

# 11.12

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## JHARKHAND

### 11.12.1 Introduction

The State of Jharkhand came into existence on 15th November 2000 after the reorganization of the erstwhile unified Bihar. Situated in the eastern part of the country, Jharkhand covers an area of 79,716 sq km, which is 2.42% of the geographical area of the country. The State lies between 22°00' N to 24°37' N latitudes and 83°15' E to 87°01' E longitudes and shares borders with Bihar in the north, Uttar Pradesh in the northwest, Chhattisgarh in the west, Odisha in the south and West Bengal in the east. Physiographically, the State has four major plateaus separated by narrow steep slopes, of which the Chhota Nagpur plateau is the most prominent. Jharkhand has tropical climate with annual rainfall of about 900 mm. Temperature varies between 4°C to 47°C. The important rivers of the State are Ganga, Son, South Koel, Baitarni and Damodar. Jharkhand has 24 districts of which 17 are tribal and none is a hill district. The State has a population of 32.99 million of which rural and urban population constitutes 75.95% and 24.05% respectively. Tribal population is 26.21% of the State's population. The population density of the State 414 per sq km which is slightly higher than the national average. The 19th Livestock census 2012 has reported a total livestock population of 18.05 million.

**TABLE 11.12.1** Land Use Pattern

Land Use Types	Area (in 000' ha)	Percentage
Geographical Area	7,972	
Reporting area for land utilization	7,970	100.00
Forests	2,239	28.10
Not available for land cultivation	1,274	15.98
Permanent pastures and other grazing lands	113	1.43
Land under misc. tree crops and groves	98	1.23
Culturable wasteland	353	4.43
Fallow land other than current fallows	1,122	14.08
Current fallows	1,386	17.38
Net area sown	1,385	17.37

Source: Land Use Statistics, Ministry of Agriculture, GOI, (2014-15)



### 11.12.1.1 A Brief Overview of Forestry Scenario

The State of Jharkhand is rich in forests and mineral wealth. As per the Champion & Seth classification of the Forest Types (1968), the forests in Jharkhand belong to two Forest Type Groups which are further divided into eight Forest Types. The State is known for its waterfalls, hills and forest landscapes. Various ethnic groups such as Munda, Oraon, Ho, Santhal, Paharia, Chero, Birjea, Asura and others live in the State and follow varying practices of agro-pastoralism. Traditionally, these indigenous people have symbiotic relationship with forests. Local festivals like Sarhul and Karma are customarily related with worshipping of trees. Jharkhand has a rich variety of flora and fauna.

Recorded Forest Area (RFA) in the State is 23,605 sq km of which 4,387 sq km is Reserved Forests, 19,185 sq km is Protected Forest and 33 sq km is Unclassed Forests. In Jharkhand, during the period 1st January 2015 to 5th Feb 2019, a total of 690.87 hectares of forest land was diverted for various non-forestry purposes under the Forest Conservation Act, 1980 (MoEF & CC, 2019). One National Park and 11 Wildlife Sanctuaries constitute the Protected Area network of the State covering 2.74% of its geographical area.

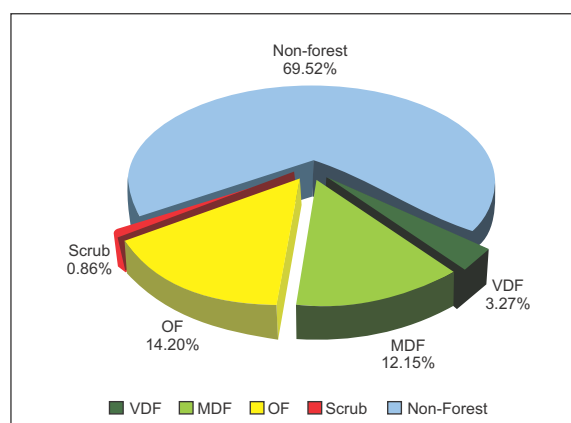
### 11.12.2 Forest Cover

Based on the interpretation of IRS Resourcesat-2 LISS III satellite data of the period Nov 2017 to Jan 2018, the Forest Cover in the State is 23,611.41 sq km which is 29.62 % of the State's geographical area. In terms of forest canopy density classes, the State has 2,603.20 sq km under Very Dense Forest (VDF), 9,687.36 sq km under Moderately Dense Forest (MDF) and 11,320.85 sq km under Open Forest (OF). Forest Cover in the State has increased by 58.41 sq km as compared to the previous assessment reported in ISFR 2017.

**TABLE 11.12.2** Forest Cover of Jharkhand

(in sq. km)		
Class	Area	% of GA
VDF	2,603.20	3.27
MDF	9,687.36	12.15
OF	11,320.85	14.20
<b>Total</b>	<b>23,611.41</b>	<b>29.62</b>
Scrub	688.05	0.86

**FIGURE 11.12.1** Forest Cover of Jharkhand



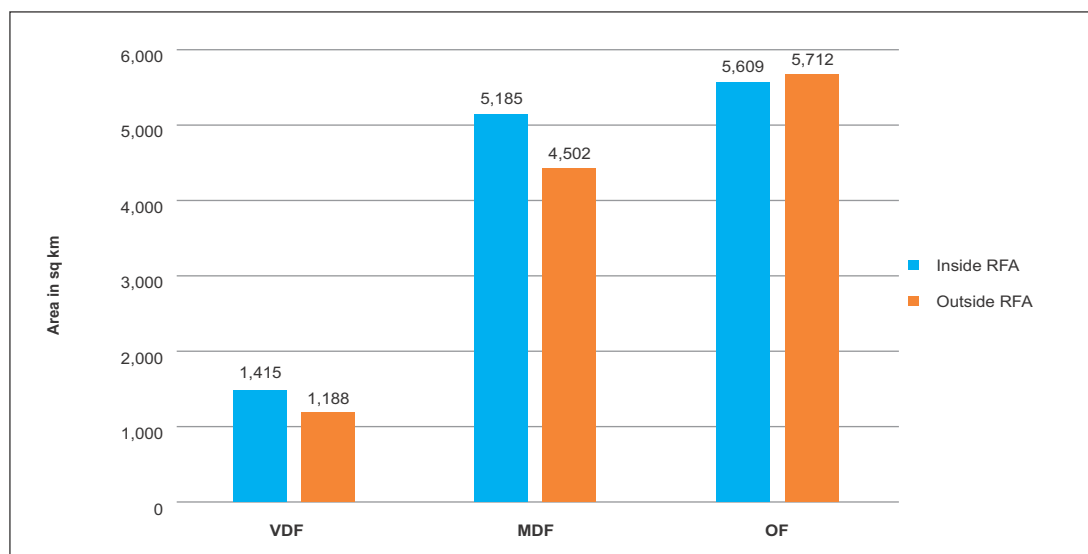
### 11.12.2.1 Forest Cover inside and outside Recorded Forest Area (or Green Wash)

The State has reported extent of recorded forest area (RFA) 23,605 sq km which is 29.61% of its geographical area. The reserved, protected and unclassified forests are 18.58%, 81.28% and 0.14% of the recorded forest area in the State respectively. However as the digitized boundary of the recorded forest area from the state covers only 19,096.61 sq km and the analysis of forest cover inside and outside this area is given below.

**TABLE 11.12.3** Forest Cover inside and outside Recorded Forest Area or (Green Wash) in Jharkhand

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
1,415	5,185	5,609	12,209	1,188	4,502	5,712	11,402
11.59%	42.47%	45.94%		10.43%	39.48%	50.09%	

\*in case of Jharkhand RFA boundaries have been used.

**FIGURE 11.12.2** Forest Cover inside and outside RFA in Jharkhand**TABLE 11.12.4** District-wise Forest Cover in Jharkhand

(in sq km)

District	Geographical Area (GA)	2019 Assessment				% of GA	Change wrt 2017 assessment	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Bokaro	2,883	61.00	232.00	280.55	573.55	19.89	3.55	38.85
Chatra	3,718	244.58	869.98	662.79	1,777.35	47.80	11.35	23.04
Deoghar <sup>T</sup>	2,477	0.00	14.41	189.30	203.71	8.22	1.71	15.80
Dhanbad	2,040	0.00	44.00	169.51	213.51	10.47	9.51	19.52
Dumka <sup>T</sup>	3,761	0.00	259.35	317.96	577.31	15.35	1.31	44.38
Garhwa <sup>T</sup>	4,093	125.00	415.34	851.25	1,391.59	34.00	1.59	62.56
Giridih	4,962	77.00	338.67	485.57	901.24	18.16	11.24	30.93
Godda <sup>T</sup>	2,266	13.00	272.09	138.26	423.35	18.68	2.35	16.00
Gumla <sup>T</sup>	5,360	304.86	586.08	551.32	1,442.26	26.91	1.26	11.00
Hazaribagh	3,555	230.00	349.00	773.77	1,352.77	38.05	1.77	19.76
Jamtara <sup>T</sup>	1,811	0.00	20.97	79.67	100.64	5.56	3.64	12.60
Khunti <sup>T</sup>	2,535	73.00	342.91	489.58	905.49	35.72	1.49	12.00
Kodarma	2,540	80.99	494.45	448.03	1,023.47	40.29	-0.53	6.50
Latehar <sup>T</sup>	4,291	480.63	1,308.74	616.97	2,406.34	56.08	2.34	9.30
Lohardaga <sup>T</sup>	1,502	173.95	218.49	112.18	504.62	33.60	0.62	8.00
Pakur <sup>T</sup>	1,811	3.00	172.00	112.13	287.13	15.85	0.13	20.00
Palamu <sup>T</sup>	4,393	63.19	512.62	624.97	1,200.78	27.33	0.78	99.72
Pashchimi Singhbhum <sup>T</sup>	7,224	462.00	1,353.61	1,550.51	3,366.12	46.60	0.12	52.06
Purbi Singhbhum <sup>T</sup>	3,562	55.00	591.33	433.05	1,079.38	30.30	3.38	21.15
Ramgarh	1,341	31.00	110.00	188.00	329.00	24.53	0.00	18.00
Ranchi <sup>T</sup>	5,097	63.04	364.19	737.26	1,164.49	22.85	0.49	35.35
Sahibganj <sup>T</sup>	2,063	17.96	259.16	295.23	572.35	27.74	-0.65	67.65
Saraikele-Kharsawan <sup>T</sup>	2,657	22.00	213.97	338.07	574.04	21.60	1.04	22.88
Simdega <sup>T</sup>	3,774	22.00	344.00	874.92	1,240.92	32.88	-0.08	21.00
<b>Grand Total</b>	<b>79,716</b>	<b>2,603.20</b>	<b>9,687.36</b>	<b>11,320.85</b>	<b>23,611.41</b>	<b>29.62</b>	<b>58.41</b>	<b>688.05</b>

**TABLE 11.12.5** Forest Cover Change Matrix for Jharkhand

(in sq km)

Class	2019 Assessment					Total ISFR 2017
	VDF	MDF	OF	Scrub	NF	
Very Dense Forest	2,587	10	0	0	1	2,598
Moderately Dense Forest	16	9,660	3	0	7	9,686
Open Forest	0	11	11,230	1	27	11,269
Scrub	0	0	8	658	3	669
Non Forest	0	6	80	29	55,379	55,494
<b>Total ISFR 2019</b>	<b>2,603</b>	<b>9,687</b>	<b>11,321</b>	<b>688</b>	<b>55,417</b>	<b>79,716</b>
Net Change	5	1	52	19	-77	

Main reasons for the increase in forest cover in the State are plantation and conservation activities as well as improvement in interpretation.

**TABLE 11.12.6** Altitude-wise Forest Cover in Jharkhand

(in sq km)

Altitude Zone (m)	Geographical Area	VDF	MDF	OF	Total	Scrub
0-500	61,272	1,032	6,705	8,382	16,119 (68.26 %)	644
500-1000	18,051	1,511	2,849	2,905	7,265 (30.78 %)	43
1000-2000	393	60	133	34	227 (0.96 %)	1
<b>Total</b>	<b>79,716</b>	<b>2,603</b>	<b>9,687</b>	<b>11,321</b>	<b>23,611</b>	<b>688</b>

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

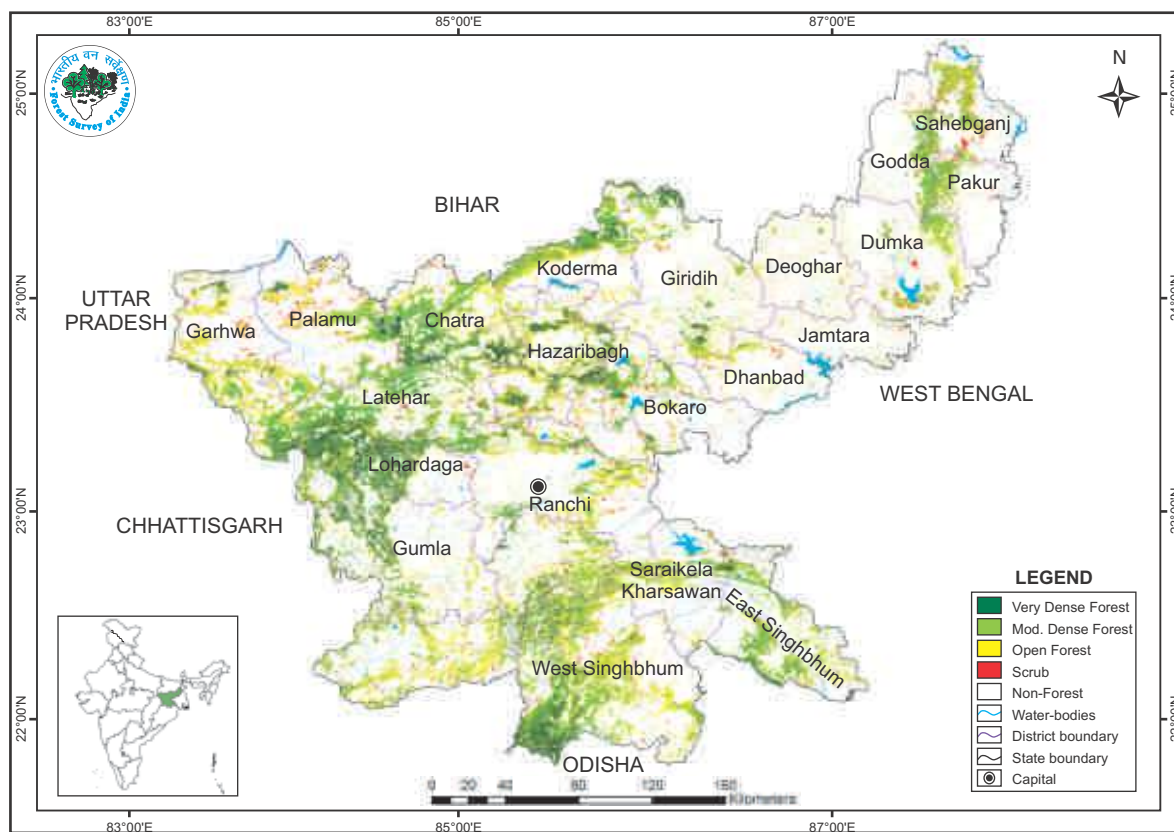
**TABLE 11.12.7** Forest Cover in different slope classes in Jharkhand

(in sq km)

Slope (in degrees)	Geographical Area	VDF	MDF	OF	Total	Scrub
0-5	65,120	1,223	4,835	6,844	12,902 (54.65%)	403
5-10	8,083	669	2,243	2,192	5,104 (21.62%)	129
10-15	3,260	376	1,253	1,091	2,720 (11.52%)	69
15-20	1,790	201	736	637	1,574 (6.67%)	44
20-25	915	90	383	346	819 (3.47%)	26
25-30	390	32	165	154	351 (1.49%)	12
>30	158	12	72	57	141 (0.58%)	5
<b>Total</b>	<b>79,716</b>	<b>2,603</b>	<b>9,687</b>	<b>11,321</b>	<b>23,611</b>	<b>688</b>

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



**FIGURE 11.12.3** Forest Cover Map of Jharkhand**TABLE 11.12.8** Wetlands inside the Recorded Forest Area (or Green Wash) in Jharkhand

(in ha)

Wetland Category	No. of Wetlands	Total Wetland Area
<b>Inland Wetlands - Natural</b>		
Riverine wetland	6	12
Waterlogged	34	60
River/Stream	209	10,028
<b>Sub - Total</b>	<b>249</b>	<b>10,100</b>
<b>Inland Wetlands - Man-made</b>		
Reservoir/Barrage	408	5,128
Tank/Pond	140	434
Waterlogged	3	4
<b>Sub - Total</b>	<b>551</b>	<b>5,566</b>
Wetlands (<2.25 ha)	862	862
<b>Total</b>	<b>1,662</b>	<b>16,528</b>
Total Recorded Forest (or Green Wash) Area (in ha)		19,09,661
<b>% of Wetland area inside Recorded Forest (or Green Wash) Area</b>		<b>0.87%</b>

*(analysis based on the National Wetland Atlas: India, 2011)***11.12.3 Forest Types & Biodiversity**

Forest Type Maps of 2011 have been refined in the recently completed exercise by FSI. Percentage area under different forest types of Jharkhand as per the Champion & Seth classification (1968), according to the latest exercise are presented in the following table.

**TABLE 11.12.9** Percentage area under different forest types of Jharkhand

Sl.No.	Forest Type	% of Forest cover
1.	3C/C2e (ii) Moist Peninsular Low Level Sal	2.34
2.	3C/C2e (iii) Moist Peninsular Valley Sal	0.28
3.	5/DS1 Dry Deciduous Scrub	2.36
4.	5/E2 Boswellia Forest	0.04
5.	5/E5 Butea Forest	0.00
6.	5/E9 Dry Bamboo Brake	0.55
7.	5B/C1c Dry Peninsular Sal Forest	53.77
8.	5B/C2 Northern Dry Mixed Deciduous Forest	35.01
9.	Plantation/ TOF	5.65
	<b>Total</b>	<b>100.00</b>

### 11.12.3.1 Assessment of Biodiversity

Findings of the rapid assessment of Biodiversity carried out at the national level for natural forests during September 2018 to May 2019 as part of the forest type mapping exercise is summarized below in table 11.12.10 and table 11.12.11 in respect of Jharkhand.

**TABLE 11.12.10** No. of species observed during the rapid assessment

Plant Type	Number of Species
Tree	111
Shrub	26
Herb	40

**TABLE 11.12.11** Shannon-Wiener Index of Tree, Shrub and Herb species in different Type Groups of Jharkhand

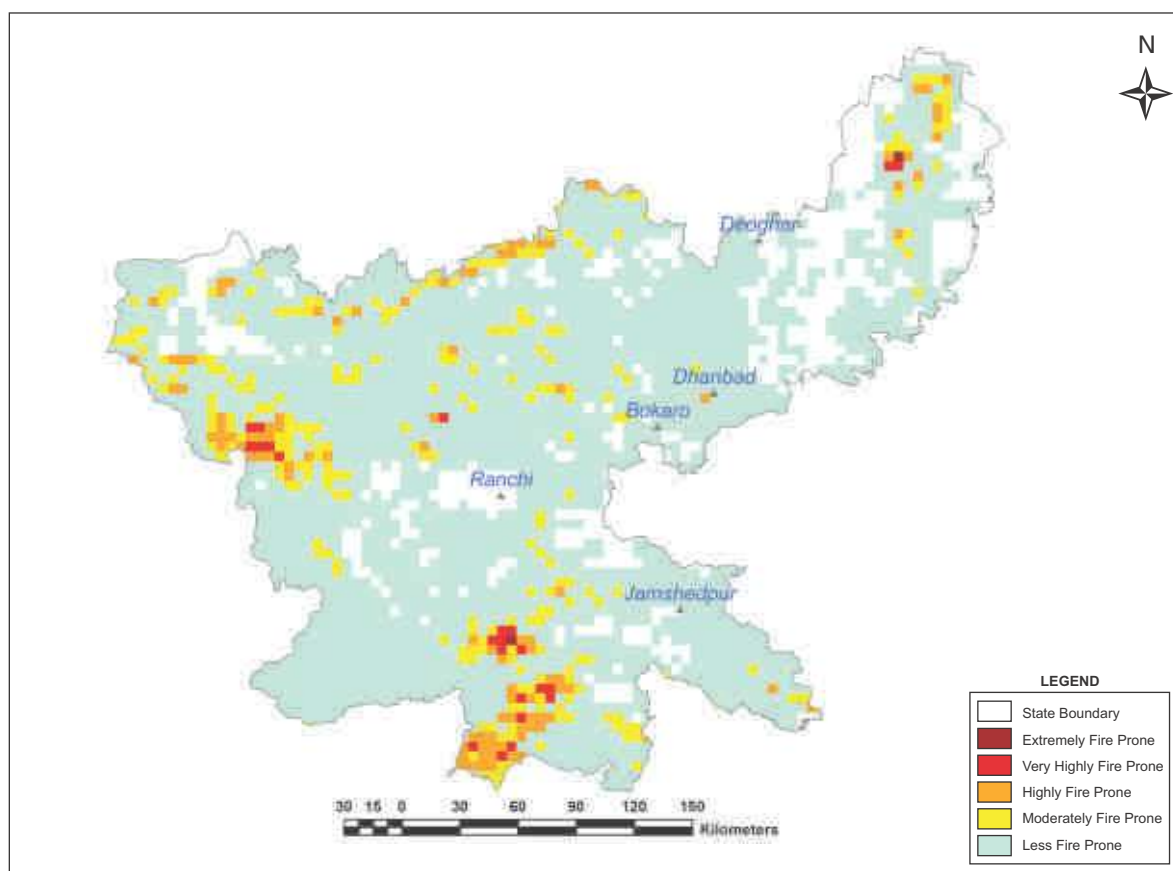
Sl.No.	Forest Type Group	Shannon-Wiener Index		
		Tree	Shrub	Herb
1.	Group 3- Tropical Moist Deciduous Forests	2.18	1.77	2.43
2.	Group 5- Tropical Dry Deciduous Forests	2.70	2.04	3.04

### 11.12.4 Fire Prone Forest Areas

Geographical area under different classes of forest fire proneness are given in the following table.

**TABLE 11.12.12** Forest Fire Prone Classes (in sq km)

Sl. No.	Forest Fire Prone Classes	Geographical Area	% of Total forest cover
1	Extremely fire prone	49.91	0.21
2	Very highly fire prone	573.91	2.18
3	Highly fire prone	2,491.58	9.16
4	Moderately fire prone	6,035.46	19.54
5	Less fire prone	57,950.27	68.91
	<b>Total</b>	<b>67,101.13</b>	<b>100.00</b>

**FIGURE 11.12.4** Fire prone forest areas under different fire prone classes

### 11.12.5 Tree Cover

Forest cover presented in the section 11.12.2 accounts for tree patches of size 1 ha and more having canopy density more than 10%. However, trees occurring in patches of size less than 1 ha including scattered trees are assessed through sampling based methodology. Tree cover in Jharkhand has been estimated as given in table 11.12.13.

**TABLE 11.12.13** Tree Cover in Jharkhand (in sq km)

Tree Cover	Area
	2,657

Tree cover of Jharkhand has decreased by 265 sq km as compared to the previous assessment reported in ISFR 2017.

### 11.12.6 Extent of Trees Outside Forest (TOF)

Trees outside Forests (TOF) refer to tree resources found outside the forests as defined in the Government records. FSI maps forest cover using satellite data and assesses tree cover outside forests using sampling based method. 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 the preceding section.



**TABLE 11.12.14** Extent of TOF in Jharkhand (in sq km)

Forest Cover outside the RFA/GW	Tree Cover	Extent of TOF
11,402	2,657	14,059

**11.12.7 Growing Stock in Jharkhand**

Growing stock in the recorded forest areas (RFA) in Jharkhand is given in the table 11.12.15. Diameter class-wise distribution of top 5 species in numbers derived from the forest inventory data is presented in the table 11.12.16

**TABLE 11.12.15** Growing Stock in Jharkhand (in m cum)

Growing Stock (GS)		% of Country's GS
Growing Stock in Recorded Forest Area	96.22	2.25
Growing Stock in TOF	71.93	4.38

**TABLE 11.12.16** Diameter class distribution of top five species inside RFA in Jharkhand (in '000)

Sl.No.	Species	Dia class (cm)		
		10-30	30-60	>60
1.	<i>Shorea robusta</i>	1,71,789	11,751	1,134
2.	<i>Madhuca latifolia</i>	14,252	3,426	351
3.	<i>Terminalia tomentosa</i>	25,871	3,218	271
4.	<i>Buchanania latifolia</i>	21,802	677	0
5.	<i>Anogeissus latifolia</i>	15,670	1,205	0

**11.12.8 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 178.01 million tonnes (652.70 million tonnes of CO<sub>2</sub> equivalent) which is 2.50% of total forest carbon of the country. Pool wise forest carbon in Jharkhand is given in the following table

**TABLE 11.12.17** Forest Carbon in Jharkhand in different pools (in '000 tonnes)

AGB	BGB	Dead wood	Litter	SOC	Total
48,994	19,899	423	2,826	1,05,870	1,78,012

**11.12.9 Growing Stock of Bamboo**

Bamboo bearing area and growing stock inside the recorded forest area (RFA)/ Green Wash in the State which include culms of 1 year age and above are given in the table 11.12.18

**TABLE 11.12.18** Growing Stock of Bamboo in Jharkhand

Growing Stock (GS)		% of Country's GS of Bamboo
Bamboo bearing area inside RFA/Green Wash (in sq km)	4,123	2.58
Total number of culms (in millions)	876	2.22
Total equivalent green weight (000' tones)	4,573	1.65

**11.12.10 Dominant tree species in Trees Outside Forests (TOF)**

Top five species in numbers in Trees Outside Forests in Jharkhand in Rural and Urban areas are given in the table 11.12.19 and table 11.12.20 respectively



**TABLE 11.12.19** Occurrence of top five tree species in TOF (Rural) in Jharkhand

Sl. No.	Species	Relative Abundance (%)
1.	<i>Butea frondosa</i>	11.82
2.	<i>Mangifera indica</i>	10.25
3.	<i>Shorea robusta</i>	8.32
4.	<i>Acacia auriculiformis</i>	6.08
5.	<i>Zizyphus jujuba</i>	5.16

**TABLE 11.12.20** Occurrence of top five tree species in TOF (Urban) in Jharkhand

Sl. No.	Species	Relative Abundance (%)
1.	<i>Mangifera indica</i>	11.18
2.	<i>Cassia siamea</i>	9.16
3.	<i>Azadirachta indica</i>	7.63
4.	<i>Moringa species</i>	6.70
5.	<i>Artocarpus integrifolia</i>	4.56

**11.12.11 Major NTFP and Invasive Species**

Major NTFP and invasive species as assessed from forest inventory data are presented in the table 11.12.21 and table 11.12.22 respectively.

**TABLE 11.12.21** Major NTFP species in the State of Jharkhand

Sl. No.	Species	Plant Type	Relative Abundance (%)
1.	<i>Shorea robusta</i>	Tree	67.97
2.	<i>Buchanania Lanza</i>	Tree	8.15
3.	<i>Madhuca indica</i>	Tree	6.77
4.	<i>Diospyrus melanoxylon</i>	Tree	5.33
5.	<i>Butea monosperma</i>	Tree	4.11

**TABLE 11.12.22** Major invasive species in the State inside the RFA/Green Wash in Jharkhand (in sq km)

Sl. No.	Species	Estimated Extent
1.	<i>Lantana camara</i>	665
2.	<i>Chromolaena odorata</i>	166
3.	<i>Ageratum houstonianum</i>	36
4.	<i>Acacia farnesiana</i>	28
5.	<i>Imperata cylindrica</i>	6

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

**11.12.12 Quantified estimation of Dependence of People living in forest fringe villages on forests in Jharkhand**

Through a nation-wide study, FSI has done estimation of dependence of people living in the villages close to forest for fuel wood, fodder, small timber and bamboo in quantified terms for each State & UT of the country (Please refer to Chapter 10 in Vol. I for details). The estimated quantities of the four produce for Jharkhand is given in the table 11.12.23

**TABLE 11.12.23** Estimation of Dependence of People in Forest Fringe Villages on Forests in Jharkhand

Fuelwood (tonnes)	Fodder (tonnes)	Bamboo (tonnes)	Small Timber (cum)
73,72,340	5,54,82,427	50,535	1,83,240