

## 9.24 SIKKIM

## 9.24.1 Introduction

The state of Sikkim lies in north-east of India bordering the state of West Bengal on its south. The area of the state is 7,096 km<sup>2</sup> which constitutes 0.22% of country's geographical area. The state lies between latitude 27°04' to 28°07' N and longitude 88°00' to 88°55' E and in physiographic zone of Eastern Himalayas. The climate ranges from subtropical to high alpine. Kanchenjunga, the world's third-highest peak, is located on the border of Sikkim with Nepal. Annual rainfall varies from 2,700 mm to 3,200 mm. The temperature

in the state ranges from sub-zero during winter to 28°C during summer.

As per *Census 2011*, the population of the state is 0.61 million which constitutes 0.05% of the country's population. The rural population constitutes 75.03% and urban population 24.97%. The population density is 86 persons per km<sup>2</sup>. The livestock population of the state is 0.27 million (*Livestock Census 2007*).

Land use pattern in the state is given in Table 9.24.1.

Table 9.24.1: Land Use Pattern

Land Use	Area in '000 ha	Percentage
Total geographical area	710	
Reporting area for land utilization	723	100.00
Forests	319	44.14
Not available for land cultivation	250	34.60
Permanent pastures and other grazing lands	4	0.55
Land under misc. tree crops and groves	5	0.69
Culturable wasteland	2	0.28
Fallow land other than current fallows	30	4.15
Current fallows	5	0.69
Net area sown	107	14.90

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

## 9.24.2 Recorded Forest Area

The recorded forest area of the state is 5,841 km<sup>2</sup> which constitutes 82.31% of state's geographical area. Reserved Forests constitute 93.34% and Protected Forests 6.66%.

## 9.24.3 Protected Areas

Sikkim has one National Park and seven Wildlife Sanctuaries covering an area of 2179.1 km<sup>2</sup> which constitutes 30.70% of the state's geographical area. The state is rich in orchids and has more than 400 species of the same. Over 600 species of butterflies are

found at various altitudes in the state. The area is home to snow leopard. Other fauna of Sikkim include leopard, red panda,

Himalayan black bear, musk deer and flying squirrel.

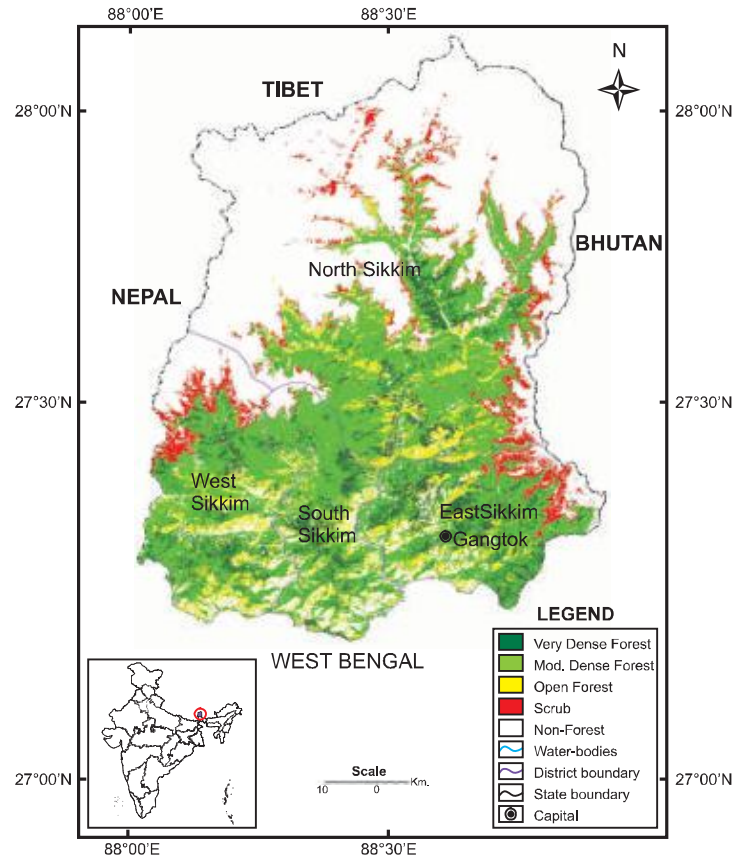
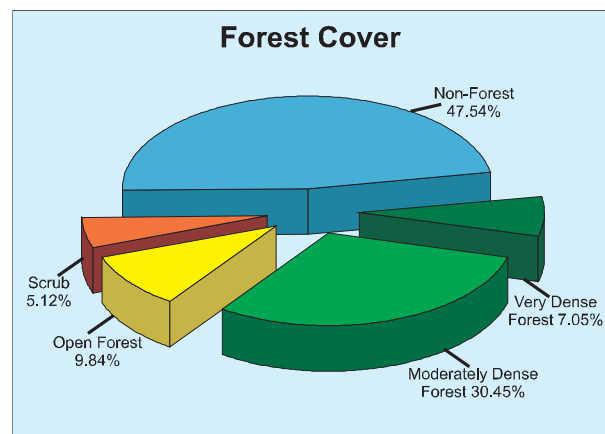


Fig 9.24 Forest cover map of Sikkim

#### 9.24.4 Forest Cover

The forest cover in the state, based on interpretation of satellite data of December 2008, is 3,359 km<sup>2</sup> which is 47.34% of the state's geographical area. In terms of forest canopy density classes, the state has 500 km<sup>2</sup> area under very dense forests, 2,161 km<sup>2</sup> area under moderately dense forests and 698 km<sup>2</sup> area under open forests. The forest cover of the state is shown in Fig. 9.24.



District-wise forest cover in different canopy density classes and scrub are given in Table 9.24.2.

**Table 9.24.2: District-wise Forest Cover** (Area in km<sup>2</sup>)

District	Geographical Area	2011 Assessment				Percent of GA	Change*	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
East Sikkim <sup>TH</sup>	954	162	411	126	699	73.27	0	71
North Sikkim <sup>TH</sup>	4,226	135	890	292	1,317	31.16	0	208
South Sikkim <sup>TH</sup>	750	93	371	107	571	76.13	0	3
West Sikkim <sup>TH</sup>	1,166	110	489	173	772	66.21	0	81
<b>Grand Total</b>	<b>7,096</b>	<b>500</b>	<b>2,161</b>	<b>698</b>	<b>3,359</b>	<b>47.34</b>	<b>0</b>	<b>363</b>

\* Change figures are based on comparison of 2011 Assessment with that of 2009 after incorporating interpretational changes therein.

**Table 9.24.3: Forest Cover Change Matrix** (Area in km<sup>2</sup>)

2009 Assessment	2011 Assessment					Total 2009
	VDF	MDF	OF	Scrub	NF	
Very Dense Forest	500	0	0	0	0	<b>500</b>
Moderately Dense Forest	0	2,161	0	0	0	<b>2,161</b>
Open Forest	0	0	698	0	0	<b>698</b>
Scrub	0	0	0	356	0	<b>356</b>
Non-Forest	0	0	0	7	3,374	<b>3,381</b>
<b>Total 2011</b>	<b>500</b>	<b>2,161</b>	<b>698</b>	<b>363</b>	<b>3,374</b>	<b>7,096</b>
Net Change	0	0	0	7	-7	

### 9.24.5 Altitude Zone-wise Forest Cover

Forest cover of the state in different altitude zones is given in Table 9.24.4

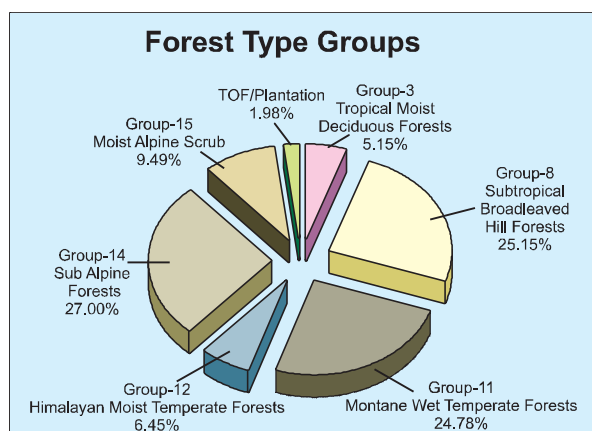
**Table 9.24.4: Altitude Zone-wise Forest Cover** (Area in km<sup>2</sup>)

Altitude Zone	VDF	MDF	OF	Total
0-500m	2	17	16	35
500-1000m	17	133	84	234
1000-2000m	207	559	350	1,116
2000-3000m	207	759	134	1,100
>3000m	67	693	114	874
<b>Total</b>	<b>500</b>	<b>2,161</b>	<b>698</b>	<b>3,359</b>

(Based on SRTM, Digital Elevation Model)

### 9.24.6 Forest Cover in Different Forest Types

Forest type mapping using satellite data has been undertaken by Forest Survey of India with reference to Champion & Seth Classification. As per this assessment, the state has 10 forest types which belong to six forest type groups, viz. Tropical Moist Deciduous, Subtropical Broadleaved Hill, Montane Wet Temperate, Himalayan Moist Temperate, Sub Alpine Forests and Moist Alpine Scrub. Distribution of forest cover in different forest type groups found in the state is given in the pie diagram.



### 9.24.7 Tree Cover

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

estimated tree cover in the state is 25km<sup>2</sup> which is 0.35% of its geographical area. Two districts, namely, East and North Sikkim were inventoried. The forest and tree cover of the state is presented in Table 9.24.5.

**Table 9.24.5: Forest and Tree Cover** (Area in km<sup>2</sup>)

Category	Area	% of Geographical Area
Tree Cover	25	0.35
Forest Cover	3,359	47.34
<b>Forest and Tree Cover</b>	<b>3384</b>	<b>47.69</b>

### 9.24.8 Growing Stock

The growing stock in the recorded forest area has been estimated on the basis of the 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 9.24.6.

**Table 9.24.6: Growing Stock** (million cum)

Forest	TOF	Total
18.832	2.017	20.849

### 9.24.9 Bamboo

The extent of bamboo bearing area in the forests of the state is 1,181 km<sup>2</sup>. Density-wise

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

**Table 9.24.7: Bamboo bearing area by density in recorded forest area (Area in km<sup>2</sup>)**

Recorded Forest Area	Pure bamboo	Dense bamboo	Scattered bamboo	Clumps hacked	Bamboo regeneration	No bamboo
5,841	0	481	684	8	8	4,660

**Table 9.24.8: 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
206	17	5	228	772	115	887