.00	0.07	0.32	0.39	28.06	0.00
110	Hoskote	12.22	0.00	0.00	0.31	0.31	2.54	0.00
111	Hospet	43.94	0.00	0.06	0.96	1.02	2.32	1.17
112	Hubli dharwad	210.56	0.00	2.18	5.24	7.42	3.52	0.11
113	Hukkeri	7.88	0.00	0.00	0.00	0.00	0.00	0.00
114	Huliyaru	11.93	0.00	0.00	1.30	1.30	10.90	0.00
115	Humnabad	19.28	0.00	0.00	0.23	0.23	1.19	0.00
116	Hunagunda	6.40	0.00	0.00	0.11	0.11	1.72	0.00
117	Hunasagi	46.48	0.00	0.00	0.00	0.00	0.00	0.51
118	Hunasemaarana halli	0.04	0.00	0.01	0.00	0.01	25.00	0.00
119	Hunsur	10.12	0.00	0.00	0.00	0.00	0.00	0.00
120	Ilkal	13.34	0.00	0.01	0.11	0.12	0.90	0.08
121	Indi	76.80	0.00	0.15	0.31	0.46	0.60	0.00
122	Jagalur	6.65	0.00	0.00	0.01	0.01	0.15	0.00
123	Jali	10.39	0.00	0.49	2.37	2.86	27.53	0.00
124	Jamakhundi	12.20	0.00	0.00	0.13	0.13	1.07	0.71
125	Jewargi	33.90	0.00	0.00	0.22	0.22	0.65	0.00
126	Jigani	11.37	0.00	0.00	0.00	0.00	0.00	0.00
127	Kabbur	59.51	0.00	0.00	0.11	0.11	0.18	0.00

Table 10.12.5 Forest Cover in Municipal Areas of Karnataka(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
128	Kadaba	22.85	0.13	4.42	13.54	18.09	79.17	0.00
129	Kadakola	0.05	0.00	0.00	0.00	0.00	0.00	0.00
130	Kadur	4.75	0.00	0.00	0.35	0.35	7.37	0.00
131	Kakkera	81.69	0.00	0.00	0.00	0.00	0.00	0.00
132	Kalaburagi	54.99	0.00	0.00	0.50	0.50	0.91	0.00
133	Kalaghatagi	10.76	0.00	0.00	0.00	0.00	0.00	0.00
134	Kalagi	42.52	0.00	0.00	0.03	0.03	0.07	0.33
135	Kallolli	27.44	0.00	0.00	0.00	0.00	0.00	0.00
136	Kamalapur	26.83	0.00	0.00	0.00	0.00	0.00	0.00
137	Kamalapura	49.25	0.00	0.00	1.03	1.03	2.09	7.39
138	Kamattagi	17.90	0.00	0.53	1.63	2.16	12.07	4.76
139	Kampli	22.54	0.00	0.00	0.00	0.00	0.00	0.00
140	Kanakagiri	40.01	0.00	0.00	0.29	0.29	0.72	0.00
141	Kanakapura	13.35	0.00	0.23	1.24	1.47	11.01	0.25
142	Kankanawadi	33.78	0.00	0.00	0.00	0.00	0.00	0.00
143	Karatagi	30.23	0.00	0.00	0.08	0.08	0.26	0.00
144	Kargal	65.92	17.22	34.36	5.07	56.65	85.94	0.00
145	Karkala	22.77	0.00	3.94	4.29	8.23	36.14	0.00
146	Karwar	27.79	0.00	2.55	9.90	12.45	44.80	0.00
147	Kaup	16.67	0.00	1.38	2.11	3.49	20.94	0.00
148	Kavitala	61.03	0.00	0.00	0.51	0.51	0.84	2.43
149	Kembhavi	72.61	0.00	0.00	0.00	0.00	0.00	0.06
150	Kerur	4.81	0.00	0.00	0.00	0.00	0.00	0.01
151	Khanapura	3.80	0.00	0.02	0.11	0.13	3.42	0.00
152	Kinnigoli	27.70	0.00	9.67	2.40	12.07	43.57	0.00
153	Kolar	18.26	0.00	0.00	0.10	0.10	0.55	0.00
154	Kolhar	6.24	0.00	0.00	0.00	0.00	0.00	0.00
155	Kollegal	28.09	0.00	0.02	0.90	0.92	3.28	2.13
156	Konnur	15.61	0.00	0.01	1.15	1.16	7.43	2.55
157	Koppa	0.77	0.00	0.43	0.02	0.45	58.44	0.00
158	Koppal	31.77	0.00	0.00	0.28	0.28	0.88	0.57
159	Koratagere	1.22	0.00	0.00	0.00	0.00	0.00	0.00
160	Kotekar	10.10	0.00	0.78	1.63	2.41	23.86	0.00
161	Kottur	22.26	0.00	0.00	0.45	0.45	2.02	0.00
162	Krishnarajapete	7.17	0.00	0.28	0.53	0.81	11.30	0.00
163	Kudachi	4.64	0.00	0.00	0.00	0.00	0.00	0.00
164	Kudalagi	31.99	0.00	0.11	0.45	0.56	1.75	0.00
165	Kudathini	72.81	0.00	0.00	0.86	0.86	1.18	0.07
166	Kuderemukha	88.60	12.03	24.36	12.60	48.99	55.29	0.03
167	Kukanur	36.80	0.00	0.00	0.06	0.06	0.16	0.00
168	Kumata	16.71	0.00	2.33	4.10	6.43	38.48	0.00
169	Kundagol	15.40	0.00	0.00	0.00	0.00	0.00	0.00



Table 10.12.5 Forest Cover in Municipal Areas of Karnataka

(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
170	Kundapur	9.90	0.00	0.37	1.88	2.25	22.73	0.00
171	Kunigal	9.87	0.00	0.36	0.84	1.20	12.16	0.00
172	Kurekuppa	21.01	0.00	0.12	0.25	0.37	1.76	0.04
173	Kurugodu	44.51	0.00	0.00	0.02	0.02	0.04	0.00
174	Kushalnagara	3.74	0.00	0.01	0.00	0.01	0.27	0.00
175	Kustagi	16.15	0.00	0.00	0.12	0.12	0.74	0.00
176	Lakshmeshwara	7.39	0.00	0.00	0.00	0.00	0.00	0.00
177	Lingasugur	77.45	0.00	0.00	0.13	0.13	0.17	0.00
178	Lokapur	25.47	0.00	0.00	0.53	0.53	2.08	0.05
179	Madanayakanahalli	25.58	0.00	0.29	0.46	0.75	2.93	0.00
180	Maddur	6.77	0.00	0.00	0.00	0.00	0.00	0.00
181	Madhugiri	8.90	0.00	0.14	0.10	0.24	2.70	0.17
182	Madikere	9.25	0.01	1.55	2.08	3.64	39.35	0.00
183	Magadi	5.52	0.00	0.04	0.13	0.17	3.08	0.00
184	Mahalingapura	9.46	0.00	0.00	0.00	0.00	0.00	0.00
185	Malavalli	7.81	0.00	0.00	0.09	0.09	1.15	0.00
186	Malebennuru	5.02	0.00	0.00	0.55	0.55	10.96	0.00
187	Malur	10.09	0.00	0.00	0.06	0.06	0.59	0.00
188	Managuli	3.05	0.00	0.00	0.00	0.00	0.00	0.00
189	Mandya	17.01	0.00	0.00	0.11	0.11	0.65	0.00
190	Mangaluru	135.02	0.00	6.94	10.69	17.63	13.06	0.00
191	Manvi	51.07	0.00	0.00	0.01	0.01	0.02	0.00
192	Mariyammanahalli	3.19	0.00	0.00	0.00	0.00	0.00	0.00
193	Maski	14.59	0.00	0.04	0.10	0.14	0.96	0.41
194	Molakalmuru	5.94	0.00	0.00	0.00	0.00	0.00	0.01
195	Moodbidri	40.66	0.00	9.25	3.27	12.52	30.79	0.00
196	Mudalagi	12.81	0.00	0.00	0.00	0.00	0.00	0.00
197	Muddebihal	10.33	0.00	0.00	0.05	0.05	0.48	0.00
198	Mudgal	54.6	0.00	0.00	0.21	0.21	0.38	0.00
199	Mudhol	8.02	0.00	0.00	0.00	0.00	0.00	0.00
200	Mudigere	1.53	0.00	0.24	0.10	0.34	22.22	0.00
201	Mugalkhod	51.70	0.00	0.00	0.00	0.00	0.00	0.00
202	Mulagunda	9.20	0.00	0.00	0.00	0.00	0.00	0.00
203	Mulbagilu	9.78	0.00	0.00	0.04	0.04	0.41	0.00
204	Mulki	10.32	0.09	1.57	0.75	2.41	23.35	0.00
205	Munavalli	4.02	0.00	0.00	0.00	0.00	0.00	0.00
206	Mundagod	12.02	0.00	0.35	2.68	3.03	25.21	0.00
207	Mundargi	42.20	0.00	0.00	0.01	0.01	0.02	0.00
208	Mysuru	86.32	0.00	0.23	1.33	1.56	1.81	0.00
209	Nagamangala	10.40	0.00	0.07	1.70	1.77	17.02	0.00
210	Naganur	31.17	0.00	0.00	0.00	0.00	0.00	0.00
211	Nalatawad	1.90	0.00	0.00	0.00	0.00	0.00	0.00

Table 10.12.5 Forest Cover in Municipal Areas of Karnataka(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
212	Nanjanagud	14.76	0.00	0.00	0.10	0.10	0.68	0.00
213	Naragunda	19.47	0.00	0.00	0.17	0.17	0.87	0.66
214	Narasimharajapura	1.37	0.00	0.48	0.21	0.69	50.36	0.00
215	Naregal	7.31	0.00	0.00	0.19	0.19	2.60	0.00
216	Navalagund	36.01	0.00	0.00	0.36	0.36	1.00	0.00
217	Nayakanahatti	40.38	0.00	0.00	0.38	0.38	0.94	0.00
218	Nelmangala	24.40	0.00	0.34	0.01	0.35	1.43	0.00
219	Nidgundi	2.61	0.00	0.00	0.00	0.00	0.00	0.04
220	Nippani	19.85	0.00	0.00	0.03	0.03	0.15	0.00
221	Nyamthi	6.47	0.00	0.00	0.00	0.00	0.00	0.00
222	Pandavapura	4.83	0.00	0.00	0.00	0.00	0.00	0.00
223	Pavagada	5.21	0.00	0.00	0.00	0.00	0.00	0.02
224	Periyapatna	11.58	0.00	0.28	0.28	0.56	4.84	0.00
225	Puttur	34.53	0.00	5.97	9.60	15.57	45.09	0.00
226	Rabkavi banahatti	16.11	0.00	0.00	0.00	0.00	0.00	0.59
227	Raibagh	5.92	0.00	0.00	0.00	0.00	0.00	0.05
228	Raichur	141.76	0.00	0.00	1.52	1.52	1.07	2.72
229	Ramanagara	12.20	0.00	0.00	0.63	0.63	5.16	0.02
230	Ramdurga	4.31	0.00	0.00	0.00	0.00	0.00	0.00
231	Rammanahalli	0.14	0.00	0.00	0.00	0.00	0.00	0.00
232	Ranebennur	52.91	0.00	0.00	1.86	1.86	3.52	0.45
233	Rattihalli	16.54	0.00	0.00	0.03	0.03	0.18	0.00
234	Robertsonpet	45.33	0.00	2.04	6.13	8.17	18.02	0.00
235	Ron	68.68	0.00	0.00	0.10	0.10	0.15	0.00
236	Sadalga	39.52	0.00	0.00	0.00	0.00	0.00	0.00
237	Sagara	18.55	0.00	1.07	2.98	4.05	21.83	0.00
238	Sakaleshpura	4.73	0.00	0.86	0.16	1.02	21.56	0.00
239	Saligrama	14.88	0.00	1.42	2.68	4.10	27.55	0.00
240	Sandoor	17.48	0.00	0.30	2.05	2.35	13.44	0.00
241	Sankeshwar	17.65	0.00	0.00	0.00	0.00	0.00	0.00
242	Sargur	2.82	0.00	0.00	0.00	0.00	0.00	0.00
243	Saundatti	14.09	0.00	0.00	0.38	0.38	2.70	0.28
244	Savanoor	8.74	0.00	0.00	0.14	0.14	1.60	0.00
245	Sedam	70.45	0.00	0.00	0.51	0.51	0.72	0.71
246	Shahabad	25.99	0.00	0.00	0.01	0.01	0.04	0.00
247	Shahapura	18.89	0.00	0.00	0.02	0.02	0.11	1.24
248	Shedbal	55.73	0.00	0.00	0.02	0.02	0.04	0.00
249	Shidlaghatta	3.60	0.00	0.00	0.00	0.00	0.00	0.00
250	Shiggaon	3.70	0.00	0.00	0.00	0.00	0.00	0.00
251	Shikaripura	18.92	0.00	0.19	0.89	1.08	5.71	0.00
252	Shirahatti	3.39	0.00	0.00	0.09	0.09	2.65	0.00
253	Shirlakoppa	13.46	0.00	0.00	0.72	0.72	5.35	0.00



Table 10.12.5 Forest Cover in Municipal Areas of Karnataka

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
254	Shirur	0.00	0.00	0.00	0.00	0.00	0.00	0.00
255	Shivamogga	76.93	0.00	0.14	9.06	9.20	11.96	0.00
256	Shorapura surapura	18.82	0.00	0.00	0.00	0.00	0.00	0.27
257	Shringeri	0.50	0.00	0.13	0.06	0.19	38.00	0.00
258	Siddapura	18.49	0.00	4.12	4.73	8.85	47.86	0.34
259	Sindagi	19.30	0.00	0.00	0.00	0.00	0.00	0.00
260	Sindanoor	30.27	0.00	0.00	0.03	0.03	0.10	0.00
261	Sira	16.10	0.00	0.00	0.26	0.26	1.61	0.00
262	Sirawar	29.41	0.00	0.00	0.00	0.00	0.00	0.00
263	Sirsi	10.16	0.00	0.79	0.83	1.62	15.94	0.00
264	Siruguppa	29.88	0.00	0.00	0.00	0.00	0.00	0.00
265	Someshwara	8.37	0.00	0.38	1.32	1.70	20.31	0.00
266	Somvarpet	0.88	0.00	0.11	0.03	0.14	15.91	0.00
267	Soraba	46.65	0.00	8.99	3.46	12.45	26.69	0.00
268	Srinivasapura	15.21	0.00	0.02	1.48	1.50	9.86	0.00
269	Srirampura	0.26	0.00	0.00	0.00	0.00	0.00	0.00
270	Srirangapatna	12.04	0.00	0.00	0.00	0.00	0.00	0.00
271	Sulya	16.69	0.32	1.00	9.30	10.62	63.63	0.01
272	Talikote	13.55	0.00	0.00	0.00	0.00	0.00	0.00
273	Tarikere	14.89	0.00	1.05	1.51	2.56	17.19	0.00
274	Tavaragera	63.23	0.00	0.00	0.59	0.59	0.93	7.73
275	Tekkalakote	43.39	0.00	0.00	0.00	0.00	0.00	0.00
276	Terdal	6.53	0.00	0.00	0.00	0.00	0.00	0.00
277	Thirthahalli	4.76	0.00	0.93	0.06	0.99	20.80	0.00
278	Tiptur	12.41	0.00	0.00	1.42	1.42	11.44	0.00
279	Tumakuru	64.03	0.00	4.60	4.15	8.75	13.67	0.00
280	Turuvekere	3.35	0.00	0.00	0.63	0.63	18.81	0.00
281	Turvihal	49.17	0.00	0.00	0.05	0.05	0.10	0.00
282	Udupi	64.84	0.00	5.59	10.13	15.72	24.24	0.00
283	Ugr khurd	26.13	0.00	0.00	0.00	0.00	0.00	0.00
284	Ullal	10.22	0.00	1.21	0.89	2.10	20.55	0.00
285	Vijayapura (Bangalore rural district)	15.08	0.00	0.00	1.59	1.59	10.54	0.00
286	Vijayapura (Vijayapura district)	91.19	0.00	0.03	0.19	0.22	0.24	0.59
287	Virajpet	9.03	0.37	1.68	1.44	3.49	38.65	0.00
288	Vitla	20.65	0.06	3.72	8.91	12.69	61.45	0.00
289	Wadi	20.16	0.00	0.00	1.01	1.01	5.01	0.00
290	Yadgir	45.26	0.00	0.00	1.03	1.03	2.28	0.36
291	Yadrami	4.41	0.00	0.00	0.00	0.00	0.00	0.00
292	Yelandur	2.56	0.00	0.00	0.26	0.26	10.16	0.00

Table 10.12.5 Forest Cover in Municipal Areas of Karnataka

(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
293	Yelburga	38.87	0.00	0.00	0.03	0.03	0.08	0.00
294	Yellapura	18.97	0.00	11.52	0.85	12.37	65.21	0.00
Grand Total		7,837.77	32.85	239.27	338.36	610.48	7.79	59.82

*Shapefile of digitized boundary as provided by Additional Principal Chief Conservator of Forest, Working plan.

10.12.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.12.6 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Karnataka

(km²)

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
3,737.90	12,876.97	6,399.03	23,013.90	799.89	8,274.78	7,165.70	16,240.37
16.24 %	55.95 %	27.81 %		4.93 %	50.95 %	44.12 %	

*In case of Karnataka, RFA boundaries have been used.

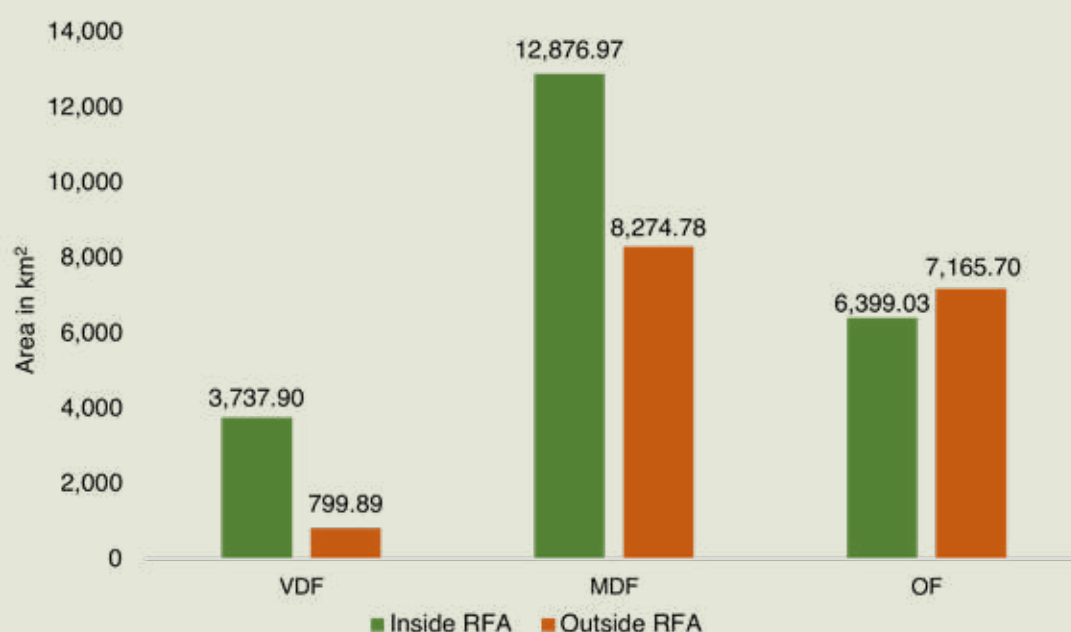
**Figure 10.12.2 Forest Cover Inside and Outside of RFA in Karnataka**



Table 10.12.7 Forest Cover Change Matrix Inside RFA/GW For Karnataka between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 inside RFA / GW Raster based*
VDF	3,734.01	0.00	0.14	0.00	1.03	3,735.18
MDF	3.37	12,869.38	4.20	0.98	7.63	12,885.56
OF	0.11	3.13	6,263.65	9.11	24.02	6,300.02
Scrub	0.00	0.05	58.50	2,734.82	29.44	2,822.81
NF	0.41	4.41	72.54	81.79	5,134.12	5,293.27
Total ISFR 2023 inside RFA/GW	3,737.90	12,876.97	6,399.03	2,826.70	5,196.24	31,036.84
Net Change	2.72	-8.59	99.01	3.89	-97.03	

*Area figure calculated without normalization factor.

Table 10.12.8 Forest Cover Change Matrix Outside RFA/GW for Karnataka between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	799.65	0.00	0.00	0.00	0.17	799.82
MDF	0.24	8,264.61	3.78	1.03	25.27	8,294.93
OF	0.00	0.99	6,963.70	13.13	113.24	7,091.06
Scrub	0.00	0.00	7.54	1,581.50	46.76	1,635.80
NF	0.00	9.18	190.68	90.79	1,42,641.90	1,42,932.55
Total ISFR 2023 outside RFA/GW	799.89	8,274.78	7,165.70	1,686.45	1,42,827.34	1,60,754.16
Net Change	0.07	-20.15	74.64	50.65	-105.21	

*Area figure calculated without normalization factor.

Table 10.12.9 Altitude-wise Forest Cover in Karnataka

(km ²)						
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	41,511.00	1,504.36	5,894.81	2,272.94	9,672.11	318.23
500-1000	1,46,593.00	2,597.53	13,517.89	10,752.66	26,868.08	4,117.00
1000-2000	3,687.00	435.90	1,739.05	539.13	2,714.08	77.92
Total	1,91,791.00	4,537.79	21,151.75	13,564.73	39,254.27	4,513.15

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

Table 10.12.10 Forest Cover in Different Slope Classes in Karnataka

(km²)

Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	1,61,569.00	942.58	9,694.23	8,518.23	19,155.04	2,527.32
5-10	15,763.00	992.72	5,445.08	2,508.87	8,946.67	976.79
10-15	6,715.00	901.03	2,903.95	1,135.73	4,940.71	474.56
15-20	3,796.00	714.87	1,629.62	652.24	2,996.73	275.88
20-25	2,122.00	478.24	845.83	392.07	1,716.14	157.88
25-30	1,085.00	276.96	394.97	216.22	888.15	72.89
>30	741.00	231.39	238.07	141.37	610.83	27.83
Total	1,91,791.00	4,537.79	21,151.75	13,564.73	39,254.27	4,513.15

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



Photo: FSI Repository

Forest Survey of India

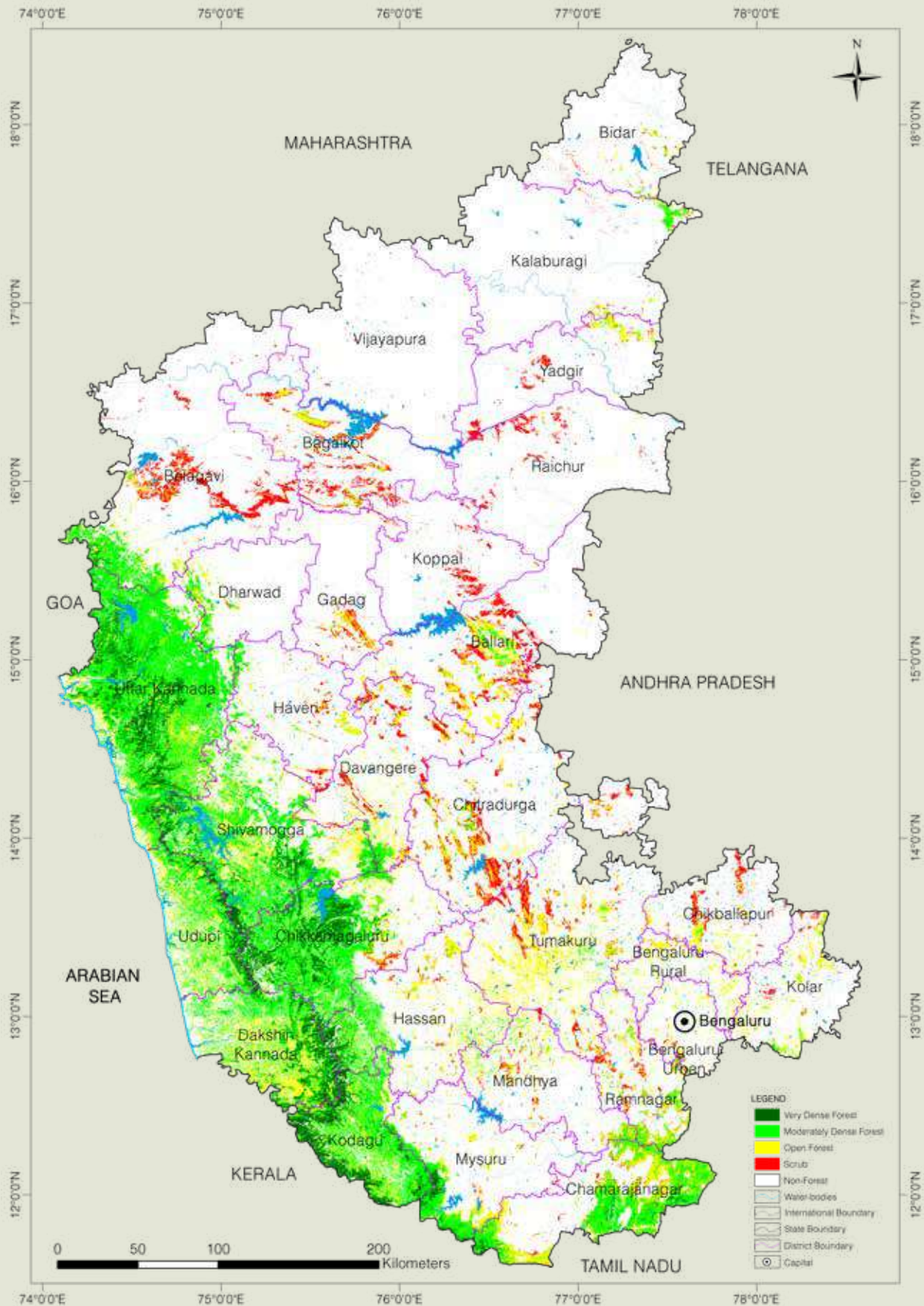


Figure 10.12.3 Forest Cover Map of Karnataka

10.12.3 Forest Types

The area under different Forest Types in Karnataka (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.12.11 Area Statistics of the Forest Types found in Karnataka

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	1A/C4 West Coast tropical evergreen forest	5,239.10	11.95
2	2A/C2 West Coast semi-evergreen forest	4,381.55	10.00
3	2A/2S1 West Coast secondary evergreen <i>Dipterocarp</i> Forest	338.86	0.77
4	2/E3 Moist bamboo brakes	1.86	0.00
5	2/E4 Lateritic semi-evergreen forest	159.62	0.36
6	3B/C1a Very moist teak forest	89.87	0.21
7	3B/C1b Moist teak forest	1,796.29	4.10
8	3B/C1c Slightly moist teak forest	992.40	2.26
9	3B/C2 Southern moist mixed deciduous forest	4,921.81	11.23
10	3B/C2/2S1 Southern secondary moist mixed deciduous forest	695.59	1.59
11	4B/TS1 Mangrove scrub	9.00	0.02
12	5A/C1a Very dry teak forest	22.54	0.05
13	5A/C1b Dry teak forest	2,515.07	5.74
14	5A/C3 Southern dry mixed deciduous forest	3,156.61	7.20
15	5/DS1 Dry deciduous scrub	2,930.39	6.69
16	5/E4 <i>Hardwickia</i> forest	414.93	0.95
17	5/E7 Laterite thorn forest	126.71	0.29
18	5/2S1 Secondary dry deciduous forest	38.91	0.09
19	6A/C1 Southern thorn forest	1,882.80	4.30
20	6A/DS1 Southern thorn scrub	3,364.01	7.68
21	8A/C1 Nilgiri subtropical hill forest	371.19	0.85
Sub Total		33,449.11	76.33
22	TOF/ Plantation	10,318.31	23.54
Total (Forest Cover & Scrub)		43,767.42	99.87
Grassland forest types (outside forest cover)			
22	5/DS4 Dry grassland	54.33	0.12
24	8A/C1/DS1 South Indian sub-tropical hill savannah (woodland)	2.65	0.01
Sub Total		56.98	0.13
Grand Total		43,824.40	100.00

* Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest types outside forest cover have also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).



10.12.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.12.12 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Bagalkot	211	65
2	Ballari	778	273
3	Belagavi	1,033	318
4	Bengaluru	44	51
5	Bengaluru Rural	169	124
6	Bidar	63	66
7	Chamarajanagar	196	140
8	Chikkamagaluru	1,187	336
9	Chikkballapura	415	300
10	Chitradurga	927	494
11	Dakshina Kannada	322	33
12	Davanagere	613	298
13	Dharwad	267	90
14	Gadag	249	69
15	Hassan	518	278
16	Haveri	384	147
17	Kalaburagi	58	50
18	Kodagu	195	77
19	Kolar	193	230
20	Koppal	27	17
21	Mandya	302	212
22	Mysuru	50	30
23	Raichur	10	5
24	Ramanagara	365	258
25	Shivamogga	1,356	436
26	Tumakuru	933	631
27	Udupi	24	11
28	Uttara Kannada	2,162	436
29	Vijayapura	8	4
30	Yadgir	15	21
Total		13,074	5,500

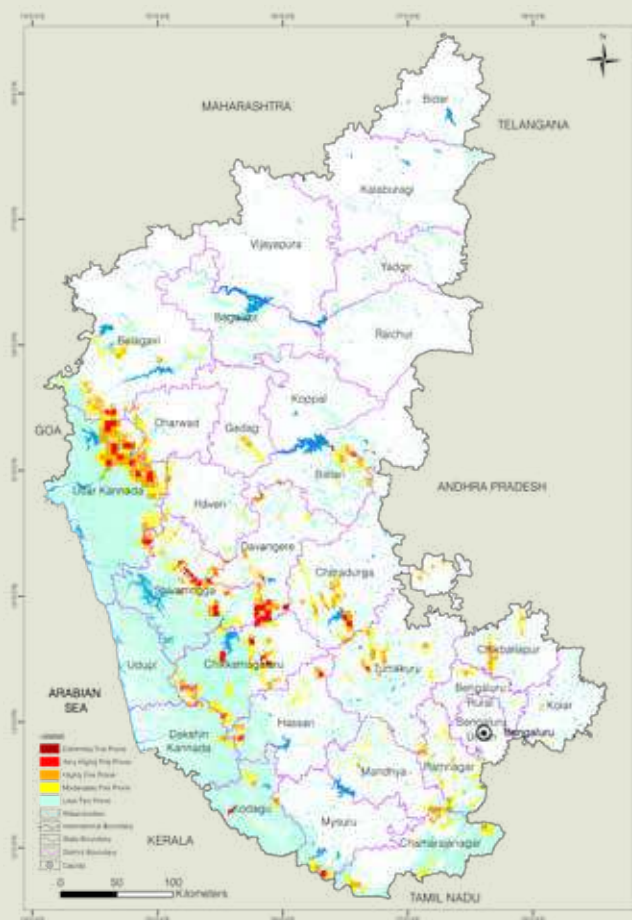
10.12.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.12.13 Forest Fire Prone Classes

Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	4.25	0.01
2	Very highly fire prone	1,130.13	2.58
3	Highly fire prone	3,409.31	7.79
4	Moderately fire prone	4,361.42	9.97
5	Less fire prone	34,862.31	79.65
Total		43767.42	100.00

* Forest Cover including Scrub.

**Figure 10.13.4 Fire Prone Forest Areas under Different Fire Prone Classes**

10.12.6 Results Derived from NFI for Karnataka

Table 10.12.14 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Terminalia paniculata</i>	56,632	27.45
2	<i>Tectona grandis</i>	43,585	16.63
3	<i>Xylia xylocarpa</i>	35,528	13.69
4	<i>Terminalia elliptica/ Terminalia crenulata</i>	35,200	19.23
5	<i>Eucalyptus species</i>	35,001	4.40



Table 10.12.15 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Areca catechu</i>	1,89,532	4.892
2	<i>Prosopis juliflora/ Neltuma juliflora</i>	99,870	1.470
3	<i>Azadirachta indica</i>	92,376	17.113
4	<i>Cocos nucifera</i>	90,248	23.568
5	<i>Mangifera indica</i>	55,598	9.056

Table 10.12.16 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Cocos nucifera</i>	8,703	1.617
2	<i>Areca catechu</i>	7,799	0.183
3	<i>Acacia auriculiformis</i>	2,251	0.062
4	<i>Mangifera indica</i>	2,154	0.506
5	<i>Tectona grandis</i>	1,595	0.208

Table 10.12.17 Major NTFP Species in Karnataka

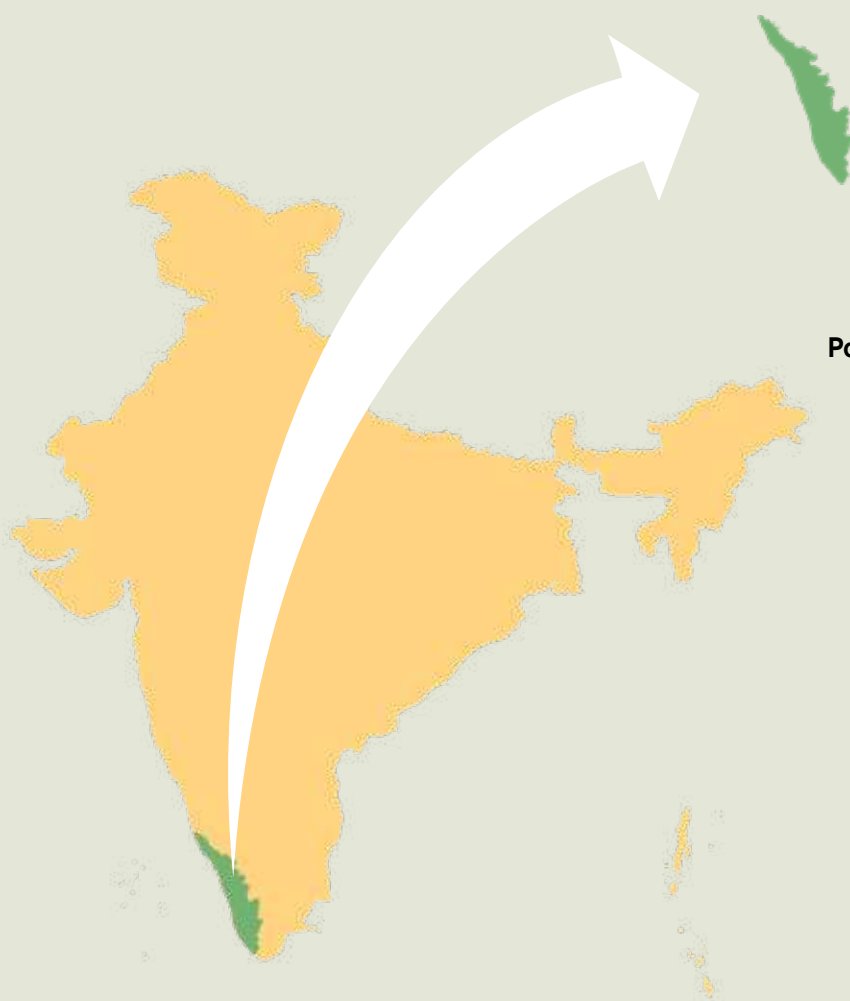
Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Anogeissus latifolia/ Terminalia anogeissiana</i>	Tree	15,36,840
2	<i>Areca catechu</i>	Tree	10,124
3	<i>Cassia senna/ Senna alexandrina</i>	Shrubs	30,05,316
4	<i>Piper species/ Piper longum/ Piper mullesua/ Piper peepuloides</i>	Climbers	49,38,270
5	<i>Hemidesmus indicus</i>	Climbers	2,88,366
6	<i>Asparagus racemosus</i>	Climbers	1,44,183
7	<i>Cymbopogon citratus</i>	Herbs	7,07,07,458
8	<i>Curcuma aromatica</i>	Herbs	54,39,035
9	<i>Ocimum species (Ocimum gratissimum/ Ocimum sanctum/ Ocimum tenuiflorum/ Ocimum americanum)</i>	Herbs	31,08,020
10	<i>Anagallis arvensis/ Lysimachia arvensis</i>	Herbs	15,54,010

Table 10.12.18 Major Invasive Species In The State Inside The RFA in Karnataka

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Lantana camara</i>	3,190.36
2	<i>Chromolaena odorata</i>	2,499.34
3	<i>Acacia farnesiana/ Vachellia farnesiana</i>	251.84
4	<i>Cassia tora/ Senna tora</i>	178.52
5	<i>Achyranthes aspera</i>	101.14



Photo: Anant Shukla



Geographical Area
38,852 km²

Geographical Coordinates
Latitude 8°17'N to 12°47' N
Longitude 74°52'E to 77°24' E

Population (as per Census 2011)
33.41 million
Urban 15.94 million (47.70 %)
Rural 17.47 million (52.30 %)
Tribal 0.48 million (1.45 %)

Average Population Density
860 per km²

Livestock Population
(as per 19th Livestock Census)
2.73 million

No. of Districts
14

No. of Hill Districts
10

No. of Tribal Districts
9

Table 10.13.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	3,885	
Reporting area for land utilization	3,886.29	100.00
Forests	1,081.51	27.83
Not available for land cultivation	581.31	14.96
Permanent pastures and other grazing lands	-	-
Land under misc. tree crops and groves	2.27	0.06
Culturable wasteland	88.50	2.27
Fallow land other than current fallows	49.42	1.27
Current fallows	53.91	1.39
Net area sown	2,029.37	52.22

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.13.1 Forest Cover

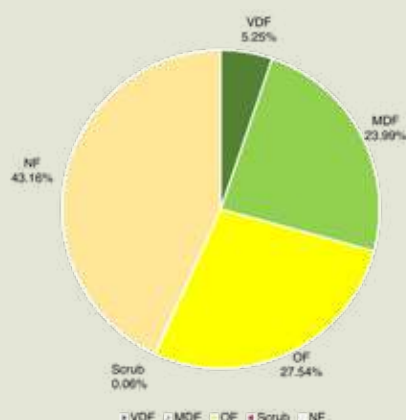


Table 10.13.2 Forest Cover of Kerala

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	2,041.17	5.25
MDF	9,321.82	23.99
OF	10,696.37	27.54
Total	22,059.36	56.78
Scrub	21.88	0.06

Figure 10.13.1 Forest Cover of Kerala

Table 10.13.3 District- wise Forest Cover in Kerala

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Alappuzha	1,415	0.00	20.01	120.91	140.92	9.96	-0.61	0.00
Ernakulam ^H	3,063	190.46	631.53	647.02	1,469.01	47.96	-2.00	0.54
Idukki ^H	4,356	399.27	1,808.42	1,003.23	3,210.92	73.71	5.06	0.03
Kannur ^H	2,961	57.64	493.12	1,281.33	1,832.09	61.87	28.66	0.10
Kasaragod ^H	1,989	0.38	241.29	896.36	1,138.03	57.22	36.16	0.08
Kollam ^H	2,483	10.35	484.39	701.84	1,196.58	48.19	12.12	0.00
Kottayam	2,206	73.71	406.62	863.44	1,343.77	60.91	-7.10	0.85
Kozhikode ^H	2,345	142.16	415.56	1,324.34	1,882.06	80.26	8.87	6.75
Malappuram ^H	3,554	406.21	617.79	1,140.83	2,164.83	60.91	3.52	12.01
Palakkad ^H	4,482	164.07	1,189.59	693.17	2,046.83	45.67	23.18	0.68
Pathanamthitta	2,652	104.97	635.14	616.37	1,356.48	51.15	4.23	0.15
Thiruvananthapuram ^H	2,189	63.49	700.46	630.52	1,394.47	63.70	10.09	0.08
Thrissur	3,027	244.63	469.92	575.48	1,290.03	42.62	10.79	0.00
Wayanad ^H	2,130	183.83	1,207.98	201.53	1,593.34	74.80	0.45	0.61
Grand Total	38,852	2,041.17	9,321.82	10,696.37	22,059.36	56.78	133.42	21.88

*Area figure calculated without normalization factor.



Table 10.13.4 Division-wise Forest Cover in Kerala

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
ABP	32.94	0.00	28.74	2.58	31.32	95.08	0.00	0.00
Achenkovil	292.94	37.13	135.00	83.00	255.13	87.09	8.86	0.97
Anamudi Shola NP	30.95	11.44	12.32	0.60	24.36	78.71	0.20	0.00
Aralam WL	54.50	21.82	31.10	0.60	53.52	98.20	-0.06	0.00
Chalakudy	976.22	17.11	149.38	165.96	332.45	34.05	0.68	0.00
Chimmini WL	77.80	26.14	25.98	8.89	61.01	78.42	0.00	0.00
Chinnar WL	91.12	18.91	31.90	4.04	54.85	60.20	0.47	0.03
Choolannur Peafowl	3.55	0.00	0.02	1.02	1.04	29.30	0.00	0.00
Eravikulam NP	111.85	25.55	4.00	2.05	31.60	28.25	0.08	0.00
Idukki Wildlife	115.92	0.00	25.58	24.29	49.87	43.02	0.35	0.00
Kadalundi Community Reserve	1.55	0.00	0.00	0.27	0.27	17.42	0.00	0.00
Kannur	4,893.78	38.96	687.56	2,082.31	2,808.83	57.40	64.25	0.18
Konni	1,008.75	0.47	330.59	228.68	559.74	55.49	4.52	0.00
Kothamangalam	1,484.42	0.92	444.71	495.11	940.74	63.37	-5.38	0.00
Kottayam	3,579.69	16.01	987.23	1,009.50	2,012.74	56.23	-8.12	0.00
Kozhikode	2,249.65	43.41	352.04	965.54	1,360.99	60.50	8.38	0.67
Kurinjomala sanctuary	44.31	0.30	26.75	1.09	28.14	63.51	0.38	0.00
Malabar WL	95.23	28.21	57.23	1.68	87.12	91.48	0.32	0.00
Malayatur	1,577.98	103.97	366.02	240.67	710.66	45.04	0.67	0.54
Mangalavanam	0.03	0.00	0.01	0.00	0.01	33.33	0.00	0.00
Mankulam	98.74	53.30	23.78	12.05	89.13	90.27	0.49	0.00
Mannarkad	982.31	93.28	123.31	449.59	666.18	67.82	4.71	11.45
Marayur	112.07	31.28	21.13	3.48	55.89	49.87	0.22	0.00
Mathikettan Shola NP	16.39	3.92	9.81	0.98	14.71	89.75	0.17	0.00
Munnar	1,259.51	178.47	522.46	221.06	921.99	73.20	4.42	0.00
Nemmara	1,332.09	57.84	176.92	244.17	478.93	35.95	0.46	0.00
Neyyar WL	118.05	13.34	69.64	13.77	96.75	81.96	0.35	0.00
Nilambur North	1,620.36	48.57	201.02	701.20	950.79	58.68	2.17	0.93
Nilambur South	1,889.00	79.50	193.36	797.48	1,070.34	56.66	1.49	5.99
Palakkad	1,565.46	48.70	92.16	360.66	501.52	32.04	18.31	0.00
Pampadum shola National Park	11.69	0.00	10.53	0.00	10.53	90.08	0.11	0.00
Parambikulam Tiger Reserve	652.21	296.11	225.55	22.68	544.34	83.46	0.14	0.09
Peechi-vazhani WL	125.80	12.51	57.40	41.19	111.10	88.31	-0.06	0.00
Peppara WL	77.84	8.46	48.34	9.84	66.64	85.61	0.67	0.00
Periyar Tiger Reserve	941.29	176.50	503.68	99.98	780.16	82.88	1.91	0.00
Punalur	1,568.88	0.63	302.49	551.91	855.03	54.50	5.15	0.00

Table 10.13.4 Division-wise Forest Cover in Kerala

(km²)

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Ranni	3,030.39	98.13	720.69	486.91	1,305.73	43.09	-3.63	0.00
Shendurney WL	172.59	55.06	74.92	22.02	152.00	88.07	-0.03	0.00
Silentvalley NP	265.13	86.79	76.29	70.76	233.84	88.20	-0.56	0.12
Thattekkad	25.82	0.00	15.74	3.92	19.66	76.14	0.00	0.00
Thenmala	154.60	6.33	88.67	39.22	134.22	86.82	0.73	0.00
Thrissur	1,442.30	5.36	118.01	324.52	447.89	31.05	8.15	0.00
Trivandrum	2,081.88	78.44	617.23	595.47	1,291.14	62.02	9.25	0.08
Vazhachal	465.12	19.80	108.42	89.57	217.79	46.82	1.17	0.00
Wayanad North	666.67	49.74	364.31	60.54	474.59	71.19	0.65	0.00
Wayanad South	1,097.91	36.78	629.91	108.71	775.40	70.63	-1.06	0.02
Wayanad WL	366.38	94.89	209.77	30.34	335.00	91.44	0.30	0.59
Area which does not fall in any Division	416.06	17.09	20.12	16.47	53.68	12.90	2.14	0.22
Grand Total	39,279.72	2,041.17	9,321.82	10,696.37	22,059.36	56.16	133.42	21.88

As per the division boundary shapefile provided by State Forest Department.

*Area figure calculated without normalization factor.

Table 10.13.5 Forest Cover in Municipal Areas of Kerala

(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
1	Alappuzha	32.83	0.00	0.00	0.14	0.14	0.43	0.00
2	Chengannur	12.74	0.00	0.78	1.09	1.87	14.68	0.00
3	Cherthala	17.70	0.00	0.00	1.79	1.79	10.11	0.00
4	Haripad	16.69	0.00	0.00	0.00	0.00	0.00	0.00
5	Kayamkulam	20.68	0.00	0.00	3.03	3.03	14.65	0.00
6	Mavelikara	14.59	0.00	0.01	1.36	1.37	9.39	0.00
7	Aluva	6.64	0.00	0.00	0.09	0.09	1.36	0.00
8	Angamaly	20.97	0.00	0.00	0.67	0.67	3.20	0.00
9	Kochi	97.71	0.00	0.26	0.67	0.93	0.95	0.00
10	Eloor	13.56	0.00	0.00	0.69	0.69	5.09	0.00
11	Kalamassery	25.41	0.00	0.23	1.81	2.04	8.03	0.00
12	Koothattukulam	22.87	0.00	5.65	6.54	12.19	53.30	0.00
13	Kothamangalam	39.55	0.00	4.84	16.64	21.48	54.31	0.00
14	Maradu	12.46	0.00	0.00	0.12	0.12	0.96	0.00
15	Muvattupuzha	29.23	0.00	1.41	7.68	9.09	31.10	0.00
16	North Paravur	8.55	0.00	0.00	0.07	0.07	0.82	0.00



Table 10.13.5 Forest Cover in Municipal Areas of Kerala

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
17	Perumbavoor	19.12	0.00	0.31	0.39	0.70	3.66	0.12
18	Piravom	29.54	0.00	3.09	8.72	11.81	39.98	0.00
19	Thrikkakara	29.58	0.00	0.00	1.12	1.12	3.79	0.00
20	Tripunithura	29.62	0.00	0.22	0.46	0.68	2.30	0.00
21	Kattappana	57.62	0.71	29.52	19.54	49.77	86.38	0.00
22	Thodupuzha	29.03	0.00	7.36	3.47	10.83	37.31	0.00
23	Andoor	24.52	0.00	0.18	4.42	4.60	18.76	0.00
24	Iritty	48.32	0.00	11.35	18.55	29.90	61.88	0.00
25	Kannur Cantonment	1.62	0.00	0.00	0.05	0.05	3.09	0.00
26	Kannur	79.59	0.00	0.01	5.19	5.20	6.53	0.00
27	Kuthuparamba	17.40	0.00	1.65	7.58	9.23	53.05	0.00
28	Mattanur	54.05	0.00	10.38	24.87	35.25	65.22	0.00
29	Payyannur	53.45	0.00	0.29	7.41	7.70	14.41	0.00
30	Sreekandapuram	70.15	0.00	1.59	50.50	52.09	74.26	0.00
31	Taliparamba	16.76	0.00	0.00	2.11	2.11	12.59	0.00
32	Thalassery	24.56	0.00	0.00	0.40	0.40	1.63	0.00
33	Kanhangad	40.43	0.00	0.09	2.15	2.24	5.54	0.00
34	Kasaragod	17.51	0.00	0.51	1.32	1.83	10.45	0.00
35	Nileshwar	26.56	0.00	1.94	3.49	5.43	20.44	0.00
36	Karunagappally	17.86	0.00	0.00	0.00	0.00	0.00	0.00
37	Kollam	71.85	0.00	0.03	2.40	2.43	3.38	0.00
38	Kottarakara	19.05	0.00	0.44	4.76	5.20	27.30	0.00
39	Paravoor	19.88	0.00	0.00	2.64	2.64	13.28	0.00
40	Punaloor	34.46	0.00	3.62	16.12	19.74	57.28	0.00
41	Changanassery	14.23	0.00	0.00	0.01	0.01	0.07	0.00
42	Erattupetta	15.40	0.00	3.08	3.96	7.04	45.71	0.00
43	Ettumanoor	27.48	0.00	2.77	3.95	6.72	24.45	0.00
44	Kottayam	56.08	0.00	0.08	1.36	1.44	2.57	0.00
45	Pala	16.39	0.00	2.06	3.96	6.02	36.73	0.00
46	Vaikom	17.57	0.00	0.00	2.38	2.38	13.55	0.00
47	Feroke	13.23	0.00	0.00	0.87	0.87	6.58	0.00
48	Koduvally	22.27	0.00	0.51	12.96	13.47	60.48	0.00
49	Koyilandy	29.18	0.00	0.62	10.10	10.72	36.74	0.00
50	Kozhikode	119.26	0.00	0.14	9.27	9.41	7.89	0.00
51	Mukkam	36.21	0.00	4.20	23.05	27.25	75.26	0.00
52	Payyoli	22.62	0.00	0.04	5.19	5.23	23.12	0.00
53	Ramanattukara	11.95	0.00	0.03	0.30	0.33	2.76	0.00
54	Vatakara	21.09	0.00	0.00	2.64	2.64	12.52	0.00
55	Kondotty	31.60	0.00	0.38	14.97	15.35	48.58	0.00
56	Kottakkal	20.38	0.00	0.34	4.03	4.37	21.44	0.00
57	Malappuram	33.11	0.00	0.89	8.12	9.01	27.21	0.00
58	Manjeri	52.66	0.00	0.17	21.57	21.74	41.28	0.00

Table 10.13.5 Forest Cover in Municipal Areas of Kerala(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
59	Nilambur	31.94	0.00	1.32	13.52	14.84	46.46	0.00
60	Parappanangadi	22.88	0.00	0.23	8.68	8.91	38.94	0.00
61	Perinthalmanna	38.29	0.00	1.36	12.45	13.81	36.07	0.00
62	Ponnani	24.80	0.00	0.01	5.94	5.95	23.99	0.00
63	Thanur	20.16	0.00	0.31	7.53	7.84	38.89	0.00
64	Tirur	17.28	0.00	0.02	6.39	6.41	37.09	0.00
65	Tirurangadi	17.62	0.00	0.55	3.93	4.48	25.43	0.00
66	Valancheri	22.37	0.00	0.81	3.58	4.39	19.62	0.00
67	Cherpulassery	31.16	0.00	0.48	14.10	14.58	46.79	0.00
68	Chittoor Thathamangalam	15.01	0.00	0.00	0.02	0.02	0.13	0.00
69	Mannarkad	15.42	0.00	0.74	4.19	4.93	31.97	0.00
70	Ottappalam	32.72	0.00	0.08	8.09	8.17	24.97	0.00
71	Palakkad	27.07	0.00	0.01	0.18	0.19	0.70	0.00
72	Pattambi	16.91	0.00	0.40	1.49	1.89	11.18	0.00
73	Shornur	31.85	0.00	0.04	4.17	4.21	13.22	0.00
74	Adoor	20.83	0.00	3.50	5.15	8.65	41.53	0.00
75	Pandalam	28.83	0.00	3.01	10.26	13.27	46.03	0.00
76	Pathanamthitta	33.78	0.00	7.03	10.31	17.34	51.33	0.00
77	Thiruvalla	25.71	0.00	0.14	0.29	0.43	1.67	0.00
78	Attingal	16.61	0.00	0.02	3.17	3.19	19.21	0.00
79	Nedumangad	29.24	0.00	6.40	11.88	18.28	62.52	0.00
80	Neyyattinkara	30.46	0.00	4.16	10.79	14.95	49.08	0.00
81	Thiruvananthapuram	206.63	0.00	0.00	0.00	0.00	0.00	0.00
82	Varkala	15.60	0.00	0.00	0.60	0.60	3.85	0.00
83	Chalakkudy	25.04	0.00	0.25	0.83	1.08	4.31	0.00
84	Chavakkad	13.09	0.00	0.07	0.70	0.77	5.88	0.00
85	Guruvayoor	29.42	0.00	0.38	2.46	2.84	9.65	0.00
86	Irinjalakkuda	37.54	0.00	0.18	0.18	0.36	0.96	0.00
87	Kodungalloor	29.68	0.00	0.56	1.04	1.60	5.39	0.00
88	Kunnamkulam	26.06	0.00	1.09	3.43	4.52	17.34	0.00
89	Thrissur	101.54	0.00	0.35	4.18	4.53	4.46	0.00
90	Wadakanchery	51.95	0.00	3.45	14.33	17.78	34.23	0.00
91	Kalpetta	38.16	0.54	20.83	3.29	24.66	64.62	0.00
92	Mananthavady	80.69	0.54	28.89	16.53	45.96	56.96	0.00
93	Sulthan Bathery	220.35	53.67	130.22	11.28	195.17	88.57	0.07
94	Thiruvananthapuram	206.63	0.00	10.64	30.15	40.79	19.74	0.00
Grand Total		3,418.74	55.46	328.60	593.85	977.91	28.60	0.19

*Shapefile of digitized boundary as provided by Directorate of Municipal Administration/Urban Development, Kerala.



10.13.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analyzed in different categories and presented in table given below.

Table 10.13.6 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Kerala

(km ²)							
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
1,877.59	5,420.36	2,627.89	9,925.84	163.58	3,901.46	8,068.48	12,133.52
18.91%	54.61%	26.48 %		1.35%	32.15%	66.50 %	

*In case of Kerala, RFA boundaries have been used.

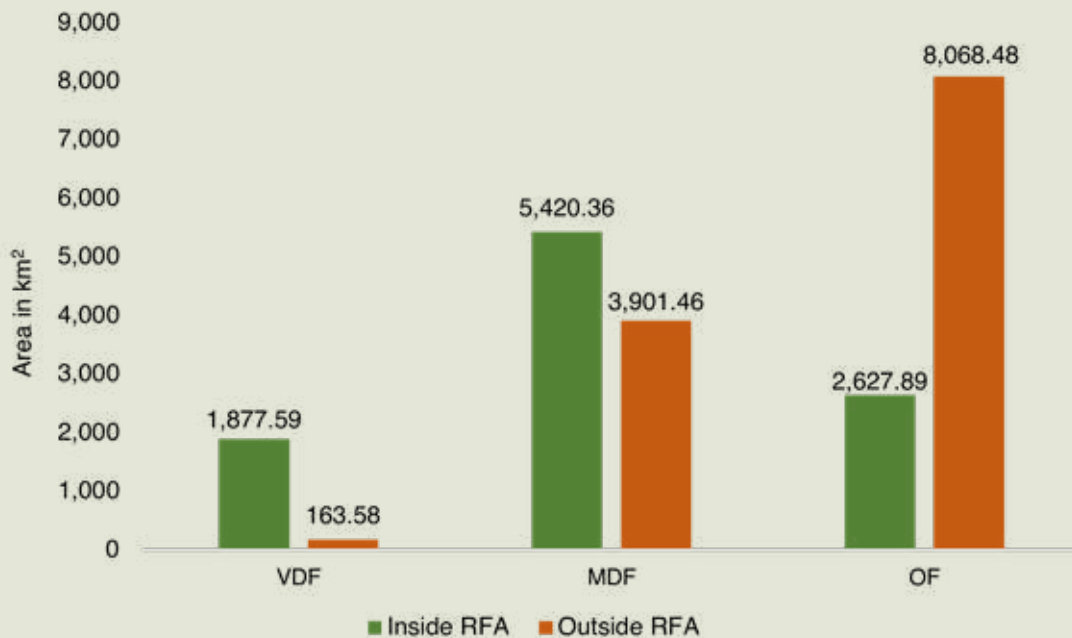


Figure 10.13.2 Forest Cover Inside and Outside of RFA in Kerala

Table 10.13.7 Forest Cover Change Matrix Inside RFA/GW for Kerala between 2021 Raster based and 2023 Assessments

(km ²)						
Class	2023 Assessment inside RFA/GW					Total ISFR 2021 inside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	1,877.48	0.00	0.29	0.00	1.16	1,878.93
MDF	0.00	5,415.28	0.54	0.00	14.07	5,429.89
OF	0.00	0.00	2,564.24	0.00	14.55	2,578.79
Scrub	0.00	0.00	0.39	19.60	0.14	20.13
NF	0.11	5.08	62.43	0.43	1,579.20	1,647.25
Total ISFR 2023 inside RFA/GW	1,877.59	5,420.36	2,627.89	20.03	1,609.12	11,554.99
Net Change	-1.34	-9.53	49.10	-0.10	-38.13	

*Area figure calculated without normalization factor.

Table 10.13.8 Forest Cover Change Matrix Outside RFA/GW for Kerala between 2021 Raster based and 2023 Assessments

(km²)

Class	2023 Assessment outside RFA/GW					Total ISFR 2021 outside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	163.58	0.00	0.10	0.00	0.32	164.00
MDF	0.00	3,895.37	0.22	0.00	28.20	3,923.79
OF	0.00	0.03	7,873.35	0.00	77.16	7,950.54
Scrub	0.00	0.00	0.06	1.79	0.27	2.12
NF	0.00	6.06	194.75	0.06	15,055.69	15,256.56
Total ISFR 2023 outside RFA/GW	163.58	3,901.46	8,068.48	1.85	15,161.64	27,297.01
Net Change	-0.42	-22.33	117.94	-0.27	-94.92	

*Area figure calculated without normalization factor.

Table 10.13.9 Altitude-wise Forest Cover in Kerala

(km²)

Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	28,678.00	214.45	5,088.05	8,986.68	14,289.18	9.45
500-1000	6,478.00	873.19	2,862.37	1,243.20	4,978.76	8.45
1000-2000	3,441.00	903.44	1,307.31	458.79	2,669.54	3.98
2000-3000	255.00	50.09	64.09	7.70	121.88	0.00
Total	38,852.00	2,041.17	9,321.82	10,696.37	22,059.36	21.88

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

Table 10.13.10 Forest Cover in Different Slope Classes in Kerala

(km²)

Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	17,923.00	177.42	2,164.92	4,247.58	6,589.92	6.39
5-10	8,347.00	283.43	2,205.86	2,774.37	5,263.66	3.85
10-15	4,607.00	337.44	1,667.26	1,513.40	3,518.10	2.33
15-20	3,051.00	351.72	1,238.95	964.10	2,554.77	2.50
20-25	2,137.00	319.95	908.20	594.04	1,822.19	2.71
25-30	1,402.00	246.35	600.32	343.87	1,190.54	2.30
>30	1,385.00	324.86	536.31	259.01	1,120.18	1.80
Total	38,852.00	2,041.17	9,321.82	10,696.37	22,059.36	21.88

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

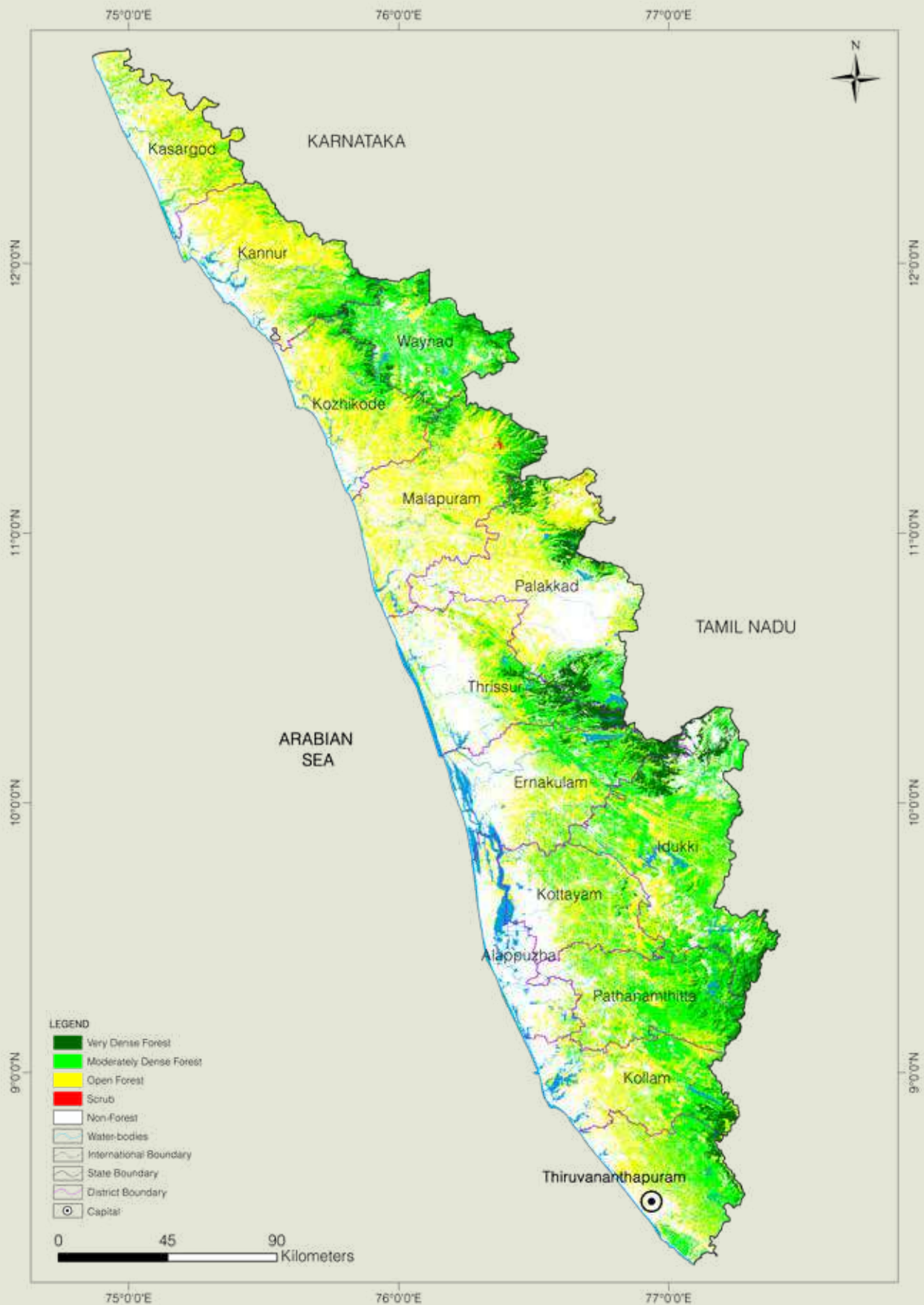


Figure 10.13.3 Forest Cover Map of Kerala

10.13.3 Forest Types

The area under different Forest Types in Kerala (as per the Champion & Seth Forest Classification, 1968) based on the Forest cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.13.11 Area Statistics of the Forest Types found in Kerala

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	1A/C3 Southern hilltop tropical evergreen forest	304.69	1.38
2	1A/C4 West Coast tropical evergreen forest	3,135.73	14.19
3	1/E2 Wet bamboo brakes	25.41	0.12
4	1/2S1 Pioneer Euphorbiaceous scrub	18.32	0.08
5	2A/C2 West Coast semi-evergreen forest	2,778.38	12.58
6	3B/C1a Very moist teak forest	154.58	0.70
7	3B/C1b Moist teak forest	129.67	0.59
8	3B/C1c Slightly moist teak forest	468.04	2.12
9	3B/C2 Southern moist mixed deciduous forest	1,798.99	8.14
10	4B/TS2 Mangrove forest	9.59	0.04
11	4C/FS1 <i>Myristica</i> swamp forest	1.48	0.01
12	5A/C3 Southern dry mixed deciduous forest	315.13	1.43
13	6A/C1 Southern thorn forest	0.28	0.00
14	11A/C1 Southern montane wet temperate forest	314.55	1.42
Sub Total		9,454.84	42.80
15	TOF/ Plantation	12,626.40	57.16
Total (Forest cover & scrub)		22,081.24	99.96
Grassland forest types (outside forest cover)			
16	5/DS4 Dry grassland	0.37	0.00
17	11A/C1/DS2 Southern montane wet grassland	9.85	0.04
Sub Total		10.22	0.04
Grand Total		22,091.46	100.00

* Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest types outside forest cover have also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).



10.13.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.13.12 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Alappuzha	0	0
2	Ernakulam	16	25
3	Idukki	449	570
4	Kannur	14	9
5	Kasaragod	3	1
6	Kollam	37	47
7	Kottayam	52	21
8	Kozhikode	6	0
9	Malappuram	95	74
10	Palakkad	544	250
11	Pathanamthitta	54	58
12	Thiruvananthapuram	14	12
13	Thrissur	182	6
14	Waynad	84	37
Total		1,550	1,110

10.13.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.13.13 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	0.00	0.00
2	Very highly fire prone	62.13	0.28
3	Highly fire prone	513.06	2.32
4	Moderately fire prone	1,322.05	5.99
5	Less fire prone	20,184.00	91.41
Total		22,081.24	100.00

* Forest Cover including Scrub.

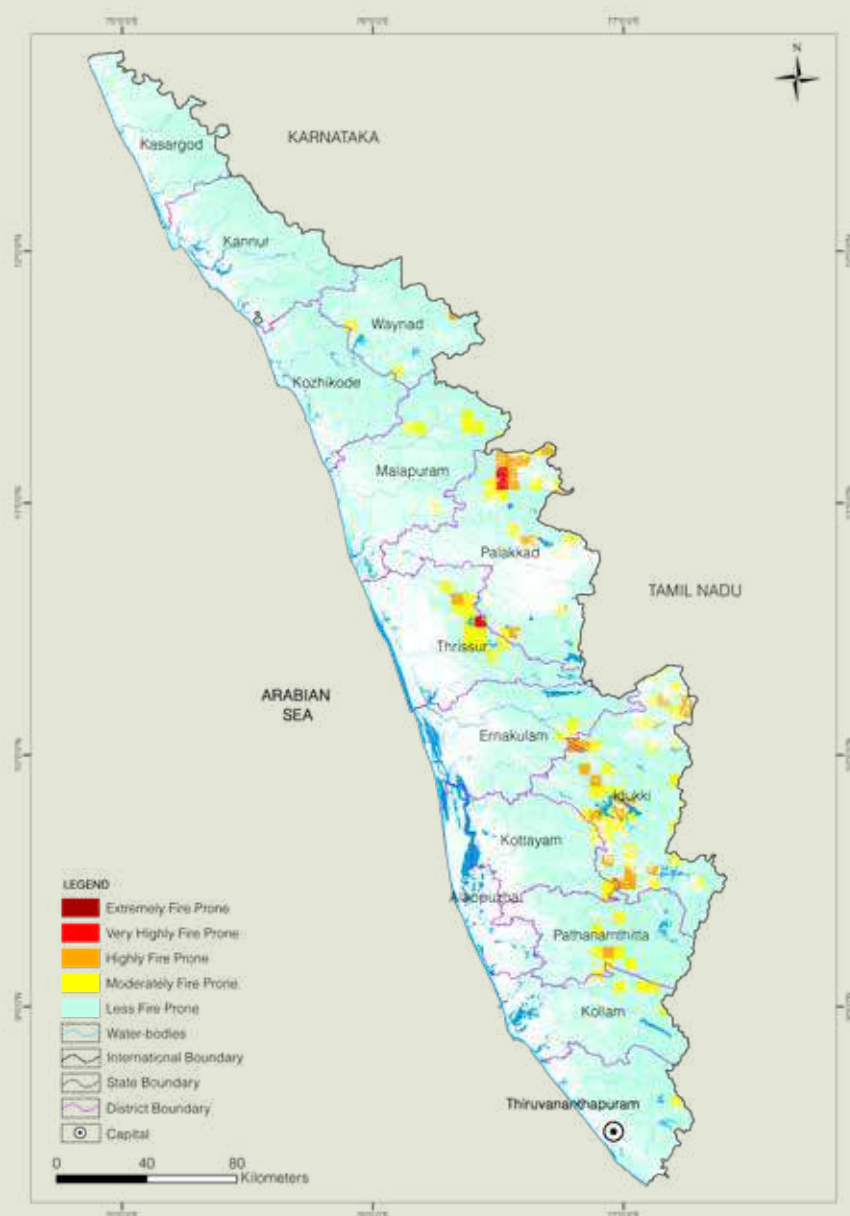


Figure 10.13.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.13.6 Results Derived from NFI for Kerala

Table 10.13.14 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Tectona grandis</i>	23,597	10.17
2	<i>Xylia xylocarpa</i>	16,561	7.14
3	<i>Terminalia paniculata</i>	16,553	12.23
4	<i>Macaranga peltata</i>	10,408	3.45
5	<i>Hevea brasiliensis</i>	10,053	1.67



Table 10.13.15 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Hevea brasiliensis</i>	1,55,616	15.146
2	<i>Areca catechu</i>	90,952	1.600
3	<i>Cocos nucifera</i>	43,885	6.058
4	<i>Swietenia mahagoni</i>	18,346	2.244
5	<i>Artocarpus heterophyllus</i>	16,911	2.169

Table 10.13.16 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Cocos nucifera</i>	32,996	6.483
2	<i>Areca catechu</i>	17,872	0.402
3	<i>Hevea brasiliensis</i>	10,679	1.454
4	<i>Mangifera indica</i>	7,735	2.078
5	<i>Artocarpus heterophyllus</i>	7,059	1.219

Table 10.13.17 Major NTFP Species in Kerala

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Hevea brasiliensis</i>	Tree	10,053
2	<i>Diospyros species</i>	Tree	7,166
3	<i>Areca catechu</i>	Tree	4,743
4	<i>Nilgiranthus ciliatus/ Strobilanthes ciliata</i>	Shrubs	18,81,436
5	<i>Piper species/ Piper longum/ Piper mullesua/ Piper peepuloides</i>	Climbers	11,87,097
6	<i>Hemidesmus indicus</i>	Climbers	1,28,789
7	<i>Rubia cordifolia</i>	Climbers	1,00,791
8	<i>Biophytum species</i>	Herbs	2,79,699
9	<i>Curcuma zedoaria</i>	Herbs	2,79,699
10	<i>Ocimum species (Ocimum gratissimum/ Ocimum sanctum/ Ocimum tenuiflorum/ Ocimum americanum)</i>	Herbs	2,79,699

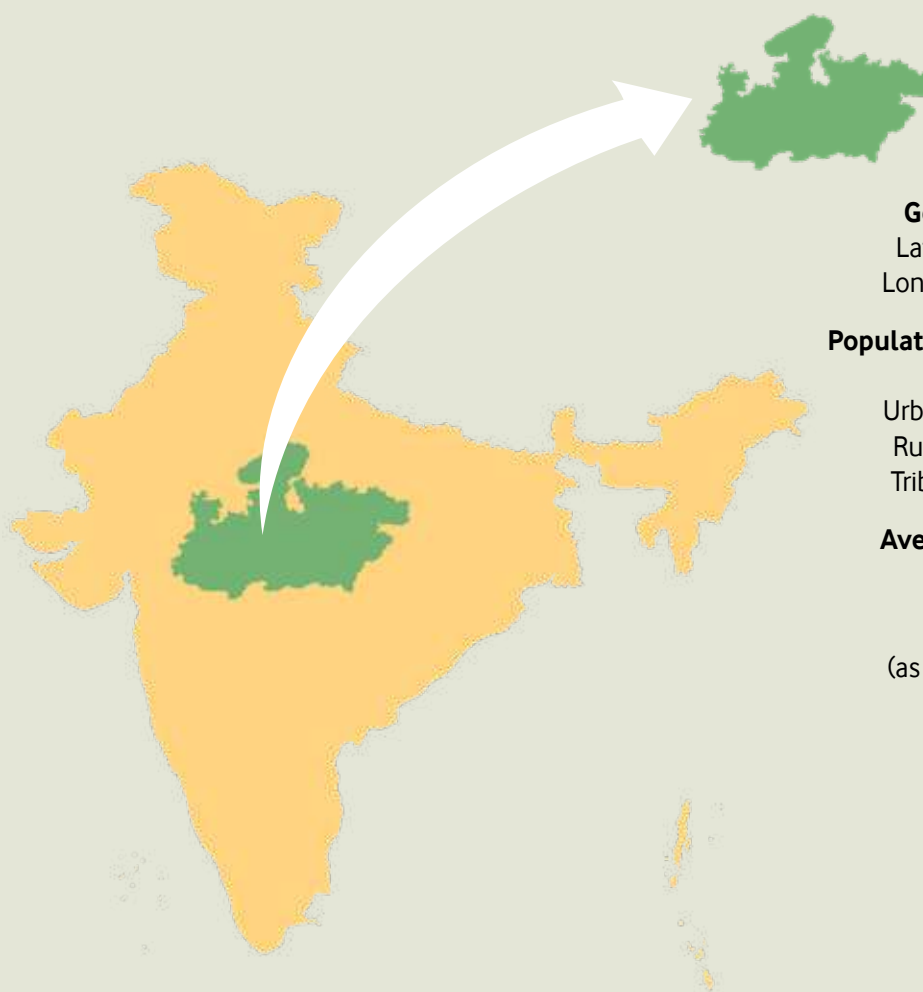
Table 10.13.18 Major invasive Species in the State inside the RFA in Kerala

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Chromolaena odorata</i>	805.20
2	<i>Lantana camara</i>	359.20
3	<i>Ageratum conyzoides</i>	34.94
4	<i>Acacia mearnsii</i>	25.11
5	<i>Ageratum houstonianum</i>	15.83



Photo: Sanjay Shukla, IFS

MADHYA PRADESH



Geographical Area
3,08,252 km²

Geographical Coordinates
Latitude 21°17' N to 26°52' N
Longitude 74°08' E to 82°49' E

Population (as per Census 2011)
72.63 million
Urban 20.07 million (27.63 %)
Rural 52.56 million (72.37 %)
Tribal 15.32 million (21.09 %)

Average Population Density
236 per km²

Livestock Population
(as per 19th Livestock Census)
36.33 million

No. of Districts
52

No. of Hill Districts
0

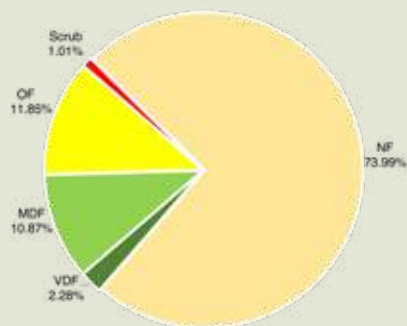
No. of Tribal Districts
24

Table 10.14.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	30,825	
Reporting area for land utilization	30,756.30	100.00
Forests	8,708.37	28.31
Not available for land cultivation	3,361.76	10.93
Permanent pastures and other grazing lands	1,253.81	4.08
Land under misc. tree crops and groves	23.25	0.08
Culturable wasteland	885.94	2.88
Fallow land other than current fallows	356.61	1.16
Current fallows	344.04	1.12
Net area sown	15,822.52	51.44

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.14.1 Forest Cover



• VDF • MDF • OF • Scrub • NF

Table 10.14.2 Forest Cover of Madhya Pradesh

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	7,021.31	2.28
MDF	33,508.64	10.87
OF	36,543.49	11.85
Total	77,073.44	25.00
Scrub	3,124.20	1.01

Figure 10.14.1 Forest Cover of Madhya Pradesh

Table 10.14.3 District- wise Forest Cover in Madhya Pradesh

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Agar Malwa	2,731.50	0.00	1.84	48.28	50.12	1.83	8.95	16.05
Alirajpur	3,182.25	0.00	225.05	485.15	710.20	22.32	-7.35	33.41
Anuppur	3,746.71	123.16	298.86	436.62	858.64	22.92	6.55	54.26
Ashoknagar	4,673.94	0.00	263.85	416.36	680.21	14.55	-12.28	55.09
Balaghat	9,229.44	1,180.47	2,547.62	1,193.09	4,921.18	53.32	1.42	26.56
Barwani	5,427.33	0.00	229.71	662.89	892.60	16.45	-19.22	34.52
Betul	10,043.41	466.71	2,330.68	875.18	3,672.57	36.57	5.34	49.15
Bhind	4,458.75	0.00	58.80	254.26	313.06	7.02	81.07	94.79
Bhopal	2,771.95	0.10	114.04	222.21	336.35	12.13	-0.54	25.93
Burhanpur	3,427.41	34.90	569.25	580.35	1,184.50	34.56	-31.14	37.04
Chhatarpur	8,687.33	157.52	506.91	1,058.13	1,722.56	19.83	-12.02	152.65
Chhindwara	11,814.67	473.84	2,127.73	1,976.62	4,578.19	38.75	-21.57	99.10
Damoh	7,305.61	0.88	630.60	1,873.01	2,504.49	34.28	-85.29	109.94
Datia	3,019.12	0.00	89.60	137.22	226.82	7.51	23.49	30.36
Dewas	7,020.28	87.21	962.96	907.63	1,957.80	27.89	2.57	35.39
Dhar	8,153.09	0.00	120.52	511.75	632.27	7.75	-19.54	65.41
Dindori	5,799.92	632.32	891.52	613.55	2,137.39	36.85	-25.12	47.29
Guna	6,390.54	1.41	325.81	948.18	1,275.40	19.96	-35.71	73.95
Gwalior	4,560.29	0.82	323.36	902.68	1,226.86	26.90	9.52	63.24
Harda	3,333.83	48.19	568.86	317.31	934.36	28.03	-8.86	3.78
Hoshangabad	6,702.67	179.74	1,500.66	730.12	2,410.52	35.96	-0.70	18.65
Indore	3,897.75	0.00	341.68	319.84	661.52	16.97	-6.71	16.60
Jabalpur	5,210.70	38.91	479.36	545.21	1,063.48	20.41	-9.05	63.84
Jhabua	3,600.11	0.00	29.30	186.99	216.29	6.01	1.54	101.03
Katni	4,949.59	93.53	694.34	554.94	1,342.81	27.13	-32.22	48.15
Khandwa (East Nimar)	7,351.71	379.54	1,124.55	599.33	2,103.42	28.61	0.85	22.47
Khargone (West Nimar)	8,025.00	0.09	494.80	808.90	1,303.79	16.25	-4.41	38.65



Table 10.14.3 District- wise Forest Cover in Madhya Pradesh

District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Mandla	7,470.25	909.00	1,477.21	1,025.18	3,411.39	45.67	4.32	40.31
Mandsaur	5,534.78	0.00	67.22	183.67	250.89	4.53	7.11	82.79
Morena	4,988.53	0.00	94.17	674.36	768.53	15.41	10.46	263.99
Narsinghpur	5,133.00	71.91	668.35	594.13	1,334.39	26.00	-5.98	37.41
Neemuch	4,255.94	0.00	168.81	641.26	810.07	19.03	3.55	259.84
Niwari	1,324.53	0.00	38.49	69.06	107.55	8.12	26.55	22.75
Panna	7,134.64	217.12	1,050.34	1,424.47	2,691.93	37.73	-17.06	137.41
Raisen	8,466.46	178.06	1,240.44	1,223.62	2,642.12	31.21	-23.23	78.92
Rajgarh	6,153.47	0.00	37.11	135.77	172.88	2.81	-1.20	32.50
Ratlam	4,860.60	0.00	1.78	117.47	119.25	2.45	38.81	37.52
Rewa	6,314.08	117.59	285.40	402.53	805.52	12.76	5.74	49.39
Sagar	10,252.44	2.30	1,118.12	1,593.21	2,713.63	26.47	-71.38	48.59
Satna	7,501.93	40.45	788.58	926.05	1,755.08	23.40	9.87	120.75
Sehore	6,577.66	71.31	662.07	619.19	1,352.57	20.56	-4.17	41.08
Seoni	8,757.91	302.44	1,721.44	1,023.65	3,047.53	34.80	-34.25	36.85
Shahdol	6,205.54	154.24	723.29	891.80	1,769.33	28.51	-13.63	19.65
Shajapur	3,463.81	0.00	0.15	29.11	29.26	0.84	7.20	5.57
Sheopur	6,605.68	121.04	1,385.13	1,901.69	3,407.86	51.59	-42.20	69.55
Shivpuri	9,949.21	14.04	684.76	1,847.82	2,546.62	25.60	4.40	129.68
Sidhi	4,850.72	381.87	791.61	806.17	1,979.65	40.81	2.73	30.37
Singrauli	5,674.86	140.40	1,117.00	888.31	2,145.71	37.81	-34.83	32.28
Tikamgarh	3,723.28	0.11	50.12	224.33	274.56	7.37	-26.79	76.72
Ujjain	6,090.92	0.00	2.58	39.18	41.76	0.69	3.36	11.73
Umaria	4,075.90	379.37	1,251.55	608.60	2,239.52	54.95	-5.07	10.11
Vidisha	7,371.07	20.72	230.66	487.06	738.44	10.02	-25.42	31.14
Grand Total	3,08,252.11	7,021.31	33,508.64	36,543.49	77,073.44	25.00	-371.54	3,124.20

*Area figure calculated without normalization factor.

Table 10.14.4 Division-wise Forest Cover in Madhya Pradesh

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Alirajpur	3,551.11	0.00	227.81	484.60	712.41	20.06	-6.49	34.63
Anuppur	3,776.22	121.89	312.85	438.66	873.40	23.13	6.30	54.05
Ashok Nagar	4,744.73	0.00	264.04	416.44	680.48	14.34	-12.30	55.07
Badwah	2,285.72	0.00	272.76	329.09	601.85	26.33	28.19	9.91
Bandhavgarh Buffer Zone	1,515.95	65.61	315.65	222.21	603.47	39.81	2.81	3.74

Table 10.14.4 Division-wise Forest Cover in Madhya Pradesh

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Bandhavgarh National Park	719.41	206.59	391.07	64.38	662.04	92.03	5.17	0.02
Barwani	2,996.80	0.00	86.00	221.35	307.35	10.26	-7.58	25.33
Bhind	4,458.92	0.00	58.63	252.50	311.13	6.98	80.48	94.60
Bhopal	2,775.64	0.10	114.15	222.01	336.26	12.11	-0.57	25.95
Burhanpur	3,266.14	34.70	563.68	574.88	1,173.26	35.92	-31.55	36.82
Chhatarpur	8,059.78	93.82	413.74	790.88	1,298.44	16.11	-7.52	129.05
Damoh	6,827.83	0.89	506.66	1,656.82	2,164.37	31.70	-87.72	109.38
Datia	2,155.86	0.00	89.15	135.61	224.76	10.43	21.42	35.10
Dewas	7,045.31	87.14	964.24	908.48	1,959.86	27.82	2.61	35.36
Dhar	8,222.11	0.00	120.70	511.61	632.31	7.69	-19.67	65.24
Dindori	5,739.90	629.31	888.24	610.87	2,128.42	37.08	-26.31	47.48
East Chhindwara	4,774.95	93.54	568.13	746.25	1,407.92	29.49	-60.80	62.87
East Mandla	2,858.89	248.69	467.19	411.40	1,127.28	39.43	0.50	19.63
Guna	6,399.58	1.40	325.92	941.41	1,268.73	19.83	-38.13	73.65
Gwalior	4,575.60	0.85	323.60	904.58	1,229.03	26.86	9.47	63.33
Harda	3,345.24	48.21	565.27	316.49	929.97	27.80	-9.19	3.84
Hoshangabad	4,951.05	24.19	580.12	332.11	936.42	18.91	-5.11	17.49
Indore	3,935.15	0.00	342.30	321.45	663.75	16.87	-6.48	16.66
Jabalpur	5,065.32	38.49	479.47	544.65	1,062.61	20.98	-8.91	63.88
Jhabua	3,297.84	0.00	29.25	184.40	213.65	6.48	0.28	99.81
Kanha Buffer Zone	1,017.33	178.70	229.93	87.65	496.28	48.78	-1.91	5.31
Kanha NP Core Zone	1,051.43	481.68	406.43	64.14	952.25	90.57	-12.48	0.84
Katni	5,004.67	72.64	653.99	547.99	1,274.62	25.47	-32.92	47.86
Khandwa	7,497.25	379.78	1,130.50	602.27	2,112.55	28.18	0.61	22.96
Khargone	5,985.53	0.07	254.49	547.36	801.92	13.40	-40.87	28.52
Kunopalpur	1,370.75	113.29	732.05	352.42	1,197.76	87.38	-3.97	1.56
Madhav National Park	356.35	6.00	123.21	172.47	301.68	84.66	1.70	1.61
Mandsaur	5,836.27	0.00	92.77	234.46	327.23	5.61	18.15	131.52
Morena	4,957.51	0.00	93.37	666.32	759.69	15.32	11.68	261.90
Narsingpur	4,885.77	63.37	527.43	512.17	1,102.97	22.58	-6.33	37.15
Neemuch	4,096.13	0.01	142.65	584.81	727.47	17.76	-8.46	210.38
Noradehi	1,392.74	8.66	567.97	572.36	1,148.99	82.50	2.58	3.72
North Balaghat	3,294.94	404.59	1,146.40	579.41	2,130.40	64.66	-25.16	4.21
North Betul	2,543.40	142.32	779.32	295.04	1,216.68	47.84	-17.00	7.18
North Panna	1,936.88	34.54	228.26	334.66	597.46	30.85	-0.51	43.05
North Sagar	4,921.63	2.22	375.48	705.97	1,083.67	22.02	-3.96	20.50
North Seoni	3,988.14	32.82	571.66	581.97	1,186.45	29.75	-44.61	25.08
North Shahdol	2,498.63	79.55	344.71	385.11	809.37	32.39	-12.84	11.05

(km²)



Table 10.14.4 Division-wise Forest Cover in Madhya Pradesh

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Obedullahganj	3,617.85	191.98	634.94	639.71	1,466.63	40.54	24.42	30.49
Panna Tiger Reserve	1,581.79	175.92	410.97	511.15	1,098.04	69.42	-18.44	46.36
Pench NP	414.96	101.24	245.42	3.98	350.64	84.50	0.28	0.00
Pench Tiger Buffer	618.28	87.59	329.86	37.67	455.12	73.61	-2.95	0.76
Raisen	4,997.06	3.52	677.96	617.92	1,299.40	26.00	-46.69	48.52
Rajgarh	6,189.64	0.00	37.09	134.90	171.99	2.78	-0.43	31.94
Ratlam	4,888.61	0.00	1.55	116.72	118.27	2.42	39.36	37.58
Rewa	6,343.05	114.55	283.24	405.44	803.23	12.66	4.43	50.18
Sanjay NP	1,334.55	274.08	359.63	237.25	870.96	65.26	-4.18	6.87
Sanjay Tiger Buffer	765.79	84.97	234.75	157.31	477.03	62.29	-0.79	1.45
Satna	7,451.99	39.69	782.55	921.67	1,743.91	23.40	9.37	120.06
Satpuda Tiger Reserve	2,030.05	177.85	1,111.09	453.40	1,742.34	85.83	4.24	1.17
Sehore	6,455.16	53.99	589.35	583.25	1,226.59	19.00	-4.74	41.16
Sendhwa	2,293.00	0.00	108.22	367.57	475.79	20.75	-3.52	9.20
Seopur	5,269.68	7.72	653.56	1,551.59	2,212.87	41.99	-41.22	68.99
Shajapur	6,225.42	0.00	1.98	76.74	78.72	1.26	15.93	21.36
Shivpuri	9,850.88	8.00	560.29	1,665.77	2,234.06	22.68	0.39	122.86
Sidhi	3,244.90	22.85	235.02	556.18	814.05	25.09	5.43	27.77
Singrauli	5,267.93	140.07	1,093.74	757.35	1,991.16	37.80	-31.16	25.52
South Balaghat	4,834.25	445.74	1,093.13	526.15	2,065.02	42.72	31.54	20.65
South Betul	5,467.33	142.22	847.64	333.24	1,323.10	24.20	27.04	37.21
South Chhindwara	2,596.93	136.87	558.87	316.22	1,011.96	38.97	19.15	14.49
South Panna	4,343.21	70.12	512.93	849.86	1,432.91	32.99	-2.49	69.60
South Sagar	4,676.97	0.01	428.23	601.20	1,029.44	22.01	-69.66	27.16
South Seoni	4,084.78	142.85	697.38	413.22	1,253.45	30.69	9.25	11.73
South Shahdol	3,108.00	70.51	309.92	458.67	839.10	27.00	-3.56	8.54
Tikamgarh	5,058.91	0.13	87.94	288.61	376.68	7.45	-3.13	99.16
Ujjain	6,138.53	0.00	2.56	39.06	41.62	0.68	3.27	11.74
Umaria	2,403.34	131.89	612.74	354.99	1,099.62	45.75	-11.81	7.23
Vidisha	7,320.00	20.74	229.67	487.01	737.42	10.07	-25.33	31.10
West Betul	1,913.91	168.45	587.33	228.89	984.67	51.45	-3.74	4.66
West Chindwara	3,960.74	169.84	795.67	857.78	1,823.29	46.03	22.78	20.78
West Mandla	3,680.68	326.93	676.01	547.21	1,550.15	42.12	11.47	15.95
Area which does not fall in any Division	1,238.35	15.33	46.17	76.10	137.60	11.11	21.35	4.67
Grand Total	3,09,646.92	7,021.31	33,508.64	36,543.49	77,073.44	24.89	-371.54	3,124.20

*As per the division boundary shapefile provided by State Forest Department.

*Area figure calculated without normalization factor.

Table 10.14.5 Forest Cover in Municipal Areas of Madhya Pradesh(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
1	Agar	21.62	0.00	0.00	1.09	1.09	5.04	0.11
2	Amarwara	9.50	0.00	0.00	0.00	0.00	0.00	0.13
3	Ambah	3.34	0.00	0.00	0.08	0.08	2.40	0.00
4	Amla	4.82	0.00	0.00	0.11	0.11	2.28	0.00
5	Anuppur Town	12.44	0.00	0.02	0.16	0.18	1.45	0.00
6	Aron	7.59	0.00	0.00	0.03	0.03	0.40	0.00
7	Ashokngar	7.97	0.00	0.12	0.19	0.31	3.89	0.00
8	Ashta	12.14	0.00	0.00	0.25	0.25	2.06	0.00
9	Athner	6.33	0.00	0.00	0.13	0.13	2.05	0.00
10	Badi	21.43	0.00	1.31	4.78	6.09	28.42	0.07
11	Baikunthpur	4.33	0.00	0.00	0.00	0.00	0.00	0.00
12	Baldevgarh	4.53	0.00	0.00	0.07	0.07	1.55	0.00
13	Barghat	8.07	0.00	0.00	0.08	0.08	0.99	0.00
14	Barkuhi	3.08	0.00	0.00	0.11	0.11	3.57	0.00
15	Begamganj	4.60	0.00	0.00	0.00	0.00	0.00	0.00
16	Berasia	9.21	0.00	0.00	0.15	0.15	1.63	0.00
17	Betul	14.90	0.00	0.27	1.01	1.28	8.59	0.00
18	Betul Bazar	2.70	0.00	0.07	0.03	0.10	3.70	0.00
19	Bhainsdehi	5.19	0.00	0.00	0.00	0.00	0.00	0.00
20	Bhedaghat Town	4.99	0.00	0.16	0.69	0.85	17.03	0.04
21	Biaora	5.73	0.00	0.00	0.24	0.24	4.19	0.00
22	Bijuri	24.82	0.00	0.06	2.40	2.46	9.91	0.00
23	Bina	12.30	0.00	0.01	0.14	0.15	1.22	0.00
24	Budhni Town	22.52	0.00	3.07	4.39	7.46	33.13	0.01
25	Burhar	7.57	0.00	0.18	0.05	0.23	3.04	0.00
26	Chachoda Binaganj	4.79	0.00	0.01	0.52	0.53	11.06	0.00
27	Chandameta Butaria	4.22	0.00	0.02	0.32	0.34	8.06	0.00
28	Chanderi	23.89	0.00	5.79	7.75	13.54	56.68	0.00
29	Chhatarapur	22.12	0.00	0.12	0.91	1.03	4.66	0.29
30	Chicholi	2.00	0.00	0.00	0.00	0.00	0.00	0.00
31	Chitrakoot	50.39	2.78	11.84	9.49	24.11	47.85	0.04
32	Chourai	4.99	0.00	0.00	0.00	0.00	0.00	0.00
33	Churhat	20.98	0.00	0.00	3.63	3.63	17.30	0.01
34	Dabra	3.57	0.00	0.00	0.06	0.06	1.68	0.00
35	Damoh	11.70	0.00	0.00	0.32	0.32	2.74	0.00
36	Damua	14.42	0.00	0.04	0.79	0.83	5.76	0.00
37	Deori	3.54	0.00	0.00	0.07	0.07	1.98	0.00
38	Dhanpuri	20.44	0.00	0.31	3.67	3.98	19.47	0.15
39	Dindori	10.44	0.00	0.00	0.34	0.34	3.26	0.00
40	Dongar Parasia	5.76	0.00	0.00	0.15	0.15	2.60	0.00



Table 10.14.5 Forest Cover in Municipal Areas of Madhya Pradesh

(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
41	Gadarwara	18.98	0.00	0.00	0.63	0.63	3.32	0.86
42	Ganjasoda	6.60	0.00	0.00	0.00	0.00	0.00	0.00
43	Garhakota	3.33	0.00	0.00	0.05	0.05	1.50	0.00
44	Gotegaon	3.32	0.00	0.04	0.02	0.06	1.81	0.00
45	Guna	30.93	0.00	0.37	3.34	3.71	11.99	0.72
46	Harda	4.93	0.00	0.00	0.17	0.17	3.45	0.00
47	Harrai	20.55	0.00	0.01	0.43	0.44	2.14	0.00
48	Hatta	7.79	0.00	0.00	0.14	0.14	1.80	0.11
49	Hindoria	15.85	0.00	0.12	0.89	1.01	6.37	0.71
50	Hoshangabad Town	23.49	0.00	0.06	1.79	1.85	7.88	0.00
51	Isagarh	6.67	0.00	0.21	1.02	1.23	18.44	0.04
52	Itarsi Town	9.32	0.00	0.00	0.42	0.42	4.51	0.00
53	Jaora	8.55	0.00	0.00	0.23	0.23	2.69	0.00
54	Jeeran	2.37	0.00	0.00	0.04	0.04	1.69	0.00
55	Jeron Khalsa	15.40	0.00	0.19	0.40	0.59	3.83	0.01
56	Joura	3.35	0.00	0.00	0.09	0.09	2.69	0.00
57	Junnardev Jamai	9.48	0.00	0.00	0.05	0.05	0.53	0.00
58	Kareli Town	22.09	0.00	0.04	0.36	0.40	1.81	0.00
59	Katangi Balaghat	7.35	0.00	0.00	0.01	0.01	0.14	0.00
60	Khirkiya	9.67	0.00	0.00	0.00	0.00	0.00	0.00
61	Khurai	11.03	0.00	0.00	0.00	0.00	0.00	0.00
62	Kotma Town	20.82	0.00	0.49	1.82	2.31	11.10	0.54
63	Kumbhraj	3.20	0.00	0.00	0.00	0.00	0.00	0.00
64	Lakhnadon	13.69	0.00	0.00	0.01	0.01	0.07	0.00
65	Lodhikheda	0.91	0.00	0.00	0.02	0.02	2.20	0.00
66	Mahidpur	3.45	0.00	0.00	0.55	0.55	15.94	0.00
67	Maihar	41.05	0.00	0.44	4.29	4.73	11.52	0.05
68	Malanjkhanda	81.08	1.53	4.06	12.23	17.82	21.98	0.62
69	Malhargarh	1.21	0.00	0.00	0.00	0.00	0.00	0.00
70	Mandideep	57.31	0.00	0.03	0.81	0.84	1.47	0.46
71	Mandla Town	5.51	0.00	0.02	0.20	0.22	3.99	0.00
72	Mandsour	26.32	0.00	0.00	2.12	2.12	8.05	0.00
73	Mohgaon	0.97	0.00	0.00	0.00	0.00	0.00	0.00
74	Morena	79.60	0.00	0.14	0.48	0.62	0.78	0.00
75	Multai	10.82	0.00	0.00	0.00	0.00	0.00	0.00
76	Mungaoli	1.32	0.00	0.00	0.00	0.00	0.00	0.00
77	Nagda	13.19	0.00	0.15	1.69	1.84	13.95	0.00
78	Nainpur	12.86	0.00	0.00	0.04	0.04	0.31	0.02
79	Narsinghpur	8.27	0.00	0.01	0.24	0.25	3.02	0.00
80	Nasrullaganj Town	8.83	0.00	0.00	0.00	0.00	0.00	0.00

Table 10.14.5 Forest Cover in Municipal Areas of Madhya Pradesh(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
81	Neemach	24.62	0.00	0.39	3.22	3.61	14.66	0.00
82	Newton Chikhali	3.41	0.00	0.00	0.02	0.02	0.59	0.00
83	Nowgaon	19.15	0.00	1.39	1.57	2.96	15.46	0.13
84	Pali	10.62	0.00	0.01	0.52	0.53	4.99	0.00
85	Panagar	6.03	0.00	0.00	0.01	0.01	0.17	0.00
86	Pandhurna	22.39	0.00	0.00	0.00	0.00	0.00	0.00
87	Panna	7.20	0.00	0.03	0.49	0.52	7.22	0.00
88	Pasan	21.06	0.02	1.72	3.95	5.69	27.02	0.23
89	Patan Town	4.20	0.00	0.00	0.00	0.00	0.00	0.00
90	Pipaliyamandi	3.83	0.00	0.00	0.05	0.05	1.31	0.00
91	Pipalrawan	2.67	0.00	0.00	0.00	0.00	0.00	0.00
92	Pipariya	3.20	0.00	0.00	0.00	0.00	0.00	0.00
93	Pipla Narayanwar	6.01	0.00	0.10	0.20	0.30	4.99	0.00
94	Porsa	11.72	0.00	0.00	0.02	0.02	0.17	0.00
95	Prithvipur	23.30	0.00	0.00	0.26	0.26	1.12	0.30
96	Raghogarh	70.04	0.00	2.41	5.31	7.72	11.02	0.31
97	Raisen	14.47	0.00	0.08	1.72	1.80	12.44	0.01
98	Rajgarh	8.13	0.00	0.00	0.92	0.92	11.32	0.00
99	Rampur Baghelan	22.72	0.00	0.00	0.00	0.00	0.00	0.00
100	Rampura	3.46	0.00	0.00	0.28	0.28	8.09	0.00
101	Rehli	16.46	0.00	0.00	0.48	0.48	2.92	0.00
102	Rehti Town	1.91	0.00	0.00	0.00	0.00	0.00	0.00
103	Sabargarh	5.68	0.00	0.00	0.65	0.65	11.44	0.27
104	Sarangpur	12.74	0.00	0.14	0.00	0.14	1.10	0.00
105	Sarni	32.83	0.00	10.99	1.19	12.18	37.10	0.00
106	Satwas	2.72	0.00	0.00	0.00	0.00	0.00	0.00
107	Sausar	16.03	0.03	1.65	1.91	3.59	22.40	0.00
108	Sehore	19.12	0.00	0.15	0.60	0.75	3.92	0.00
109	Seoni	14.85	0.00	0.02	0.30	0.32	2.15	0.00
110	Seoni Malwa	5.74	0.00	0.00	0.04	0.04	0.70	0.00
111	Shadol	19.45	0.00	0.09	0.71	0.80	4.11	0.00
112	Shahganj	6.44	0.00	0.00	0.00	0.00	0.00	0.00
113	Shahpura	5.71	0.00	0.00	0.08	0.08	1.40	0.00
114	Shahpura Town	2.91	0.00	0.00	0.00	0.00	0.00	0.00
115	Shajapur	12.21	0.00	0.00	0.73	0.73	5.98	0.00
116	Shamgarh	3.13	0.00	0.00	0.00	0.00	0.00	0.00
117	Shamshabad	0.95	0.00	0.00	0.01	0.01	1.05	0.00
118	Shivpuri	57.96	0.03	3.12	10.70	13.85	23.90	1.28
119	Shujalpur	7.37	0.00	0.00	0.18	0.18	2.44	0.00
120	Sidhi	14.93	0.00	0.00	0.00	0.00	0.00	0.00

**Table 10.14.5 Forest Cover in Municipal Areas of Madhya Pradesh**

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
121	Sihora	14.19	0.00	0.00	0.48	0.48	3.38	0.30
122	Singoli	2.35	0.00	0.00	0.01	0.01	0.43	0.00
123	Sirmor	20.80	0.00	0.49	0.87	1.36	6.54	1.90
124	Sironj	9.70	0.00	0.00	0.31	0.31	3.20	0.00
125	Sohagpur	4.87	0.00	0.01	0.24	0.25	5.13	0.00
126	Sonkatch	2.60	0.00	0.00	0.07	0.07	2.69	0.00
127	Suwasra	2.22	0.00	0.00	0.00	0.00	0.00	0.00
128	Tendukhera Town	19.17	0.00	1.38	2.56	3.94	20.55	0.00
129	Tikamgarh	14.97	0.00	0.16	0.72	0.88	5.88	0.00
130	Timarni	7.26	0.00	0.00	0.00	0.00	0.00	0.00
131	Umaria	13.10	0.01	1.72	1.63	3.36	25.65	0.00
132	Vidisha	21.13	0.00	0.01	0.30	0.31	1.47	0.00
Grand Total		1,756.16	4.40	55.84	122.09	182.33	10.38	9.72

*Shapefile of digitized boundary as provided by Municipal Reform Cell, Urban Administration and Development Department.

10.14.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.14.6 Forest Cover Inside and Outside Recorded Forest Area (Or Green Wash) in Madhya Pradesh

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
6,886.21	31,366.97	29,517.32	67,770.50	135.10	2,141.67	7,026.17	9,302.94
10.16%	46.28%	43.56%		1.45%	23.02%	75.53%	

*In case of Madhya Pradesh, RFA boundaries have been used.

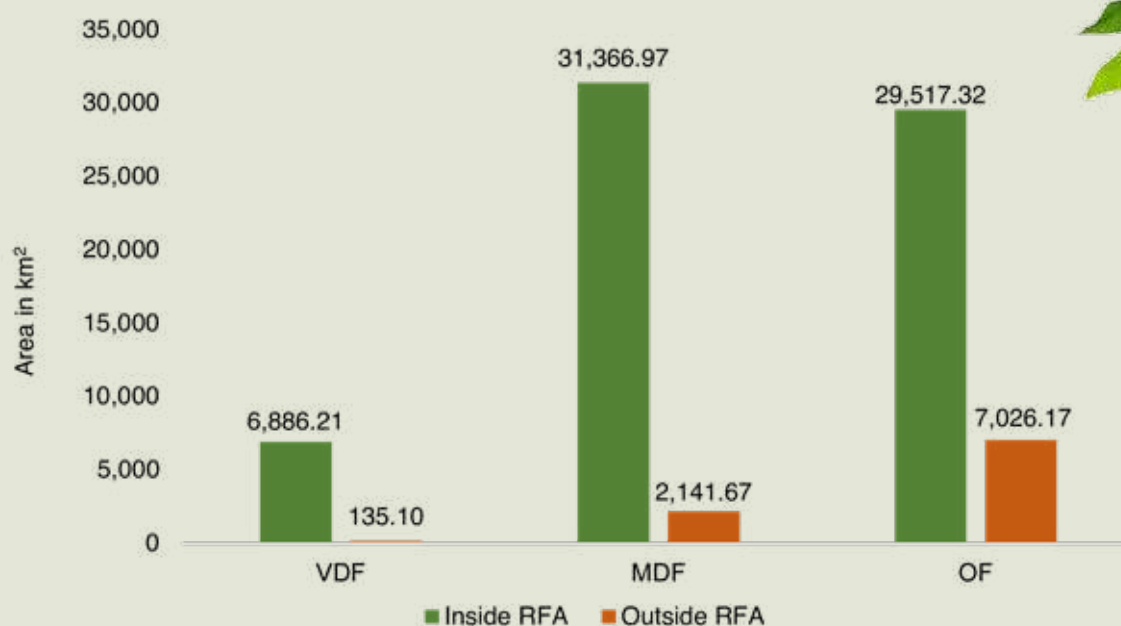


Figure 10.14.2 Forest Cover Inside and Outside of RFA in Madhya Pradesh

Table 10.14.7 Forest Cover Change Matrix Inside RFA/GW For Madhya Pradesh between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					Total ISFR 2021 inside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	5,056.77	1,346.49	41.67	0.29	23.52	6,468.74
MDF	1,542.71	27,214.70	2,520.76	9.26	389.32	31,676.75
OF	276.13	2,657.93	25,179.57	164.85	1,373.30	29,651.78
Scrub	0.22	15.29	494.52	1,507.73	476.79	2,494.55
NF	10.38	132.56	1,280.80	109.54	20,944.32	22,477.60
Total ISFR 2023 inside RFA/GW	6,886.21	31,366.97	29,517.32	1,791.67	23,207.25	92,769.42
Net Change	417.47	-309.78	-134.46	-702.88	729.65	

*Area figure calculated without normalization factor.

Table 10.14.8 Forest Cover Change Matrix Outside RFA/GW for Madhya Pradesh between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					Total ISFR 2021 outside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	114.00	62.58	6.02	0.01	6.76	189.37
MDF	15.62	1,863.85	336.89	2.89	243.01	2,462.26
OF	4.20	168.00	5,245.07	81.35	1,497.46	6,996.08
Scrub	0.03	5.16	338.06	1,159.70	1,161.28	2,664.23
NF	1.25	42.08	1,100.13	88.58	2,01,938.71	2,03,170.75
Total ISFR 2023 outside RFA/GW	135.10	2,141.67	7,026.17	1,332.53	2,04,847.22	2,15,482.69
Net Change	-54.27	-320.59	30.09	-1,331.70	1,676.47	

*Area figure calculated without normalization factor.

**Table 10.14.9 Altitude-Wise Forest Cover in Madhya Pradesh**

(km ²)						
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	2,31,982.09	2,881.57	20,795.97	26,251.52	49,929.06	2,503.78
500-1000	75,712.02	4,068.38	12,563.79	10,207.30	26,839.47	616.00
1000-2000	558.00	71.36	148.88	84.67	304.91	4.42
Total	3,08,252.11	7,021.31	33,508.64	36,543.49	77,073.44	3,124.20

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

Table 10.14.10 Forest Cover in Different Slope Classes in Madhya Pradesh

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	2,65,973.08	4,233.41	23,058.46	27,984.66	55,276.53	2,688.02
5-10	25,674.03	1,523.91	5,692.73	4,839.68	12,056.32	301.39
10-15	9,369.00	707.66	2,552.25	2,004.21	5,264.12	86.97
15-20	4,283.00	331.03	1,269.84	980.35	2,581.22	31.53
20-25	1,884.00	142.49	589.42	460.14	1,192.05	11.05
25-30	708.00	53.29	226.98	181.15	461.42	3.56
>30	361.00	29.52	118.96	93.30	241.78	1.68
Total	3,08,252.11	7,021.31	33,508.64	36,543.49	77,073.44	3,124.20

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





10.14.3 Forest Types

The area under different Forest Types in Madhya Pradesh (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.14.11 Area Statistics of the Forest Types Found in Madhya Pradesh

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	3B/C1c Slightly moist teak forest	1,889.83	2.36
2	3B/C2 Southern moist mixed deciduous forest	1,933.43	2.41
3	3C/C2e (i) Moist peninsular high level sal	2,747.26	3.42
4	4E/RS1 Riparian fringing forest	15.07	0.02
5	5A/C1a Very dry teak forest	678.30	0.85
6	5A/C1b Dry teak forest	21,715.29	27.06
7	5A/C3 Southern dry mixed deciduous forest	19,580.68	24.40
8	5B/C1c Dry peninsular sal forest	4,205.91	5.24
9	5B/C2 Northern dry mixed deciduous forest	15,094.58	18.81
10	5/DS1 Dry deciduous scrub	4,474.46	5.58
11	5/DS2 Dry savannah forest	1.19	0.00
12	5/E1 <i>Anogeissus pendula</i> forest	2,708.81	3.38
13	5/E1/DS1 <i>Anogeissus pendula</i> scrub	348.66	0.43
14	5/E2 <i>Boswellia</i> forest	387.23	0.48
15	5/E5 <i>Butea</i> forest	188.23	0.23
16	5/E9 Dry bamboo brakes	745.10	0.93
17	5/1S2 <i>Khair-sissu</i> forest	1,315.30	1.64
18	6B/C2 Ravine thorn forest	740.69	0.92
19	8A/C3 Central Indian subtropical hill forest	1.37	0.00
Sub Total		78,771.39	98.16
20	TOF/ Plantation	1,426.25	1.78
Total (Forest cover & scrub)		80,197.64	99.94
Grassland forest types (outside forest cover)			
21	3C/C2/DS1 Moist sal savannah	40.72	0.05
22	5/DS4 Dry grassland	6.98	0.01
Sub Total		47.70	0.06
Grand Total		80,245.34	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest types outside forest cover have also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).



10.14.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.14.12 District-Wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Agar Malwa	7	5
2	Alirajpur	110	119
3	Anuppur	109	48
4	Ashoknagar	33	43
5	Balaghat	1,098	681
6	Barwani	73	84
7	Betul	527	173
8	Bhind	1	24
9	Bhopal	98	123
10	Burhanpur	378	139
11	Chhatarpur	192	732
12	Chhindwara	1,405	431
13	Damoh	991	817
14	Datia	31	33
15	Dewas	981	1,265
16	Dhar	202	183
17	Dindori	312	151
18	Guna	467	604
19	Gwalior	38	124
20	Harda	121	67
21	Hoshangabad	280	235
22	Indore	219	291
23	Jabalpur	397	140
24	Jhabua	29	26
25	Katni	242	201
26	Khandwa (East Nimar)	539	457
27	Khargone (West Nimar)	347	303
28	Mandla	479	323
29	Mandsaur	17	35
30	Morena	0	10
31	Narsinghpur	438	426
32	Neemuch	56	121
33	Niwari	5	0
34	Panna	422	563
35	Raisen	1,352	1,696
36	Rajgarh	8	6
37	Ratlam	72	55
38	Rewa	107	182
39	Sagar	465	511

**Table 10.14.12 District-Wise Number of Forest Fire Detected**

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
40	Satna	292	430
41	Sehore	632	1,136
42	Seoni	749	595
43	Shahdol	580	238
44	Shajapur	0	0
45	Sheopur	217	641
46	Shivpuri	171	333
47	Sidhi	544	242
48	Singrauli	300	214
49	Tikamgarh	12	13
50	Ujjain	6	3
51	Umaria	671	212
52	Vidisha	320	394
Total		17,142	15,878

10.14.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.14.13 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	1,135.38	1.42
2	Very highly fire prone	10,478.22	13.07
3	Highly fire prone	14,910.49	18.59
4	Moderately fire prone	14,519.68	18.10
5	Less fire prone	39,153.87	48.82
Total		80,197.64	100.00

* Forest Cover including Scrub.

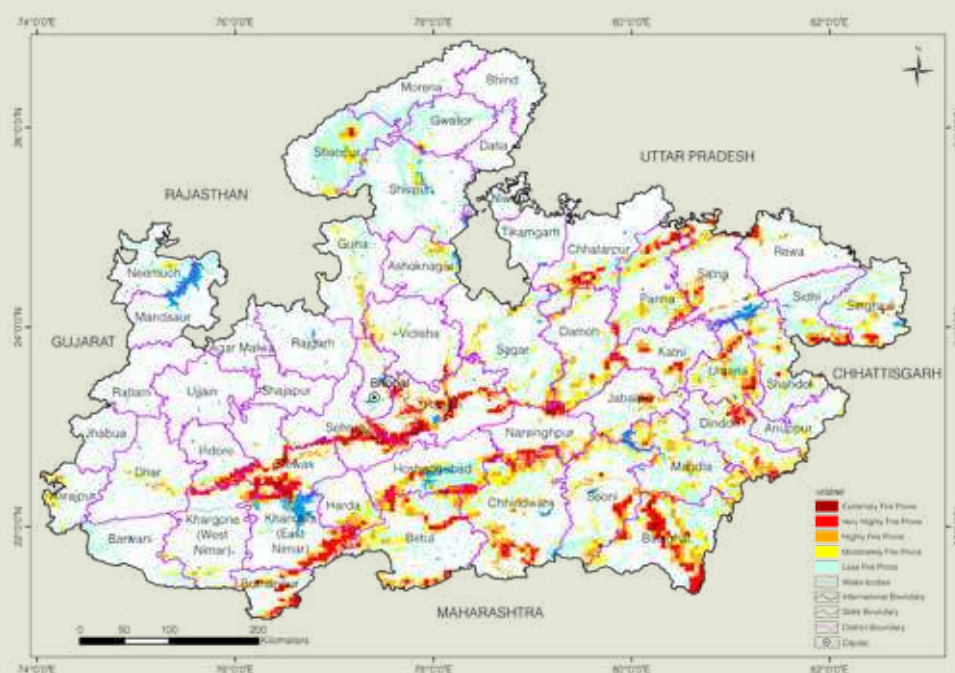


Figure 10.14.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.14.6 Results Derived from NFI for Madhya Pradesh

Table 10.14.14 Number of Trees and Their Volume for Top 5 Species In RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Tectona grandis</i>	3,48,017	62.00
2	<i>Shorea robusta</i>	1,53,943	62.15
3	<i>Diospyros melanoxylon</i>	97,775	13.94
4	<i>Lagerstroemia parviflora</i>	96,813	15.33
5	<i>Anogeissus latifolia/ Terminalia anogeissiana</i>	88,556	21.81



Table 10.14.15 Number of Trees and Their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Butea monosperma</i>	76,206	16.646
2	<i>Acacia Arabica/ Vachellia nilotica</i>	47,313	9.926
3	<i>Ziziphus mauritiana</i>	31,671	3.522
4	<i>Leucaena leucocephala</i>	25,827	1.972
5	<i>Azadirachta indica</i>	24,996	7.570

Table 10.14.16 Number of Trees and Their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Psidium guajava</i>	1,935	0.068
2	<i>Azadirachta indica</i>	1,758	1.250
3	<i>Leucaena leucocephala</i>	1,445	0.153
4	<i>Mangifera indica</i>	1,412	0.821
5	<i>Annona squamosa</i>	1,224	0.032

Table 10.14.17 Major NTFP Species in Madhya Pradesh

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Diospyros melanoxylon</i>	Tree	1,15,12,623
2	<i>Shorea robusta</i>	Tree	91,49,403
3	<i>Buchanania Lanza</i>	Tree	8,14,840
4	<i>Aegle marmelos</i>	Tree	7,01,873
5	<i>Madhuca longifolia/ M. latifolia/ M. indica</i>	Tree	1,93,450
6	<i>Helicteres isora</i>	Shrubs	3,33,35,308
7	<i>Tylophora indica/ Vincetoxicum indicum</i>	Climbers	99,61,126
8	<i>Celastrus paniculatus</i>	Climbers	84,82,521
9	<i>Chlorophytum borivilianum</i>	Herbs	1,03,93,270
10	<i>Andrographis paniculata</i>	Herbs	34,07,629

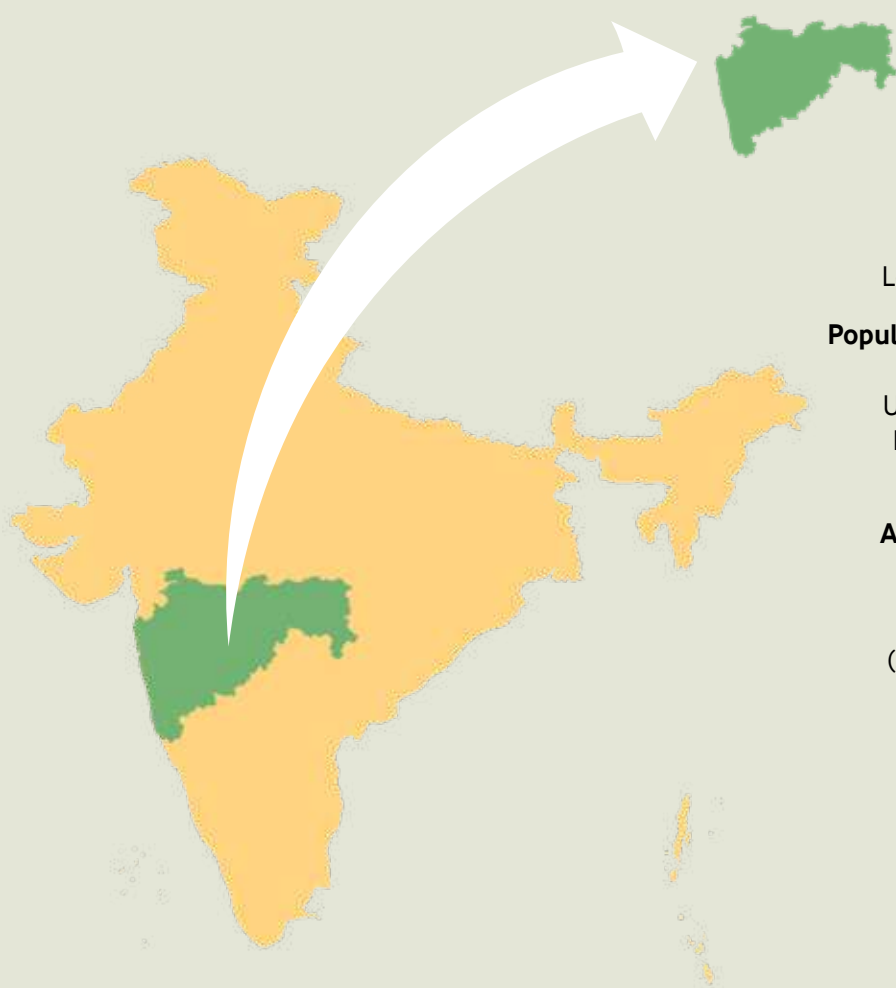
Table 10.14.18 Major Invasive Species in The State Inside the RFA In Madhya Pradesh

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Lantana camara</i>	5,914.49
2	<i>Cassia tora/ Senna tora</i>	4,579.87
3	<i>Ageratum conyzoides</i>	1,055.80
4	<i>Triumfetta rhomboidea</i>	854.83
5	<i>Achyranthes aspera</i>	383.54



Photo: FSI Repository

MAHARASHTRA



Geographical Area

3,07,713 km²

Geographical Coordinates

Latitude 15°35' N to 22°02' N

Longitude 72°36' E to 80°54' E

Population (as per Census 2011)

112.37 million

Urban 50.82 million (45.22 %)

Rural 61.55 million (54.78 %)

Tribal 10.51 million (9.35 %)

Average Population Density

365 per km²

Livestock Population

(as per 19th Livestock Census)

32.48 million

No. of Districts

36

No. of Hill Districts

07

No. of Tribal Districts

12

Table 10.15.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	30,771	
Reporting area for land utilization	30,758.20	100.00
Forests	5,209.00	16.94
Not available for land cultivation	3,719.00	12.09
Permanent pastures and other grazing lands	1,364.00	4.43
Land under misc. tree crops and groves	274.10	0.89
Culturable wasteland	943.50	3.07
Fallow land other than current fallows	1,202.70	3.91
Current fallows	1,455.50	4.73
Net area sown	16,590.40	53.94

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.15.1 Forest Cover

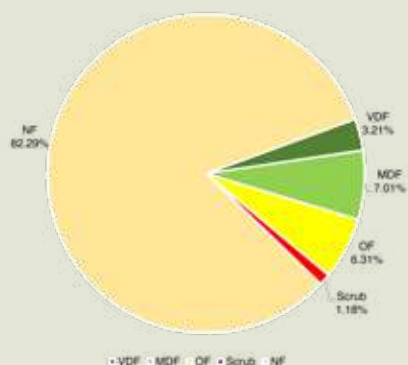


Table 10.15.2 Forest Cover of Maharashtra

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	9,865.62	3.21
MDF	21,577.79	7.01
OF	19,415.12	6.31
Total	50,858.53	16.53
Scrub	3,645.67	1.18

Figure 10.15.1 Forest Cover of Maharashtra

Table 10.15.3 District- Wise Forest Cover in Maharashtra

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Ahmednagar	17,048.00	0.00	65.54	246.68	312.22	1.83	26.48	495.97
Akola	5,676.00	10.48	115.00	187.99	313.47	5.52	-11.54	14.83
Amravati	12,210.00	644.65	1,848.62	681.73	3,175.00	26.00	1.10	98.39
Aurangabad	10,107.00	13.31	112.84	424.55	550.70	5.45	-3.11	152.00
Beed	10,693.00	0.00	11.58	146.66	158.24	1.48	-3.94	344.29
Bhandara	4,087.00	271.36	519.16	289.65	1,080.17	26.43	8.31	16.25
Buldhana	9,661.00	24.42	145.41	436.02	605.85	6.27	-1.80	161.70
Chandrapur	11,443.00	1,318.87	1,521.60	1,189.18	4,029.65	35.21	-9.46	43.67
Dhule	7,195.00	0.00	60.21	237.79	298.00	4.14	-8.76	102.21
Gadchiroli	14,412.00	5,123.42	3,900.08	991.98	10,015.48	69.49	-19.93	17.37
Gondia	5,234.00	962.58	662.20	279.03	1,903.81	36.37	3.40	22.94
Hingoli	4,827.00	0.00	8.62	103.11	111.73	2.31	-1.55	42.51
Jalgaon	11,765.00	51.41	346.54	768.95	1,166.90	9.92	-1.26	88.91
Jalna	7,718.00	0.21	5.67	24.96	30.84	0.40	-4.55	46.01
Kolhapur ^H	7,685.00	85.21	991.42	678.78	1,755.41	22.84	-21.10	94.86
Latur	7,157.00	0.00	0.15	15.54	15.69	0.22	2.76	16.99
Mumbai City	157.00	0.00	0.83	3.59	4.42	2.82	-0.16	0.00
Mumbai Suburban	446.00	0.00	81.20	69.44	150.64	33.78	1.42	0.00
Nagpur	9,892.00	562.35	811.55	631.67	2,005.57	20.27	-3.24	68.58
Nanded	10,528.00	169.40	348.45	424.50	942.35	8.95	-2.04	107.07
Nandurbar	5,955.00	0.00	357.12	771.05	1,128.17	18.94	-64.49	4.44
Nashik ^H	15,530.00	0.22	303.84	808.06	1,112.12	7.16	25.04	288.43
Osmanabad	7,569.00	0.00	2.32	49.50	51.82	0.68	0.38	39.11
Palghar	5,262.00	0.00	662.02	964.33	1,626.35	30.91	-86.97	68.74
Parbhani	6,214.00	0.00	5.86	26.30	32.16	0.52	-7.89	34.11
Pune ^H	15,643.00	0.44	791.81	924.70	1,716.95	10.98	-4.57	407.26
Raigad ^H	7,152.00	41.51	1,533.09	1,347.49	2,922.09	40.86	-3.93	66.54
Ratnagiri ^H	8,208.00	35.42	1,922.21	2,334.54	4,292.17	52.29	53.45	4.06
Sangli	8,572.00	44.83	53.31	49.79	147.93	1.73	-3.07	164.02


Table 10.15.3 District- Wise Forest Cover in Maharashtra

(km²)

District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Satara ^H	10,480.00	164.98	560.51	580.00	1,305.49	12.46	32.38	308.85
Sindhudurg ^H	5,207.00	94.82	1,317.29	1,327.65	2,739.76	52.62	-7.33	22.81
Solapur	14,895.00	0.00	6.08	38.78	44.86	0.30	-5.65	65.57
Thane	4,296.00	0.00	532.89	809.81	1,342.70	31.25	82.84	65.02
Wardha	6,309.00	10.88	592.74	256.73	860.35	13.64	-0.06	61.39
Washim	4,898.00	4.88	102.46	196.72	304.06	6.21	-3.31	31.43
Yavatmal	13,582.00	229.97	1,277.57	1,097.87	2,605.41	19.18	-12.32	79.34
Grand Total	3,07,713.00	9,865.62	21,577.79	19,415.12	50,858.53	16.53	-54.47	3,645.67

*Area figure calculated without normalization factor.

Table 10.15.4 Division-wise Forest Cover in Maharashtra

(km²)

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Ahmednagar	13,169.70	0.00	9.35	93.85	103.20	0.78	-2.88	217.53
Akola	5,228.74	9.41	85.57	170.86	265.84	5.08	-10.83	14.98
Akola WL	297.62	5.36	40.93	139.10	185.39	62.29	1.18	2.57
Akot	744.74	48.99	317.70	173.90	540.59	72.59	1.36	0.00
Alibag	3,447.75	15.51	670.93	619.56	1,306.00	37.88	1.03	37.78
Allapalli	2,602.62	635.34	722.30	124.13	1,481.77	56.93	-18.04	6.06
Amravati	8,226.44	0.00	158.03	197.06	355.09	4.32	17.41	45.54
Aurangabad	17,013.00	6.68	89.43	371.08	467.19	2.75	-9.44	194.33
Beed	10,477.90	0.00	10.78	132.18	142.96	1.36	-3.89	334.47
Bhamraragrh	3,195.18	1,810.28	713.08	77.47	2,600.83	81.40	-9.48	0.02
Bhandara	3,891.78	149.19	443.32	238.42	830.93	21.35	5.44	16.56
Bhor	2,561.59	0.44	255.06	231.03	486.53	18.99	-11.00	112.12
Bor Wildlife Division	331.68	100.67	152.60	32.16	285.43	86.06	-0.47	0.00
Bramhapuri	3,071.17	350.00	439.27	294.93	1,084.20	35.30	-4.90	19.31
Buldhana	9,359.75	7.84	66.33	246.31	320.48	3.42	-0.06	162.03
CCF & Director SGNP Borivali	250.47	0.00	128.06	58.23	186.29	74.38	-8.61	0.87
CCF & FD STR Kolhapur	1,609.65	162.60	601.39	230.86	994.85	61.81	3.28	16.02
CCF & FD Tadoba (Buffer)	1,041.17	257.03	287.66	110.81	655.50	62.96	-2.23	0.34
CCF & FD Tadoba (Core)	621.36	392.69	151.41	48.34	592.44	95.35	-1.29	0.94
CCF (WL) Pune	471.78	0.00	68.86	48.18	117.04	24.81	-4.95	33.41
Central Chanda	3,569.40	208.65	389.83	445.16	1,043.64	29.24	-12.54	11.15
CF (WL) Nashik	716.82	17.43	117.18	151.37	285.98	39.90	-2.12	18.09
Chandrapur	2,986.79	91.63	203.25	225.85	520.73	17.43	12.49	11.14

Table 10.15.4 Division-wise Forest Cover in Maharashtra

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Dahanu	2,322.25	0.00	325.40	371.78	697.18	30.02	-93.95	20.33
DFO (WL) Aurangabad	1,486.55	8.22	49.45	142.83	200.50	13.49	1.82	13.86
DFO Mumbai Mangroves Conservation Unit	238.56	0.00	40.55	49.03	89.58	37.55	-2.39	0.00
Dhule	7,068.35	0.00	50.23	202.98	253.21	3.58	-10.59	100.74
DM Gorewada Project (FDCM)	19.16	0.00	4.49	7.16	11.65	60.80	-0.46	0.79
Dy. Director (PTR)	738.21	341.66	210.93	55.87	608.46	82.42	-0.80	0.17
East Nashik	7,084.57	0.17	125.24	279.66	405.07	5.72	3.32	89.32
Gadchiroli	2,757.74	1,020.91	609.23	288.82	1,918.96	69.58	-1.47	1.34
Gondia	4,761.54	617.82	584.42	262.13	1,464.37	30.75	2.53	23.14
Gondia WL	675.29	448.32	136.78	61.69	646.79	95.78	1.74	0.00
Gugamal	637.49	170.16	355.57	53.21	578.94	90.82	-4.25	0.00
Hingoli	4,710.41	0.00	8.64	103.20	111.84	2.37	-1.49	42.52
Jalgaon	8,670.37	0.58	59.62	365.61	425.81	4.91	6.51	71.33
Jawhar	2,155.71	0.00	178.53	427.18	605.71	28.10	23.21	40.75
Junnar	5,209.78	0.00	90.50	250.88	341.38	6.55	80.49	183.52
Kinwat	180.57	46.15	47.00	56.03	149.18	82.62	-1.60	0.00
Kolhapur	7,082.95	69.25	714.32	600.30	1,383.87	19.54	-23.77	94.12
Malegaon	3,133.65	0.00	12.51	88.81	101.32	3.23	13.58	68.73
Markhanda	341.36	116.91	177.43	30.21	324.55	95.08	0.09	0.07
Melghat Territorial	1,645.98	99.79	430.37	206.85	737.01	44.78	-7.03	50.05
Melghat Wildlife	460.96	85.43	216.62	71.44	373.49	81.02	-2.33	2.61
Mewasi	1,423.41	0.00	95.97	282.54	378.51	26.59	-35.72	1.52
Nagpur	8,987.15	143.20	545.11	543.65	1,231.96	13.71	-0.44	67.56
Nanded	10,371.80	121.10	301.44	368.63	791.17	7.63	-2.07	107.04
Nandurbar	4,556.98	0.00	269.15	489.90	759.05	16.66	-30.70	3.14
Osmanabad	14,744.10	0.00	2.31	51.93	54.24	0.37	3.71	55.70
Pandharkawada	4,557.42	0.30	328.32	312.91	641.53	14.08	8.87	20.02
Pandharkawda WL	611.77	212.20	203.05	71.84	487.09	79.62	-1.83	0.00
Parbhani	6,306.14	0.00	5.86	26.30	32.16	0.51	-7.83	34.15
Pranhita	285.96	99.53	117.67	22.71	239.91	83.90	1.41	0.14
Pune	7,698.47	0.00	380.29	411.30	791.59	10.28	-65.72	102.33
Pusad	3,429.00	14.02	263.06	285.68	562.76	16.41	-17.54	22.77
Ratnagiri (Chiplun)	8,257.88	35.08	1,914.93	2,324.18	4,274.19	51.76	55.41	4.06
Roha	3,434.73	21.92	816.66	724.27	1,562.85	45.50	-2.76	28.83
Sangamner	2,901.42	0.00	5.84	79.01	84.85	2.92	32.13	241.06
Sangli	8,406.73	0.00	2.13	27.76	29.89	0.36	-3.99	158.12
Satara	9,659.50	63.12	295.19	459.37	817.68	8.47	34.06	298.44
Sawantwadi	5,097.33	95.02	1,318.87	1,329.30	2,743.19	53.82	-4.74	22.89
Shahapur	1,492.94	0.00	138.36	321.70	460.06	30.82	44.74	22.45
Sipna	830.34	246.50	434.47	63.81	744.78	89.70	-8.69	0.00

(km²)

**Table 10.15.4 Division-wise Forest Cover in Maharashtra**(km²)

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Sironcha	1,929.46	479.64	657.68	118.56	1,255.88	65.09	8.99	1.47
Solapur	14,807.50	0.00	6.06	39.32	45.38	0.31	-2.34	64.81
Sub DFO (WL) Allapalli	243.11	125.88	85.43	1.91	213.22	87.71	-4.07	0.00
Sub DFO (WL) Sironcha	631.22	312.12	205.42	42.01	559.55	88.65	6.17	0.00
Thane	3,092.25	0.00	305.42	490.16	795.58	25.73	32.41	48.98
Thane WL	418.68	4.31	179.28	119.15	302.74	72.31	-2.80	0.08
Wadsa	2,515.01	505.26	567.49	248.04	1,320.79	52.52	-9.23	8.24
Wardha	6,221.35	5.62	508.80	254.72	769.14	12.36	2.03	61.40
Washim	5,101.42	5.93	93.25	187.42	286.60	5.62	-5.45	29.11
West Chanda	241.34	39.89	102.98	76.72	219.59	90.99	-2.14	0.80
West Nashik	5,202.88	0.00	165.20	448.99	614.19	11.80	8.05	130.42
Yavatmal	5,003.79	3.48	483.11	427.87	914.46	18.28	-2.20	35.77
Yawal	2,831.41	31.27	200.95	315.89	548.11	19.36	-6.21	14.18
Area which doesn't fall in any Division	541.85	5.12	27.89	11.06	44.07	8.13	1.40	1.54
Grand Total	3,08,102.89	9,865.62	21,577.79	19,415.12	50,858.53	16.51	-54.47	3,645.67

#As per the division boundary shapefile provided by State Forest Department.

*Area figure calculated without normalization factor.

10.15.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.15.5 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Maharashtra(km²)

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
9,538.99	15,827.39	10,744.55	36,110.93	326.63	5,750.40	8,670.57	14,747.60
26.42%	43.83%	29.75%		2.21%	38.99%	58.80%	

*In case of Maharashtra, RFA boundaries have been used.

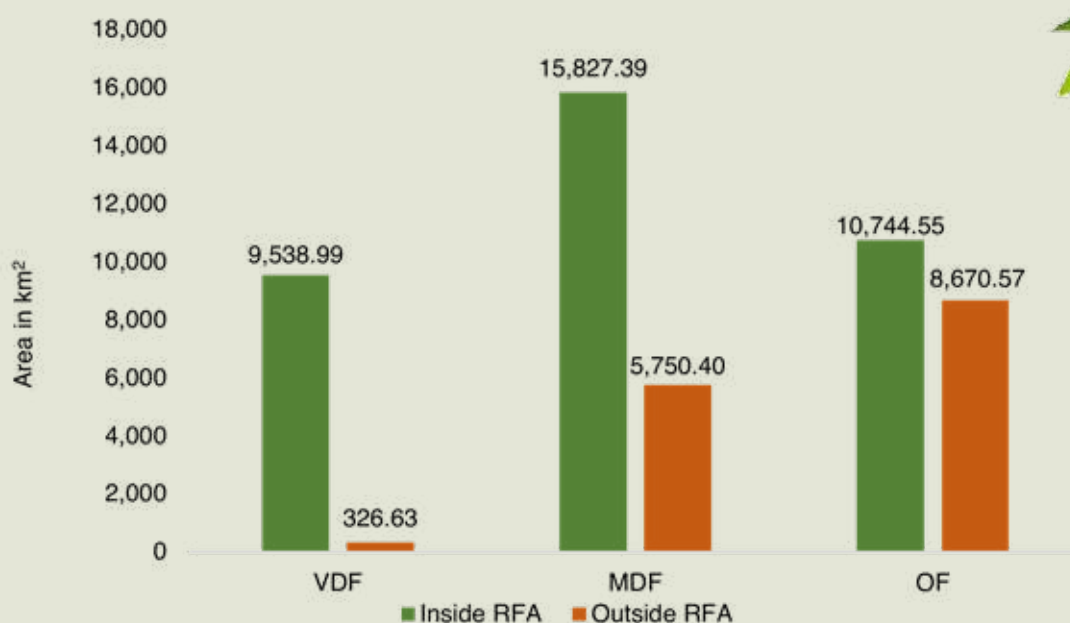


Figure 10.15.2 Forest Cover Inside and Outside of RFA in Maharashtra

Table 10.15.6 Forest Cover Change Matrix Inside RFA/GW for Maharashtra between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					(km²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 inside RFA / GW Raster based*
VDF	8,458.16	31.43	1.01	0.00	7.18	8,497.78
MDF	1,055.02	13,767.81	64.19	2.80	213.91	15,103.73
OF	9.94	1,989.36	10,040.77	30.48	452.27	12,522.82
Scrub	0.00	4.09	289.37	1,435.32	29.17	1,757.95
NF	15.87	34.70	349.21	22.20	19,420.57	19,842.55
Total ISFR 2023 inside RFA/GW	9,538.99	15,827.39	10,744.55	1,490.80	20,123.10	57,724.83
Net Change	1,041.21	723.66	-1,778.27	-267.15	280.55	

*Area figure calculated without normalization factor.

Table 10.15.7 Forest Cover Change Matrix Outside RFA/GW for Maharashtra between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	294.42	8.37	0.27	0.00	0.69	303.75
MDF	31.16	5,285.62	43.79	4.91	151.12	5,516.60
OF	1.05	431.57	7,945.74	29.09	560.87	8,968.32
Scrub	0.00	8.76	280.13	2,111.36	88.24	2,488.49
NF	0.00	16.08	400.64	9.51	2,32,284.78	2,32,711.01
Total ISFR 2023 outside RFA/GW	326.63	5,750.40	8,670.57	2,154.87	2,33,085.70	2,49,988.17
Net Change	22.88	233.80	-297.75	-333.62	374.69	

*Area figure calculated without normalization factor.


Table 10.15.8 Altitude-Wise Forest Cover in Maharashtra

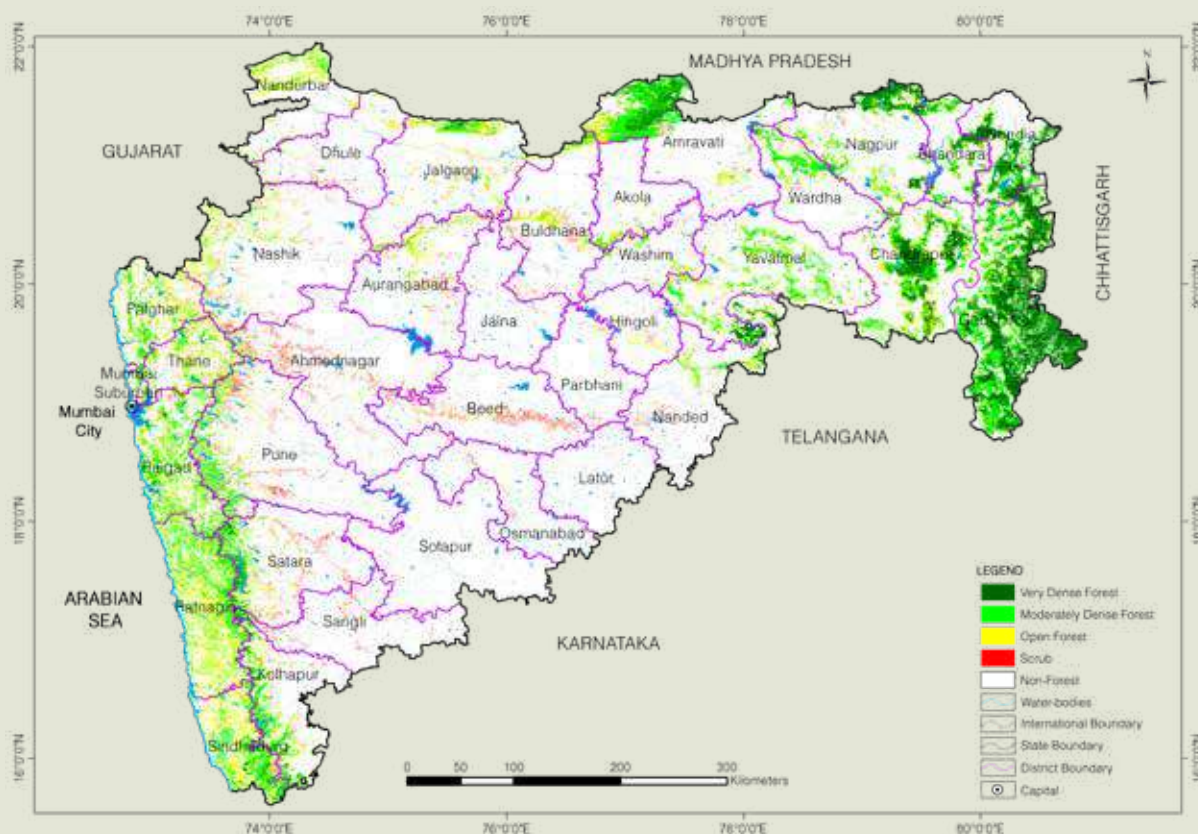
(km ²)						
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	2,37,017.00	8,570.13	16,490.57	14,301.75	39,362.45	1,065.28
500-1000	66,142.00	1,230.08	4,806.00	4,833.34	10,869.42	2,507.59
1000-2000	4,554.00	65.41	281.22	280.03	626.66	72.80
Total	3,07,713.00	9,865.62	21,577.79	19,415.12	50,858.53	3,645.67

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

Table 10.15.9 Forest Cover in Different Slope Classes in Maharashtra

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	2,58,652.00	6,858.12	10,005.70	8,942.04	25,805.86	1,331.06
5-10	23,811.00	1,409.71	4,054.96	4,069.91	9,534.58	911.39
10-15	11,555.00	781.41	3,035.70	2,754.92	6,572.03	623.97
15-20	6,633.00	446.83	2,087.34	1,736.01	4,270.18	390.10
20-25	3,707.00	221.00	1,256.38	1,026.02	2,503.40	222.78
25-30	1,896.00	92.18	660.36	525.35	1,277.89	109.90
>30	1,459.00	56.37	477.35	360.87	894.59	56.47
Total	3,07,713.00	9,865.62	21,577.79	19,415.12	50,858.53	3,645.67

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


Figure 10.15.3 Forest Cover Map of Maharashtra



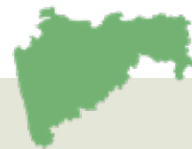
10.15.3 Forest Types

The area under different Forest Types in Maharashtra (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.15.10 Area Statistics of The Forest Types Found in Maharashtra

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	2A/C2 West coast semi-evergreen forest	6,620.62	12.15
2	3B/C1b Moist teak forest	5,546.58	10.18
3	3B/C2 Southern moist mixed deciduous forest	11,312.50	20.75
4	4A/L1 Littoral forest	0.75	0.00
5	4B/TS1 Mangrove scrub	23.72	0.04
6	4B/TS2 Mangrove forest	271.02	0.50
7	4E/RS1 Riparian fringing forest	0.93	0.00
8	5A/C1b Dry teak forest	9,405.86	17.26
9	5A/C3 Southern dry mixed deciduous forest	14,286.39	26.21
10	5/DS1 Dry deciduous scrub	4,509.36	8.27
11	5/E2 <i>Boswellia</i> forest	43.15	0.08
12	5/E3 <i>Babul</i> forest	11.00	0.02
13	5/E4 <i>Hardwickia</i> forest	61.02	0.11
14	5/E5 <i>Butea</i> forest	9.81	0.02
15	5/E9 Dry bamboo brakes	253.11	0.46
16	6A/C1 Southern thorn forest	215.54	0.40
17	8A/C2 Western subtropical hill forest	645.88	1.19
Sub Total		53,217.24	97.64
18	TOF/ Plantation	1,286.96	2.36
Total (Forest cover & scrub)		54,504.20	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). The total mapped area, therefore, is sum of forest cover and scrub.



10.15.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.15.11 District-Wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Ahmednagar	273	255
2	Akola	44	17
3	Amravati	482	152
4	Aurangabad	85	92
5	Beed	48	19
6	Bhandara	93	147
7	Buldhana	130	36
8	Chandrapur	1,246	965
9	Dhule	165	148
10	Gadchiroli	6,093	7,042
11	Gondia	605	644
12	Hingoli	16	21
13	Jalgaon	413	207
14	Jalna	13	4
15	Kolhapur	618	523
16	Latur	9	2
17	Mumbai city	0	1
18	Mumbai Suburban	48	31
19	Nagpur	238	255
20	Nanded	361	179
21	Nandurbar	109	183
22	Nashik	414	542
23	Osmanabad	10	5
24	Palghar	371	331
25	Parbhani	5	4
26	Pune	759	911
27	Raigad	1,005	1,128
28	Ratnagiri	7	19
29	Sangli	158	83
30	Satara	574	621
31	Sindhudurg	275	97
32	Solapur	58	42
33	Thane	725	717
34	Wardha	120	141
35	Washim	82	32
36	Yavatmal	467	412
Total		16,119	16,008

10.15.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.15.12 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	1,508.20	2.77
2	Very highly fire prone	6,853.38	12.57
3	Highly fire prone	10,393.30	19.07
4	Moderately fire prone	11,128.85	20.42
5	Less fire prone	24,620.47	45.17
Total		54,504.20	100.00

* Forest Cover including Scrub.

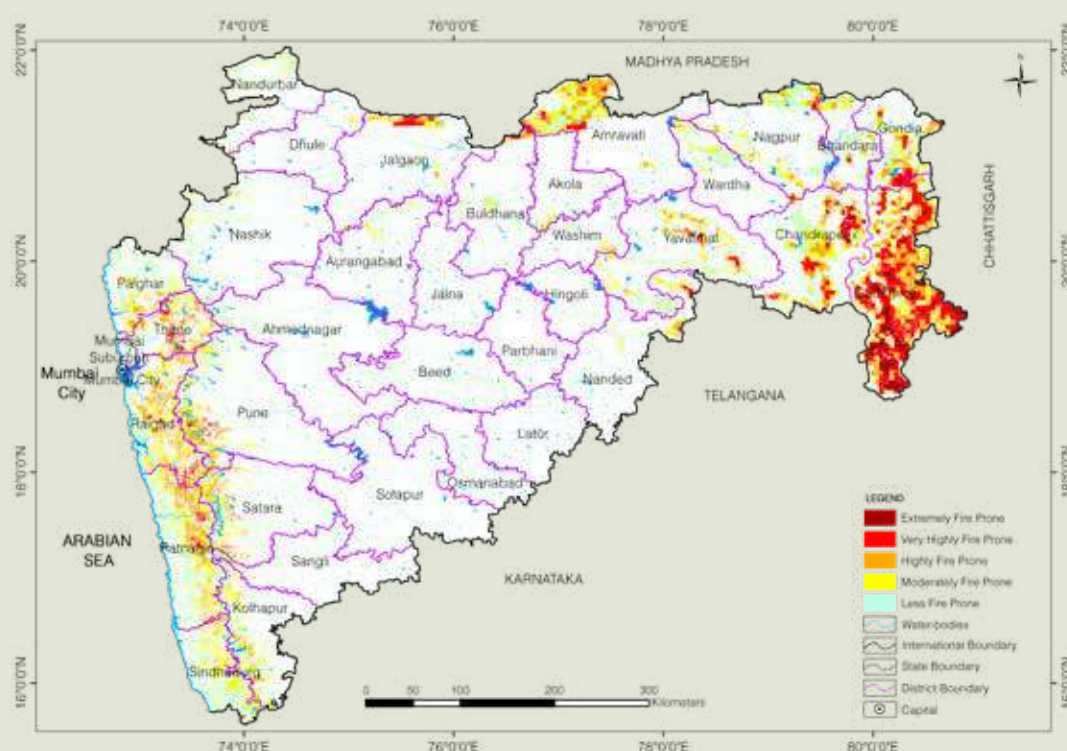


Figure 10.15.4 Fire Prone Forest Areas Under Different Fire Prone Classes

10.15.6 Results Derived from NFI for Maharashtra

Table 10.15.13 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Tectona grandis</i>	2,88,206	46.24
2	<i>Terminalia elliptica/ Terminalia crenulata</i>	1,07,421	21.97
3	<i>Anogeissus latifolia/ Terminalia anogeissiana</i>	58,814	14.00
4	<i>Butea monosperma</i>	50,468	5.37
5	<i>Cleistanthus collinus</i>	45,107	3.80



Table 10.15.14 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Azadirachta indica</i>	1,53,880	32.050
2	<i>Mangifera indica</i>	86,601	34.803
3	<i>Prosopis juliflora/ Neltuma juliflora</i>	85,351	1.983
4	<i>Ziziphus mauritiana</i>	70,205	6.336
5	<i>Acacia Arabica/ Vachellia nilotica</i>	64,181	14.571

Table 10.15.15 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Mangifera indica</i>	2,395	0.735
2	<i>Azadirachta indica</i>	2,088	0.740
3	<i>Cocos nucifera</i>	2,027	0.470
4	<i>Annona squamosa</i>	1,594	0.023
5	<i>Psidium guajava</i>	1,435	0.037

Table 10.15.16 Major Invasive Species in The State Inside the RFA in Maharashtra

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Cassia tora/ Senna tora</i>	3,246.02
2	<i>Lantana camara</i>	3,161.10
3	<i>Triumfetta rhomboidea</i>	839.07
4	<i>Ageratina adenophora</i>	441.08
5	<i>Ageratum conyzoides</i>	371.37

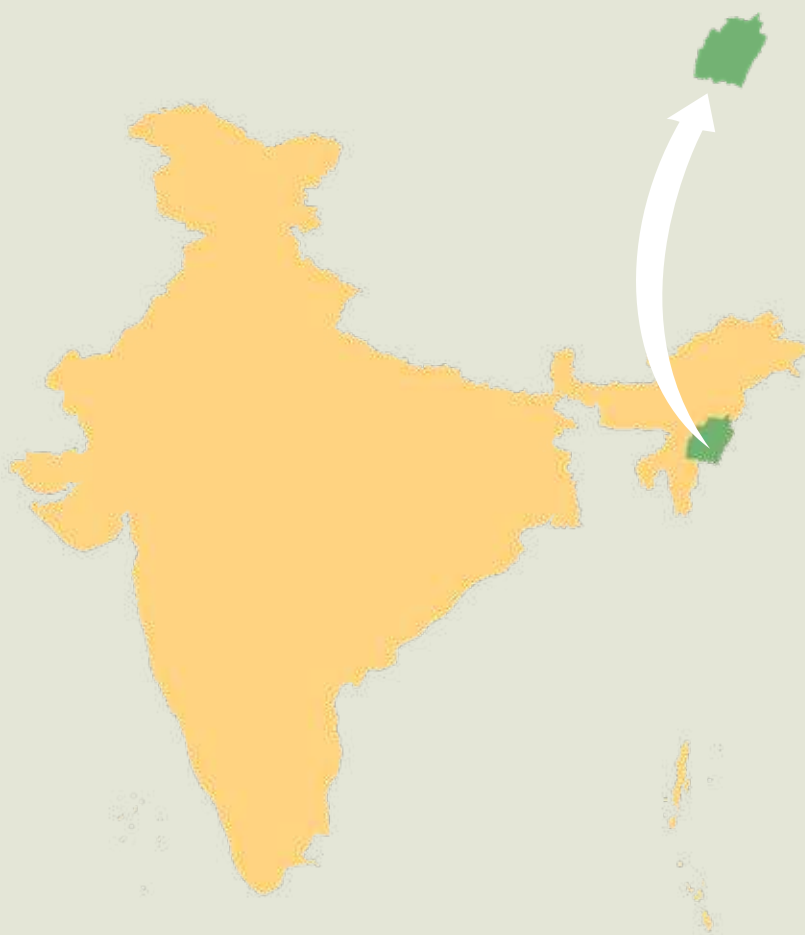
Table 10.15.17 Major NTFP Species in Maharashtra

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Butea monosperma</i>	Tree	26,40,808
2	<i>Acacia catechu/ Senegalia catechu</i>	Tree	20,44,721
3	<i>Pterocarpus marsupium</i>	Tree	9,46,107
4	<i>Cassia fistula/ Sp.</i>	Tree	5,25,828
5	<i>Helicteres isora</i>	Shrubs	2,34,66,048
6	<i>Nothapodytes nimmoniana/ Mappia nimmoniana</i>	Shrubs	6,15,100
7	<i>Hemidesmus indicus</i>	Climbers	38,03,696
8	<i>Asparagus racemosus</i>	Climbers	4,28,585
9	<i>Ocimum species (Ocimum gratissimum/ Ocimum sanctum/ Ocimum tenuiflorum/ Ocimum americanum)</i>	Herbs	77,80,79,280
10	<i>Chlorophytum borivilianum</i>	Herbs	1,66,88,027



Photo: FSI Repository

MANIPUR

**Geographical Area**22,327 km²**Geographical Coordinates**

Latitude 23°50' N to 25°42' N

Longitude 92°59' E to 94°46' E

Population (as per Census 2011)

2.86 million

Urban 0.84 million (29.21 %)

Rural 2.02 million (70.79 %)

Tribal 1.17 million (40.88 %)

Average Population Density115 per km²**Livestock Population**(as per 19th Livestock Census)

0.70 million

No. of Districts

16

No. of Hill Districts

16

No. of Tribal Districts

16

Table 10.16.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	2,233	
Reporting area for land utilization	2,087.54	100.00
Forests	1,659.80	79.51
Not available for land cultivation	26.90	1.29
Permanent pastures and other grazing lands	1.37	0.07
Land under misc. tree crops and groves	5.95	0.28
Culturable wasteland	0.74	0.03
Fallow land other than current fallows	0.06	0.00
Current fallows	0.14	0.01
Net area sown	392.58	18.81

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.16.1 Forest Cover

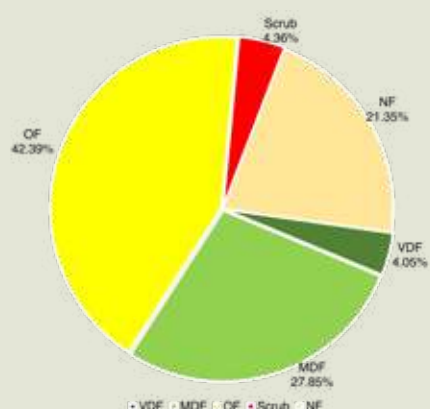


Figure 10.16.1 Forest Cover of Manipur

Table 10.16.2 Forest Cover of Manipur

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	904.05	4.05
MDF	6,217.55	27.85
OF	9,463.86	42.39
Total	16,585.46	74.29
Scrub	973.65	4.36

Table 10.16.3 District- wise Forest Cover in Manipur

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Bishnupur ^H	471.50	0.00	0.93	19.91	20.84	4.42	-1.17	2.52
Chandel ^H	2,094.75	8.41	655.83	1,142.12	1,806.36	86.23	-22.32	89.89
Churachandpur ^H	2,419.75	8.02	772.32	1,131.42	1,911.76	79.01	-78.00	122.11
Imphal East ^H	456.75	0.00	5.68	56.76	62.44	13.67	-5.26	14.11
Imphal West ^H	440.25	0.00	4.80	27.08	31.88	7.24	-1.49	0.67
Jiribam ^H	155.25	0.00	25.09	90.72	115.81	74.60	-1.93	0.90
Kakching ^H	265.25	0.00	0.84	20.17	21.01	7.92	-2.90	3.75
Kamjong ^H	2,478.75	79.48	823.63	1,248.39	2,151.50	86.80	-21.29	102.17
Kangpokpi ^H	1,436.25	62.56	226.67	516.25	805.48	56.08	-31.57	92.81
Noney ^H	1,265.25	21.22	548.67	535.71	1,105.60	87.38	-16.79	57.71
Pherzawl ^H	2,299.75	34.99	834.24	1,120.70	1,989.93	86.53	-59.89	72.01
Senapati ^H	1,842.50	182.83	427.00	777.00	1,386.83	75.27	81.61	112.87
Tamenglong ^H	3,143.25	390.81	1,120.82	1,158.14	2,669.77	84.94	-38.43	106.79
Tengnoupal ^H	1,166.50	1.86	278.55	625.44	905.85	77.66	1.55	93.97
Thoubal ^H	339.50	0.00	0.00	10.43	10.43	3.07	-0.95	2.71
Ukhrul ^H	2,051.75	113.87	492.48	983.62	1,589.97	77.50	144.00	98.66
Grand Total	22,327.00	904.05	6,217.55	9,463.86	16,585.46	74.29	-54.83	973.65

*Area figure calculated without normalization factor.

**Table 10.16.4 Division-wise Forest Cover in Manipur**

Division	Digitized Division Boundary Area #	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Bishnupur FD	654.27	0.15	12.64	87.19	99.98	15.28	-4.65	8.70
Central FD	929.23	0.00	17.78	118.87	136.65	14.71	-6.79	29.03
EFD Ukhur	4,526.92	193.11	1,303.95	2,226.66	3,723.72	82.26	122.96	200.69
Jiribam FD	1,413.56	71.39	469.69	676.18	1,217.26	86.11	-13.11	41.04
NFD Kangpokpi	1,196.84	76.20	238.76	441.55	756.51	63.21	-29.84	57.78
Senapati FD	1,713.78	168.35	392.93	724.71	1,285.99	75.04	84.34	108.39
Southern FD, CCP	4,541.43	42.97	1,537.29	2,135.72	3,715.98	81.82	-136.41	189.48
Tengnoupal FD	3,250.47	10.27	924.98	1,761.23	2,696.48	82.96	-21.93	180.47
Thoubal FD	811.40	0.00	5.27	82.94	88.21	10.87	-5.95	32.75
Western FD, Tamenglong	3,279.96	340.10	1,288.37	1,173.05	2,801.52	85.41	-40.31	124.55
Area Which Does not fall in any Division	91.94	1.51	25.89	35.76	63.16	68.70	-3.14	0.77
Grand Total	22,409.80	904.05	6,217.55	9,463.86	16,585.46	74.01	-54.83	973.65

#As per the division boundary shape file provided by State Forest Department.

*Area figure calculated without normalization factor.

10.16.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.16.5 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Manipur

(km ²)							
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
893.52	5,744.86	8,152.43	14,790.81	10.53	472.69	1,311.43	1,794.65
6.04%	38.84%	55.12%		0.59%	26.34%	73.07%	

*In case of Manipur, Green Wash boundaries have been used.

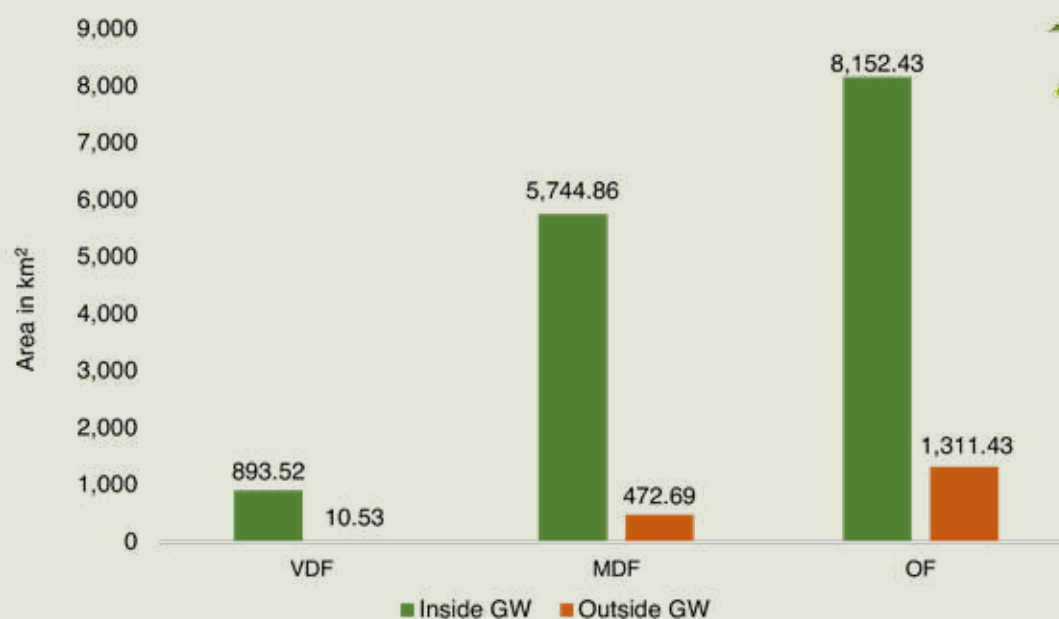


Figure 10.16.2 Forest Cover Inside and Outside of Green Wash in Manipur

Table 10.16.6 Forest Cover Change Matrix Inside RFA/GW for Manipur between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					(km²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 inside RFA / GW Raster based*
VDF	882.54	4.13	0.31	0.00	6.89	893.87
MDF	10.57	5,488.95	155.57	1.48	119.79	5,776.36
OF	0.41	236.77	7,524.24	55.68	350.95	8,168.05
Scrub	0.00	9.88	347.38	334.65	48.55	740.46
NF	0.00	5.13	124.93	309.44	1,458.37	1,897.87
Total ISFR 2023 inside RFA / GW	893.52	5,744.86	8,152.43	701.25	1,984.55	17,476.61
Net Change	-0.35	-31.50	-15.62	-39.21	86.68	

*Area figure calculated without normalization factor.

Table 10.16.7 Forest Cover Change Matrix Outside RFA/GW for Manipur between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	10.47	0.05	0.00	0.00	0.16	10.68
MDF	0.06	453.03	21.58	0.06	9.42	484.15
OF	0.00	18.22	1,211.99	19.42	57.55	1,307.18
Scrub	0.00	0.85	55.00	162.45	18.11	236.41
NF	0.00	0.54	22.86	90.47	2,698.10	2,811.97
Total ISFR 2023 outside RFA/GW	10.53	472.69	1,311.43	272.40	2,783.34	4,850.39
Net Change	-0.15	-11.46	4.25	35.99	-28.63	

*Area figure calculated without normalization factor.

**Table 10.16.8 Altitude-Wise Forest Cover in Manipur**

(km ²)						
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	3,303	13.48	1,098.17	1,895.95	3,007.60	65.87
500-1000	9,066	31.87	2,098.52	3,559.45	5,689.84	425.69
1000-2000	9,342	507.40	2,905.10	3,933.52	7,346.02	475.13
2000-3000	616	351.30	115.76	74.94	542.00	6.96
Total	22,327	904.05	6,217.55	9,463.86	16,585.46	973.65

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

Table 10.16.9 Forest Cover in Different Slope Classes in Manipur

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	2,934	27.23	224.01	483.86	735.10	44.89
5-10	2,361	86.12	539.52	1,084.77	1,710.41	119.95
10-15	3,630	146.32	944.70	1,753.92	2,844.94	193.05
15-20	4,275	171.16	1,230.55	2,089.08	3,490.79	217.54
20-25	3,902	158.29	1,245.94	1,870.96	3,275.19	183.36
25-30	2,753	126.61	980.66	1,251.14	2,358.41	118.95
>30	2,472	188.32	1,052.17	930.13	2,170.62	95.91
Total	22,327	904.05	6,217.55	9,463.86	16,585.46	973.65

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



Photo: FSI Repository

Forest Survey of India

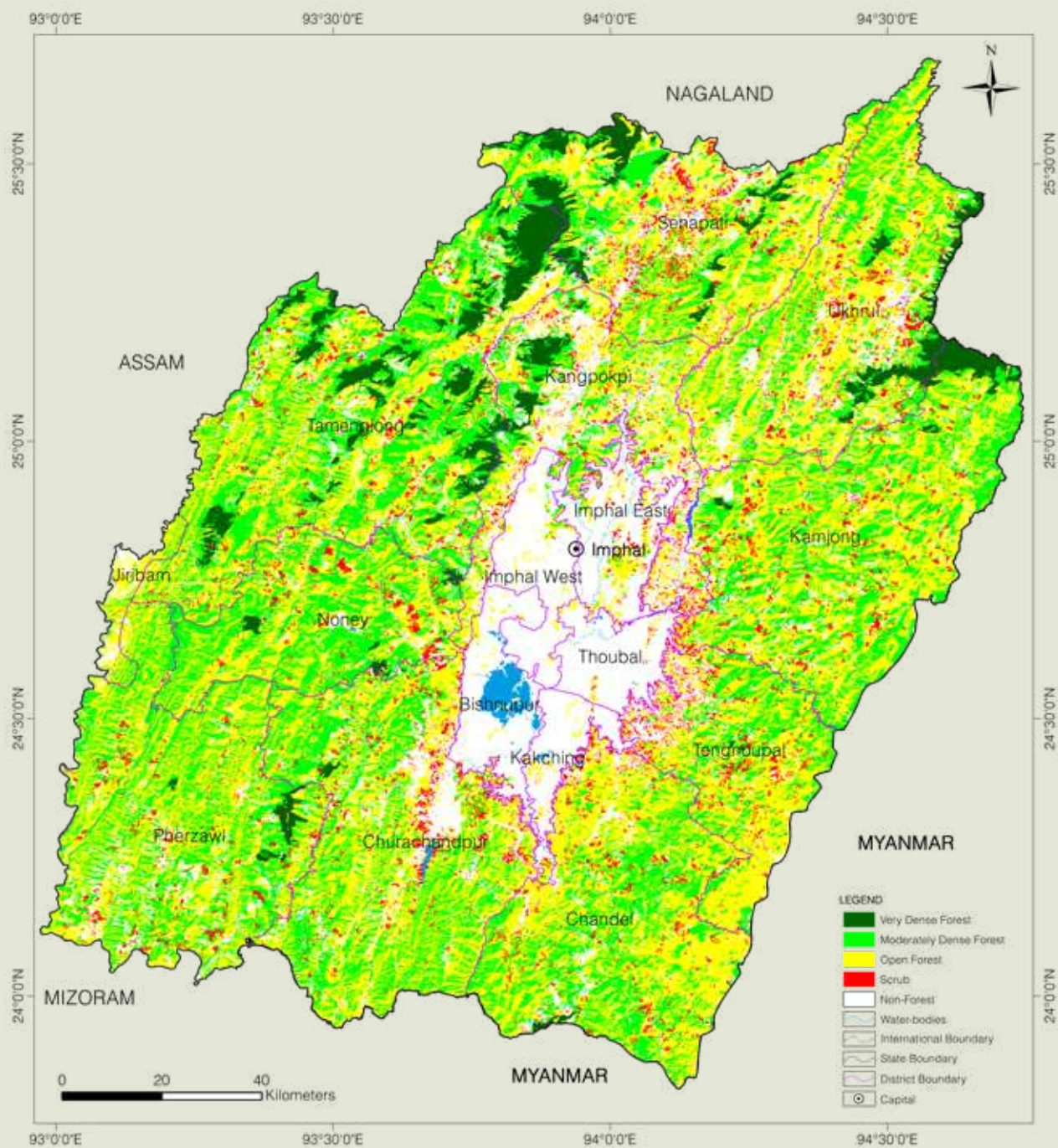


Figure 10.16.3 Forest Cover Map of Manipur



10.16.3 Forest Types

The area under different Forest Types in Manipur (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.16.10 Area Statistics of the Forest Types Found in Manipur

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	2B/C1/2S1 Pioneer Euphorbiaceous scrub	973.65	5.49
2	2B/C2 Cachar semi-evergreen forest	2,826.42	15.93
3	2/2S1 Secondary moist bamboo brakes	1,248.28	7.02
4	3C/C3b East Himalayan moist mixed deciduous forest	4,451.11	25.08
5	8B/C1 East Himalayan subtropical wet hill forest	6,073.13	34.23
6	8B/C2 <i>Khasi</i> subtropical wet hill forest	410.18	2.31
7	9/C2 Assam subtropical pine forest	705.58	3.98
8	11B/C1b <i>Buk</i> oak forest	507.09	2.86
9	11B/C2 Naga hills wet temperate forest	235.12	1.33
10	12/DS1 Montane bamboo brakes	15.40	0.09
Sub Total		17,445.96	98.32
11	TOF/ Plantation	113.15	0.64
Total (Forest Cover & Scrub)		17,559.11	98.96
Grassland forest types (outside forest cover)			
12	4D/2S2 Eastern wet alluvial grassland	135.93	0.77
13	9/C2/DS1 Assam subtropical pine savannah	48.83	0.27
Sub Total		184.76	1.04
Grand Total		17,743.87	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest types outside forest cover have also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).

10.16.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.16.11 District-Wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Bishnupur	5	1
2	Chandel	1,120	461
3	Churachandpur	1,738	767
4	Imphal East	99	4
5	Imphal West	7	0
6	Jiribam	30	14
7	Kakching	20	1
8	Kamjong	862	346
9	Kangpokpi	1,085	317
10	Noney	558	232
11	Pherzawl	696	647
12	Senapati	810	199
13	Tamenglong	1,326	819
14	Tengnoupal	596	266
15	Thoubal	7	1
16	Ukhul	1,168	423
Total		10,127	4,498

10.16.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.16.12 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	39.45	0.23
2	Very highly fire prone	2,787.33	15.87
3	Highly fire prone	6,799.43	38.72
4	Moderately fire prone	5,016.92	28.57
5	Less fire prone	2,915.98	16.61
Total		17,559.11	100.00

*Forest Cover including Scrub.

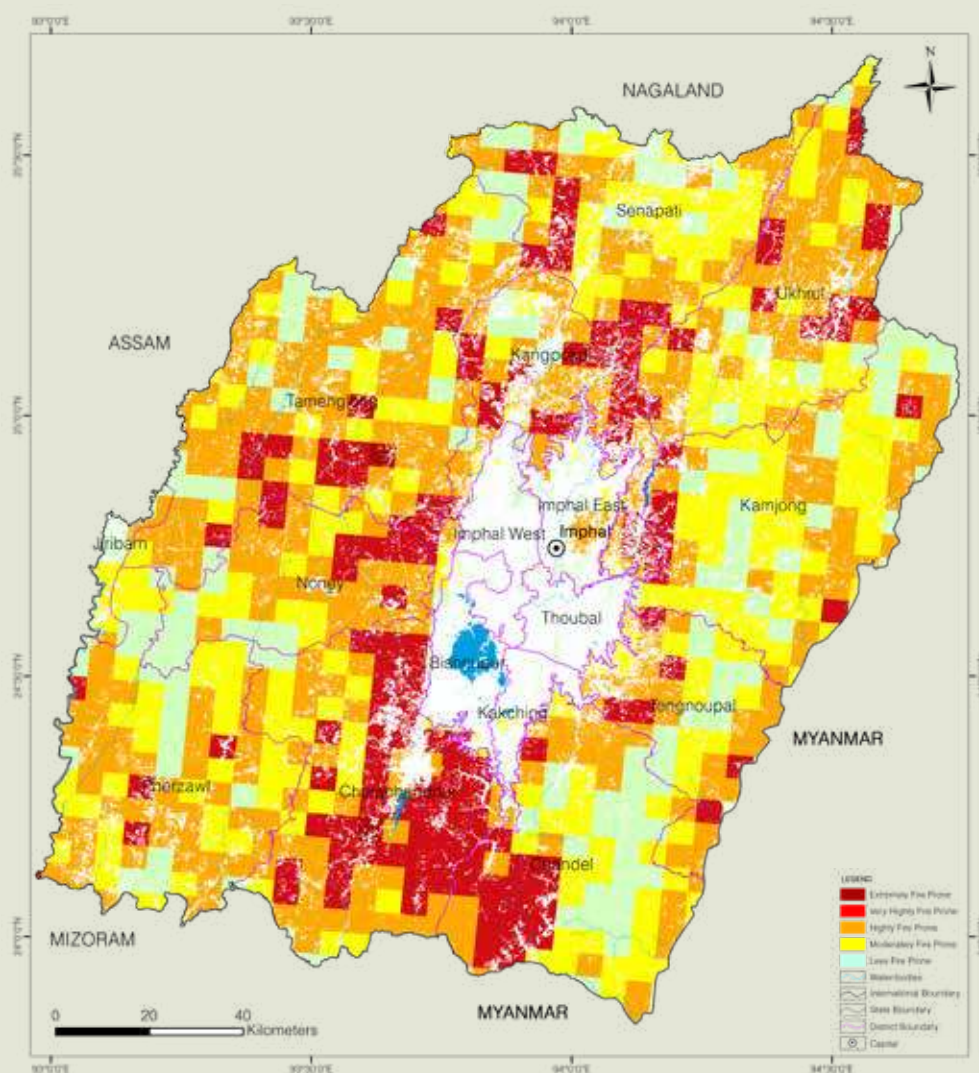


Figure 10.16.4 Fire Prone Forest Areas Under Different Fire Prone Classes

10.16.6 Results Derived from NFI for Manipur

Table 10.16.13 Number of Trees and Their Volume for Top 5 Species in RFA

	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Schima wallichii</i>	44,308	7.28
2	<i>Callicarpa arborea</i>	29,123	3.12
3	<i>Quercus species</i>	21,745	3.15
4	<i>Castanopsis species</i>	19,613	3.15
5	<i>Albizia species</i>	15,245	3.06


Table 10.16.14 Number of Trees and Their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Quercus species</i>	5,700	0.577
2	<i>Castanopsis species</i>	4,188	0.162
3	<i>Schima wallichii</i>	3,677	0.655
4	<i>Pinus kesiya</i>	2,121	0.474
5	<i>Alnus species</i>	1,740	0.243

Table 10.16.15 Number of Trees and Their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Mangifera indica</i>	107	0.010
2	<i>Eucalyptus species</i>	51	0.010
3	<i>Syzygium cumini</i>	35	0.004
4	<i>Parkia javanica/ Gleditsia javanica</i>	33	0.004
5	<i>Psidium guajava</i>	28	0.001

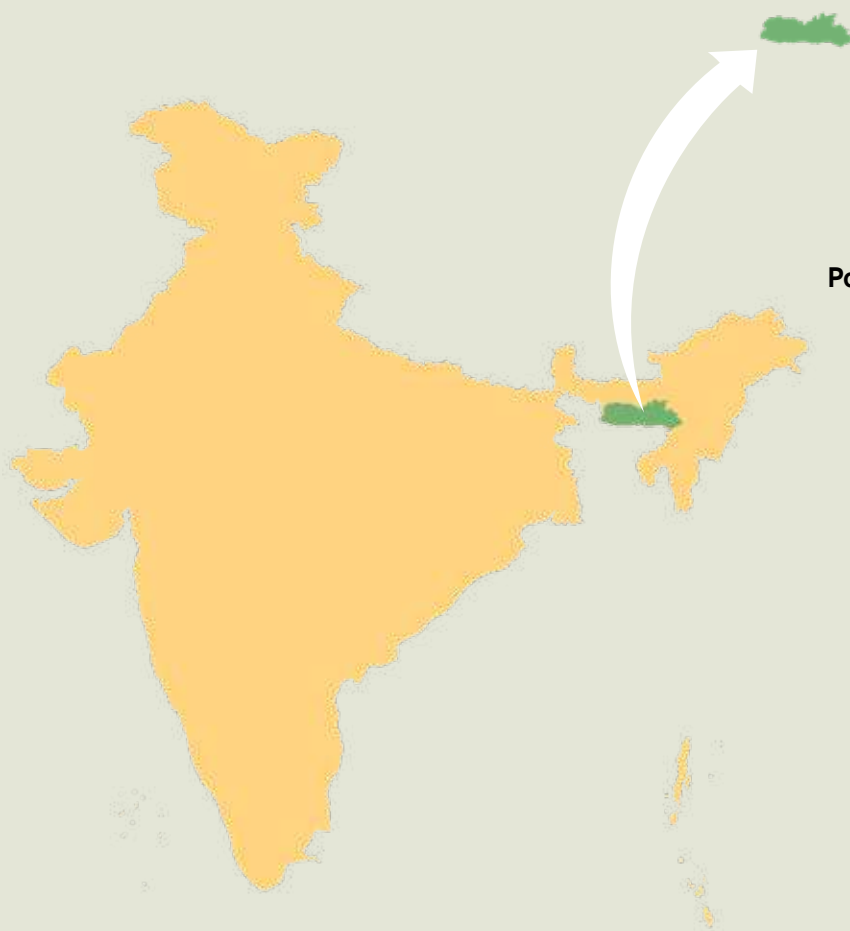
Table 10.16.16 Major NTFP Species in Manipur

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Emblia officinalis/ Phyllanthus emblica</i>	Tree	4,63,852
2	<i>Bombax species/ Bombax ceiba</i>	Tree	12,656
3	<i>Cinnamomum tamala</i>	Tree	12,482
4	<i>Parkia javanica/ Gleditsia javanica</i>	Tree	490
5	<i>Aquilaria malaccensis/Aquilaria agallocha</i>	Tree	416
6	<i>Citrus latipes</i>	Tree	208
7	<i>Calamus arborescens</i>	Shrubs	19,17,679
8	<i>Dioscorea species</i>	Climbers	2,20,53,303
9	<i>Thysanolaena latifolia/ Thysanolaena maxima</i>	Herbs	15,77,95,644
10	<i>Kaempferia rotunda</i>	Herbs	30,78,939

Table 10.16.17 Major Invasive Species in the State Inside the RFA in Manipur

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Chromolaena odorata</i>	793.04
2	<i>Mikania micrantha</i>	746.39
3	<i>Lantana camara</i>	486.48
4	<i>Imperata cylindrica</i>	159.94
5	<i>Dioscorea deltoidea</i>	46.65

MEGHALAYA


Geographical Area

 22,429 km²
Geographical Coordinates

 Latitude 24°58' N to 26°07'N
 Longitude 89°48' E to 92°51'E

Population (as per Census 2011)

2.96 million

Urban 0.59 million (20.07 %)

Rural 2.37 million (79.93 %)

Tribal 2.56 million (21.09 %)

Average Population Density

 132 per km²
Livestock Population

 (as per 19th Livestock Census)

1.96 million

No. of Districts

12

No. of Hill Districts

12

No. of Tribal Districts

12

Table 10.17.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	2,243	
Reporting area for land utilization	2,203.40	100.00
Forests	866.35	39.32
Not available for land cultivation	322.20	14.62
Permanent pastures and other grazing lands	0.00	0.00
Land under misc. tree crops and groves	170.37	7.73
Culturable wasteland	368.52	16.73
Fallow land other than current fallows	153.89	6.98
Current fallows	53.51	2.43
Net area sown	268.56	12.19

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.17.1 Forest Cover

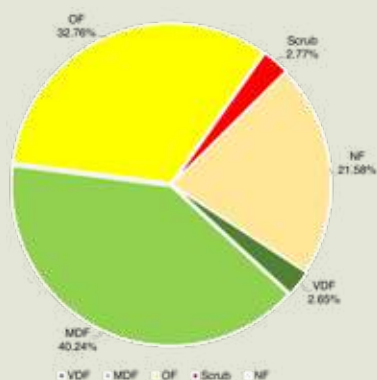


Table 10.17.2 Forest Cover of Meghalaya

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	594.84	2.65
MDF	9,023.81	40.24
OF	7,348.19	32.76
Total	16,966.84	75.65
Scrub	620.41	2.77

Figure 10.17.1 Forest Cover of Meghalaya

Table 10.17.3 District- wise Forest Cover in Meghalaya

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
East Garo Hills ^H	1,443	67.95	610.63	674.39	1,352.97	93.76	-28.09	78.70
East Jaintia Hills ^H	2,040	147.58	585.69	595.53	1,328.80	65.14	-20.76	70.95
East Khasi Hills ^H	2,748	24.48	964.48	765.54	1,754.50	63.85	13.69	90.41
Eastern West Khasi Hills ^H	1,145	98.66	561.40	147.95	808.01	70.57	2.94	19.78
North Garo Hills ^H	1,160	0.00	532.09	523.07	1,055.16	90.96	-15.37	38.03
Ri-Bhoi ^H	2,448	123.28	1,069.41	890.60	2,083.29	85.10	0.56	50.32
South Garo Hills ^H	1,887	82.64	934.47	618.59	1,635.70	86.68	-5.28	16.13
South West Garo Hills ^H	866	0.00	236.61	367.57	604.18	69.77	-4.59	1.96
South West Khasi Hills ^H	1,401	29.74	469.37	402.72	901.83	64.37	10.10	84.07
West Garo Hills ^H	2,811	0.00	940.57	1,145.84	2,086.41	74.22	12.72	48.30
West Jaintia Hills ^H	1,779	3.71	793.60	373.46	1,170.77	65.81	-8.03	57.65
West Khasi Hills ^H	2,701	16.80	1,325.49	842.93	2,185.22	80.90	12.11	64.11
Grand Total	22,429	594.84	9,023.81	7,348.19	16,966.84	75.65	-30.00	620.41

*Area figure calculated without normalization factor.



10.17.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.17.4 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Meghalaya

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
547.93	7,502.05	6,600.87	14,650.85	46.91	1,521.76	747.32	2,315.99
3.74%	51.21%	45.05%		2.02%	65.71%	32.27%	

(km²)

*In case of Meghalaya, GW boundaries have been used.

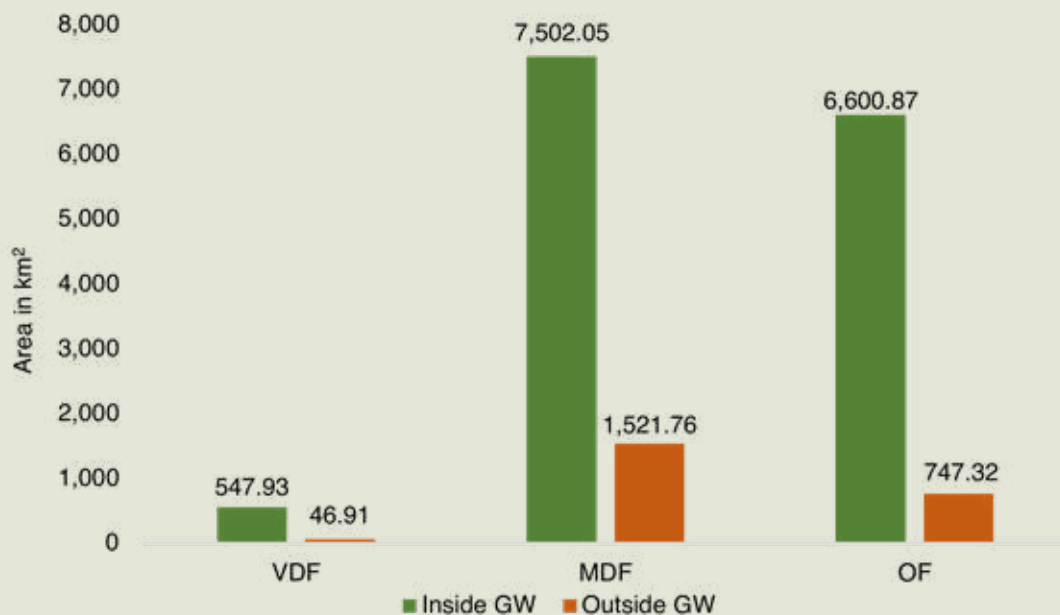


Figure 10.17.2 Forest Cover Inside and Outside of GW in Meghalaya

Table 10.17.5 Forest Cover Change Matrix Inside RFA/GW for Meghalaya between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					Total ISFR 2021 inside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	507.94	0.00	0.00	0.00	1.04	508.98
MDF	39.84	7,473.88	14.51	28.93	42.50	7,599.66
OF	0.15	13.77	6,396.05	78.78	86.27	6,575.02
Scrub	0.00	2.08	66.99	401.42	134.85	605.34
NF	0.00	12.32	123.32	56.53	2,009.44	2,201.61
Total ISFR 2023 inside RFA / GW	547.93	7,502.05	6,600.87	565.66	2,274.10	17,490.61
Net Change	38.95	-97.61	25.85	-39.68	72.49	

*Area figure calculated without normalization factor.

Table 10.17.6 Forest Cover Change Matrix Outside RFA/GW for Meghalaya between 2021 Raster based and 2023 Assessments

(km²)

Class	2023 Assessment outside RFA/GW					Total ISFR 2021 outside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	46.15	0.00	0.16	0.00	0.16	46.47
MDF	0.62	1,514.58	3.53	2.71	16.31	1,537.75
OF	0.00	0.32	708.20	4.61	15.83	728.96
Scrub	0.00	0.50	4.02	35.58	26.02	66.12
NF	0.14	6.36	31.41	11.85	2,509.33	2,559.09
Total ISFR 2023 outside RFA/GW	46.91	1,521.76	747.32	54.75	2,567.65	4,938.39
Net Change	0.44	-15.99	18.36	-11.37	8.56	

*Area figure calculated without normalization factor.

Table 10.17.7 Altitude-wise Forest Cover in Meghalaya

(km²)

Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	10,152	310.80	4,142.05	4,052.63	8,505.48	209.01
500-1000	6,239	208.66	2,622.68	2,286.08	5,117.42	319.26
1000-2000	6,038	75.38	2,259.08	1,009.48	3,343.94	92.14
Total	22,429	594.84	9,023.81	7,348.19	16,966.84	620.41

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

Table 10.17.8 Forest Cover in Different Slope Classes in Meghalaya

(km²)

Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	6,169	123.19	1,866.61	1,619.55	3,609.35	139.14
5-10	6,115	127.09	2,420.43	2,095.05	4,642.57	165.24
10-15	4,403	106.48	1,936.62	1,602.20	3,645.30	125.76
15-20	2,670	88.47	1,262.07	967.78	2,318.32	81.51
20-25	1,488	65.68	740.51	523.71	1,329.90	48.73
25-30	806	42.06	409.67	277.42	729.15	28.69
>30	778	41.87	387.90	262.48	692.25	31.34
Total	22,429	594.84	9,023.81	7,348.19	16,966.84	620.41

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

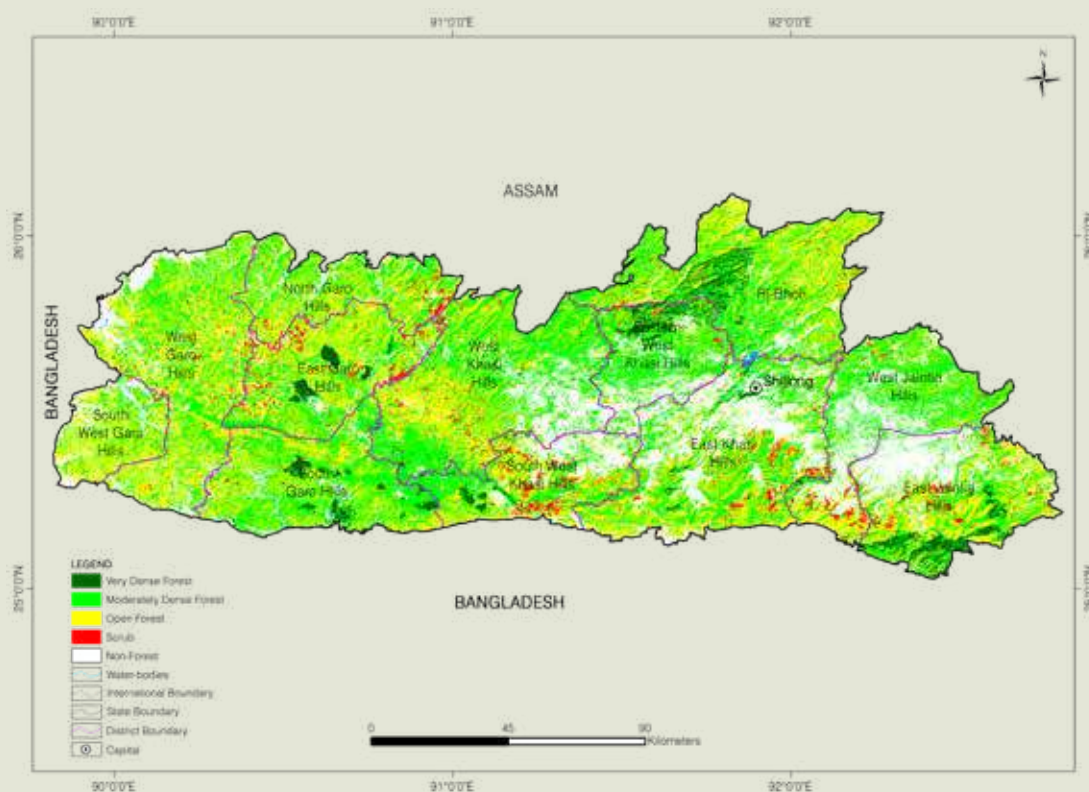


Figure 10.17.3 Forest Cover Map of Meghalaya

10.17.3 Forest Types

The area under different Forest Types in Meghalaya (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.17.9 Area Statistics of the Forest Types Found in Meghalaya

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	1B/C3 Cachar tropical evergreen forest	1,518.93	8.29
2	1/2S1 Pioneer Euphorbiaceous scrub	448.48	2.45
3	2B/ C1a Assam alluvial plains semi-evergreen forest	128.27	0.70
4	2/2S1 Secondary moist bamboo brakes	354.84	1.95
5	3C/C1a(ii) <i>Khasi</i> hill sal	1,117.12	6.10
6	3C/C3b East Himalayan moist mixed deciduous forest	8,709.09	47.56
7	8B/C2 <i>Khasi</i> subtropical wet hill forest	3,569.97	19.49
8	9/C2 Assam subtropical pine forest	1,170.24	6.39
Sub Total		17,016.94	92.93
9	TOF/ Plantation	570.31	3.11
Total (Forest Cover & Scrub)		17,587.25	96.04
Grassland forest type (outside forest cover)			
10	9/C2/DS1 Assam subtropical pine savannah	725.26	3.96
Sub Total		725.26	3.96
Grand Total		18,312.51	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest type outside forest cover has also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).

10.17.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.17.10 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	East Garo Hills	571	331
2	East Jaintia Hills	766	348
3	East Khasi Hills	380	226
4	Eastern West Khasi Hills	342	493
5	North Garo Hills	356	213
6	Ri-Bhoi	1,559	1,377
7	South Garo Hills	130	90
8	South West Garo Hills	14	15
9	South West Khasi Hills	589	119
10	West Garo Hills	164	114
11	West Jaintia Hills	391	243
12	West Khasi Hills	1,342	750
Grand Total		6,604	4,319

10.17.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.17.11 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	638.89	3.63
2	Very highly fire prone	2,516.49	14.31
3	Highly fire prone	4,013.73	22.82
4	Moderately fire prone	3,752.65	21.34
5	Less fire prone	6,665.49	37.90
Total		17,587.25	100.00

*Forest Cover including Scrub.

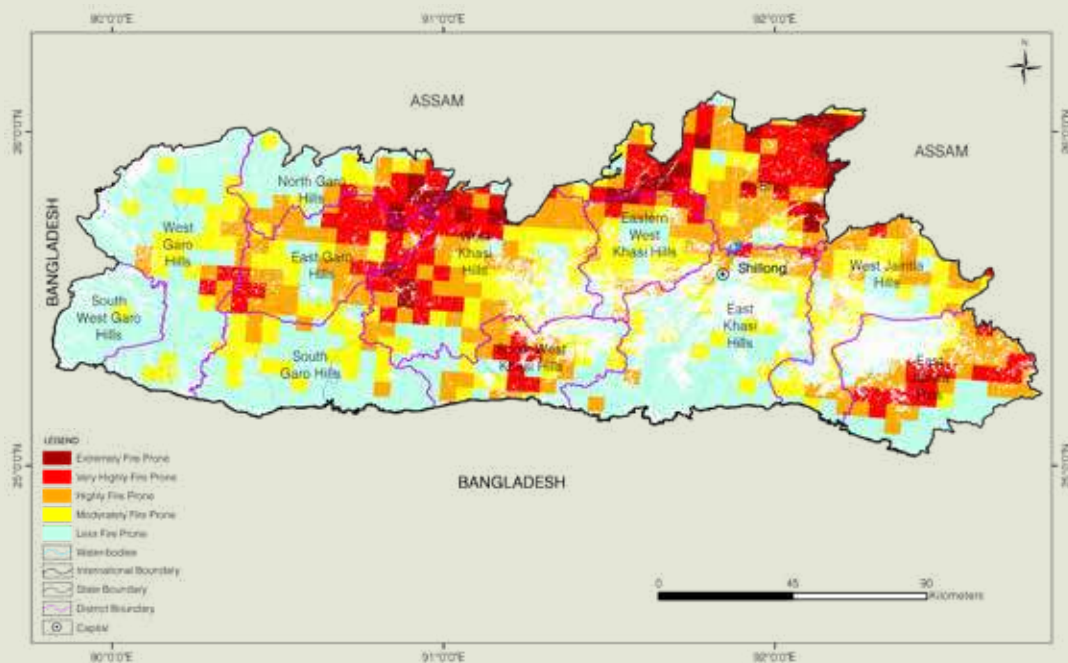


Figure 10.17.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.17.6 Results Derived from NFI for Meghalaya

Table 10.17.12 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Areca catechu</i>	36,326	0.83
2	<i>Schima wallichii</i>	15,538	2.28
3	<i>Pinus kesiya</i>	5,872	1.76
4	<i>Anacardium occidentale</i>	5,391	0.76
5	<i>Macaranga species</i>	5,144	0.64

Table 10.17.13 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Pinus kesiya</i>	48,224	7.363
2	<i>Schima wallichii</i>	27,558	3.984
3	<i>Pinus roxburghii</i>	18,516	2.459
4	<i>Areca catechu</i>	9,991	0.213
5	<i>Castanopsis species</i>	8,367	0.923



Table 10.17.14 Number of Trees and their Volume for Top 5 Species in Urban Area

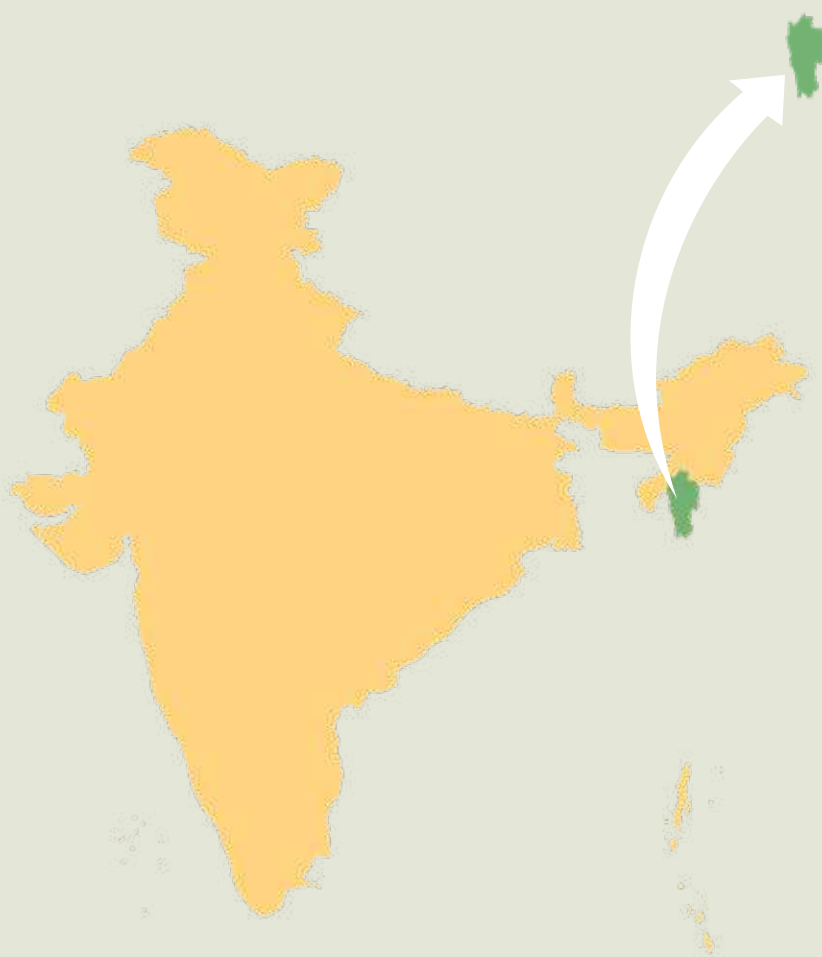
Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Pinus kesiya</i>	287	0.044
2	<i>Areca catechu</i>	145	0.003
3	<i>Pinus patula</i>	93	0.01
4	<i>Pinus roxburghii</i>	54	0.01
5	<i>Schima wallichii</i>	40	0.012

Table 10.17.15 Major NTFP Species in Meghalaya

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Bauhinia variegata/Phanera variegata</i>	Tree	1,08,615
2	<i>Emblica officinalis/ Phyllanthus emblica</i>	Tree	62,503
3	<i>Cinnamomum tamala</i>	Tree	51,779
4	<i>Areca catechu</i>	Tree	36,326
5	<i>Careya arborea</i>	Tree	21,901
6	<i>Anacardium occidentale</i>	Tree	19,945
7	<i>Terminalia bellirica</i>	Tree	10,388
8	<i>Piper sarmentosum</i>	Shrubs	1,85,918
9	<i>Ficus Hispida</i>	Shrubs	1,48,735
10	<i>Thatch Grass</i>	Herbs	3,55,21,791

Table 10.17.16 Major Invasive Species in the State Inside the RFA in Meghalaya

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Chromolaena odorata</i>	277.44
2	<i>Mikania micrantha</i>	92.91
3	<i>Lantana camara</i>	25.38
4	<i>Saccharum spontaneum</i>	13.76
5	<i>Ageratina adenophora</i>	11.18

**Geographical Area**21,081 km²**Geographical Coordinates**

Latitude 21°56' N to 24°31' N

Longitude 92°16' E to 93°26' E

Population (as per Census 2011)

1.09 million

Urban 0.57 million (52.11 %)

Rural 0.52 million (47.89 %)

Tribal 1.03 million (94.43 %)

Average Population Density52 per km²**Livestock Population**(as per 19th Livestock Census)

0.31 million

No. of Districts

11

No. of Hill Districts

11

No. of Tribal Districts

11

Table 10.18.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	2,108	
Reporting area for land utilization	2,038.99	100.00
Forests	1,585.30	77.75
Not available for land cultivation	75.25	3.69
Permanent pastures and other grazing lands	11.11	0.55
Land under misc. tree crops and groves	41.31	2.03
Culturable wasteland	7.44	0.36
Fallow land other than current fallows	127.32	6.24
Current fallows	46.56	2.28
Net area sown	144.70	7.10

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.18.1 Forest Cover

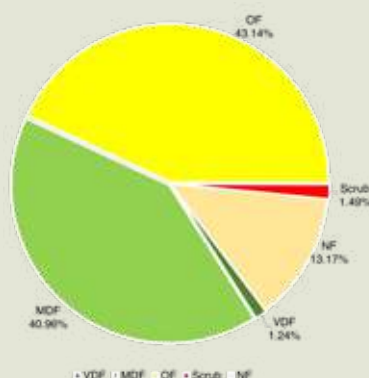


Table 10.18.2 Forest Cover of Mizoram

			(km ²)
Class	Area	% of Calculated Area by Sol	
VDF	261.52	1.24	
MDF	8,635.76	40.96	
OF	9,093.18	43.14	
Total	17,990.46	85.34	
Scrub	314.54	1.49	

Figure 10.18.1 Forest Cover of Mizoram

Table 10.18.3 District- wise Forest Cover in Mizoram

									(km ²)
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub	
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total				
Aizawl ^H	2,213.50	15.09	917.38	967.42	1,899.89	85.83	-33.64	13.89	
Champhai ^H	1,652.50	42.95	915.45	415.98	1,374.38	83.17	86.69	68.24	
Hnahthial ^H	851.50	0.00	372.14	363.32	735.46	86.37	114.67	12.62	
Khawzawl ^H	1,088.25	9.03	489.22	324.92	823.17	75.64	12.89	49.75	
Kolasib ^H	1,492.50	1.32	636.15	640.45	1,277.92	85.62	-37.58	2.68	
Lawngtlai ^H	2,424.75	78.44	781.73	1,081.75	1,941.92	80.09	50.17	25.51	
Lunglei ^H	3,685.25	30.32	1,263.70	1,964.41	3,258.43	88.42	-30.66	27.77	
Mamit ^H	3,048.25	50.07	1,176.17	1,495.81	2,722.05	89.30	-21.96	32.11	
Saitual ^H	1,651.25	17.10	729.86	612.81	1,359.77	82.35	-17.56	60.92	
Serchhip ^H	1,443.75	16.71	589.59	603.07	1,209.37	83.77	14.17	10.18	
Siaha ^H	1,529.50	0.49	764.37	623.24	1,388.10	90.76	104.54	10.87	
Grand Total	21,081.00	261.52	8,635.76	9,093.18	17,990.46	85.34	241.73	314.54	

*Area figure calculated without normalization factor.



Table 10.18.4 Division-wise Forest Cover in Mizoram

(km ²)								
Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Aizawl	1,730.75	21.99	649.23	798.89	1,470.11	84.94	-35.81	19.88
CADC	671.79	0.00	177.88	273.03	450.91	67.12	-16.17	4.44
Champhai	3,238.52	59.07	1,646.13	887.57	2,592.77	80.06	87.46	142.78
Dampa Tiger Reserve	377.17	29.84	129.38	213.13	372.35	98.72	-0.91	0.04
Darlawn	1,527.25	11.48	679.63	633.65	1,324.76	86.74	-30.82	21.42
Kawrthah	816.74	0.00	342.19	322.23	664.42	81.35	-0.69	15.41
Kolasib	1,516.42	1.32	642.97	605.97	1,250.26	82.45	-37.30	2.61
LADC	1,742.20	78.52	596.66	803.28	1,478.46	84.86	67.97	19.95
Lunglei	1,882.48	0.06	717.22	1,002.05	1,719.33	91.33	53.35	11.89
MADC	1,542.89	0.49	769.43	623.50	1,393.42	90.31	102.33	11.96
Mamit	1,785.33	18.00	668.42	928.21	1,614.63	90.44	-19.64	16.16
N.Vanlaiphai	994.69	2.63	460.81	366.20	829.64	83.41	106.89	12.56
Thenzawl	2,187.37	38.09	810.84	1,074.44	1,923.37	87.93	-35.13	20.80
Tlabung	1,084.88	0.00	329.41	545.78	875.19	80.67	-0.20	14.24
Area Which Does not fall in any Division	48.43	0.03	15.56	15.25	30.84	63.68	0.40	0.40
Grand Total	21,146.91	261.52	8,635.76	9,093.18	17,990.46	85.07	241.73	314.54

*As per the division boundary shapefile provided by State Forest Department.

*Area figure calculated without normalization factor.

Table 10.18.5 Forest Cover in Municipal Areas of Mizoram

(km ²)								
Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
1	Aizawl	113.71	0.00	41.04	29.22	70.26	61.79	2.18
2	Lunglei	170.28	0.00	70.78	78.39	149.17	87.60	0.47
Grand Total		283.99	0.00	111.82	107.61	219.43	77.27	2.65

*Shapefile of digitized boundary as provided by under Secretary to Govt. of Mizoram; Environment, Forest & Climate Change Department.

10.18.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.18.6 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Mizoram

(km ²)							
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
259.83	8,438.53	8,931.24	17,629.60	1.69	197.23	161.94	360.86
1.47%	47.87%	50.66%		0.47%	54.65%	44.88%	

*In case of Mizoram, Green Wash boundaries have been used.

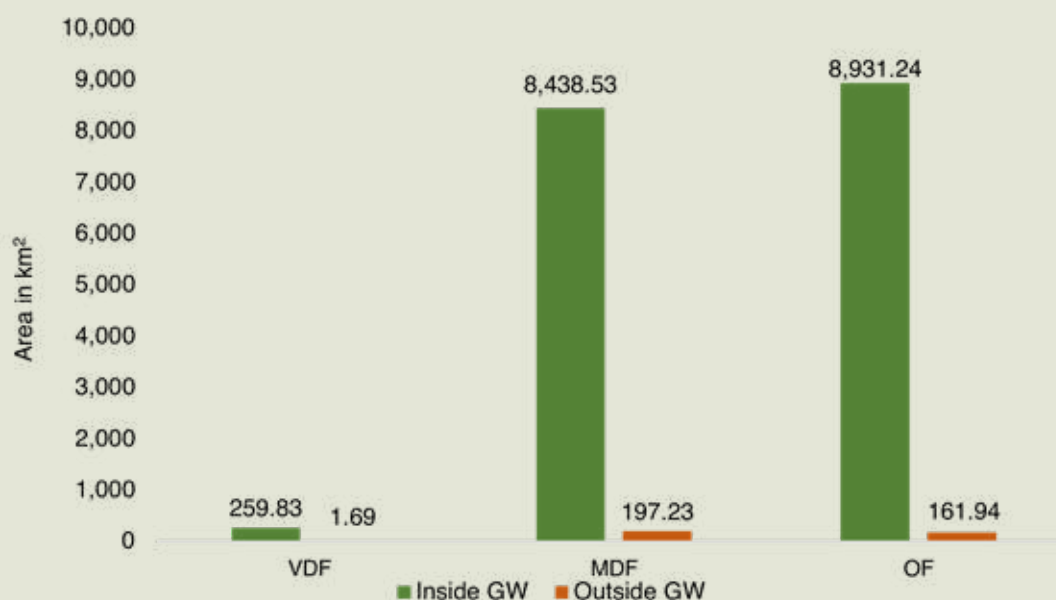


Figure 10.18.2 Forest Cover Inside and Outside of Green Wash in Mizoram

Table 10.18.7 Forest Cover Change Matrix Inside RFA/GW for Mizoram between 2021 Raster based and 2023 Assessments

(km ²)						
Class	2023 Assessment inside RFA/GW					Total ISFR 2021 inside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	192.71	0.01	0.03	0.00	0.98	193.73
MDF	66.11	8,269.75	5.72	1.06	306.00	8,648.64
OF	0.80	10.59	8,026.29	3.14	553.49	8,594.31
Scrub	0.00	0.00	0.00	1.43	0.00	1.43
NF	0.21	158.18	899.20	295.85	1,778.66	3,132.10
Total ISFR 2023 inside RFA / GW	259.83	8,438.53	8,931.24	301.48	2,639.13	20,570.21
Net Change	66.10	-210.11	336.93	300.05	-492.97	

*Area figure calculated without normalization factor.



Table 10.18.8 Forest Cover Change Matrix Outside RFA/GW for Mizoram between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	0.36	0.00	0.00	0.00	0.00	0.36
MDF	1.33	178.27	0.11	0.00	11.18	190.89
OF	0.00	0.20	111.83	0.00	8.77	120.80
Scrub	0.00	0.00	0.00	0.29	0.00	0.29
NF	0.00	18.76	50.00	12.77	116.92	198.45
Total ISFR 2023 outside RFA/GW	1.69	197.23	161.94	13.06	136.87	510.79
Net Change	1.33	6.34	41.14	12.77	-61.58	

*Area figure calculated without normalization factor.

Table 10.18.9 Altitude-wise Forest Cover in Mizoram

(km ²)						
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	9,163.00	87.18	3,125.39	4,676.68	7,889.25	62.19
500-1000	8,205.00	76.95	3,610.92	3,421.12	7,108.99	145.70
1000-2000	3,710.00	96.60	1,898.17	994.98	2,989.75	106.65
2000-3000	3.00	0.79	1.28	0.40	2.47	0.00
Total	21,081.00	261.52	8,635.76	9,093.18	17,990.46	314.54

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

Table 10.18.10 Forest Cover in Different Slope Classes in Mizoram

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	1,565.00	16.74	488.44	602.07	1,107.25	17.56
5-10	2,668.00	43.44	947.33	1,161.01	2,151.78	37.97
10-15	3,625.00	60.25	1,371.99	1,610.57	3,042.81	59.07
15-20	4,058.00	52.71	1,627.50	1,816.08	3,496.29	66.65
20-25	3,713.00	38.34	1,574.11	1,651.69	3,264.14	57.73
25-30	2,745.00	24.68	1,237.70	1,194.65	2,457.03	40.96
>30	2,707.00	25.36	1,388.69	1,057.11	2,471.16	34.60
Total	21,081.00	261.52	8,635.76	9,093.18	17,990.46	314.54

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

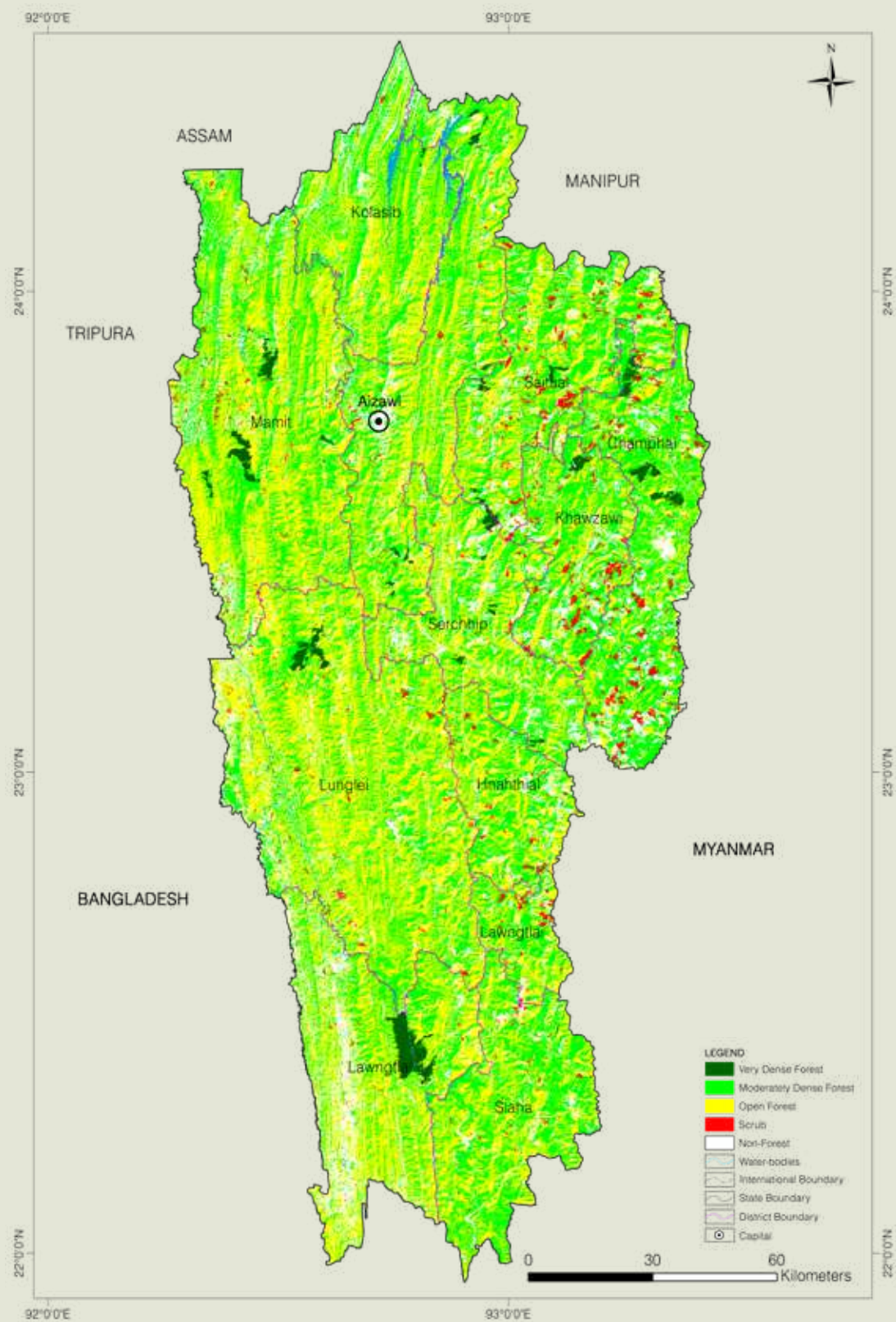


Figure 10.18.3 Forest Cover Map of Mizoram



10.18.3 Forest Types

The area under different Forest Types in Mizoram (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.18.11 Area Statistics of the Forest Types Found in Mizoram

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	2B/C1/2S1 Pioneer Euphorbiaceous scrub	74.28	0.41
2	2B/C2 Cachar semi-evergreen forest	5,572.04	30.44
3	2/2S1 Secondary moist bamboo brakes	6,656.91	36.37
4	3C/C3b East Himalayan moist mixed deciduous forest	5,897.13	32.21
5	8B/C1 East Himalayan subtropical wet hill forest	7.97	0.04
6	9/C2 Assam subtropical pine forest	92.68	0.51
Sub Total		18,301.01	99.98
7	TOF/ Plantation	3.99	0.02
Total (Forest Cover & Scrub)		18,305.00	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). The total mapped area, therefore, is sum of forest cover and scrub.

10.18.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.18.12 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Aizawl	446	442
2	Champhai	581	140
3	Hnahthial	70	178
4	Khawzawl	127	198
5	Kolasib	245	284
6	Lawngtlai	1,385	1,811
7	Lunglei	1,045	1,558
8	Mamit	814	994
9	Saitual	316	340
10	Serchhip	381	245
11	Siaha	388	437
Total		5,798	6,627

10.18.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.18.13 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	473.93	2.59
2	Very highly fire prone	2,596.79	14.19
3	Highly fire prone	6,252.11	34.15
4	Moderately fire prone	5,164.07	28.21
5	Less fire prone	3,818.10	20.86
Total		18,305.00	100.00

*Forest Cover including Scrub.

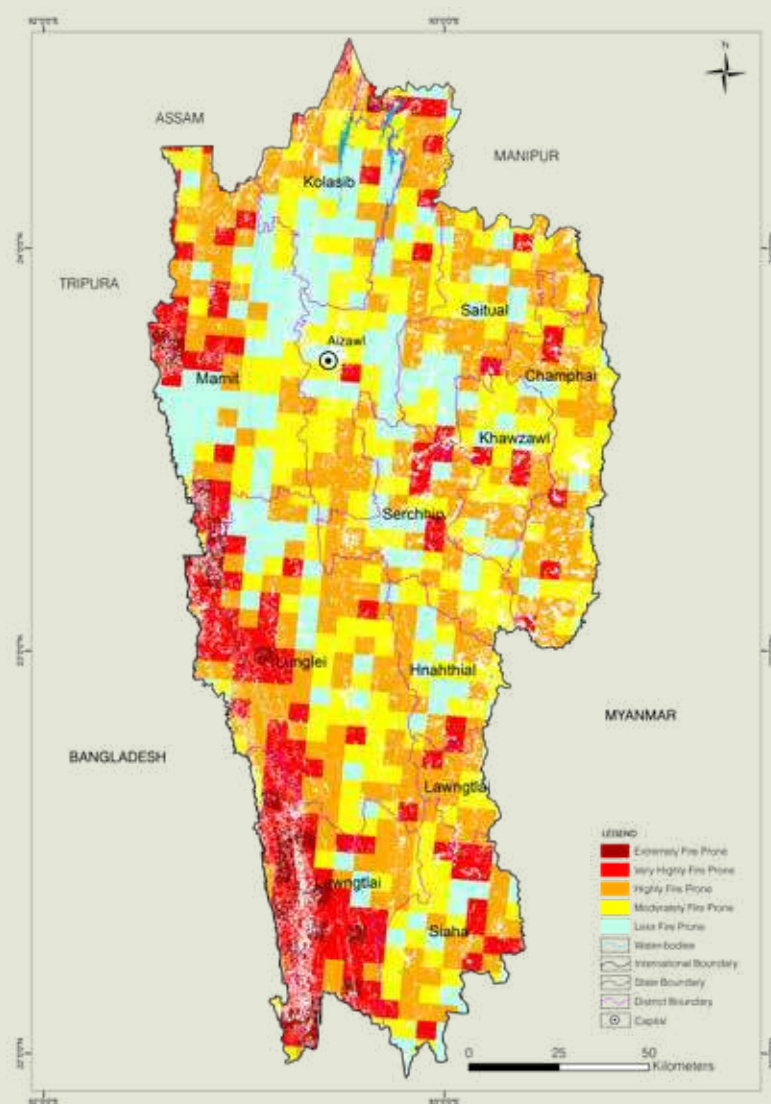


Figure 10.18.4 Fire Prone Forest Areas under Different Fire Prone Classes



10.18.6 Results Derived from NFI for Mizoram

Table 10.18.14 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Schima wallichii</i>	16,007	3.31
2	<i>Quercus species</i>	15,153	2.38
3	<i>Macaranga species</i>	13,411	2.32
4	<i>Tectona grandis</i>	11,494	3.63
5	<i>Albizia species</i>	5,467	1.15

Table 10.18.15 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Schima wallichii</i>	27,708	6.989
2	<i>Macaranga species</i>	19,569	2.186
3	<i>Castanopsis species</i>	15,102	2.425
4	<i>Areca catechu</i>	11,989	0.250
5	<i>Quercus species</i>	11,564	3.358

Table 10.18.16 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Areca catechu</i>	1,207	0.024
2	<i>Mangifera indica</i>	950	0.129
3	<i>Schima wallichii</i>	531	0.100
4	<i>Artocarpus heterophyllus</i>	375	0.076
5	<i>Parkia javanica</i> / <i>Gleditsia javanica</i>	268	0.031

Table 10.18.17 Major NTFP Species in Mizoram

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Emblica officinalis</i> / <i>Phyllanthus emblica</i>	Tree	38,849
2	<i>Saraca asoca</i>	Tree	11,179
3	<i>Aquilaria malaccensis</i> / <i>Aquilaria agallocha</i>	Tree	7,710
4	<i>Alstonia scholaris</i>	Tree	6,362
5	<i>Costus speciosus</i>	Shrubs	11,11,616
6	<i>Hedyotis scandens</i> / <i>Dimetia scandens</i>	Shrubs	7,41,077
7	<i>Calamus spp.</i>	Climbers	4,80,328
8	<i>Embelia ribes</i>	Climbers	1,37,237
9	<i>Thysanolaena latifolia</i> / <i>Thysanolaena maxima</i>	Herbs	5,16,36,741
10	<i>Curcuma caesia</i>	Herbs	32,59,838

Table 10.18.18 Major Invasive Species in the State Inside the RFA in Mizoram

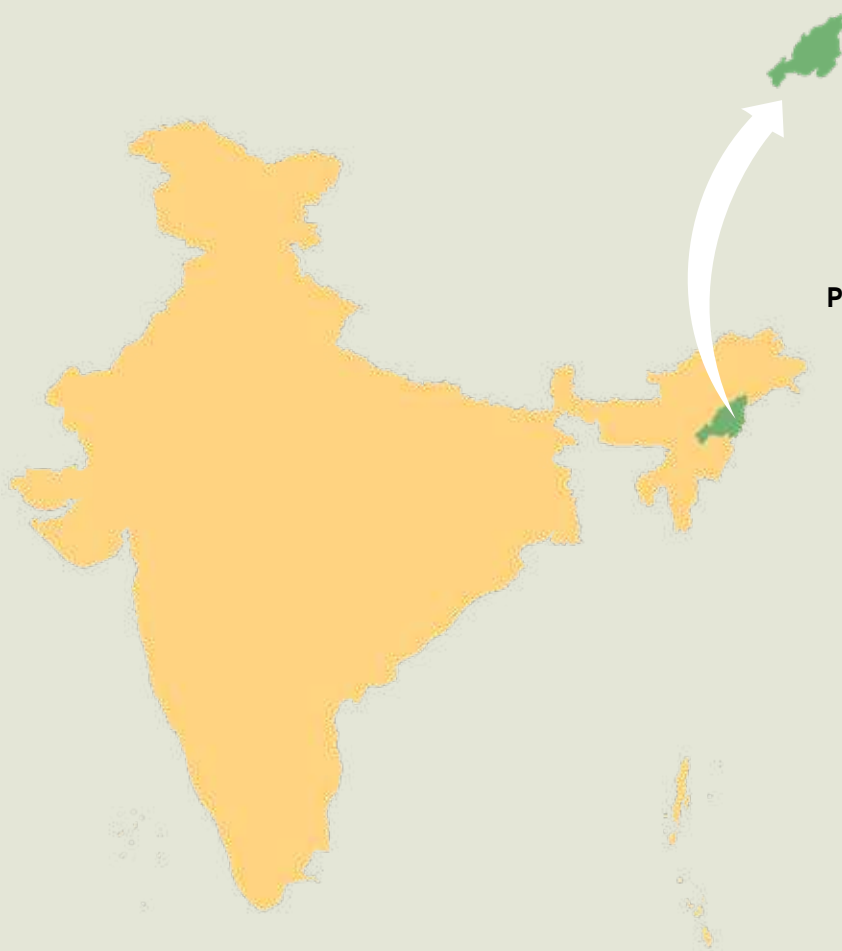
Sl. No.	Species	Estimated Extent (km ²)
1	<i>Chromolaena odorata</i>	128.40
2	<i>Saccharum spontaneum</i>	50.44
3	<i>Mikania micrantha</i>	21.78
4	<i>Ipomoea carnea</i>	17.20
5	<i>Ageratina adenophora</i>	12.61



Photo: FSI Repository

Forest Survey of India

NAGALAND

**Geographical Area**16,579 km²**Geographical Coordinates**

Latitude 25°10' N to 27°4' N

Longitude 93°15' E to 95°6' E

Population (as per Census 2011)

1.98 million

Urban 0.57 million (28.86 %)

Rural 1.41 million (71.14 %)

Tribal 1.71 million (86.48 %)

Average Population Density119 per km²**Livestock Population**(as per 19th Livestock Census)

0.91 million

No. of Districts

11

No. of Hill Districts

11

No. of Tribal Districts

11

Table 10.19.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	1,658	
Reporting area for land utilization	1,656.74	100.00
Forests	862.93	52.08
Not available for land cultivation	121.54	7.34
Permanent pastures and other grazing lands	0.00	0.00
Land under misc. tree crops and groves	69.03	4.17
Culturable wasteland	60.00	3.62
Fallow land other than current fallows	186.44	11.25
Current fallows	91.95	5.55
Net area sown	264.85	15.99

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.19.1 Forest Cover

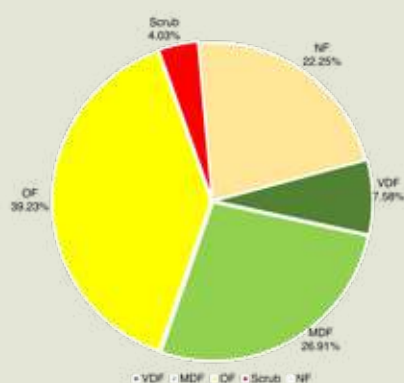


Table 10.19.2 Forest Cover of Nagaland

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	1,256.38	7.58
MDF	4,461.81	26.91
OF	6,504.28	39.23
Total	12,222.47	73.72
Scrub	667.27	4.03

Figure 10.19.1 Forest Cover of Nagaland

Table 10.19.3 District- wise Forest Cover in Nagaland

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Dimapur ^H	927	24.70	116.04	323.13	463.87	50.04	-3.48	7.49
Kiphire ^H	1,130	139.29	268.29	404.31	811.89	71.85	-0.54	65.20
Kohima ^H	1,463	119.25	345.10	625.54	1,089.89	74.50	-4.15	42.47
Longleng ^H	562	15.73	125.76	243.93	385.42	68.58	5.26	22.76
Mokokchung ^H	1,615	2.32	546.66	791.87	1,340.85	83.02	14.88	36.72
Mon ^H	1,786	96.35	523.69	735.76	1,355.80	75.91	-18.30	99.90
Peren ^H	1,651	148.40	649.11	702.29	1,499.80	90.84	-8.48	74.95
Phek ^H	2,026	265.57	549.16	677.58	1,492.31	73.66	0.88	62.08
Tuensang ^H	2,536	356.80	433.80	568.81	1,359.41	53.60	-14.28	108.56
Wokha ^H	1,628	0.93	461.60	831.04	1,293.57	79.46	-7.99	59.00
Zunheboto ^H	1,255	87.04	442.60	600.02	1,129.66	90.01	-15.69	88.14
Grand Total	16,579	1,256.38	4,461.81	6,504.28	12,222.47	73.72	-51.89	667.27

*Area figure calculated without normalization factor.



10.19.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.19.4 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Nagaland

(km ²)							
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
1,156.13	3,168.30	4,195.60	8,520.03	100.25	1,293.51	2,308.68	3,702.44
13.57%	37.19%	49.24%		2.71%	34.94%	62.35%	

*In case of Nagaland, Green Wash boundaries have been used.

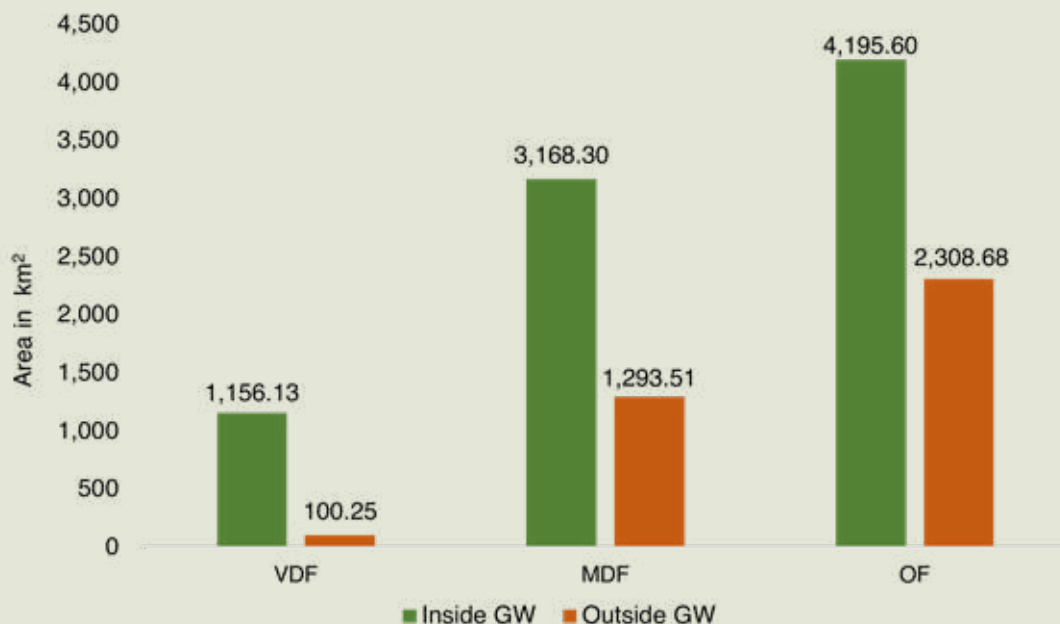


Figure 10.19.2 Forest Cover Inside and Outside of Green Wash in Nagaland

Table 10.19.5 Forest Cover Change Matrix Inside RFA/GW for Nagaland between 2021 Raster based and 2023 Assessments

(km ²)						
Class	2023 Assessment inside RFA/GW					Total ISFR 2021 inside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	1,150.48	0.30	0.03	0.00	8.20	1,159.01
MDF	5.53	3,044.31	8.71	2.12	112.06	3,172.73
OF	0.12	121.72	3,812.89	22.50	261.98	4,219.21
Scrub	0.00	0.19	198.89	185.11	77.83	462.02
NF	0.00	1.78	175.08	127.65	1,293.51	1,598.02
Total ISFR 2023 inside RFA / GW	1,156.13	3,168.30	4,195.60	337.38	1,753.58	10,610.99
Net Change	-2.88	-4.43	-23.61	-124.64	155.56	

*Area figure calculated without normalization factor.

Table 10.19.6 Forest Cover Change Matrix Outside RFA/GW for Nagaland between 2021 Raster based and 2023 Assessments.

(km²)

Class	2023 Assessment outside RFA/GW					Total ISFR 2021 outside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	99.16	0.00	0.00	0.00	3.08	102.24
MDF	1.09	1,221.95	6.57	0.27	82.85	1,312.73
OF	0.00	70.10	1,964.53	17.02	256.79	2,308.44
Scrub	0.00	0.08	168.53	102.17	100.62	371.40
NF	0.00	1.38	169.05	210.43	1,492.34	1,873.20
Total ISFR 2023 outside RFA/GW	100.25	1,293.51	2,308.68	329.89	1,935.68	5,968.01
Net Change	-1.99	-19.22	0.24	-41.51	62.48	

*Area figure calculated without normalization factor.

Table 10.19.7 Altitude-wise Forest Cover in Nagaland

(km²)

Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	4,047	0.00	1,160.30	1,990.05	3,150.35	66.10
500-1000	5,017	21.91	1,342.76	2,247.37	3,612.04	253.38
1000-2000	6,470	596.57	1,734.72	2,143.43	4,474.72	339.24
2000-3000	1,027	627.86	217.82	121.95	967.63	8.41
3000-4000	18	10.04	6.21	1.48	17.73	0.14
Total	16,579	1,256.38	4,461.81	6,504.28	12,222.47	667.27

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

Table 10.19.8 Forest Cover in different slope classes in Nagaland

(km²)

Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	1,710	22.93	318.44	655.36	996.73	37.52
5-10	2,006	77.43	509.84	905.37	1,492.64	74.64
10-15	2,805	152.59	724.39	1,205.53	2,082.51	121.67
15-20	3,097	215.99	830.26	1,261.38	2,307.63	139.33
20-25	2,809	242.54	785.39	1,076.16	2,104.09	126.73
25-30	2,113	220.30	621.73	757.72	1,599.75	93.18
>30	2,039	324.60	671.76	642.76	1,639.12	74.20
Total	16,579	1,256.38	4,461.81	6,504.28	12,222.47	667.27

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

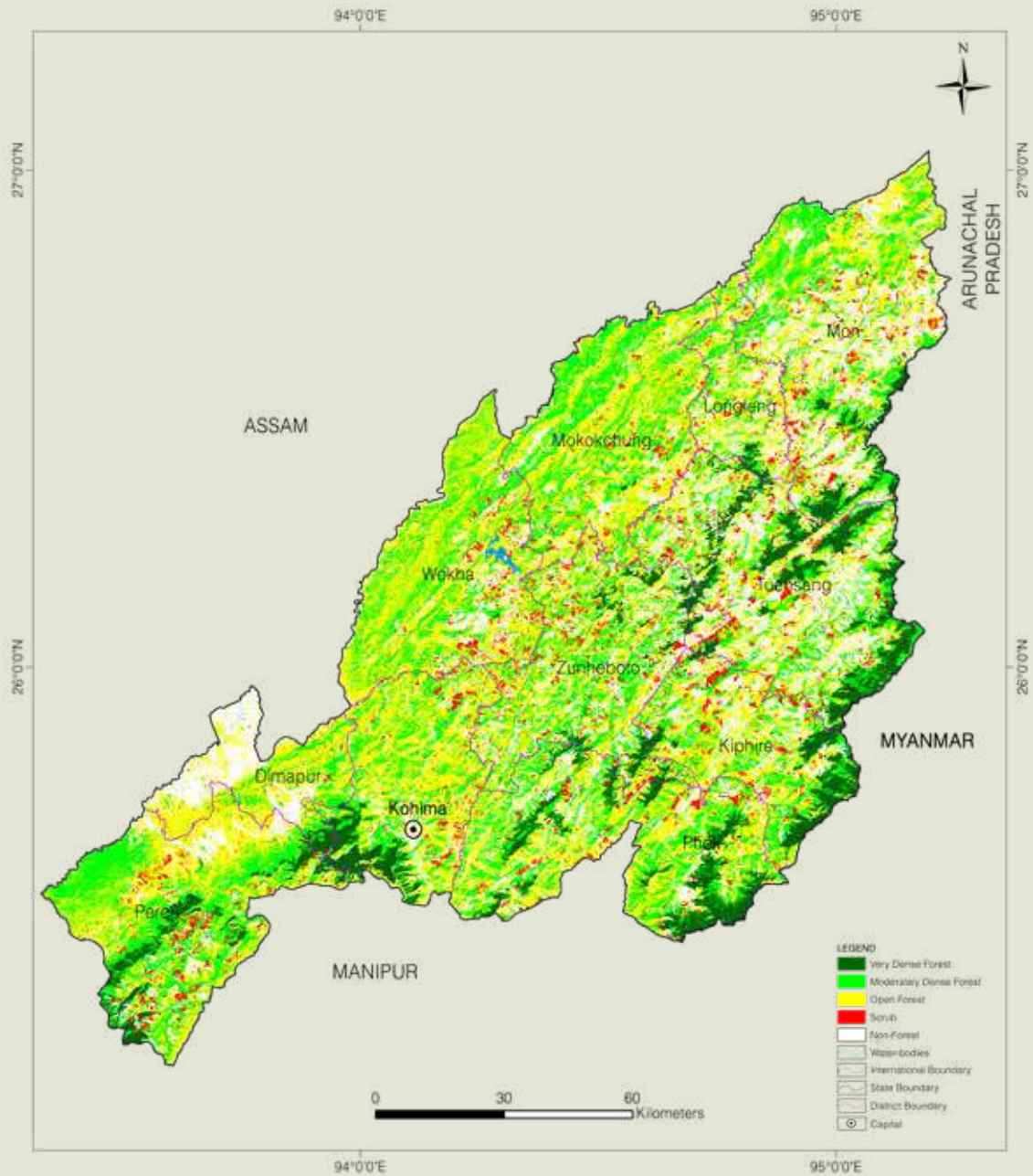


Figure 10.19.3 Forest Cover Map of Nagaland

10.19.3 Forest Types

The area under different Forest Types in Nagaland (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.19.9 Area Statistics of the Forest Types Found in Nagaland

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	1B/C1 Assam Valley tropical wet evergreen forest (<i>Dipterocarpus</i>)	71.66	0.55
2	1/2S1 Pioneer Euphorbiaceous scrub	667.27	5.17
3	2B/C1/2S2 Eastern alluvial secondary semi-evergreen forest	2,436.73	18.88
4	2/2S1 Secondary moist bamboo brakes	491.42	3.81
5	3C/C3b East Himalayan moist mixed deciduous forest	4,899.37	37.95
6	8B/C2 <i>Khasi</i> subtropical wet hill forest	2,008.62	15.56
7	9/C2 Assam subtropical pine forest	700.80	5.43
8	11B/C2 Naga hill wet temperate forest	1,446.81	11.21
9	12/DS1 Montane bamboo brakes	15.44	0.12
Sub Total		12,738.12	98.68
10	TOF/ Plantation	151.62	1.17
Total (Forest Cover & Scrub)		12,889.74	99.86
Grassland forest type (outside forest cover)			
11	9/C2/DS1 Assam subtropical pine savannah	18.39	0.14
Grand Total		12,908.13	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest type outside forest cover has also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).

10.19.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.19.10 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Dimapur	196	134
2	Kiphire	209	239
3	Kohima	402	182
4	Longleng	118	115
5	Mokokchung	156	120
6	Mon	557	442
7	Peren	590	345
8	Phek	672	291
9	Tuensang	397	327
10	Wokha	248	185
11	Zunheboto	337	229
Total		3,882	2,609



10.19.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.19.11 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	0.00	0.00
2	Very highly fire prone	385.65	2.99
3	Highly fire prone	2,938.57	22.80
4	Moderately fire prone	4,410.46	34.22
5	Less fire prone	5,155.06	39.99
Total		12,889.74	100.00

*Forest Cover including Scrub.

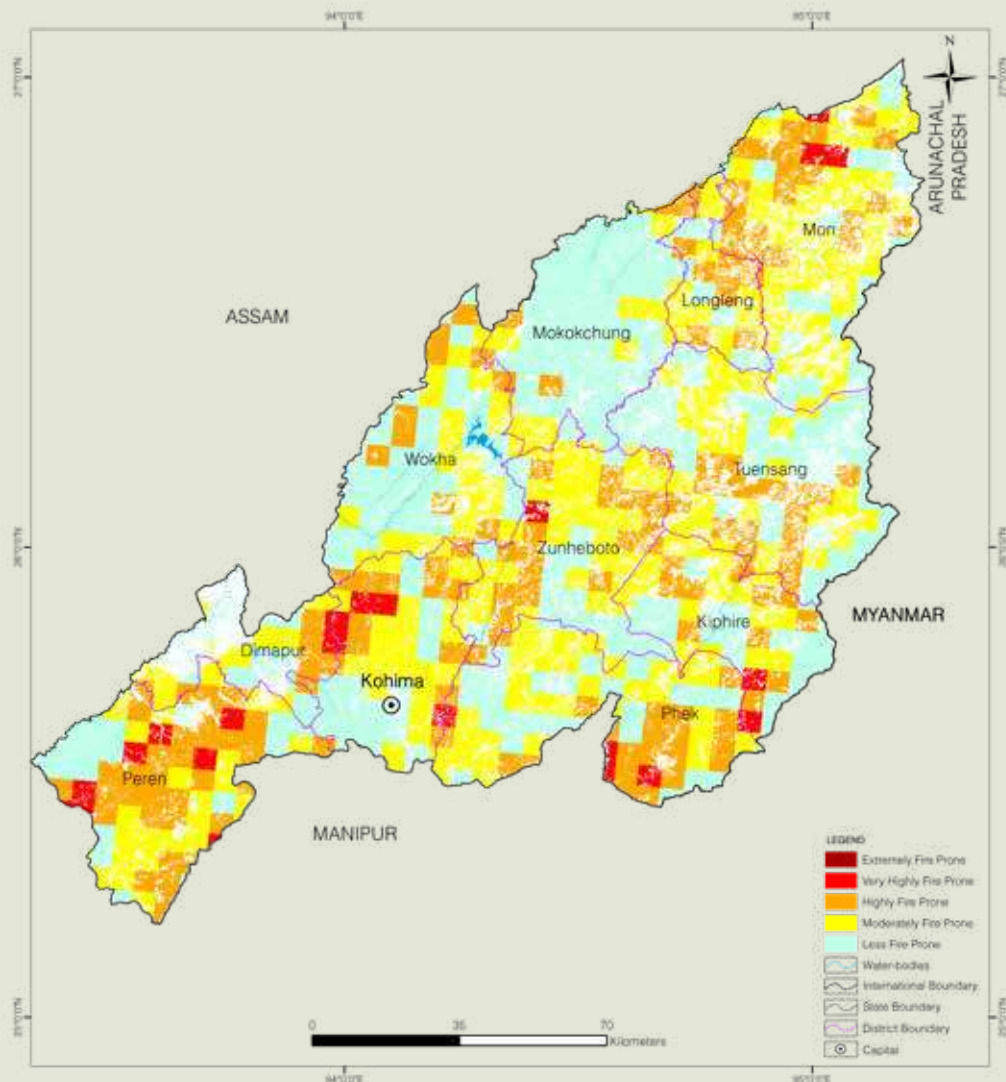


Figure 10.19.4 Fire Prone Forest Areas Under Different Fire Prone Classes



10.19.6 Results Derived from NFI for Nagaland

Table 10.19.12 Number of Trees and their volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Quercus species</i>	20,694	4.02
2	<i>Castanopsis species</i>	16,225	1.55
3	<i>Schima wallichii</i>	15,635	2.77
4	<i>Macaranga species</i>	12,677	1.69
5	<i>Premna bengalensis</i>	5,646	0.23

Table 10.19.13 Number of Trees and their volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Alnus nepalensis</i>	9,067	3.001
2	<i>Schima wallichii</i>	8,109	2.039
3	<i>Macaranga species</i>	7,969	0.695
4	<i>Castanopsis species</i>	5,454	0.433
5	<i>Quercus species</i>	4,954	0.452

Table 10.19.14 Number of Trees and their volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Areca catechu</i>	100	0.002
2	<i>Mangifera indica</i>	51	0.014
3	<i>Aquilaria malaccensis/ Aquilaria agallocha</i>	24	0.001
4	<i>Tectona grandis</i>	21	0.007
5	<i>Parkia javanica/ Gleditsia javanica</i>	16	0.002

Table 10.19.15 Major NTFP Species in Nagaland

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Emblica officinalis/ Phyllanthus emblica</i>	Tree	64,028
2	<i>Oroxylum indicum</i>	Tree	9,206
3	<i>Livistona jenkinsiana</i>	Tree	2,467
4	<i>Cinnamomum tamala</i>	Tree	255
5	<i>Clerodendrum colebrookeanum</i>	Shrubs	8,63,064
6	<i>Paris polyphylla</i>	Shrubs	1,29,460
7	<i>Butea buteiformis</i>	Shrubs	1,07,883
8	<i>Asparagus racemosus</i>	Climbers	4,15,350
9	<i>Thysanolaena latifolia/ Thysanolaena maxima</i>	Herbs	4,46,69,511
10	<i>Curcuma angustifolia</i>	Herbs	33,87,262



Table 10.19.16 Major invasive Species in the State inside the RFA in Nagaland

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Chromolaena odorata</i>	777.86
2	<i>Mikania micrantha</i>	295.14
3	<i>Ageratina adenophora</i>	98.80
4	<i>Imperata cylindrica</i>	73.78
5	<i>Lantana camara</i>	70.03

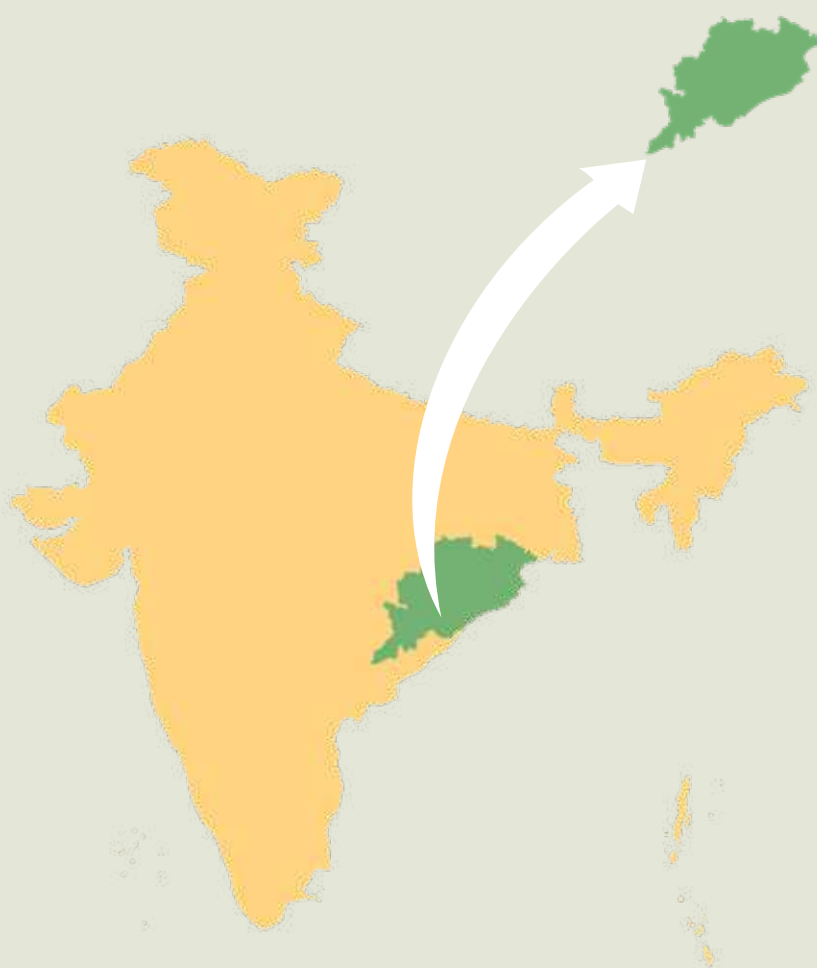


Photo: FSI Repository

Forest Survey of India



Photo: FSI Repository

**Geographical Area**1,55,707 km²**Geographical Coordinates**

Latitude 17°47' N to 22°34' N

Longitude 81°22' E to 87°29' E

Population (as per Census 2011)

41.97 million

Urban 7.00 million (16.68 %)

Rural 34.97 million (83.32 %)

Tribal 9.59 million (22.85 %)

Average Population Density270 per km²**Livestock Population**(as per 19th Livestock Census)

20.73 million

No. of Districts

30

No. of Hill Districts

0

No. of Tribal Districts

12

Table 10.20.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	15,571	
Reporting area for land utilization	14,845.28	100.00
Forests	5,215.60	35.13
Not available for land cultivation	2,338.58	15.75
Permanent pastures and other grazing lands	509.29	3.43
Land under misc. tree crops and groves	251.56	1.69
Culturable wasteland	576.82	3.89
Fallow land other than current fallows	688.16	4.64
Current fallows	943.46	6.36
Net area sown	4,321.81	29.11

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.20.1 Forest Cover

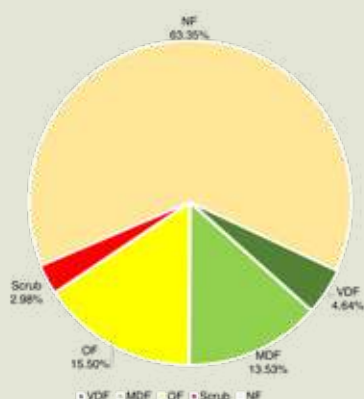


Figure 10.20.1 Forest Cover of Odisha

Table 10.20.2 Forest Cover of Odisha

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	7,224.42	4.64
MDF	21,065.55	13.53
OF	24,143.59	15.50
Total	52,433.56	33.67
Scrub	4,632.68	2.98

Table 10.20.3 District- wise Forest Cover in Odisha

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Angul	6,375	371.48	1,373.67	1,028.79	2,773.94	43.51	-5.56	49.84
Balangir	6,575	69.07	227.59	860.62	1,157.28	17.60	5.01	100.60
Baleswar	3,806	22.63	132.14	237.41	392.18	10.30	11.39	38.19
Bargarh	5,837	175.97	374.94	531.34	1,082.25	18.54	1.16	15.88
Baudh	3,098	266.01	569.03	472.48	1,307.52	42.21	3.47	48.32
Bhadrak	2,505	0.12	9.14	65.39	74.65	2.98	0.14	0.00
Cuttack	3,932	51.98	233.51	532.80	818.29	20.81	0.75	55.77
Deogarh	2,940	193.13	672.19	618.64	1,483.96	50.47	-1.73	16.43
Dhenkanal	4,452	172.60	436.89	829.78	1,439.27	32.33	3.53	82.38
Gajapati	4,325	328.49	722.53	1,447.78	2,498.80	57.78	-11.63	213.19
Ganjam	8,206	174.74	1,114.20	1,126.75	2,415.69	29.44	169.18	452.83
Jagatsinghpur	1,668	0.00	4.83	136.11	140.94	8.45	-0.47	0.00
Jajapur	2,899	5.49	74.20	232.96	312.65	10.78	6.24	44.89
Jharsuguda	2,081	2.75	169.72	156.42	328.89	15.80	0.88	32.12
Kalahandi	7,920	368.10	713.87	1,294.94	2,376.91	30.01	-61.94	402.85
Kandhamal	8,021	653.03	2,598.55	2,150.45	5,402.03	67.35	-2.70	440.97
Kendrapara	2,644	81.55	86.53	161.10	329.18	12.45	1.55	1.75
Kendujhar	8,303	290.04	1,412.30	1,486.74	3,189.08	38.41	-30.92	85.51
Khordha	2,813	22.19	188.73	319.48	530.40	18.86	7.19	121.27
Koraput	8,807	52.23	549.61	1,493.45	2,095.29	23.79	25.86	1,396.58
Malkangiri	5,791	159.66	707.40	1,444.44	2,311.50	39.92	-12.34	59.32
Mayurbhanj	10,418	1,329.22	1,743.49	1,026.03	4,098.74	39.34	3.92	30.66
Nabarangpur	5,291	154.08	424.95	597.50	1,176.53	22.24	-29.46	83.07
Nayagarh	3,890	191.33	981.82	593.98	1,767.13	45.43	33.61	117.49
Nuapada	3,852	106.25	536.46	745.54	1,388.25	36.04	78.52	12.79
Puri	3,479	0.00	53.63	231.40	285.03	8.19	1.37	5.45
Rayagada	7,073	385.49	1,185.77	1,714.99	3,286.25	46.46	5.17	606.48
Sambalpur	6,657	536.47	1,724.59	1,059.23	3,320.29	49.88	-31.27	31.17



Table 10.20.3 District- wise Forest Cover in Odisha

District	Calculated Area by Sol	2023 Assessment				% of Cal- culated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Subarnapur	2,337	43.08	195.52	164.17	402.77	17.23	-1.55	10.53
Sundargarh	9,712	1,017.24	1,847.75	1,382.88	4,247.87	43.74	-17.48	76.35
Grand Total	1,55,707	7,224.42	21,065.55	24,143.59	52,433.56	33.67	151.89	4,632.68

*Area figure calculated without normalization factor.

Table 10.20.4 Division-wise Forest Cover in Odisha

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Angul	2,824.86	49.42	367.13	454.39	870.94	30.83	-4.35	26.30
Athagarh	1,529.22	51.37	189.11	314.90	555.38	36.32	-0.33	23.14
Athamalik	1,847.22	93.30	465.99	287.44	846.73	45.84	2.36	10.43
Balasore (WL)	3,813.52	22.49	132.14	235.52	390.15	10.23	11.12	38.09
Baliguda	4,399.21	299.27	1,306.77	1,357.56	2,963.60	67.37	-7.04	322.39
Bamra	2,351.58	308.24	525.54	338.28	1,172.06	49.84	-17.99	14.21
Bargarh	5,343.52	103.14	227.64	440.70	771.48	14.44	1.26	14.11
Baripada	4,688.88	182.32	552.14	557.17	1,291.63	27.55	1.75	14.83
Berhampur	3,427.41	21.26	161.54	374.74	557.54	16.27	77.38	196.47
Bhadrak	2,594.24	0.11	8.46	67.93	76.50	2.95	0.14	0.00
Bolangir	6,569.65	69.12	229.04	859.94	1,158.10	17.63	5.74	100.40
Bonai	2,749.31	626.10	841.39	437.26	1,904.75	69.28	-8.96	12.03
Boudh	2,988.48	246.80	508.97	460.26	1,216.03	40.69	3.52	47.49
Chandaka (WL)	494.28	0.00	33.36	167.45	200.81	40.63	0.00	36.03
Chilika (WL)	1,381.41	0.00	16.29	29.50	45.79	3.31	4.63	9.73
City Forest	1,445.18	0.00	0.51	58.39	58.90	4.08	-0.07	1.28
Cuttack	5,043.28	5.67	87.41	442.89	535.97	10.63	5.50	55.65
Deogarh	4,115.00	317.08	909.82	847.28	2,074.18	50.41	-6.07	24.62
Dhenkanal	4,462.98	171.31	435.13	828.57	1,435.01	32.15	3.80	82.26
Ghumsur North	1,781.52	131.01	470.46	275.80	877.27	49.24	22.32	45.37
Ghumsur South	2,860.06	27.48	480.61	435.67	943.76	33.00	61.61	175.65
Hirakud (WL)	473.22	72.02	143.33	83.21	298.56	63.09	0.00	1.51
Jeypore	3,026.93	18.38	198.22	508.45	725.05	23.95	-13.05	133.36
Jharsuguda	2,120.65	2.75	177.78	159.50	340.03	16.03	0.89	32.41
Kalahandi North	3,826.74	220.22	298.83	610.29	1,129.34	29.51	-11.21	173.33
Kalahandi South	4,097.24	147.01	412.10	680.29	1,239.40	30.25	-51.84	230.48
Karanjia	2,369.07	308.15	468.66	224.39	1,001.20	42.26	0.50	5.71
Keonjhar	6,266.88	161.76	1,164.20	1,147.58	2,473.54	39.47	-33.59	70.15
Keonjhar (WL)	2,030.80	127.45	245.33	337.77	710.55	34.99	2.42	16.14
Khariar	3,235.19	63.73	288.01	541.68	893.42	27.62	79.35	11.45

Table 10.20.4 Division-wise Forest Cover in Odisha(km²)

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Khordha	3,553.01	47.17	298.39	318.18	663.74	18.68	7.37	140.65
Koraput	5,197.02	29.74	295.96	944.37	1,270.07	24.44	39.16	1,236.47
Mahanadi (WL)	414.61	80.59	210.25	56.20	347.04	83.70	0.07	0.48
Malkangiri	5,975.42	162.52	752.85	1,492.65	2,408.02	40.30	-11.52	61.54
Nabarangpur	5,482.20	152.57	417.66	596.38	1,166.61	21.28	-30.38	84.21
Nayagarh	3,078.18	103.93	702.36	486.63	1,292.92	42.00	33.43	67.74
Parlakhemundi	4,333.90	324.31	720.71	1,450.66	2,495.68	57.59	-7.44	239.92
Phulbani	3,634.06	353.25	1,292.36	788.36	2,433.97	66.98	4.00	105.50
Puri (WL)	1,763.14	0.00	37.32	183.21	220.53	12.51	0.84	4.90
Rairakhol	2,050.37	173.34	787.59	441.27	1,402.20	68.39	-1.95	3.17
Rairangpur	2,440.44	297.92	373.56	210.34	881.82	36.13	1.57	6.92
Rajnagar (WL)	2,854.25	81.53	90.75	154.71	326.99	11.46	0.80	1.75
Rayagada	7,405.24	385.83	1,192.52	1,727.61	3,305.96	44.64	5.28	607.57
Rourkela	2,999.59	117.29	426.32	379.23	922.84	30.77	6.53	31.36
Sambalpur	2,254.19	55.18	407.29	283.40	745.87	33.09	-11.57	13.71
Satkosia (WL)	632.89	104.70	314.89	66.53	486.12	76.81	2.34	8.83
STR Baripada	906.73	536.23	339.77	17.05	893.05	98.49	0.00	0.00
Subarnapur	2,366.19	43.07	195.50	164.01	402.58	17.01	-1.56	10.53
Sunabeda (WL)	628.06	42.18	241.53	202.29	486.00	77.38	-0.92	1.10
Sundargarh	3,989.35	271.50	572.60	561.73	1,405.83	35.24	-15.21	32.87
Area which does not fall in any division	378.08	14.61	49.46	53.98	118.05	31.22	1.26	48.44
Grand Total	1,56,494.45	7,224.42	21,065.55	24,143.59	52,433.56	33.51	151.89	4,632.68

As per the division boundary shapefile provided by State Forest Department.

*Area figure calculated without normalization factor.

10.20.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.20.5 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Odisha(km²)

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
5,709.16	14,834.51	12,496.80	33,040.47	1,515.26	6,231.04	11,646.79	19,393.09
17.28%	44.90%	37.82%		7.81%	32.13%	60.06%	

*In case of Odisha, RFA boundaries have been used.

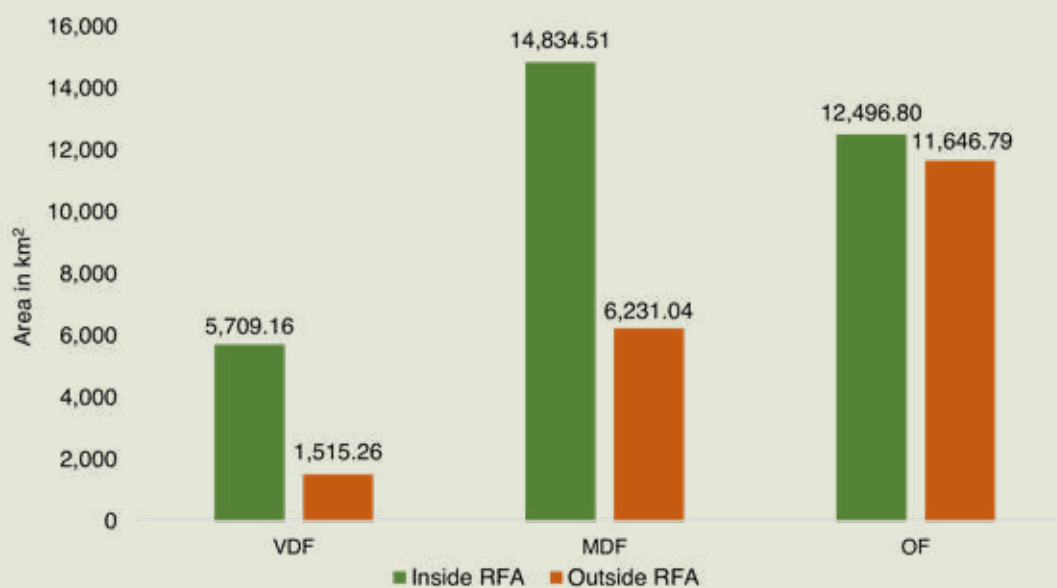


Figure 10.20.2 Forest Cover Inside and Outside of RFA in Odisha

Table 10.20.6 Forest Cover Change Matrix Inside RFA/GW for Odisha Between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 inside RFA / GW Raster based*
VDF	5,664.23	13.86	8.63	9.83	9.52	5,706.07
MDF	42.03	14,633.68	58.62	39.68	26.08	14,800.09
OF	1.34	141.93	12,083.19	91.49	98.19	12,416.14
Scrub	0.28	28.28	278.36	1,478.51	223.23	2,008.66
NF	1.28	16.76	68.00	115.25	7,298.37	7,499.66
Total ISFR 2023 inside RFA / GW	5,709.16	14,834.51	12,496.80	1,734.76	7,655.39	42,430.62
Net Change	3.09	34.42	80.66	-273.90	155.73	

*Area figure calculated without normalization factor.

Table 10.20.7 Forest Cover Change Matrix Outside RFA/GW for Odisha between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	1,512.19	5.89	0.89	0.47	1.70	1,521.14
MDF	2.39	6,153.61	27.08	18.82	25.78	6,227.68
OF	0.07	51.85	11,286.96	105.97	165.70	11,610.55
Scrub	0.01	6.70	189.56	1,997.43	664.39	2,858.09
NF	0.60	12.99	142.30	775.23	90,127.80	91,058.92
Total ISFR 2023 outside RFA/GW	1,515.26	6,231.04	11,646.79	2,897.92	90,985.37	1,13,276.38
Net Change	-5.88	3.36	36.24	39.83	-73.55	

*Area figure calculated without normalization factor.

Table 10.20.8 Altitude-Wise Forest Cover in Odisha

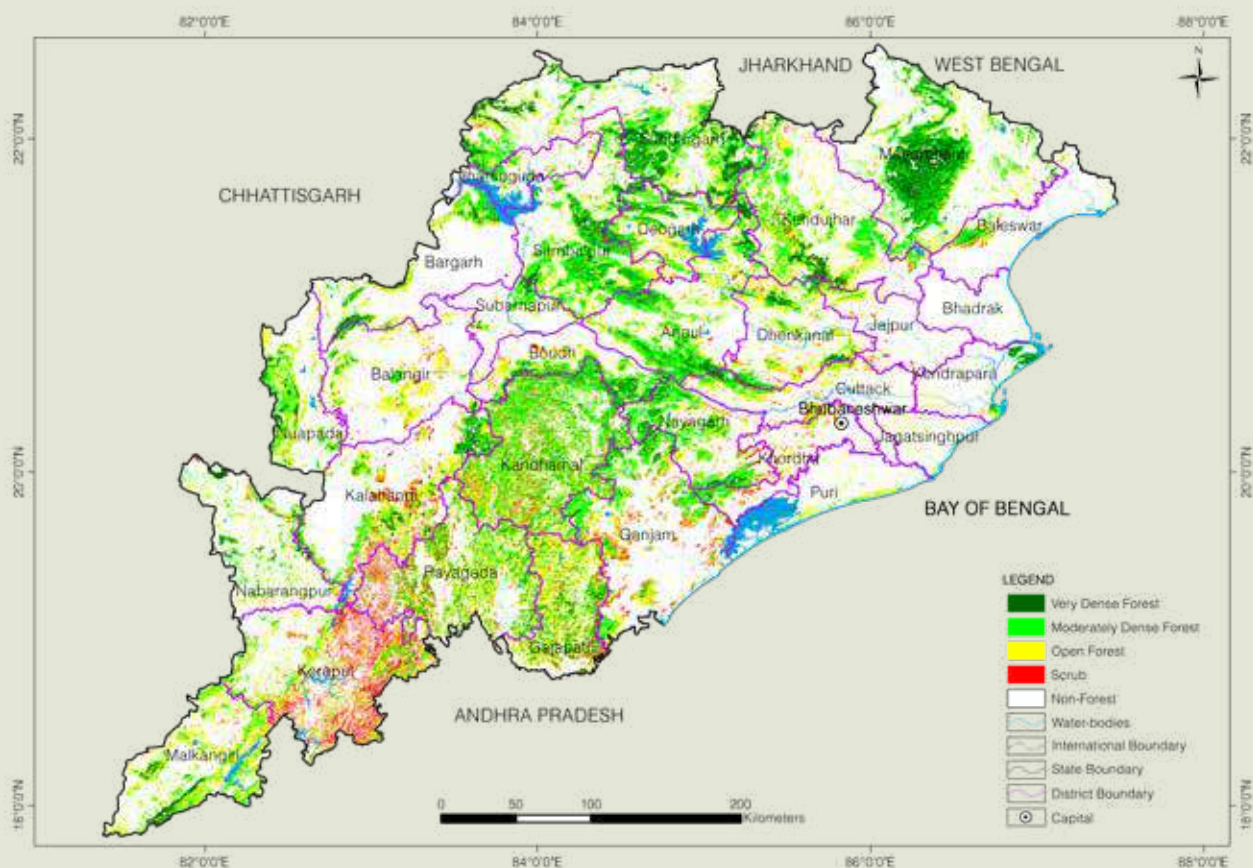
(km ²)						
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	1,19,476	4,157.08	14,018.59	16,576.55	34,752.22	2,034.04
500-1000	34,706	3,006.42	6,878.95	7,294.39	17,179.76	2,225.33
1000-2000	1,525	60.92	168.01	272.65	501.58	373.31
Total	1,55,707	7,224.42	21,065.55	24,143.59	52,433.56	4,632.68

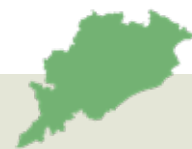
(based on SRTM, Digital Elevation Model, 30 m, 2016).

Table 10.20.9 Forest Cover in Different Slope Classes in Odisha

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	1,09,048	2,707.31	9,686.21	13,343.51	25,737.03	2,060.02
5-10	15,890	1,534.65	3,788.51	3,494.14	8,817.30	761.22
10-15	10,209	1,168.93	2,766.91	2,479.80	6,415.64	599.19
15-20	9,130	821.08	2,093.51	2,000.28	4,914.87	509.48
20-25	6,609	526.65	1,439.11	1,449.93	3,415.69	365.58
25-30	3,005	287.63	801.62	843.18	1,932.43	204.25
>30	1,816	178.17	489.68	532.75	1,200.60	132.94
Total	1,55,707	7,224.42	21,065.55	24,143.59	52,433.56	4,632.68

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

**Figure 10.20.3 Forest Cover Map of Odisha**



10.20.3 Forest Types

The area under different Forest Types in Odisha (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.20.10 Area Statistics of the Forest Types Found in Odisha

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	2B/C3 Odisha semi-evergreen forest	64.31	0.11
2	2/2S1 Secondary moist bamboo brakes	199.45	0.35
3	3B/C2 Southern moist mixed deciduous forest	1,326.67	2.32
4	3B/C2/2S1 Southern Secondary moist mixed deciduous forest	417.48	0.73
5	3C/C1d Peninsular (coastal) sal forest	4.01	0.01
6	3C/C2e (i) Moist peninsular high level sal	2,437.93	4.27
7	3C/C2e (ii) Moist peninsular low level sal	12,459.88	21.82
8	3C/C2e (iii) Moist peninsular valley sal	940.38	1.65
9	3C/C3/2S1 Northern secondary moist mixed deciduous forest	4,786.46	8.39
10	4A/L1 Littoral forest	157.64	0.28
11	4B/TS2 Mangrove forest	267.23	0.47
12	5A/C1b Dry teak forest	173.34	0.30
13	5A/C3 Southern dry mixed deciduous forest	6,023.23	10.55
14	5B/C1c Dry peninsular sal forest	9,775.63	17.13
15	5B/C2 Northern dry mixed deciduous forest	12,050.12	21.11
16	5/DS1 Dry deciduous scrub	2,714.24	4.76
17	5/E2 <i>Boswellia</i> forest	26.28	0.05
18	5/E9 Dry bamboo brakes	814.92	1.43
Sub Total		54,639.20	95.73
19	TOF/ Plantation	2,427.04	4.26
Total (Forest Cover & Scrub)		57,066.24	99.99
Grassland forest type (outside forest cover)			
20.	3C/C2/DS1 Moist sal savannah	7.20	0.01
Sub Total		7.20	0.01
Grand Total		57,073.44	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest type outside forest cover has also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).

10.20.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.20.11 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Angul	1,471	833
2	Balangir	468	286
3	Baleswar	116	19
4	Bargarh	743	316

**Table 10.20.11 District-wise Number of Forest Fire Detected**

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
5	Bhadrak	36	3
6	Baudh	675	189
7	Cuttack	256	166
8	Deogarh	1,145	329
9	Dhenkanal	663	201
10	Gajapati	1,498	814
11	Ganjam	1,499	593
12	Jagatsinghpur	4	13
13	Jajapur	120	127
14	Jharsuguda	468	157
15	Kalahandi	1,889	1,768
16	Kandhamal	3,090	2,591
17	Kendrapara	17	8
18	Kendujhar	2,204	926
19	Khordha	256	63
20	Koraput	1,447	1,994
21	Malkangiri	1,107	2,582
22	Mayurbhanj	2,698	800
23	Nabarangpur	1,232	656
24	Nayagarh	847	509
25	Nuapada	1,303	328
26	Puri	22	27
27	Rayagada	2,541	2,646
28	Sambalpur	2,248	692
29	Subarnapur	294	106
30	Sundargarh	3,104	1,231
	Total	33,461	20,973

10.20.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.20.12 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	575.40	1.01
2	Very highly fire prone	10,261.95	17.98
3	Highly fire prone	18,296.36	32.06
4	Moderately fire prone	12,617.42	22.11
5	Less fire prone	15,315.11	26.84
	Total	57,066.24	100.00

*Forest Cover including Scrub.

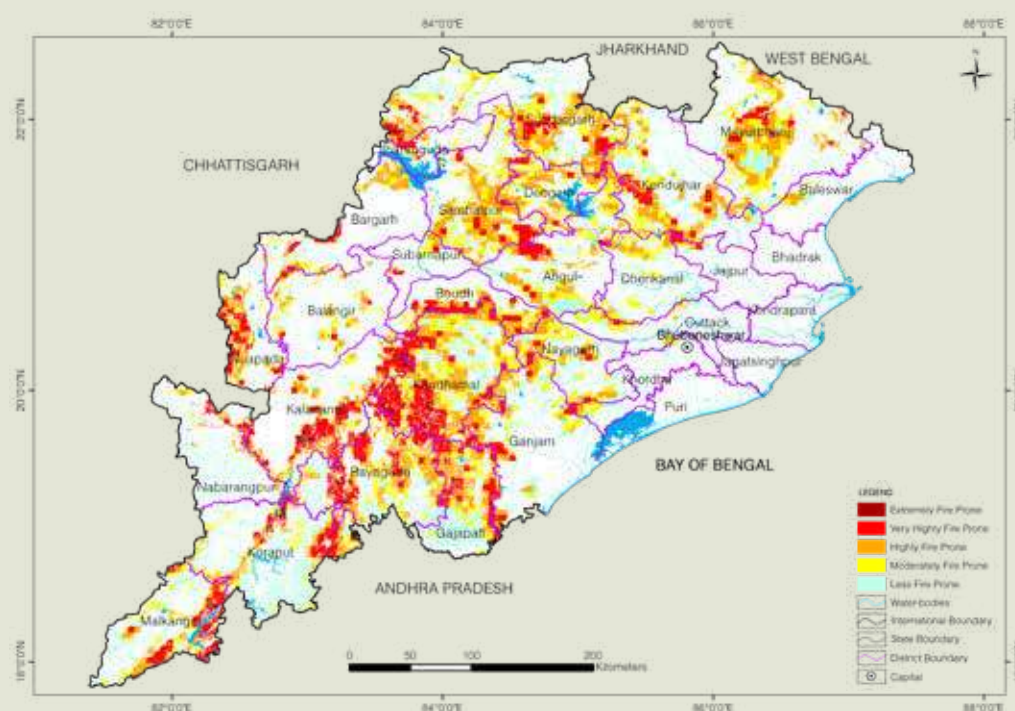


Figure 10.20.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.20.6 Results Derived from NFI for Odisha

Table 10.20.13 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Shorea robusta</i>	2,93,321	81.73
2	<i>Anogeissus latifolia</i> / <i>Terminalia anogeissiana</i>	54,592	15.96
3	<i>Terminalia elliptica</i> / <i>Terminalia crenulata</i>	52,334	13.20
4	<i>Buchanania lanzan</i> / <i>Buchanania latifolia</i>	50,376	4.57
5	<i>Cleistanthus collinus</i>	50,298	4.31

Table 10.20.14 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Mangifera indica</i>	23,128	14.323
2	<i>Shorea robusta</i>	21,282	6.931
3	<i>Anacardium occidentale</i>	19,098	1.266
4	<i>Butea monosperma</i>	18,955	2.321
5	<i>Acacia auriculiformis</i>	16,248	1.380


Table 10.21.15 Number of Trees and their volume for Top 5 Species in Urban Area

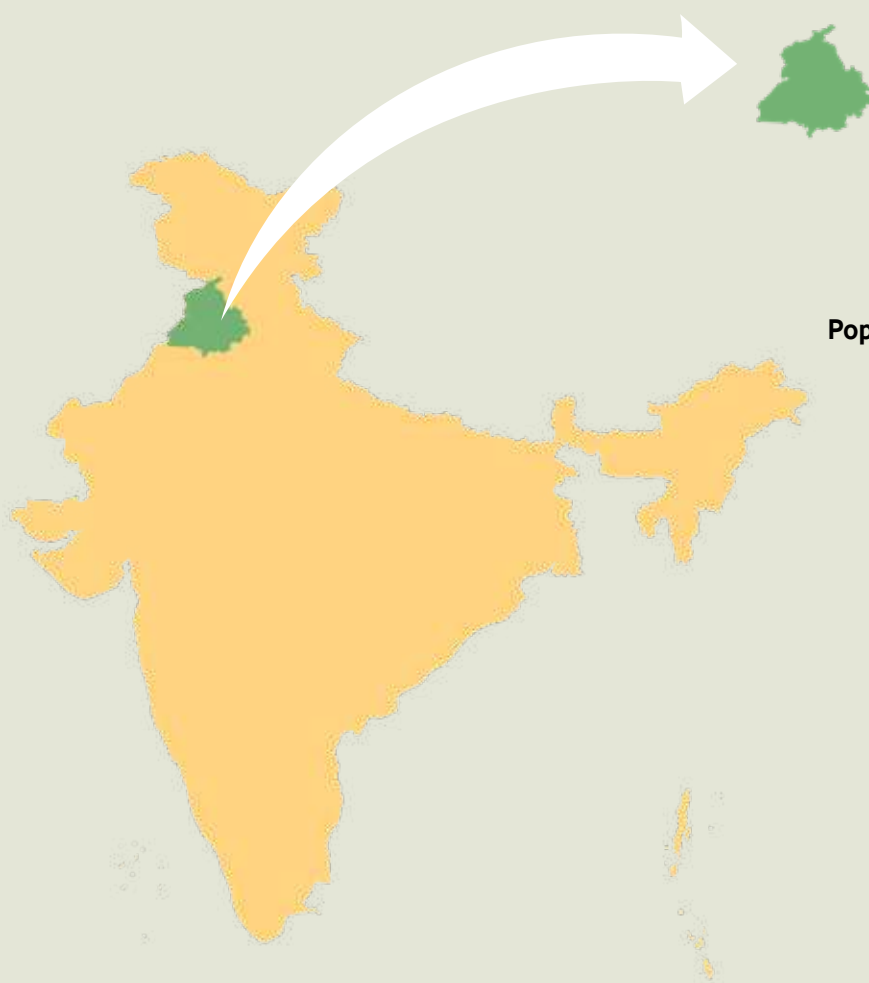
Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Mangifera indica</i>	10,118	3.257
2	<i>Tectona grandis</i>	6,841	1.033
3	<i>Cocos nucifera</i>	6,651	1.592
4	<i>Azadirachta indica</i>	6,593	1.435
5	<i>Moringa species</i>	6,378	0.512

Table 10.20.16 Major NTFP Species in Odisha

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Shorea robusta</i>	Tree	1,60,28,395
2	<i>Buchanania Lanza</i>	Tree	28,60,931
3	<i>Madhuca longifolia/ M. latifolia/ M. indica</i>	Tree	7,83,120
4	<i>Schleichera oleosa</i>	Tree	7,71,953
5	<i>Woodfordia fruticosa</i>	Shrubs	1,92,88,459
6	<i>Acacia concinna/ Senegalia pennata</i>	Shrubs	2,21,706
7	<i>Hemidesmus indicus</i>	Climbers	47,32,579
8	<i>Bauhinia vahlii/ Phanera vahlii</i>	Climbers	39,22,498
9	<i>Ocimum species (Ocimum gratissimum/ Ocimum sanctum/ Ocimum tenuiflorum/ Ocimum americanum)</i>	Herbs	6,19,06,431
10	<i>Andrographis paniculata</i>	Herbs	4,54,62,536

Table 10.20.17 Major Invasive Species in the State Inside the RFA in Odisha

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Chromolaena odorata</i>	4,075.54
2	<i>Lantana camara</i>	1,469.41
3	<i>Cassia tora/ Senna tora</i>	368.86
4	<i>Triumfetta rhomboidea</i>	107.28
5	<i>Mimosa pigra</i>	101.26



Geographical Area
50,362 km²

Geographical Coordinates
Latitude 29°33' N to 32°32' N
Longitude 73°53' E to 76°56' E

Population (as per Census 2011)
27.74 million
Urban 10.40 million (37.48 %)
Rural 17.34 million (62.52 %)
Tribal NIL

Average Population Density
551 per km²

Livestock Population
(as per 19th Livestock Census)
8.12 million

No. of Districts
22

No. of Hill Districts
0

No. of Tribal Districts
0

Table 10.21.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	5,036	
Reporting area for land utilization	5,032.73	100.00
Forests	244.57	4.86
Not available for land cultivation	558.37	11.10
Permanent pastures and other grazing lands	4.34	0.09
Land under misc. tree crops and groves	9.21	0.18
Culturable wasteland	8.27	0.16
Fallow land other than current fallows	5.16	0.10
Current fallows	90.24	1.79
Net area sown	4,112.57	81.72

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.21.1 Forest Cover

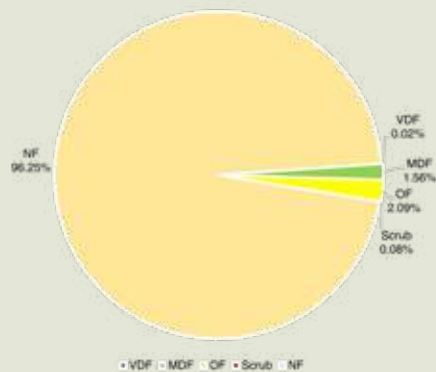


Table 10.21.2 Forest Cover of Punjab

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	9.44	0.02
MDF	784.89	1.56
OF	1,051.76	2.09
Total	1,846.09	3.67
Scrub	41.61	0.08

Figure 10.21.1 Forest Cover of Punjab

Table 10.21.3 District- wise Forest Cover in Punjab

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Amritsar	2,683.00	0.70	10.35	18.14	29.19	1.09	1.67	0.64
Barnala	1,482.00	0.00	0.95	7.93	8.88	0.60	0.07	0.00
Bathinda	3,377.00	0.00	20.75	33.20	53.95	1.60	0.10	7.93
Faridkot	1,442.00	0.00	3.55	12.60	16.15	1.12	0.00	1.10
Fatehgarh Sahib	1,180.00	0.00	2.74	0.27	3.01	0.26	0.00	0.00
Fazilka	2,873.00	0.00	4.14	52.71	56.85	1.98	2.66	0.00
Firozpur	2,389.00	0.00	2.19	11.46	13.65	0.57	0.18	2.23
Gurdaspur	2,601.00	0.00	5.55	18.36	23.91	0.92	0.88	1.36
Hoshiarpur	3,386.00	0.00	368.14	329.17	697.31	20.59	-3.31	11.34
Jalandhar	2,624.00	0.00	1.59	8.60	10.19	0.39	0.26	1.55
Kapurthala	1,633.00	0.00	3.36	9.15	12.51	0.77	0.33	0.99
Ludhiana	3,598.00	0.00	18.05	29.52	47.57	1.32	1.46	0.64
Mansa	2,174.00	0.00	1.35	9.26	10.61	0.49	0.00	0.69
Moga	2,258.00	0.00	0.45	8.42	8.87	0.39	0.00	0.00
Muktsar	2,636.00	0.00	5.18	13.38	18.56	0.70	0.12	0.00
Pathankot	950.00	0.00	96.46	96.00	192.46	20.26	0.20	0.62
Patiala	3,222.00	7.48	28.55	39.08	75.11	2.33	-0.48	4.58
Rupnagar	1,356.00	0.00	105.49	170.41	275.90	20.35	-0.43	1.54
Sahibzada Ajit Singh Nagar	1,197.00	0.27	70.52	64.07	134.86	11.27	-0.30	1.25
Sangrur	3,625.00	0.00	6.86	16.54	23.40	0.65	0.00	0.00
Shahid Bhagat Singh Nagar	1,262.00	0.00	24.43	90.00	114.43	9.07	-3.99	5.15
Tarn Taran	2,414.00	0.99	4.24	13.49	18.72	0.78	0.13	0.00
Grand Total	50,362.00	9.44	784.89	1,051.76	1,846.09	3.67	-0.45	41.61

*Area figure calculated without normalization factor.



Table 10.21.4 Division-wise Forest Cover in Punjab

(km ²)								
Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Amritsar	5,087.59	1.72	14.62	31.66	48.00	0.94	1.80	0.65
Bathinda	3,352.22	0.00	20.73	33.25	53.98	1.61	0.10	8.12
Dasuya	1,263.60	0.00	120.00	74.40	194.40	15.38	0.45	4.12
Ferozepur	10,088.85	0.00	6.29	32.51	38.80	0.38	0.30	3.41
Gurdaspur	2,602.52	0.00	5.84	18.34	24.18	0.93	0.90	1.39
Hoshiarpur	1,320.93	0.00	231.21	192.07	423.28	32.04	0.57	0.00
Jalandhar	5,030.71	0.00	4.87	17.52	22.39	0.45	0.60	2.54
Ludhiana	3,650.02	0.00	18.05	29.59	47.64	1.31	1.46	0.65
Mansa	2,193.54	0.00	1.35	9.40	10.75	0.49	0.00	0.71
Muktsar	1,504.47	0.00	9.25	66.36	75.61	5.03	2.66	0.00
Nawanshar	1,294.95	0.00	40.95	148.92	189.87	14.66	-8.35	11.58
Pathankot	950.42	0.00	95.75	94.87	190.62	20.06	0.20	0.63
Patiala	4,036.77	7.45	29.29	37.68	74.42	1.84	-0.48	4.70
Rupnagar	1,342.08	0.00	104.90	167.93	272.83	20.33	-0.43	1.56
Sangrur	5,037.01	0.00	7.79	24.18	31.97	0.63	0.07	0.00
Sahibzada Ajit Singh Nagar	1,542.03	0.27	67.15	64.70	132.12	8.57	-0.30	1.28
Area which does not fall in any division	57.93	0.00	6.85	8.38	15.23	26.29	0.00	0.27
Grand Total	50,355.64	9.44	784.89	1,051.76	1,846.09	3.67	-0.45	41.61

#As per the division boundary shapefile provided by State Forest Department.

*Area figure calculated without normalization factor.

10.21.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.21.5 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Punjab

(km ²)							
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
8.72	450.21	316.83	775.76	0.72	334.68	734.93	1,070.33
1.12%	58.04%	40.84%		0.07%	31.27%	68.66%	

*in case of Punjab, Green Wash boundaries have been used.

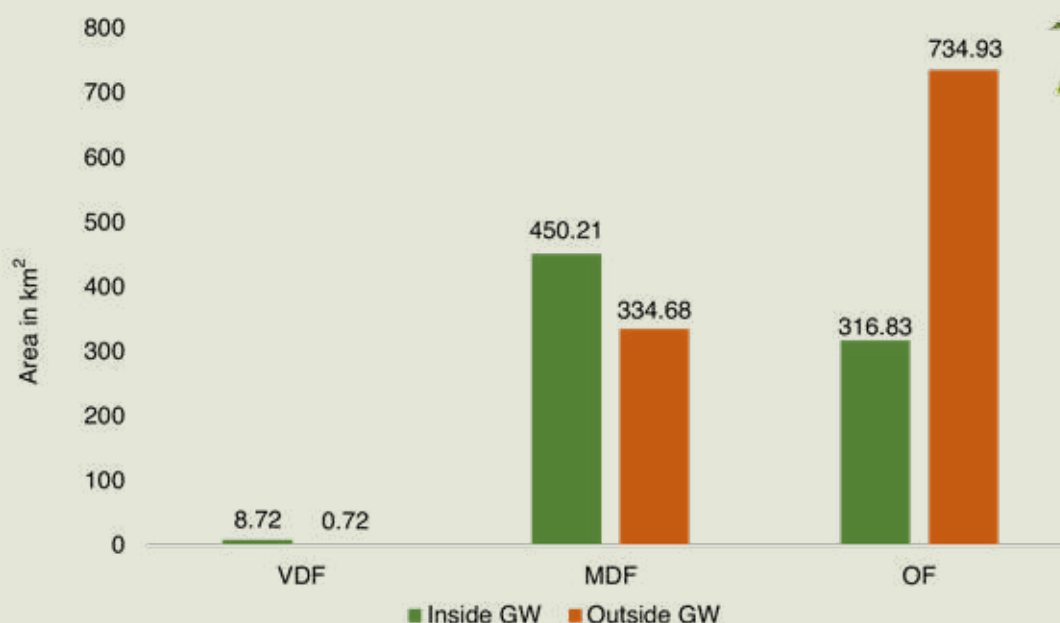


Figure 10.21.2 Forest Cover Inside and Outside of GW in Punjab

Table 10.21.6 Forest Cover Change Matrix Inside RFA/GW for Punjab between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					(km²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 inside RFA / GW Raster based*
VDF	8.72	0.00	0.00	0.00	0.48	9.20
MDF	0.00	450.21	0.00	0.00	0.36	450.57
OF	0.00	0.00	316.63	0.00	0.40	317.03
Scrub	0.00	0.00	0.00	9.07	0.00	9.07
NF	0.00	0.00	0.20	0.02	137.94	138.16
Total ISFR 2023 inside RFA / GW	8.72	450.21	316.83	9.09	139.18	924.03
Net Change	-0.48	-0.36	-0.20	0.02	1.02	

*Area figure calculated without normalization factor.

Table 10.21.7 Forest Cover Change Matrix Outside RFA/GW for Punjab between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	0.72	0.00	0.00	0.00	0.00	0.72
MDF	0.00	334.68	0.00	0.00	0.35	335.03
OF	0.00	0.00	724.72	8.16	1.11	733.99
Scrub	0.00	0.00	0.12	24.36	0.00	24.48
NF	0.00	0.00	10.09	0.00	48,333.66	48,343.75
Total ISFR 2023 outside RFA/GW	0.72	334.68	734.93	32.52	48,335.12	49,437.97
Net Change	0.00	-0.35	0.94	8.04	-8.63	

*Area figure calculated without normalization factor.


Table 10.21.8 Altitude-wise Forest Cover in Punjab

(km ²)						
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	49,882.00	9.44	559.25	920.73	1,489.42	39.89
500-1000	480.00	0.00	225.64	131.03	356.67	1.72
Total	50,362.00	9.44	784.89	1,051.76	1,846.09	41.61

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

Table 10.21.9 Forest Cover in Different Slope Classes in Punjab

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	48,329.00	8.78	369.18	681.02	1,058.98	36.75
5-10	1,582.00	0.61	225.98	214.50	441.09	3.58
10-15	316.00	0.04	123.78	105.50	229.32	1.00
15-20	99.00	0.01	47.57	37.56	85.14	0.27
20-25	26.00	0.00	13.59	9.37	22.96	0.01
25-30	7.00	0.00	3.72	2.66	6.38	0.00
>30	3.00	0.00	1.07	1.15	2.22	0.00
Total	50,362.00	9.44	784.89	1,051.76	1,846.09	41.61

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



Photo: FSI Repository

Forest Survey of India

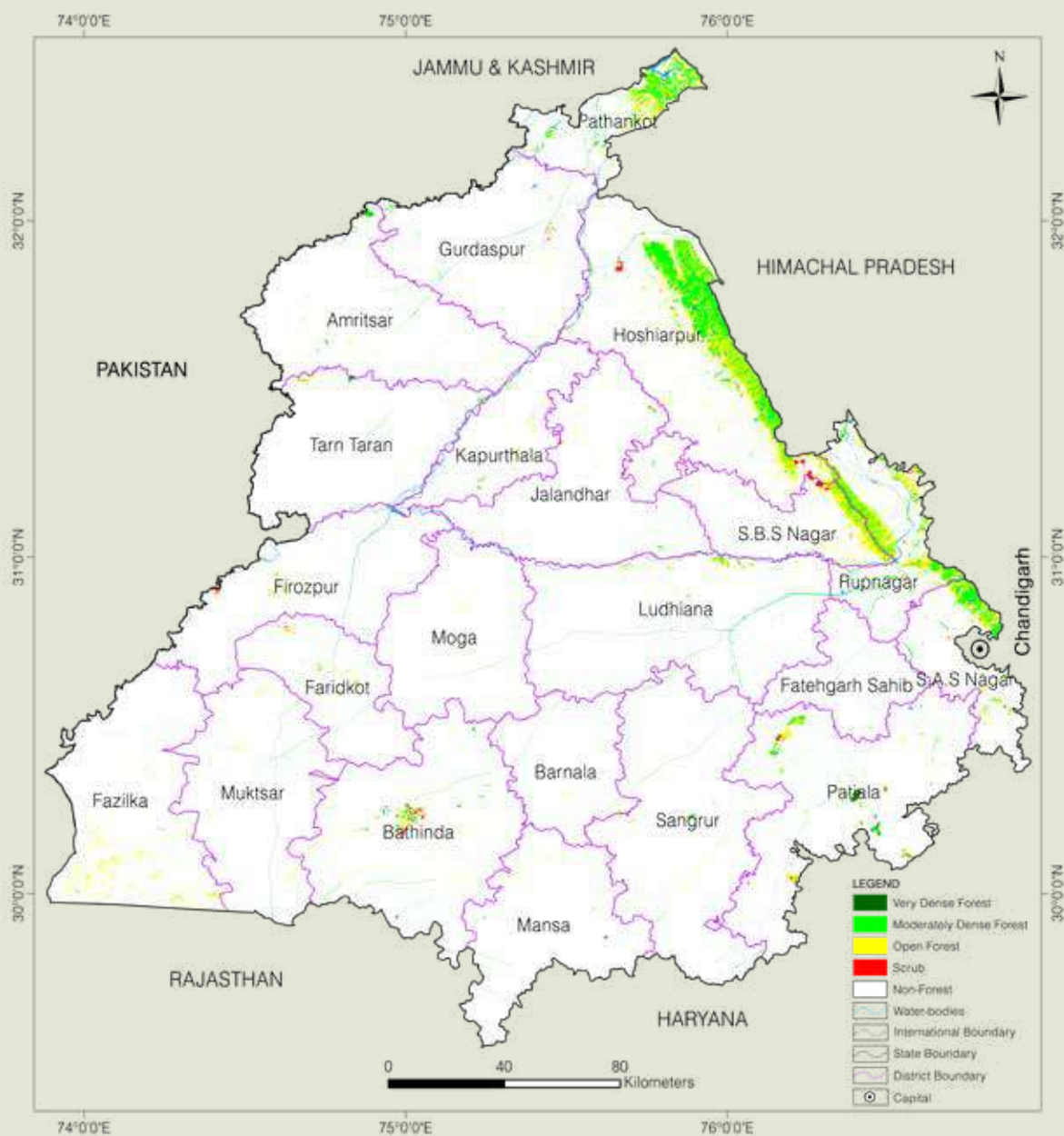


Figure 10.21.3 Forest Cover Map of Punjab



10.21.3 Forest Types

The area under different Forest Types in Punjab (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.21.10 Area Statistics of the Forest Types Found in Punjab

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	5B/C2 Northern dry mixed deciduous	1,225.22	64.91
2	5/DS1 Dry deciduous scrub	9.05	0.48
3	5/E9 Dry bamboo brakes	30.93	1.64
4	5/1S2 <i>Khair-sissu</i> forest	0.56	0.03
5	6B/C2 Ravine thorn forest	73.54	3.89
6	6/1S1 Desert dune scrub	10.09	0.53
7	9/C1a Lower or Siwalik chir pine	27.13	1.44
Sub Total		1,376.52	72.92
8	TOF/ Plantation	511.18	27.08
Total (Forest Cover & Scrub)		1,887.70	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). The total mapped area, therefore, is sum of forest cover and scrub.

10.21.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.21.11 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Amritsar	3	7
2	Barnala	7	5
3	Bathinda	15	9
4	Faridkot	2	7
5	Fatehgarh Sahib	0	0
6	Fazilka	1	2
7	Firozpur	4	5
8	Gurdaspur	2	8
9	Hoshiarpur	18	271
10	Jalandhar	0	1
11	Kapurthala	4	6
12	Ludhiana	5	14
13	Mansa	6	0
14	Moga	0	0
15	Muktsar	0	0
16	Pathankot	3	75
17	Patiala	13	18
18	Rupnagar	11	67
19	Sahibzada Ajit Singh Nagar	3	88
20	Sangrur	7	12
21	Shahid Bhagat Singh Nagar	10	6
22	Tarn Taran	5	4
Total		119	605

10.21.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.21.12 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	0.03	0.00
2	Very highly fire prone	20.66	1.09
3	Highly fire prone	224.95	11.92
4	Moderately fire prone	202.71	10.74
5	Less fire prone	1,439.35	76.25
Total		1,887.70	100.00

*Forest Cover including Scrub.



Figure 10.21.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.21.6 Results Derived from NFI for Punjab

Table 10.21.13 Number of Trees and their volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Prosopis juliflora/ Neltuma juliflora</i>	7,661	2.17
2	<i>Acacia catechu/ Senegalia catechu</i>	6,129	1.20
3	<i>Mallotus philippensis</i>	4,204	0.49
4	<i>Eucalyptus species</i>	2,787	1.91
5	<i>Leucaena leucocephala</i>	2,267	0.39



Table 10.21.14 Number of Trees and their volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Eucalyptus species</i>	22,686	4.828
2	<i>Melia azedarach</i>	20,266	2.670
3	<i>Citrus species</i>	9,003	0.215
4	<i>Dalbergia sissoo</i>	8,578	2.574
5	<i>Psidium guajava</i>	6,419	0.227

Table 10.21.15 Number of Trees and their volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Eucalyptus species</i>	2,246	0.396
2	<i>Melia azedarach</i>	1,898	0.242
3	<i>Morus species</i>	742	0.094
4	<i>Psidium guajava</i>	552	0.017
5	<i>Prosopis juliflora/ Neltuma juliflora</i>	444	0.027

Table 10.21.16 Major NTFP Species in Punjab

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Ziziphus species</i>	Tree	39,272
2	<i>Acacia catechu/ Senegalia catechu</i>	Tree	15,494
3	<i>Emblia officinalis/ Phyllanthus emblica</i>	Tree	1,364
4	<i>Bauhinia species</i>	Tree	401
5	<i>Butea monosperma</i>	Tree	251

Table 10.21.17 Major invasive Species in the State inside the RFA in Punjab

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Lantana camara</i>	615.13
2	<i>Prosopis juliflora/ Neltuma juliflora</i>	43.09
3	<i>Saccharum spontaneum</i>	40.34
4	<i>Ageratum houstonianum</i>	35.75
5	<i>Imperata cylindrica</i>	20.17



Photo: FSI Repository

RAJASTHAN

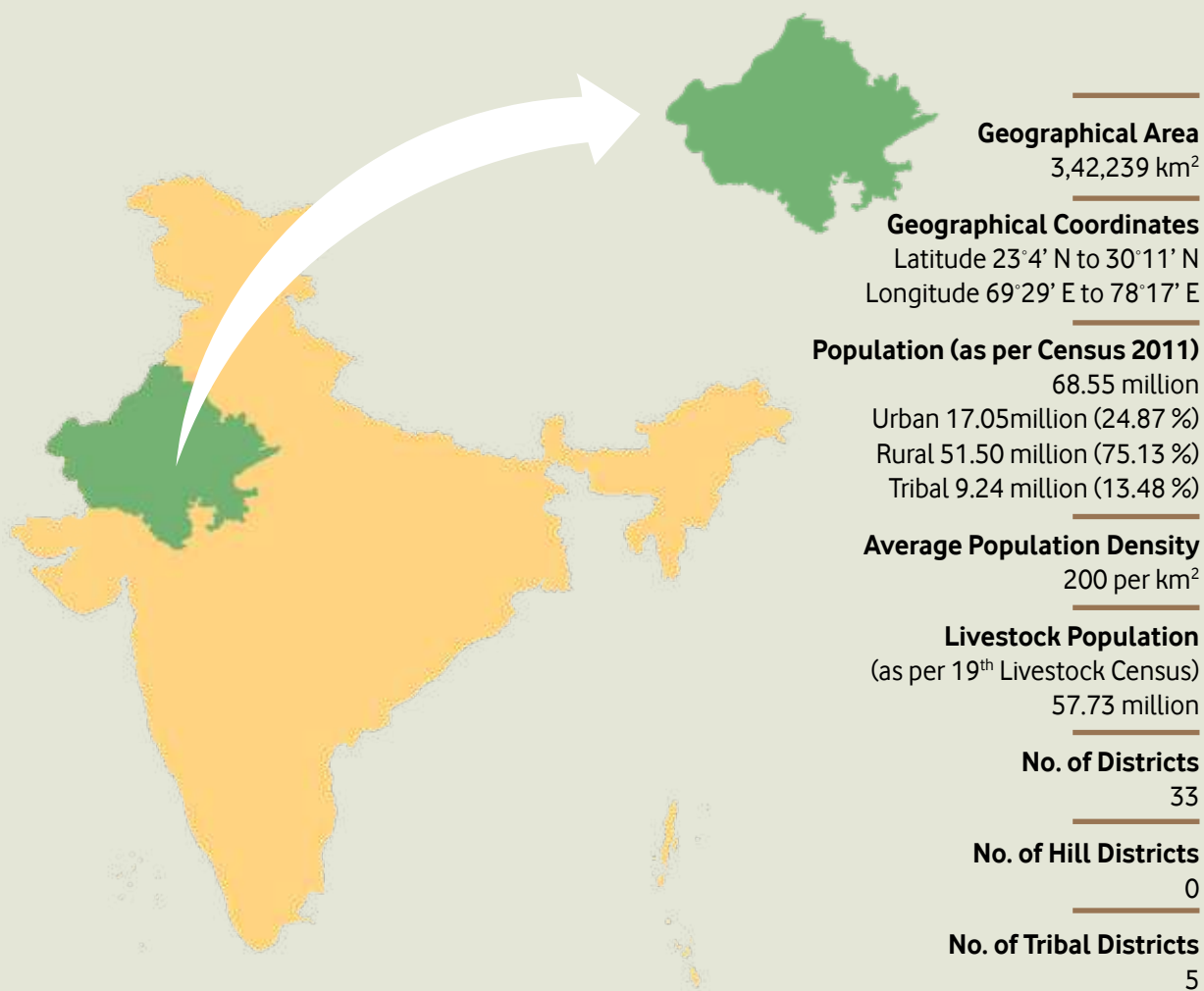


Table 10.22.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	34,224	
Reporting area for land utilization	34,292.67	100.00
Forests	2,777.56	8.10
Not available for land cultivation	4,396.61	12.82
Permanent pastures and other grazing lands	1,655.31	4.83
Land under misc. tree crops and groves	28.81	0.08
Culturable wasteland	3,680.16	10.73
Fallow land other than current fallows	2,039.70	5.95
Current fallows	1,584.92	4.62
Net area sown	18,129.60	52.87

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.22.1 Forest Cover

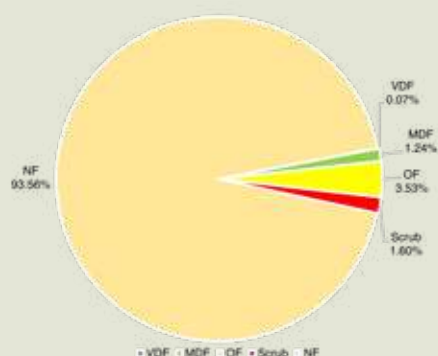


Table 10.22.2 Forest Cover of Rajasthan

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	223.20	0.07
MDF	4,237.41	1.24
OF	12,087.60	3.53
Total	16,548.21	4.84
Scrub	5,476.75	1.60

Figure 10.22.1 Forest Cover of Rajasthan

Table 10.22.3 District- wise Forest Cover in Rajasthan

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Ajmer	8,474.89	0.00	45.50	287.51	333.01	3.93	-18.34	276.83
Alwar	8,383.63	61.72	335.28	801.74	1,198.74	14.30	16.39	320.99
Banswara	4,511.20	0.00	41.66	226.09	267.75	5.94	-0.38	58.28
Baran	7,004.86	0.00	153.27	821.86	975.13	13.92	-33.29	88.50
Barmer	28,387.57	0.00	12.05	297.79	309.84	1.09	19.00	223.02
Bharatpur	5,066.97	0.00	47.11	167.17	214.28	4.23	-6.40	87.93
Bhilwara	10,492.92	0.00	34.55	202.42	236.97	2.26	-0.04	248.66
Bikaner	30,343.12	0.44	24.57	234.43	259.44	0.86	-14.85	50.17
Bundi	5,777.12	1.02	140.13	417.43	558.58	9.67	0.32	177.31
Chittaurgarh	7,822.51	0.00	223.39	764.69	988.08	12.63	1.93	162.17
Churu	13,850.45	0.00	2.24	60.49	62.73	0.45	-11.74	36.36
Dausa	3,424.38	0.30	11.75	109.75	121.80	3.56	-0.23	99.85
Dhaulpur	3,034.43	0.00	77.57	322.66	400.23	13.19	-8.14	75.43
Dungarpur	3,770.52	0.00	43.19	258.80	301.99	8.01	-5.57	101.46
Hanumangarh	9,714.69	0.92	6.04	85.33	92.29	0.95	-2.25	8.92
Jaipur	11,138.09	12.78	101.19	450.61	564.58	5.07	-2.02	318.60
Jaisalmer	38,381.51	2.91	51.49	286.91	341.31	0.89	11.46	233.25
Jalor	10,643.78	0.00	21.00	201.41	222.41	2.09	-11.54	207.69
Jhalawar	6,343.15	0.00	87.83	352.21	440.04	6.94	-4.14	107.92
Jhunjhun	5,924.19	0.00	19.29	177.54	196.83	3.32	-1.57	205.97
Jodhpur	22,681.16	0.00	5.01	106.22	111.23	0.49	2.66	166.82
Karauli	5,008.09	0.00	87.87	672.55	760.42	15.18	-3.69	269.28
Kota	5,088.30	0.00	147.12	383.79	530.91	10.43	2.25	141.92
Nagaur	17,810.78	0.00	13.25	157.67	170.92	0.96	-4.31	149.20
Pali	12,387.03	21.58	203.38	467.91	692.87	5.59	-9.65	453.45
Pratapgarh	4,433.97	0.00	537.90	458.96	996.86	22.48	-30.79	75.62
Rajsamand	4,620.71	23.22	133.17	356.97	513.36	11.11	-5.97	167.66
Sawai Madhopur	5,026.04	37.04	151.98	328.40	517.42	10.29	-2.91	158.85
Shriganga Nagar	10,904.04	0.00	11.42	102.04	113.46	1.04	2.85	16.38


Table 10.22.3 District- wise Forest Cover in Rajasthan

District	Calculated Area by Sol	2023 Assessment				% of Cal- culated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Sikar	7,730.98	0.00	30.78	187.77	218.55	2.83	19.14	233.55
Sirohi	5,138.45	0.00	282.86	616.59	899.45	17.50	0.70	223.68
Tonk	7,197.79	0.00	29.85	140.58	170.43	2.37	4.86	71.41
Udaipur	11,721.67	61.27	1,123.72	1,581.31	2,766.30	23.60	12.46	259.62
Grand Total	3,42,238.99	223.20	4,237.41	12,087.60	16,548.21	4.84	-83.80	5,476.75

*Area figure calculated without normalization factor.

Table 10.22.4 Division-wise Forest Cover in Rajasthan

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Ajmer	8,418.73	0.00	17.99	253.97	271.96	3.23	-17.27	273.15
Alwar	7,209.51	4.20	60.14	390.60	454.94	6.31	8.33	286.11
Banswara	4,476.06	0.00	41.65	224.67	266.32	5.95	-0.34	58.09
Baran	6,905.87	0.00	135.70	772.81	908.51	13.16	-34.98	85.51
Barmer	27,233.70	0.00	11.19	289.29	300.48	1.10	15.63	218.07
Bharatpur	4,859.03	0.00	34.70	98.05	132.75	2.73	-4.42	69.50
Bhilwara	10,487.10	0.00	34.50	202.34	236.84	2.26	-0.03	247.91
Bikaner	18,158.30	0.00	6.08	72.08	78.16	0.43	0.08	16.63
Bikaner IGNP-II	6,754.27	0.43	16.24	109.58	126.25	1.87	-13.32	29.40
Bundi	4,937.80	1.02	36.25	180.79	218.06	4.42	-0.45	113.62
Chhatargarh-IGNP-I	5,384.60	0.00	2.25	52.80	55.05	1.02	-1.62	4.30
Chittaurgarh	6,982.12	0.00	78.55	543.30	621.85	8.91	1.42	137.38
Churu	13,835.70	0.00	2.22	60.39	62.61	0.45	-11.62	36.37
Dausa	3,955.92	0.41	20.38	201.75	222.54	5.63	-2.01	121.51
DCF & DFD I RTR SWM, DCF & DFD II RTR Karoli	2,087.77	36.63	193.53	556.32	786.48	37.67	-2.04	142.86
DCF Bharatpur WL	29.17	0.00	4.74	11.62	16.36	56.09	-0.13	1.16
DCF Chittaurgarh WL	558.53	0.00	313.41	105.40	418.81	74.98	-2.76	3.62
DCF Churu	8.32	0.00	0.02	0.11	0.13	1.56	-0.12	0.00
DCF Jaipur WL	364.51	5.68	44.08	136.77	186.53	51.17	-0.20	31.19
DCF Jaisalmer DNP	3,170.48	0.00	1.05	12.00	13.05	0.41	3.89	9.00
DCF Kota WL	422.43	0.00	94.16	157.38	251.54	59.55	2.17	20.43
DCF Mt. Abu WL	345.51	0.00	182.06	87.36	269.42	77.98	-3.47	4.88
DCF NCS	794.20	0.00	15.40	124.50	139.90	17.62	0.14	63.18
DCF Rajsamand WL	1,161.53	49.84	350.48	389.77	790.09	68.02	-2.10	62.89
DCF Sariska WL	1,182.30	57.87	275.90	410.23	744.00	62.93	7.70	34.34
DCF Udaipur WL	570.23	35.53	357.56	96.34	489.43	85.83	-14.94	3.75

Table 10.22.4 Division-wise Forest Cover in Rajasthan(km²)

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
DCF WL MNP	766.65	0.00	148.55	240.31	388.86	50.72	5.89	57.39
Dhaulpur	2,426.64	0.00	65.99	244.05	310.04	12.78	-7.83	61.59
Dungarpur	3,786.95	0.00	42.91	258.91	301.82	7.97	-5.71	101.63
Ganganagar	10,712.00	0.00	10.94	97.71	108.65	1.01	2.51	15.79
Hanumangarh	9,921.39	0.92	6.53	89.16	96.61	0.97	-1.89	9.35
Jaipur	7,438.58	0.35	26.76	124.61	151.72	2.04	-2.78	70.77
Jaipur North	3,327.93	6.29	29.18	189.32	224.79	6.75	0.91	216.02
Jaisalmer	36,697.00	2.92	51.30	283.35	337.57	0.92	10.87	229.22
Jalor	10,639.30	0.00	21.00	201.70	222.70	2.09	-11.55	208.14
Jhalawar	6,221.56	0.00	80.32	330.04	410.36	6.60	-4.90	105.37
Jhunjhunun	5,915.64	0.00	19.21	176.78	195.99	3.31	-1.58	205.21
Jodhpur	22,696.90	0.00	4.98	106.10	111.08	0.49	2.58	166.89
Karauli	4,076.03	0.00	44.08	431.16	475.24	11.66	-2.55	193.13
Kota	4,488.84	0.00	35.68	207.36	243.04	5.41	1.50	98.17
Nagaur	17,805.10	0.00	13.74	159.18	172.92	0.97	-4.29	150.12
Pali	11,701.40	0.77	26.32	235.29	262.38	2.24	-10.51	408.06
Pratapgarh	4,646.43	0.00	404.24	502.82	907.06	19.52	-25.51	88.85
Rajsamand	4,264.51	0.93	22.77	272.40	296.10	6.94	-5.73	154.55
Sawai Madhopur	3,986.41	0.41	7.61	77.00	85.02	2.13	-1.34	86.43
Sikar	7,726.76	0.00	30.90	188.73	219.63	2.84	19.18	233.97
Sirohi	4,788.36	0.00	101.53	529.39	630.92	13.18	4.29	218.83
Tonk	7,160.40	0.00	28.72	136.91	165.63	2.31	4.77	65.83
Udaipur	5,681.35	5.70	321.68	804.20	1,131.58	19.92	17.80	137.30
Udaipur North	4,846.42	13.30	313.95	567.67	894.92	18.47	11.03	104.27
Wild life Udaipur	23.34	0.00	0.00	0.90	0.90	3.86	0.00	0.16
Area which does not fall in any Division	659.46	0.00	48.29	92.33	140.62	21.32	-6.50	14.86
Grand Total	3,42,699.04	223.20	4,237.41	12,087.60	16,548.21	4.83	-83.80	5,476.75

#As per the division boundary shapefile provided by State Forest Department.

*Area figure calculated without normalization factor.

10.22.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.



Table 10.22.5 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Rajasthan

(km ²)							
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
216.92	3,892.73	8,596.49	12,706.14	6.28	344.68	3,491.11	3,842.07
1.71%	30.64%	67.65%		0.16%	8.97%	90.87%	

*In case of Rajasthan, RFA boundaries have been used.

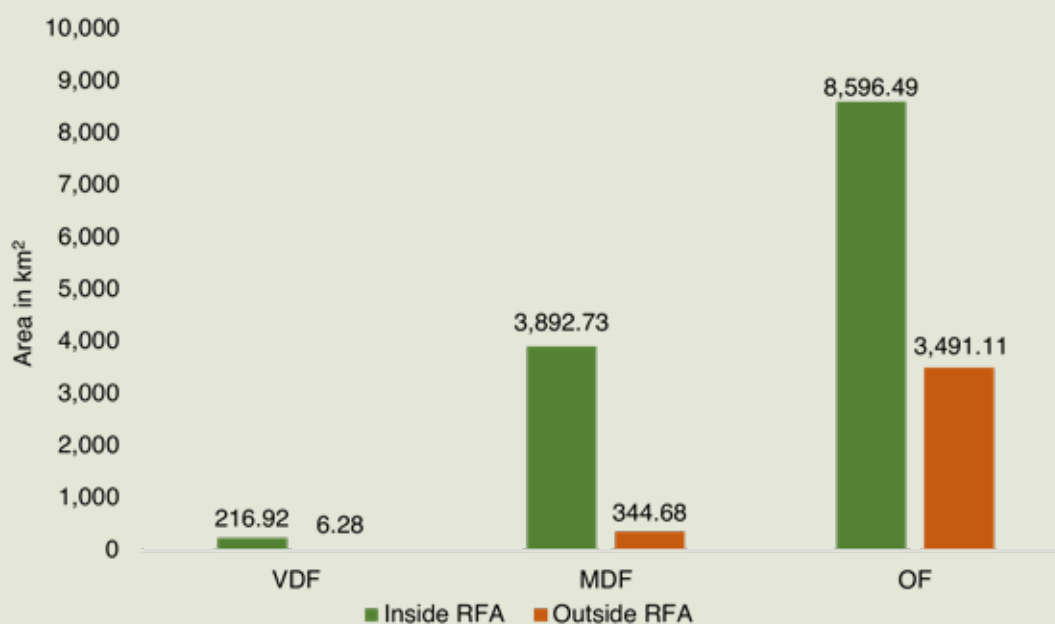


Figure 10.22.2 Forest Cover Inside and Outside of RFA in Rajasthan

Table 10.22.6 Forest Cover Change Matrix Inside RFA/GW for Rajasthan between 2021 Raster based and 2023 Assessments

(km ²)						
Class	2023 Assessment inside RFA/GW					Total ISFR 2021 inside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	74.46	0.22	0.04	0.24	0.00	74.96
MDF	114.16	3,778.78	79.65	2.55	45.97	4,021.11
OF	28.30	112.26	8,129.29	109.58	203.79	8,583.22
Scrub	0.00	1.47	189.63	2,514.12	86.53	2,791.75
NF	0.00	0.00	197.88	214.85	20,079.66	20,492.39
Total ISFR 2023 inside RFA / GW	216.92	3,892.73	8,596.49	2,841.34	20,415.95	35,963.43
Net Change	141.96	-128.38	13.27	49.59	-76.44	

*Area figure calculated without normalization factor.

Table 10.22.7 Forest Cover Change Matrix Outside RFA/GW for Rajasthan between 2021 Raster based and 2023 Assessments

(km²)

Class	2023 Assessment outside RFA/GW					Total ISFR 2021 outside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	3.85	0.00	0.00	0.00	0.02	3.87
MDF	1.90	320.45	15.85	0.56	15.18	353.94
OF	0.53	21.19	3,241.74	56.40	275.05	3,594.91
Scrub	0.00	0.00	63.44	2,354.02	276.36	2,693.82
NF	0.00	3.04	170.08	224.43	2,99,231.47	2,99,629.02
Total ISFR 2023 outside RFA/GW	6.28	344.68	3,491.11	2,635.41	2,99,798.08	3,06,275.56
Net Change	2.41	-9.26	-103.80	-58.41	169.06	

*Area figure calculated without normalization factor.

Table 10.22.8 Altitude-wise Forest Cover in Rajasthan

(km²)

Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	3,24,906.81	79.21	2,618.53	9,430.78	12,128.52	4,602.60
500-1000	17,115.78	139.26	1,527.55	2,611.17	4,277.98	868.54
1000-2000	216.40	4.73	91.33	45.65	141.71	5.61
Total	3,42,238.99	223.20	4,237.41	12,087.60	16,548.21	5,476.75

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

Table 10.22.9 Forest Cover in Different Slope Classes in Rajasthan

(km²)

Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	3,15,998.33	30.28	1,551.37	7,085.57	8,667.22	3,922.32
5-10	15,769.17	28.07	832.38	1,933.15	2,793.60	688.33
10-15	4,728.38	34.91	652.51	1,183.69	1,871.11	342.35
15-20	2,658.54	40.19	517.83	824.65	1,382.67	228.28
20-25	1,653.10	38.82	361.99	562.54	963.35	155.13
25-30	901.01	29.33	199.98	318.23	547.54	89.18
>30	530.46	21.60	121.35	179.77	322.72	51.16
Total	3,42,238.99	223.20	4,237.41	12,087.60	16,548.21	5,476.75

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



Figure 10.22.3 Forest Cover Map of Rajasthan

10.22.3 Forest Types

The area under different Forest Types in Rajasthan (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.22.10 Area Statistics of the Forest types Found in Rajasthan

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	5A/C1a Very dry teak forest	1,073.57	4.87
2	5A/C1b Dry teak forest	44.96	0.20
3	5B/C2 Northern dry mixed deciduous forest	8,400.21	38.15
4	5/DS1 Dry deciduous scrub	2,513.87	11.41
5	5/DS2 Dry savannah forest	2.96	0.01
6	5/E1 <i>Anogeissus pendula</i> forest	3,242.81	14.72
7	5/E1/DS1 <i>Anogeissus pendula</i> scrub	508.04	2.31
8	5/E2 <i>Boswellia</i> forest	151.77	0.69
9	5/E5 <i>Butea</i> forest	52.40	0.24
10	5/E6 <i>Aegle</i> forest	1.78	0.01
11	5/E8a <i>Phoenix</i> savannah	1.97	0.01
12	5/1S1 Dry tropical riverain forest	48.42	0.22
13	5/1S2 <i>Khair-sissu</i> forest	302.60	1.37
14	6B/C1 Desert thorn forest	828.99	3.76
15	6B/C2 Ravine thorn forest	327.13	1.49

Table 10.22.10 Area Statistics of the Forest types Found in Rajasthan

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
16	6B/DS1 <i>Ziziphus</i> scrub	180.62	0.82
17	6B/DS2 Tropical <i>Euphorbia</i> scrub	1.92	0.01
18	6/E1 <i>Euphorbia</i> scrub	129.40	0.59
19	6/E2 <i>Acacia senegal</i> forest	43.96	0.20
20	6/1S1 Desert dune scrub	1,011.42	4.59
Sub Total		18,868.80	85.67
21	TOF/ Plantation	3,156.16	14.33
Total (Forest Cover & Scrub)		22,024.96	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). The total mapped area, therefore, is sum of forest cover and scrub.

10.22.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.22.11 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Ajmer	8	6
2	Alwar	6	30
3	Banswara	126	203
4	Baran	144	166
5	Barmer	3	4
6	Bharatpur	11	13
7	Bhilwara	15	17
8	Bikaner	7	5
9	Bundi	83	51
10	Chittaurgarh	90	198
11	Churu	2	0
12	Dausa	5	2
13	Dholpur	1	6
14	Dungarpur	77	314
15	Hanumangarh	3	4
16	Jaipur	9	0
17	Jaisalmer	78	44
18	Jalor	16	9
19	Jhalawar	17	30
20	Jhunjhunun	3	3
21	Jodhpur	0	6
22	Karauli	11	11
23	Kota	52	79
24	Nagaur	43	13
25	Pali	56	211


Table 10.22.11 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
26	Pratapgarh	646	1,057
27	Rajsamand	40	300
28	Sawai Madhopur	15	11
29	Shriganga Nagar	2	2
30	Sikar	5	15
31	Sirohi	36	103
32	Tonk	6	1
33	Udaipur	443	1,438
Total		2,059	4,352

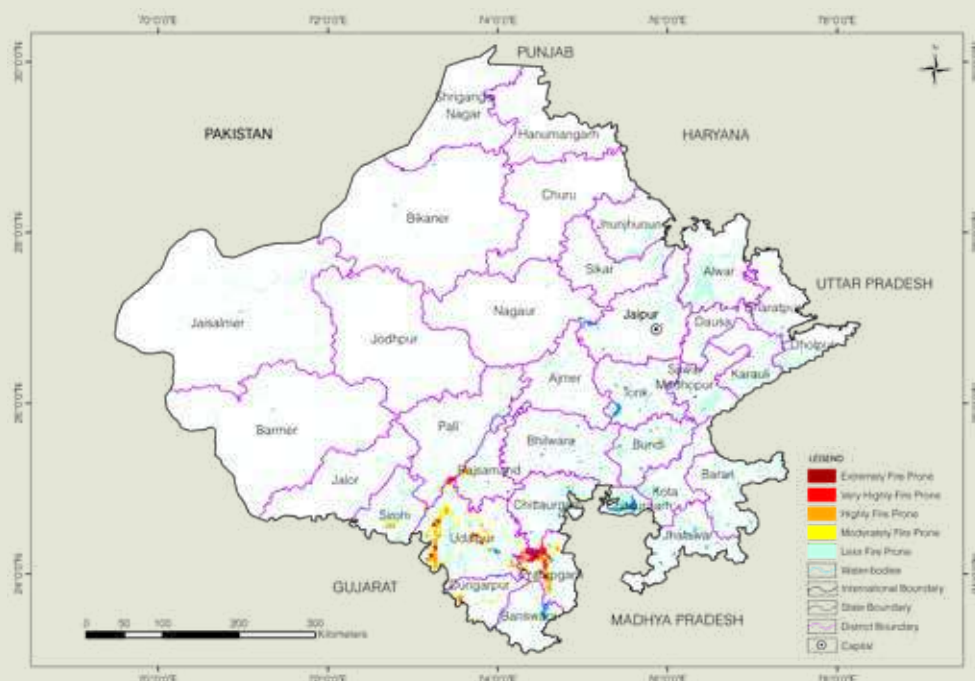
10.22.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.22.12 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	92.64	0.42
2	Very highly fire prone	622.77	2.83
3	Highly fire prone	964.79	4.38
4	Moderately fire prone	1,299.19	5.90
5	Less fire prone	19,045.57	86.47
Total		22,024.96	100.00

*Forest Cover including Scrub.


Figure 10.22.4 Fire Prone Forest Areas under Different Fire Prone Classes



10.22.6 Results Derived from NFI for Rajasthan

Table 10.22.13 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Anogeissus pendula</i> / <i>Terminalia pendula</i>	49,150	2.47
2	<i>Butea monosperma</i>	19,438	2.92
3	<i>Tectona grandis</i>	14,754	0.94
4	<i>Lannea coromandelica</i>	10,406	3.56
5	<i>Boswellia serrata</i>	10,018	3.11

Table 10.22.14 Number of Trees and their volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Prosopis juliflora</i> / <i>Neltuma juliflora</i>	1,66,706	3.865
2	<i>Prosopis cineraria</i>	93,706	31.564
3	<i>Ziziphus species</i>	47,892	3.741
4	<i>Acacia tortilis</i> / <i>Vachellia tortilis</i>	44,388	2.149
5	<i>Acacia nilotica</i> / <i>Acacia arabica</i> / <i>Vachellia nilotica</i>	41,855	7.256

Table 10.22.15 Number of Trees and Their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Prosopis juliflora</i> / <i>Neltuma juliflora</i>	4,117	0.200
2	<i>Azadirachta indica</i> / <i>Melia indica</i>	2,568	0.926
3	<i>Acacia arabica</i> / <i>Acacia nilotica</i> / <i>indica</i>	892	0.172
4	<i>Ziziphus species</i>	786	0.068
5	<i>Prosopis cineraria</i>	561	0.261

Table 10.22.16 Major NTFP Species in Rajasthan

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Butea monosperma</i>	Tree	6,63,560
2	<i>Acacia catechu</i> / <i>Senegalia catechu</i>	Tree	2,40,230
3	<i>Balanites aegyptiaca</i>	Tree	1,88,423
4	<i>Grewia flavescens</i>	Tree	1,77,981
5	<i>Aegle marmelos</i>	Tree	1,69,979
6	<i>Diospyros melanoxylon</i>	Tree	1,42,739
7	<i>Wrightia arborea</i> / <i>Wrightia tomentosa</i>	Tree	29,660
8	<i>Boswellia serrata</i>	Tree	26,198
9	<i>Terminalia bellirica</i>	Tree	14,998
10	<i>Madhuca longifolia</i> / <i>M. latifolia</i> / <i>M. indica</i>	Tree	14,924



Table 10.22.17 Major Invasive Species In the State Inside the RFA in Rajasthan

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Cassia tora/ Senna tora</i>	973.57
2	<i>Lantana camara</i>	870.22
3	<i>Prosopis juliflora/ Neltuma juliflora</i>	642.73
4	<i>Senna occidentalis</i>	250.73
5	<i>Triumfetta rhomboidea</i>	159.00

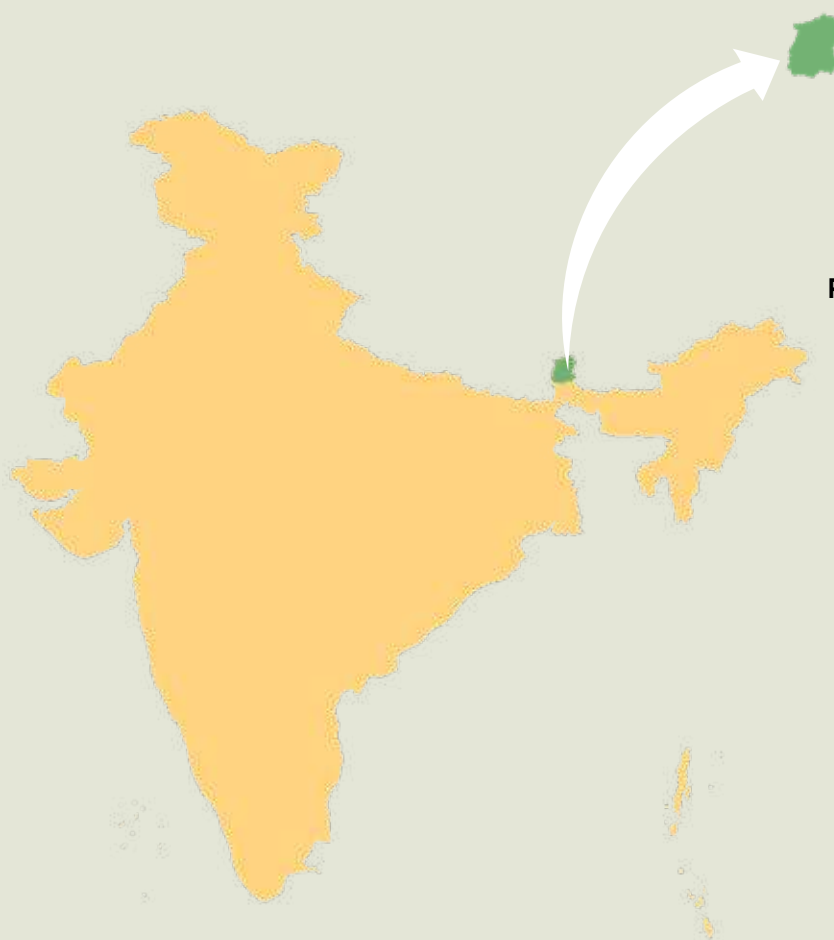


Photo: FSI Repository

Forest Survey of India



Photo: FSI Repository



Geographical Area
7,096 km²

Geographical Coordinates
Latitude 27°04' N to 28°07' N
Longitude 88°00' E to 88°55' E

Population (as per Census 2011)
0.61 million
Urban 0.153 million (25.15 %)
Rural 0.457 million (74.85 %)
Tribal 0.206 million (33.72 %)

Average Population Density
86 per km²

Livestock Population
(as per 19th Livestock Census)
0.29 million

No. of Districts
4

No. of Hill Districts
4

No. of Tribal Districts
4

Table 10.23.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	710	
Reporting area for land utilization	440.80	100.00
Forests	334.10	75.79
Not available for land cultivation	10.20	2.32
Permanent pastures and other grazing lands	-	-
Land under misc. tree crops and groves	3.60	0.82
Culturable wasteland	4.20	0.95
Fallow land other than current fallows	4.50	1.02
Current fallows	7.00	1.59
Net area sown	77.20	17.51

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.23.1 Forest Cover

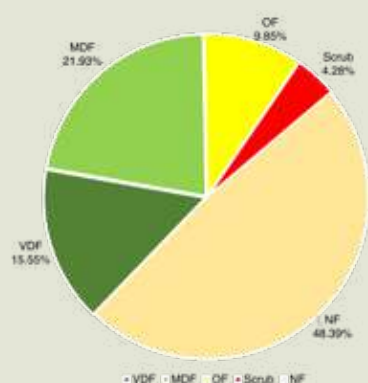


Table 10.23.2 Forest Cover of Sikkim

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	1,103.31	15.55
MDF	1,555.89	21.93
OF	699.20	9.85
Total	3,358.40	47.33
Scrub	303.49	4.28

Figure 10.23.1 Forest Cover of Sikkim

Table 10.23.3 District- wise Forest Cover in Sikkim

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
East Sikkim ^H	954	268.99	313.85	132.60	715.44	74.99	4.46	50.85
North Sikkim ^H	4,226	413.00	587.47	289.86	1,290.33	30.53	1.45	203.89
South Sikkim ^H	750	170.40	284.01	108.61	563.02	75.07	0.94	4.16
West Sikkim ^H	1,166	250.92	370.56	168.13	789.61	67.72	-1.66	44.59
Grand Total	7,096	1,103.31	1,555.89	699.20	3,358.40	47.33	5.19	303.49

*Area figure calculated without normalization factor.

10.23.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.23.4 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Sikkim

(km ²)							
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
831.08	879.76	349.79	2,060.63	272.23	676.13	349.41	1,297.77
40.33%	42.69%	16.98%		20.98%	52.10%	26.92%	

*In case of Sikkim, RFA boundaries have been used.

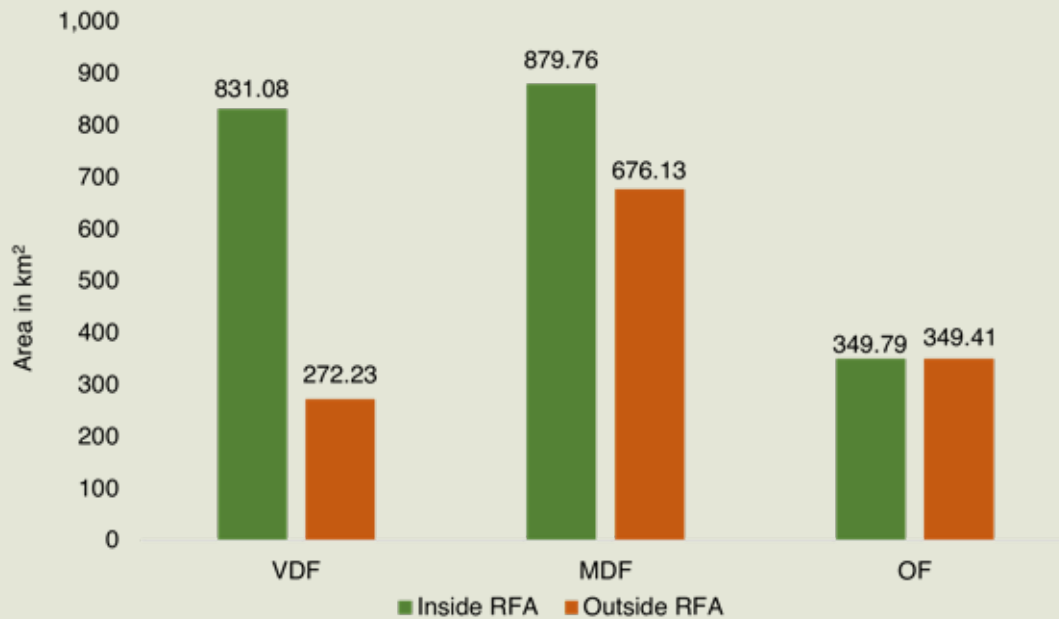


Figure 10.23.2 Forest Cover Inside and Outside of RFA in Sikkim

Table 10.23.5 Forest Cover Change Matrix Inside RFA/GW for Sikkim between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 inside RFA / GW Raster based*
VDF	831.08	0.46	0.00	0.00	0.27	831.81
MDF	0.00	879.30	0.56	0.26	0.65	880.77
OF	0.00	0.00	343.19	1.07	0.87	345.13
Scrub	0.00	0.00	4.04	197.50	0.06	201.60
NF	0.00	0.00	2.00	1.77	3,151.30	3,155.07
Total ISFR 2023 inside RFA / GW	831.08	879.76	349.79	200.60	3,153.15	5,414.38
Net Change	-0.73	-1.01	4.66	-1.00	-1.92	

*Area figure calculated without normalization factor.

Table 10.23.6 Forest Cover Change Matrix Outside RFA/GW for Sikkim between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	272.23	0.00	0.00	0.00	0.01	272.24
MDF	0.00	675.83	0.00	0.00	0.22	676.05
OF	0.00	0.00	346.90	0.00	0.31	347.21
Scrub	0.00	0.00	0.00	102.17	6.30	108.47
NF	0.00	0.30	2.51	0.72	274.12	277.65
Total ISFR 2023 outside RFA/GW	272.23	676.13	349.41	102.89	280.96	1,681.62
Net Change	-0.01	0.08	2.20	-5.58	3.31	

*Area figure calculated without normalization factor.

**Table 10.23.7 Altitude-wise Forest Cover in Sikkim**

(km ²)						
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	50	0.18	20.14	15.93	36.25	1.42
500-1000	375	12.35	155.48	96.47	264.30	13.31
1000-2000	1,306	277.80	573.59	247.99	1,099.38	15.36
2000-3000	1,155	578.19	404.78	91.32	1,074.29	7.41
3000-4000	1,103	228.71	368.80	178.28	775.79	102.88
> 4000	3,107	6.08	33.10	69.21	108.39	163.11
Total	7,096	1,103.31	1,555.89	699.20	3,358.40	303.49

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

Table 10.23.8 Forest Cover in Different Slope Classes in Sikkim

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	351	12.04	15.60	7.44	35.08	7.63
5-10	554	48.62	56.80	25.20	130.62	18.36
10-15	767	109.76	129.67	54.89	294.32	30.46
15-20	969	167.44	211.86	89.81	469.11	41.10
20-25	1,062	199.10	265.78	112.74	577.62	46.95
25-30	1,034	198.32	275.80	117.86	591.98	47.37
>30	2,359	368.03	600.38	291.26	1,259.67	111.62
Total	7,096	1,103.31	1,555.89	699.20	3,358.40	303.49

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

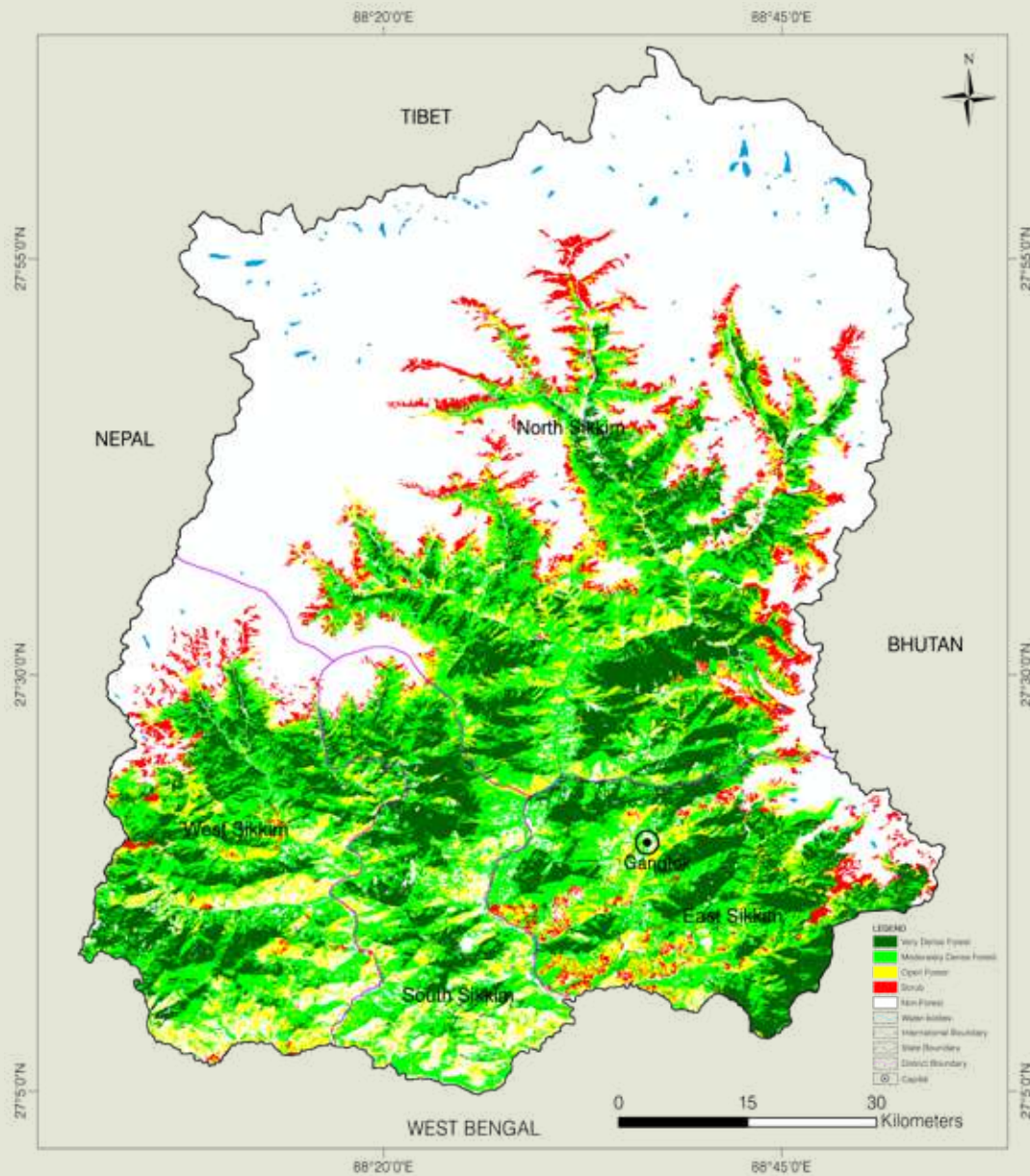


Figure 10.23.3 Forest Cover Map of Sikkim

10.23.3 Forest Types

The area under different Forest Types in Sikkim (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.23.9 Area Statistics of The Forest Types Found in Sikkim

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	3C/C1a(i) East Himalayan sal	69.80	1.84
2	3C/C3b East Himalayan moist mixed deciduous forest	190.98	5.03
3	8B/C1 East Himalayan subtropical wet hill forest	889.35	23.42
4	11B/C1b <i>Buk oak</i> forest	877.86	23.11
5	12/C3a East Himalayan mixed coniferous forest	223.74	5.89
6	12/DS1 Montane bamboo brakes	7.08	0.18
7	14/C2 East Himalayan sub-alpine birch/fir forest	903.18	23.78
8	15/C1 Birch/ <i>Rhododendron</i> scrub forest	145.60	3.83
9	15/E1 Dwarf <i>Rhododendron</i> scrub	11.50	0.30
10	15/E2 Dwarf juniper scrub	208.76	5.50
Sub Total		3,527.85	92.88
11	TOF/ Plantation	134.04	3.53
Total (Forest Cover & Scrub)		3,661.89	96.41
Grassland forest type (outside forest cover)			
12	15/C3 Alpine pastures	136.28	3.59
Grand Total		3,798.17	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest type outside forest cover has also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).

10.23.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.23.10 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	East Sikkim	4	36
2	North Sikkim	8	0
3	South Sikkim	30	39
4	West Sikkim	7	26
Total		49	101



10.23.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.23.11 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	0.00	0.00
2	Very highly fire prone	0.00	0.00
3	Highly fire prone	0.00	0.00
4	Moderately fire prone	29.72	0.81
5	Less fire prone	3,632.17	99.19
Total		3,661.89	100.00

*Forest Cover including Scrub.

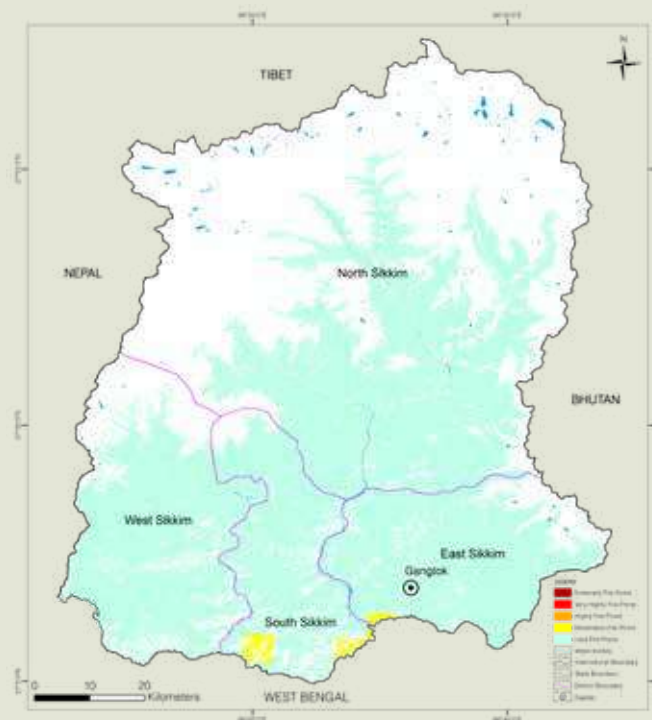


Figure 10.23.4 Fire Prone Forest Areas Under Different Fire Prone Classes

10.23.6 Results Derived from NFI for Sikkim

Table 10.23.12 Number of Trees and their volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Symplocos theifolia</i>	7,072	0.92
2	<i>Shorea robusta</i>	6,789	3.61
3	<i>Schima wallichii</i>	6,181	2.03
4	<i>Castanopsis species</i>	5,750	5.63
5	<i>Viburnum species</i>	3,555	0.42

Table 10.23.13 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Schima wallichii</i>	1,688	0.412
2	<i>Ficus species</i>	940	0.068
3	<i>Alnus nepalensis</i>	447	0.119
4	<i>Alnus species</i>	445	0.220
5	<i>Macaranga species</i>	396	0.077

Table 10.23.14 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Schima wallichii</i>	10	0.004
2	<i>Pinus kesiya</i>	6	0.005
3	<i>Ficus species</i>	3	0.001
4	<i>Cryptomeria japonica</i>	2	0.001
5	<i>Macaranga species</i>	2	0.002

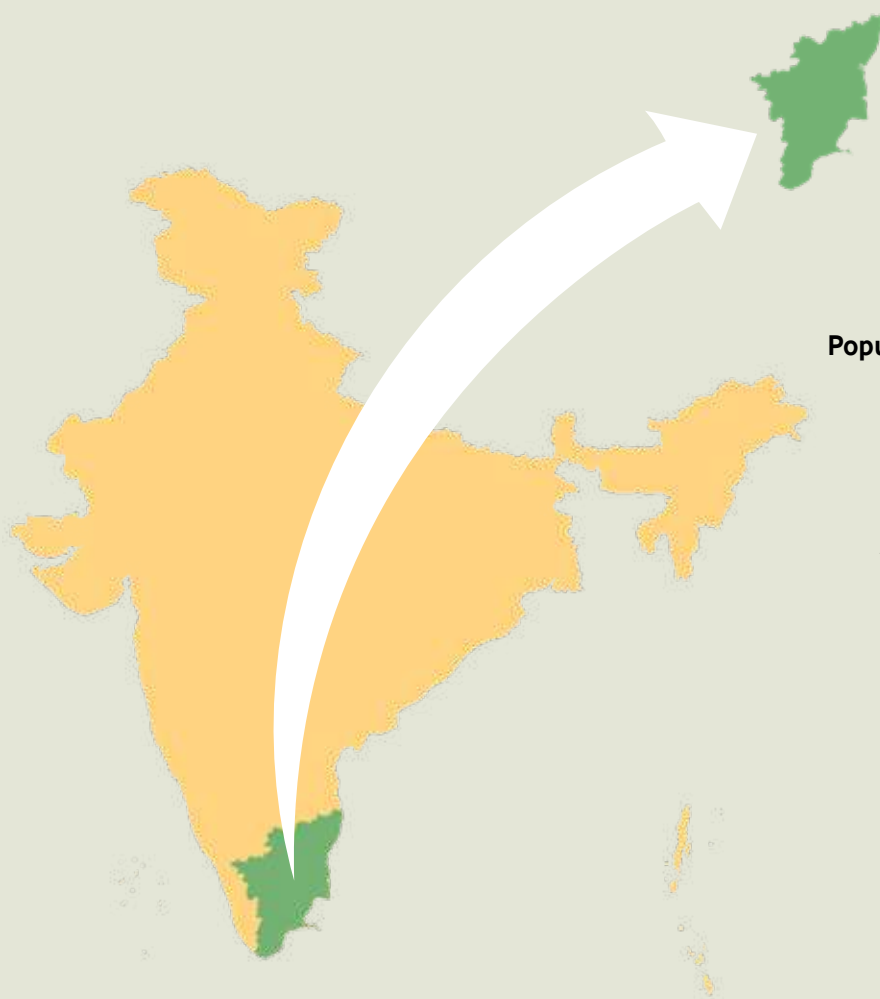
Table 10.23.15 Major NTFP Species in Sikkim

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Spondias axillaris/ Choerospondias axillaris</i>	Tree	198
2	<i>Machilus edulis</i>	Tree	22
3	<i>Thysanolaena latifolia/ Thysanolaena maxima</i>	Shrubs	2,85,626
4	<i>Polygonum sp.</i>	Shrubs	16,802
5	<i>Rubia cordifolia</i>	Climbers	1,77,116
6	<i>Diplazium species</i>	Herbs	1,44,17,894
7	<i>Nephrolepis species</i>	Herbs	98,08,895
8	<i>Urtica dioica</i>	Herbs	12,40,884
9	<i>Aconitum ferox</i>	Herbs	2,95,449
10	<i>Podophyllum hexandrum</i>	Herbs	88,635

Table 10.23.16 Major Invasive Species in the State inside the RFA in Sikkim

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Chromolaena odorata</i>	110.41
2	<i>Galinsoga parviflora</i>	65.55
3	<i>Ageratina adenophora</i>	29.90
4	<i>Mikania micrantha</i>	24.15
5	<i>Lantana camara</i>	21.85

TAMIL NADU



Geographical Area
1,30,060 km²

Geographical Coordinates
Latitude 08°05' N to 13°35' N
Longitude 76°15' E to 80°20' E

Population (as per Census 2011)
72.15 million
Urban 34.92 million (48.40 %)
Rural 37.23 million (51.60 %)
Tribal 0.79 million (1.10 %)

Average Population Density
555 per km²

Livestock Population
(as per 19th Livestock Census)
22.72 million

No. of Districts
38

No. of Hill Districts
6

No. of Tribal Districts
6

Table 10.24.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	13,006	
Reporting area for land utilization	13,033.12	100.00
Forests	2,156.57	16.54
Not available for land cultivation	2,663.42	20.44
Permanent pastures and other grazing lands	107.64	0.83
Land under misc. tree crops and groves	186.07	1.43
Culturable wasteland	346.37	2.65
Fallow land other than current fallows	1,863.66	14.30
Current fallows	800.45	6.14
Net area sown	4,908.94	37.67

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.24.1 Forest Cover

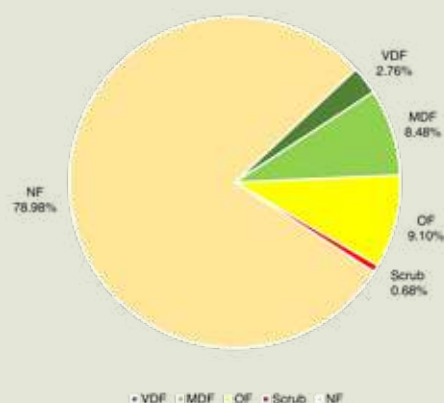


Table 10.24.2 Forest Cover of Tamil Nadu

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	3,586.19	2.76
MDF	11,027.03	8.48
OF	11,837.00	9.10
Total	26,450.22	20.34
Scrub	878.29	0.68

Figure 10.24.1 Forest Cover of Tamil Nadu

Table 10.24.3 District- wise Forest Cover in Tamil Nadu

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Ariyalur	1,940	0.01	41.53	350.78	392.32	20.22	-16.83	7.21
Chengalpattu	2,831	0.00	61.64	189.10	250.74	8.86	-5.87	25.63
Chennai	175	0.00	7.82	13.30	21.12	12.07	-2.04	1.98
Coimbatore ^H	4,732	354.75	669.13	929.30	1,953.18	41.28	-7.37	7.91
Cuddalore	3,703	0.00	45.54	339.94	385.48	10.41	-6.86	16.26
Dharmapuri	4,497	267.82	840.94	607.53	1,716.29	38.17	-2.39	15.81
Dindigul	6,036	251.84	786.81	849.53	1,888.18	31.28	4.74	33.81
Erode	5,760	399.31	1,137.15	792.00	2,328.46	40.42	17.68	36.59
Kallakurichi	3,256	78.36	236.98	261.40	576.74	17.71	-11.64	40.49
Kancheepuram	1,652	0.00	10.47	61.40	71.87	4.35	-1.82	13.19
Kanniyakumari ^H	1,684	130.50	571.97	310.07	1,012.54	60.13	10.70	0.58
Karur	2,904	1.35	27.89	76.30	105.54	3.63	6.24	9.96
Krishnagiri	5,129	91.67	824.11	699.99	1,615.77	31.50	9.80	35.48
Madurai ^H	3,710	39.57	235.35	285.95	560.87	15.12	7.33	39.29
Mayiladuthurai	1,178	0.00	5.40	27.23	32.63	2.77	-0.45	0.00
Nagapattinam	1,391	0.03	17.28	81.26	98.57	7.09	-27.35	0.02
Namakkal	3,420	84.20	285.29	220.75	590.24	17.26	3.98	26.49
Perambalur	1,756	9.33	66.38	67.30	143.01	8.14	-1.73	17.41
Pudukkottai	4,644	0.62	87.37	267.17	355.16	7.65	-10.35	17.68
Ramanathapuram	4,104	0.43	23.58	218.33	242.34	5.90	-10.28	9.71
Ranipet	1,849	0.00	14.31	82.34	96.65	5.23	-7.15	16.54
Salem	5,237	201.37	764.10	525.05	1,490.52	28.46	3.82	36.59
Sivaganga	4,233	0.00	36.95	276.17	313.12	7.40	-9.79	20.81
Tenkasi ^H	2,833	115.00	215.92	153.15	484.07	17.09	3.99	9.16
Thanjavur	3,411	0.07	243.02	85.70	328.79	9.64	-20.14	2.84
The Nilgiris ^H	2,565	447.59	622.92	636.38	1,706.89	66.55	-1.61	9.11
Theni	2,868	176.82	478.16	562.13	1,217.11	42.44	33.09	32.33
Thiruvavur	2,274	0.00	38.83	32.89	71.72	3.15	0.55	0.00
Thoothukudi	4,745	0.02	23.49	237.74	261.25	5.51	12.26	82.31



Table 10.24.3 District- wise Forest Cover in Tamil Nadu

District	Calculated Area by Sol	2023 Assessment				% of Cal- culated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Tiruchchirapalli	4,509	54.40	242.75	196.88	494.03	10.96	2.58	50.87
Tirunelveli ^h	3,860	342.51	352.95	153.88	849.34	22.00	1.52	20.63
Tirupathur	1,964	137.54	504.64	256.98	899.16	45.78	5.33	26.19
Tiruppur	5,187	48.29	234.52	566.32	849.13	16.37	-0.56	8.12
Tiruvallur	3,394	11.85	45.28	222.90	280.03	8.25	-17.50	50.11
Tiruvannamalai	6,188	235.96	601.24	481.25	1,318.45	21.31	-4.99	73.45
Vellore	2,262	63.52	434.51	347.06	845.09	37.36	-8.54	39.33
Viluppuram	3,938	0.00	59.05	191.83	250.88	6.37	-12.57	8.07
Virudhunagar	4,241	41.46	131.76	179.72	352.94	8.32	3.26	36.33
Grand Total	1,30,060	3,586.19	11,027.03	11,837.00	26,450.22	20.34	-60.96	878.29

*Area figure calculated without normalization factor.

Table 10.24.4 Division-wise Forest Cover in Tamil Nadu

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Ariyalur	1,947.91	0.01	41.31	346.61	387.93	19.92	-16.76	7.15
Attur	2,103.73	109.69	382.89	204.31	696.89	33.13	-0.79	7.70
Chengalpattu	4,483.21	0.00	72.44	244.67	317.11	7.07	-8.69	39.67
Coimbatore	2,919.91	124.47	378.36	378.41	881.24	30.18	0.50	6.80
Cuddalore	3,712.62	0.00	44.84	333.88	378.72	10.20	-6.87	13.36
Dharmapuri	2,639.57	60.62	455.18	435.49	951.29	36.04	-3.29	5.66
Dindigul	5,206.65	67.88	508.66	700.67	1,277.21	24.53	2.98	27.31
Erode	2,852.50	238.19	443.08	203.88	885.15	31.03	12.88	3.42
Gudalur	483.05	75.67	113.66	183.95	373.28	77.28	-0.26	2.27
Harur	1,835.02	210.16	383.55	168.97	762.68	41.56	0.84	9.23
Hassanur	529.60	62.96	228.26	207.74	498.96	94.21	-0.36	9.05
Hosur	5,173.89	93.40	825.27	699.21	1,617.88	31.27	10.06	35.50
Kallakurichi	1,838.44	75.02	228.09	129.28	432.39	23.52	-6.85	25.18
Kanyakumari	1,604.15	79.29	541.83	310.41	931.53	58.07	10.40	0.59
Karaikkal	159.85	0.00	0.00	0.01	0.01	0.01	0.00	0.00
Karur	2,909.07	1.83	30.78	79.93	112.54	3.87	6.24	11.03
Kodaikanal	941.45	186.61	300.38	180.31	667.30	70.88	2.32	10.36
Madurai	2,660.56	14.33	126.23	192.80	333.36	12.53	4.75	21.66
Megamalai	546.28	16.88	96.63	106.75	220.26	40.32	2.75	5.22
Namakkal	3,430.53	83.61	287.28	225.62	596.51	17.39	4.05	26.33
Nilgiris North	1,073.51	102.19	266.72	339.92	708.83	66.03	-1.75	6.24
Nilgiris South	578.17	139.54	101.41	45.77	286.72	49.59	0.64	0.48
Perambalur	1,751.10	11.02	60.82	58.88	130.72	7.47	-1.77	18.27

Table 10.24.4 Division-wise Forest Cover in Tamil Nadu(km²)

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Puducherry	294.07	0.00	0.02	0.41	0.43	0.15	-0.05	0.00
Pudukkottai	4,688.87	0.43	94.67	268.79	363.89	7.76	-12.21	17.67
Ramanathapuram	4,110.64	0.47	22.73	213.63	236.83	5.76	-9.15	9.30
Salem	3,138.34	89.75	379.25	319.85	788.85	25.14	4.61	28.23
Sathyamangalam	929.47	95.70	423.33	327.19	846.22	91.04	-0.09	16.67
Sivagangai	4,236.89	0.00	36.63	284.35	320.98	7.58	-9.56	20.94
Thanjavur	3,685.04	0.07	245.90	72.62	318.59	8.65	-19.64	3.10
Theni	2,312.87	161.92	384.09	465.52	1,011.53	43.73	30.08	24.05
Thiruvallur	3,419.47	10.88	42.83	221.49	275.20	8.05	-19.05	46.99
Thiruvarur	2,009.97	0.00	36.45	33.00	69.45	3.46	0.54	0.00
Thoothukudi	4,627.27	0.02	22.80	237.14	259.96	5.62	11.99	85.80
Tiruchirappalli	4,518.65	51.50	240.94	203.16	495.60	10.97	2.58	50.46
Tirunelveli	5,435.84	112.09	223.46	222.33	557.88	10.26	9.05	21.32
Tirupattur	2,028.74	128.12	471.51	231.19	830.82	40.95	-1.87	21.87
Tiruvannamalai (N)	3,687.62	164.36	275.28	194.87	634.51	17.21	-2.24	28.48
Tiruvannamalai (S)	2,526.22	69.65	317.97	284.62	672.24	26.61	-2.81	42.85
Vellore	4,073.12	73.98	478.33	449.11	1,001.42	24.59	-7.88	56.81
Viluppuram	5,408.48	0.00	68.86	327.69	396.55	7.33	-16.95	24.09
WL ATR Pollachi	1,862.69	232.36	324.40	561.98	1,118.74	60.06	-7.95	0.84
WL ATR Tiruppur	5,206.96	48.34	234.34	568.97	851.65	16.36	-0.78	8.07
WL, Chennai	179.16	0.00	6.24	6.28	12.52	6.99	-0.90	0.00
WL, KMTR	1,458.66	391.85	350.98	92.15	834.98	57.24	-1.36	10.71
WL Marine NP	1,564.93	0.00	0.72	4.66	5.38	0.34	-1.43	0.77
WL MTR	410.62	131.43	143.75	66.35	341.53	83.17	-0.06	0.10
WL Nagapattinam	2,591.83	0.03	23.14	101.64	124.81	4.82	-27.86	0.03
WL Srivilliputhur	5,218.73	61.56	222.24	252.86	536.66	10.28	5.91	56.61
WL STR	1,399.73	1.68	12.86	44.75	59.29	4.24	5.10	9.24
Area which does not fall in any Division	319.02	6.63	25.64	2.93	35.20	11.03	0.00	0.81
Grand Total	1,32,724.67	3,586.19	11,027.03	11,837.00	26,450.22	19.93	-60.96	878.29

#As per the division boundary shapefile provided by State Forest Department.

*Area figure calculated without normalization factor.



10.24.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.24.5 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Tamil Nadu

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
3,344.13	8,681.60	5,708.57	17,734.30	242.06	2,345.43	6,128.43	8,715.92
18.86%	48.95%	32.19%		2.78%	26.91%	70.31%	

**In case of Tamil Nadu, RFA boundaries have been used.*

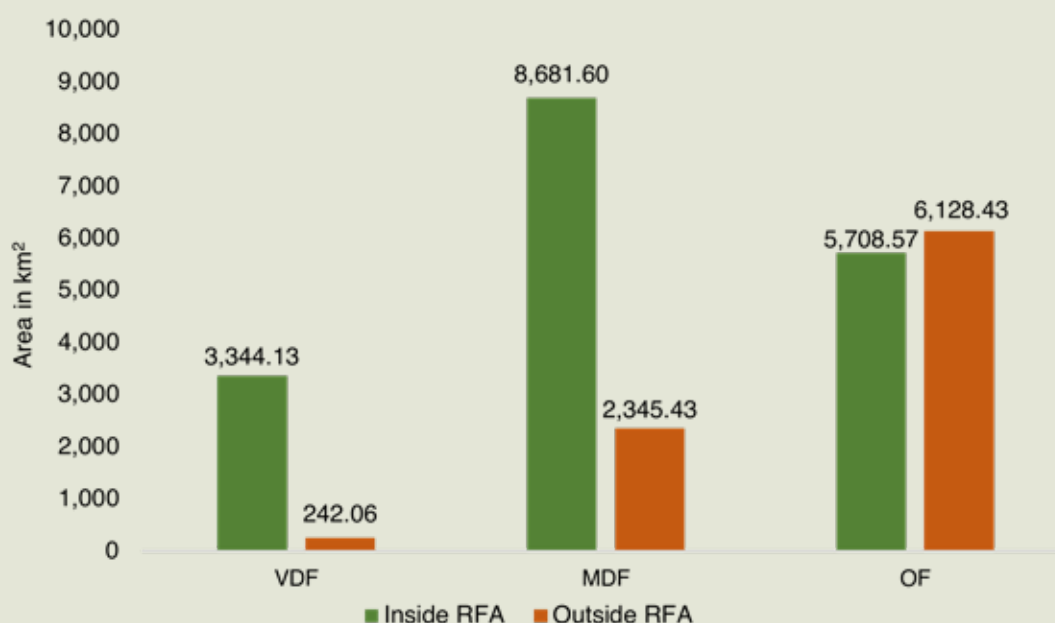


Figure 10.24.2 Forest Cover Inside and Outside of RFA in Tamil Nadu

Table 10.24.6 Forest Cover Change Matrix Inside RFA/GW for Tamil Nadu between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					Total ISFR 2021 inside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	3,343.53	1.63	0.35	0.00	0.98	3,346.49
MDF	0.04	8,675.59	1.31	1.62	11.41	8,689.97
OF	0.00	2.51	5,661.03	11.21	46.09	5,720.84
Scrub	0.00	0.00	4.64	425.32	4.95	434.91
NF	0.56	1.87	41.24	10.83	3,338.31	3,392.81
Total ISFR 2023 inside RFA / GW	3,344.13	8,681.60	5,708.57	448.98	3,401.74	21,585.02
Net Change	-2.36	-8.37	-12.27	14.07	8.93	

**Area figure calculated without normalization factor.*

Table 10.24.7 Forest Cover Change Matrix Outside RFA/GW for Tamil Nadu between 2021 Raster based and 2023 Assessments

(km²)

Class	2023 Assessment outside RFA/GW					Total ISFR 2021 outside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	241.94	0.05	0.02	0.00	0.46	242.47
MDF	0.00	2,341.49	13.23	0.37	28.55	2,383.64
OF	0.00	0.56	5,843.67	11.55	271.99	6,127.77
Scrub	0.00	0.00	1.61	318.60	14.95	335.16
NF	0.12	3.33	269.90	98.79	99,013.80	99,385.94
Total ISFR 2023 outside RFA/GW	242.06	2,345.43	6,128.43	429.31	99,329.75	1,08,474.98
Net Change	-0.41	-38.21	0.66	94.15	-56.19	

*Area figure calculated without normalization factor.

Table 10.24.8 Altitude-wise Forest Cover in Tamil Nadu

(km²)

Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	1,11,060.00	346.59	5,052.06	8,618.63	14,017.28	718.88
500-1000	13,688.00	1,821.42	4,469.61	2,549.09	8,840.12	137.02
1000-2000	4,437.00	1,094.06	1,384.93	623.08	3,102.07	19.91
2000-3000	875.00	324.12	120.43	46.20	490.75	2.48
Total	1,30,060.00	3,586.19	11,027.03	11,837.00	26,450.22	878.29

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

Table 10.24.9 Forest Cover in Different Slope Classes in Tamil Nadu

(km²)

Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	1,09,583.00	323.03	3,430.29	7,481.15	11,234.47	555.65
5-10	5,911.00	527.72	1,748.33	1,283.75	3,559.80	82.19
10-15	3,943.00	583.47	1,501.07	881.37	2,965.91	60.81
15-20	3,364.00	583.64	1,374.03	722.79	2,680.46	55.18
20-25	2,856.00	555.03	1,220.16	603.50	2,378.69	49.12
25-30	2,208.00	482.10	929.95	461.24	1,873.29	40.52
> 30	2,195.00	531.20	823.20	403.20	1,757.60	34.82
Total	1,30,060.00	3,586.19	11,027.03	11,837.00	26,450.22	878.29

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

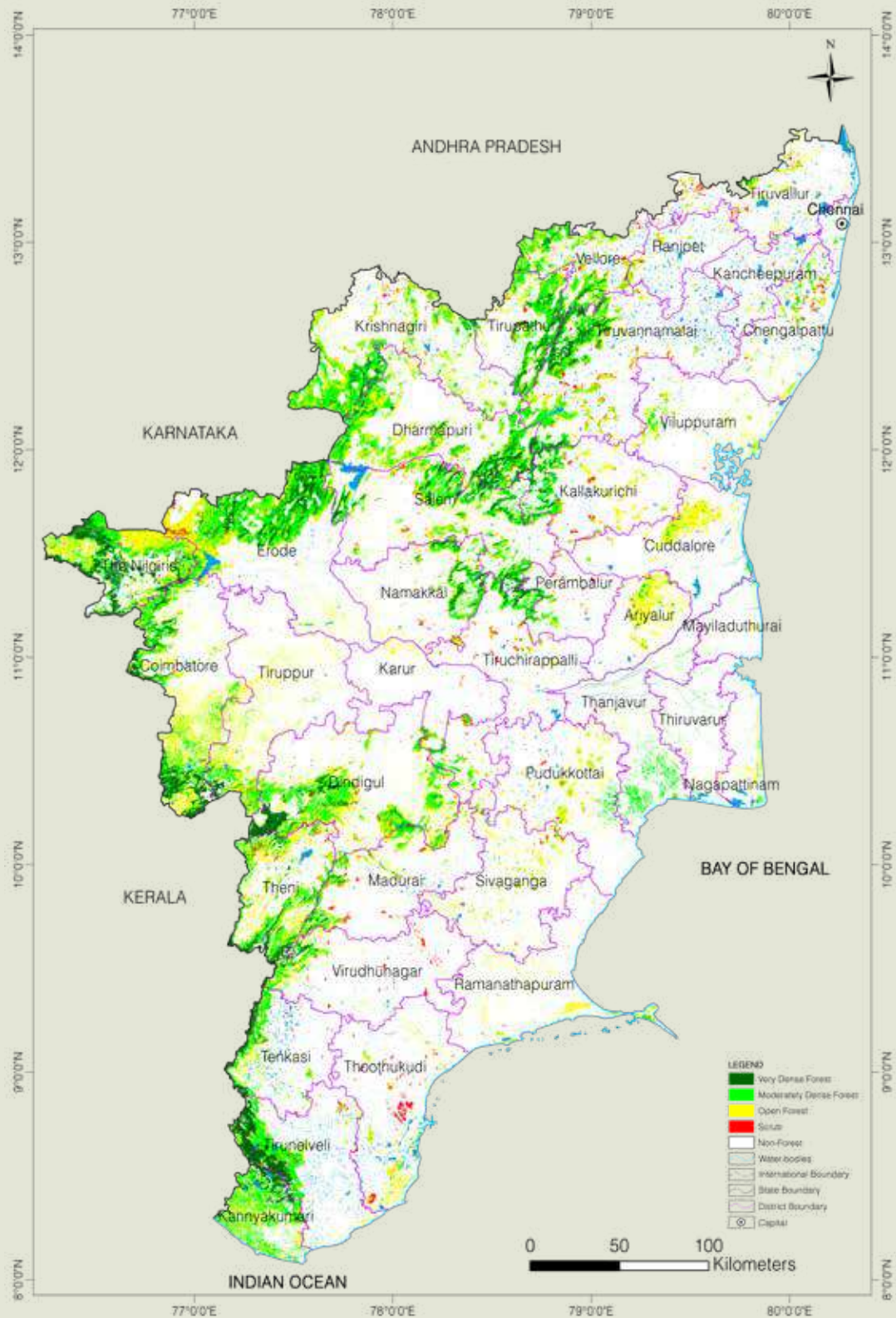


Figure 10.24.3 Forest Cover Map of Tamil Nadu

10.24.3 Forest Types

The area under different Forest Types in Tamil Nadu (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.24.10 Area Statistics of the Forest Types Found in Tamil Nadu

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	1A/C3 Southern hilltop tropical evergreen forest	107.26	0.38
2	1A/C4 West Coast tropical evergreen forest	681.19	2.44
3	2A/C2 West Coast semi-evergreen forest	403.33	1.45
4	2A/C3 Tirunelveli semi-evergreen forest	116.60	0.42
5	2/E3 Moist bamboo brakes	328.56	1.18
6	3B/C1a Very moist teak forest	59.20	0.21
7	3B/C1b Moist teak forest	166.14	0.60
8	3B/C1c Slightly moist teak forest	51.59	0.19
9	3B/C2 Southern moist mixed deciduous forest	1,241.41	4.46
10	3B/C2/2S1 Southern secondary moist mixed deciduous forest	259.02	0.93
11	4A/L1 Littoral Forest	7.77	0.03
12	4B/TS1 Mangrove scrub	28.00	0.10
13	4B/TS2 Mangrove forest	20.81	0.07
14	4C/FS2 Submontane hill valley swamp forest	1.93	0.01
15	4E/RS1 Riparian fringing forest	36.69	0.13
16	5A/C1a Very dry teak forest	0.91	0.00
17	5A/C1b Dry teak forest	156.43	0.56
18	5A/C2 Dry red sanders-bearing forest	10.73	0.04
19	5A/C3 Southern dry mixed deciduous forest	6,246.63	22.42
20	5/DS1 Dry deciduous scrub	938.98	3.37
21	5/DS2 Dry savannah forest	260.82	0.94
22	5/DS3 <i>Euphorbia</i> scrub	3.30	0.01
23	5/DS4 Dry grass land	51.70	0.19
24	5/E4 <i>Hardwickia</i> forest	440.61	1.58
25	5/E9 Dry bamboo brakes	147.64	0.53
26	5/1S1 Dry tropical riverain forest	110.64	0.40
27	5/2S1 Secondary dry deciduous forest	2,749.37	9.87
28	6A/C1 Southern thorn forest	1,851.58	6.65
29	6A/C2 Carnatic umbrella thorn forest	1,459.40	5.24
30	6A/DS1 Southern thorn scrub	516.91	1.86
31	6A/DS2 Southern <i>Euphorbia</i> scrub	42.96	0.15
32	7/C1 Tropical dry evergreen forest	302.53	1.09
33	7/DS1 Tropical dry evergreen scrub	77.26	0.28
34	8A/C1 Nilgiri sub tropical hill forest	173.39	0.62
35	8A/C1/DS1 South Indian sub-tropical hill savannah (woodland)	18.73	0.07
36	8A/E1 Reed brakes (<i>Ochlandra</i>)	3.08	0.01
37	11A/C1 Southern montane wet temperate forest	185.14	0.66
38	11A/C1/DS1 Southern montane wet scrub	3.81	0.01



Table 10.24.10 Area Statistics of the Forest Types Found in Tamil Nadu

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
39	11A/C1/DS2 Southern montane wet grassland	19.10	0.07
	Sub Total	19,281.15	69.21
40	TOF/ Plantation	8,047.36	28.87
	Total (Forest Cover & Scrub)	27,328.51	98.08
	Grassland forest type (outside forest cover)		
41	5/DS2 Dry savannah forest	108.48	0.39
42	5/DS4 Dry grassland	232.74	0.84
43	11A/C1/DS2 Southern montane wet grassland	192.90	0.69
	Sub Total	534.12	1.92
	Grand Total	27,862.63	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest types outside forest cover have also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).

10.24.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.24.11 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Ariyalur	4	2
2	Chengalpattu	8	4
3	Chennai	0	0
4	Coimbatore	162	13
5	Cuddalore	1	8
6	Dharmapuri	39	101
7	Dindigul	205	798
8	Erode	44	100
9	Kallakurichi	52	43
10	Kancheepuram	4	4
11	Kanniyakumari	178	118
12	Karur	0	1
13	Krishnagiri	277	348
14	Madurai	32	22
15	Mayiladuthurai	0	1
16	Nagapattinam	0	0
17	Namakkal	18	51
18	Perambalur	6	9
19	Pudukkottai	4	14
20	Ramanathapuram	1	1
21	Ranipet	50	58
22	Salem	29	90
23	Sivaganga	4	4

Table 10.24.11 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
24	Tenkasi	4	7
25	Thanjavur	3	2
26	The Nilgiris	100	400
27	Theni	215	171
28	Thiruvavur	0	0
29	Thoothukudi	4	2
30	Tiruchchirapalli	6	14
31	Tirunelveli	2	0
32	Tirupathur	104	322
33	Tiruppur	133	54
34	Tiruvallur	89	80
35	Tiruvannamalai	109	260
36	Vellore	102	249
37	Viluppuram	4	0
38	Virudhunagar	5	29
Total		1,998	3,380

10.24.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.24.12 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	0.00	0.00
2	Very highly fire prone	95.86	0.35
3	Highly fire prone	690.41	2.53
4	Moderately fire prone	1,699.73	6.22
5	Less fire prone	24,842.51	90.90
Total		27,328.51	100.00

*Forest Cover including Scrub.

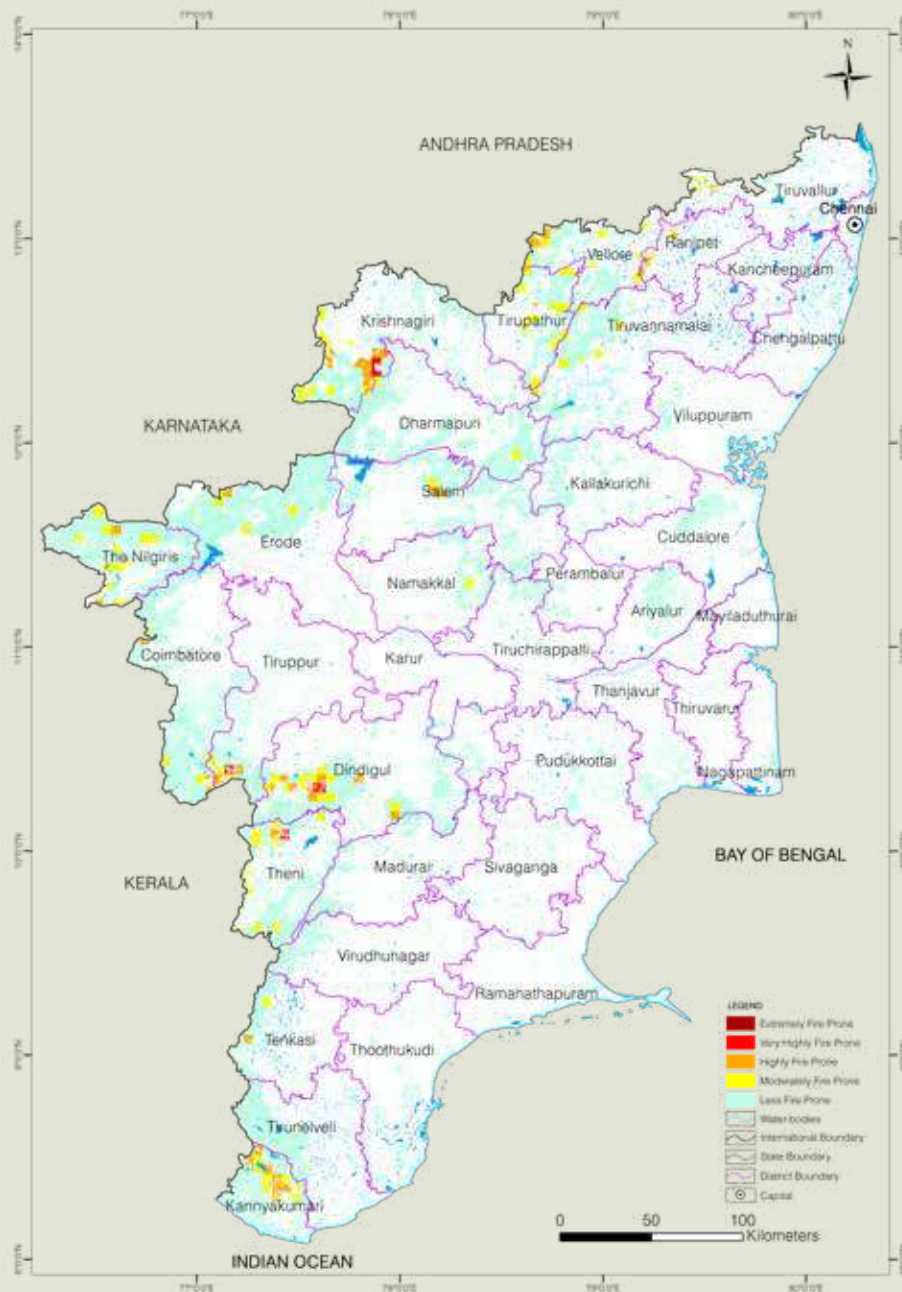


Figure 10.24.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.24.6 Results Derived from NFI for Tamil Nadu

Table 10.24.13 Number of Trees and their volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Albizia amara</i>	76,363	6.58
2	<i>Anogeissus latifolia</i> / <i>Terminalia anogeissiana</i>	27,562	6.36
3	<i>Commiphora species</i>	18,187	2.90
4	<i>Eucalyptus species</i>	17,701	2.38
5	<i>Chloroxylon swietenia</i>	17,642	1.70



Table 10.24.14 Number of Trees and their volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Prosopis juliflora</i> / <i>Neltuma juliflora</i>	1,00,552	2.306
2	<i>Cocos nucifera</i>	80,370	22.455
3	<i>Azadirachta indica</i>	68,371	5.847
4	<i>Borassus flabellifer</i> / <i>Borassus flabelliformis</i>	29,497	13.918
5	<i>Mangifera indica</i>	26,516	6.489

Table 10.24.15 Number of Trees and their volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Cocos nucifera</i>	18,440	4.119
2	<i>Azadirachta indica</i>	10,647	1.838
3	<i>Prosopis juliflora</i> / <i>Neltuma juliflora</i>	5,664	0.175
4	<i>Moringa oleifera</i>	5,483	0.340
5	<i>Mangifera indica</i>	3,608	1.208

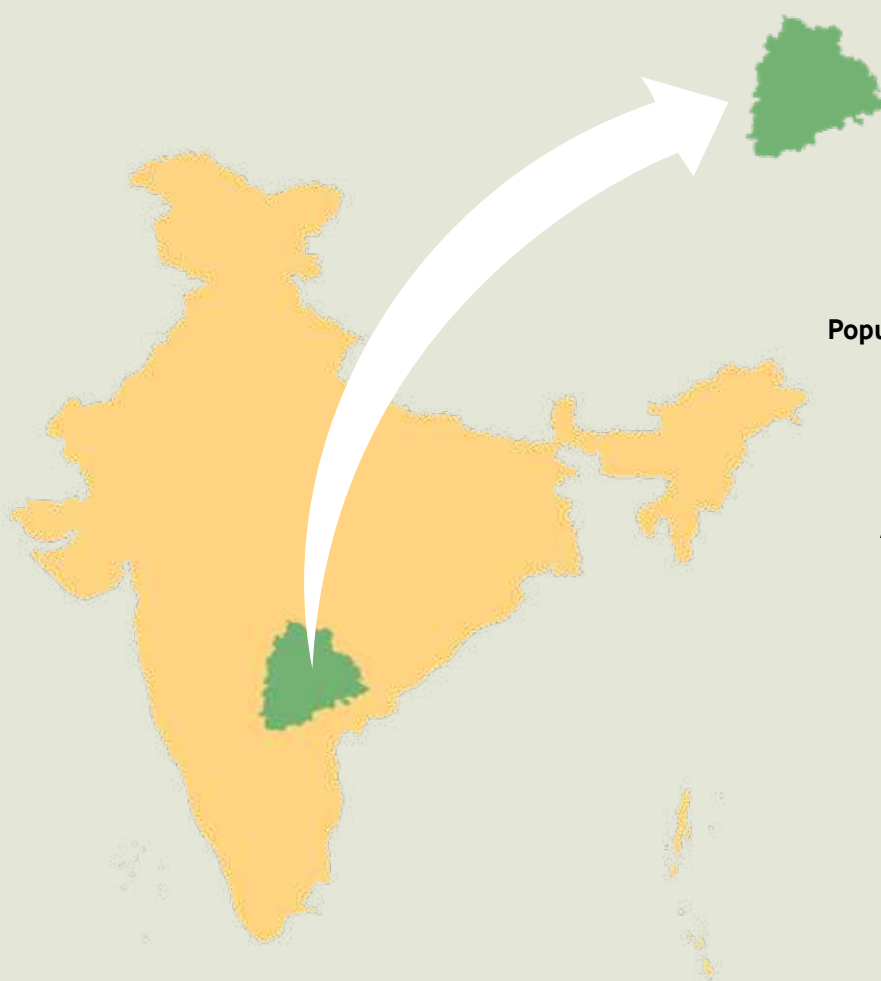
Table 10.24.16 Major NTFP Species in Tamil Nadu

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Albizia amara</i>	Tree	9,10,036
2	<i>Azadirachta indica</i>	Tree	4,75,926
3	<i>Murraya koenigii</i> / <i>Bergera koenigii</i>	Tree	4,05,545
4	<i>Carissa carandas</i>	Tree	3,41,514
5	<i>Anogeissus latifolia</i> / <i>Terminalia anogeissiana</i>	Tree	3,37,870
6	<i>Emblica officinalis</i> / <i>Phyllanthus emblica</i>	Tree	2,77,819
7	<i>Ziziphus species</i>	Tree	2,45,589
8	<i>Solanum torvum</i>	Shrubs	36,60,140
9	<i>Cissus quadrangularis</i>	Climbers	8,76,908
10	<i>Cymbopogon citratus</i>	Herbs	3,74,67,101

Table 10.24.17 Major invasive Species in the State inside the RFA in Tamil Nadu

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Lantana camara</i>	2,045.96
2	<i>Chromolaena odorata</i>	962.59
3	<i>Prosopis juliflora</i> / <i>Neltuma juliflora</i>	166.42
4	<i>Ageratum conyzoides</i>	130.00
5	<i>Cuscuta spp.</i>	111.10

TELANGANA

**Geographical Area**1,12,122 km²**Geographical Coordinates**

Latitude 15°50' N to 19°55' N

Longitude 77°14' E to 81°19' E

Population (as per Census 2011)

35.19 million

Urban 13.61 million (38.88 %)

Rural 21.58 million (61.12 %)

Tribal 3.29 million (9.35 %)

Average Population Density306 per km²**Livestock Population**(as per 19th Livestock Census)

56.10 million

No. of Districts

33

No. of Hill Districts

0

No. of Tribal Districts

3

Table 10.25.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	11,208	
Reporting area for land utilization	11,207.70	100.00
Forests	2,767.89	24.70
Not available for land cultivation	1,458.33	13.01
Permanent pastures and other grazing lands	266.92	2.38
Land under misc. tree crops and groves	81.91	0.73
Culturable wasteland	111.01	0.99
Fallow land other than current fallows	343.72	3.07
Current fallows	552.73	4.93
Net area sown	5,625.19	50.19

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.25.1 Forest Cover

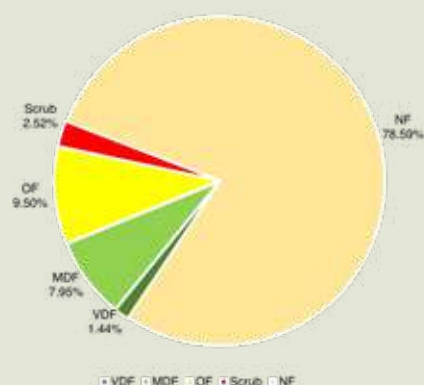


Table 10.25.2 Forest Cover of Telangana

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	1,613.32	1.44
MDF	8,909.90	7.95
OF	10,655.82	9.50
Total	21,179.04	18.89
Scrub	2,829.88	2.52

Figure 10.25.1 Forest Cover of Telangana

Table 10.25.3 District- wise Forest Cover in Telangana

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Adilabad	3,999.63	22.01	694.52	428.73	1,145.26	28.63	-115.50	35.02
Bhadradi Kothagudem	6,985.69	637.34	1,502.71	721.61	2,861.66	40.96	-95.55	28.93
Hanumakonda	1,652.57	0.00	5.63	42.79	48.42	2.93	0.19	7.81
Hyderabad	191.22	0.00	4.66	13.50	18.16	9.50	1.43	2.86
Jagtial	2,868.72	0.14	195.13	442.53	637.80	22.23	54.70	83.44
Jangaon	2,112.98	0.00	7.92	57.40	65.32	3.09	-2.13	28.57
Jayashankar Bhupalpally	2,904.13	70.52	647.44	439.43	1,157.39	39.85	-15.43	37.78
Jogulamba Gadwal	2,576.27	0.00	0.10	34.02	34.12	1.32	0.96	25.59
Kamareddy	3,751.07	0.00	126.03	434.17	560.20	14.93	8.46	114.75
Karimnagar	2,126.21	0.00	0.15	34.05	34.20	1.61	4.45	14.45
Khammam	4,523.77	42.68	261.44	303.35	607.47	13.43	-25.76	21.94
Kumuram Bheem	4,487.77	41.32	987.67	749.27	1,778.26	39.62	-44.61	27.80
Mahabubabad	3,620.76	122.28	508.20	291.54	922.02	25.46	-26.98	37.28
Mahabubnagar	2,748.96	0.00	54.38	129.08	183.46	6.67	12.90	102.34
Mancherial	3,910.76	28.42	782.47	754.04	1,564.93	40.02	34.96	42.08
Medak	2,765.29	0.00	69.45	388.63	458.08	16.57	28.86	91.59
Medchal-Malkajgiri	1,075.94	0.00	20.22	122.52	142.74	13.27	1.38	103.93
Mulugu	4,259.61	257.80	1,256.04	1,185.55	2,699.39	63.37	-25.91	54.03
Nagarkurnool	6,410.89	332.68	532.20	1,067.65	1,932.53	30.14	50.53	363.14
Nalgonda	7,205.53	0.00	8.16	311.69	319.85	4.44	26.41	370.06
Narayanpet	2,391.23	0.00	11.06	50.70	61.76	2.58	1.78	68.01
Nirmal	3,719.29	57.74	688.43	338.85	1,085.02	29.17	-45.37	24.41
Nizamabad	4,156.80	0.22	158.68	516.68	675.58	16.25	-4.78	139.00
Peddapalli	2,195.46	0.00	67.53	249.02	316.55	14.42	1.83	68.72
Rajanna Sircilla	1,876.92	0.00	62.94	214.67	277.61	14.79	10.81	61.95
Rangareddy	5,004.44	0.11	30.54	399.32	429.97	8.59	5.05	266.28



Table 10.25.3 District- wise Forest Cover in Telangana

District	Calculated Area by Sol	2023 Assessment				% of Cal- culated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Sangareddy	4,442.30	0.00	25.19	185.73	210.92	4.75	33.67	89.45
Siddipet	3,616.49	0.00	42.69	197.47	240.16	6.64	22.04	77.19
Suryapet	3,592.19	0.00	1.80	43.43	45.23	1.26	-1.05	122.40
Vikarabad	3,608.24	0.03	122.14	246.08	368.25	10.21	0.12	70.15
Wanaparthy	2,157.65	0.00	3.52	54.41	57.93	2.68	6.83	94.58
Warangal	1,754.31	0.00	17.81	35.76	53.57	3.05	-2.51	8.32
Yadadri Bhuvanagiri	3,429.35	0.03	13.05	172.15	185.23	5.40	-2.20	146.03
Grand Total	1,12,122.44	1,613.32	8,909.90	10,655.82	21,179.04	18.89	-100.42	2,829.88

*Area figure calculated without normalization factor.

Table 10.25.4 Division-wise Forest Cover in Telangana

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area*	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Achampet	4,570.41	19.19	312.76	396.42	728.37	15.94	29.31	115.59
Adilabad	2,247.61	0.00	265.78	206.97	472.75	21.03	-59.40	29.20
Amangal	2,904.33	0.11	15.62	260.63	276.36	9.52	10.02	157.20
Amrabad WL	1,832.35	313.49	219.47	672.38	1,205.34	65.78	22.18	253.47
Armoor	1,832.83	0.00	82.71	161.96	244.67	13.35	-6.21	51.65
Asifabad	2,818.66	39.67	565.18	517.93	1,122.78	39.83	-30.59	19.00
Banswada	1,856.28	0.00	61.56	163.55	225.11	12.13	-0.32	46.61
Bellemapally	1,122.91	11.17	135.38	190.18	336.73	29.99	0.02	7.37
Bhadrachalam	868.31	23.91	165.79	83.89	273.59	31.51	-28.47	5.81
Bhupalpally	1,945.72	20.66	352.28	252.37	625.31	32.14	-15.35	35.28
Chennur	1,005.46	0.00	272.93	182.89	455.82	45.33	13.20	14.92
Echoda	1,231.15	1.00	208.22	169.54	378.76	30.76	-23.54	4.18
Eturnagaram WL	1,017.29	130.34	364.79	244.48	739.61	72.70	-16.13	6.69
Gadwal	2,577.78	0.00	0.10	33.93	34.03	1.32	0.98	25.52
Guduru WL	1,148.29	98.41	379.11	159.01	636.53	55.43	-15.63	4.81
Hanumakonda	1,293.55	0.00	6.62	38.85	45.47	3.52	0.14	6.97
Hyderabad	181.86	0.00	5.20	12.39	17.59	9.67	1.39	2.24
Jagtial	2,852.61	0.14	189.01	433.29	622.44	21.82	53.53	81.45
Jangoan	2,284.79	0.00	7.51	56.93	64.44	2.82	-2.53	28.94
Jannaram WL	543.98	16.80	152.57	96.59	265.96	48.89	8.74	1.85
Kaghaznagar	1,675.38	1.51	432.21	231.72	665.44	39.72	-14.07	8.24
Kamareddy	1,869.33	0.00	62.18	265.80	327.98	17.55	9.00	67.60
Karimnagar	2,125.05	0.00	0.15	34.86	35.01	1.65	5.24	15.41

Table 10.25.4 Division-wise Forest Cover in Telangana

(km²)

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area*	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Khammam	2,947.83	8.27	55.26	130.58	194.11	6.58	-1.70	16.94
Khanapur	1,078.26	57.27	515.44	137.18	709.89	65.84	-24.64	2.58
Kinnerasani WL	823.06	129.59	238.19	52.95	420.73	51.12	1.89	2.22
Kothagudem	1,196.13	65.17	154.38	137.45	357.00	29.85	-2.24	3.51
Mahaboobnagar	2,731.78	0.00	70.92	141.87	212.79	7.79	12.50	98.54
Mahabubabad	2,387.65	23.77	91.80	101.58	217.15	9.09	-10.66	31.89
Mahadevpur	1,084.55	54.09	349.63	219.05	622.77	57.42	-0.43	5.61
Mancherial	1,234.69	0.00	210.77	283.35	494.12	40.02	12.79	18.41
Manuguru	1,077.20	109.70	181.85	127.37	418.92	38.89	-16.75	3.56
Medak	2,747.88	0.00	69.48	387.00	456.48	16.61	29.52	94.47
Medchal	1,083.57	0.00	20.38	123.21	143.59	13.25	1.41	105.18
Mulugu	1,060.03	21.33	230.82	266.76	518.91	48.95	-1.12	16.50
Nagarjunasagar WL	1,742.00	0.00	7.05	171.01	178.06	10.22	13.18	236.76
Nalgonda	5,483.08	0.00	1.10	140.22	141.32	2.58	13.14	133.80
Narayanpet	2,390.27	0.00	11.06	51.52	62.58	2.62	1.45	71.83
Nirmal	2,656.17	0.11	188.22	199.93	388.26	14.62	-22.09	21.78
Nizamabad	2,333.92	0.09	70.90	342.12	413.11	17.70	1.35	85.52
Paloncha	1,843.36	194.43	393.83	264.09	852.35	46.24	-35.00	9.98
Peddapally	2,212.28	0.00	67.58	252.67	320.25	14.48	1.81	69.49
Rajanna-Sircilla	1,901.23	0.13	74.58	235.71	310.42	16.33	11.39	64.23
Sangareddy	4,459.37	0.00	25.17	181.15	206.32	4.63	32.91	86.62
Sathupally	1,527.67	27.59	167.49	161.42	356.50	23.34	-18.51	4.42
Shamshabad	2,094.33	0.00	14.68	140.03	154.71	7.39	-4.98	109.55
Siddipet	3,635.59	0.00	44.95	204.44	249.39	6.86	21.83	76.85
Suryapet	3,585.06	0.00	1.80	43.21	45.01	1.26	-1.22	121.82
Tadvai	815.35	78.81	274.54	183.11	536.46	65.80	-8.94	3.17
Utnoor FDPT	549.82	21.97	204.54	52.52	279.03	50.75	-31.41	1.50
Venkatapur	1,199.69	21.98	331.38	432.74	786.10	65.53	0.00	24.68
Vikarabad	3,613.71	0.03	105.42	229.16	334.61	9.26	-0.70	65.64
Wanaparthy	2,181.97	0.00	3.51	56.19	59.70	2.74	7.47	92.78
Warangal	2,140.07	0.02	28.01	55.93	83.96	3.92	-2.35	9.79
Yadadri Bhuvanagiri	3,252.81	0.03	12.56	169.96	182.55	5.61	-1.85	144.60
Yellandu	1,265.88	81.31	367.35	94.60	543.26	42.92	-17.41	3.97
Area which does not fall in any Division	277.59	41.23	68.13	19.18	128.54	46.31	-2.57	1.69
Grand Total	1,12,419.78	1,613.32	8,909.90	10,655.82	21,179.04	18.84	-100.42	2,829.88

#As per the division boundary shapefile provided by State Forest Department.

*Area figure calculated without normalization factor.



10.25.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.25.5 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Telangana

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
1,544.81	8,520.97	8,390.33	18,456.11	68.51	388.93	2,265.49	2,722.93
8.37	46.17	45.46		2.52	14.28	83.20	

(km²)

*In case of Telangana, RFA boundaries have been used.

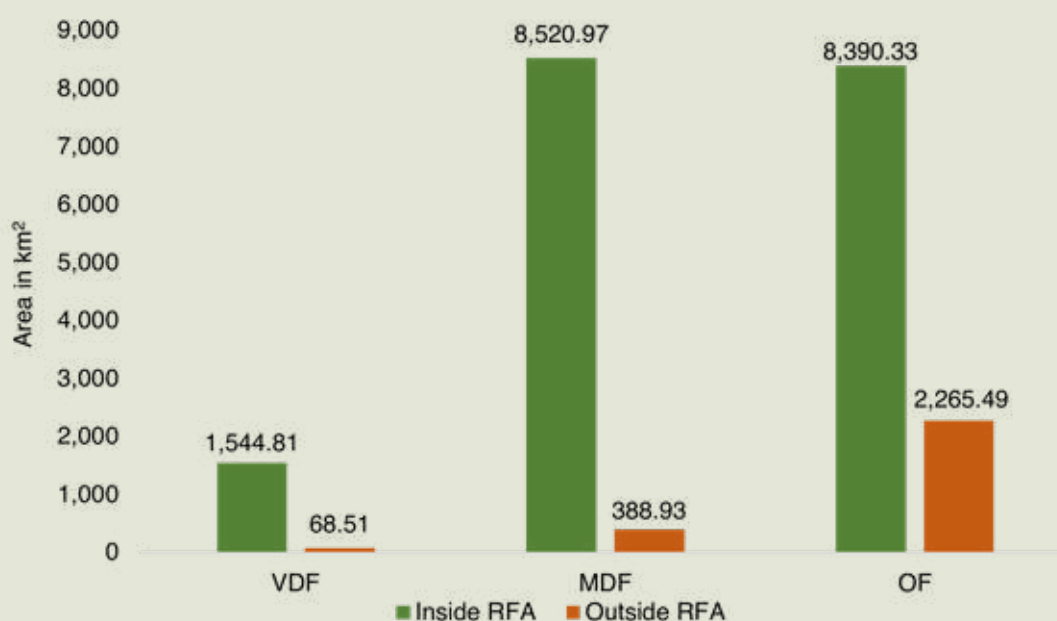


Figure 10.25.2 Forest Cover Inside and Outside of RFA in Telangana

Table 10.25.6 Forest Cover Change Matrix Inside RFA/GW for Telangana between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					Total ISFR 2021 inside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	1,532.96	0.89	1.61	1.61	11.40	1,548.47
MDF	11.53	8,353.60	35.47	18.14	213.85	8,632.59
OF	0.32	154.40	7,840.34	51.86	334.00	8,380.92
Scrub	0.00	1.00	199.01	1,040.46	87.64	1,328.11
NF	0.00	11.08	313.90	193.09	6,473.22	6,991.29
Total ISFR 2023 inside RFA / GW	1,544.81	8,520.97	8,390.33	1,305.16	7,120.11	26,881.38
Net Change	-3.66	-111.62	9.41	-22.95	128.82	

*Area figure calculated without normalization factor.

Table 10.25.7 Forest Cover Change Matrix Outside RFA/GW for Telangana between 2021 Raster based and 2023 Assessments

(km²)

Class	2023 Assessment outside RFA/GW					Total ISFR 2021 outside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	68.36	0.12	0.14	0.18	2.31	71.11
MDF	0.15	377.79	5.19	2.59	54.52	440.24
OF	0.00	8.39	1,827.93	25.16	344.65	2,206.13
Scrub	0.00	0.18	113.03	1,231.75	316.65	1,661.61
NF	0.00	2.45	319.20	265.04	80,275.28	80,861.97
Total ISFR 2023 outside RFA/GW	68.51	388.93	2,265.49	1,524.72	80,993.41	85,241.06
Net Change	-2.60	-51.31	59.36	-136.89	131.44	

*Area figure calculated without normalization factor

Table 10.25.8 Altitude-wise Forest Cover in Telangana

(km²)

Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	88,735.19	1,283.18	7,578.60	7,903.84	16,765.62	1,986.07
500-1000	23,387.25	330.14	1,331.30	2,751.98	4,413.42	843.81
Total	1,12,122.44	1,613.32	8,909.90	10,655.82	21,179.04	2,829.88

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

Table 10.25.9 Forest Cover in Different Slope Classes in Telangana

(km²)

Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	1,01,814.77	911.44	5,651.90	7,432.11	13,995.45	2,191.11
5-10	5,543.84	286.08	1,421.92	1,550.00	3,258.00	350.08
10-15	2,244.06	166.27	828.84	768.99	1,764.10	140.24
15-20	1,260.26	109.42	512.45	444.64	1,066.51	74.51
20-25	719.20	73.73	291.96	259.43	625.12	42.60
25-30	357.61	42.11	137.93	132.50	312.54	21.52
>30	182.70	24.27	64.90	68.15	157.32	9.82
Total	1,12,122.44	1,613.32	8,909.90	10,655.82	21,179.04	2,829.88

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

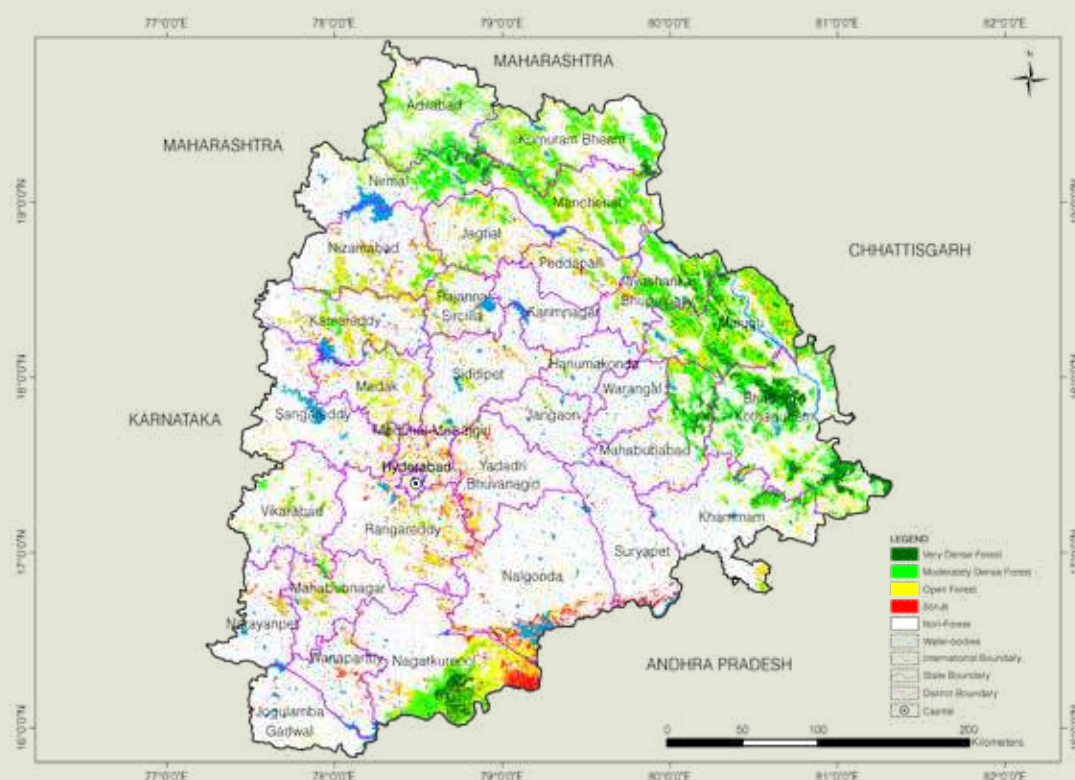


Figure 10.25.3 Forest Cover Map of Telangana

10.25.3 Forest Types

The area under different Forest Types in Telangana (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map(FCM), ISFR-2023, is presented in the following table.

Table 10.25.10 Area Statistics of the Forest Types found in Telangana

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	3B/C2 Southern moist mixed deciduous forest	50.30	0.21
2	5A/C1b Dry teak forest	3,321.86	13.80
3	5A/C3 Southern dry mixed deciduous forest	14,273.00	59.31
4	5/DS1 Dry deciduous scrub	4,741.87	19.70
5	5/DS2 Dry savannah forest	4.04	0.02
6	5/DS4 Dry grassland	11.23	0.05
7	5/E2 <i>Boswellia</i> forest	0.77	0.00
8	5/E4 <i>Hardwickia</i> forest	0.45	0.00
9	5/E9 Dry bamboo brakes	17.48	0.07
10	5/2S1 Secondary dry deciduous forest	128.39	0.53
11	6A/C1 Southern thorn forest	331.15	1.38

Table 10.25.10 Area Statistics of the Forest Types found in Telangana

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
12	6A/DS1 Southern thorn scrub	6.50	0.03
	Sub Total	22,887.04	95.10
13	TOF/ Plantation	1,121.88	4.66
	Total (Forest Cover & Scrub)	24,008.92	99.76
	Grassland forest type (outside forest cover)		
14	5/DS4 Dry grassland	57.47	0.24
	Grand Total	24,066.39	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest type outside forest cover has also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).

10.25.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.25.11 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Adilabad	786	391
2	Bhadradi Kothagudem	1,942	2,600
3	Hanumakonda	4	2
4	Hyderabad	0	0
5	Jagtial	510	455
6	Jangaon	2	0
7	Jayashankar Bhupalapally	659	1,006
8	Jogulamba Gadwal	0	0
9	Kamareddy	347	403
10	Karimnagar	1	1
11	Khammam	381	260
12	Kumuram Bheem	889	582
13	Mahabubabad	1,318	1,245
14	Mahabubnagar	9	21
15	Mancherial	714	513
16	Medak	140	155
17	Medchal-Malkajgiri	22	11
18	Mulugu	1,783	2,597
19	Nagarkurnool	1,207	1,185
20	Nalgonda	14	29
21	Narayanpet	11	11
22	Nirmal	1,166	685
23	Nizamabad	552	680



Table 10.25.11 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
24	Peddapalli	170	177
25	Rajanna Sircilla	94	170
26	Rangareddy	66	23
27	Sangareddy	77	76
28	Siddipet	80	45
29	Suryapet	3	17
30	Vikarabad	77	97
31	Wanaparthy	4	3
32	Warangal	72	36
33	Yadadri Bhuvanagiri	17	3
Total		13,117	13,479

10.25.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.25.12 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	1,517.74	6.32
2	Very highly fire prone	6,003.97	25.01
3	Highly fire prone	4,319.76	17.99
4	Moderately fire prone	3,041.05	12.67
5	Less fire prone	9,126.40	38.01
Total		24,008.92	100.00

*Forest Cover including Scrub.

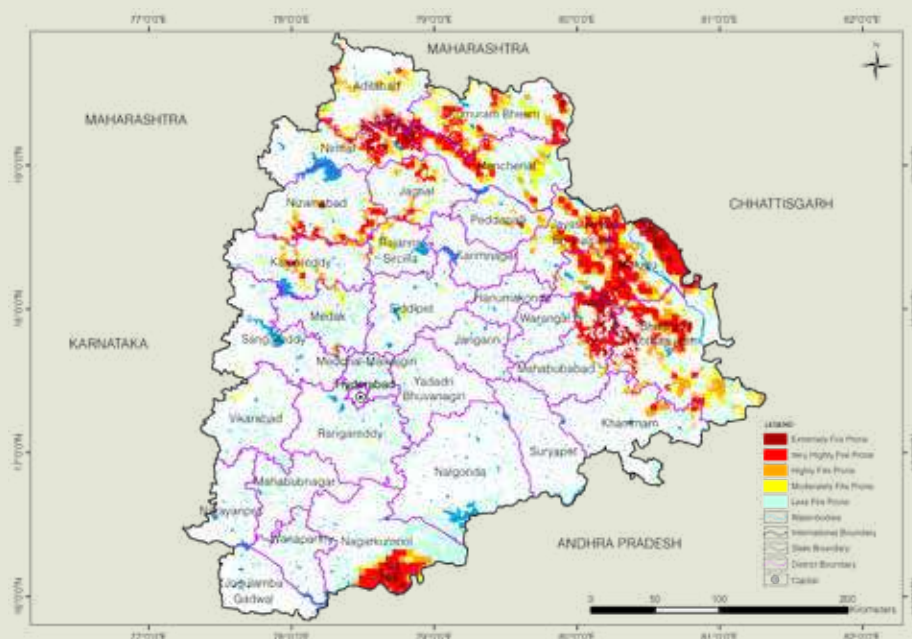


Figure 10.25.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.25.6 Results Derived from NFI for Telangana

Table 10.25.13 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Tectona grandis</i>	91,489	12.21
2	<i>Chloroxylon swietenia</i>	39,637	4.28
3	<i>Anogeissus latifolia/ Terminalia anogeissiana</i>	27,784	7.30
4	<i>Xylia xylocarpa</i>	26,859	5.22
5	<i>Terminalia elliptica/ Terminalia crenulata</i>	23,671	4.48

Table 10.25.14 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Mangifera indica</i>	98,330	12.151
2	<i>Azadirachta indica</i>	40,318	6.744
3	<i>Prosopis juliflora/ Neltuma juliflora</i>	24,927	0.421
4	<i>Butea monosperma</i>	18,933	2.105
5	<i>Tectona grandis</i>	16,204	1.334



Table 10.25.15 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Azadirachta indica</i>	1,548	0.415
2	<i>Prosopis juliflora</i> / <i>Neltuma juliflora</i>	982	0.018
3	<i>Pongamia pinnata</i>	870	0.103
4	<i>Psidium guajava</i>	828	0.022
5	<i>Mangifera indica</i>	791	0.151

Table 10.25.16 Major NTFP Species in Telangana

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Diospyros melanoxylon</i>	Tree	27,81,602
2	<i>Anogeissus latifolia</i> / <i>Terminalia anogeissiana</i>	Tree	21,32,172
3	<i>Strychnos potatorum</i>	Tree	1,92,416
4	<i>Ziziphus species</i>	Tree	1,70,133
5	<i>Strychnos nux-vomica</i>	Tree	1,51,401
6	<i>Schleichera oleosa</i>	Tree	1,12,423
7	<i>Terminalia bellirica</i>	Tree	68,066
8	<i>Hemidesmus indicus</i>	Climbers	1,51,69,177
9	<i>Solanum nigrum</i>	Herbs	4,18,60,083
10	<i>Ocimum species</i> (<i>Ocimum gratissimum</i> / <i>Ocimum sanctum</i> / <i>Ocimum tenuiflorum</i> / <i>Ocimum americanum</i>)	Herbs	2,73,99,327

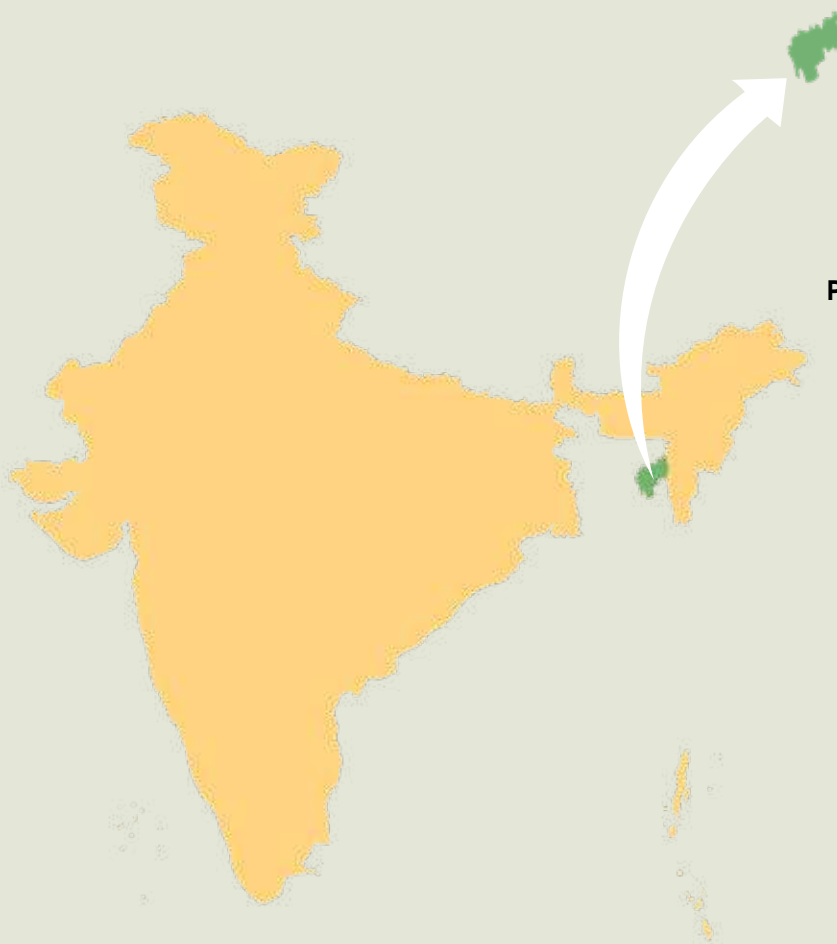
Table 10.25.17 Major Invasive Species in the State Inside the RFA in Telangana

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Lantana camara</i>	941.76
2	<i>Chromolaena odorata</i>	625.72
3	<i>Ageratum conyzoides</i>	253.11
4	<i>Cassia tora</i> / <i>Senna tora</i>	214.94
5	<i>Achyranthes aspera</i>	84.84



Photo: FSI Repository

TRIPURA



Geographical Area

10,486 km²

Geographical Coordinates

Latitude 22°57' N to 24°32' N

Longitude 91°10' E to 92°20' E

Population (as per Census 2011)

3.67 million

Urban 0.96 million (26.17 %)

Rural 2.71 million (73.83 %)

Tribal 1.17 million (31.76 %)

Average Population Density

350 per km²

Livestock Population

(as per 19th Livestock Census)

1.94 million

No. of Districts

8

No. of Hill Districts

8

No. of Tribal Districts

8

Table 10.26.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	1,049	
Reporting area for land utilization	1,049.17	100.00
Forests	629.43	59.99
Not available for land cultivation	149.09	14.21
Permanent pastures and other grazing lands	0.89	0.08
Land under misc. tree crops and groves	9.65	0.92
Culturable wasteland	2.48	0.25
Fallow land other than current fallows	1.20	0.11
Current fallows	1.02	0.10
Net area sown	255.41	24.34

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.26.1 Forest Cover

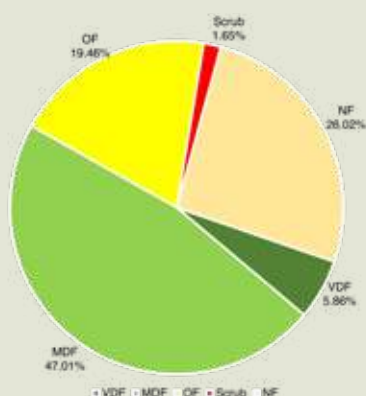


Table 10.26.2 Forest Cover of Tripura

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	614.43	5.86
MDF	4,929.99	47.01
OF	2,040.35	19.46
Total	7,584.77	72.33
Scrub	173.27	1.65

Figure 10.26.1 Forest Cover of Tripura

Table 10.26.3 District- wise Forest Cover in Tripura

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Dhalai ^H	2,298.47	95.68	1,302.69	421.78	1,820.15	79.19	-44.58	60.18
Gomati ^H	1,650.23	123.70	861.58	251.56	1,236.84	74.95	6.86	12.05
Khowai ^H	1,055.66	93.62	453.48	192.59	739.69	70.07	-23.16	10.88
North Tripura ^H	1,349.70	11.70	663.97	368.65	1,044.32	77.37	-18.88	56.34
Sepahijala ^H	1,053.06	101.24	368.57	185.44	655.25	62.22	-7.35	1.56
South Tripura ^H	1,468.69	108.17	671.29	294.31	1,073.77	73.11	11.60	6.31
Unakoti ^H	685.53	34.29	304.62	92.31	431.22	62.90	-13.52	13.50
West Tripura ^H	924.66	46.03	303.79	233.71	583.53	63.11	-6.28	12.45
Grand Total	10,486.00	614.43	4,929.99	2,040.35	7,584.77	72.33	-95.31	173.27

*Area figure calculated without normalization factor.



Table 10.26.4 Division- wise Forest Cover in Tripura

(km ²)								
Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area*	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Ambassa	1,380.74	67.26	800.11	202.86	1,070.23	77.51	-30.29	38.12
Bagafa	1,200.70	81.43	603.97	224.85	910.25	75.81	8.79	11.15
Gumti	955.77	66.48	564.03	138.13	768.64	80.42	-6.30	4.20
Kailashahar	878.56	31.74	272.85	171.64	476.23	54.21	-7.27	13.47
Kanchanpur	1,186.91	15.87	690.00	277.27	983.14	82.83	-26.30	55.24
Manu	859.38	27.95	493.60	210.39	731.94	85.17	-9.98	20.13
Sadar	1,476.72	114.70	477.46	274.93	867.09	58.72	-10.00	12.96
Sepahijala WL Sanctuary	26.52	14.73	1.72	0.41	16.86	63.57	-0.04	0.00
Teliamura	1,397.61	109.36	570.84	278.82	959.02	68.62	-25.41	12.68
Trishna WLS	489.67	35.43	171.14	138.32	344.89	70.43	1.51	1.83
Udaipur	605.10	47.69	265.46	90.69	403.84	66.74	11.64	1.09
Area which does not fall in any Division	96.75	1.79	18.81	32.04	52.64	54.41	-1.66	2.40
Grand Total	10,554.43	614.43	4,929.99	2,040.35	7,584.77	71.86	-95.31	173.27

#As per the division boundary shapefile provided by State Forest Department.

*Area figure calculated without normalization factor.

Table 10.26.5 Forest Cover in Municipal Areas of Tripura

(km ²)								
Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
1	Agartala	81.14	0.00	3.45	17.58	21.03	25.92	0.07
Grand Total		81.14	0.00	3.45	17.58	21.03	25.92	0.07

*Shapefile of digitized boundary as provided by Agartala Municipal Corporation.

10.26.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.26.6 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Tripura

(km ²)							
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
393.77	3,719.84	1,242.58	5,356.19	220.66	1,210.15	797.77	2,228.58
7.35%	69.45%	23.20%		9.90%	54.30%	35.80%	

*In case of Tripura, RFA boundaries have been used.

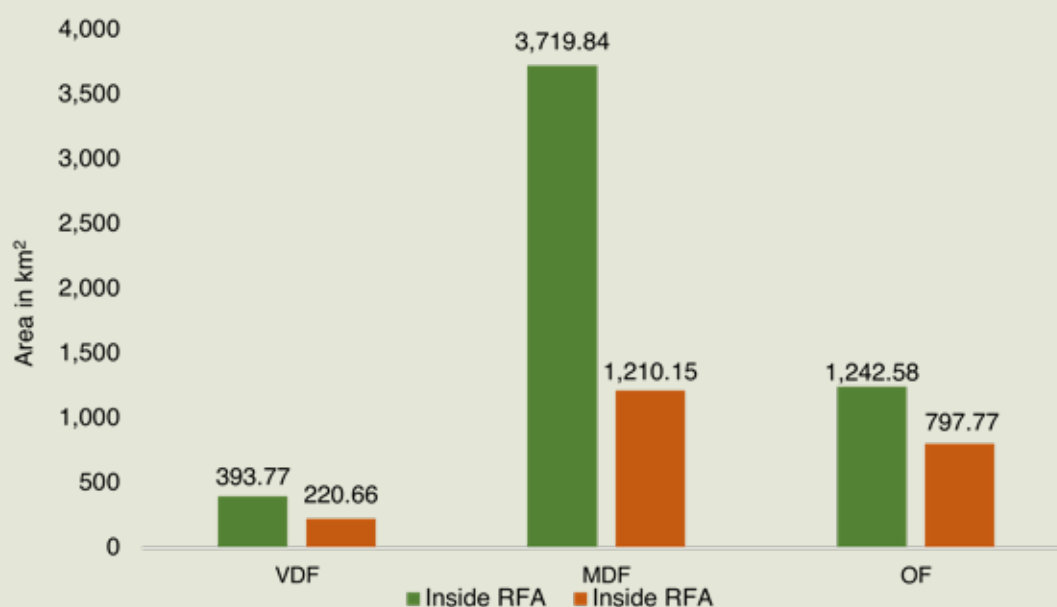


Figure 10.26.2 Forest Cover Inside and Outside of RFA in Tripura

Table 10.26.7 Forest Cover Change Matrix Inside RFA/GW for Tripura between 2021 Raster based and 2023 Assessments

(km ²)						
Class	2023 Assessment inside RFA/GW					Total ISFR 2021 inside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	392.28	2.13	1.24	6.43	6.23	408.31
MDF	1.49	3,620.14	114.28	69.61	79.63	3,885.15
OF	0.00	97.24	1,005.59	47.21	29.59	1,179.63
Scrub	0.00	0.00	16.13	5.60	0.00	21.73
NF	0.00	0.33	105.34	3.29	351.22	460.18
Total ISFR 2023 inside RFA /GW	393.77	3,719.84	1,242.58	132.14	466.67	5,955.00
Net Change	-14.54	-165.31	62.95	110.41	6.49	

*Area figure calculated without normalization factor.



Table 10.26.8 Forest Cover Change Matrix Outside RFA/GW for Tripura between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	220.66	0.66	0.18	1.03	2.80	225.33
MDF	0.00	1,122.90	91.05	9.35	35.02	1,258.32
OF	0.00	85.60	612.23	6.24	19.27	723.34
Scrub	0.00	0.00	1.07	23.77	0.36	25.20
NF	0.00	0.99	93.24	0.74	2,203.84	2,298.81
Total ISFR 2023 outside RFA/GW	220.66	1,210.15	797.77	41.13	2,261.29	4,531.00
Net Change	-4.67	-48.17	74.43	15.93	-37.52	

*Area figure calculated without normalization factor.

Table 10.26.9 Altitude-wise Forest Cover in Tripura

(km ²)						
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	10,424.58	614.43	4,892.50	2,022.33	7,529.26	169.90
500-1000	61.42	0.00	37.49	18.02	55.51	3.37
Total	10,486.00	614.43	4,929.99	2,040.35	7,584.77	173.27

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

Table 10.26.10 Forest Cover in Different Slope Classes in Tripura

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	6,070.75	402.22	2,292.70	1,049.20	3,744.12	69.85
5-10	2,634.23	165.98	1,519.22	517.95	2,203.15	48.67
10-15	1,056.10	34.66	677.56	250.91	963.13	28.04
15-20	443.19	7.79	278.11	126.67	412.57	15.02
20-25	177.89	2.24	104.78	58.60	165.62	6.98
25-30	67.40	0.74	37.44	24.24	62.42	3.09
>30	36.44	0.80	20.18	12.78	33.76	1.62
Total	10,486.00	614.43	4,929.99	2,040.35	7,584.77	173.27

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

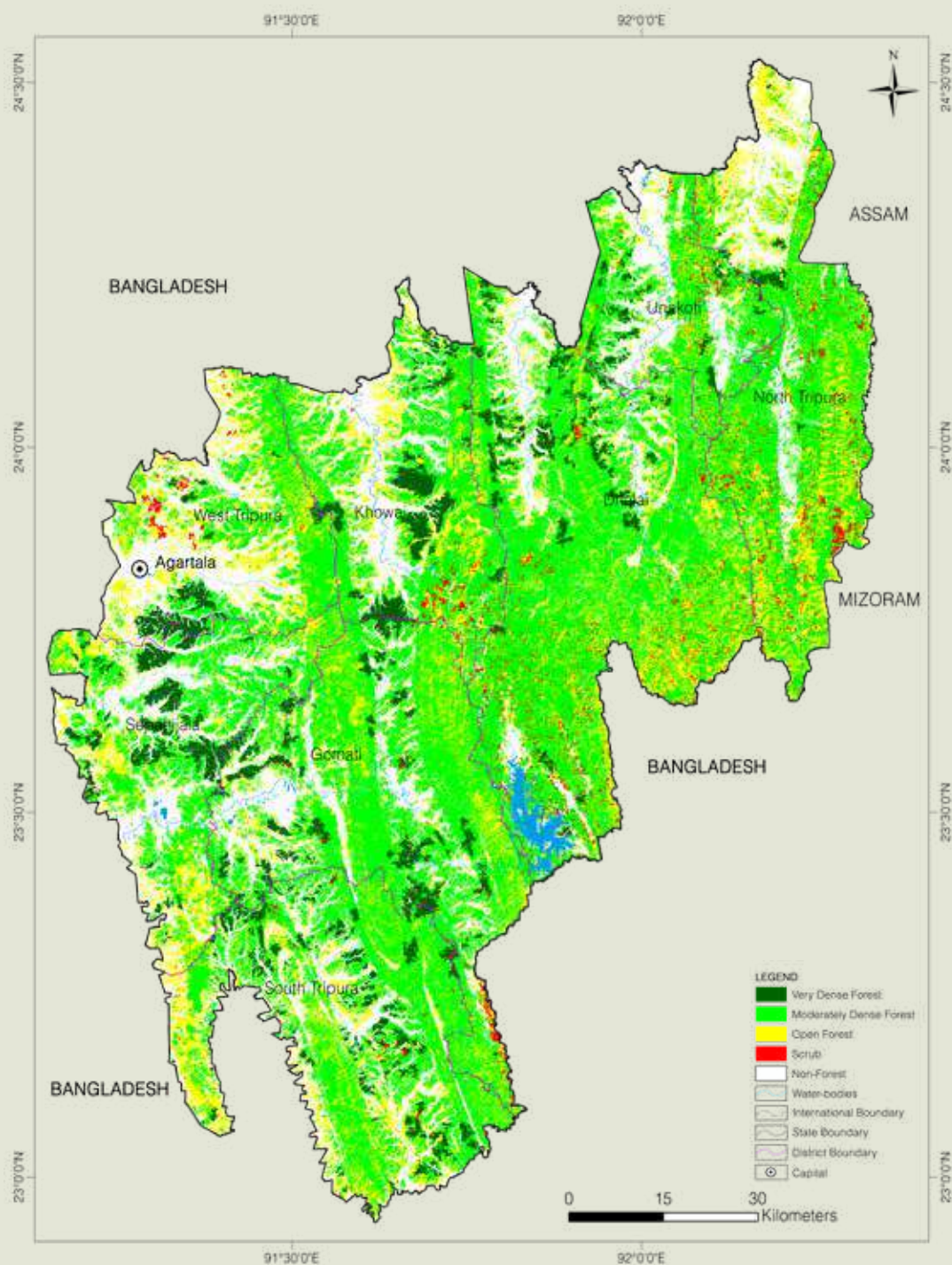


Figure 10.26.3 Forest Cover Map of Tripura



10.26.3 Forest Types

The area under different Forest Types in Tripura (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.26.11 Area Statistics of the Forest Types Found in Tripura

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	2B/C2 Cachar semi-evergreen forest	1.09	0.01
2	2B/C1/2S1 Pioneer Euphorbiaceous scrub	2,141.12	27.60
3	2/2S1 Secondary moist bamboo brakes	583.60	7.52
4	3C/C1b(ii) East Himalayan lower bhabar sal	195.35	2.52
5	3C/C3b East Himalayan moist mixed deciduous forest	3,020.86	38.94
Sub Total		5,942.02	76.59
6	TOF/ Plantation	1,816.02	23.41
Total (Forest Cover & Scrub)		7,758.04	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). The total mapped area, therefore, is sum of forest cover and scrub.

10.26.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.26.12 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Dhalai	1,935	1,070
2	Gomati	665	210
3	Khowai	306	137
4	North Tripura	788	436
5	Sepahijala	60	14
6	South Tripura	248	100
7	Unakoti	261	99
8	West Tripura	69	23
Total		4,332	2,089

10.26.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.26.13 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	688.72	8.88
2	Very highly fire prone	1,791.02	23.08
3	Highly fire prone	1,104.48	14.24
4	Moderately fire prone	975.94	12.58
5	Less fire prone	3,197.88	41.22
Total		7,758.04	100.00

*Forest Cover including Scrub.

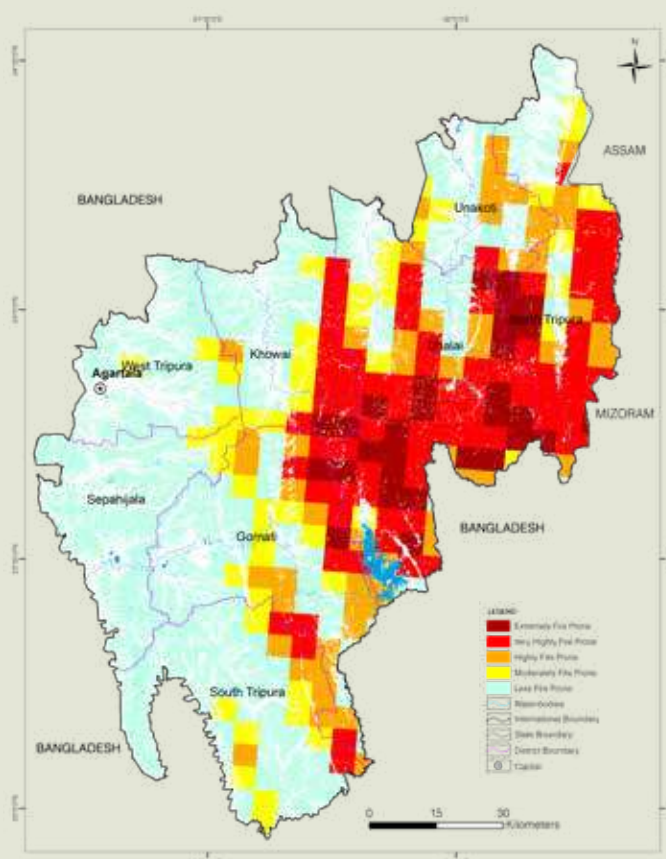


Figure 10.26.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.26.6 Results Derived from NFI for Tripura

Table 10.26.14 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Hevea brasiliensis</i>	46,562	6.66
2	<i>Tectona grandis</i>	8,814	2.56
3	<i>Schima wallichii</i>	4,322	1.49
4	<i>Albizia species</i>	3,986	1.55
5	<i>Macaranga species</i>	3,808	0.38



Table 10.26.15 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Hevea brasiliensis</i>	37,112	3.610
2	<i>Tectona grandis</i>	3,760	0.804
3	<i>Areca catechu</i>	2,491	0.041
4	<i>Schima wallichii</i>	1,266	0.314
5	<i>Syzygium cumini</i>	1,087	0.287

Table 10.26.16 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Areca catechu</i>	972	0.018
2	<i>Hevea brasiliensis</i>	495	0.046
3	<i>Mangifera indica</i>	348	0.084
4	<i>Artocarpus heterophyllus</i>	206	0.041
5	<i>Cocos nucifera</i>	182	0.046

Table 10.26.17 Major NTFP Species in Tripura

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Shorea robusta</i>	Tree	4,49,598
2	<i>Hevea brasiliensis</i>	Tree	46,562
3	<i>Terminalia bellirica</i>	Tree	32,411
4	<i>Anacardium occidentale</i>	Tree	17,677
5	<i>Areca catechu</i>	Tree	2,207
6	<i>Mucuna pruriens</i>	Climbers	6,88,206
7	<i>Thysanolaena latifolia/ Thysanolaena maxima</i>	Herbs	1,17,40,130
8	<i>Schumannianthus benthamianus/ Schumannianthus dichotomus</i>	Herbs	3,68,318

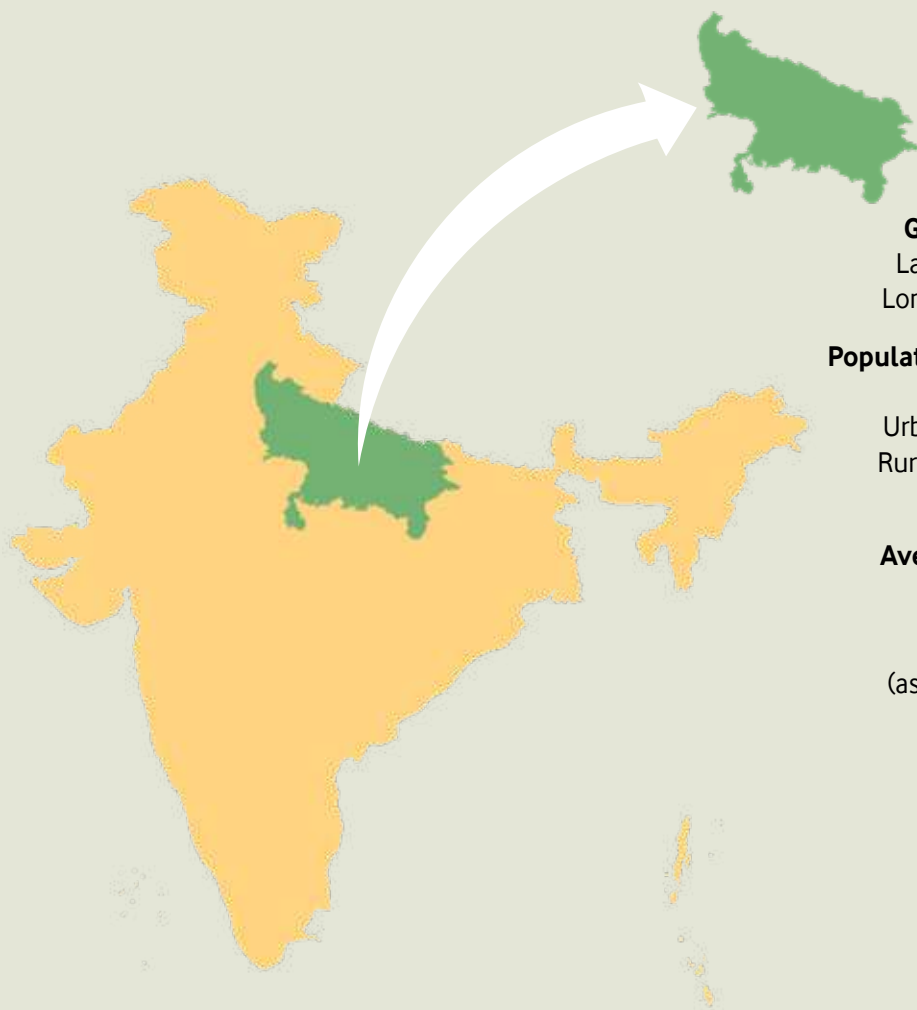
Table 10.26.18 Major Invasive Species in the State Inside the RFA in Tripura

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Chromolaena odorata</i>	352.47
2	<i>Mikania micrantha</i>	107.32
3	<i>Ageratum conyzoides</i>	39.42
4	<i>Lantana camara</i>	26.18
5	<i>Triumfetta rhomboidea</i>	22.73



Photo: FSI Repository

UTTAR PRADESH

**Geographical Area**2,40,928 km²**Geographical Coordinates**

Latitude 23°52' N to 31°28' N

Longitude 77°30' E to 84°39' E

Population (as per Census 2011)

199.81 million

Urban 44.50 million (22.27 %)

Rural 155.31 million (77.73 %)

Tribal 1.13 million (0.57 %)

Average Population Density829 per km²**Livestock Population**(as per 19th Livestock Census)

68.71 million

No. of Districts

75

No. of Hill Districts

0

No. of Tribal Districts

1

Table 10.27.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	24,093	
Reporting area for land utilization	23,513.81	100.00
Forests	1,772.24	7.54
Not available for land cultivation	3,407.16	14.49
Permanent pastures and other grazing lands	70.15	0.30
Land under misc. tree crops and groves	237.25	1.01
Culturable wasteland	369.07	1.57
Fallow land other than current fallows	595.54	2.53
Current fallows	966.49	4.11
Net area sown	16,095.91	68.45

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.27.1 Forest Cover

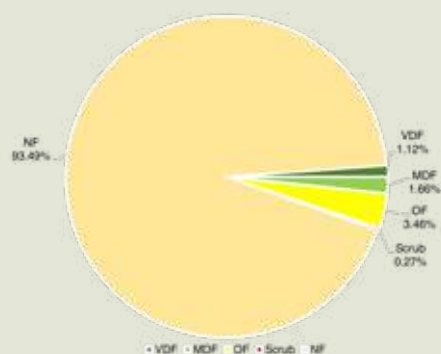


Table 10.27.2 Forest Cover of Uttar Pradesh

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	2,688.73	1.12
MDF	4,001.41	1.66
OF	8,355.66	3.46
Total	15,045.80	6.24
Scrub	639.51	0.27

Figure 10.27.1 Forest Cover of Uttar Pradesh

Table 10.27.3 District- wise Forest Cover in Uttar Pradesh

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Agra	4,027.03	0.00	67.62	207.11	274.73	6.82	12.90	63.42
Aligarh	3,650.25	0.00	6.77	52.86	59.63	1.63	-5.19	1.08
Ambedkar Nagar	2,350.00	0.00	1.29	43.19	44.48	1.89	3.39	0.51
Amethi	3,060.00	4.57	3.12	64.80	72.49	2.37	2.21	0.01
Amroha/ Jyotiba Phule Nagar	2,408.56	0.00	34.64	92.14	126.78	5.26	31.44	1.94
Auraiya	2,016.00	0.00	5.08	40.74	45.82	2.27	1.69	13.09
Ayodhya/ Faizabad	2,341.00	6.86	12.49	87.07	106.42	4.55	4.33	0.80
Azamgarh	4,054.00	0.00	1.09	46.10	47.19	1.16	-1.56	0.00
Baghpat	1,321.38	0.00	3.52	11.96	15.48	1.17	-0.32	0.00
Bahraich	5,237.00	223.69	149.17	158.55	531.41	10.15	1.65	4.27
Ballia	2,981.00	0.00	0.14	20.90	21.04	0.71	-3.45	0.00
Balrampur	3,349.00	293.49	155.24	106.92	555.65	16.59	11.04	7.58
Banda	4,408.00	0.00	50.92	50.41	101.33	2.30	-2.69	2.05
Bara Banki	4,402.00	3.58	5.71	94.70	103.99	2.36	1.99	3.98
Bareilly	4,120.43	0.00	6.83	32.24	39.07	0.95	-5.44	0.00
Basti	2,688.00	0.15	5.14	33.62	38.91	1.45	8.02	0.04
Bhadohi/ Sant Ravidas Nagar	1,015.00	0.00	0.28	4.94	5.22	0.51	0.00	0.00
Bijnor	4,561.15	38.65	212.03	167.31	417.99	9.16	13.53	5.49
Budaun	4,378.05	0.00	4.75	23.15	27.90	0.64	-2.81	6.36
Bulandshahr	3,431.04	0.00	42.61	98.92	141.53	4.12	5.71	0.13
Chandauli	2,541.00	7.69	183.17	358.64	549.50	21.63	-0.81	1.85
Chitrakoot	3,216.00	80.53	314.81	241.22	636.56	19.79	5.86	33.12
Deoria	2,540.00	0.00	1.13	19.19	20.32	0.80	4.78	0.00
Etah	2,490.43	0.00	0.35	20.47	20.82	0.84	-3.15	0.08
Etawah	2,310.58	0.00	63.20	223.59	286.79	12.41	28.84	43.97
Farrukhabad	2,181.07	0.00	14.05	36.44	50.49	2.31	0.71	1.63
Fatehpur	4,169.00	0.00	19.24	37.77	57.01	1.37	-0.05	2.38
Firozabad	2,360.82	0.00	4.44	56.53	60.97	2.58	2.12	24.10



Table 10.27.3 District- wise Forest Cover in Uttar Pradesh

(km²)

District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Gautam Buddha Nagar	1,441.86	0.00	4.45	18.32	22.77	1.58	-0.05	0.00
Ghaziabad	891.61	0.00	7.90	13.12	21.02	2.36	0.03	0.00
Ghazipur	3,377.00	0.00	0.58	23.77	24.35	0.72	-3.86	0.00
Gonda	4,003.00	64.93	9.03	52.97	126.93	3.17	1.29	0.46
Gorakhpur	3,321.00	27.98	21.60	24.91	74.49	2.24	-2.41	0.00
Hamirpur	4,021.00	0.00	77.21	145.97	223.18	5.55	1.66	14.15
Hapur	1,106.67	0.00	6.72	21.09	27.81	2.51	5.72	1.17
Hardoi	5,985.66	0.00	15.62	129.58	145.20	2.43	-1.18	9.36
Hathras/ Mahamaya Nagar	1,840.49	0.00	0.58	21.51	22.09	1.20	-4.15	0.20
Jalaun	4,565.00	0.00	60.66	195.83	256.49	5.62	6.41	53.03
Jaunpur	4,038.00	0.00	10.06	53.94	64.00	1.58	-6.75	0.31
Jhansi	5,024.00	0.00	57.11	284.21	341.32	6.79	34.79	66.79
Kannauj	2,092.87	0.00	0.00	25.61	25.61	1.22	-2.73	0.25
Kanpur Dehat	3,021.00	0.00	3.05	44.01	47.06	1.56	-24.70	16.18
Kanpur Nagar	3,155.00	0.00	8.53	61.59	70.12	2.22	25.29	3.39
Kasganj/ Kanshiram Nagar	1,955.28	0.00	5.37	36.60	41.97	2.15	-10.11	0.11
Kaushambi	1,779.00	0.00	4.35	29.15	33.50	1.88	1.15	0.00
Kheri	7,680.44	805.14	157.70	271.29	1,234.13	16.07	-27.66	8.22
Kushinagar	2,905.00	0.07	2.97	32.13	35.17	1.21	-0.93	0.00
Lalitpur	5,039.00	0.00	127.26	449.79	577.05	11.45	0.00	33.24
Lucknow	2,528.00	0.00	161.18	240.08	401.26	15.87	2.62	8.09
Mahoba	3,144.00	0.00	21.22	151.03	172.25	5.48	2.84	60.55
Mahrajganj	2,952.00	262.28	92.72	71.17	426.17	14.44	-0.66	0.32
Mainpuri	2,760.04	0.00	0.19	17.23	17.42	0.63	1.47	0.00
Mathura	3,339.64	0.00	3.90	49.44	53.34	1.60	-2.15	3.11
Mau	1,713.00	0.00	0.23	11.14	11.37	0.66	0.00	0.00
Meerut	2,500.86	0.00	34.59	56.74	91.33	3.65	5.22	0.00
Mirzapur	4,405.00	8.38	278.51	450.02	736.91	16.73	-2.00	46.59
Moradabad	2,009.40	0.00	3.50	14.23	17.73	0.88	0.82	0.12
Muzaffarnagar	2,750.86	0.00	8.43	45.63	54.06	1.97	5.16	2.71
Pilibhit	3,498.90	486.20	81.75	105.89	673.84	19.26	-21.61	9.92
Pratapgarh	3,717.00	0.00	26.94	97.29	124.23	3.34	0.56	1.63
Prayagraj/ Allahabad	5,482.00	6.28	25.01	134.94	166.23	3.03	4.94	26.67
Raebareli	3,289.00	0.00	2.72	87.10	89.82	2.73	3.80	3.65
Rampur	2,366.58	3.89	24.61	40.49	68.99	2.92	-3.83	0.00
Saharanpur	3,688.96	0.00	182.13	342.87	525.00	14.23	9.07	0.81
Sambhal	2,497.95	0.00	0.74	11.73	12.47	0.50	2.79	0.00
Sant Kabir Nagar	1,646.00	0.00	1.16	12.97	14.13	0.86	0.00	1.17
Shahjahanpur	4,575.24	26.15	5.47	28.77	60.39	1.32	2.25	0.79
Shamli	1,257.46	0.00	3.96	20.43	24.39	1.94	1.54	1.21
Shravasti	1,640.00	197.72	99.29	46.56	343.57	20.95	2.29	0.27

Table 10.27.3 District- wise Forest Cover in Uttar Pradesh

(km²)

District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Siddharthnagar	2,895.00	0.00	11.04	38.65	49.69	1.72	2.61	0.13
Sitapur	5,743.00	0.00	18.77	182.40	201.17	3.50	-1.20	4.62
Sonbhadra	6,905.00	140.50	927.26	1,340.11	2,407.87	34.87	0.66	42.12
Sultanpur	2,679.00	0.00	6.65	130.87	137.52	5.13	-7.55	0.03
Unnao	4,558.00	0.00	28.32	246.06	274.38	6.02	2.24	0.26
Varanasi	1,535.00	0.00	1.54	14.95	16.49	1.07	0.00	0.00
Grand Total	2,40,927.56	2,688.73	4,001.41	8,355.66	15,045.80	6.24	118.43	639.51

*Area figure calculated without normalization factor.

10.27.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.27.4 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Uttar Pradesh

(km²)

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
2,537.81	3,041.49	3,759.46	9,338.76	150.92	959.92	4,596.20	5,707.04
27.17%	32.57%	40.26%		2.64%	16.82%	80.54%	

*In case of Uttar Pradesh, Green Wash boundaries have been used.

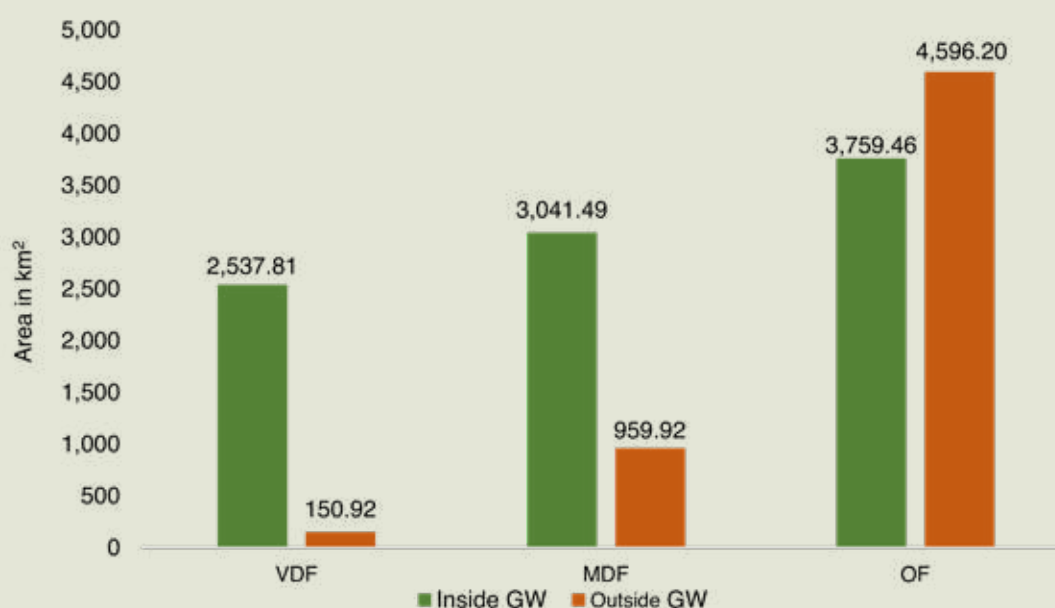
**Figure 10.27.2 Forest Cover Inside and Outside of Green Wash in Uttar Pradesh**



Table 10.27.5 Forest Cover change matrix inside RFA/GW for Uttar Pradesh between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 inside RFA / GW Raster based*
VDF	2,432.96	48.14	6.70	0.06	16.70	2,504.56
MDF	87.34	2,737.58	178.00	1.19	45.85	3,049.96
OF	8.36	213.10	3,322.28	27.28	174.06	3,745.08
Scrub	0.02	1.50	64.34	217.96	25.59	309.41
NF	9.13	41.17	188.14	64.48	3,495.66	3,798.58
Total ISFR 2023 inside RFA / GW	2,537.81	3,041.49	3,759.46	310.97	3,757.86	13,407.59
Net Change	33.25	-8.47	14.38	1.56	-40.72	

*Area figure calculated without normalization factor.

Table 10.27.6 Forest Cover change matrix outside RFA/GW for Uttar Pradesh between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	138.87	4.04	1.50	0.01	6.31	150.73
MDF	5.20	810.80	50.19	0.37	79.01	945.57
OF	1.75	73.92	3,529.21	14.84	911.75	4,531.47
Scrub	0.01	2.23	39.05	191.91	37.68	270.88
NF	5.09	68.93	976.25	121.41	2,20,449.64	2,21,621.32
Total ISFR 2023 outside RFA/GW	150.92	959.92	4,596.20	328.54	2,21,484.39	2,27,519.97
Net Change	0.19	14.35	64.73	57.66	-136.93	

*Area figure calculated without normalization factor.

Table 10.27.7 Altitude-Wise Forest Cover in Uttar Pradesh

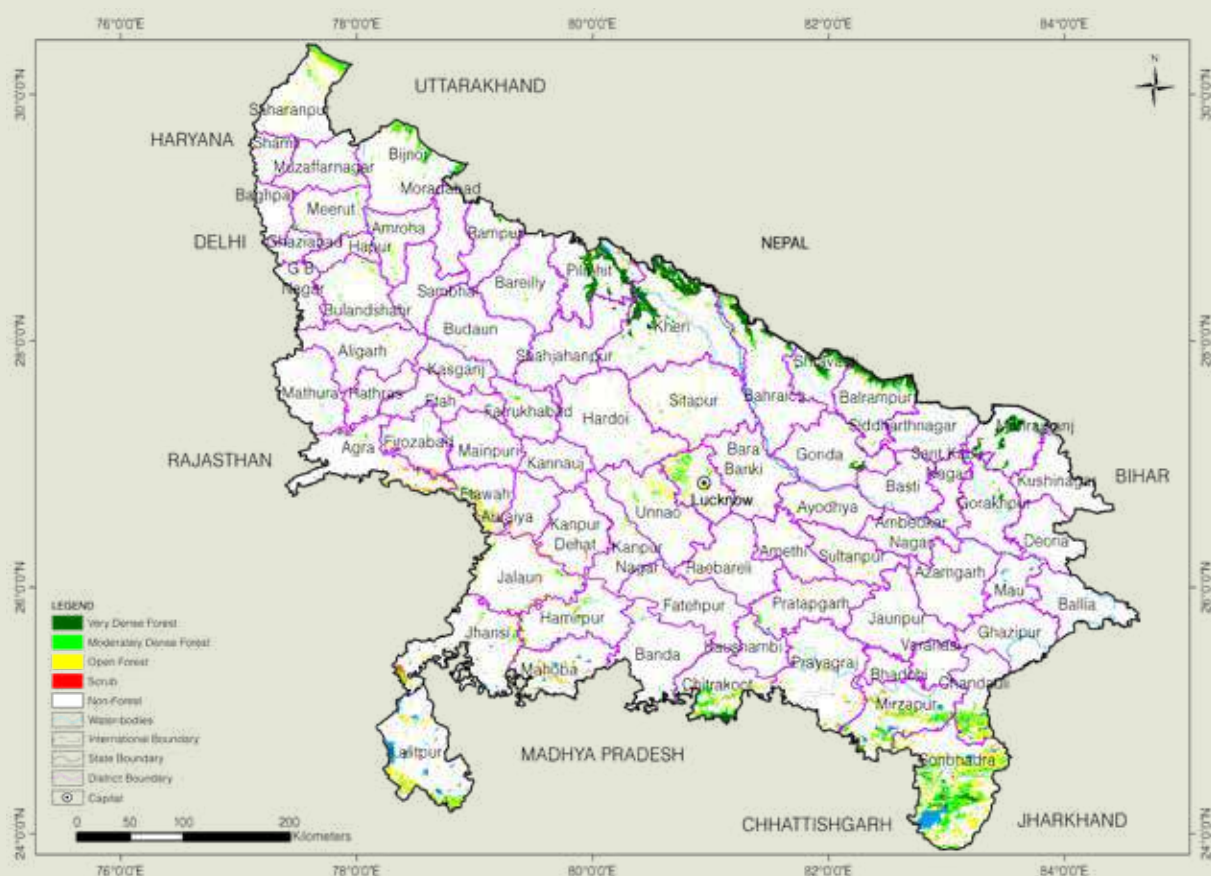
(km ²)						
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	2,40,457.56	2,688.73	3,823.24	8,049.64	14,561.61	639.03
500-1000	470.00	0.00	178.17	306.02	484.19	0.48
Total	2,40,927.56	2,688.73	4,001.41	8,355.66	15,045.80	639.51

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

Table 10.27.8 Forest Cover in different slope classes in Uttar Pradesh

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	2,35,258.57	2,456.92	3,079.70	7,324.53	12,861.15	558.32
5-10	4,404.99	161.35	488.60	634.40	1,284.35	58.45
10-15	730.00	40.94	215.20	207.26	463.40	14.00
15-20	300.00	15.93	113.79	103.97	233.69	5.68
20-25	143.00	8.13	61.63	51.63	121.39	2.23
25-30	60.00	3.89	27.93	21.75	53.57	0.67
>30	31.00	1.57	14.56	12.12	28.25	0.16
Total	2,40,927.56	2,688.73	4,001.41	8,355.66	15,045.80	639.51

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

**Figure 10.27.3 Forest Cover Map of Uttar Pradesh**



10.27.3 Forest Types

The area under different Forest Types in Uttar Pradesh (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.27.9 Area statistics of the Forest Types found in Uttar Pradesh

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	2/E1 Cane brakes	20.01	0.13
2	3C/C2d (i) Western light alluvium plains sal	1,540.00	9.76
3	3C/C2d (iii) Eastern heavy alluvium plains sal	650.62	4.12
4	3C/C3a West Gangetic moist mixed deciduous forest	408.46	2.59
5	3C/C3/2S1 Northern Secondary moist mixed deciduous forest	345.16	2.19
6	4D/SS2 <i>Barringtonia</i> swamp forest	0.34	0.00
7	4D/SS3 <i>Syzygium cumini</i> swamp low forest	205.84	1.30
8	5A/C1b Dry teak forest	143.81	0.91
9	5B/C1a Dry Siwalik sal forest	110.53	0.70
10	5B/C1b Dry plains sal forest	60.88	0.39
11	5B/C1c Dry peninsular sal forest	352.88	2.24
12	5B/C2 Northern dry mixed deciduous forest	5,459.24	34.58
13	5/DS1 Dry deciduous scrub	329.83	2.09
14	5/DS2 Dry savannah forest	0.65	0.00
15	5/DS3 <i>Euphorbia</i> scrub	0.87	0.01
16	5/E1 <i>Anogeissus pendula</i> forest	491.69	3.11
17	5/E1/DS1 <i>Anogeissus pendula</i> scrub	205.24	1.30
18	5/E2 <i>Boswellia</i> forest	104.78	0.66
19	5/E3 <i>Babul</i> forest	48.65	0.31
20	5/E5 <i>Butea</i> forest	6.77	0.04
21	5/E8a <i>Phoenix</i> savannah	1.91	0.01
22	5/E8b <i>Babul</i> savannah	17.42	0.11
23	5/E9 Dry bamboo brakes	69.14	0.44
24	5/1S1 Dry tropical riverain forest	0.24	0.00
25	5/1S2 <i>Khair-sissu</i> forest	148.43	0.94
26	6B/C2 Ravine thorn forest	904.89	5.73
Sub Total		11,628.28	73.66
27	TOF/ Plantation	4,057.03	25.70
Total (Forest Cover & Scrub)		15,685.31	99.36
28	3/1S1 Low alluvial savannah woodland (<i>Salmalia-Albizzia</i>)	5.06	0.03
29	4D/2S2 Eastern wet alluvial grassland	96.31	0.61
Sub Total		101.37	0.64
Grand Total		15,786.68	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest types outside forest cover have also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).

10.27.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.27.10 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Agra	15	37
2	Aligarh	0	0
3	Ambedkar Nagar	1	0
4	Amethi	9	9
5	Amroha/ Jyotiba Phule Nagar	9	0
6	Auraiya	8	20
7	Ayodhya/ Faizabad	8	26
8	Azamgarh	1	0
9	Baghpat	0	4
10	Bahraich	195	288
11	Ballia	0	0
12	Balrampur	407	626
13	Banda	0	5
14	Bara Banki	5	5
15	Bareilly	0	0
16	Basti	1	11
17	Bhadohi/ Sant Ravidas Nagar	0	0
18	Bijnor	88	155
19	Budaun	12	22
20	Bulandshahr	9	5
21	Chandauli	94	28
22	Chitrakoot	54	174
23	Deoria	0	1
24	Etah	1	0
25	Etawah	13	63
26	Farrukhabad	4	1
27	Fatehpur	0	2
28	Firozabad	4	19
29	Gautam Buddha Nagar	12	5
30	Ghaziabad	1	2
31	Ghazipur	0	0
32	Gonda	7	22
33	Gorakhpur	9	22
34	Hamirpur	12	17
35	Hapur	2	1
36	Hardoi	12	14
37	Hathras/ Mahamaya Nagar	0	0
38	Jalaun	41	98
39	Jaunpur	8	11
40	Jhansi	61	52
41	Kannauj	0	0
42	Kanpur Dehat	17	22

**Table 10.27.10 District-wise Number of Forest Fire Detected**

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
43	Kanpur Nagar	0	11
44	Kasganj/Kanshiram Nagar	0	0
45	Kaushambi	0	0
46	Kheri	557	689
47	Kushinagar	0	0
48	Lalitpur	113	58
49	Lucknow	4	7
50	Mahoba	7	6
51	Mahrajganj	333	462
52	Mainpuri	0	0
53	Mathura	3	1
54	Mau	1	2
55	Meerut	6	15
56	Mirzapur	48	49
57	Moradabad	3	0
58	Muzaffarnagar	15	14
59	Pilibhit	294	430
60	Pratapgarh	10	16
61	Prayagraj/Allahabad	25	22
62	Raebareli	7	11
63	Rampur	7	10
64	Saharanpur	74	158
65	Sambhal	0	0
66	Sant Kabir Nagar	8	5
67	Shahjahanpur	14	32
68	Shamli	0	0
69	Shravasti	93	328
70	Siddharthnagar	29	48
71	Sitapur	2	7
72	Sonbhadra	457	272
73	Sultanpur	2	4
74	Unnao	1	0
75	Varanasi	2	0
Total		3,235	4,424

10.27.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.27.11 Forest Fire Prone Classes

(km²)

Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	106.14	0.68
2	Very highly fire prone	1,196.61	7.63
3	Highly fire prone	2,489.20	15.87
4	Moderately fire prone	2,077.08	13.24
5	Less fire prone	9,816.28	62.58
Total		15,685.31	100.00

*Forest Cover including Scrub.



Figure 10.27.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.27.6 Results Derived from NFI for Uttar Pradesh

Table 10.27.12 Number of Trees and their Volume For Top 5 Species In RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Shorea robusta</i>	35,091	49.28
2	<i>Tectona grandis</i>	16,160	11.56
3	<i>Mallotus philippensis</i>	9,584	1.83
4	<i>Prosopis juliflora/ Neltuma juliflora</i>	7,965	1.71
5	<i>Lannea coromandelica</i>	7,800	2.65



Table 10.27.13 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Eucalyptus species</i>	1,42,126	6.971
2	<i>Mangifera indica</i>	1,33,474	41.741
3	<i>Populus species</i>	49,051	2.407
4	<i>Dalbergia sissoo</i>	25,258	6.758
5	<i>Prosopis juliflora/ Neltuma juliflora</i>	24,746	0.843

Table 10.27.14 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Azadirachta indica/ Melia indica</i>	3,689	1.676
2	<i>Mangifera indica</i>	2,958	1.050
3	<i>Eucalyptus species</i>	2,866	0.331
4	<i>Psidium guajava</i>	2,707	0.083
5	<i>Prosopis juliflora/ Neltuma juliflora</i>	1,907	0.090

Table 10.27.15 Major NTFP Species in Uttar Pradesh

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Shorea robusta</i>	Tree	12,74,568
2	<i>Butea monosperma</i>	Tree	3,05,918
3	<i>Acacia catechu/ Senegalia catechu</i>	Tree	1,44,323
4	<i>Helicteres isora</i>	Shrubs	20,87,767
5	<i>Adhatoda vasica/ Justicia adhatoda</i>	Shrubs	11,62,984
6	<i>Commiphora wightii</i>	Shrubs	7,70,652
7	<i>Withania somnifera</i>	Shrubs	1,82,154
8	<i>Ocimum basilicum</i>	Herbs	12,72,71,894
9	<i>Desmostachya species</i>	Herbs	2,87,48,628
10	<i>Vetiveria zizanioides/ Chrysopogon zizanioides</i>	Herbs	61,27,826

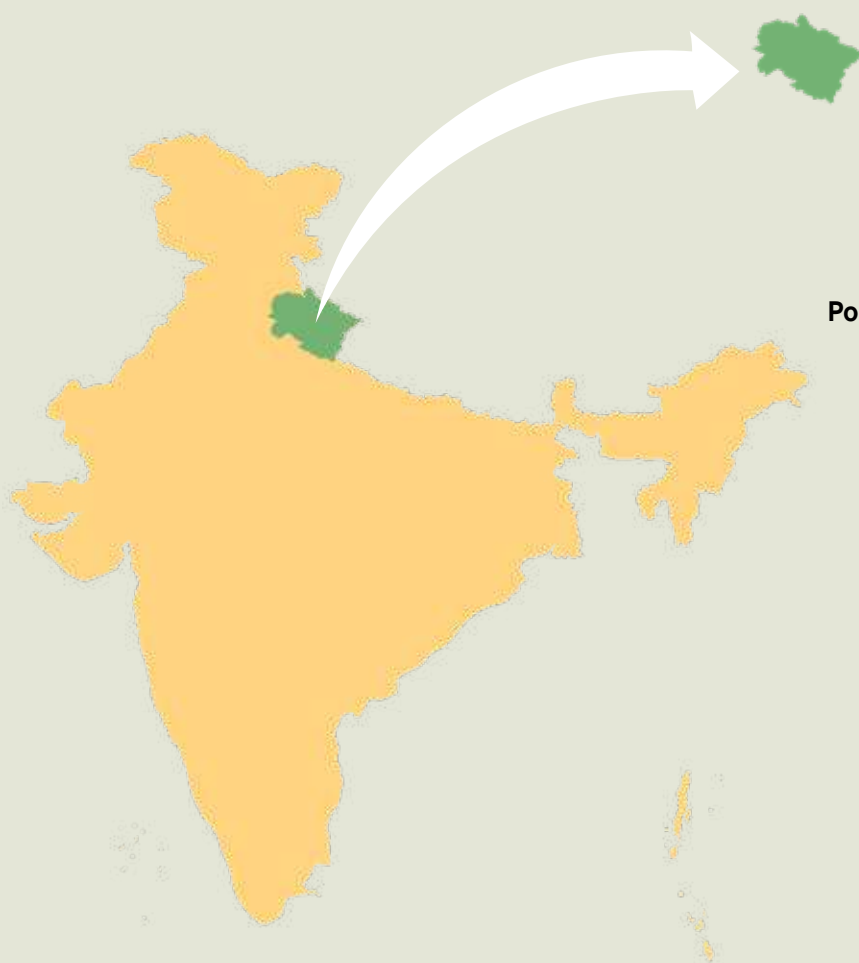
Table 10.27.16 Major Invasive Species in the State Inside the RFA in Uttar Pradesh

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Lantana camara</i>	1,080.84
2	<i>Prosopis juliflora/ Neltuma juliflora</i>	448.92
3	<i>Cassia tora/ Senna tora</i>	376.53
4	<i>Triumfetta rhomboidea</i>	84.96
5	<i>Saccharum spontaneum</i>	63.34



Photo: FSI Repository

UTTARAKHAND

**Geographical Area**53,483.36 km²**Geographical Coordinates**

Latitude 28°43' N to 31°28' N

Longitude 77°34' E to 81°03' E

Population (as per Census 2011)

10.09 million

Urban 3.05 million (30.23 %)

Rural 7.04 million (69.77 %)

Tribal 0.29 million (2.89 %)

Average Population Density189 per km²**Livestock Population**(as per 19th Livestock Census)

4.79 million

No. of Districts

13

No. of Hill Districts

13

No. of Tribal Districts

0

Table 10.28.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	5,348	
Reporting area for land utilization	6,001.53	100.00
Forests	3,811.66	63.51
Not available for land cultivation	440.90	7.35
Permanent pastures and other grazing lands	207.77	3.46
Land under misc. tree crops and groves	393.69	6.56
Culturable wasteland	348.57	5.81
Fallow land other than current fallows	107.89	1.80
Current fallows	97.37	1.62
Net area sown	593.68	9.89

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.28.1 Forest Cover

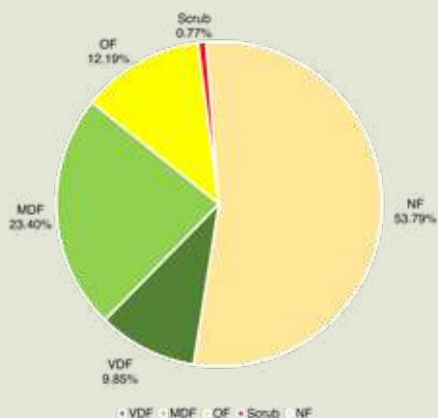


Table 10.28.2 Forest Cover of Uttarakhand

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	5,266.58	9.85
MDF	12,517.63	23.40
OF	6,519.62	12.19
Total	24,303.83	45.44
Scrub	412.88	0.77

Figure 10.28.1 Forest Cover of Uttarakhand

Table 10.28.3 District- wise Forest Cover in Uttarakhand

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Almora ^H	3,144.05	222.24	817.89	682.83	1,722.96	54.80	4.09	5.82
Bageshwar ^H	2,241.00	167.73	741.21	354.43	1,263.37	56.38	-2.36	1.43
Chamoli ^H	8,030.21	442.65	1,522.23	676.42	2,641.30	32.89	-9.36	3.78
Champawat ^H	1,765.78	382.01	571.36	266.02	1,219.39	69.06	-3.28	9.06
Dehradun ^H	3,088.00	680.99	588.99	370.32	1,640.30	53.12	4.67	80.47
Garhwal ^H	5,328.55	588.44	1,847.84	924.27	3,360.55	63.07	0.58	99.06
Haridwar ^H	2,360.20	76.86	274.35	213.55	564.76	23.93	-2.47	11.25
Nainital ^H	4,251.35	780.03	1,583.17	503.35	2,866.55	67.43	0.77	15.88
Pithoragarh ^H	7,090.05	518.02	978.53	640.78	2,137.33	30.15	0.68	44.89
Rudrapur ^H	1,984.14	272.76	582.17	291.68	1,146.61	57.79	-3.23	9.23
Tehri Garhwal ^H	3,642.17	305.87	1,149.08	767.73	2,222.68	61.03	8.87	103.25
Udham Singh Nagar ^H	2,542.25	157.69	216.42	120.06	494.17	19.44	-11.29	4.53
Uttarkashi ^H	8,015.81	671.29	1,644.39	708.18	3,023.86	37.72	-10.65	24.23
Grand Total	53,483.36	5,266.58	12,517.63	6,519.62	24,303.83	45.44	-22.98	412.88

*Area figure calculated without normalization factor.



Table 10.28.4 Division-wise Forest Cover in Uttarakhand

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Almora Forest Division	2,345.25	170.77	600.44	521.04	1,292.25	55.10	5.42	3.94
Badrinath Forest Division	2,178.68	227.22	840.69	370.07	1,437.98	66.00	-4.05	0.43
Bageshwar	2,223.58	160.94	729.59	359.37	1,249.90	56.21	-2.37	1.43
Binog Wildlife Sanctuary	11.55	4.04	4.24	1.42	9.70	83.98	0.00	0.02
Binsar Wildlife Sanctuary	58.91	17.01	29.56	3.15	49.72	84.40	0.00	0.00
Chakrata Forest Division	1,221.75	160.81	199.70	155.87	516.38	42.27	4.43	65.22
Champawat Forest Division	1,714.93	339.09	578.96	268.58	1,186.63	69.19	-1.93	8.17
Civil & Soyam Kalsi	439.35	115.08	76.17	41.06	232.31	52.88	2.19	2.41
Civil Soyam Almora	586.81	18.86	153.75	121.75	294.36	50.16	0.48	3.06
Corbett National Park	502.40	196.56	203.92	31.38	431.86	85.96	-0.38	0.78
Corbett National Park Buffer	156.88	27.21	89.38	22.22	138.81	88.48	0.37	1.18
Dehradun	873.99	250.22	154.14	78.74	483.10	55.28	-2.25	4.24
Gangotri National Park	2,440.26	0.00	10.50	36.24	46.74	1.92	0.00	0.90
Garhwal Forest Division	2,856.02	192.15	694.42	592.13	1,478.70	51.77	-2.30	60.07
Govind National Park	552.55	3.03	22.77	20.86	46.66	8.44	-1.66	1.66
Govind Wildlife Sanctuary	611.02	55.06	184.94	111.19	351.19	57.48	-5.07	0.28
Haldwani Forest Division	692.21	236.52	293.44	66.40	596.36	86.15	-0.54	0.31
Hardwar Forest Division	2,020.52	11.24	113.20	145.37	269.81	13.35	-1.46	10.31
Kalagarh Tiger Reserve	321.33	114.77	160.25	6.04	281.06	87.47	-0.04	0.04
Kalagarh Tiger Reserve Buffer	315.42	97.47	191.69	15.48	304.64	96.58	-0.08	0.18
Kedarnath Wildlife Division	2,047.73	249.45	582.16	308.83	1,140.44	55.69	-3.58	1.24
Lansdowne Forest Division	1,308.38	54.33	527.05	267.96	849.34	64.92	2.88	36.80
Mussoorie Forest Division	803.48	83.94	215.02	155.20	454.16	56.52	-0.63	18.90
Nainital Forest Division	1,311.33	186.67	530.47	214.24	931.38	71.03	-1.82	0.54
Nanda Devi Biosphere Reserve	2,691.25	0.02	16.35	8.28	24.65	0.92	0.75	0.52
Nanda Devi Forest Division	1,098.22	32.38	273.68	63.16	369.22	33.62	-2.36	1.74
Nanda Devi National Park (part)	542.61	0.00	1.95	1.72	3.67	0.68	0.00	0.00
Narendranagar Forest Division	1,182.66	61.54	292.36	348.91	702.81	59.43	0.48	35.69
Pithoragarh Forest Division	7,226.62	517.60	975.47	638.53	2,131.60	29.50	0.69	44.90
Rajaji National Park	862.53	243.01	396.64	123.59	763.24	88.49	-0.98	1.26
Ramnagar Forest Division	581.44	200.75	247.69	44.49	492.93	84.78	-1.22	0.21
Rudraprayag Forest Division	1,193.55	206.88	390.80	229.21	826.89	69.28	-1.69	10.43
Tarai Central	1,115.68	7.20	184.81	84.22	276.23	24.76	-7.55	3.96
Tarai East Forest Division	1,645.12	221.64	239.34	118.26	579.24	35.21	0.18	6.19
Tarai West	1,063.42	13.69	158.85	69.71	242.25	22.78	-3.72	7.12
Tehri Forest Division	2,199.73	173.70	710.58	332.87	1,217.15	55.33	9.39	57.46

Table 10.28.4 Division-wise Forest Cover in Uttarakhand

(km²)

Division	Digitized Division Boundary Area*	2023 Assessment				% of Digitized Division Boundary Area	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Tons Forest Division	761.22	178.63	284.41	138.37	601.41	79.01	-0.06	1.12
Upper Yamuna Barkot Forest Division	1,029.10	137.22	371.05	120.08	628.35	61.06	-2.04	6.83
Uttarkashi Forest Division	2,614.82	298.04	769.72	279.40	1,347.16	51.52	-1.82	12.78
Valley of Flowers (part)	75.40	0.00	0.01	0.94	0.95	1.26	0.00	0.00
Area which does not fall in any Division	135.32	1.84	17.47	3.29	22.60	16.70	-0.64	0.56
Grand Total	53,613.02	5,266.58	12,517.63	6,519.62	24,303.83	45.33	-22.98	412.88

#As per the division boundary shapefile provided by State Forest Department.

* Area figure calculated without normalization factor.

10.28.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analyzed in different categories and presented in table given below.

Table 10.28.5 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Uttarakhand

(km²)

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
4,520.08	9,109.85	3,269.35	16,899.28	746.50	3,407.78	3,250.27	7,404.55
26.75%	53.90%	19.35%		10.08%	46.02%	43.90%	

*In case of Uttarakhand, RFA boundaries have been used.

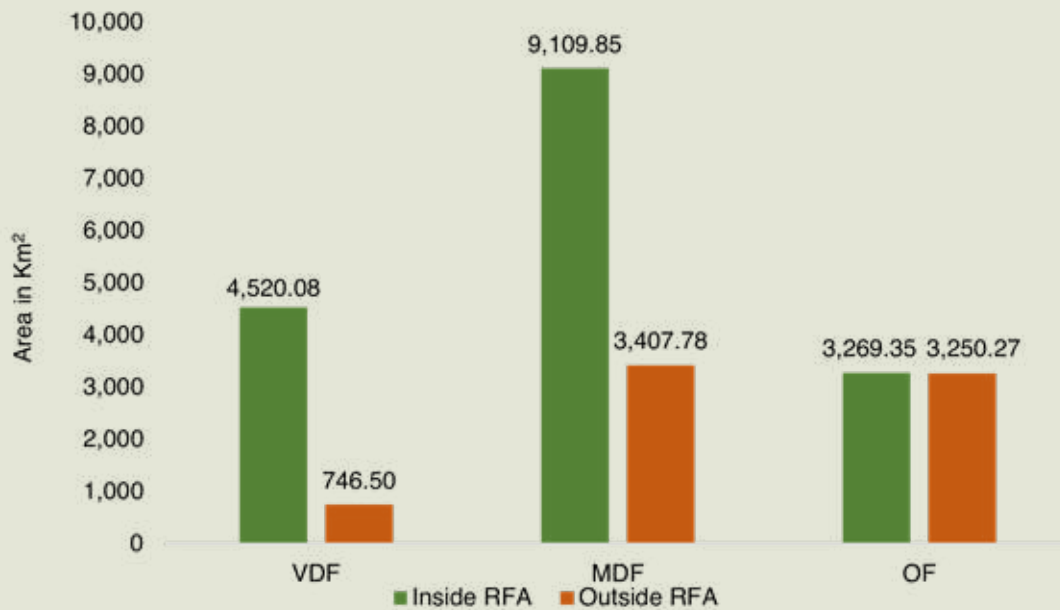


Figure 10.28.2 Forest Cover Inside and Outside of RFA in Uttarakhand

Table 10.28.6 Forest Cover Change Matrix Inside RFA/GW for Uttarakhand between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					Total ISFR 2021 inside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	4,307.46	1.55	0.55	0.00	4.69	4,314.25
MDF	212.61	9,010.07	41.95	1.25	41.04	9,306.92
OF	0.01	98.23	3,154.64	9.97	29.70	3,292.55
Scrub	0.00	0.00	25.11	52.42	0.74	78.27
NF	0.00	0.00	47.10	11.04	8,444.34	8,502.48
Total ISFR 2023 inside RFA / GW	4,520.08	9,109.85	3,269.35	74.68	8,520.51	25,494.47
Net Change	205.83	-197.07	-23.20	-3.59	18.03	

*Area figure calculated without normalization factor.

Table 10.28.7 Forest Cover Change Matrix Outside RFA/GW for Uttarakhand between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					Total ISFR 2021 outside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	725.59	0.26	0.36	0.04	0.68	726.93
MDF	20.91	3,383.22	24.47	0.59	10.67	3,439.86
OF	0.00	23.73	3,182.56	4.70	35.31	3,246.30
Scrub	0.00	0.00	2.68	330.35	4.91	337.94
NF	0.00	0.57	40.20	2.52	20,194.57	20,237.86
Total ISFR 2023 outside RFA/GW	746.50	3,407.78	3,250.27	338.20	20,246.14	27,988.89
Net Change	19.57	-32.08	3.97	0.26	8.28	

*Area figure calculated without normalization factor.

Table 10.28.8 Altitude-wise Forest Cover in Uttarakhand

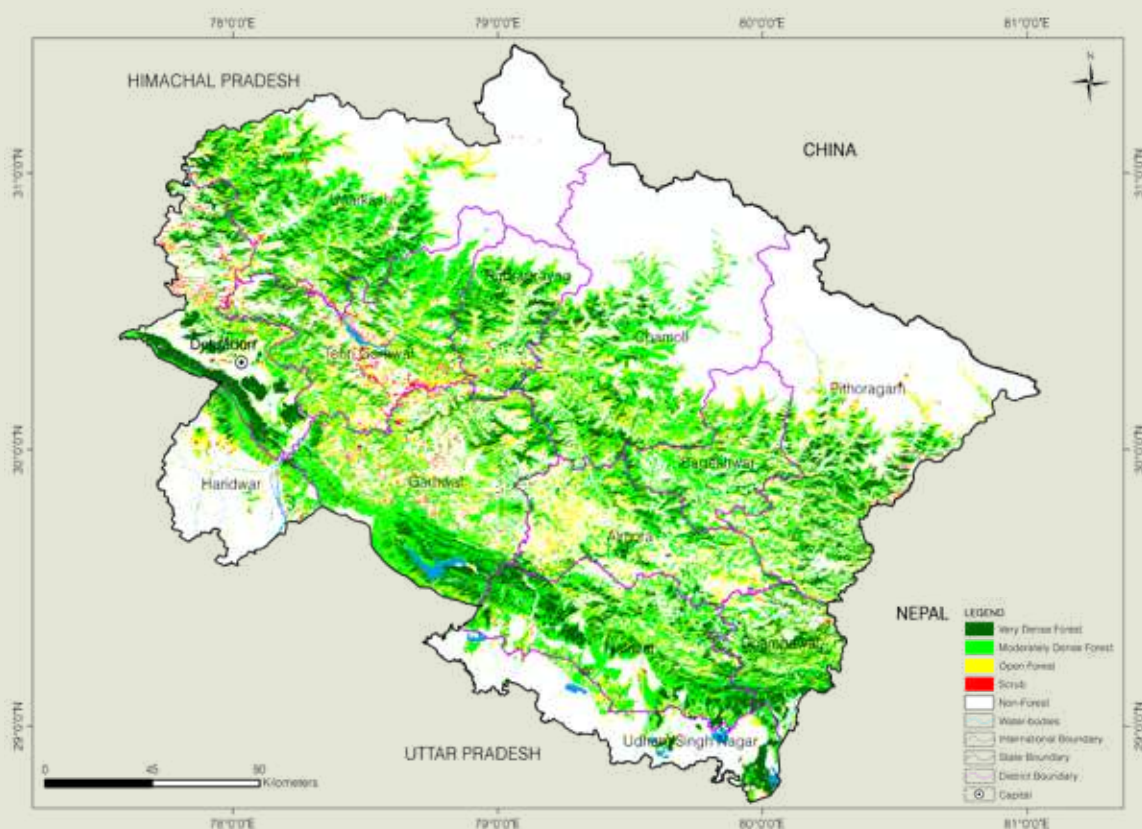
(km ²)						
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	7,937.03	713.24	1,501.40	613.09	2,827.73	35.56
500-1000	5,703.01	1,193.46	1,830.75	913.20	3,937.41	106.47
1000-2000	17,560.08	1,546.53	5,084.29	3,396.26	10,027.08	230.03
2000-3000	7,248.04	1,684.12	3,003.48	1,050.44	5,738.04	22.55
3000-4000	4,193.08	129.22	1,094.83	536.58	1,760.63	17.11
>4000	10,842.12	0.01	2.88	10.05	12.94	1.16
Total	53,483.36	5,266.58	12,517.63	6,519.62	24,303.83	412.88

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

Table 10.28.9 Forest Cover in Different Slope Classes in Uttarakhand

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	9,446.02	919.17	1,371.22	646.14	2,936.53	44.52
5-10	4,069.01	505.08	948.89	353.65	1,807.62	19.02
10-15	5,688.06	638.36	1,474.60	652.83	2,765.79	38.82
15-20	7,028.03	759.54	1,893.38	935.23	3,588.15	60.58
20-25	7,313.11	756.44	2,014.82	1,058.30	3,829.56	70.73
25-30	6,683.05	667.25	1,849.74	1,029.67	3,546.66	68.32
>30	13,256.08	1,020.74	2,964.98	1,843.80	5,829.52	110.89
Total	53,483.36	5,266.58	12,517.63	6,519.62	24,303.83	412.88

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

**Figure 10.28.3 Forest Cover Map of Uttarakhand**



10.28.3 Forest Types

The area under different Forest Types in Uttarakhand (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.28.10 Area Statistics of the Forest Types Found in Uttarakhand

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	3C/C2a Moist Siwalik sal forest	3,401.22	12.80
2	3C/C2b(i) <i>Bhabar-dun</i> sal forest	242.94	0.92
3	3C/C2c Moist tarai sal forest	393.77	1.48
4	3C/C2d(i) Western light alluvium plains sal	154.72	0.58
5	3C/C3a West Gangetic moist mixed deciduous forest	1,045.71	3.94
6	4C/FS2 Submontane hill valley swamp forest	0.79	0.00
7	5B/C1a Dry Siwalik sal forest	486.47	1.83
8	5B/C1b Dry plains sal forest	9.27	0.03
9	5B/C2 Northern dry mixed deciduous forest	921.00	3.47
10	5/DS1 Dry deciduous scrub	45.31	0.17
11	5/1S2 <i>Khair-sissu</i> forest	255.73	0.96
12	9/C1a Lower or Siwalik chir pine forest	43.68	0.16
13	9/C1b Upper or Himalayan chir pine forest	7,502.20	28.24
14	9/C1/DS1 Himalayan subtropical scrub	419.47	1.58
15	9/C1/DS2 Subtropical Euphorbia scrub	37.03	0.14
16	12/C1a <i>Ban</i> oak forest (<i>Q. incana</i>)	2,200.38	8.29
17	12/C1b <i>Moru</i> oak forest (<i>Q. dilatata</i>)	123.88	0.47
18	12/C1c Moist deodar forest (<i>Cedrus</i>)	387.65	1.46
19	12/C1d Western mixed coniferous forest (spruce, blue pine, silver fir)	2,750.49	10.36
20	12/C1e Moist temperate deciduous forest	209.57	0.79
21	12/C1f Low-level blue pine forest (<i>P. wallichiana</i>)	30.53	0.11
22	12/C1/DS1 Oak scrub	33.37	0.13
23	12/C1/DS2 Himalayan temperate secondary scrub	15.80	0.06
24	12/C2a <i>Kharsu</i> oak forest (<i>Q. semecarpifolia</i>)	817.76	3.08
25	12/C2b West Himalayan upper oak/fir forest	1,475.99	5.56
26	12/C2c Moist temperate deciduous forest	202.93	0.76
27	12/1S1 Alder forest	8.40	0.03
28	12/2S1 Low-level blue pine forest	21.86	0.08
29	13/C2b Dry deodar forest (<i>Cedrus</i>)	196.87	0.74
30	13/C5 West Himalayan dry juniper forest (<i>J. macropoda</i>)	3.78	0.01
31	13/1S1 <i>Hippophae/Myricaria</i> scrub	65.03	0.24
32	14/C1a West Himalayan sub-alpine fir forest	185.00	0.70
33	14/C1b West Himalayan sub-alpine birch/fir forest	516.49	1.95
34	14/1S1 <i>Hippophae/Myricaria</i> brakes	20.61	0.08
35	14/1S2 Deciduous sub-alpine scrub	40.69	0.15
36	15/C1 Birch/ <i>Rhododendron</i> scrub forest	114.10	0.43
37	15/E1 Dwarf <i>Rhododendron</i> scrub	9.83	0.04
38	16/C1 Dry alpine scrub	2.75	0.01
39	16/E1 Dwarf juniper scrub	27.70	0.10
Sub Total		24,420.77	91.93

**Table 10.28.10 Area Statistics of the Forest Types Found in Uttarakhand**

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
40	TOF/ Plantation	295.94	1.12
Total (Forest Cover & Scrub)		24,716.71	93.05
Grassland forest type (outside forest cover)			
41	3C/C2/DS1 Moist sal savannah	9.96	0.04
42	3/1S1 Low alluvial savannah woodland (<i>Salmalia-Albizia</i>)	3.28	0.01
43	12/DS2 Himalayan temperate parkland	14.88	0.06
44	12/DS3 Himalayan temperate pastures	85.58	0.32
45	14/DS1 Sub-alpine pastures	219.90	0.83
46	15/C3 Alpine pastures	1,513.58	5.69
Sub Total		1,847.18	6.95
Grand Total		26,563.89	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest types outside forest cover have also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).

10.28.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.28.11 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Almora	786	2,810
2	Bageshwar	321	805
3	Chamoli	330	1,331
4	Champawat	470	1,782
5	Dehradun	230	705
6	Garhwal	928	3,193
7	Haridwar	99	59
8	Nainital	570	3,320
9	Pithoragarh	785	1,204
10	Rudraprayag	70	489
11	Tehri Garhwal	310	2,589
12	Udham Singh Nagar	128	289
13	Uttarkashi	324	2,457
Total		5,351	21,033



10.28.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.27.12 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	24.39	0.10
2	Very highly fire prone	3,193.95	12.92
3	Highly fire prone	6,832.16	27.64
4	Moderately fire prone	4,946.88	20.01
5	Less fire prone	9,719.33	39.33
Total		24,716.71	100.00

*Forest Cover including Scrub.

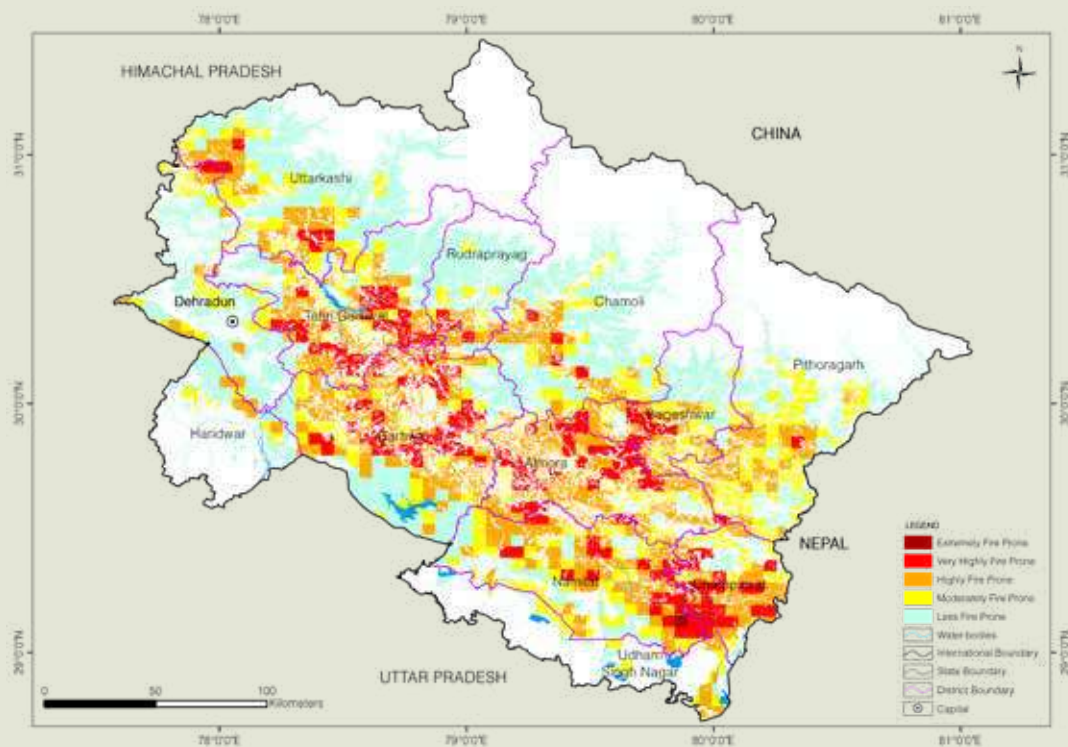


Figure 10.28.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.28.6 Results Derived from NFI for Uttarakhand

Table 10.28.13 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Pinus roxburghii</i>	1,93,883	100.34
2	<i>Quercus leucotrichophora</i>	1,57,597	38.46
3	<i>Shorea robusta</i>	90,283	91.67
4	<i>Rhododendron arboreum</i>	84,836	22.46
5	<i>Mallotus philippensis</i>	53,278	4.73



Table 10.28.14 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Grewia optiva</i> / <i>Grewia oppositifolia</i>	34,551	1.622
2	<i>Quercus leucotrichophora</i>	20,313	2.375
3	<i>Mangifera indica</i>	10,913	2.127
4	<i>Pinus roxburghii</i>	10,317	3.074
5	<i>Ficus species</i>	7,745	0.700

Table 10.28.15 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Quercus leucotrichophora</i>	607	0.183
2	<i>Mangifera indica</i>	399	0.110
3	<i>Litchi chinensis</i> / <i>Litchi sinensis</i>	171	0.015
4	<i>Psidium guajava</i>	151	0.004
5	<i>Cedrus deodara</i>	123	0.097

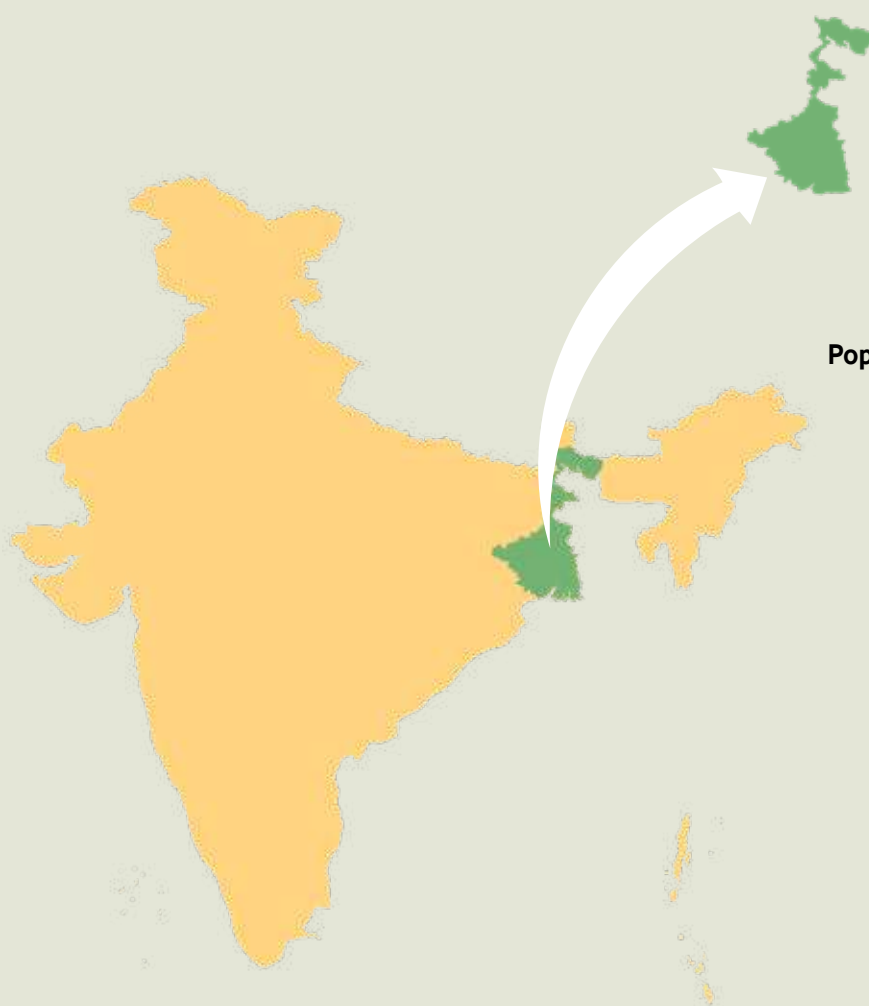
Table 10.28.16 Major NTFP Species in Uttarakhand

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Shorea robusta</i>	Tree	37,79,429
2	<i>Rhododendron arboreum</i>	Tree	12,23,741
3	<i>Myrica esculenta</i>	Tree	5,30,071
4	<i>Pinus roxburghii</i> / <i>Pinus longifolia</i>	Tree	1,93,883
5	<i>Ehretia aspera</i> / <i>Ehretia laevis</i>	Tree	1,72,249
6	<i>Lannea coromandelica</i>	Tree	70,627
7	<i>Aegle marmelos</i>	Tree	43,783
8	<i>Cinnamomum tamala</i>	Tree	29,600
9	<i>Zanthoxylum alatum</i>	Shrubs	27,16,982
10	<i>Cudrania javanensis</i> / <i>Maclura cochinchinensis</i>	Shrubs	2,46,998

Table 10.28.17 Major Invasive Species in the State Inside the RFA in Uttarakhand

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Lantana camara</i>	1,334.69
2	<i>Ageratina adenophora</i>	668.59
3	<i>Cassia tora</i> / <i>Senna tora</i>	119.75
4	<i>Saccharum spontaneum</i>	79.83
5	<i>Parthenium hysterophorus</i>	62.37

WEST BENGAL



Geographical Area
88,752 km²

Geographical Coordinates
Latitude 21°29' N to 27°13' N
Longitude 85°50' E to 89°52' E

Population (as per Census 2011)
91.27 million
Urban 29.09 million (11.29 %)
Rural 62.18 million (88.71 %)
Tribal 5.30 million (5.80 %)

Average Population Density
1,028 per km²

Livestock Population
(as per 19th Livestock Census)
30.35 million

No. of Districts
23

No. of Hill Districts
2

No. of Tribal Districts
11

Table 10.29.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	8,875	
Reporting area for land utilization	8,684.11	100.00
Forests	1,175.16	13.53
Not available for land cultivation	1,912.02	22.02
Permanent pastures and other grazing lands	1.92	0.02
Land under misc. tree crops and groves	42.75	0.49
Culturable wasteland	10.65	0.12
Fallow land other than current fallows	6.25	0.07
Current fallows	254.03	2.93
Net area sown	5,281.33	60.82

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.29.1 Forest Cover

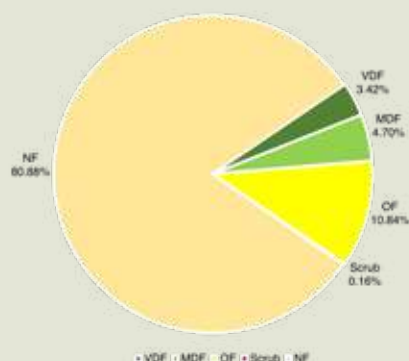


Table 10.29.2 Forest Cover of West Bengal

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	3,037.10	3.42
MDF	4,175.38	4.70
OF	9,619.85	10.84
Total	16,832.33	18.96
Scrub	137.92	0.16

Figure 10.29.1 Forest Cover of West Bengal

Table 10.29.3 District-wise Forest Cover in West Bengal

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Alipurduar	2,801	438.92	319.19	791.26	1,549.37	55.31	12.42	20.55
Bankura	6,882	232.33	420.02	656.43	1,308.78	19.02	41.18	24.22
Birbhum	4,545	0.54	39.29	146.71	186.54	4.10	2.34	7.17
Cooch Behar	3,387	0.00	26.88	335.96	362.84	10.71	-1.39	0.00
Dakshin Dinajpur	2,219	0.00	5.17	76.77	81.94	3.69	-0.06	0.00
Darjeeling ^H	2,054	397.04	338.90	666.63	1,402.57	68.28	-2.82	6.82
Hoogly	3,149	0.00	13.36	142.17	155.53	4.94	-1.54	0.00
Howrah	1,467	0.00	48.04	243.57	291.61	19.88	-14.36	0.00
Jalpaiguri	3,426	297.45	113.15	868.18	1,278.78	37.33	1.35	23.43
Jhargram	3,097	126.71	310.63	445.40	882.74	28.50	12.83	13.70
Kalimpong ^H	1,095	324.66	343.09	265.82	933.57	85.26	0.37	0.90
Kolkata	185	0.00	0.05	1.79	1.84	0.99	0.55	0.00
Malda	3,733	0.00	214.56	294.40	508.96	13.63	20.87	0.00
Murshidabad	5,324	0.00	52.21	287.80	340.01	6.39	-2.86	0.17
Nadia	3,927	1.04	154.95	309.55	465.54	11.85	0.26	0.00
North 24 Parganas	4,094	13.44	179.01	509.58	702.03	17.15	-5.95	0.00
Paschim Bardhaman	1,812	47.77	45.79	97.62	191.18	10.55	0.12	4.07
Paschim Medinipur	6,271	135.16	319.44	857.37	1,311.97	20.92	29.61	10.13
Purba Bardhaman	5,212	11.93	51.75	85.53	149.21	2.86	1.51	1.30
Purba Medinipur	4,713	1.68	110.22	678.12	790.02	16.76	-16.30	2.25
Purulia	6,259	40.23	311.59	582.70	934.52	14.93	3.94	23.21
South 24 Parganas	9,960	968.20	754.47	1,047.39	2,770.06	27.81	-28.21	0.00
Uttar Dinajpur	3,140	0.00	3.62	229.10	232.72	7.41	-3.64	0.00
Grand Total	88,752	3,037.10	4,175.38	9,619.85	16,832.33	18.97	50.22	137.92

*Area figure calculated without normalization factor.



Table 10.29.4 Forest Cover in Municipal Areas of West Bengal

(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total		
1	Asansol	327.47	0.00	1.48	5.80	7.28	2.22	0.00
2	Durgapur	155.78	0.12	1.99	10.37	12.48	8.01	0.69
3	Bidhan Nagar	55.70	0.00	0.06	0.59	0.65	1.17	0.00
4	Howrah	51.27	0.00	0.10	2.31	2.41	4.70	0.00
5	Rajpur- Sonarpur	50.52	0.00	0.00	5.35	5.35	10.59	0.00
6	Kharagpur	46.04	0.39	0.20	5.32	5.91	12.84	0.00
7	Maheshtala	42.43	0.00	0.02	7.43	7.45	17.56	0.00
8	Siliguri	41.92	0.00	0.01	0.51	0.52	1.24	0.00
9	Barasat	28.55	0.00	0.14	4.62	4.76	16.67	0.00
10	Bhatpara	26.77	0.00	0.17	6.99	7.16	26.75	0.00
11	Bardhaman	25.69	0.00	0.00	1.12	1.12	4.36	0.00
12	Basirhat	24.07	0.00	4.73	8.15	12.88	53.51	0.00
13	Kalyani	22.89	0.00	0.18	3.89	4.07	17.78	0.00
14	Habra	22.44	0.00	1.08	10.31	11.39	50.76	0.00
15	Santipur	22.37	0.00	4.33	0.94	5.27	23.56	0.00
16	Chandannagar	22.08	0.00	0.49	5.90	6.39	28.94	0.00
17	Ashokenagar-Kalyannagar	21.52	0.00	0.56	9.34	9.90	46.00	0.00
18	Madhyamgram	20.84	0.00	0.10	1.92	2.02	9.69	0.00
19	North DumDum	19.74	0.00	0.00	0.00	0.00	0.00	0.00
20	Medinipur	19.59	0.00	0.00	1.60	1.60	8.17	0.00
21	Panihati	19.30	0.00	0.06	0.25	0.31	1.61	0.00
22	Bankura	19.06	0.00	0.00	0.44	0.44	2.31	0.00
23	Bongaon	15.56	0.00	2.38	1.45	3.83	24.61	0.00
24	South DumDum	14.64	0.00	0.00	0.00	0.00	0.00	0.00
25	Baidyabati	14.56	0.00	0.00	0.05	0.05	0.34	0.00
26	Krishnanagar	14.23	0.00	0.09	1.87	1.96	13.77	0.00
27	Hoogly-Chinsurah	13.99	0.00	0.00	0.21	0.21	1.50	0.00
28	Purulia	13.90	0.00	0.08	0.09	0.17	1.22	0.00
29	North Barrackpore	13.63	0.00	0.13	1.32	1.45	10.64	0.00
30	Berhampore	13.59	0.00	0.00	0.18	0.18	1.32	0.00
31	English- Bazar	13.41	0.00	0.14	0.18	0.32	2.39	0.00
32	Jalpaiguri	12.43	0.00	0.02	0.22	0.24	1.93	0.00
33	Bally	11.82	0.00	0.00	0.02	0.02	0.17	0.00
34	Kamarhati	11.30	0.00	0.00	0.05	0.05	0.44	0.00
35	Uttarpara	11.22	0.00	0.00	0.06	0.06	0.53	0.00
36	Raiganj	10.84	0.00	0.00	0.25	0.25	2.31	0.00
37	Balurghat	10.77	0.00	0.02	1.37	1.39	12.91	0.00
38	Jangipur	9.96	0.00	0.75	2.00	2.75	27.61	0.00
39	Nabadwip	9.27	0.00	1.61	0.09	1.70	18.34	0.00
40	Darjeeling	9.16	0.71	2.75	2.68	6.14	67.03	0.00

Table 10.29.4 Forest Cover in Municipal Areas of West Bengal(km²)

Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total		
41	Halisahar	9.09	0.00	0.00	0.74	0.74	8.14	0.00
42	Barrackpore	8.60	0.00	0.00	0.35	0.35	4.07	0.00
43	Bhadreswar	8.49	0.00	0.18	2.37	2.55	30.04	0.00
44	Baranagar	8.48	0.00	0.00	0.00	0.00	0.00	0.00
45	Bansberia	8.46	0.00	0.00	0.68	0.68	8.04	0.00
46	Kanchrapara	7.78	0.00	0.00	0.44	0.44	5.66	0.00
47	Naihati	7.54	0.00	0.15	0.68	0.83	11.01	0.00
48	Srerampore	7.26	0.00	0.03	0.12	0.15	2.07	0.00
49	Khardah	6.04	0.00	0.02	0.10	0.12	1.99	0.00
50	Champdani	5.72	0.00	0.00	0.40	0.40	6.99	0.00
51	DumDum	5.13	0.00	0.00	0.00	0.00	0.00	0.00
52	Rishra	4.85	0.00	0.04	0.10	0.14	2.89	0.00
53	Titagarh	3.33	0.00	0.00	0.05	0.05	1.50	0.00
54	Ulberia	34.02	0.00	0.54	18.56	19.10	56.14	0.00
55	Haldia	104.60	0.00	0.72	12.56	13.28	12.70	0.00
Grand Total		1,539.71	1.22	25.35	142.39	168.96	10.97	0.69

*Shapefile of digitized boundary as provided by State Mission Directorate, AMRUT.

10.29.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.29.5 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in West Bengal(km²)

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
2,781.11	2,654.27	2,253.18	7,688.56	255.99	1,521.11	7,366.67	9,143.77
36.17 %	34.52 %	29.31 %		2.80%	16.64%	80.56%	

*In case of West Bengal, RFA boundaries have been used.

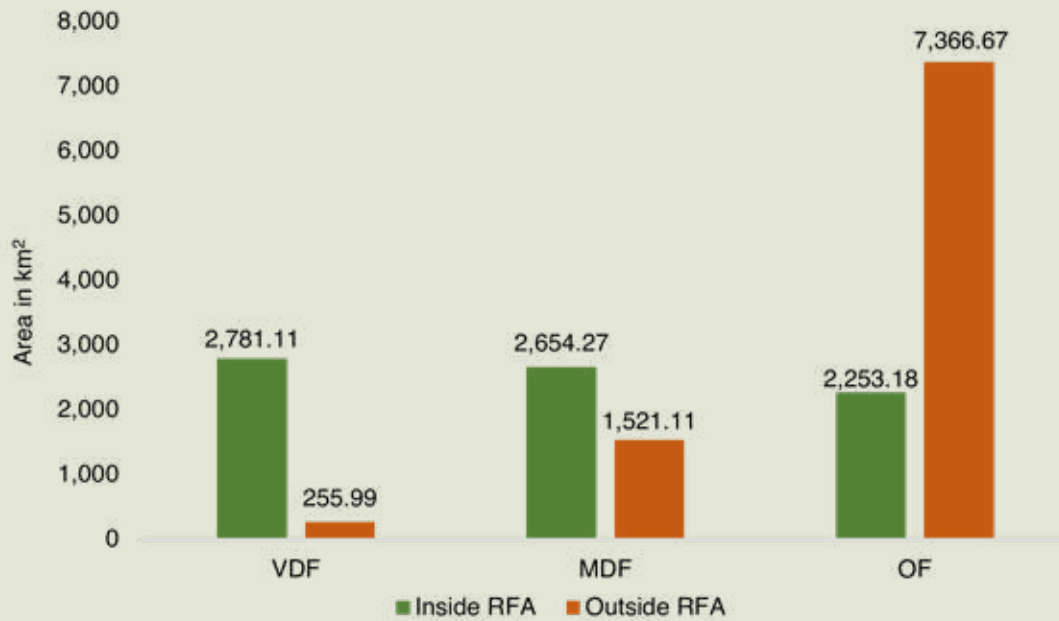


Figure 10.29.2 Forest Cover Inside and Outside of RFA in West Bengal

Table 10.29.6 Forest Cover Change Matrix Inside RFA/GW for West Bengal between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					Total ISFR 2021 inside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	2,744.40	7.59	7.65	0.08	3.87	2,763.59
MDF	30.84	2,575.24	10.34	0.51	6.27	2,623.20
OF	3.63	60.96	2,152.27	2.63	17.49	2,236.98
Scrub	0.12	3.10	19.42	69.53	3.85	96.02
NF	2.12	7.38	63.50	4.57	3990.04	4,067.61
Total ISFR 2023 inside RFA / GW	2,781.11	2,654.27	2,253.18	77.32	4,021.52	11,787.40
Net Change	17.52	31.07	16.20	-18.70	-46.09	

*Area figure calculated without normalization factor.

Table 10.29.7 Forest Cover Change Matrix Outside RFA/GW for West Bengal between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					Total ISFR 2021 outside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	251.77	0.62	0.42	0.00	0.86	253.67
MDF	2.46	1,440.37	41.29	0.10	22.65	1,506.87
OF	0.72	57.59	7,030.87	6.55	302.07	7,397.80
Scrub	0.00	0.11	3.65	48.65	2.08	54.49
NF	1.04	22.42	290.44	5.30	67,432.57	67,751.77
Total ISFR 2023 outside RFA/GW	255.99	1,521.11	7,366.67	60.60	67,760.23	76,964.60
Net Change	2.32	14.24	-31.13	6.11	8.46	

*Area figure calculated without normalization factor.

**Table 10.29.8 Altitude-wise Forest Cover in West Bengal**

(km ²)						
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	86,650	2,411.66	3,592.43	8,954.93	14,959.02	137.62
500-1000	807	141.62	289.39	250.28	681.29	0.30
1000-2000	970	260.76	238.51	371.34	870.61	0.00
2000-3000	292	196.67	50.79	41.95	289.41	0.00
>3000	33	26.39	4.26	1.35	32.00	0.00
Total	88,752	3,037.10	4,175.38	9,619.85	16,832.33	137.92

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

Table 10.29.9 Forest Cover in Different Slope Classes in West Bengal

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	85,130	2,225.81	3,223.52	8,659.56	14,108.89	124.28
5-10	1,227	142.19	219.04	225.25	586.48	5.76
10-15	508	118.22	154.61	148.25	421.08	2.55
15-20	539	147.63	163.01	165.40	476.04	1.97
20-25	514	149.07	155.68	160.24	464.99	1.48
25-30	404	121.77	124.37	126.58	372.72	0.97
>30	430	132.41	135.15	134.57	402.13	0.91
Total	88,752	3,037.10	4,175.38	9,619.85	16,832.33	137.92

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

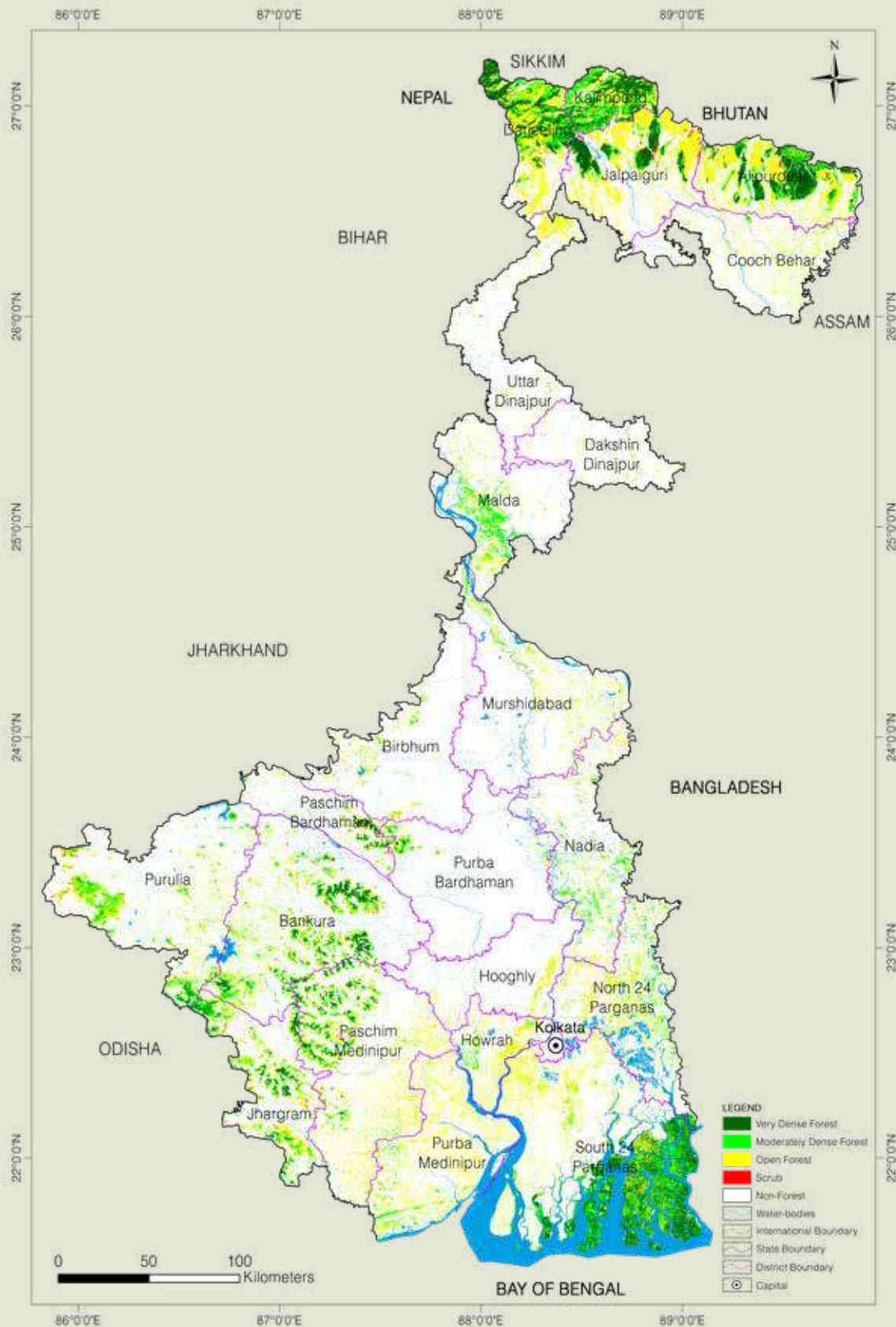


Figure 10.29.3 Forest Cover Map of West Bengal

10.29.3 Forest Types

The area under different Forest Types in West Bengal (as per the Champion & Seth Forest Classification, 1968) based on Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.29.10 Area Statistics of the Forest Types Found in West Bengal

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	2B/C1/2S3 Sub-Himalayan secondary wet mixed forest	360.94	2.12
2	3C/C1a(i) East Himalayan sal	405.56	2.39
3	3C/C1b(i) East Himalayan upper <i>bhabarsal</i>	153.00	0.90
4	3C/C1b(ii) East Himalayan lower <i>bhabarsal</i>	115.19	0.68
5	3C/C1c Eastern <i>taraisal</i> forest	326.82	1.92
6	3C/C2d (iii) Eastern heavy alluvium plains sal	2.62	0.02
7	3C/C2/DS1 Moist sal savannah	10.91	0.06
8	3C/C3a West Gangetic moist mixed deciduous forest	11.83	0.07
9	3C/C3b East Himalayan moist mixed deciduous forest	418.18	2.46
10	3C/C3/2S2 Secondary Euphorbiaceous scrub	4.69	0.03
11	3/1S1 Low alluvial savannah woodland (<i>Salimalia-Albizzia</i>)	32.25	0.19
12	4B/TS1 Mangrove scrub	144.94	0.85
13	4B/TS2 Mangrove forest	1,047.03	6.15
14	4B/TS3 Saltwater mixed forest (<i>Heritiera</i>)	479.91	2.82
15	4B/TS4 Brackish water mixed forest (<i>Heritiera</i>)	317.43	1.87
16	4B/TS4/E1 Palm swamp	158.71	0.93
17	4C/FS2 Submontane hill valley swamp forest	5.50	0.03
18	4D/SS2 <i>Barringtonia</i> swamp forest	3.40	0.02
19	5B/C1c Dry peninsular sal forest	2,814.92	16.55
20	5B/C2 Northern dry mixed deciduous forest	260.34	1.53
21	5/DS1 Dry deciduous scrub	28.76	0.17
22	5/E5 <i>Butea</i> forest	23.07	0.14
23	5/1S2 <i>Khair-sissu</i> forest	214.43	1.26
24	8B/C1 East Himalayan subtropical wet hill forest	478.96	2.82
25	11B/C1a Lauraceous forest	123.11	0.72
26	11B/C1b <i>Buk</i> oak forest	53.28	0.31
27	11B/C1c High-level oak forest	20.17	0.12
28	12/C3a East Himalayan mixed coniferous forest	327.42	1.92
29	12/DS1 Montane bamboo brakes	8.13	0.05
30	14/C2 East Himalayan sub-alpine birch/fir forest	12.45	0.07
Sub Total		8,363.95	49.17
31	TOF/ Plantation	8,606.30	50.59
Total (Forest Cover & Scrub)		16,970.25	99.76
Grassland forest types (outside forest cover)			
32	4D/2S2 Eastern wet alluvial grassland	35.10	0.21
33	12/DS3 Himalayan temperate pastures	5.81	0.03
Sub Total		40.91	0.24
Grand Total		17,011.16	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest types outside forest cover have also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).



10.29.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.29.11 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Alipurduar	56	151
2	Bankura	772	456
3	Birbhum	56	37
4	Cooch Behar	1	1
5	Dakshin Dinajpur	16	13
6	Darjeeling	34	41
7	Hoogly	2	0
8	Howrah	0	0
9	Jalpaiguri	109	128
10	Jhargram	698	371
11	Kalimpong	90	78
12	Kolkata	0	0
13	Malda	8	0
14	Murshidabad	0	1
15	Nadia	5	0
16	North 24 Parganas	0	0
17	Paschim Bardhaman	161	128
18	Paschim Medinipur	692	295
19	Purba Bardhaman	73	36
20	Purba Medinipur	0	0
21	Purulia	323	282
22	South 24 Parganas	0	2
23	Uttar Dinajpur	0	0
Total		3,096	2,020

10.29.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.29.12 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	0.00	0.00
2	Very highly fire prone	204.47	1.20
3	Highly fire prone	943.16	5.56
4	Moderately fire prone	1,159.94	6.84
5	Less fire prone	14,662.68	86.40
Total		16,970.25	100.00

*Forest Cover including Scrub.

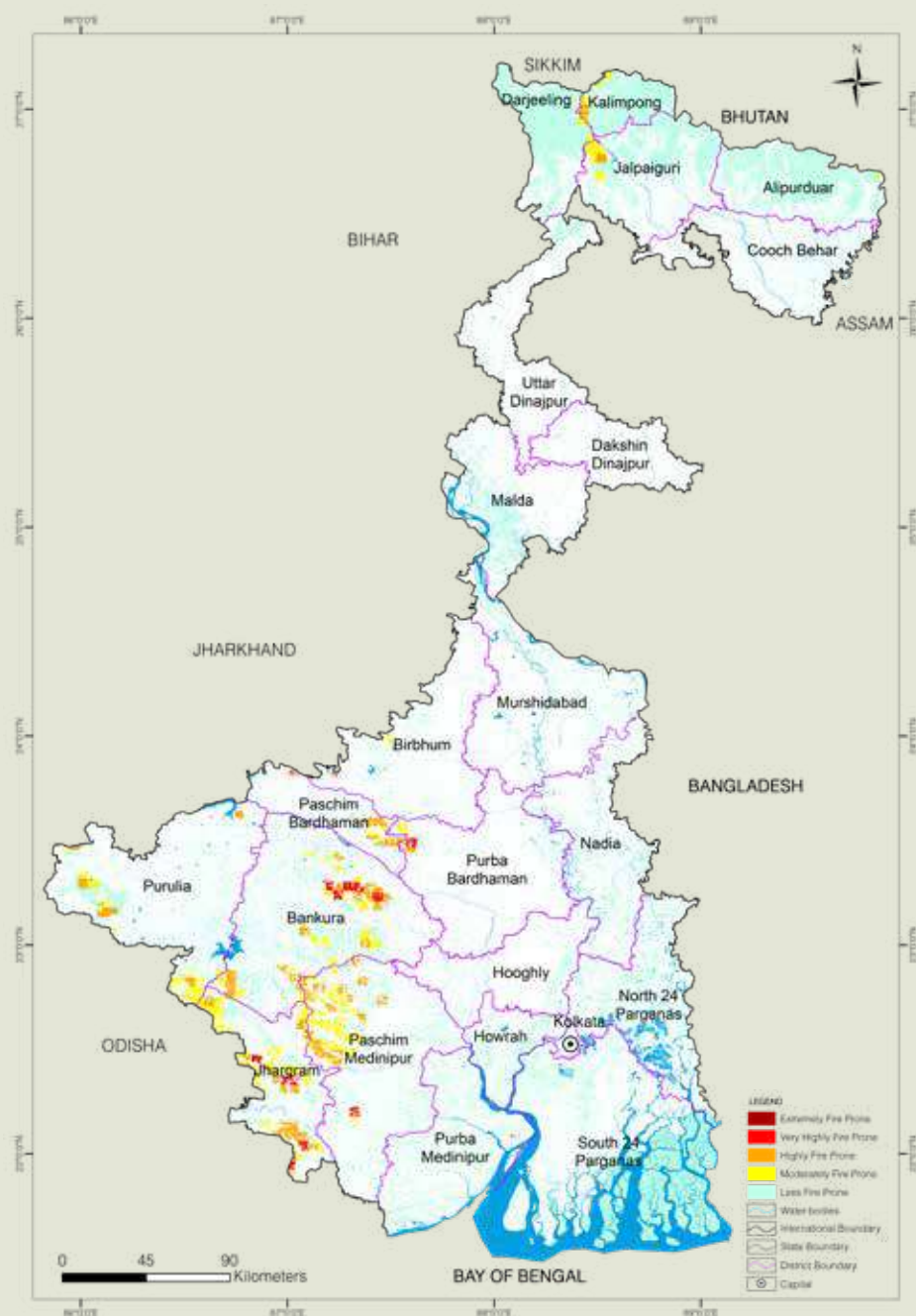


Figure 10.29.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.29.6 Results Derived from NFI for West Bengal

Table 10.29.13 Number of Trees and their volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Shorea robusta</i>	1,10,695	23.71
2	<i>Acacia auriculiformis</i>	27,579	1.65
3	<i>Eucalyptus species</i>	11,905	1.44
4	<i>Madhuca longifolia/ M. latifolia/ M. indica</i>	9,079	1.11
5	<i>Tectona grandis</i>	7,524	4.29



Table 10.29.14 Number of Trees and their volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Acacia auriculiformis</i>	42,808	2.281
2	<i>Mangifera indica</i>	17,825	5.804
3	<i>Areca catechu</i>	16,471	0.317
4	<i>Eucalyptus species</i>	14,534	1.044
5	<i>Butea monosperma</i>	10,842	1.039

Table 10.29.15 Number of Trees and their volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Areca catechu</i>	10,539	0.170
2	<i>Cocos nucifera</i>	4,442	0.841
3	<i>Mangifera indica</i>	4,260	0.804
4	<i>Artocarpus heterophyllus</i>	1,961	0.349
5	<i>Swietenia mahagoni</i>	1,918	0.195

Table 10.29.16 Major NTFP Species in West Bengal

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Shorea robusta</i>	Tree	74,97,860
2	<i>Madhuca longifolia</i> / <i>M. latifolia</i> / <i>M. indica</i>	Tree	5,55,424
3	<i>Butea monosperma</i>	Tree	1,99,922
4	<i>Terminalia bellirica</i>	Tree	1,29,640
5	<i>Piper species</i> / <i>Piper longum</i> / <i>Piper mullesua</i> / <i>Piper peepuloides</i>	Tree	20,04,325
6	<i>Asparagus racemosus</i>	Climber	4,51,679
7	<i>Calamus floribundus</i>	Climber	37,640
8	<i>Andrographis paniculata</i>	Climber	1,57,05,012
9	<i>Ocimum species</i> (<i>Ocimum gratissimum</i> / <i>Ocimum sanctum</i> / <i>Ocimum tenuiflorum</i> / <i>Ocimum americanum</i>)	Herbs	1,02,20,722
10	<i>Centella asiatica</i>	Herbs	47,36,432

Table 10.29.17 Major invasive Species in the State inside the RFA in West Bengal

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Chromolaena odorata</i>	641.10
2	<i>Lantana camara</i>	241.95
3	<i>Mikania micrantha</i>	92.15
4	<i>Ageratum conyzoides</i>	58.64
5	<i>Imperata cylindrica</i>	53.71



Photo: Anant Shukla

ANDAMAN & NICOBAR ISLANDS



Geographical Area
8,249 km²

Geographical Coordinates
Latitude 06° N to 14° N
Longitude 92° E to 94° E

Population (as per Census 2011)
0.38 million
Urban 0.14 million (37.70 %)
Rural 0.24 million (62.30 %)
Tribal 0.03 million (7.50 %)

Average Population Density
46 per km²

Livestock Population
(as per 19th Livestock Census)
0.15 million

No. of Districts
3

No. of Hill Districts
0

No. of Tribal Districts
3

Table 10.30.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	825	
Reporting area for land utilization	714.71	100.00
Forests	674.40	94.36
Not available for land cultivation	8.82	1.23
Permanent pastures and other grazing lands	3.69	0.52
Land under misc. tree crops and groves	4.09	0.57
Culturable wasteland	3.09	0.43
Fallow land other than current fallows	3.28	0.46
Current fallows	2.63	0.37
Net area sown	14.71	2.06

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.30.1 Forest Cover

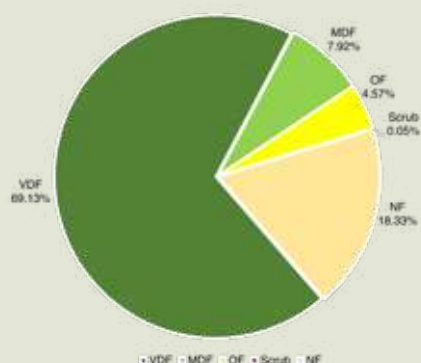


Table 10.30.2 Forest Cover of Andaman & Nicobar Islands

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	5,702.87	69.13
MDF	653.20	7.92
OF	376.85	4.57
Total	6,732.92	81.62
Scrub	4.16	0.05

Figure 10.30.1 Forest Cover of Andaman & Nicobar Islands

Table 10.30.3 District- wise Forest Cover in Andaman & Nicobar Islands

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Nicobars	1,841.00	1,147.61	105.83	156.97	1,410.41	76.61	6.88	1.30
North & Middle Andaman	3,736.16	2,668.91	320.07	70.63	3,059.61	81.90	-10.50	2.32
South Andaman	2,671.85	1,886.35	227.30	149.25	2,262.90	84.69	-0.40	0.54
Grand Total	8,249.00	5,702.87	653.20	376.85	6,732.92	81.62	-4.02	4.16

*Area figure calculated without normalization factor.

Table 10.30.4 Forest Cover in Municipal areas of Andaman & Nicobar Islands

(km ²)								
Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total		
1	Port Blair Municipal Corporation	41.46	1.54	5.26	10.78	17.58	42.40	0.00

*Shapefile of digitized boundary as provided by Directorate of Municipal Administration/Urban Development Port Blair Municipal Corporation.

10.30.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.30.5 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in A&N Islands

(km ²)							
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
5,393.99	525.49	251.03	6,170.51	308.88	127.71	125.82	562.41
87.41%	8.52%	4.07%		54.92%	22.71%	22.37%	

*In case of A&N Islands, new RFA boundaries have been used.

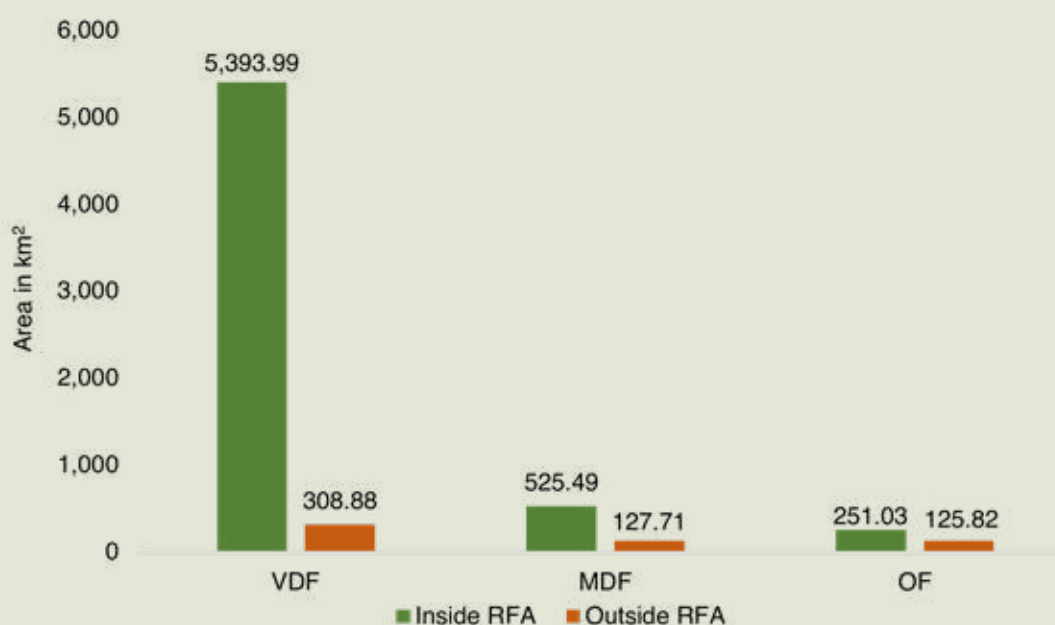


Figure 10.30.2 Forest Cover Inside and Outside of RFA in Andaman & Nicobar Islands

Table 10.30.6 Forest Cover change matrix Inside RFA/GW for Andaman & Nicobar Islands between 2021 Raster based* and 2023 Assessments

(km ²)						
Class	2023 Assessment inside RFA/GW					Total ISFR 2021 inside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	5,366.42	0.65	0.11	0.43	5.39	5,373.00
MDF	26.50	521.44	0.20	0.99	0.00	549.13
OF	0.43	3.02	245.32	0.90	1.00	250.67
Scrub	0.00	0.00	0.00	0.78	0.00	0.78
NF	0.64	0.38	5.40	0.00	567.11	573.53
Total ISFR 2023 inside RFA / GW	5,393.99	525.49	251.03	3.10	573.50	6,747.11
Net Change	20.99	-23.64	0.36	2.32	-0.03	

*Area figure calculated without normalization factor.



Table 10.30.7 Forest Cover Change Matrix Outside RFA/GW for Andaman & Nicobar Islands between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	307.38	2.08	0.23	0.00	0.11	309.80
MDF	1.36	121.18	0.97	0.71	3.71	127.93
OF	0.14	4.44	119.39	0.12	2.32	126.41
Scrub	0.00	0.00	0.00	0.13	0.00	0.13
NF	0.00	0.01	5.23	0.10	932.28	937.62
Total ISFR 2023 outside RFA/GW	308.88	127.71	125.82	1.06	938.42	1,501.89
Net Change	-0.92	-0.22	-0.59	0.93	0.80	

*Area figure calculated without normalization factor.

Table 10.30.8 Altitude-wise Forest Cover in Andaman & Nicobar Islands

(km ²)						
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	8,238.00	5,692.28	653.11	376.77	6,722.16	4.16
500-1000	11.00	10.59	0.09	0.08	10.76	0.00
Total	8,249.00	5,702.87	653.20	376.85	6,732.92	4.16

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

Table 10.30.9 Forest Cover in different Slope Classes in Andaman & Nicobar Islands

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	3,983.00	2,262.47	367.04	257.19	2,886.70	2.97
5-10	1,999.00	1,492.08	182.27	76.48	1,750.83	0.67
10-15	1,185.00	976.43	72.17	27.78	1,076.38	0.30
15-20	651.00	575.59	21.77	9.64	607.00	0.14
20-25	299.00	274.43	6.74	3.42	284.59	0.06
25-30	101.00	93.44	2.21	1.34	96.99	0.02
Above 30	31.00	28.43	1.00	1.00	30.43	0.00
Total	8,249.00	5,702.87	653.20	376.85	6,732.92	4.16

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

ANDAMAN & NICOBAR ISLANDS

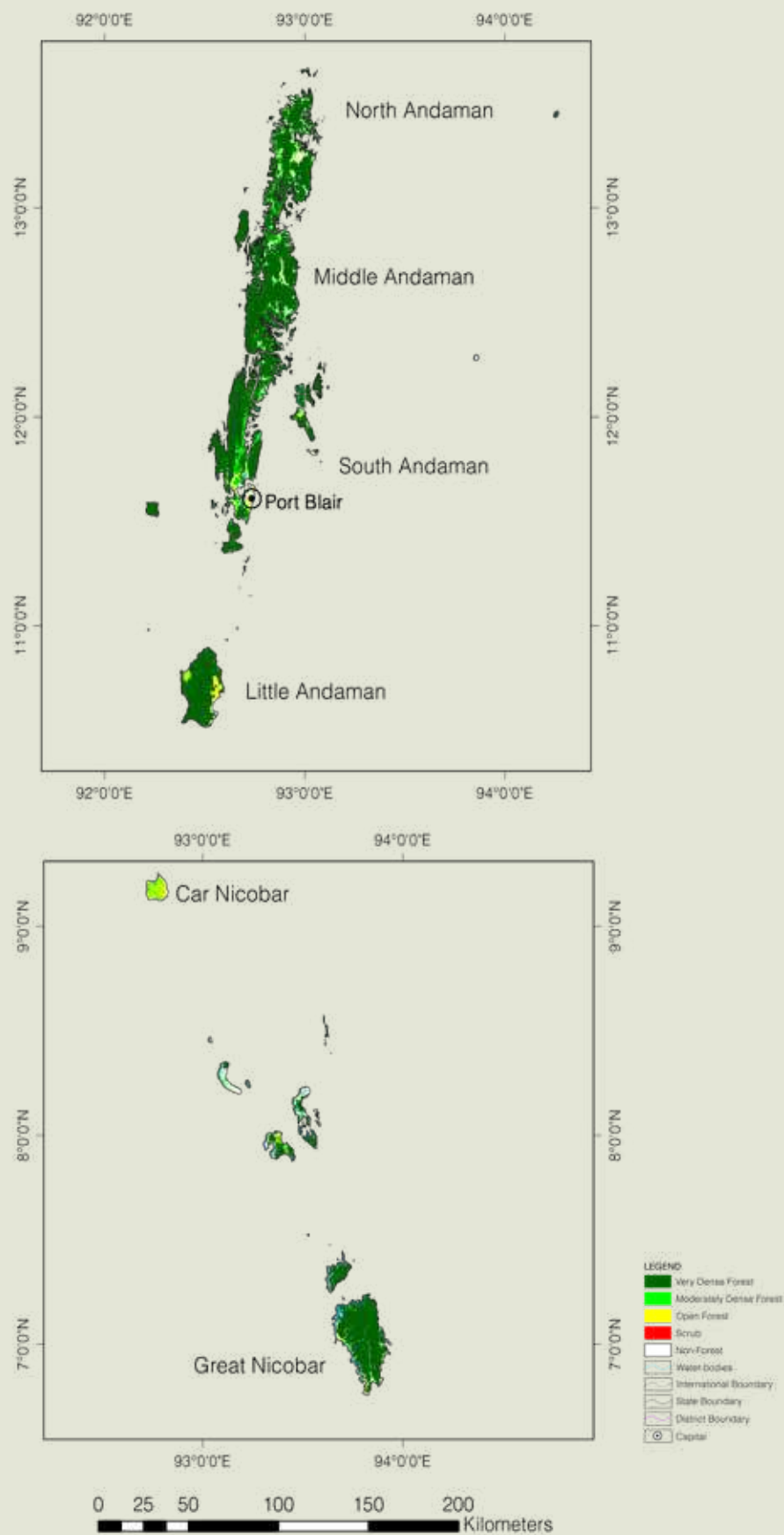


Figure 10.30.3 Forest Cover Map of Andaman & Nicobar Islands

10.30.3 Forest Types

The area under different Forest Types in Andaman & Nicobar Islands (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.30.10 Area Statistics of the Forest Types found in Andaman & Nicobar Islands

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	1A/C1 Giant evergreen forest	38.52	0.57
2	1A/C2 Andamans tropical evergreen forest	2,966.97	44.04
3	1A/C2/E1 Andamans moist deciduous forest	160.95	2.39
4	1A/C3 Southern hilltop tropical evergreen forest	80.79	1.20
5	1/E1 Cane brakes	0.26	0.01
6	1/E2 Wet bamboo brakes	21.85	0.32
7	1/2S1 Pioneer Euphorbiaceous scrub	3.41	0.05
8	2A/C1 Andamans semi-evergreen forest	2,062.05	30.61
9	2/E2 Wet bamboo brakes	12.50	0.19
10	3A/C1 Andamans moist deciduous forest	545.82	8.10
11	3A/C1/2S1 Andamans secondary moist deciduous forest	7.70	0.11
12	4A/L1 Littoral forest	7.62	0.11
13	4B/TS2 Mangrove forest	622.55	9.24
Sub Total		6,530.99	96.94
14	TOF/Plantation	206.09	3.06
Total (Forest Cover & Scrub)		6,737.08	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). The total mapped area, therefore, is sum of forest cover and scrub.

10.30.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.30.11 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Nicobars	17	11
2	North & Middle Andaman	2	6
3	South Andaman	1	4
Total		20	21

ANDAMAN & NICOBAR ISLANDS

10.30.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.30.12 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	0.00	0.00
2	Very highly fire prone	0.00	0.00
3	Highly fire prone	0.00	0.00
4	Moderately fire prone	1.83	0.03
5	Less fire prone	6,735.25	99.97
Total		6,737.08	100.00

*Forest Cover including Scrub.

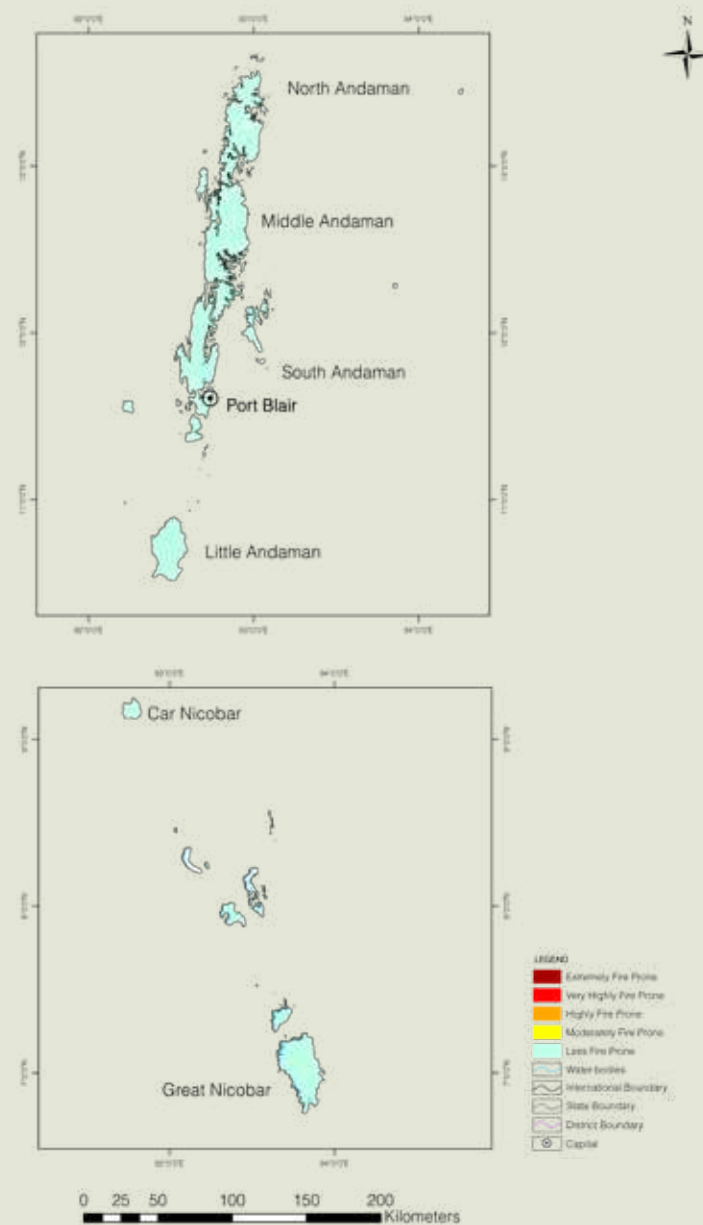


Figure 10.30.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.30.6 Results Derived from NFI for Andaman Nicobar Islands

Table 10.30.13 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Myristica species</i>	15,902	3.29
2	<i>Dipterocarpus turbinatus</i>	12,970	15.44
3	<i>Diospyros species</i>	8,389	1.02
4	<i>Areca catechu</i>	7,735	0.25
5	<i>Lagerstroemia hypoleuca</i>	4,900	2.58

Table 10.30.14 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Areca catechu</i>	29,713	0.940
2	<i>Cocos nucifera</i>	2,061	0.803
3	<i>Mangifera indica</i>	332	0.188
4	<i>Syzygium species</i>	258	0.009
5	<i>Acacia auriculiformis</i>	200	0.120

Table 10.30.15 Number of Trees and their volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Areca catechu</i>	83	0.003
2	<i>Gliricidia sepium</i>	15	0.001
3	<i>Cocos nucifera</i>	10	0.003
4	<i>Mangifera indica</i>	7	0.002
5	<i>Artocarpus heterophyllus/ Artocarpus integrifolia</i>	3	0.002

Table 10.30.16 Major NTFP Species in Andaman & Nicobar Islands

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Cinnamomum tamala</i>	Tree	91,560
2	<i>Licuala peltata</i>	Tree	80,931
3	<i>Areca catechu</i>	Tree	7,735
4	<i>Heritiera littoralis</i>	Tree	5,422
5	<i>Calamus longisetus</i>	Shrubs	13,28,296
6	<i>Calamus latifolius/ Calamus palustris</i>	Shrubs	5,97,466
7	<i>Korthalsia laciniata</i>	Climbers	13,32,297

Table 10.30.17 Major Invasive Species in the State Inside the RFA in Andaman & Nicobar Islands

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Chromolaena odorata</i>	72.69
2	<i>Mimosa pigra</i>	2.51
3	<i>Alternanthera philoxeroides</i>	2.51



Photo: Anant Shukla



Photo: FSI Repository

CHANDIGARH



Geographical Area
114 km²

Geographical Coordinates
Latitude 30°39' N to 30°49' N
Longitude 75°41' E to 75°51' E

Population (as per Census 2011)
1.06 million
Urban 1.03 million (97.25 %)
Rural 0.03 million (2.75 %)
Tribal NIL

Average Population Density
9,298 per km²

Livestock Population
(as per 19th Livestock Census)
0.024 million

No. of Districts
1

No. of Hill Districts
0

No. of Tribal Districts
0

Table 10.31.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	11	
Reporting area for land utilization	9.10	100.00
Forests	2.29	25.16
Not available for land cultivation	5.36	58.90
Permanent pastures and other grazing lands	0.00	0.00
Land under misc. tree crops and groves	0.17	1.87
Culturable wasteland	0.00	0.00
Fallow land other than current fallows	0.05	0.55
Current fallows	0.05	0.55
Net area sown	1.18	12.97

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.31.1 Forest Cover

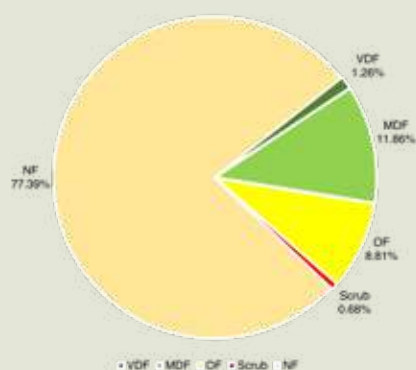


Table 10.31.2 Forest Cover of Chandigarh

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	1.44	1.26
MDF	13.52	11.86
OF	10.04	8.81
Total	25.00	21.93
Scrub	0.78	0.68

Figure 10.31.1 Forest Cover of Chandigarh

Table 10.31.3 District- wise Forest Cover in Chandigarh

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Chandigarh	114	1.44	13.52	10.04	25.00	21.93	1.20	0.78
Grand Total	114	1.44	13.52	10.04	25.00	21.93	1.20	0.78

*Area figure calculated without normalization factor.

10.31.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.31.4 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Chandigarh

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
1.36	5.04	2.54	8.94	0.08	8.48	7.50	16.06
15.21%	56.38%	28.41%		0.50%	52.80%	46.70%	

*In case of Chandigarh, RFA boundaries have been used.

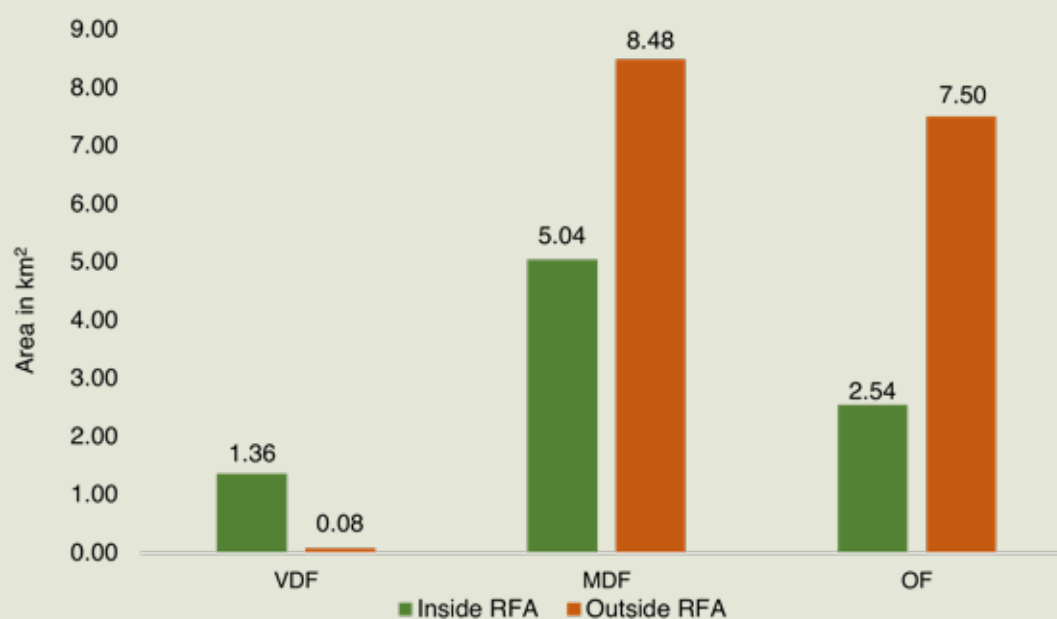


Figure 10.31.2 Forest Cover Inside and Outside of RFA in Chandigarh

Table 10.31.5 Forest Cover Change Matrix Inside RFA/GW for Chandigarh between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 inside RFA / GW Raster based*
VDF	1.29	0.00	0.00	0.00	0.00	1.29
MDF	0.07	4.96	0.03	0.00	0.01	5.07
OF	0.00	0.05	2.30	0.00	0.00	2.35
Scrub	0.00	0.00	0.00	0.05	0.00	0.05
NF	0.00	0.03	0.21	0.00	2.32	2.56
Total ISFR 2023 inside RFA / GW	1.36	5.04	2.54	0.05	2.33	11.32
Net Change	0.07	-0.03	0.19	0.00	-0.23	

*Area figure calculated without normalization factor.



Table 10.31.6 Forest Cover Change Matrix Outside RFA/GW for Chandigarh between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	0.07	0.00	0.00	0.00	0.00	0.07
MDF	0.01	8.22	0.31	0.00	0.14	8.68
OF	0.00	0.09	6.00	0.00	0.25	6.34
Scrub	0.00	0.00	0.00	0.53	0.00	0.53
NF	0.00	0.17	1.19	0.20	85.5	87.06
Total ISFR 2023 outside RFA/GW	0.08	8.48	7.50	0.73	85.89	102.68
Net Change	0.01	-0.20	1.16	0.20	-1.17	

*Area figure calculated without normalization factor.

Table 10.31.7 Altitude-wise Forest Cover in Chandigarh

(km ²)						
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	114.00	1.44	13.52	10.04	25.00	0.78
Total	114.00	1.44	13.52	10.04	25.00	0.78

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

Table 10.31.8 Forest Cover in different slope classes in Chandigarh

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	109	1.38	12.65	9.49	23.52	0.75
5-10	5	0.06	0.87	0.55	1.48	0.03
Total	114.00	1.44	13.52	10.04	25.00	0.78

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

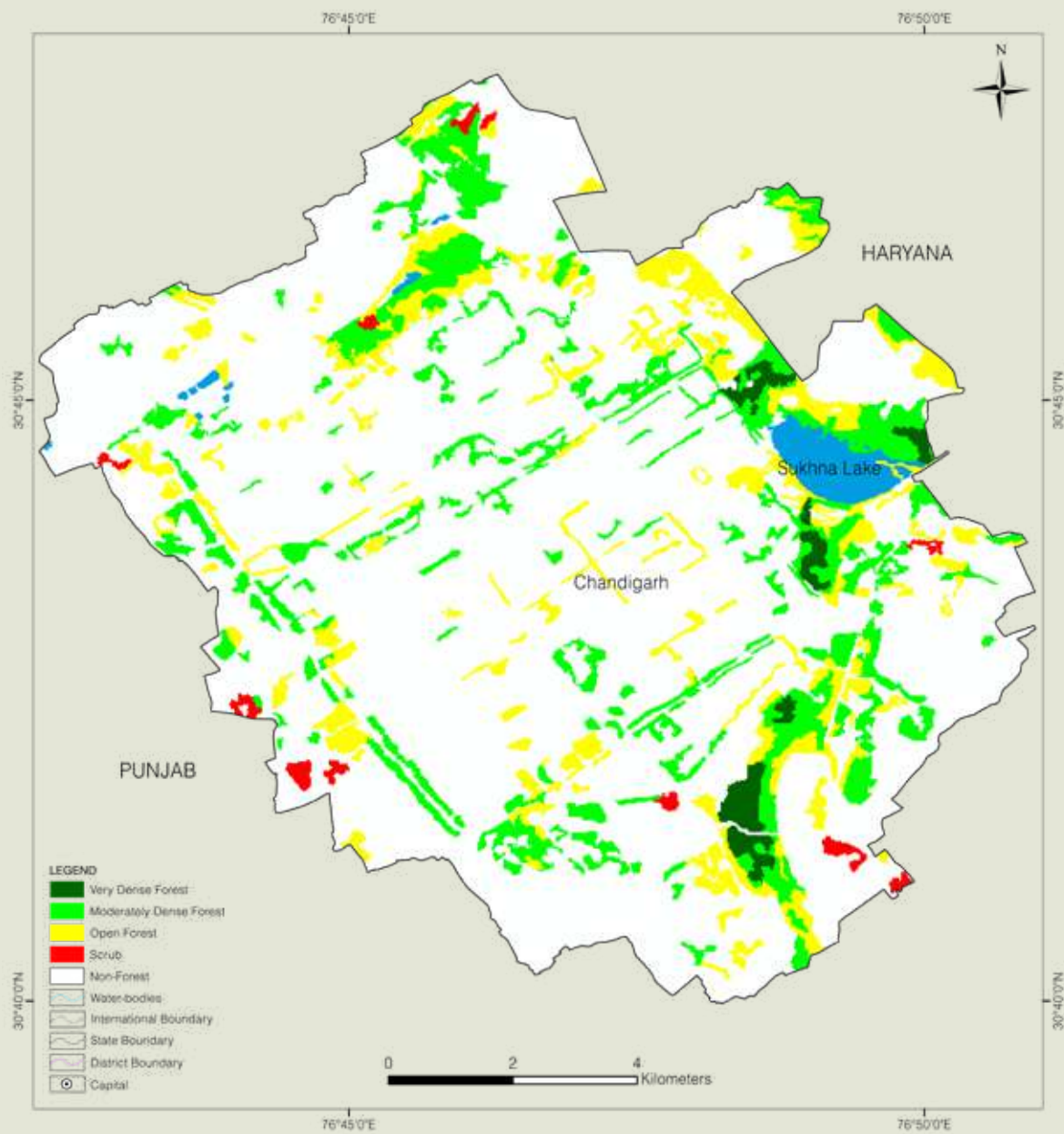


Figure 10.31.3 Forest Cover Map of Chandigarh



10.31.3 Forest Types

The area under different Forest Types in Chandigarh (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.31.9 Area Statistics of the Forest Types Found in Chandigarh

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	5B/C2 Northern dry mixed deciduous forest	11.12	43.14
2	5/DS1 Dry deciduous scrub	0.89	3.45
Sub Total		12.01	46.59
3	TOF/ Plantation	13.77	53.41
Total (Forest Cover & Scrub)		25.78	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). The total mapped area, therefore, is sum of forest cover and scrub.

10.31.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.31.10 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Chandigarh	1	1
Total		1	1

10.31.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.31.11 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	0.00	0.00
2	Very highly fire prone	0.00	0.00
3	Highly fire prone	0.00	0.00
4	Moderately fire prone	0.00	0.00
5	Less fire prone	25.78	100.00
Total		25.78	100.00

*Forest Cover including Scrub.

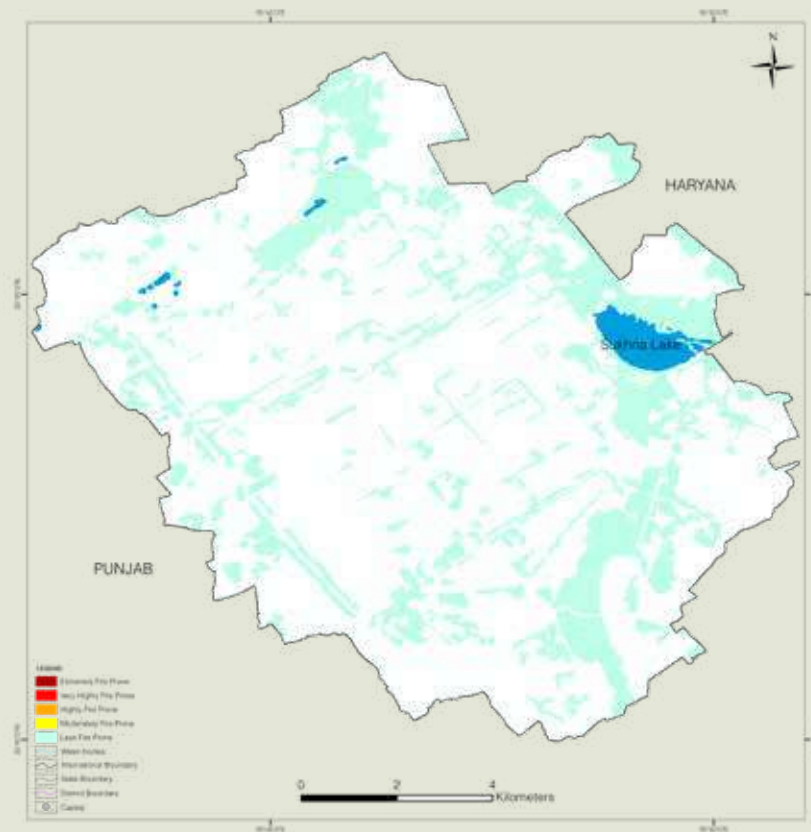


Figure 10.31.4 : Fire Prone Forest Areas under Different Fire Prone Classes

10.31.6 Results Derived from NFI for Chandigarh

Table 10.31.12 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Leucaena leucocephala</i>	183	0.02
2	<i>Acacia catechu/ Senegalia catechu</i>	164	0.02
3	<i>Dalbergia sissoo</i>	101	0.03
4	<i>Emblica officinalis/ Phyllanthus emblica</i>	84	0.01
5	<i>Melia azedarach</i>	64	0.01

Table 10.31.13 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Eucalyptus species</i>	13	0.0050
2	<i>Morus species</i>	7	0.0010
3	<i>Dalbergia sissoo</i>	5	0.0004
4	<i>Mangifera indica</i>	5	0.0030
5	<i>Prosopis juliflora/ Neltuma juliflora</i>	4	0.0010



Table 10.31.14 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Mangifera indica</i>	72	0.046
2	<i>Polyalthia longifolia/ Monoon longifolium</i>	70	0.007
3	<i>Pongamia pinnata(Old) Bongamia glabra</i>	62	0.012
4	<i>Morus species</i>	49	0.009
5	<i>Psidium guajava</i>	44	0.002

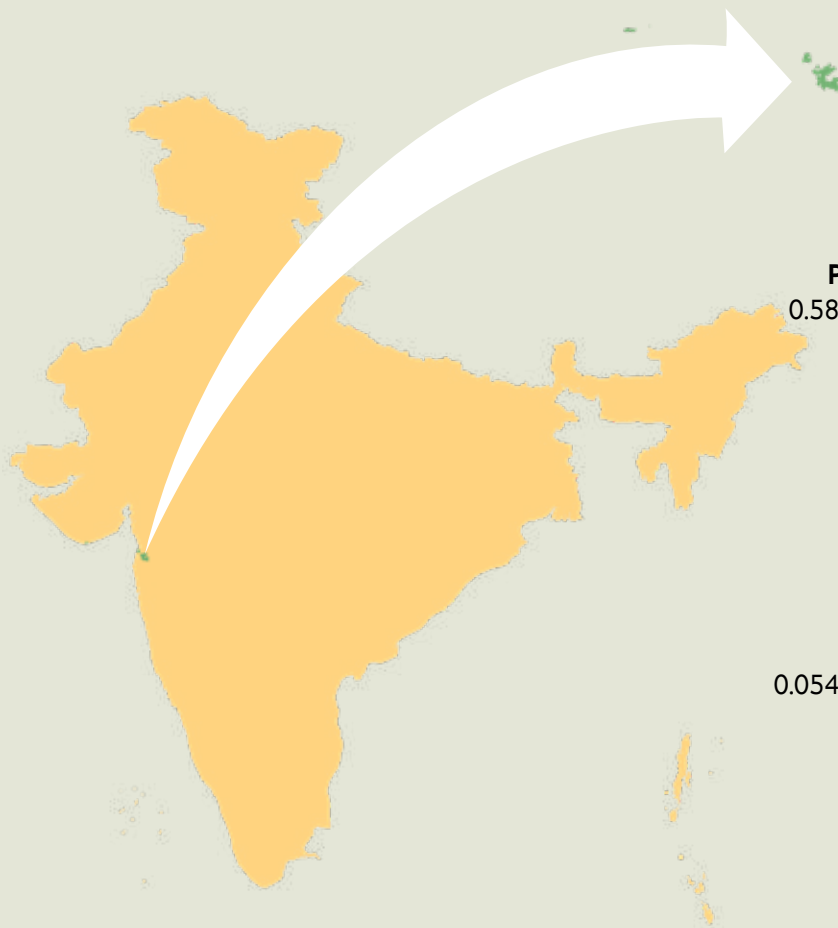
Table 10.31.15 Major NTFP Species in Chandigarh

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Murraya koenigii/ Bergera koenigii</i>	Tree	10,781
2	<i>Morus alba</i>	Tree	2,476
3	<i>Acacia catechu/ Senegalia catechu</i>	Tree	350
4	<i>Emblica officinalis/ Phyllanthus emblica</i>	Tree	270
5	<i>Syzygium cumini</i>	Tree	46
6	<i>Ziziphus species</i>	Tree	45
7	<i>Terminalia arjuna</i>	Tree	37
8	<i>Ficus virens</i>	Tree	9
9	<i>Psidium guajava</i>	Tree	6
10	<i>Cassia fistula/ Sp.</i>	Tree	4

Table 10.31.16 Major Invasive Species in the State Inside the RFA in Chandigarh

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Lantana camara</i>	3.93
2	<i>Parthenium hysterophorus</i>	1.65
3	<i>Saccharum spontaneum</i>	1.35
4	<i>Achyranthes aspera</i>	0.22
5	<i>Tridax procumbens</i>	0.07

DADRA & NAGAR HAVELI AND DAMAN & DIU



Geographical Area
602 km²

Geographical Coordinates
Latitude 20°00'N to 20°28' N
Longitude 70°00'E to 73°15' E

Population (as per Census 2011)
0.58 million (combined Dadra & Nagar
Haveli & Daman & Diu)
Urban 0.34 million (58.51 %)
Rural 0.24 million (41.49 %)
Tribal 0.19 million (33.04 %)

Average Population Density
963 per km²

Livestock Population
(as per 19th Livestock Census)
0.054 million (combined Dadra & Nagar
Haveli & Daman & Diu)

No. of Districts
3

No. of Hill Districts
0

No. of Tribal Districts
2

Table 10.32.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	60	
Reporting area for land utilization	47.42	100.00
Forests	20.35	42.91
Not available for land cultivation	4.02	8.48
Permanent pastures and other grazing lands	0.02	0.04
Land under misc. tree crops and groves	0.06	0.13
Culturable wasteland	0.09	0.19
Fallow land other than current fallows	0.05	0.13
Current fallows	0.21	0.44
Net area sown	22.61	47.68

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.32.1 Forest Cover

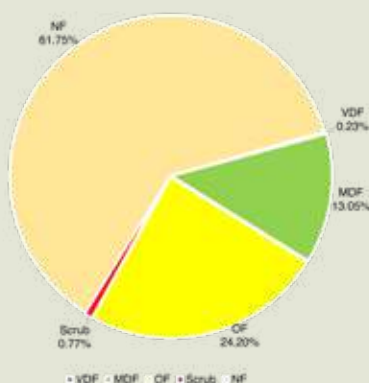


Figure 10.32.1 Forest Cover of Dadra & Nagar Haveli and Daman & Diu

Table 10.32.2 Forest Cover of Dadra & Nagar Haveli and Daman & Diu

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	1.36	0.23
MDF	78.59	13.05
OF	145.67	24.20
Total	225.62	37.48
Scrub	4.66	0.77

Table 10.32.3 District- wise Forest Cover in Dadra & Nagar Haveli and Daman & Diu

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Dadra & Nagar Haveli	491.00	0.00	72.71	129.99	202.70	41.28	-2.83	4.52
Daman	72.00	0.00	1.96	10.91	12.87	17.88	2.15	0.14
Diu	39.00	1.36	3.92	4.77	10.05	25.77	0.36	0.00
Total	602.00	1.36	78.59	145.67	225.62	37.48	-0.32	4.66

*Area figure calculated without normalization factor.

10.32.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.32.4 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Dadra & Nagar Haveli and Daman & Diu

(km ²)							
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
0.00	67.85	90.66	158.51	1.36	10.74	55.01	67.11
0.00%	42.80%	57.20%		2.03%	16.00%	81.97%	

*In case of Dadra & Nagar Haveli and Daman & Diu, RFA boundaries have been used.

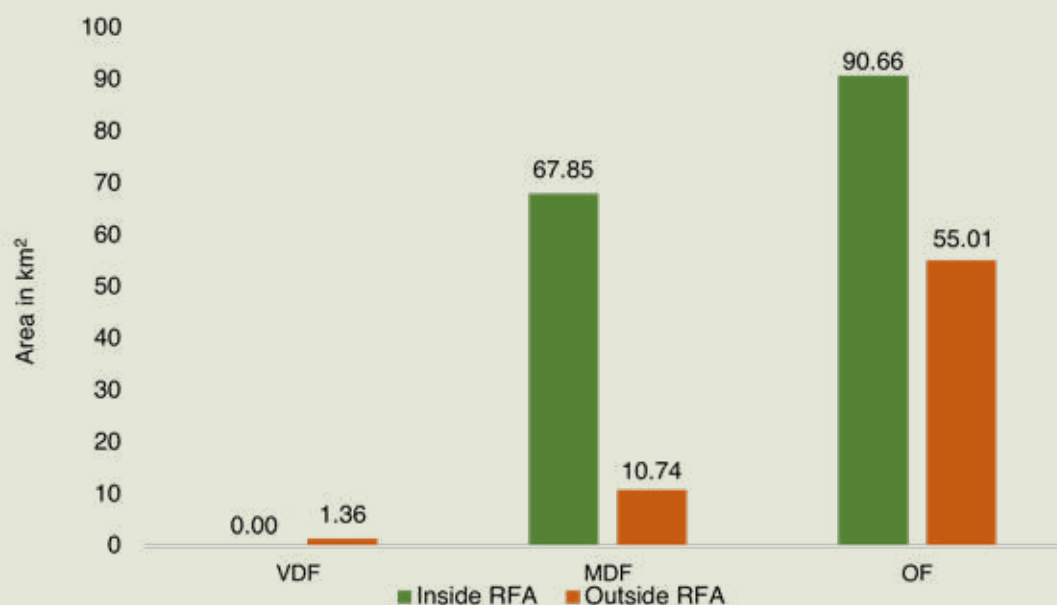


Figure 10.32.2 Forest Cover Inside and Outside of RFA in Dadra & Nagar Haveli and Daman & Diu

Table 10.32.5 Forest Cover Change Matrix Inside RFA/GW for Dadra & Nagar Haveli and Daman & Diu between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 inside RFA / GW Raster based*
VDF	0.00	0.00	0.00	0.00	0.00	0.00
MDF	0.00	67.85	0.68	0.00	0.85	69.38
OF	0.00	0.00	89.92	0.00	0.72	90.64
Scrub	0.00	0.00	0.00	4.17	0.00	4.17
NF	0.00	0.00	0.06	0.00	32.70	32.76
Total ISFR 2023 inside RFA / GW	0.00	67.85	90.66	4.17	34.27	196.95
Net Change	0.00	-1.53	0.02	0.00	1.51	

*Area figure calculated without normalization factor.



Table 10.32.6 Forest Cover Change Matrix Outside RFA/GW for Dadra & Nagar Haveli and Daman & Diu between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	1.36	0.00	0.00	0.00	0.00	1.36
MDF	0.00	10.62	0.29	0.00	0.71	11.62
OF	0.00	0.04	51.99	0.00	0.91	52.94
Scrub	0.00	0.04	0.09	0.35	0.02	0.50
NF	0.00	0.04	2.64	0.14	335.81	338.63
Total ISFR 2023 outside RFA/GW	1.36	10.74	55.01	0.49	337.45	405.05
Net Change	0.00	-0.88	2.07	-0.01	-1.18	

*Area figure calculated without normalization factor.

Table 10.32.7 Altitude-wise Forest Cover in Dadra & Nagar Haveli and Daman & Diu

Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub	(km ²)
0-500	602.00	1.36	78.59	145.67	225.62	4.66	
Total	602.00	1.36	78.59	145.67	225.62	4.66	

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

Table 10.32.8 Forest Cover in Different Slope Classes in Dadra & Nagar Haveli and Daman & Diu

Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub	(km ²)
0-5	432.00	1.35	24.72	77.92	103.99	3.15	
5-10	95.00	0.01	22.44	36.10	58.55	0.84	
10-15	45.00	0.00	16.71	19.26	35.97	0.42	
15-20	19.00	0.00	9.01	8.39	17.40	0.21	
20-25	7.00	0.00	3.84	2.90	6.74	0.04	
25-30	3.00	0.00	1.52	0.88	2.40	0.00	
>30	1.00	0.00	0.35	0.22	0.57	0.00	
Total	602.00	1.36	78.59	145.67	225.62	4.66	

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

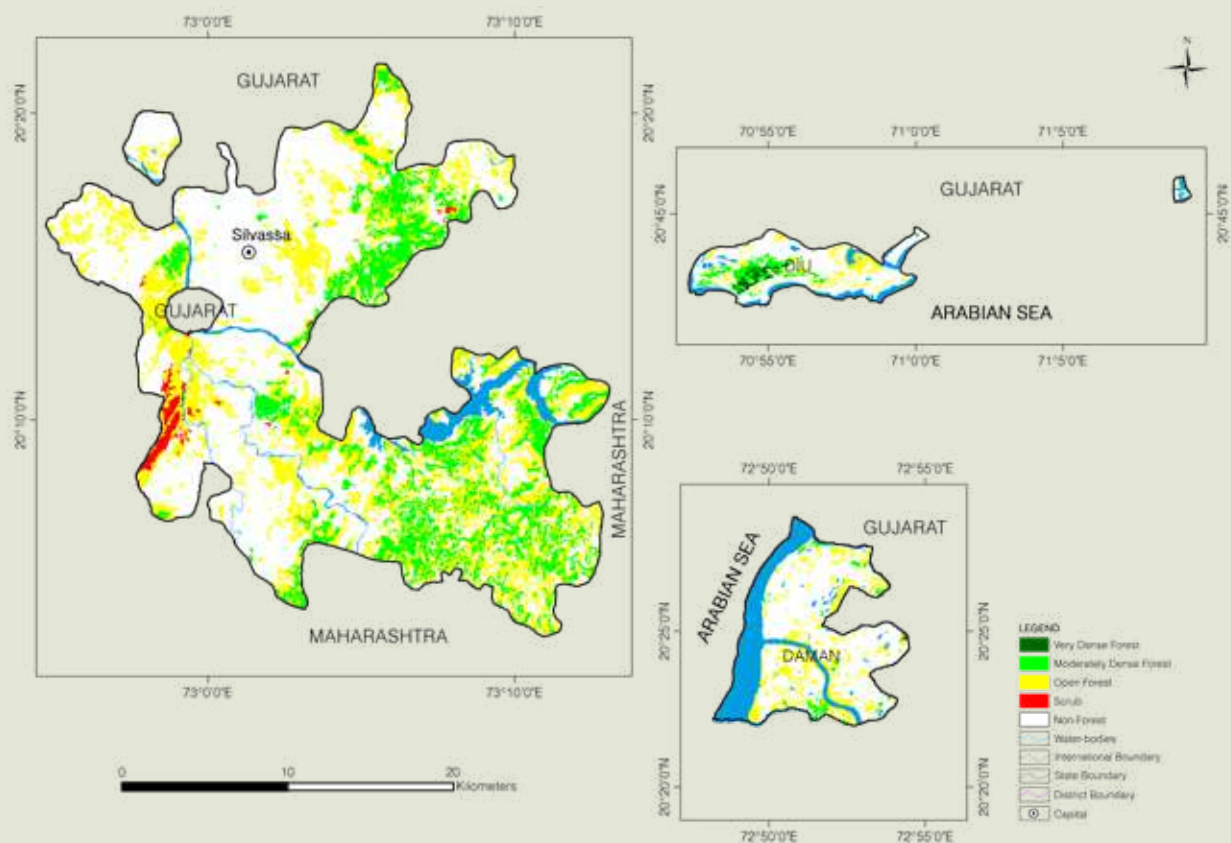


Figure 10.32.3 Forest Cover Map of Dadra & Nagar Haveli and Daman & Diu

10.32.3 Forest Types

The area under different Forest Types in Dadra & Nagar Haveli and Daman & Diu (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.32.9 Area Statistics of the Forest Types Found in Dadra & Nagar Haveli and Daman & Diu

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	3B/C1b Moist teak forest	19.79	8.59
2	3B/C2 Southern moist mixed deciduous forest	155.29	67.44
3	4A/L1 Littoral forest	1.33	0.58
4	4B/TS2 Mangrove forest	4.05	1.76
5	5A/C3 Southern dry mixed deciduous forest	8.98	3.90
6	5/DS1 Dry deciduous scrub	5.55	2.41
7	6B/C1 Desert thorn forest	3.26	1.41
Sub Total		198.25	86.09
8	TOF/Plantation	32.03	13.91
Total (Forest Cover & Scrub)		230.28	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). The total mapped area, therefore, is sum of forest cover and scrub.

10.32.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.32.10 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Dadra & Nagar Haveli	15	15
2	Daman	0	1
3	Diu	1	0
Total		16	16

10.32.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.32.11 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	0.00	0.00
2	Very highly fire prone	0.00	0.00
3	Highly fire prone	0.00	0.00
4	Moderately fire prone	0.00	0.00
5	Less fire prone	230.28	100.00
Total		230.28	100.00

*Forest Cover including Scrub.

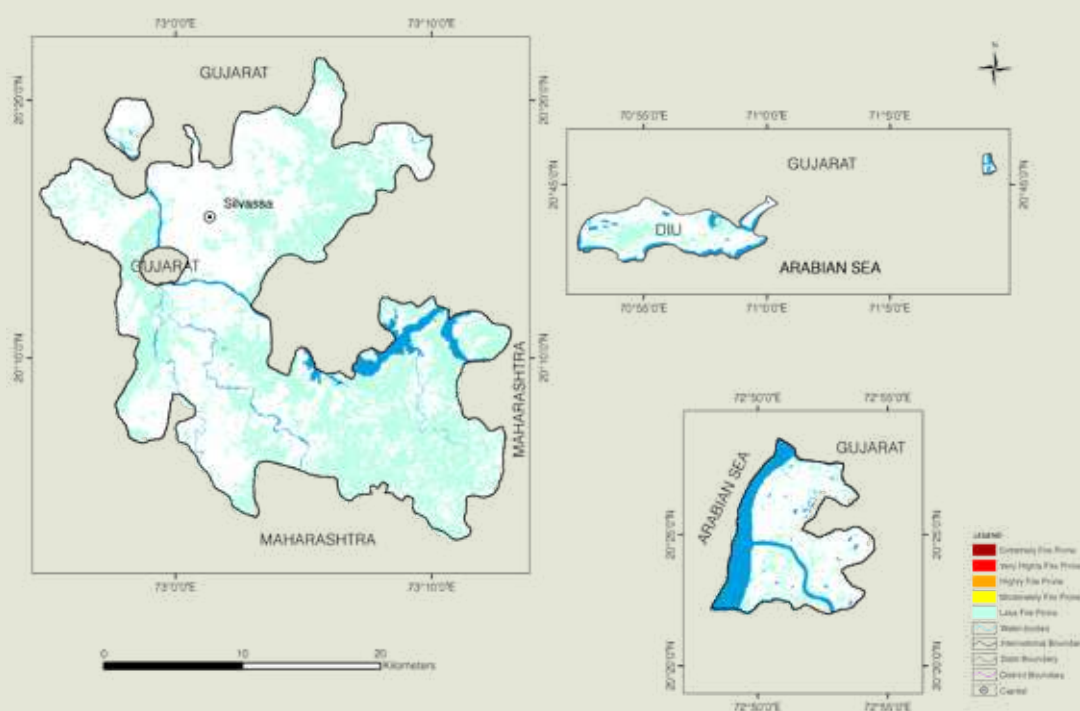


Figure 10.32.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.32.6 Results Derived from NFI for Dadra & Nagar Haveli and Daman & Diu

Table 10.32.12 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Terminalia elliptica/ Terminalia crenulata</i>	595	0.06
2	<i>Tectona grandis</i>	323	0.04
3	<i>Lannea coromandelica</i>	228	0.05
4	<i>Acacia catechu</i>	200	0.05
5	<i>Butea monosperma</i>	156	0.01

Table 10.32.13 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Mangifera indica</i>	680	0.163
2	<i>Phoenix sylvestris</i>	294	0.080
3	<i>Manihot esculenta/ Manihot utilissima</i>	148	0.023
4	<i>Cocos nucifera</i>	141	0.038
5	<i>Tectona grandis</i>	132	0.014

Table 10.32.14 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Mangifera indica</i>	63	0.021
2	<i>Cocos nucifera</i>	61	0.011
3	<i>Jonesia asoca/ Saraca asoca</i>	18	0.003
4	<i>Ziziphus species</i>	15	0.001
5	<i>Azadirachta indica/ Melia indica</i>	15	0.005

Table 10.32.15 Major NTFP Species in Dadra & Nagar Haveli And Daman & Diu

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Diospyros melanoxylon</i>	Tree	5,333
2	<i>Madhuca longifolia/ M. latifolia/ M. indica</i>	Tree	2,037
3	<i>Phoenix sylvestris</i>	Tree	1,049
4	<i>Lannea coromandelica</i>	Tree	857
5	<i>Anogeissus latifolia/ Terminalia anogeissiana</i>	Tree	489
6	<i>Emblia officinalis/ Phyllanthus emblica</i>	Tree	420
7	<i>Bombax species/ Bombax ceiba</i>	Tree	298
8	<i>Miliusa tomentosa</i>	Tree	220
9	<i>Acacia catechu/ Senegalia catechu</i>	Tree	200
10	<i>Acacia nilotica/ Acacia arabica/ Vachellia nilotica</i>	Tree	74



Table 10.32.16 Major Invasive Species In the State Inside the RFA in Dadra & Nagar Haveli And Daman & Diu

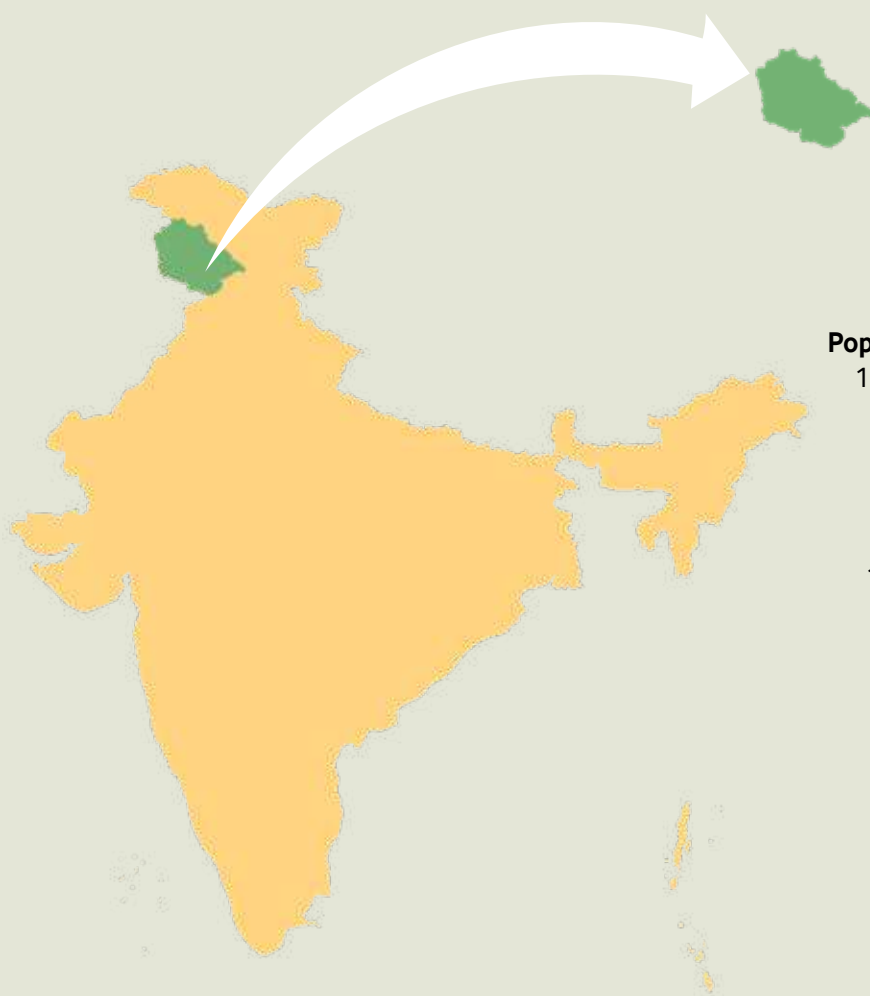
Sl. No.	Species	Estimated Extent (km ²)
1	<i>Cassia tora</i> / <i>Senna tora</i>	18.02
2	<i>Triumfetta rhomboidea</i>	5.81
3	<i>Ageratum conyzoides</i>	5.66
4	<i>Achyranthes aspera</i>	1.04
5	<i>Galinsoga parviflora</i>	1.04



Photo: FSI Repository

Forest Survey of India

JAMMU & KASHMIR



Geographical Area

54,634 km²#

Geographical Coordinates

Latitude 30°17' N to 35°08' N

Longitude 73°25' E to 76°45' E

Population (as per Census 2011)

12.54 million (including Ladakh)

Urban 3.43 million (27.38 %)

Rural 9.11 million (72.62 %)

Tribal 1.49 million (11.91 %)

Average Population Density

125 per km² (including Ladakh)

Livestock Population

(as per 19th Livestock Census)

9.20 million (including Ladakh)

No. of Districts

22

No. of Hill Districts

22

No. of Tribal Districts

0

Area of Digitized boundary provided by Survey of India (November, 2023).
Notified Geographical Area from Sol awaited.

Table 10.33.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	5,462	
Reporting area for land utilization	3,843.31	100.00
Forests	2,138.70	55.65
Not available for land cultivation	523.00	13.61
Permanent pastures and other grazing lands	106.40	2.77
Land under misc. tree crops and groves	63.43	1.65
Culturable wasteland	154.19	4.01
Fallow land other than current fallows	36.86	0.96
Current fallows	87.83	2.28
Net area sown	732.90	19.07

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.33.1 Forest Cover

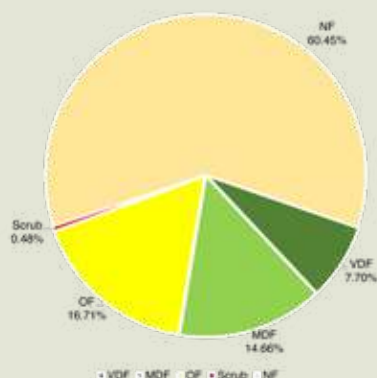


Figure 10.33.1 Forest Cover of Jammu & Kashmir

Table 10.33.2 Forest Cover of Jammu & Kashmir

(km ²)		
Class	Area	% of Digitized Boundary Area* (Sol)
VDF	4,208.79	7.70
MDF	8,006.56	14.66
OF	9,131.04	16.71
Total	21,346.39	39.07
Scrub	262.27	0.48

Area of Digitized boundary provided by Survey of India (November, 2023). Notified geographical area from Sol awaited.

Table 10.33.3 District- wise Forest Cover in Jammu & Kashmir

(km ²)								
District	Digitized Boundary Area* (Sol)	2023 Assessment				% of Digitized Boundary Area (Sol)	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Anantnag ^H	2,727.07	128.94	463.72	484.38	1,077.04	39.49	9.27	6.60
Badgam ^H	1,249.55	100.91	80.99	170.95	352.85	28.24	5.45	18.22
Bandipura ^H	4,042.47	344.41	287.58	291.30	923.29	22.84	5.73	3.39
Baramula ^H	2,061.93	272.91	222.90	390.63	886.44	42.99	4.31	9.49
Doda ^H	2,411.28	329.56	711.58	443.31	1,484.45	61.56	6.63	8.33
Ganderbal ^H	1,619.60	130.45	181.84	184.05	496.34	30.65	4.19	8.09
Jammu ^H	2,409.73	0.00	221.14	472.63	693.77	28.79	5.14	27.01
Kathua ^H	2,512.64	109.32	624.89	595.07	1,329.28	52.90	4.90	10.91
Kishtwar ^H	8,178.63	242.67	750.10	795.19	1,787.96	21.86	12.86	12.80
Kulgam ^H	1,264.73	82.80	98.22	204.01	385.03	30.44	-3.87	5.49
Kupwara ^H	2,743.72	764.83	417.34	338.18	1,520.35	55.41	3.39	2.19
Mirpur ^H	3,759.30	2.65	431.34	888.52	1,322.51	35.18	11.07	41.57
Muzaffarbad ^H	4,662.67	829.37	451.20	462.00	1,742.57	37.37	-4.41	10.18
Pulwama ^H	896.39	16.07	124.04	235.25	375.36	41.87	0.19	6.78
Punch ^H	4,244.12	325.80	1,021.30	653.15	2,000.25	47.13	8.73	20.65
Rajauri ^H	2,635.32	41.16	422.44	754.49	1,218.09	46.22	6.78	11.58
Ramban ^H	1,288.19	72.06	292.74	295.43	660.23	51.25	5.19	5.55
Reasi ^H	1,932.30	235.31	381.93	415.56	1,032.80	53.45	7.40	7.96
Samba ^H	927.70	0.00	139.85	195.44	335.29	36.14	0.81	18.48
Shupiyan ^H	505.54	61.87	37.76	216.33	315.96	62.50	-4.98	1.92
Srinagar ^H	281.58	0.77	19.14	24.55	44.46	15.79	0.32	0.00
Udhampur ^H	2,279.66	116.93	624.52	620.62	1,362.07	59.75	-5.55	25.08
Grand Total	54,634.12	4,208.79	8,006.56	9,131.04	21,346.39	39.07	83.55	262.27

Area of Digitized boundary provided by Survey of India (November, 2023). Notified geographical area from Sol awaited.

*Area figure calculated without normalization factor.



Table 10.33.4 Forest Cover in Municipal areas of Jammu & Kashmir

(km ²)								
Sl. No.	Name of Urban Local Body	Area as per Digitized Boundary*	2023 Assessment				% of Total Forest Cover w.r.t. Area of Digitized Boundary	Scrub
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover		
1	Akhnoor	2.04	0.00	0.00	0.15	0.15	7.35	0.00
2	Arnia	1.85	0.00	0.00	0.00	0.00	0.00	0.00
3	Banihal	1.95	0.00	0.02	0.04	0.06	3.08	0.00
4	Bari Brahmana	9.59	0.00	0.00	0.36	0.36	3.75	0.00
5	Basholi	3.86	0.00	0.18	0.86	1.04	26.94	0.04
6	Batote	2.99	0.01	0.49	0.82	1.32	44.15	0.00
7	Bhaderwah	2.62	0.04	0.02	0.05	0.11	4.20	0.00
8	Billawar	10.82	0.00	2.13	3.57	5.70	52.68	0.00
9	Bisnah	2.12	0.00	0.00	0.03	0.03	1.42	0.00
10	Chenani	0.67	0.00	0.00	0.07	0.07	10.45	0.00
11	Doda	6.06	0.00	0.08	1.30	1.38	22.77	0.18
12	Gho Manhasan	0.81	0.00	0.00	0.00	0.00	0.00	0.00
13	Hiranagar	10.01	0.00	0.00	1.33	1.33	13.29	0.04
14	Jourian	3.37	0.00	0.00	0.05	0.05	1.48	0.00
15	Kalakote	2.61	0.00	0.06	0.97	1.03	39.46	0.00
16	Kathua	18.56	0.00	0.00	0.79	0.79	4.26	0.00
17	Katra	1.45	0.02	0.01	0.05	0.08	5.52	0.00
18	Khour	3.46	0.00	0.00	0.02	0.02	0.58	0.00
19	Kishtwar	5.01	0.00	0.00	0.15	0.15	2.99	0.00
20	Lakhanpur	2.60	0.00	0.13	0.44	0.57	21.92	0.00
21	Nowshera	3.72	0.05	0.03	0.28	0.36	9.68	0.00
22	Parole	1.10	0.00	0.00	0.00	0.00	0.00	0.00
23	Poonch	7.96	0.00	0.03	0.80	0.83	10.43	0.00
24	R S Pura	3.10	0.00	0.00	0.03	0.03	0.97	0.00
25	Rajouri	16.08	0.00	0.13	0.83	0.96	5.97	0.00
26	Ramban	1.52	0.00	0.01	0.08	0.09	5.92	0.02
27	Ramgarh	2.04	0.00	0.00	0.00	0.00	0.00	0.00
28	Ramnagar	4.00	0.00	0.88	1.18	2.06	51.50	0.00
29	Reasi	4.15	0.00	0.00	0.68	0.68	16.39	0.01
30	Samba	5.94	0.00	0.48	1.05	1.53	25.76	0.03
31	Sunderbani	2.03	0.00	0.01	0.14	0.15	7.39	0.00
32	Surankote	4.44	0.31	0.09	0.24	0.64	14.41	0.00
33	Thanamandi	3.61	0.00	0.07	0.15	0.22	6.09	0.00
34	Thathri	0.46	0.00	0.08	0.00	0.08	17.39	0.00
35	Udhampur	10.78	0.00	0.20	1.67	1.87	17.35	0.00
36	Vijaypur	2.29	0.00	0.00	0.05	0.05	2.18	0.00
Grand Total		165.67	0.43	5.13	18.23	23.79	14.36	0.32

*Shapefile of digitized boundary as provided by Urban Local bodies of Jammu.

10.33.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.33.5 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Jammu & Kashmir

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
3,073.86	5,352.73	4,685.44	13,112.03	1,134.93	2,653.83	4,445.60	8,234.36
23.44 %	40.82 %	35.74 %		13.78 %	32.23 %	53.99 %	

*In case of Jammu & Kashmir, RFA boundaries have been used.

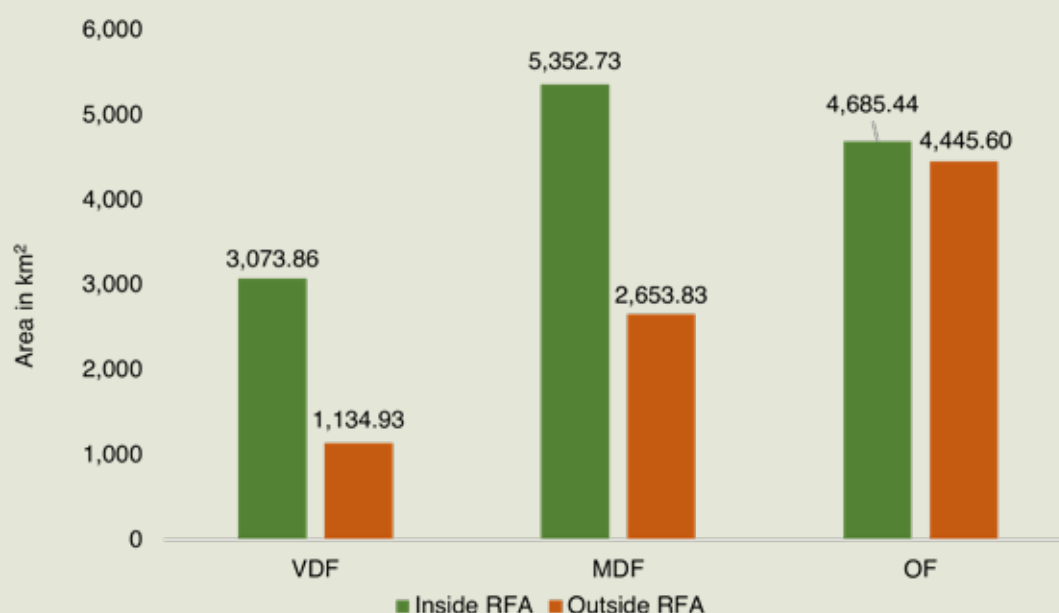


Figure 10.33.2 Forest Cover Inside and Outside of RFA in Jammu & Kashmir

Table 10.33.6 Forest Cover Change Matrix Inside RFA/GW for Jammu & Kashmir between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					Total ISFR 2021 inside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	3,042.21	23.93	2.42	0.07	4.38	3,073.01
MDF	26.20	5,243.95	29.30	0.84	51.06	5,351.35
OF	2.89	52.46	4,442.42	4.30	150.82	4,652.89
Scrub	0.00	0.00	2.44	91.47	3.23	97.14
NF	2.56	32.39	208.86	39.31	14,244.95	14,528.07
Total ISFR 2023 inside RFA / GW	3,073.86	5,352.73	4,685.44	135.99	14,454.44	27,702.46
Net Change	0.85	1.38	32.55	38.85	-73.63	

*Area figure calculated without normalization factor.



Table 10.33.7 Forest Cover Change Matrix Outside RFA/GW for Jammu & Kashmir between 2021 Raster based and 2023 Assessments

Class	2023 Assessment outside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	1,129.21	0.65	0.00	0.00	3.53	1,133.39
MDF	3.25	2,599.73	4.86	0.93	30.60	2,639.37
OF	0.00	17.44	4,171.66	2.55	221.18	4,412.83
Scrub	0.00	0.00	0.11	87.88	1.23	89.22
NF	2.47	36.01	268.97	34.92	18,314.48	18,656.85
Total ISFR 2023 outside RFA/GW	1,134.93	2,653.83	4,445.60	126.28	18,571.02	26,931.66
Net Change	1.54	14.46	32.77	37.06	-85.83	

*Area figure calculated without normalization factor.

Table 10.33.8 Altitude-wise Forest Cover in Jammu & Kashmir

Altitude Zone (m)	Digitized Boundary Area* (Sol)						(km ²)
		VDF	MDF	OF	Total	Scrub	
0-500	5,001.75	0.20	219.08	821.91	1,041.19	54.44	
500-1000	6,565.49	48.94	1,312.49	2,033.21	3,394.64	64.95	
1000-2000	14,191.05	691.26	2,350.18	3,175.42	6,216.86	37.20	
2000-3000	12,156.80	2,895.36	3,132.28	2,126.18	8,153.82	30.20	
3000-4000	10,194.22	573.01	991.84	973.20	2,538.05	74.93	
> 4000	6,524.81	0.02	0.69	1.12	1.83	0.55	
Total	54,634.12	4,208.79	8,006.56	9,131.04	21,346.39	262.27	

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

Area of Digitized boundary provided by Survey of India (November, 2023). Notified geographical area from Sol awaited.

Table 10.33.9 Forest Cover in Different Slope Classes in Jammu & Kashmir

Slope (in degrees)	Digitized Boundary Area* (Sol)						(km ²)
		VDF	MDF	OF	Total	Scrub	
0-5	10,741.69	93.65	466.69	1,554.94	2,115.28	40.17	
5-10	5,825.38	241.55	732.25	1,205.01	2,178.81	37.76	
10-15	6,518.94	416.11	1,077.02	1,292.30	2,785.43	38.52	
15-20	7,064.15	597.26	1,280.00	1,270.72	3,147.98	36.81	
20-25	6,945.52	699.09	1,307.39	1,156.51	3,162.99	32.80	
25-30	6,278.38	713.33	1,195.69	1,001.79	2,910.81	27.74	
>30	11,260.06	1,447.80	1,947.52	1,649.77	5,045.09	48.47	
Total	54,634.12	4,208.79	8,006.56	9,131.04	21,346.39	262.27	

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

Area of Digitized boundary provided by Survey of India (November, 2023). Notified geographical area from Sol awaited.

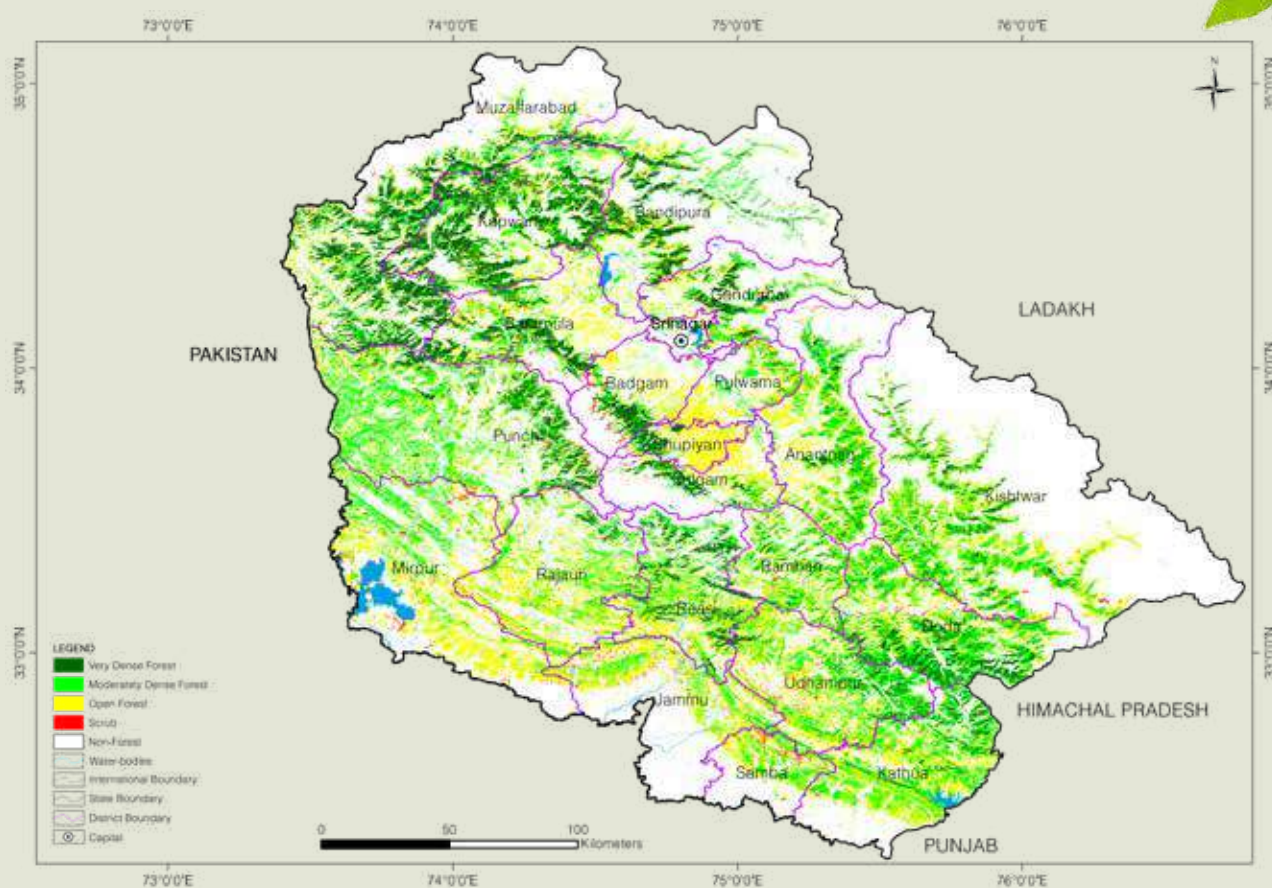


Figure 10.33.3 Forest Cover Map of Jammu & Kashmir

10.33.3 Forest Types

The area under different Forest Types in Jammu & Kashmir (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.33.10 Area Statistics of the Forest Types Found in Jammu & Kashmir

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	5B/C2 Northern dry mixed deciduous forest	1,579.40	6.03
2	5/DS1 Dry deciduous scrub	419.47	1.60
3	5/DS3 (<i>Euphorbia</i> scrub)	0.76	0.00
4	5/E9 Dry bamboo brake	18.04	0.07
5	5/1S2 <i>Khair-sissu</i> forest	5.47	0.02
6	9/C1a Lower or Siwalik chir pine forest	2,609.06	9.97
7	9/C1b Upper or Himalayan chir pine forest	1,094.78	4.18
8	9/C1/DS1 Himalayan subtropical scrub	236.68	0.90
9	10/C1a <i>Olea cuspidata</i> scrub forest	126.03	0.48
10	10/C1b <i>Acacia modesta</i> scrub forest	6.33	0.02


Table 10.33.10 Area Statistics of the Forest Types Found in Jammu & Kashmir

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
11	10/DS1 <i>Dodonaea</i> scrub	7.79	0.03
12	12/C1a <i>Ban oak</i> forest (<i>Q. incana</i>)	603.96	2.31
13	12/C1b <i>Moru oak</i> forest (<i>Q. dilatata</i>)	30.77	0.12
14	12/C1c Moist deodar forest (<i>Cedrus</i>)	1,675.08	6.40
15	12/C1d Western mixed coniferous forest (spruce, blue pine, silver fir)	3,557.18	13.59
16	12/C1e Moist temperate deciduous forest	31.48	0.12
17	12/C1f Low-level blue pine forest (<i>P. wallichiana</i>)	2,168.28	8.28
18	12/C1/DS1 Oak scrub	96.61	0.37
19	12/C1/DS2 Himalayan temperate secondary scrub	101.14	0.39
20	12/C2a <i>Kharsu oak</i> forest (<i>Q. semecarpifolia</i>)	28.75	0.11
21	12/C2b West Himalayan upper oak/fir forest	3.73	0.01
22	12/1S1 Alder forest	2.24	0.01
23	12/1S2 Riverain blue pine forest	49.88	0.19
24	12/2S1 Low level blue pine forest	57.91	0.22
25	13/C1 Dry broadleaved and coniferous forest (<i>Q. ilex</i> - <i>P. gerardiana</i>)	381.17	1.46
26	13/C2b Dry deodar forest (<i>Cedrus</i>)	650.22	2.48
27	13/C2/DS1 Pohu scrub	62.66	0.24
28	13/C2/DS2 Dry temperate scrub	79.19	0.30
29	13/C3 West Himalayan dry temperate deciduous forest	257.62	0.98
30	13/C4 West Himalayan high level dry blue pine forest (<i>P. wallichiana</i>)	1,271.03	4.86
31	13/1S2 <i>Populus</i> / <i>Salix</i> forest	28.79	0.11
32	14/C1a West Himalayan sub-alpine fir forest	357.79	1.37
32	14/C1b West Himalayan sub-alpine birch/fir forest	1,426.28	5.45
34	14/2S1 Sub-alpine blue pine forest (<i>P. wallichiana</i>)	84.18	0.32
35	15/C1 Birch / <i>Rhododendron</i> scrub forest	115.97	0.44
36	15/C2 Deciduous alpine scrub	132.78	0.51
37	15/E1 Dwarf <i>Rhododendron</i> scrub	33.13	0.13
38	16/C1 Dry alpine scrub	606.45	2.32
39	16/E1 Dwarf juniper scrub	70.13	0.27
Sub Total		20,068.21	76.66
40	TOF/ Plantation	1,540.45	5.88
Total (Forest Cover & Scrub)		21,608.66	82.54
Grassland forest types (outside forest cover)			
41	12/DS3 Himalayan temperate pastures	798.28	3.05
42	14/DS1 Sub-alpine pastures	1,133.77	4.33
43	15/C3 Alpine pastures	2,637.42	10.08
Sub Total		4,569.47	17.46
Grand Total		26,178.13	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest types outside forest cover have also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).

10.33.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.33.11 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Anantnag	5	56
2	Badgam	0	1
3	Bandipura	8	39
4	Baramula	14	113
5	Doda	5	132
6	Ganderbal	6	38
7	Jammu	8	458
8	Kathua	17	403
9	Kishtwar	5	193
10	Kulgam	1	7
11	Kupwara	3	28
12	Mirpur	4	33
13	Muzaffarbad	0	0
14	Pulwama	4	12
15	Punch	8	168
16	Rajauri	26	797
17	Ramban	4	116
18	Reasi	9	502
19	Samba	4	174
20	Shupiyan	0	0
21	Srinagar	0	2
22	Udhampur	0	557
Total		131	3,829

10.33.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.33.12 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	0.00	0.00
2	Very highly fire prone	270.11	1.25
3	Highly fire prone	890.62	4.12
4	Moderately fire prone	1,244.13	5.76
5	Less fire prone	19,203.80	88.87
Total		21,608.66	100.00

*Forest Cover including Scrub.

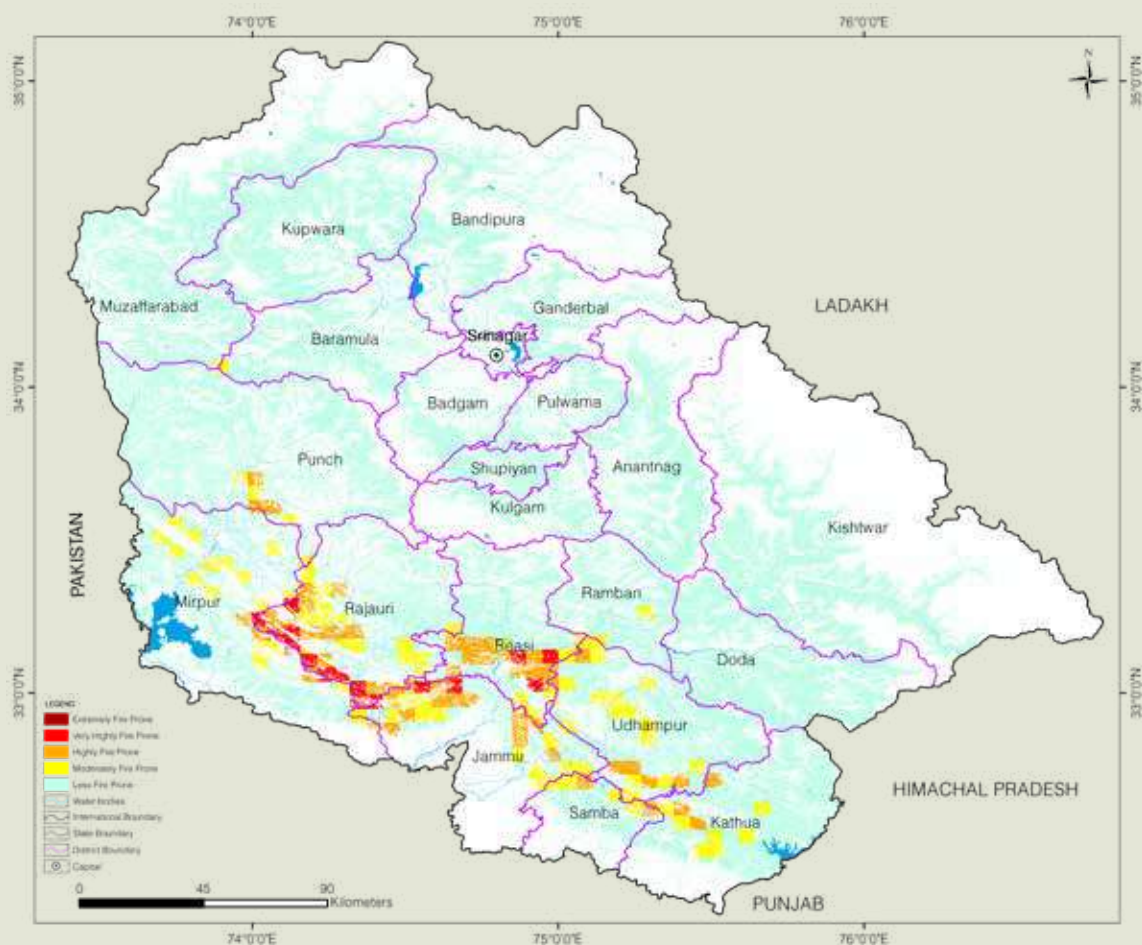


Figure 10.33.4 Fire Prone Forest Areas Under Different Fire Prone Classes

10.33.6 Results derived from NFI for Jammu and Kashmir

Table 10.33.13 Number of Trees and their Volume for Top 5 Species in RFA

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Pinus wallichiana/ Pinus excelsa</i>	76,758	99.64
2	<i>Pinus roxburghii/longifolia</i>	43,031	52.81
3	<i>Cedrus deodara</i>	39,140	58.94
4	<i>Abies pindrow</i>	37,220	96.66
5	<i>Mallotus philippensis</i>	18,736	1.97

Table 10.33.14 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Pyrus species</i>	22,276	2.875
2	<i>Quercus leucotrichophora</i>	20,293	10.428
3	<i>Mallotus philippensis</i>	19,042	2.164
4	<i>Leucaena leucocephala</i>	17,573	3.607
5	<i>Grewia optiva / Grewia oppositifolia</i>	15,905	1.843

Table 10.33.15 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Grewia oppositifolia</i>	233	0.021
2	<i>Leucaena leucocephala</i>	183	0.014
3	<i>Pyrus species</i>	173	0.012
4	<i>Salix species</i>	163	0.053
5	<i>Populus species</i>	156	0.041

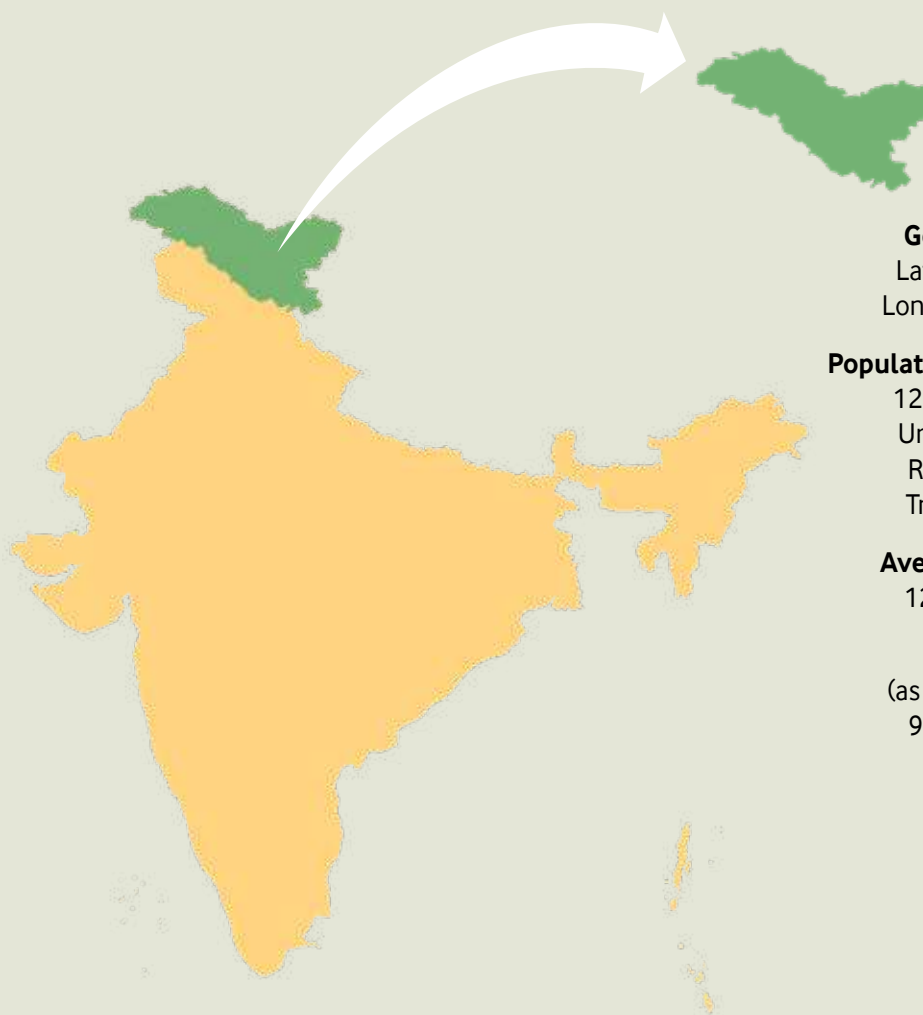
Table 10.33.16 Major NTFP Species in Jammu & Kashmir

Sl. No.	Species	Habit	No. of Plants (in '000)
1	<i>Pinus wallichiana</i> / <i>Pinus excelsa</i>	Tree	76,758
2	<i>Pinus roxburghii</i> / <i>Pinus longifolia</i>	Tree	43,031
3	<i>Acacia catechu</i> / <i>Senegalia catechu</i>	Tree	41,550
4	<i>Cedrus deodara</i>	Tree	39,140
5	<i>Juglans regia</i>	Tree	7,371

Table 10.33.17 Major Invasive Species in the State Inside the RFA in Jammu & Kashmir

Sl. No.	Species	Estimated Extent (km ²)
1	<i>Lantana camara</i>	160.73
2	<i>Parthenium hysterophorus</i>	149.65
3	<i>Ichnocarpus frutescens</i>	10.39
4	<i>Argemone mexicana</i>	8.31
5	<i>Ipomoea fistulosa</i>	4.85

LADAKH



Geographical Area
1,68,327 km²#

Geographical Coordinates
Latitude 32°20' N to 37°05' N
Longitude 72°30' E to 80°20' E

Population (as per Census 2011)
12.54 million (Including J&K)
Urban 3.43 million (27.38 %)
Rural 9.11 million (72.62 %)
Tribal 1.49 million (11.91 %)

Average Population Density
124 per km² (Including J&K)

Livestock Population
(as per 19th Livestock Census)
9.20 million (Including J&K)

No. of Districts
2

No. of Hill Districts
2

No. of Tribal Districts
0

Area of Digitized boundary provided by Survey of India (November, 2023).
Notified Geographical Area from Sol awaited.

Table 10.34.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	16,763	
Reporting area for land utilization	292.14	100.00
Forests	227.20	77.77
Not available for land cultivation	35.55	12.17
Permanent pastures and other grazing lands	1.24	0.42
Land under misc. tree crops and groves	2.13	0.73
Culturable wasteland	3.60	1.23
Fallow land other than current fallows	1.01	0.35
Current fallows	1.34	0.46
Net area sown	20.07	6.87

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.34.1 Forest Cover

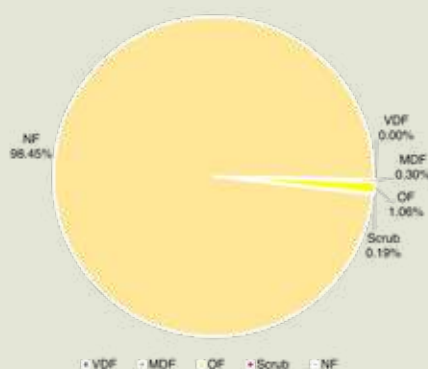


Figure 10.34.1 Forest Cover of Ladakh

Table 10.34.2 Forest Cover of Ladakh

(km ²)		
Class	Area	% of Digitized Boundary Area* (Sol)
VDF	2.27	0.00
MDF	509.07	0.30
OF	1,774.58	1.06
Total	2,285.92	1.36
Scrub	325.49	0.19

Area of Digitized boundary provided by Survey of India (November, 2023). Notified Geographical area from Sol awaited.

Table 10.34.3 District-wise Forest Cover in Ladakh

(km ²)								
District	Digitized Boundary Area# (Sol)	2023 Assessment				% of Digitized Boundary Area* (Sol)	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Kargil ^H	14,201.37	0.00	1.74	56.52	58.26	0.41	0.01	25.29
Leh ^H	1,54,125.63	2.27	507.33	1,718.06	2,227.66	1.45	7.36	300.20
Grand Total	1,68,327.00	2.27	509.07	1,774.58	2,285.92	1.36	7.37	325.49

Area of Digitized boundary provided by Survey of India (November, 2023). Notified Geographical Area from Sol awaited.

*Area figure calculated without normalization factor.

10.34.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.34.4 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Ladakh

(km ²)							
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
2.20	183.53	608.85	794.58	0.07	325.54	1,165.73	1,491.34
0.28%	23.10%	76.62%		0.00%	21.83%	78.17%	

*In case of Ladakh, Green Wash boundaries have been used.

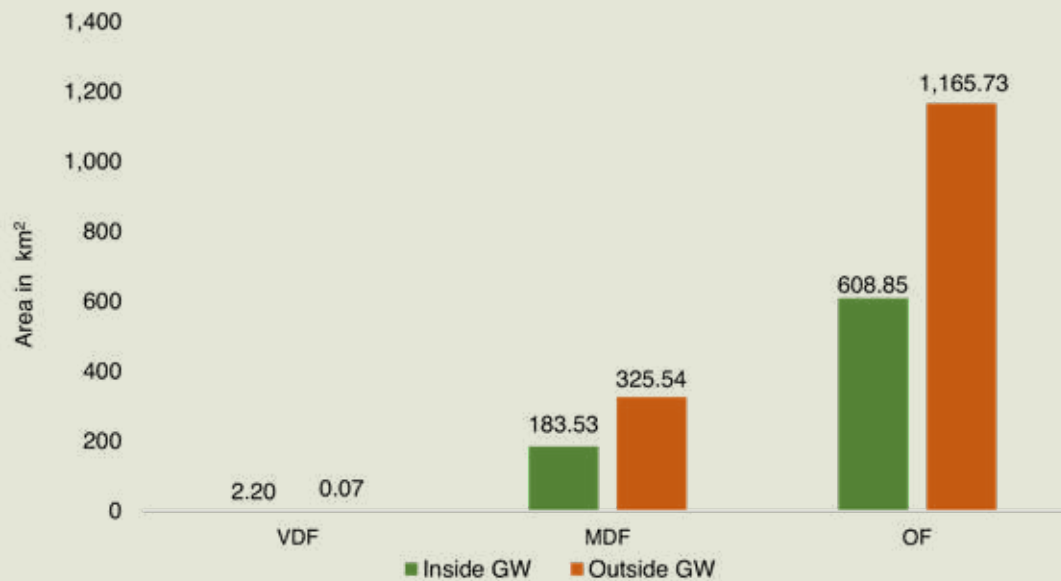


Figure 10.34.2 Forest Cover Inside and Outside of Green Wash in Ladakh

Table 10.34.5 Forest Cover Change Matrix Inside RFA/GW for Ladakh between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 inside RFA / GW Raster based*
VDF	2.20	0.00	0.00	0.00	0.00	2.20
MDF	0.00	177.38	1.01	0.13	0.64	179.16
OF	0.00	5.20	593.55	8.12	12.25	619.12
Scrub	0.00	0.00	2.70	59.87	0.01	62.58
NF	0.00	0.95	11.59	5.68	2,303.51	2,321.73
Total ISFR 2023 inside RFA / GW	2.20	183.53	608.85	73.80	2,316.41	3,184.79
Net Change	0.00	4.37	-10.27	11.22	-5.32	

*Area figure calculated without normalization factor.

Table 10.34.6 Forest Cover Change Matrix Outside RFA/GW for Ladakh between 2021 Raster based and 2023 Assessments

(km²)

Class	2023 Assessment outside RFA/GW					Total ISFR 2021 outside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	0.07	0.00	0.00	0.00	0.00	0.07
MDF	0.00	315.17	11.84	0.36	5.75	333.12
OF	0.00	9.11	1,089.38	11.05	35.34	1,144.88
Scrub	0.00	0.04	2.61	213.62	0.21	216.48
NF	0.00	1.22	61.90	26.66	1,63,357.88	1,63,447.66
Total ISFR 2023 outside RFA/GW	0.07	325.54	1,165.73	251.69	1,63,399.18	1,65,142.21
Net Change	0.00	-7.58	20.85	35.21	-48.48	

*Area figure calculated without normalization factor.

Table 10.34.7 Altitude-wise Forest Cover in Ladakh

(km²)

Altitude Zone (m)	Digitized Boundary Area* (Sol)	VDF	MDF	OF	Total	Scrub
0-500	0.00	0.00	0.00	0.00	0.00	0.00
500-1000	13.76	0.00	0.00	0.06	0.06	0.00
1000-2000	1,809.72	0.00	20.59	63.71	84.30	7.78
2000-3000	7,130.94	0.32	239.96	778.99	1,019.27	70.86
3000-4000	23,444.05	1.95	247.64	911.63	1,161.22	209.86
Above 4000	1,35,928.53	0.00	0.88	20.19	21.07	36.99
Total	1,68,327.00	2.27	509.07	1,774.58	2,285.92	325.49

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

Area of Digitized boundary provided by Survey of India (November, 2023). Notified Geographical Area from Sol awaited.

Table 10.34.8 Forest Cover in Different Slope Classes in Ladakh

(km²)

Slope (in degrees)	Digitized Boundary Area*	VDF	MDF	OF	Total	Scrub
0-5	27,127.11	0.01	18.11	196.78	214.90	37.55
5-10	18,457.64	0.10	18.02	134.40	152.52	26.17
10-15	18,760.46	0.35	31.27	148.78	180.40	30.88
15-20	20,677.64	0.49	56.71	203.46	260.66	39.98
20-25	21,479.30	0.33	76.88	248.89	326.10	46.40
25-30	20,697.81	0.42	86.72	269.62	356.76	47.81
> 30	41,127.04	0.57	221.36	572.65	794.58	96.70
Total	1,68,327.00	2.27	509.07	1,774.58	2,285.92	325.49

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

Area of Digitized boundary provided by Survey of India (November, 2023). Notified Geographical Area from Sol awaited.

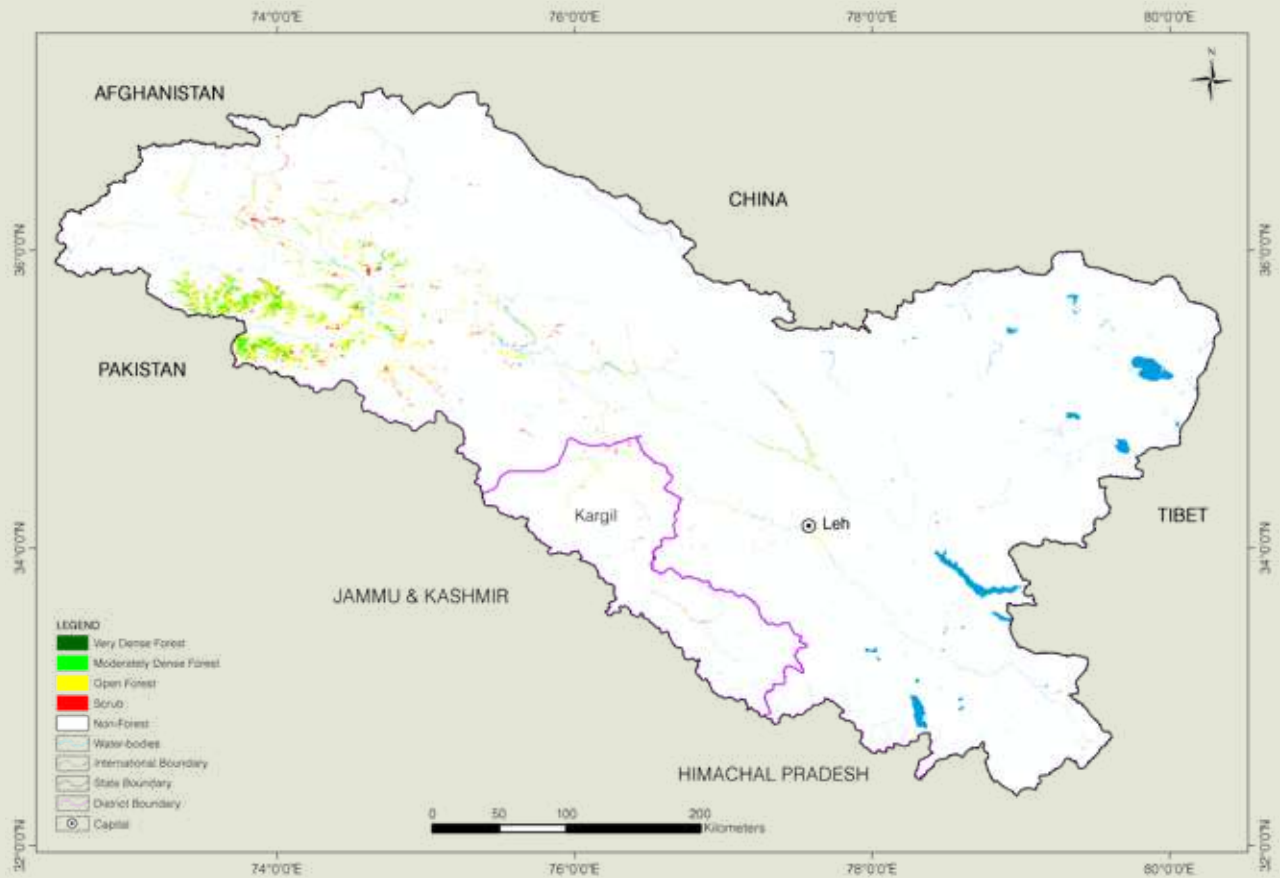


Figure 10.34.3 Forest Cover Map of Ladakh

10.34.3 Forest Types

The area under different Forest Types in Ladakh (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.34.9 Area Statistics of the Forest Types Found in Ladakh

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	12/C1c Moist deodar forest (<i>Cedrus</i>)	2.91	0.11
2	12/C1d Western mixed coniferous forest	7.04	0.27
3	12/C1f Low-level blue pine forest (<i>P.wallichiana</i>)	1.73	0.07
4	12/C1/DS1 Oak scrub	0.10	0.00
5	12/C1/DS2 Himalayan temperate secondary scrub	31.93	1.22
6	13/C1 Dry broadleaved and coniferous forest (<i>Quercus ilex</i> - <i>P. gerardiana</i>)	231.30	8.84
7	13/1S2 Populus/Salix forest	201.99	7.72
8	14/C1a West Himalayan sub-alpine fir forest	703.77	26.90
9	14/2S1 Sub-alpine blue pine forest (<i>P. wallichiana</i>)	171.76	6.57
10	16/C1 Dry alpine scrub	540.60	20.67
11	16/E1 Dwarf juniper scrub	681.52	26.05
Sub Total		2,574.65	98.42
12	TOF/ Plantation	36.76	1.41
Total (Forest Cover & Scrub)		2,611.41	99.83
Grassland forest type (outside forest cover)			
13	14/DS1 Sub-alpine pastures	4.51	0.17
14	15/C3 (Alpine pastures)	0.02	0.00
Sub Total		4.53	0.17
Grand Total		2,615.94	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). Grassland forest types outside forest cover have also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).

10.34.4 Forest Fire

District-wise number of forest fire detected by FSI using SNPP-VIIRS sensors (This includes large, continuous and repeated forest fires) during the fire season 2022-23 & 2023-24.

Table 10.34.10 District-wise Number of Forest Fire Detected

Sl. No.	District	SNPP-VIIRS Detection during 2022-23	SNPP-VIIRS Detection during 2023-24
1	Kargil	0	1
2	Leh	20	31
Total		20	32

10.34.5 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.34.11 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	0.00	0.00
2	Very highly fire prone	0.00	0.00
3	Highly fire prone	0.00	0.00
4	Moderately fire prone	21.06	0.81
5	Less fire prone	2,590.35	99.19
Total		2,611.41	100.00

*Forest Cover including Scrub.

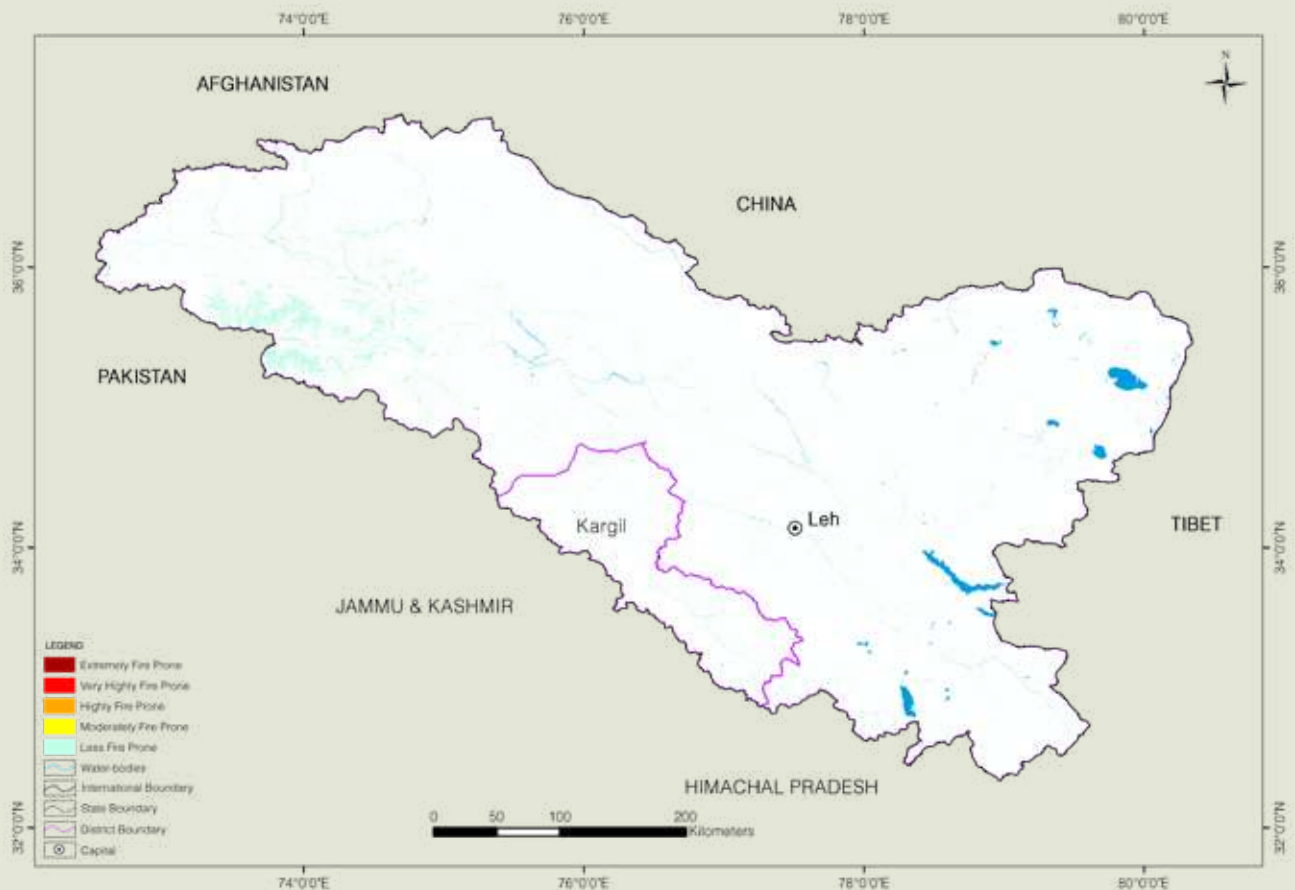


Figure 10.34.4 Fire Prone Forest Areas under Different Fire Prone Classes

10.34.6 Results Derived from NFI for Ladakh

Table 10.34.12 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Salix species</i>	38,818	11.292
2	<i>Populus species</i>	28,668	8.537
3	<i>Prunus species</i>	10,781	3.545
4	<i>Salix alba</i>	10,627	3.124
5	<i>Populus ciliata</i>	7,617	1.712

Table 10.34.13 Number of Trees and their Volume for Top 5 Species in Urban Area

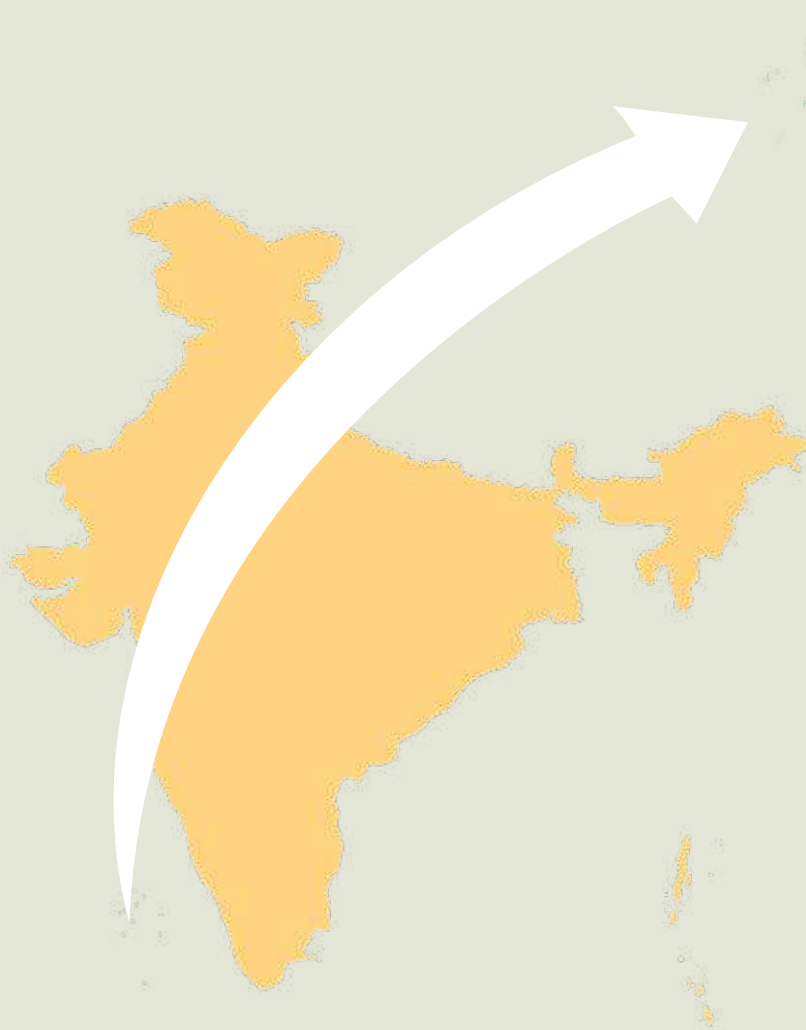
Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Populus species</i>	64	0.0080
2	<i>Salix alba</i>	45	0.0060
3	<i>Salix tetrasperma</i>	37	0.0040
4	<i>Salix species</i>	18	0.0080
5	<i>Hippophae salicifolia</i>	4	0.0001



Photo: FSI Repository

Forest Survey of India

LAKSHADWEEP



Geographical Area
30 km²

Geographical Coordinates
Latitude 08°15' N to 11°45' N
Longitude 72°00' E to 74°00' E

Population (as per Census 2011)
0.064 million
Urban 0.050 million (78.07 %)
Rural 0.014 million (21.93 %)
Tribal 0.061 million (94.80 %)

Average Population Density
2,015 per km²

Livestock Population
(as per 19th Livestock Census)
0.049 million

No. of Districts
1

No. of Hill Districts
0

No. of Tribal Districts
1

Table 10.35.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	3	
Reporting area for land utilization	5.37	100.00
Forests	2.71	50.47
Not available for land cultivation	0.52	9.68
Permanent pastures and other grazing lands	0.00	0.00
Land under misc. tree crops and groves	0.00	0.00
Culturable wasteland	0.00	0.00
Fallow land other than current fallows	0.00	0.00
Current fallows	0.00	0.00
Net area sown	2.14	39.85

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.35.1 Forest Cover

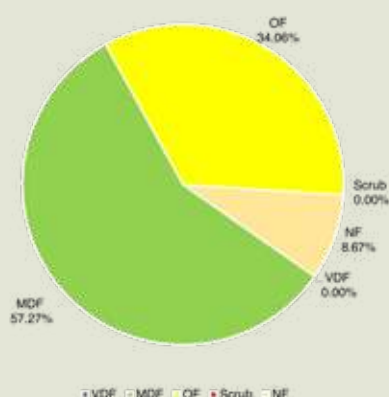


Table 10.35.2 Forest Cover of Lakshadweep

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	0.00	0.00
MDF	16.97	57.27
OF	10.09	34.06
Total	27.06	91.33
Scrub	0.00	0.00

Figure 10.35.1 Forest Cover of Lakshadweep

Table 10.35.3 District- wise Forest Cover in Lakshadweep

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Lakshadweep	29.63	0.00	16.97	10.09	27.06	91.33	0.00	0.00
Grand Total	29.63	0.00	16.97	10.09	27.06	91.33	0.00	0.00

*Area figure calculated without normalization factor.

10.35.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.35.4 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Lakshadweep

(km ²)							
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
0.00	0.00	0.00	0.00	0.00	16.97	10.09	27.06
0.00%	0.00%	0.00%		0.00%	62.71%	37.29%	

*There are no Green Wash / Recorded Forest Areas in Lakshadweep (vide official letter no. F. no. 72/1/2020-E & F part/583).

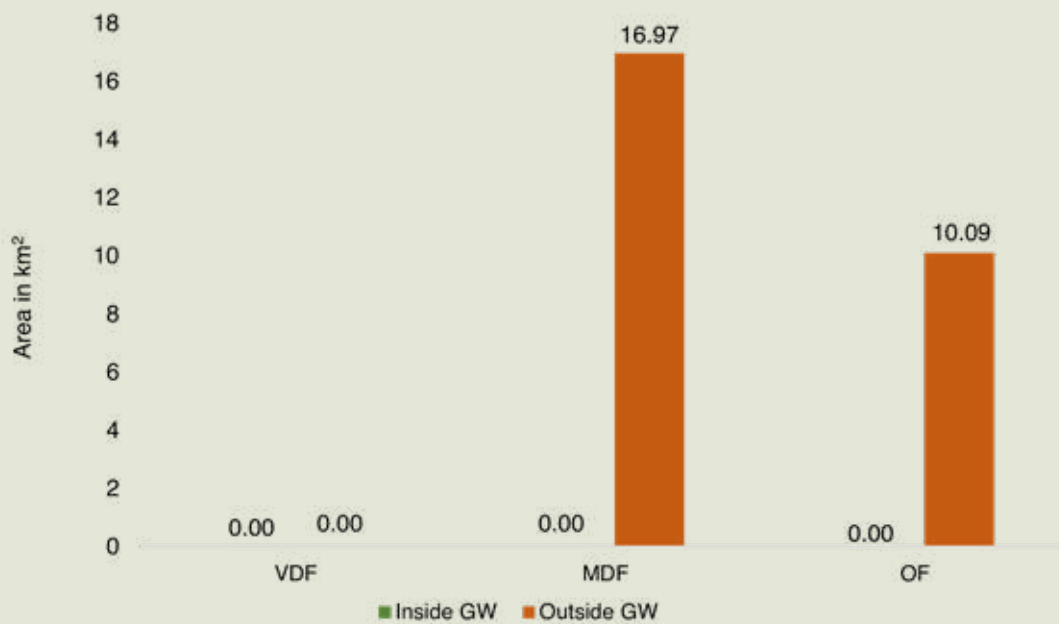


Figure 10.35.2 Forest Cover Inside and Outside of Green Wash in Lakshadweep

Table 10.35.5 Forest Cover Change Matrix Outside RFA/GW for Lakshadweep between 2021 Raster based and 2023 Assessments

(km²)

Class	2023 Assessment outside RFA/GW					Total ISFR 2021 outside RFA / GW Raster based*
	VDF	MDF	OF	Scrub	NF	
VDF	0.00	0.00	0.00	0.00	0.00	0.00
MDF	0.00	16.97	0.00	0.00	0.00	16.97
OF	0.00	0.00	10.09	0.00	0.00	10.09
Scrub	0.00	0.00	0.00	0.00	0.00	0.00
NF	0.00	0.00	0.00	0.00	2.57	2.57
Total ISFR 2023 outside RFA / GW	0.00	16.97	10.09	0.00	2.57	29.63
Net Change	0.00	0.00	0.00	0.00	0.00	

*Area figure calculated without normalization factor.

Table 10.35.6 Altitude-wise Forest Cover in Lakshadweep

(km²)

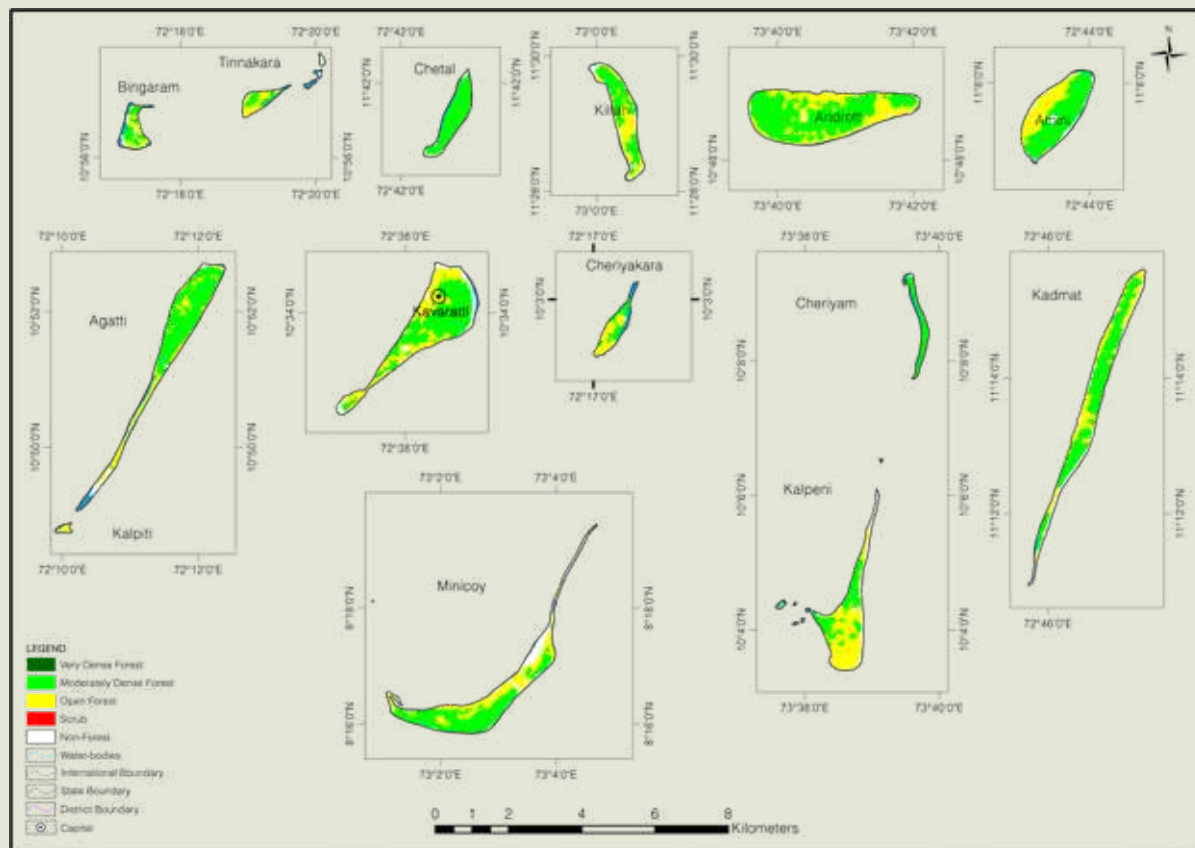
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	29.63	0.00	16.97	10.09	27.06	0.00
Total	29.63	0.00	16.97	10.09	27.06	0.00

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

Table 10.35.7 Forest Cover in Different Slope Classes in Lakshadweep(km²)

Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	29.63	0.00	16.97	10.09	27.06	0.00
Total	29.63	0.00	16.97	10.09	27.06	0.00

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

**Figure 10.35.3 Forest Cover Map of Lakshadweep**

10.35.3 Forest Types

The area under different Forest Types in Lakshadweep (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.35.8 Area Statistics of the Forest Types Found in Lakshadweep(km²)

Sl. No.	Forest Type	Area	% of the total mapped area*
1	TOF/ Plantation	27.06	100.00
Total		27.06	100.00

*Forest Types have been assigned to the natural forest formation under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). The total mapped area, therefore, is sum of forest cover and scrub.

10.35.4 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.35.11 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	0.00	0.00
2	Very highly fire prone	0.00	0.00
3	Highly fire prone	0.00	0.00
4	Moderately fire prone	0.00	0.00
5	Less fire prone	27.06	100.00
Total		27.06	100.00

*Forest Cover including Scrub.

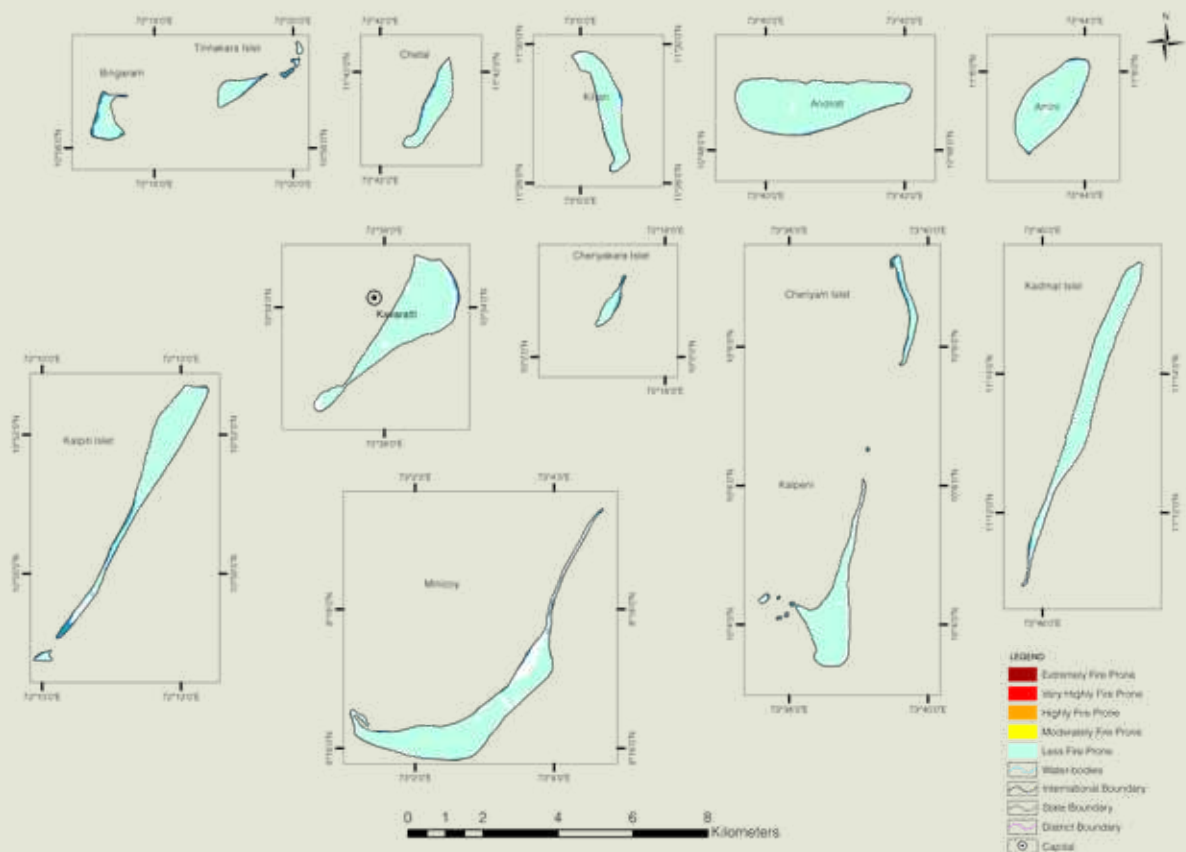


Figure 10.35.4 Fire Prone Forest Areas under Different Fire Prone Classes



10.35.5 Results Derived from NFI for Lakshadweep

Table 10.35.10 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Cocos nucifera</i>	181	0.0480
2	<i>Thespesia populnea</i>	15	0.0020
3	<i>Muntingia Calabura</i>	3	0.0001
4	<i>Artocarpus altilis/ Artocarpus communis</i>	3	0.0010
5	<i>Artocarpus hirsutus</i>	2	0.0020

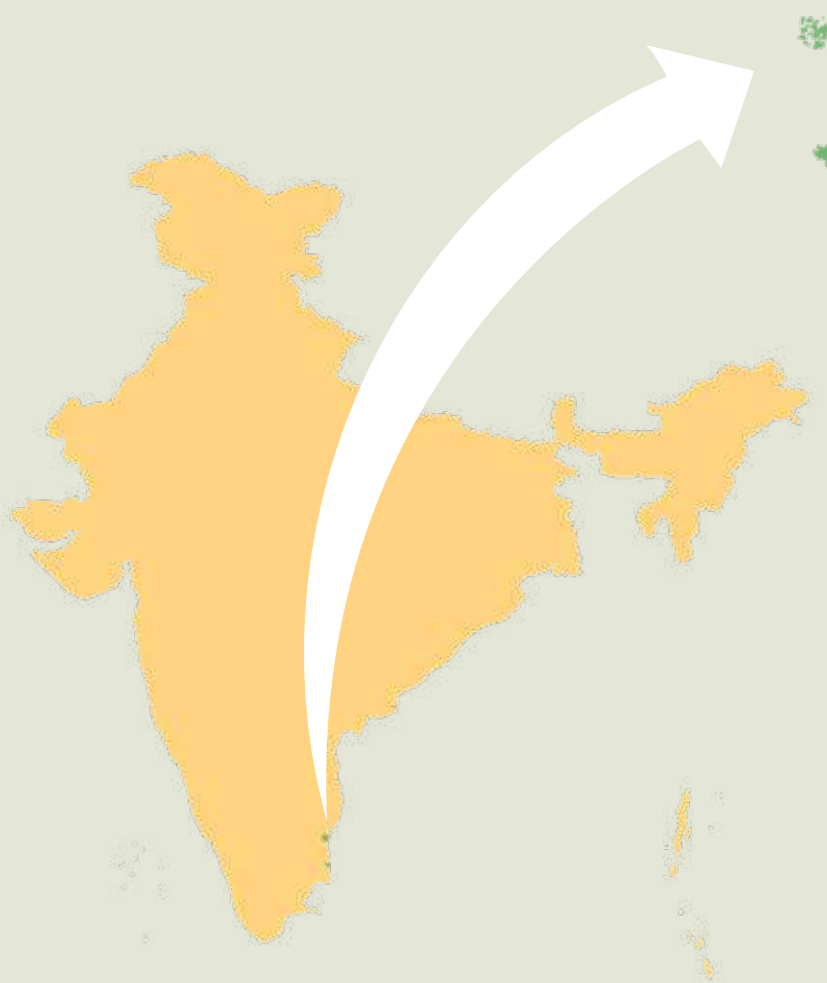
Table 10.35.11 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Cocos nucifera</i>	257	0.0320
2	<i>Thespesia populnea</i>	16	0.0010
3	<i>Erythrina species</i>	4	0.0001
4	<i>Moringa oleifera/ Moringa pterygosperma</i>	3	0.0001
5	<i>Artocarpus altilis/ Artocarpus communis</i>	2	0.0050



Photo: Anant Shukla

PUDUCHERRY



Geographical Area
490 km²

Geographical Coordinates
Latitude 11°45' N to 12°30' N
Longitude 79°36' E to 79°53' E

Population (as per Census 2011)
1.25 million
Urban 0.85 million (68.33%)
Rural 0.40 million (31.37%)
Tribal Nil

Average Population Density
2,547 per km²

Livestock Population
(as per 19th Livestock Census)
0.12 million

No. of Districts
4

No. of Hill Districts
0

No. of Tribal Districts
0

Table 10.36.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	49	
Reporting area for land utilization	48.65	100
Forests	0.39	0.80
Not available for land cultivation	20.14	41.40
Permanent pastures and other grazing lands	0.00	0.00
Land under misc. tree crops and groves	1.23	2.53
Culturable wasteland	4.72	9.70
Fallow land other than current fallows	2.62	5.38
Current fallows	3.76	7.73
Net area sown	15.79	32.46

Source: Land Use Statistics, Ministry of Agriculture and Farmer's Welfare, GOI, (2021-22).

10.36.1 Forest Cover

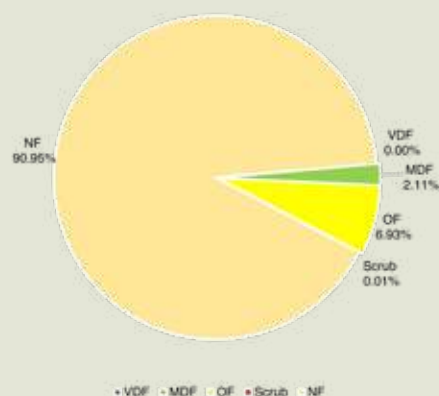


Figure 10.36.1 Forest Cover of Puducherry

Table 10.36.2 Forest Cover of Puducherry

(km ²)		
Class	Area	% of Calculated Area by Sol
VDF	0.00	0.00
MDF	10.33	2.11
OF	33.98	6.93
Total	44.31	9.04
Scrub	0.07	0.01

Table 10.36.3 District- wise Forest Cover in Puducherry

(km ²)								
District	Calculated Area by Sol	2023 Assessment				% of Calculated Area by Sol	Change w.r.t. 2021 Raster based*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Karaikal	156.51	0.00	2.90	9.12	12.02	7.68	-0.11	0.00
Mahe	9.00	0.00	0.72	4.45	5.17	57.44	0.00	0.00
Puducherry	294.49	0.00	6.71	14.25	20.96	7.12	0.20	0.00
Yanam	30.00	0.00	0.00	6.16	6.16	20.53	0.07	0.07
Grand Total	490.00	0.00	10.33	33.98	44.31	9.04	0.16	0.07

*Area figure calculated without normalization factor.

10.36.2 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash)

The Forest Cover inside and outside Recorded Forest Area (RFA) has been analysed in different categories and presented in table given below.

Table 10.36.4 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Puducherry

(km ²)							
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
0.00	0.61	2.47	3.08	0.00	9.72	31.51	41.23
0.00%	19.81%	80.19%		0.00%	23.58%	76.42%	

*In case of Puducherry, RFA boundaries have been used.

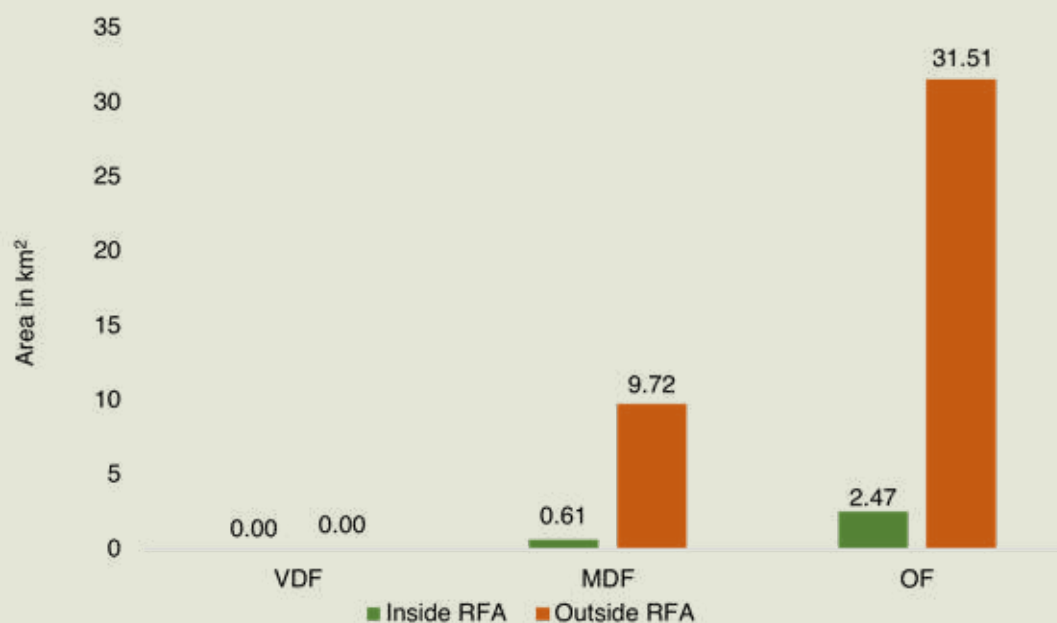


Figure 10.36.2 Forest Cover Inside and Outside of RFA in Puducherry

Table 10.36.5 Forest Cover Change Matrix Inside RFA/GW for Puducherry between 2021 Raster based and 2023 Assessments

Class	2023 Assessment inside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 inside RFA / GW Raster based*
VDF	0.00	0.00	0.00	0.00	0.00	0.00
MDF	0.00	0.61	0.00	0.00	0.00	0.61
OF	0.00	0.00	2.41	0.00	0.00	2.41
Scrub	0.00	0.00	0.00	0.06	0.00	0.06
NF	0.00	0.00	0.06	0.00	6.37	6.43
Total ISFR 2023 inside RFA /GW	0.00	0.61	2.47	0.06	6.37	9.51
Net Change	0.00	0.00	0.06	0.00	-0.06	

*Area figure calculated without normalization factor.

Table 10.36.6 Forest Cover Change Matrix Outside RFA/GW for Puducherry between 2021 Raster based and 2023 Assessments.

Class	2023 Assessment outside RFA/GW					(km ²)
	VDF	MDF	OF	Scrub	NF	Total ISFR 2021 outside RFA / GW Raster based*
VDF	0.00	0.00	0.00	0.00	0.00	0.00
MDF	0.00	9.62	0.00	0.00	0.53	10.15
OF	0.00	0.00	29.01	0.00	1.97	30.98
Scrub	0.00	0.00	0.00	0.01	0.00	0.01
NF	0.00	0.10	2.50	0.00	436.75	439.35
Total ISFR 2023 outside RFA /GW	0.00	9.72	31.51	0.01	439.25	480.49
Net Change	0.00	-0.43	0.53	0.00	-0.10	

*Area figure calculated without normalization factor.

Table 10.36.7 Altitude-wise Forest Cover in Puducherry

(km ²)						
Altitude Zone (m)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-500	490	0.00	10.33	33.98	44.31	0.07
Total	490	0.00	10.33	33.98	44.31	0.07

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

Table 10.36.8 Forest Cover in Different Slope Classes in Puducherry

(km ²)						
Slope (in degrees)	Calculated Area by Sol	VDF	MDF	OF	Total	Scrub
0-5	449.00	0.00	10.02	32.66	42.68	0.07
5-10	40.53	0.00	0.28	1.23	1.51	0.00
10-15	0.42	0.00	0.03	0.08	0.11	0.00
15-20	0.05	0.00	0.00	0.01	0.01	0.00
Total	490.00	0.00	10.33	33.98	44.31	0.07

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

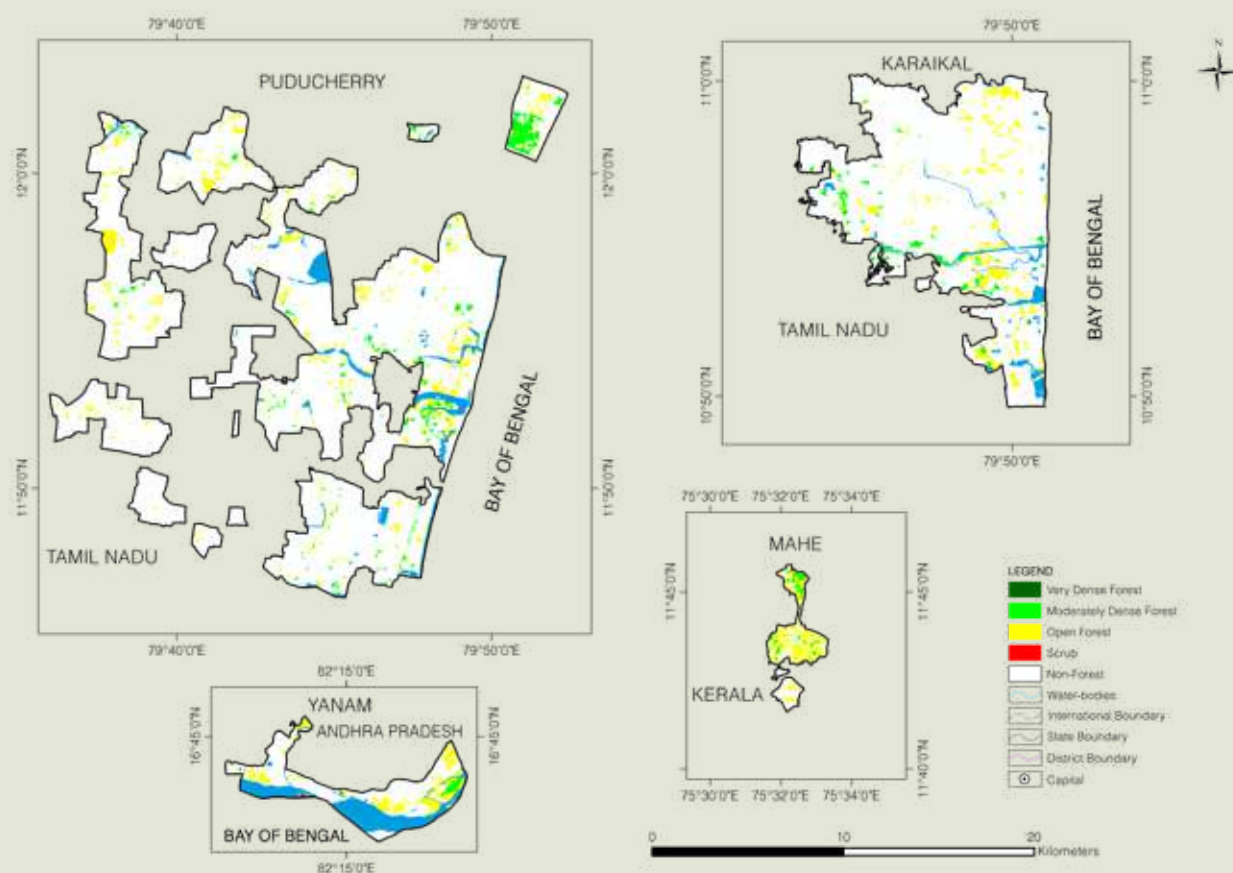


Figure 10.36.3 Forest Cover Map of Puducherry



10.36.3 Forest Types

The area under different Forest Types in Puducherry (as per the Champion & Seth Forest Classification, 1968) based on the Forest Cover Map (FCM), ISFR-2023, is presented in the following table.

Table 10.36.9 Area Statistics of the Forest Types Found in Puducherry

(km ²)			
Sl. No.	Forest Type	Area	% of the total mapped area*
1	4B/TS2 Mangrove forest	2.84	6.40
Sub Total		2.84	6.40
2	TOF/ Plantation	41.54	93.60
Grand Total		44.38	100.00

*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in the forest cover mapping (ISFR, 2023). The total mapped area, therefore, is sum of forest cover and scrub.

10.36.4 Fire Prone Forest Areas

Forest Cover under different classes of forest fire proneness is given in following table.

Table 10.36.10 Forest Fire Prone Classes

(km ²)			
Sl. No.	Forest Fire Prone Classes	Forest Cover*	% of Total Forest Cover
1	Extremely fire prone	0.00	0.00
2	Very highly fire prone	0.00	0.00
3	Highly fire prone	0.00	0.00
4	Moderately fire prone	0.00	0.00
5	Less fire prone	44.38	100.00
Total		44.38	100.00

*Forest Cover including Scrub.

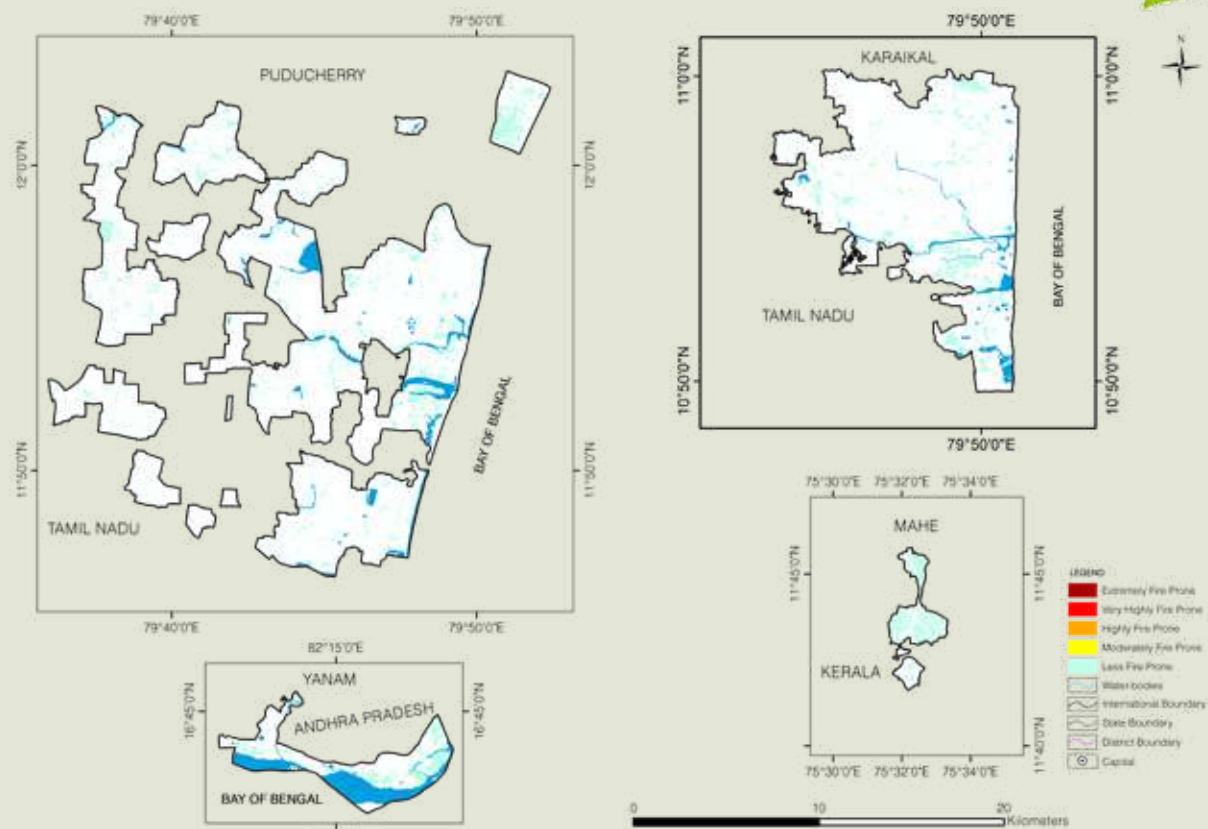


Figure 10.36.4 Fire Prone Forest Areas under Different Fire Prone Classes
10.36.5 Results Derived from NFI for Puducherry

Table 10.36.11 Number of Trees and their Volume for Top 5 Species in Rural Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Prosopis juliflora/ Neltuma juliflora</i>	447	0.011
2	<i>Cocos nucifera</i>	257	0.071
3	<i>Casuarina equisetifolia</i>	257	0.006
4	<i>Azadirachta indica/ Melia indica</i>	200	0.015
5	<i>Eucalyptus species</i>	102	0.007

Table 10.36.12 Number of Trees and their Volume for Top 5 Species in Urban Area

Sl. No.	Species	No. of Trees (in '000)	Volume (M m ³)
1	<i>Cocos nucifera</i>	168	0.053
2	<i>Moringa oleifera/ Moringa pterygosperma</i>	130	0.009
3	<i>Azadirachta indica/ Melia indica</i>	128	0.027
4	<i>Pongamia pinnata/ Pongamia glabra</i>	67	0.014
5	<i>Mangifera indica</i>	59	0.016



Photo: Subharanjan Sen, IFS





Photo: Subharanjan Sen, IFS



Photo: Subharanjan Sen, IFS

About FSI

Forest Survey of India (FSI) is a premier national organization under the Ministry of Environment, Forest and Climate Change, Government of India. It is responsible for assessment and monitoring of the forest resources of the country on regular basis. Established on 1st June 1981, Forest Survey of India succeeded the "Pre-investment Survey of Forest Resources" (PISFR), a project initiated in 1965 by Government of India with the sponsorship of FAO and UNDP. The main objective of PISFR was to ascertain the availability of raw material for establishment of wood based industries in selected areas of the country. In its report in 1976, the National Commission on Agriculture (NCA) recommended for the creation of a National Forest Survey Organization for a regular, periodic and comprehensive forest resources survey of the country leading to creation of FSI.

The major activities of FSI include remote sensing based nation-wide forest cover mapping in biennial cycle, National Forest Inventory based on large number of sample plots laid across the country, forest fire monitoring, forest carbon assessment, forest type mapping and several projects on emerging issues and State specific requirements. Since 1987, FSI is publishing biennial 'State of Forest Reports' on the status of the forest resources of the country. These reports are widely acclaimed nationally and as well as internationally and are treasure trove of primary information on Indian Forests.

FSI has headquarters at Dehradun and has pan India presence with four regional offices at Shimla, Kolkata, Nagpur and Bangalore. The Eastern zone has a sub centre at Burnihat.



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