

9.7 GOA

9.7.1 Introduction

Goa, the popular tourist destination of the country, is located on the west coast nestled between Maharashtra and Karnataka. It lies between latitude 14°53' N - 15°40' N and between longitude 73°40' E- 74°21' E. It is a tiny state with a geographical area of 3,702 km² constituting 0.11% of total area of the country. The state falls under two physiographic zones, i.e. Western Ghats and Coastal Plains. The mean temperature in the

state varies from 16.2°C to 36.7°C. The average annual rainfall is 3,790 mm.

The population of the state is 1.46 million (*Census 2011*) which constitutes 0.12% of the country's population. Of this, rural population is 37.83% and urban 62.17%. The population density is 394 persons per km². The livestock population is 0.18 million (*Livestock Census 2007*).

Land use pattern of the state is given in Table 9.7.1.

Table 9.7.1: Land Use Pattern

Land Use	Area in '000 ha	Percentage
Total geographical area	370	
Reporting area for land utilization	361	100.00
Forests	125	34.63
Not available for 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 lands other than current fallows	0	0.00
Current fallows	9	2.49
Net area sown	135	37.40

Source: Land Use Statistics, Ministry of Agriculture, GOI, 2008-09.

9.7.2 Recorded Forest Area

The recorded forest area in the state is 1,224 km² which is 33.06% of its geographical area. Of this, the Reserved Forests constitute 20.67%, Protected Forests 69.04% and Unclassed Forests 10.29% of the total forest area.

9.7.3 Protected Areas

The state has one National Park (Mollem) and 6 Wildlife Sanctuaries covering an area of 107 km² and 648 km² respectively. A total of 755 km² area constituting 61.68% of the Recorded Forest Area and 20.4% of the geographical area of the state is under protected area network.

(Source: WII Dehradun).

9.7.4 Forest Cover

The forest cover in the state, based on interpretation of satellite data of February 2009, is 2,219 km² which is 59.94% of the state's geographical area. In terms of forest canopy density classes, the state has 543 km² area

under very dense forests, 585 km² area under moderately dense forests and 1,091 km² area under open forests. The density class-wise distribution of the forest cover is shown in Fig.9.7. Proportion of different forest density classes is depicted in the pie diagram in percentage terms.

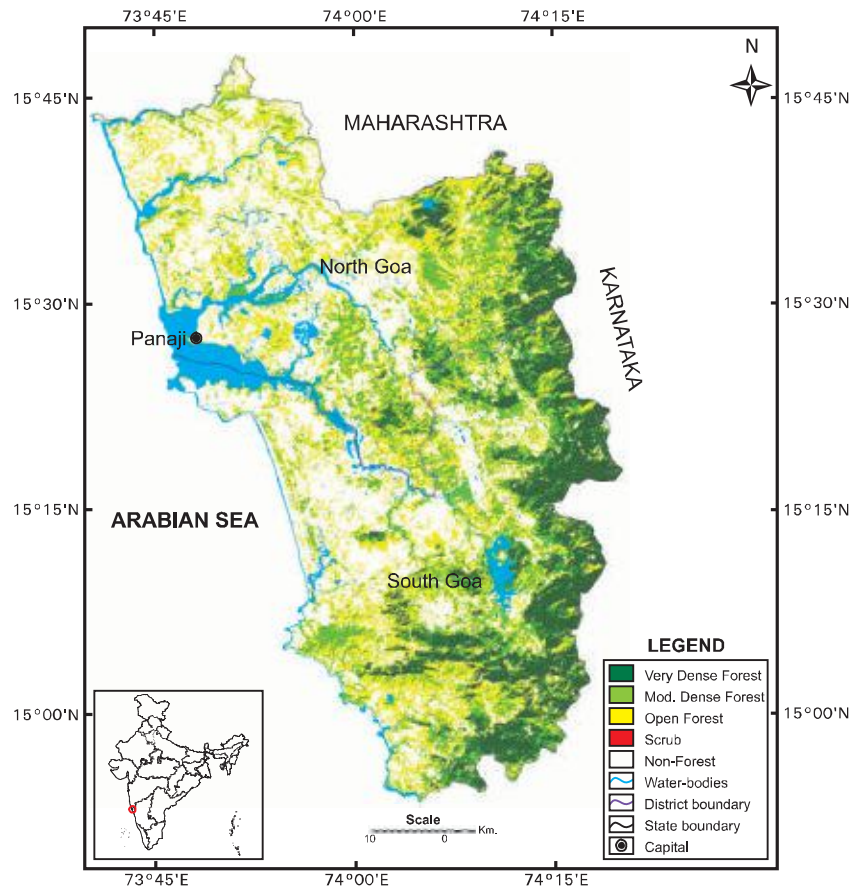
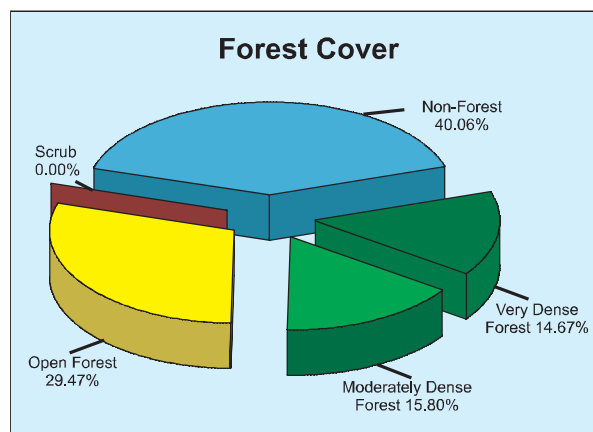


Fig 9.7 Forest cover map of Goa



District-wise forest cover in different canopy density classes, scrub and change in forest

cover in comparison to 2009 assessment are given in Table 9.7.2.

Table 9.7.2: District-wise Forest Cover (Area in km²)

District	Geographical Area	2011 Assessment				Percent of GA	Change*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
North Goa	1,736	128	236	559	923	53.17	3	0
South Goa	1,966	415	349	532	1,296	65.92	4	0
Grand Total	3,702	543	585	1,091	2,219	59.94	7	0

* Change figures are based on comparison of 2011 assessment with that of 2009 after incorporating interpretational changes

9.7.5 Forest Cover Change

On the basis of interpretation of satellite data and ground truthing done by the officials of FSI and the information gathered from State Forest Department, there is an increase of 7

km² in the moderate dense forest due to increase in mangrove forest and TOF from the reported area in ISFR 2009 in the districts of North Goa and South Goa. A quantitative account of the class-wise change is given in the forest cover change matrix in Table 9.7.3.

Table 9.7.3: Forest Cover Change Matrix (Area in km²)

2009 Assessment	2011 Assessment					Total 2009
	VDF	MDF	OF	Scrub	NF	
Very Dense Forest	543	0	0	0	0	543
Moderately Dense Forest	0	578	0	0	0	578
Open Forest	0	0	1091	0	0	1091
Scrub	0	0	0	0	0	0
Non-Forest	0	7	0	0	1483	1490
Total 2011	543	585	1091	0	1483	3702
Net Change	0	7	0	0	-7	

9.7.6 Altitude Zone-wise Forest Cover

Forest cover of the state in different altitude zones is given in Table 9.7.4.

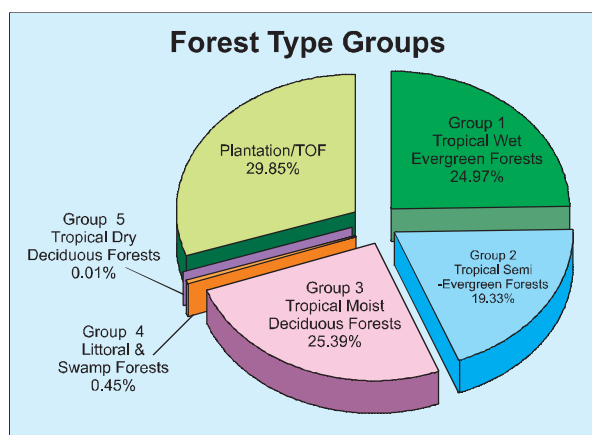
Table 9.7.4: Altitude Zone-wise Forest Cover (Area in km²)

Altitude Zone	VDF	MDF	OF	Total
0-500m	444	561	1,058	2,063
500-1000m	99	24	33	156
Total	543	585	1,091	2,219

(Based on SRTM, Digital Elevation Model)

9.7.7 Forest Cover in Different Forest Types

Forest type mapping using satellite data was carried out by Forest Survey of India with reference to the Champion & Seth Classification. As per this assessment, the state has 5 forest types which belong to five forest type groups, viz. Tropical Wet Evergreen, Tropical Semi Evergreen, Tropical Moist Deciduous, Littoral & Swamp and Tropical Dry Deciduous Forests. Distribution of forest cover in different forest type groups found in the state is given in the pie diagram.



9.7.8 Tree Cover

Tree cover of the state has been estimated using TOF inventory collected over a period of six years i.e. 2004-10. The estimated tree

cover in the state is 286 km² which is 7.73% of the geographical area of the state. North Goa district of the state has been inventoried. The forest and tree cover of the state is presented in Table 9.7.5.

Table 9.7.5: Forest and Tree Cover (Area in km²)

Category	Area	% of Geographical Area
Tree Cover	286	7.73
Forest Cover	2,219	59.94
Forest & Tree Cover	2505	67.67

9.7.9 Growing Stock

The growing stock in the recorded forest area has been estimated on the basis of current forest cover map, forest type map and forest

inventory data. For trees outside forests (TOF) the same has been estimated using TOF inventory data. It is presented in the Table 9.7.6.

Table 9.7.6: Growing Stock (million cum)

Forest	TOF	Total
7.716	3.895	11.611

9.7.10 Bamboo

The extent of bamboo bearing area in the forests of the state is 308 km². Density-wise

details, number of culms by soundness and equivalent green weight by soundness are given in the following tables:

Table 9.7.7: Bamboo bearing area by density in recorded forest area (Area in km²)

Recorded Forest Area	Pure bamboo	Dense bamboo	Scattered bamboo	Clumps hacked	Bamboo regeneration	No bamboo
1,224	0	40	212	12	44	916

Table 9.7.8: Estimated number of bamboo culms and equivalent green weight

Number of culms (in millions)				Equivalent Green Weight (in 000' tonnes)		
Green	Dry	Decayed	Total	Green	Dry	Total
10	4	0	14	50	31	81