



## Goa

### 9.7.1 Introduction

Goa has an area of 3,702 sq km which is 0.11% of the geographical area of the country. The state has two distinct physiographic regions, namely western ghats and coastal plains. Goa has a tropical monsoon climate. The average annual rainfall is 3,790 mm and the average annual temperature ranges between 16°C to 37°C. The state is drained by a number of rivers, which include Terekhol, Chapora, Baga, Mandovi, Zuari, Sal, Saleri, Talpona and Galgibag. The state has 2 districts none of which are hill or tribal. As per the 2011 census, Goa has a population of 1.46 million accounting to 0.91% of India's population. The urban, rural and tribal population is 62.17%, 37.83% and 10.23% respectively. The population density of the state is 394 persons per sq km. The 19<sup>th</sup> Livestock census 2012 has reported a total livestock population of 0.14 million.

Table 9.7.1 Land Use Pattern

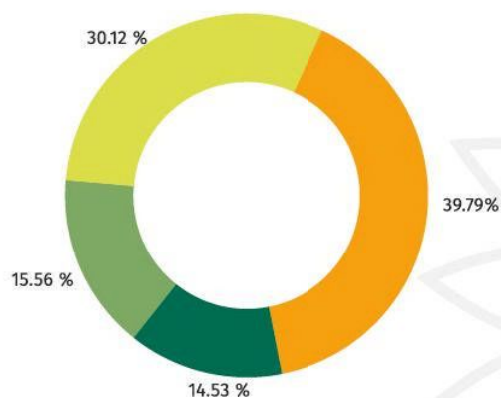
Land Use Types	Area (in 000' ha)	Percentage
Total Geographic Area	370	
Reporting area for land utilization	361	100
Forests	125	34.63
Not available for land cultivation	37	10.25
Permanent pastures and other grazing lands	1	0.28
Land under misc. tree crops and groves	1	0.28
Culturable wasteland	53	14.68
Fallow land other than current fallows	0	0.00
Current fallows	15	4.15
Net area sown	129	35.73

Source: Land Use Statistics, Ministry of Agriculture, GOI, 2013-14.

### 9.7.2

#### Forest Cover

Based on interpretation of satellite data pertaining to Oct - Dec 2015, the forest cover in the State is 2,229 sq km, which is 60.21% of the State's geographical area. In terms of forest canopy density classes, the state has 538 sq km under very dense forest, 576 sq km under moderately dense forest and 1,115 sq km under open forest.



### Forest cover of Goa

Pie Chart showing forest cover of Goa



#### 9.7.3

### Forest Cover within and outside Recorded Forest Area

The recorded forest area of the state is 1,225 sq km which constitutes 33.09% of its geographical area. The Reserved and Unclassed Forests are 20.65% and 79.35% respectively of the recorded forest area. However, as the digitized boundary of recorded forest area from the State covers 1,309 sq km, the analysis of forest cover within and outside this area is depicted below.

Table 9.7.2 Forest Cover within and outside Recorded Forest Area

Forest Cover within Recorded Forest Area (Area in sq km)	
Very Dense Forest (VDF)	500
Moderately Dense Forest (MDF)	316
Open Forest (OF)	357
<b>Total</b>	<b>1,173</b>
Forest Cover outside Recorded Forest Area	
Very Dense Forest	38
Moderately Dense Forest	260
Open Forest	758
<b>Total</b>	<b>1,056</b>
<b>Total Forest Cover</b>	<b>2,229</b>
Tree Cover	323
<b>Total Forest &amp; Tree Cover</b>	<b>2,552</b>
Of State's Geographical Area	68.94%
Of India's Forest & Tree Cover	0.32%
Per capita Forest & Tree Cover	0.17 ha

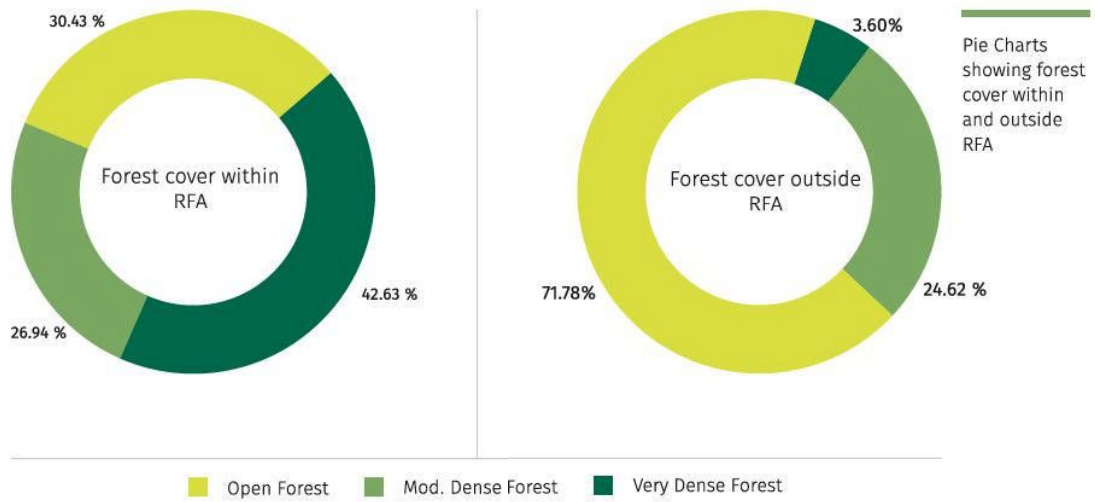


Table 9.7.3 Altitude-wise Forest Cover (Area in sq km)

Altitude Zone (m)	Geographical Area	VDF	MDF	OF	Total
0-500	3,549	442	556	1,088	2,085
500-1000	153	96	20	27	144
<b>Total</b>	<b>3,702</b>	<b>538</b>	<b>576</b>	<b>1,115</b>	<b>2,229</b>

(Based on SRTM, Digital Elevation Model)

Table 9.7.4 Forest Cover in different Patch Size Classes

S.No.	Patch Size Range (sq km)	No. of Patches	Area(sq km)	%age
1.	≥ 0.01 ≤ 1.0	2,045	186	8.34
2.	> 1.0 ≤ 10	52	113	5.07
3.	> 10 ≤ 100	13	210	9.42
4.	> 100 ≤ 500	0	0	0.00
5.	> 500 ≤ 1000	0	0	0.00
6.	> 1000 ≤ 5000	1	1,720	77.17
	<b>Total</b>	<b>2,111</b>	<b>2,229</b>	<b>100</b>

Table 9.7.5 Growing Stock

	Growing Stock	% Contribution to country
Growing Stock in Recorded Forest Area	9.516 m cum	0.23
Growing Stock in TOF	3.832 m cum	0.24
Potential Production of industrial wood from TOF	0.15 m cum	0.20
Bamboo bearing area within forest area of the state	382 sq km	0.24
Total number of culms	26 millions	0.09
Total green weight equivalent of culms	148 (000' tonnes)	0.08

#### 9.7.4

### Carbon Stock in forest

The total Carbon stock of forests in the State is 19,016 million tonnes (69,725 million tonnes of CO<sub>2</sub> equivalent) which is 0.27 % of total forest carbon of the country.

#### 9.7.5

### Decadal Change in water bodies within Forest

An increase of 8 sq km has been observed in the water body coverage within forest compared to 2005. The graphical and tabular comparison is depicted below.

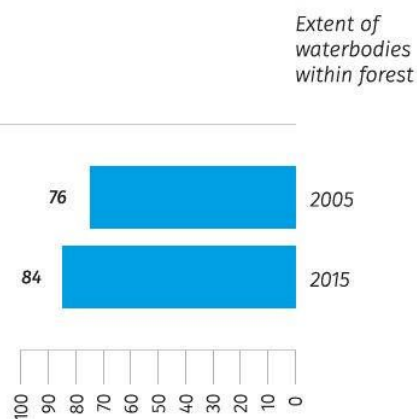


Table 9.7.6 Water bodies within Forest for the years 2005 and 2015

Area/Coverage	2005	2015
Extent of water bodies (sq km) within Forest	76	84
% of water bodies to Forest Cover	3.53	3.77

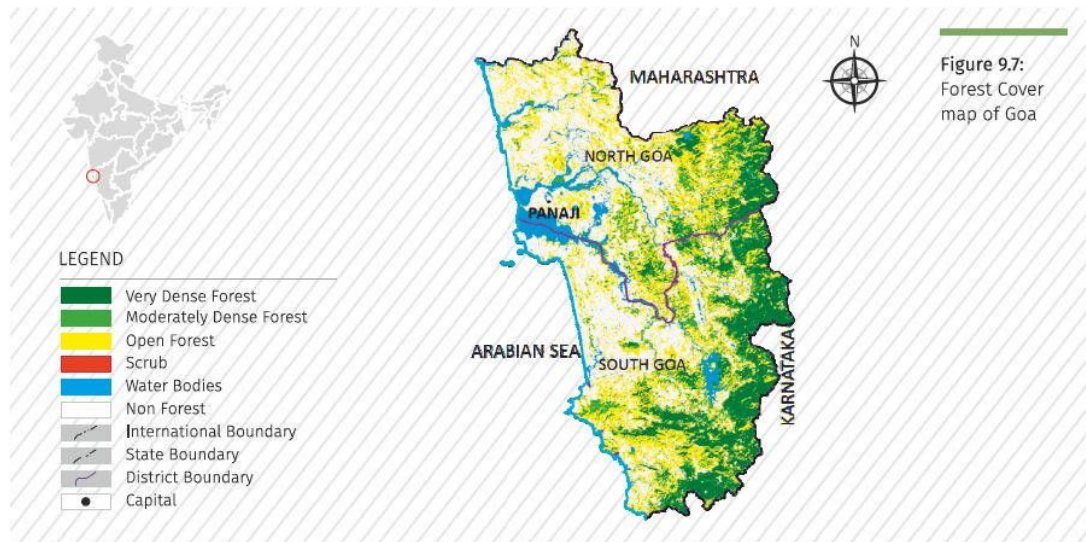


Figure 9.7:  
Forest Cover  
map of Goa

Table 9.7.7 District- wise Forest Cover

(area in sq km)

District	Geographical Area	2017 Assessment			Total	% of GA	Change *	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest				
North Goa	1,736	127	231	569	927	53.40	7	0
South Goa	1,966	411	345	546	1,302	66.23	12	0
<b>TOTAL</b>	<b>3,702</b>	<b>538</b>	<b>576</b>	<b>1,115</b>	<b>2,229</b>	<b>60.21</b>	<b>19</b>	<b>0</b>

\*Change compared to updated 2015 assessment.

Table 9.7.8 Forest Cover Change Matrix

(area in sq km)

Class	2017 Assessment					Total ISFR 2015 updated
	VDF	MDF	OF	Scrub	NF	
Very Dense Forest	536	0	0	0	0	536
Moderately Dense Forest	2	574	2	0	2	580
Open Forest	0	1	1,067	0	26	1,094
Scrub	0	0	0	0	0	0
Non Forest	0	1	46	0	1445	1,492
<b>Total ISFR 2017</b>	<b>538</b>	<b>576</b>	<b>1,115</b>	<b>0</b>	<b>1,473</b>	<b>3,702</b>
Net Change	2	-4	21	0	-19	

### 9.7.6

#### Reasons for change detected in 2017 assessment

An increase of 19 sq km in forest cover has been observed in the State mostly due to expansion of tree cover outside Recorded Forest Areas. However, forest cover within the Recorded Forest Area has decreased by 9 sq km due to mining and other developmental activities.