

13.2

ARUNACHAL PRADESH



Geographical Area
83,743 sq km

Geographical Coordinates
Latitude 26° 28' N to 29° 30' N
Longitude 91° 30' E to 97° 30' E

Population (as per Census 2011)
1.38 million
Urban 0.32 million (22.94 %)
Rural 1.06 million (77.06 %)
Tribal 0.95 million (68.79 %)

Average Population Density
17 per sq km

Livestock population
(as per 19th Live Stock Census)
1.41 million

No. of Districts
16

No. of Hill Districts
16

No. of Tribal Districts
16

Table 13.2.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	8,374	
Reporting area for land utilization	7,172	100.00
Forests	6,669	92.99
Not available for land cultivation	62	0.86
Permanent pastures and other grazing lands	18	0.25
Land under misc. tree crops and groves	34	0.47
Culturable wasteland	61	0.85
Fallow land other than current fallows	61	0.86
Current fallows	34	0.47
Net area sown	233	3.25

Source: Land Use Statistics, Ministry of Agriculture, GOI, (2017-18)

13.2.1 Forest Cover

Figure 13.2.1
Forest Cover
of Arunachal
Pradesh

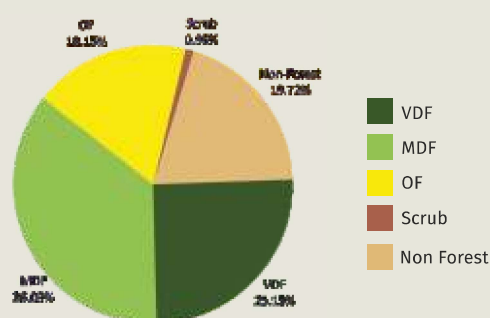


Table 13.2.2 Forest Cover of Arunachal Pradesh (in sq km)

Class	Area	% of GA
VDF	21,058.37	25.15
MDF	30,175.56	36.03
OF	15,196.74	18.15
Total	66,430.67	79.33
Scrub	796.98	0.95

Table 13.2.3 District- wise Forest Cover in Arunachal Pradesh (in sq km)

District	Geo-geographical Area (GA)	2021 Assessment				%of GA	Change wrt 2019 assessment	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Changlang TH	4,662	1,809.08	1,327.54	844.39	3,981.01	85.39	-5.75	10.68
Dibang Valley TH & Lower Dibang Valley TH	13,029	1,688.91	4,806.97	2,583.83	9,079.71	69.69	-128.19	83.24
East Kameng TH & West Kameng TH	11,556	3,504.95	4,478.14	2,241.25	10,224.34	88.48	-9.78	166.20
East Siang TH	3,603	876.18	1,261.58	773.91	2,911.67	80.81	42.57	12.98
Kurung Kumey TH & Lower Subansiri TH	9,548	3,120.32	3,821.11	1,439.86	8,381.29	87.78	11.17	67.19
Lohit TH & Anjaw TH	11,402	2,016.68	3,805.80	1,547.55	7,370.03	64.64	-217.57	83.45
Papum Pare TH	3,462	981.00	1,473.11	741.92	3,196.03	92.32	11.12	7.60
Tawang TH	2,172	325.81	410.82	412.64	1,149.27	52.91	-24.88	106.79
Tirap TH	2,362	736.80	646.96	469.67	1,853.43	78.47	-7.56	76.03
Upper Siang TH	6,590	1,551.83	2,479.31	1,329.12	5,360.26	81.34	-0.47	111.98
Upper Subansiri TH	7,032	1,813.33	2,567.30	1,180.36	5,560.99	79.08	7.99	45.09
West Siang TH	8,325	2,633.48	3,096.92	1,632.24	7,362.64	88.44	64.24	25.75
Grand Total	83,743	21,058.37	30,175.56	15,196.74	66,430.67	79.33	-257.11	796.98

13.2.1.1 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 13.2.4 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Arunachal Pradesh (in sq km)

Forest Cover Inside the Recorded Forest Area (or Green Wash)				Forest Cover Outside the Recorded Forest Area (or Green Wash)			
VDF	MDF	OF	Total	VDF	MDF	OF	Total
19,637	27,171	11,872	58,680	1,421	3,005	3,325	7,751
33.46%	46.31%	20.23%		18.33%	38.77%	42.90%	

in case of Arunachal Pradesh, Green Wash boundaries have been used

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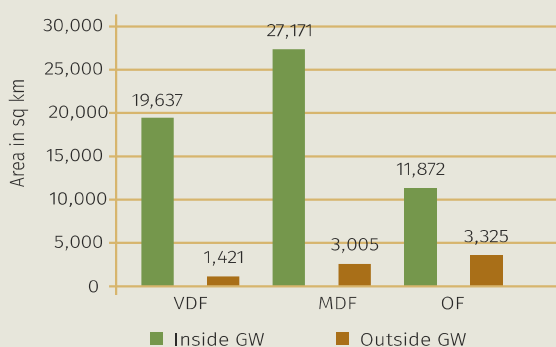


Figure 13.2.2
Forest Cover
Inside and
Outside of Green
Wash in
Arunachal
Pradesh

Table 13.2.5 Forest Cover Change Matrix for Arunachal Pradesh

(in sq km)

Class	2021 Assessment					Total ISFR 2019
	VDF	MDF	OF	Scrub	NF	
Very Dense Forest	20,918	64	76	14	23	21,095
Moderately Dense Forest	124	29,790	386	128	129	30,557
Open Forest	7	267	14,109	111	542	15,036
Scrub	0	0	18	188	23	229
Non Forest	9	55	608	356	15,798	16,826
Total ISFR 2021	21,058	30,176	15,197	797	16,515	83,743
Net Change	-37	-381	161	568	-311	

Table 13.2.6 Altitude-wise Forest Cover in Arunachal Pradesh

(in sq km)

Altitude Zone (m)	Geographical Area	VDF	MDF	OF	Total	Scrub
0-500	11,136	1,509	3,313	2,320	7,142	70
500-1000	11,082	2,843	4,151	3,156	10,150	47
1000-2000	23,752	7,977	9,831	4,601	22,409	59
2000-3000	17,965	6,676	8,864	1,707	17,247	29
3000-4000	13,370	2,032	3,900	3,096	9,028	358
>4000	6,438	21	117	317	455	234
Total	83,743	21,058	30,176	15,197	66,431	797

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

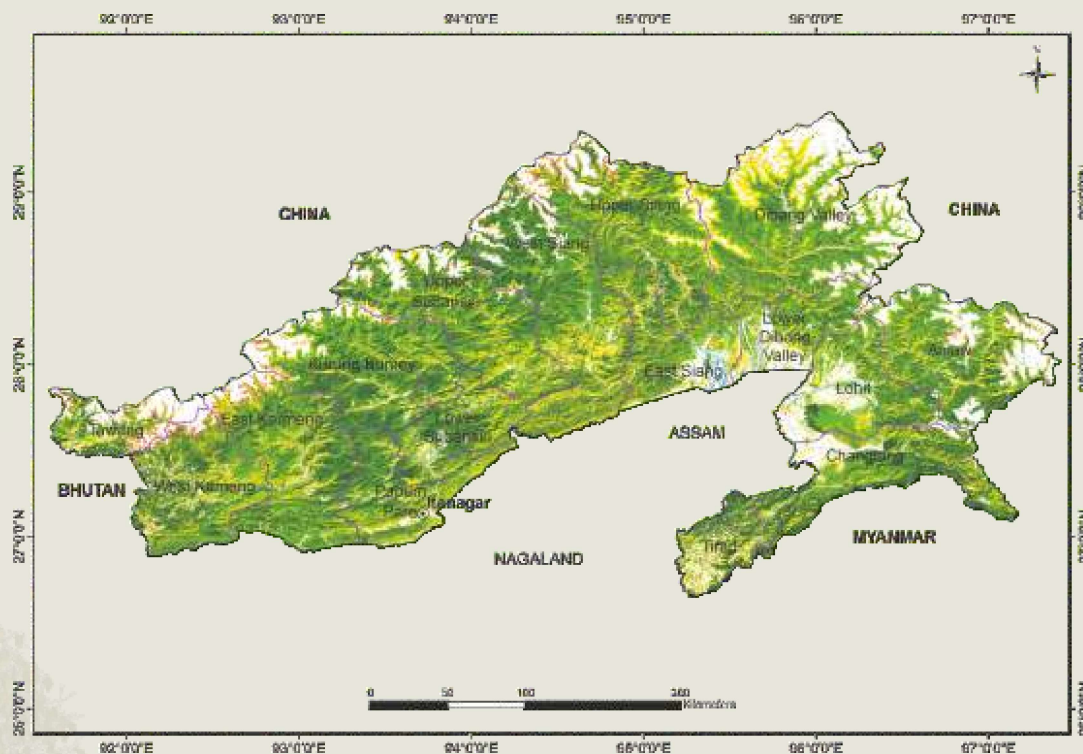
Table 13.2.7 Forest Cover in different slope classes in Arunachal Pradesh

(in sq km)

Slope (in degrees)	Geographical Area	VDF	MDF	OF	Total	Scrub
0-5	7,629	701	1,804	1,217	3,722	77
5-10	5,608	1,435	1,961	911	4,307	52
10-15	8,588	2,508	2,998	1,449	6,955	78
15-20	11,278	3,355	3,964	1,960	9,279	102
20-25	12,494	3,649	4,456	2,209	10,314	115
25-30	12,172	3,431	4,474	2,213	10,118	115
>30	25,974	5,979	10,519	5,238	21,736	258
Total	83,743	21,058	30,176	15,197	66,431	797

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

Figure 13.2.3
Forest Cover
Map of
Arunachal
Pradesh



LEGEND

- Very Dense Forest
- Moderately Dense Forest
- Open Forest
- Scrub
- Non-Forest
- Water-bodies
- International Boundary
- State Boundary
- District Boundary
- Capital

13.2.2 Forest Types

The area under different forest types of Arunachal Pradesh as per the Champion & Seth classification (1968), according to the Atlas Forest Types of India 2020 are presented in the following Table.

Table 13.2.8 Area statistics of the Forest Types found in Arunachal Pradesh

(in sq km)

Sl. No.	Forest Type	Area	% of the total mapped area*
1.	1B/C1 Assam Valley tropical wet evergreen forest (<i>Dipterocarpus</i>)	1,505.16	2.07
2.	1B/C2a Kayea forest	745.68	1.03
3.	1/2S1 Pioneer Euphorbiaceous scrub	103.86	0.14
4.	2B/ C1a Assam alluvial plains semi-evergreen forest	3,961.00	5.44
5.	2B/C1b Eastern sub-montane semi-evergreen forest	2,330.86	3.20
6.	2B/C1/1S1 Sub-Himalayan light alluvial semi-evergreen forest	4,077.78	5.60
7.	2B/C1/2S2 Eastern alluvial secondary semi-evergreen forest	3,777.01	5.19
8.	2/2S1 Secondary moist bamboo brakes	1,133.65	1.56
9.	3C/C3/2S2 Secondary Euphorbiaceous scrub	0.26	0.00

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(in sq km)

Sl. No.	Forest Type	Area	% of the total mapped area*
10.	3/1S2b <i>Terminalia-Duabanga</i>	854.57	1.17
11.	8B/C1 East Himalayan subtropical wet hill forest	15,667.69	21.53
12.	8B/C2 <i>Khasi</i> subtropical wet hill forest	1,253.62	1.72
13.	9/C2 Assam subtropical pine forest	718.82	0.99
14.	11B/C1 East Himalayan wet temperate forest	16,531.13	22.72
15.	12/C1f Low-level blue pine forest (<i>P. wallichiana</i>)	211.82	0.29
16.	12/C3a East Himalayan mixed coniferous forest	4,333.74	5.96
17.	12/DS1 Montane bamboo brakes	66.17	0.09
18.	13/C6 East Himalayan dry temperate coniferous forest	540.45	0.74
19.	14/C2 East Himalayan sub-alpine birch/fir forest	7,810.33	10.73
20.	15/C1 Birch/ <i>Rhododendron</i> scrub forest	159.22	0.22
21.	16/C1 Dry alpine scrub	481.74	0.66
	Sub Total	66,264.56	91.05
22.	TOF/ Plantation	652.68	0.90
	Total (Forest Cover & Scrub)	66,917.24	
	Grassland forest types (outside forest cover)		
23.	9/C2/DS1 Assam subtropical pine savannah	36.07	0.05
24.	12/DS3 Himalayan temperate pastures	375.10	0.52
25.	15/C3 Alpine pastures	5,446.34	7.48
	Sub Total	5,857.51	8.05
	Grand Total	72,774.75	100.00

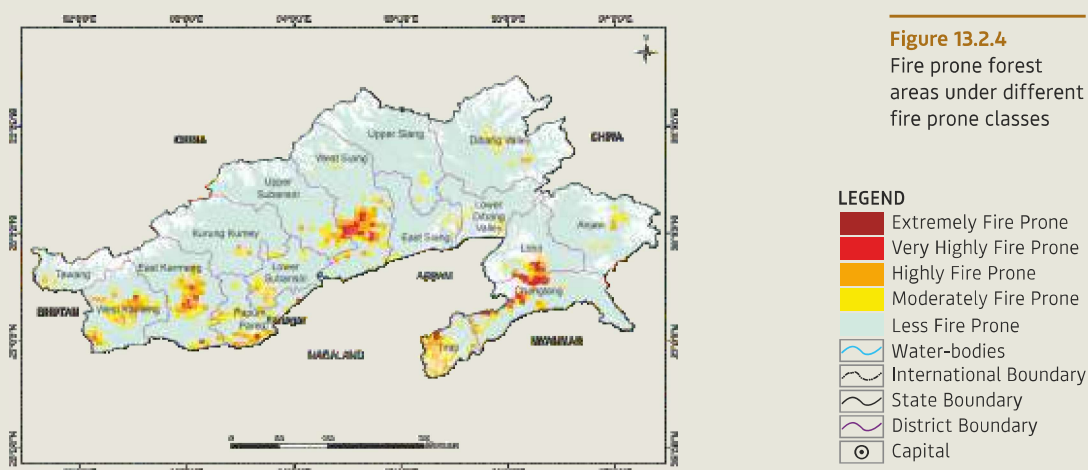
*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in forest cover mapping (ISFR, 2019). Grassland forest types outside forest cover have also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest types (found in non-forest).

13.2.3 Fire Prone Forest Areas

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

Table 13.2.9 Forest Fire Prone Classes (in sq km)

Sl. No.	Forest Fire Prone Classes	Forest Cover	% of Total Forest Cover
1.	Extremely fire prone	35.16	0.06
2.	Very highly fire prone	959.77	1.44
3.	Highly fire prone	2,744.50	4.13
4.	Moderately fire prone	4,459.72	6.71
5.	Less fire prone	58,231.85	87.66
	Total	66,431.00	100.00



13.2.4 Tree Cover

Tree cover is defined as all tree patches of size less than 1 ha occurring outside the recorded forest area. Tree cover includes trees in all formations including scattered trees. Tree cover in Arunachal Pradesh has been estimated as given in following table.

Table 13.2.10 Tree Cover in Arunachal Pradesh (in sq km)

2019 Assessment	2021 Assessment	Change wrt 2019 Assessment
848	1,001	153

13.2.5 Extent of Trees Outside Forest (TOF)

Trees outside Forests (TOF) refer to tree resources found outside the forests as defined in the Government records. Forest Cover outside the recorded forest area is derived using boundaries of RFA or Green Wash. Extent of TOF therefore may be estimated as the sum of extent of forest cover outside the recorded forest areas (RFA) and tree cover as given in following table.

Table 13.2.11 Extent of TOF in Arunachal Pradesh (in sq km)

Forest Cover outside the RFA/GW	Tree Cover	Extent of TOF
7,751	1,001	8,752

13.2.6 Growing Stock in Forest

Growing stock in the recorded forest areas (RFA) in Arunachal Pradesh is given in the Table 13.2.12. Diameter class-wise distribution of top 5 species in numbers derived from the forest inventory data is presented in the table 13.2.13

Table 13.2.12 Growing Stock in Arunachal Pradesh (in m cum)

Sl. No.	Growing Stock (GS)	2019 Assessment	2021 Assessment	Change wrt 2019 Assessment	% of Country's GS
1.	Growing Stock in Recorded Forest Area	458.00	418.99	-39.01	9.55
2.	Growing Stock in TOF	75.08	73.48	-1.60	4.13

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Table 13.2.13 Diameter class distribution of top five tree species inside RFA in Arunachal Pradesh (in '000)

Sl. No.	Species	Dia class (cm)		
		10-30	30-60	>60
1.	<i>Castanopsis</i> spp.	67,024	15,779	4,717
2.	<i>Terminalia myriocarpa</i>	18,087	11,137	1,782
3.	<i>Shorea assamica</i>	17,733	5,082	891
4.	<i>Ficus</i> spp.	15,005	2,055	1,782
5.	<i>Duabanga grandiflora</i>	10,170	4,197	1,164

13.2.7 Dominant tree species in Trees Outside Forests (TOF)

Top five species in numbers in Trees Outside Forests in Arunachal Pradesh in Rural and Urban areas are given in the Table 13.2.14 and Table 13.2.15 respectively

Table 13.2.14 Top five tree species in TOF (Rural) in Arunachal Pradesh

Sl. No.	Species	Relative Abundance (%)
1.	<i>Castanopsis</i> spp.	17.46
2.	<i>Pinus excelsa</i>	12.67
3.	<i>Citrus</i> spp.	4.45
4.	<i>Terminalia myriocarpa</i>	4.43
5.	<i>Macaranga</i> spp.	2.60

Table 13.2.15 Top five tree species in TOF (Urban) in Arunachal Pradesh

Sl. No.	Species	Relative Abundance (%)
1.	<i>Gmelina arborea</i>	6.39
2.	<i>Areca catechu</i>	6.06
3.	<i>Mangifera indica</i>	5.10
4.	<i>Grevillea robusta</i>	4.04
5.	<i>Artocarpus heterophyllus</i>	3.90

13.2.8 Carbon Stock in Forest

The total Carbon stock of forest in the State including the TOF patches which are more than 1ha in size is 1,023.84 million tonnes (3,754.08 million tonnes of CO₂ equivalent) which is 14.21% of total forest carbon of the country. Pool wise forest carbon in Arunachal Pradesh is given in the following table.

Table 13.2.16 Forest Carbon in Arunachal Pradesh in different pools (in '000 tonnes)

Sl. No.	Carbon Pools	Forest Carbon
1.	AGB	3,40,351
2.	BGB	1,02,229
3.	Dead wood	9,163
4.	Litter	11,802
5.	SOC	5,60,298
	Total	10,23,843

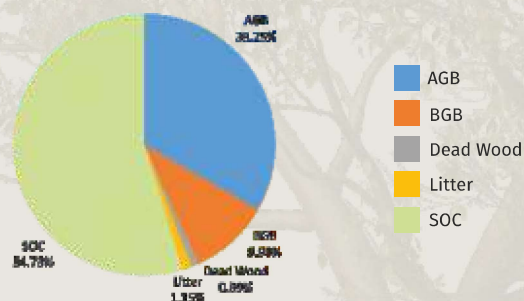


Figure 13.2.5 Forest Carbon in Arunachal Pradesh

13.2.9 Growing Stock of Bamboo

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

Table 13.2.17 Growing Stock of Bamboo in Arunachal Pradesh

Growing Stock (GS)		% of Country's GS of Bamboo
Bamboo bearing area inside RFA/Green Wash (in sq km)	15,739	10.53
Total number of culms (in millions)	8,824	16.54
Total equivalent green weight (in '000 tonnes)	46,546	11.58

13.2.10 Major NTFP and Invasive Species

Major NTFP and invasive species as assessed from forest inventory data are presented in the Table 13.2.18 and Table 13.2.19 respectively.

Table 13.2.18 Major NTFP species in Arunachal Pradesh

Sl. No.	Species	Plant Type	Relative Abundance (%)
1.	<i>Piper spp./Piper longum/ Piper mullesua</i>	Climber	46.27
2.	<i>Swertia chiraita</i>	Herbs	24.38
3.	<i>Thysanolaena maxima</i>	Herbs	12.94
4.	<i>Acorus calamus</i>	Herbs	5.97
5.	<i>Oroxylum indicum</i>	Tree	4.48

Table 13.2.19 Major invasive species in the State inside the RFA/Green Wash in Arunachal Pradesh (in sq km)

Sl. No.	Species	Estimated Extent
1.	<i>Chromolaena odorata</i>	295
2.	<i>Mikania micrantha</i>	277
3.	<i>Ageratum conyzoides</i>	73
4.	<i>Lantana camara</i>	63
5.	<i>Acacia farnesiana</i>	53

Major NTFP species are given in terms of relative abundance whereas invasive species are given in terms of their estimated extent.