EXECUTIVE SUMMARY

Every two years, Forest Survey of India (FSI) undertakes assessment of country's forest resources, the results of which are presented as the 'India State of Forest Report (ISFR)'. Since 1987, 15 such assessments have been completed and the current assessment is the 16th in the series. Based on the regular nation-wide mapping of forest cover, sample plots based national forest inventory and the specific studies conducted at the national level, the information presented in the ISFR 2019 is primary information on different parameters of the forest resources of the country.

The country's forest cover includes all patches of land with a tree canopy density of more than 10% and more than 1 ha in area, irrespective of land use, ownership and species of trees. It is assessed by a wall-to-wall mapping exercise using remote sensing technique followed by intensive ground truthing. Results of the exercise is a nation-wide forest cover map of the country on 1:50,000 scale in three canopy density classes viz Very Dense Forest with a canopy density more than 70%, Moderately Dense Forest with a canopy density between 40-70% and Open Forest with a canopy density between 10-40%. The tree cover is assessed following a methodology involving remote sensing based stratification and observations on sample plots laid in the strata as part of the National Forest Inventory. Tree cover includes all patches of trees less than 1 ha.

Keeping pace with the technology and refinement in methodologies are the continuous processes in FSI. In the current assessment, ortho-rectified LISS III data of IRS Resourcesat-2 with a spatial resolution of 23.5 meters for the period October to December 2017 have been used for interpretation at a scale of interpretation 1:50,000 with the Minimum Mappable Unit of 1 ha. The procedural details of forest cover mapping have been codified into a 'Manual for Forest Cover Mapping'. For the current assessment, ground truthing has been carried out at more than 2,200 locations across the country. Change matrix showing a quantitative account of class wise change and also the flux of changes among the classes between the current and previous assessment has been presented for all the States & UTs and country as a whole.

FSI undertakes National Forest Inventory to assess the growing stock in forests and TOF, bamboo resource, carbon stock along with several other parameters. Field data for the same is collected from approximately 30,000 sample plots laid in 2 years period as per the standardized design. Estimate of different parameters at the State and national level. The growing stock and other assessments presented in ISFR 2019 are on the basis of a new grid based forestry inventory design adopted by FSI in 2016, which ensures higher sampling intensity with uniformly spread sample plots across the country leading to higher precision.

In the current ISFR, a new chapter 'Forest Types and Biodiversity' has been added which presents findings of the forest type mapping based on Champion & Seth classification (1968) and the results of the first ever rapid biodiversity assessment of plant species in the 16 Forest Type Groups. Since, forest and hydrology are closely associated, information on extent and types of wetlands within Recorded Forest Area (RFA) is also being presented. A new nation-wide study has been undertaken to assess the dependence of the people living in Forest Fringe Villages for fuelwood, fodder, small timber and bamboo on the forests. The results of the study will not only help in evaluating the impacts of programmes and policies but will also help in understanding the gap between the potential productivity and actual increment observed in the forests of the country. Results of the special study on fire proneness of States based on forest fire alerts generated by FSI in the last 13 years are also

being presented. This information would enable the SFDs to better manage and control forest fires in the respective States. Information on forest cover distribution in different slope classes will be useful in developing strategies for catchment area treatment programmes.

FSI under joint collaboration with ISRO Institutions has undertaken national level project for estimation of Above Ground Biomass (AGB) for the country and has completed biomass mapping for the State of Assam using Phased Array Type L-band Synthetic Aperture Radar (PALSAR) mosaic with forest inventory data at sample plots of FSI.

In view of the wealth of information generated in the current cycle, the ISFR 2019 has been structured into two volumes, Vol I pertaining to the national level assessment,and special studies. VolII is dedicated to the information about each State and Union Territories of the country as sub chapters.

Salient findings
The key findings of the ISFR 2019 are as follows:

◆ The total forest cover of the country is 7,12,249 sq km which is 21.67% of the geographical area of the country. The tree cover of the country is estimated as 95,027 sq km which is 2.89% of the geographical area.

◆ The total Forest and Tree cover of the country is 8,07,276 sq km which is 24.56% of the geographical area of the country.

◆ The current assessment shows an increase of 3,976 sq km (0.56%) of forest cover, 1,212 sq km (1.29%) of tree cover and 5,188 sq km (0.65%) of forest and tree cover put together, at the national level as compared to the previous assessment i.e. ISFR 2017.

◆ Forest cover within the RFA/GW has shown a slight decrease of 330 sq km (0.05%) whereas there is an increase of 4,306 sq km of forest cover outside the RFA/GW as compared to previous assessment of 2017.

◆ The top five States in terms of increase in forest cover are Karnataka (1,025 sq km), Andhra Pradesh (990 sq km), Kerala (823 sq km), Jammu & Kashmir (371 sq km) and Himachal Pradesh (334 sq km).

◆ Forest cover in the hill districts of the country is 2,84,006 sq km, which is 40.30% of the total geographical area of these districts. The current assessment shows an increase of 544 sq km (0.19%) in 140 hill districts of the country.

◆ The total forest cover in the tribal districts is 4,22,351 sq km, which is 37.54% of the geographical area of these districts. The current assessment shows a decrease of 741 sq km of forest cover within the RFA/GW in the tribal districts and an increase of 1,922 sq km outside.

◆ Total forest cover in the North Eastern region is 1,70,541 sq km, which is 65.05% of its geographical area. The current assessment shows a decrease of forest cover to the extent of 765 sq km (0.45%) in the region. Except Assam and Tripura, all the States in the region show decrease in forest cover.

◆ Mangrove cover in the country has increased by 54 sq km (1.10%) as compared to the previous assessment.

◆ The total growing stock of wood in the country is estimated 5,915.76 million cum comprising 4,273.47 million cum inside forest areas and 1,642.29 million cum outside recorded forest areas (TOF). The average growing stock per hectare in forest has been estimated as 55.69 cum.

◆ Total bamboo bearing area of the country is estimated as 1,60,037 sq km. There is an increase of 3,229 sq km in bamboo bearing area as compared to the estimate of ISFR 2017.

- In the present assessment, total carbon stock in forest is estimated as 7,124.6 million tonnes. There is an increase of 42.6 million tonnes in the carbon stock of the country as compared to the last assessment of 2017. The annual increase is 21.3 million tonnes, which is 78.1 million tonnes CO_2 eq.

- Soil Organic Carbon (SOC) represents the largest pool of carbon stock in forests, which has been estimated 4,004 million tonnes. The SOC contributes 56% to the total forest carbon stock of the country.

- There are 62,466 wetlands covering 3.83% of the area within the RFA/GW of the country. The total number of wetlands located within the RFA/GW is 8.13%. Amongst the States, Gujarat has largest area of wetlands within RFA in the country followed by West Bengal.

- Dependence of fuelwood on forests is highest in the State of Maharashtra, whereas, for fodder, small timber and bamboo, dependence is highest in Madhya Pradesh. It has been assessed that the annual removal of the small timber by the people living in forest fringe villages is nearly 7% of the average annual yield of forests in the country.

- The information on area affected by five major invasive species in States/UTs based on analysis of NFI data has been given in the present ISFR.

- Fire prone forest areas of different severity classes have been mapped in the grids of 5km x 5km based on the frequency of forest fires. The analysis reveals that 21.40% of the forest cover of the country is highly to extremely fire prone.

TABLE 1   Forest and Tree cover of India in 2019

Class	Area (sq km)	Percentage of Geographical Area
Forest Cover		
Very Dense Forest	99,278	3.02
Moderately Dense Forest	3,08,472	9.38
Open Forest	3,04,499	9.26
Total Forest Cover*	**7,12,249**	**21.67**
Tree Cover	95,027	2.89
Total Forest and Tree Cover	**8,07,276**	**24.56**
Scrub	46,297	1.41
Non-Forest#	25,28,923	76.92
Total Geographic Area	**32,87,469**	**100.00**

*   Includes 4,975 sq km under Mangrove Cover
#   Non-forest includes Tree Cover (Percentage rounded off)