

Equator IAS Academy

1. This is the 15th forest cover assessment in the series of biennial forest cover assessments initiated in the year 1987. These biennial assessments describe how much and where our forest cover is, irrespective of its origin, species, ownership, land use or legal status: All tree stands with canopy density over 10% having an extent of more than 1Ha (being the Minimum Mapping Unit) including bamboos, orchards, coconut palm etc within recorded forest private, community or institutional lands are thus reflected in the assessment of forest cover.
- 2 Consistency is maintained in the assessment methodology including the type of satellite data used, making the successive estimates comparable with each other. This helps forest managers and policy makers involved in scientific management to track the changes in forest cover.
3. The LISS-111 data used in the current assessment were procured from National Remote Sensing Centre (NRSC), Hyderabad in digital format. Most of the satellite data used in the current assessment pertains to the period between October 2015 to December 2015.
4. Data from post monsoonal period is favored as it is cloud free in most parts of the country. In addition, the new flush of leaves post monsoon favor better discernibility of the vegetation on the satellite image. However, some parts of the country especially in the North-East have cloud cover even during this period and therefore additional images of such areas pertaining to January- February 2016 were used.

Table 2.2 Forest cover classified in terms of canopy density classes

Class	Description
Very Dense Forest	All lands with tree canopy density of 70 percent and above.
Moderately Dense Forest than 70 percent.	All lands with tree canopy density of 40 percent and more but less than 70 percent.
Open Forest than 40 percent.	All lands with tree canopy density of 10 percent and more but less than 40 percent.
Scrub	Degraded forest lands with canopy density less than 10 percent.
Non-forest	Lands not included in any of the above classes. (includes water)



Very dense forest



Moderately dense forest



Open forest



Scrub

Note:- In UPSC and UKPCS Prelims Examination they ask a question “ Type of Forest”

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Limitations of the Forest Cover assessment exercise

Remote sensing data has certain inherent limitations that affect the accuracy of the Forest Cover Mapping, some of which are mentioned below:

- Since the resolution of the LISS-III sensor data is 23.5 m, land cover having a geometric dimension on the ground less than 23.5 m is not discernible.
- Considerable ground details may sometimes be obscured due to clouds and shadows. Such areas can be classified to a certain extent with the help of collateral data.
- Non-availability of appropriate season data sometimes leads to misinterpretation of the features owing to poor reflectance of data.
- Occurrence of weeds like lantana in forest areas and agricultural crops like sugarcane, cotton, etc. adjacent to forest area causes mixing of the spectral signatures and often make precise forest cover delineation difficult.
- Young plantations and tree species with less chlorophyll or poor foliage are many times not discernible on satellite images due to low leaf area index and transmittance.
- Where heterogeneity in tree species composition is high, generalized classification may affect the accuracy level.

Table 2.3 Forest cover of India

Class	Area (sq km)	Percent of Geographic Area
Very Dense Forest	98,158	2.99
Moderately Dense Forest	3,08,318	9.38
Open Forest	3,01,797	9.18
Total Forest Cover *	7,08,273	21.54
Scrub	45,979	1.40
Non-Forest	25,33,217	77.06
Total Geographic Area	32,87,469	100.00

*Includes 4,921 sq km under Mangrove Cover
Percentage rounded off

The total forest cover of the country, as per current assessment is 7,08,273 sq km which is 21.54% of the geographic area of the country. In terms of density classes, area covered by VDF is 98,158 sq km, that with MDF is 3,08,318 sq km and OF is 3,01,797 sq km corresponding to 2.99, 9.38 and 9.18 percent respectively of the total geographical area of the country.

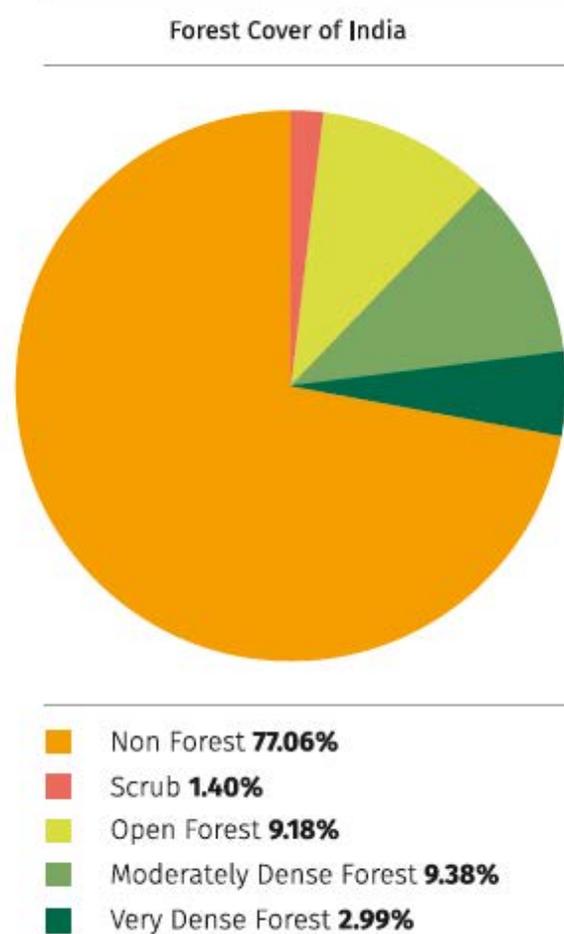


Figure 2.3: Pie-chart showing Forest Cover of India

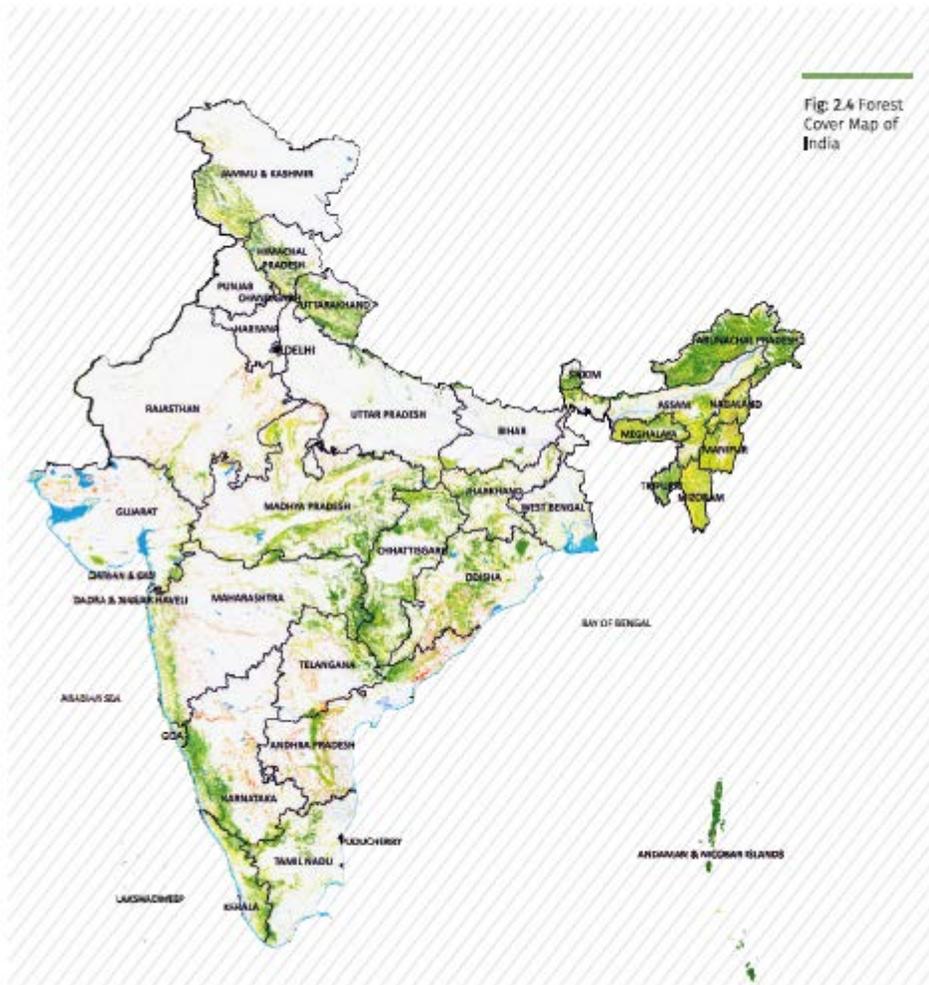
- @ Madhya Pradesh (77.414 sq km) in the country followed by
- @ Arunachal Pradesh (66,964 sq km),
- @ Chhattisgarh (55,547 sq km),
- @ Odisha (51,345 sq km)
- @ Maharashtra (50,682 sq km).

Note:- In UKPCS Prelims and IAS Prelims ask 1 to 2 questions from this part

@ In terms of percentage of forest cover with respect to total geographical area,

- 1 Lakshadweep leads at 90.33\,
- 2 Mizoram (86.27 %),
- 3 Andaman & Nicobar Islands (81.73%),
- 4 Arunachal Pradesh (79.96%),
- 5 Manipur (77.69\),
- 6 Meghalaya (76.45\),
- 7 Nagaland (75.33\)

8 Tripura (73.68%).



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Table 2.5 States/UTs with Forest Cover more than 33 percent of Geographic Area

(area in sq km)

States/Uts	Geographic Area	2017 Assessment				Scrub	Forest Cover Percent
		VDF	MDF	OF	Total		
Lakshadweep	30	0	17.04	10.06	27.10	0	90.33
Mizoram	21,081	131	5,861	12,194	18,186	0	86.27
A & N Islands	8,249	5,678	684	380	6,742	1	81.73
Arunachal Pradesh	83,743	20,721	30,955	15,288	66,964	247	79.96
Manipur	22,327	908	6,510	9,928	17,346	1,111	77.69
Meghalaya	22,429	453	9,386	7,307	17,146	505	76.45
Nagaland	16,579	1,279	4,587	6,623	12,489	503	75.33
Tripura	10,486	656	5,246	1,824	7,726	15	73.68
Goa	3,702	538	576	1,115	2,229	0	60.21
Kerala	38,852	1,663	9,407	9,251	20,321	23	52.30
Sikkim	7,096	1081	1,575	688	3,344	307	47.13
Uttarakhand	53,483	4,969	12,884	6,442	24,295	383	45.43
Dadra & Nagar Haveli	491	0	80	127	207	5	42.16
Chhattisgarh	135,192	7,064	32,215	16,268	55,547	552	41.09
Assam	78,438	2,797	10,192	15,116	28,105	217	35.83
Total	502,178	47,938	130,175	102,561	280,674	3,869	55.89

1. After taking into account the changes observed during the two assessments periods i.e. ISFR 2015 (Updated) and SFR 2017, there has been an increase of 6,778 sq km forest cover at the national level Three states namely **Andhra Pradesh, Karnataka and Kerala** have contributed to an increase of 2,141 sq km, 1,101 sq km and 1,043 sq km respectively, much of which can be attributed to plantation and conservation activities both within and outside the Recorded Forest areas as well as improvement in interpretation due to better radiometric resolution of the recent satellite data from Resourcesat-2.

Note:- UPSC and UKPCS ask the name of a satellite

2. Other states where significant increase has been observed are Odisha (885 sq km), Assam (567 sq km), Telangana (565 sq km), Rajasthan (466 sq km), Himachal Pradesh (393 sq km), Uttar Pradesh (278 sq km), Jammu & Kashmir (253 sq km) and Manipur (263 sq km). The States which show reduction in forest cover primarily include Mizoram (531 sq km), Nagaland (450 sq km) and Arunachal Pradesh (190 sq km). At the country level there is an increase of 9,526 sq km of VDF and 1,674 sq km in OF, while there is a decrease of 4,421 sq km of MDF.

@ As per the present assessment, the forest cover in the hill districts of the country is 2,83,462 sq km,

@ which is 40.22 per cent of the total geographic area of these districts.

@ All districts of the States of Arunachal Pradesh, Himachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and Uttarakhand are hill districts.

@ The current assessment shows an increase of 754 sq km of forest cover in all hill districts of the country.

Table 2.11 State wise summary of Forest Cover in hill districts (Area in sq km)									
State	No. of Hill Districts	Geographical Area	2017 Assessment				% of GA	Change	Scrub
			VDF	MDF	OF	Total			
Arunachal Pradesh	16	83,743	20,721	30,955	15,288	66,964	79.96	-190	247
Assam	3	19,295	845	5,683	6,575	13,103	67.91	100	89
Himachal Pradesh	12	55,673	3,110	6,705	5,285	15,100	27.12	393	308
Jammu & Kashmir	(a) 14	101,388	2,728	6,119	7,165	16,012	15.79	8	238
	(b)*	120,848	1,347	2,460	3,422	7,229	5.98	245	335
Karnataka	6	48,353	3,912	14,941	4,831	23,684	48.98	334	792
Kerala	10	29,552	1,308	7,166	7,830	16,304	55.17	956	22
Maharashtra	7	69,905	315	7,246	8,059	15,620	22.34	47	1415
Manipur	9	22,327	908	6,510	9,928	17,346	77.69	263	1,111
Meghalaya	7	22,429	453	9,386	7,307	17,146	76.45	-116	505
Mizoram	8	21,081	131	5,861	12,194	18,186	86.27	-531	0
Nagaland	8	16,579	1,279	4,587	6,623	12,489	75.33	-450	503
Sikkim	4	7,096	1,081	1,575	688	3,344	47.13	-9	307
Tamil Nadu	5	19,384	1,487	2,614	2,448	6,549	33.79	-144	61
Tripura	4	10,486	656	5,246	1,824	7,726	73.68	-164	15
Uttarakhand	13	53,483	4,969	12,884	6,442	24,295	45.43	23	383
West Bengal	1	3,149	722	648	995	2,365	75.10	-11	10
Grand Total	127	7,04,771	45,972	1,30,586	1,06,904	2,83,462	40.22	754	6,341

@ The total forest cover in the tribal districts is 4,21,170 sq km which is 37.431 of the geographical area of these districts. The current assessment shows an actual increase of 86.89 sq km in all the tribal districts of the country.

@ North-Eastern region of the country comprising eight States namely, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura is endowed with rich forest resources and is one of the 18 biodiversity hotspots of the world.

@ The region, with just 7.98 per cent of the geographical area of the country, accounts for nearly one fourth of its forest cover.

@ One distinct feature of land use is the prevalence of shifting cultivation in hilly parts of almost all the States of this region. Shifting cultivation has traditionally been intricately linked to socio-cultural life of tribal people.

Table 2.13 Forest Cover in North-Eastern States

(Area in sq km)

State	Geographical Area	2017 Assessment								Change	Scrub
		VDF	% VDF	MDF	% MDF	OF	% OF	Total	% Forest to GA		
Arunachal Pradesh	83,743	20,721	30.94	30,955	46.23	15,288	22.83	66,964	79.96	-190	247
Assam	78,438	2,797	9.95	10,192	36.26	15,116	53.78	28,105	35.83	567	217
Manipur	22,327	908	5.23	6,510	37.53	9,928	57.24	17,346	77.69	263	1,111
Meghalaya	22,429	453	2.64	9,386	54.74	7,307	42.62	17,146	76.45	-116	505
Mizoram	21,081	131	0.72	5,861	32.23	12,194	67.05	18,186	86.27	-531	0
Nagaland	16,579	1,279	10.24	4,587	36.73	6,623	53.03	12,489	75.33	-450	503
Sikkim	7,096	1,081	32.33	1,575	47.10	688	20.57	3,344	47.13	-9	307
Tripura	10,486	656	8.49	5,246	67.90	1,824	23.61	7,726	73.68	-164	15
Grand Total	2,62,179	28,026	16.36	74,312	43.38	68,968	40.26	1,71,306	65.34	-630	2,905

Table 2.14 Forest Cover in Altitude Zones

(Area in sq km)

Altitude Zone	Geo. Area	VDF	MDF	Open	Total Forest cover	Percent Total FC	Percent of GA of Zone	Change w.r.t ISFR 2015 (updated)
0-500 m	23,29,321	39,049	1,50,794	1,85,146	3,74,989	52.94	16.10	7,087
500-1000 m	5,41,747	25,493	95,178	77,787	1,98,458	28.02	36.63	276
1000-2000 m	1,17,835	15,267	35,979	25,056	76,302	10.77	64.75	-217
2000-3000 m	56,891	14,740	18,569	7,218	40,527	5.72	71.24	-193
3000-4000 m	62,405	3,555	7,554	6,100	17,209	2.43	27.58	-76
Above 4000 m	1,79,270	54	244	490	788	0.11	0.44	-99
Total	32,87,469	98,158	3,08,318	3,01,797	7,08,273	100	21.54	6,778

Zone-wise geographical area worked out on the basis of SRTM Digital Elevation Model (DEM)