

11.32

CHANDIGARH

11.32.1 Introduction

The Union Territory of Chandigarh, one of the first planned cities in post-independence India is the joint capital of the States of Punjab and Haryana. It is the fifth largest Union Territory covering an area of 114 sq km, which is 0.003% of the geographical area of the country. The Union Territory lies between 30°39' N to 30°49'N latitude and 75°41'E to 75°51'E longitude and is bordered by the State of Punjab in the north, south and west and by the State of Haryana in the east. Physiographically, the UT falls in the Great Indian Northern Plains although near to the foothills of the Shiwalik Hills. Chandigarh experiences humid subtropical climate characterized by seasonal changes i.e very hot summers, severe winters, moderate to heavy rainfall in monsoon. The average annual rainfall ranges between 400 mm to 600 mm and the average annual temperature varies from 1°C to 45°C. As per the 2011 census, Chandigarh comprises of a single district, which is neither hill nor tribal. The UT has a population of 1.06 million accounting to 0.09% of India's population. The rural and urban population constitute 2.75% and 97.25% respectively. The Tribal population is 30.62%. The population density is 9,298 persons per sq km. The 19th livestock census 2012 has reported a total livestock population of 24,197 in Chandigarh.

TABLE 11.32.1 Land Use Pattern

Land Use Types	Area (in 000' ha)	Percentage
Geographical Area	11	
Reporting area for land utilization	7	100.00
Forests	0.21	3.02
Not available for land cultivation	5.36	76.24
Permanent pastures and other grazing lands	-	-
Land under misc. tree crops and groves	0.17	2.45
Culturable wasteland	-	-
Fallow land other than current fallows	0.05	0.71
Current fallows	0.05	0.75
Net area sown	1.18	16.83

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



11.32.1.1 A Brief Overview of Forestry Scenario

The Union Territory of Chandigarh is a planned city which is divided into 56 Sectors and is mainly dominated with urban land use. As per the Champion & Seth Classification of Forest Types (1968), the forests of Chandigarh belong to one Forest Type Group i.e. Tropical Dry Deciduous Forest, which is further divided into two Forest Types. Chandigarh has beautiful roadside linear plantations, especially in the older sectors. Chandigarh is one of the greenest cities of the country. Urban forestry is the thrust area for the UT Forest Department which regularly undertakes plantation activities for increasing the forest and tree cover. The UT Department of Forest & Wildlife, Chandigarh, has started a novel initiative 'Forest department at your doorsteps', which is a scheme for free distribution of plants/saplings to general public without any formal application. To increase green cover in Chandigarh, "Annual Greening Chandigarh Action Plan" is being prepared.

Recorded Forest Area (RFA) in the Union Territory is 35 sq km of which 32 sq km is Reserved Forest and 3 sq km is Unclassed Forest. In Chandigarh, during the period 1st January 2015 to 5th February 2019, a total of 0.39 hectares of forest land was diverted for non-forestry purposes under the Forest Conservation Act, 1980 (MoEF&CC, 2019).

The Protected Area network in the UT has two Wildlife Sanctuaries, covering an area of 26.01 sq km which is 22.81% of geographical area of the Union Territory viz Sukhna Wildlife Sanctuary and City Bird Wildlife Sanctuary.

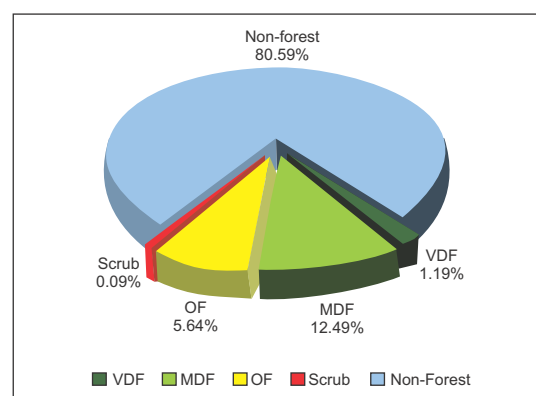
11.32.2 Forest Cover

Based on the interpretation of IRS Resourcesat-2 LISS III satellite data of the October 2017, the Forest Cover in the UT is 22.03 sq km which is 19.32 % of the UT's geographical area. In terms of forest canopy density classes, the State has 1.36sq km under Very Dense Forest (VDF), 14.24 sq km under Moderately Dense Forest (MDF) and 6.43 sq km under Open Forest (OF). Forest Cover in the UT has increased by 0.47 sq km as compared to the previous assessment reported in ISFR 2017.

TABLE 11.32.2 Forest Cover of Chandigarh
(in sq km)

Class	Area	% of GA
VDF	1.36	1.19
MDF	14.24	12.49
OF	6.43	5.64
Total	22.03	19.32
Scrub	0.10	0.09

FIGURE 11.32.1 Forest Cover of Chandigarh



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

The UT has reported extent of recorded forest area (RFA) 35 sq km which is 30.70% of its geographical area. The reserved and unclassified forests are 91.43% and 8.57% respectively of the recorded forest area in the UT. However as the digitized boundary of recorded forest area from the UT covers 9.85 sq km and the analysis of forest cover inside and outside this area is given below.

TABLE 11.32.3 Forest Cover inside and outside Recorded Forest Area or (Green Wash) in Chandigarh (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
1.29	4.93	2.05	8.27	0.07	9.31	4.38	13.76
15.60%	59.61%	24.79%		0.51%	67.66%	31.83%	

*in case of Chandigarh RFA boundaries have been used

FIGURE 11.32.2 Forest Cover inside and outside RFA in Chandigarh

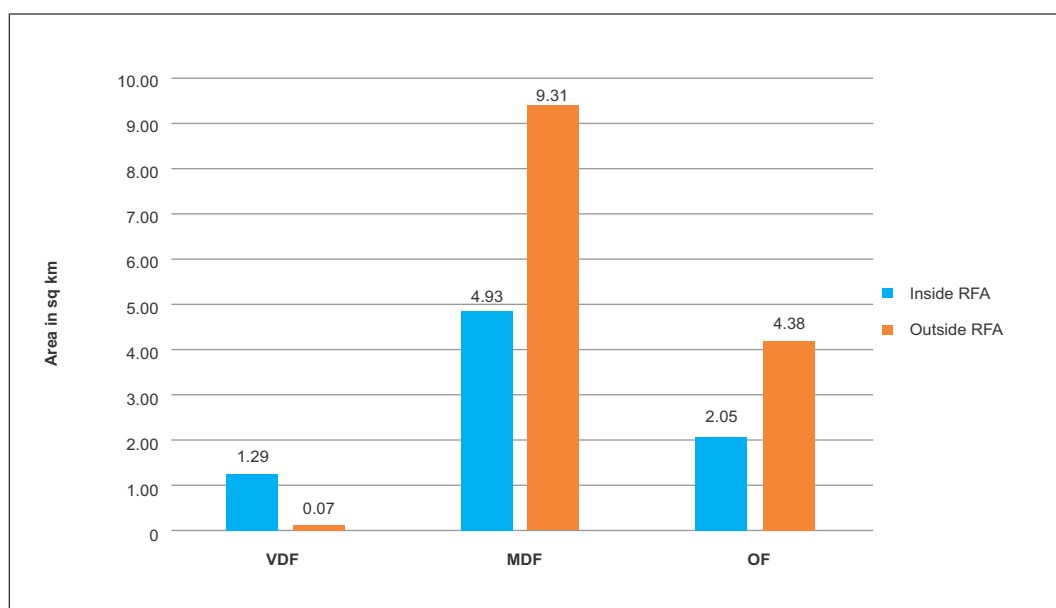


TABLE 11.32.4 District- wise Forest Cover in Chandigarh (in sq km)

District	Geographical Area (GA)	2019 Assessment				% of GA	Change wrt 2017 assessment	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Chandigarh	114	1.36	14.24	6.43	22.03	19.32	0.47	0.10
Grand Total	114	1.36	14.24	6.43	22.03	19.32	0.47	0.10

TABLE 11.32.5 Forest Cover Change Matrix for Chandigarh (in sq km)

Class	2019 Assessment					Total ISFR 2017
	VDF	MDF	OF	Scrub	NF	
Very Dense Forest	1.36	0.00	0.00	0.00	0.00	1.36
Moderately Dense Forest	0.00	13.82	0.00	0.00	0.00	13.82
Open Forest	0.00	0.42	5.96	0.00	0.00	6.38
Scrub	0.00	0.00	0.00	0.02	0.00	0.02
Non Forest	0.00	0.00	0.47	0.08	91.87	92.42
Total ISFR 2019	1.36	14.24	6.43	0.10	91.87	114.00
Net Change	0.00	0.42	0.05	0.08	-0.55	

Positive changes observed in forest cover is due to conservation and plantation activities.

TABLE 11.32.6 Altitude-wise Forest Cover in Chandigarh (in sq km)

Altitude Zone (m)	Geographical Area	VDF	MDF	OF	Total	Scrub
0-500	114	1.36	14.24	6.43	22.03 (100%)	0.10
Total	114	1.36	14.24	6.43	22.03	0.10

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

TABLE 11.32.7 Forest Cover in different slope classes in Chandigarh (in sq km)

Slope (in degrees)	Geographical Area	VDF	MDF	OF	Total	Scrub
0-5	109	1.30	13.39	6.05	20.74 (94.14%)	0.10
5-10	5	0.06	0.85	0.38	1.29 (5.86%)	0
Total	114	1.36	14.24	6.43	22.03	0.10

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



FIGURE 11.32.3 Forest Cover Map of Chandigarh

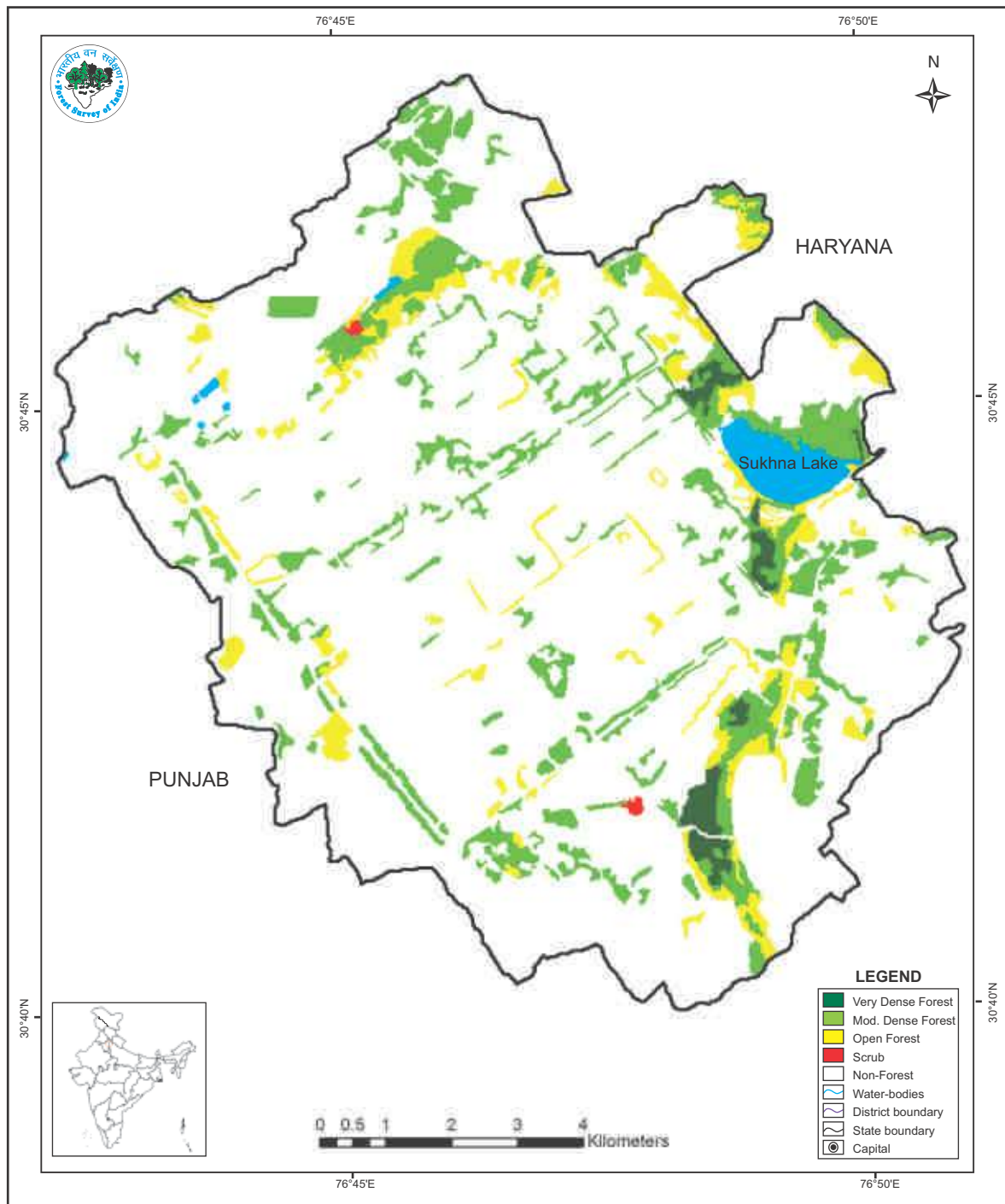


TABLE 11.32.8 Wetlands inside the Recorded Forest Area (or Green Wash) in Chandigarh (in ha)

Wetland Category	No. of Wetlands	Total Wetland Area
Inland Wetlands - Natural		
Lake/Pond	1	12
River/Stream	3	48
Sub - Total	4	60
Wetlands (<2.25 ha)	0	0
Total	4	60
Total Recorded Forest (or Green Wash) Area (in ha)		985
% of Wetland area inside Recorded Forest (or Green Wash) Area		6.09%

(analysis based on the National Wetland Atlas: India, 2011)

11.32.3 Forest Types & Biodiversity

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

TABLE 11.32.9 Percentage area under different forest types of Chandigarh

Sl.No.	Forest Type	% of Forest cover
1.	5B/C2 Northern Dry Mixed Deciduous Forest	48.33
2.	5B/DS1 Dry Deciduous Scrub	0.09
3.	Plantation/ TOF	51.58
	Total	100.00

11.32.3.1 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 11.32.10 and table 11.32.11 in respect of Chandigarh.

TABLE 11.32.10 No. of species observed during the rapid assessment

Plant Type	Number of Species
Tree	21
Shrub	4
Herb	7

TABLE 11.32.11 Shannon-Wiener Index of Tree, Shrub and Herb species in different Type Groups of Chandigarh

Sl.No.	Forest Type Group	Shannon-Wiener Index		
		Tree	Shrub	Herb
1.	Group 5- Tropical Dry Deciduous Forests	1.60	1.23	1.56

11.32.4 Fire Prone Forest Areas

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

TABLE 11.32.12 Forest Fire Prone Classes (in sq km)

Sl. No.	Forest Fire Prone Classes	Geographical Area	% of Total forest cover
1.	Extremely fire prone	0	0
2.	Very highly fire prone	0	0
3.	Highly fire prone	0	0
4.	Moderately fire prone	0	0
5.	Less fire prone	112.88	100.00
	Total	112.88	100.00

11.32.5 Tree Cover

Forest cover presented in the section 11.32.2 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 Chandigarh has been estimated as in table 11.32.13.

TABLE 11.32.13 Tree Cover in Chandigarh (in sq km)

Tree Cover	Area
	25

Tree cover of Chandigarh has increased by 15 sq km as compared to the previous assessment reported in ISFR 2017.

11.32.6 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 11.32.14 Extent of TOF in Chandigarh (in sq km)

Forest Cover outside the RFA/GW	Tree Cover	Extent of TOF
13.76	25	38.76

11.32.7 Growing Stock in Forest

Growing stock in the recorded forest areas (RFA) in Chandigarh is given in the table 11.32.15. Diameter class-wise distribution of top 5 species in numbers derived from the forest inventory data is presented in the table 11.32.16

TABLE 11.32.15 Growing Stock in Chandigarh (in m cum)

Growing Stock (GS)		% of Country's GS
Growing Stock in Recorded Forest Area	0.29	0.01
Growing Stock in TOF	0.50	0.03

TABLE 11.32.16 Diameter class distribution of top five species inside RFA in Chandigarh (in '000)

Sl.No.	Species	Dia class (cm)		
		10-30	30-60	>60
1.	<i>Dalbergia sissoo</i>	123	18	0
2.	<i>Leucaena leucocephala</i>	263	15	0
3.	<i>Acacia catechu</i>	319	7	0
4.	<i>Melia azadirachta</i>	81	14	0
5.	<i>Populus species</i>	19	9	0

11.32.8 Carbon Stock in Forest

The total Carbon stock of forests in UT including the TOF patches which are more than 1 ha in size is 0.19 million tonnes (0.70 million tonnes of CO₂ equivalent) which is 0.0027% of total forest carbon of the country. Pool wise forest carbon in Chandigarh is given in the following table

TABLE 11.32.17 Forest Carbon in Chandigarh in different pools (in '000 tonnes)

AGB	BGB	Dead wood	Litter	SOC	Total
57	18	0.46	3	111	189

11.32.9 Dominant tree species in Trees Outside Forests (TOF)

Top five species in numbers in Trees Outside Forests in Chandigarh in Rural and Urban areas are given in the table 11.32.18 and table 11.32.19 respectively

TABLE 11.32.18 Top five tree species in TOF (Rural) in Chandigarh

Sl. No.	Species	Relative Abundance (%)
1.	<i>Eucalyptus species</i>	51.04
2.	<i>Dalbergia sissoo</i>	7.47
3.	<i>Morus species</i>	7.37
4.	<i>Acacia arabica</i>	6.34
5.	<i>Leucaena leucocephala</i>	5.02

TABLE 11.32.19 Top five tree species in TOF (Urban) in Chandigarh

Sl. No.	Species	Relative Abundance (%)
1.	<i>Mangifera indica</i>	13.17
2.	<i>Morus species</i>	8.03
3.	<i>Polyalthia longifolia</i>	7.46
4.	<i>Terminalia arjuna</i>	6.13
5.	<i>Cassia fistula</i>	5.67

11.32.10 Major NTFP and Invasive Species

Major NTFP and invasive species as assessed from forest inventory data are presented in the table 11.32.20 and table 11.32.21 respectively.

TABLE 11.32.20 Major NTFP species in the UT of Chandigarh

Sl. No.	Species	Plant Type	Relative Abundance (%)
1.	<i>Morus species</i>	Tree	61.54
2.	<i>Ziziphus mauritiana</i>	Tree	15.38
3.	<i>Psidium guajava</i>	Tree	5.13
4.	<i>Cassia fistula</i>	Tree	5.13
5.	<i>Azadirachta indica</i>	Tree	5.13

TABLE 11.32.21 Major invasive species in the UT inside the RFA/Green Wash in Chandigarh (in sq km)

Sl. No.	Species	Estimated Extent
1.	<i>Lantana camara</i>	2.55
2.	<i>Parthenium hysterophorus</i>	1.56
3.	<i>Leucanea leucocephala</i>	0.30
4.	<i>Saccharum spontanem</i>	0.09

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

