

13.3

ASSAM



Geographical Area
78,438 sq km

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 sq km

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

No. of Districts
27

No. of Hill Districts
3

No. of Tribal Districts
19

Table 13.3.1 Land Use Pattern

Land Use Types	Area (in '000 ha)	Percentage
Geographical Area	7,844	
Reporting area for land utilization	7,844	100.00
Forests	1,853	23.62
Not available for land cultivation	2,509	31.99
Permanent pastures and other grazing lands	180	2.29
Land under misc. tree crops and groves	221	2.82
Culturable wasteland	160	2.04
Fallow land other than current fallows	92	1.18
Current fallows	106	1.35
Net area sown	2,723	34.71

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



13.3.1 Forest Cover

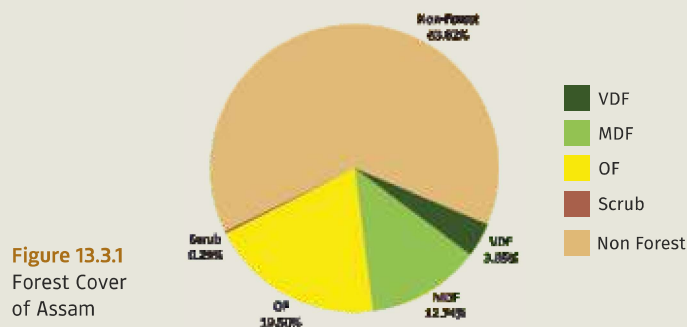
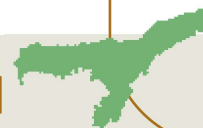


Table 13.3.2 Forest Cover of Assam (in sq km)

Class	Area	% of GA
VDF	3,016.67	3.85
MDF	9,991.02	12.74
OF	15,303.82	19.50
Total	28,311.51	36.09
Scrub	227.94	0.29

Table 13.3.3 District- wise Forest Cover in Assam (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			
Baksa ^T	2,457	154.50	130.56	277.83	562.89	22.91	3.22	7.23
Barpeta ^T	2,282	0.00	33.42	84.28	117.70	5.16	2.52	1.09
Bongaigaon	1,093	0.00	62.32	188.37	250.69	22.94	0.56	0.11
Cachar ^T	3,786	183.15	985.06	1,059.34	2,227.55	58.84	5.21	17.43
Chirang	1,923	395.58	107.87	198.78	702.23	36.52	2.39	5.34
Darrang ^T	1,585	0.00	14.10	79.98	94.08	5.94	4.65	1.15
Dhemaji ^T	3,237	68.65	123.20	164.83	356.68	11.02	11.88	5.56
Dhubri ^T	2,176	0.98	22.65	83.02	106.65	4.90	8.19	3.84
Dibrugarh ^T	3,381	105.78	68.70	584.04	758.52	22.43	3.29	7.30
Dima Hasao ^H	4,888	268.66	1,455.08	2,428.18	4,151.92	84.94	-55.01	8.59
Goalpara ^T	1,824	13.73	139.14	251.74	404.61	22.18	8.87	2.18
Golaghat	3,502	22.95	118.12	533.13	674.20	19.25	4.29	6.74
Hailakandi	1,327	15.97	360.97	391.15	768.09	57.88	-6.25	1.49
Jorhat ^T	2,851	12.00	104.70	449.12	565.82	19.85	5.72	7.87
Kamrup ^T	3,105	50.00	454.06	462.64	966.70	31.13	3.23	3.25
Kamrup Metropolitan ^T	955	0.00	224.32	238.51	462.83	48.46	2.78	0.75
Karbi-Anglong ^H	10,434	662.07	3,657.48	3,514.36	7,833.91	75.08	-55.27	83.66
Karimganj	1,809	3.00	299.88	553.58	856.46	47.34	5.03	1.05
Kokrajhar ^T	3,296	437.60	270.40	460.86	1,168.86	35.46	2.29	4.08
Lakhimpur ^T	2,277	28.40	85.47	196.68	310.55	13.64	3.98	1.87
Morigaon ^T	1,551	10.00	42.15	124.26	176.41	11.37	2.30	4.05
Naogaon ^H	3,973	50.28	360.29	503.86	914.43	23.02	3.17	11.37
Nalbari ^T	1,052	0.00	30.93	81.07	112.00	10.65	4.89	0.01
Sivasagar ^T	2,668	8.97	150.50	540.52	699.99	26.24	10.03	5.25
Sonitpur ^T	5,204	108.88	255.79	706.69	1,071.36	20.59	1.75	15.33
Tinsukia ^T	3,790	407.83	350.49	825.06	1,583.38	41.78	0.81	15.58
Udalguri ^T	2,012	7.69	83.37	321.94	413.00	20.53	0.48	5.77
Grand Total	78,438	3,016.67	9,991.02	15,303.82	28,311.51	36.09	-15.00	227.94



13.3.1.1 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 13.3.4 Forest Cover Inside and Outside Recorded Forest Area (or Green Wash) in Assam (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
2,748	8,566	8,689	20,003	269	1,425	6,615	8,309
13.74%	42.82%	43.44%		3.24%	17.15%	79.61%	

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

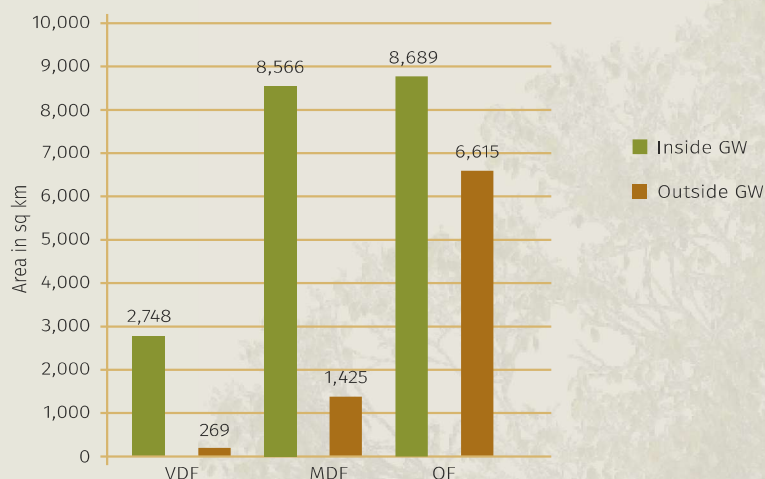


Figure 13.3.2
Forest Cover Inside and Outside of GW in Assam

Table 13.3.5 Forest Cover Change Matrix for Assam (in sq km)

Class	2021 Assessment					Total ISFR 2019
	VDF	MDF	OF	Scrub	NF	
Very Dense Forest	2,770	12	2	0	11	2,795
Moderately Dense Forest	247	9,948	14	1	69	10,279
Open Forest	0	8	14,869	32	344	15,253
Scrub	0	0	7	160	6	173
Non Forest	0	23	412	35	49,468	49,938
Total ISFR 2021	3,017	9,991	15,304	228	49,898	78,438
Net Change	222	-288	51	55	-40	

Table 13.3.6 Altitude-wise Forest Cover in Assam (in sq km)

Altitude Zone (m)	Geographical Area	VDF	MDF	OF	Total	Scrub
0-500	72,348	2,344	7,761	12,899	23,004	191
500-1000	5,315	388	2,082	2,146	4,616	36
1000-2000	775	285	148	259	692	1
Total	78,438	3,017	9,991	15,304	28,312	228

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

Table 13.3.7 Forest Cover in different slope classes in Assam (in sq km)

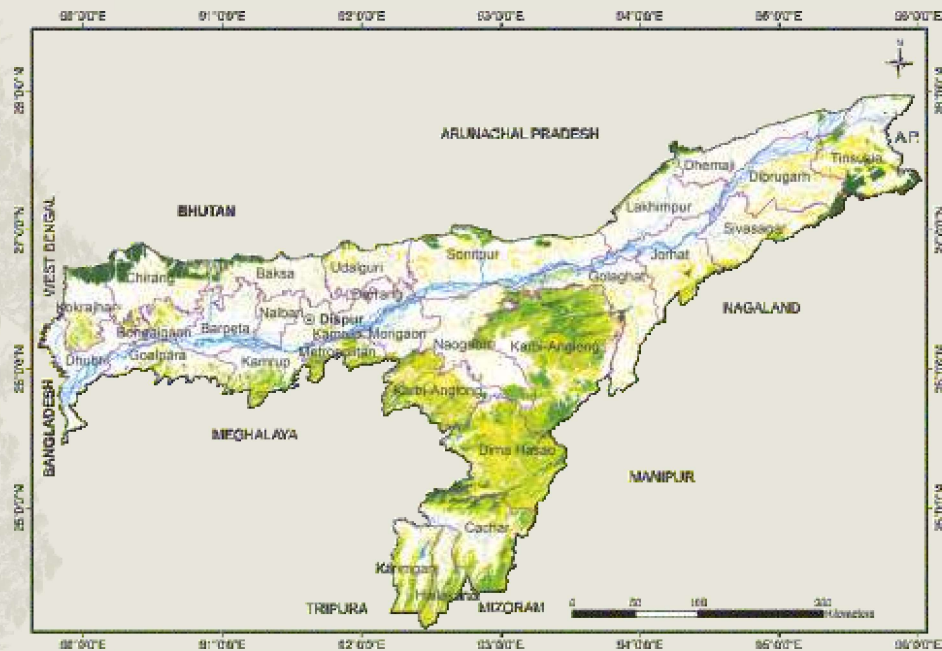
Slope (in degrees)	Geographical Area	VDF	MDF	OF	Total	Scrub
0-5	61,901	1,777	3,842	8,707	14,326	160
5-10	6,929	395	2,277	2,504	5,176	31
10-15	4,156	265	1,643	1,788	3,696	17
15-20	2,643	216	1,074	1,158	2,448	11
20-25	1,511	162	615	647	1,424	6
25-30	759	104	308	312	724	2
>30	539	98	232	188	518	1
Total	78,438	3,017	9,991	15,304	28,312	228

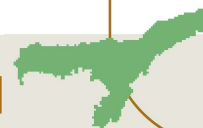
(based on SRTM, Digital Elevation Model, 30 m, 2016)

Figure 13.3.3
Forest Cover
Map of
Assam

LEGEND

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





13.3.2 Forest Types

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

Table 13.3.8 Area statistics of the Forest Types found in Assam

(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>)	1,006.79	3.51
2.	1B/C2a <i>Kayea</i> forest	216.12	0.75
3.	1B/C2b <i>Mesua</i> forest	5.53	0.02
4.	1B/C3 Cachar tropical evergreen forest	886.92	3.1
5.	2B/ C1a Assam alluvial plains semi-evergreen forest	453.68	1.58
6.	2B/C1/1S1 Sub-Himalayan light alluvial semi-evergreen forest	356.00	1.24
7.	2B/C1/1S2 <i>Syzygium</i> parkland	19.43	0.07
8.	2B/C1/2S1 Pioneer Euphorbiaceous scrub	84.52	0.29
9.	2B/C1/2S2 Eastern alluvial secondary semi-evergreen forest	348.87	1.22
10.	2B/C2 Cachar semi-evergreen forest	10,719.16	37.41
11.	2/2S1 Secondary moist bamboo brakes	857.76	2.99
12.	3C/C1a(ii) <i>Khasi</i> hill sal	40.39	0.14
13.	3C/C1b (i) East Himalayan upper <i>bhabar</i> sal	670.56	2.34
14.	3C/C2d (iv) App. Kamrup sal	759.57	2.65
15.	3C/C3b East Himalayan moist mixed deciduous forest	5,095.46	17.78
16.	3C/C3/2S1 Northern secondary moist mixed deciduous forest	505.65	1.76
17.	3C/1S1 Low alluvial savannah woodland (<i>Salmalia-Albizia</i>)	13.69	0.05
18.	3/1S2(a) <i>Terminalia-Lagerstroemia</i>	2.83	0.01
19.	4C/FS3 Creeper swamp forest	0.09	0.00
20.	4D/SS1 Eastern seasonal swamp forest	0.88	0.00
21.	5/1S2 <i>Khair-sissu</i> forest	24.19	0.08
22.	8B/DS1 Assam subtropical hill savannah woodland	9.79	0.03
23.	9/C2 Assam subtropical pine forest	119.72	0.42
	Sub Total	22,197.60	77.44
24.	TOF/Plantation	6,302.34	21.99
	Total (Forest Cover & Scrub)	28,499.94	
	Grassland forest types (outside forest cover)		
25.	4D/2S1 <i>Syzygium</i> parkland	0.65	0.00
26.	4D/2S2 Eastern wet alluvial grassland	153.18	0.57
	Sub Total	153.83	0.57
	Grand Total	28,653.77	100.00

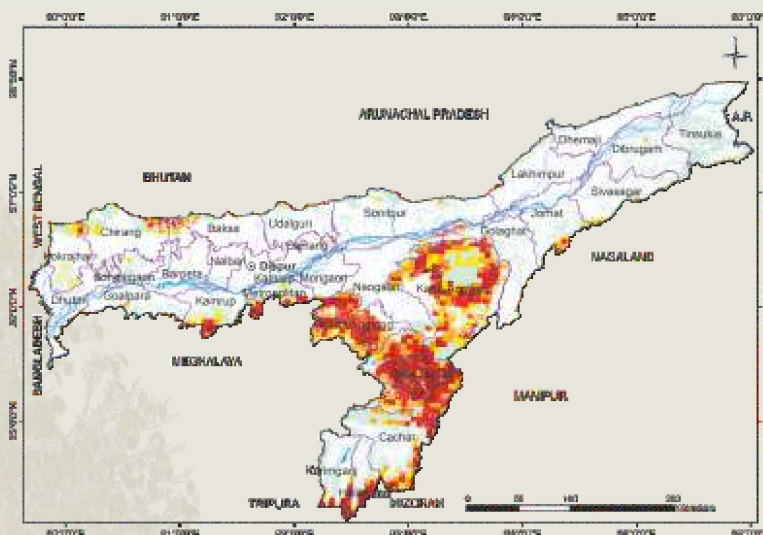
*Forest Types have been assigned to the natural forest formations under forest cover and scrub categories shown in forest cover mapping (ISFR, 2019). Grassland forest types outside forest cover have also been mapped. The total mapped area, therefore, is sum of forest cover, scrub and grassland forest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

Table 13.3.9 Forest Fire Prone Classes (in sq km)

Sl. No.	Forest Fire Prone Classes	Forest Cover	% of Total Forest Cover
1.	Extremely fire prone	3,166.11	11.18
2.	Very highly fire prone	4,871.05	17.20
3.	Highly fire prone	3,400.46	12.01
4.	Moderately fire prone	2,653.93	9.37
5.	Less fire prone	14,220.45	50.24
	Total	28,312.00	100.00

13.3.3 Fire Prone Forest Areas

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

**Figure 13.3.4**

Fire prone forest areas under different fire prone classes

LEGEND

- Extremely Fire Prone
- Very Highly Fire Prone
- Highly Fire Prone
- Moderately Fire Prone
- Less Fire Prone
- Water-bodies
- International Boundary
- State Boundary
- District Boundary
- Capital

13.3.4 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 Assam has been estimated as given in following table.

Table 13.3.10 Tree Cover in Assam (in sq km)

2019 Assessment	2021 Assessment	Change wrt 2019 Assessment
1,408	1,630	222

11.3.5 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.

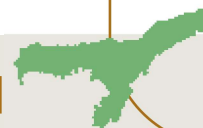


Table 13.3.11 Extent of TOF in Assam

(in sq km)

Forest Cover outside the RFA/GW	Tree Cover	Extent of TOF
8,309	1,630	9,939

13.3.6 Growing Stock in Forest

Growing stock in the recorded forest areas (RFA) in Assam is given in the Table 13.3.12. Diameter class-wise distribution of top 5 species in numbers derived from the forest inventory data is presented in the table 13.3.13

Table 13.3.12 Growing Stock in Assam

(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	115.40	112.68	-2.72	2.57
2.	Growing Stock in TOF	22.96	23.94	0.98	1.35

Table 13.3.13 Diameter class distribution of top five tree species inside RFA in Assam

(in '000)

Sl. No.	Species	Dia class (cm)		
		10-30	30-60	>60
1.	<i>Schima wallichii</i>	15,948	2,714	75
2.	<i>Tectona grandis</i>	11,449	2,520	59
3.	<i>Albizia spp.</i>	9,119	2,717	144
4.	<i>Bombax ceiba</i>	2,554	2,692	443
5.	<i>Stereospermum personatum/ colais/chelonoides</i>	1,625	1,639	449

13.3.7 Dominant tree species in Trees Outside Forests (TOF)

Top five species in numbers in Trees Outside Forests in Assam in Rural and Urban areas are given in the Table 13.3.14 and Table 13.3.15 respectively.

Table 13.3.14 Top five tree species in TOF (Rural) in Assam

Sl. No.	Species	Relative Abundance (%)
1.	<i>Areca catechu</i>	33.68
2.	<i>Tectona grandis</i>	4.26
3.	<i>Gmelina arborea</i>	3.70
4.	<i>Albizia spp.</i>	3.55
5.	<i>Mangifera indica</i>	3.23

Table 13.3.15 Top five tree species in TOF (Urban) in Assam

Sl. No.	Species	Relative Abundance (%)
1.	<i>Areca catechu</i>	42.07
2.	<i>Cocos nucifera</i>	11.11
3.	<i>Mangifera indica</i>	8.90
4.	<i>Artocarpus heterophyllus</i>	3.62
5.	<i>Anthocephalus cadamba</i>	3.23

13.3.8 Carbon Stock in Forest

The total Carbon stock of forests in the State including the TOF patches which are more than 1 ha in size is 271.37 million tonnes (995.02 million tonnes of CO₂ equivalent) which is 3.77 % of total forest carbon of the country. Pool wise forest carbon in Assam is given in the following table.

Table 13.3.16 Forest Carbon in Assam in different pools (in '000 tonnes)

Sl. No.	Carbon Pools	Forest Carbon
1.	AGB	87,070
2.	BGB	21,495
3.	Dead wood	1,875
4.	Litter	4,890
5.	SOC	1,56,042
	Total	2,71,372

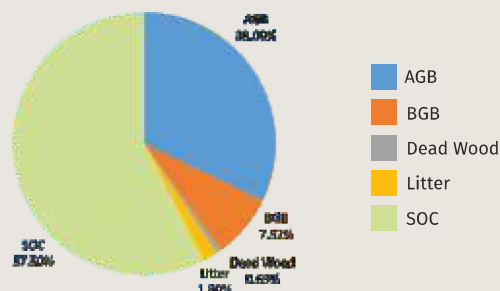


Figure 13.3.5 Forest Carbon in Assam

13.3.9 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 13.3.17 Growing Stock of Bamboo in Assam

Growing Stock (GS)		% of Country's GS of Bamboo
Bamboo bearing area inside RFA/Green Wash (in sq km)	10,659	7.13
Total number of culms (in millions)	5,656	10.60
Total equivalent green weight (in '000 tonnes)	38,600	9.60

13.3.10 Major NTFP and Invasive Species

Major NTFP and invasive species as assessed from forest inventory data are presented in the Table 13.3.18 and Table 13.3.19 respectively.

Table 13.3.18 Major NTFP species in Assam

Sl. No.	Species	Plant Type	Relative Abundance (%)
1.	<i>Shorea robusta</i>	Tree	41.64
2.	<i>Bombax</i> spp. / <i>Bombax ceiba</i>	Tree	13.83
3.	<i>Terminalia belerica</i>	Tree	11.10
4.	<i>Piper</i> spp./ <i>Piper longum</i> / <i>Piper mullesua</i>	Climber	8.65
5.	<i>Smilax china</i>	Climber	6.92

Table 13.3.19 Major invasive species in the State inside the RFA/Green Wash in Assam (in sq km)

Sl. No.	Species	Estimated Extent
1.	<i>Chromolaena odorata</i>	457
2.	<i>Mikania micrantha</i>	242
3.	<i>Lantana camara</i>	175
4.	<i>Microcystis aeruginosa</i>	22
5.	<i>Imperata cylindrica</i>	21

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