



# 10

## Chapter

### People & Forests

**Dependence of people in forest fringe villages on forests for fuelwood, fodder, small timber and bamboo**

#### 10.1 INTRODUCTION

In India, the rural population is about 68% of the country's total population<sup>1</sup> and a significant part of it is dependent on the forests for meeting the needs of fuelwood, fodder, small timber, bamboo and NTFPs. The livestock population in the country is one of the largest in the world. As per the Census 2011, there are about 6,50,000 villages in the country, out of which nearly 1,70,000 villages are located in the proximity of forest areas, they are often termed Forest Fringe Villages<sup>2</sup> (FFVs). Forests play an important role in the socio-economic and cultural lives of the people inhabiting these villages. They have been dependant on the forests for fuel wood, fodder, timber and bamboo since ages but with the manifold increase in their population in the last 60 to 70 years, pressure on forests has also increased in the likewise manner. Most of these removals from forests, which take place in a

<sup>1</sup> Census of India (2011), Office of Registrar General and Census Commissioner of India, Ministry of Home Affairs, Govt. of India

<sup>2</sup> State of Forest Report (1999), Forest Survey of India

gradual and continuous manner remain unrecorded. Thus, possibly a major driver of impairment of forest productivity remains unassessed and does not get adequate attention of policy makers and forest managers due to lack of data. Also, the information on socio-economic and ecological impact of such removals of forest produce on forests is scant. Under the circumstances, need for a study was felt to assess the dependence of communities inhabiting the forest fringe villages in quantified terms. It has been more than eight years since a study on production and consumption of forest resources in India was conducted by Forest Survey of India (FSI, 2011). The study revealed that the dependence of communities for fuelwood and fodder which is available to them free of cost from the forests is high. Moreover, it was done for the whole country including all the villages and therefore it did not reflect dependence of the people in forest fringe villages only. Therefore, a study to assess the dependence of the people living in proximity to forests on produce such as fuelwood, fodder, small timber and bamboo was undertaken by FSI during Sept 2018 to June 2019 to understand the removals in quantified terms and provide the information for policy, planning and management purposes. The study has been done using a statistical design considering forest fringe villages as the first stage sample unit and households in the sample villages as the second stage sampling units. The methodology in detail is described in the following sections.

## 10.2 OBJECTIVE

The main objective of the study is to estimate the dependence of people living in forest fringe villages on the nearby forests in terms of the removal of

- ◆ quantity of fuel wood
- ◆ quantity of fodder
- ◆ quantity of small timber
- ◆ quantity of bamboo

## 10.3 POPULATION UNDER STUDY

The scope of this study encompasses assessment of the dependence of people in FFVs on forests for fuelwood, fodder, small timber and bamboo all over the country. FFVs in this study have been defined as those villages which fall within five kilometres from the periphery of Recorded Forest Areas (RFA) or Green wash area where boundaries of RFAs are not available in digital form. Vector layer of boundaries of RFA/Green wash area in GIS has been used to select the FFVs. Since the dependence of the FFVs may vary with the distance from RFA boundary, therefore it has been decided to distribute the FFVs into four strata (buffers) as follows:

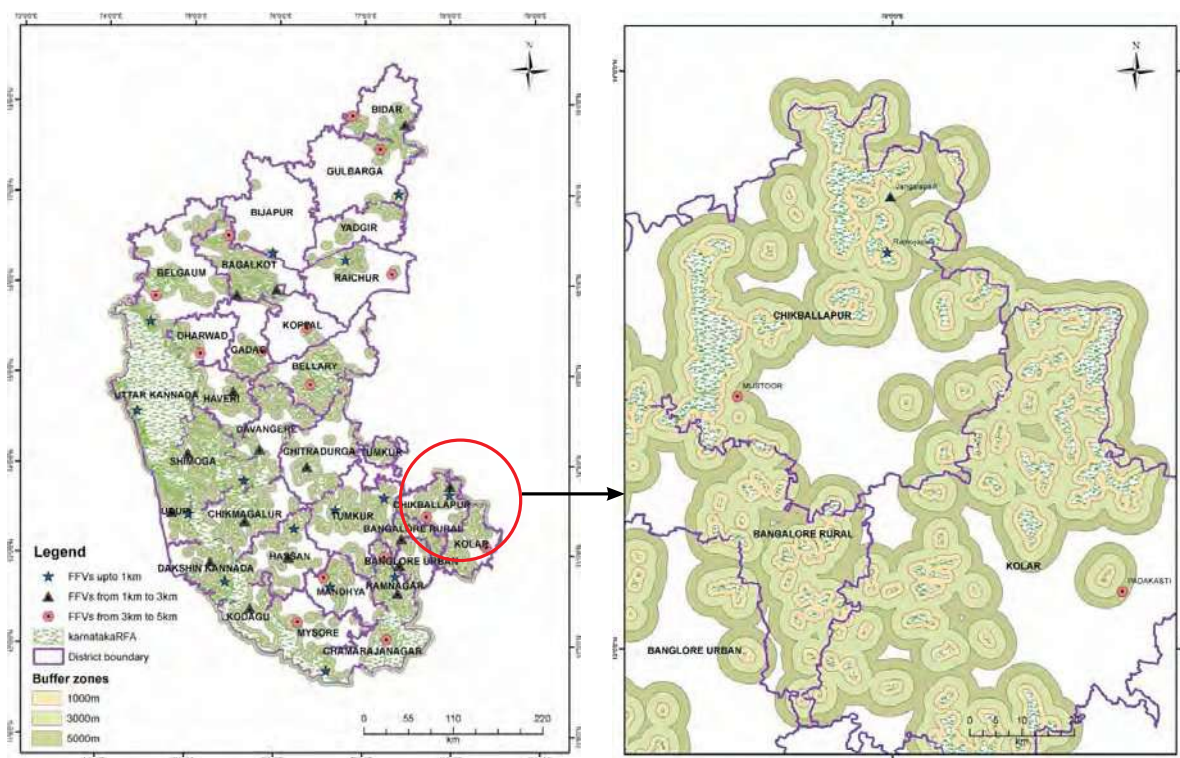
- a) Villages inside the forests (Stratum 0)
- b) Villages within one km (Stratum 1)
- c) Villages between one to three km (Stratum 2)
- d) Villages between three to five km (Stratum 3)

Vector coverage of village boundaries of all the States in the country was procured from the Survey of India (SOI). The coverage provided by SOI did not have village boundaries of a few states of North Eastern India viz Meghalaya, Arunachal Pradesh and Nagaland. For these States, point locations of the villages were digitized from the SOI toposheets and buffers around these locations were used as proxy for the village boundary. Socio economic data of the villages was collected from the Census Report (2011). The following figure illustrates selection of villages (FFVs) in different strata:



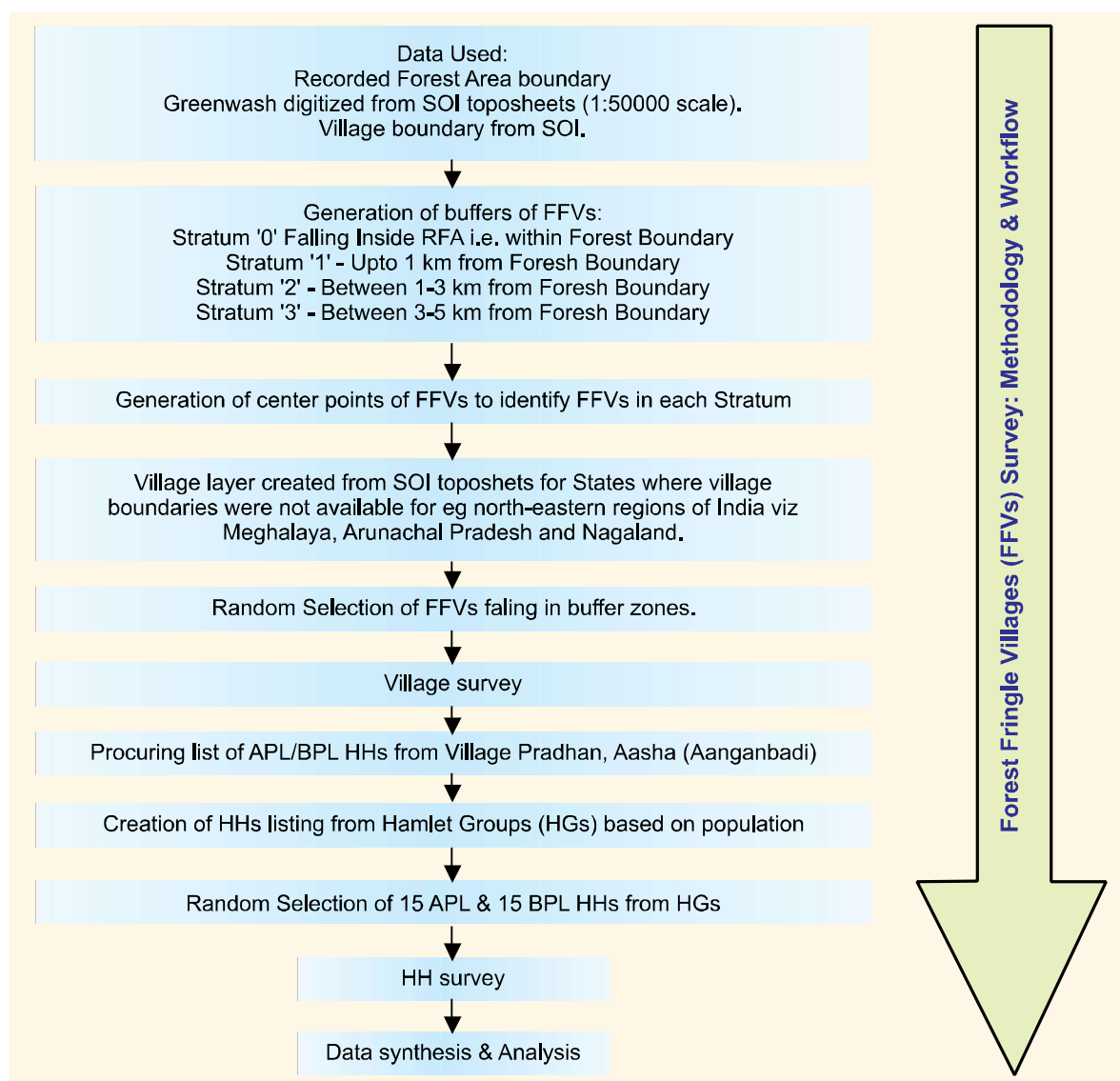
**FIGURE 10.1** Selection of FFVs using buffers

Selection of FFVs – an example from Chikballapur district of Karnataka (zoomed view)



## 10.4 SURVEY DESIGN & METHODOLOGY

A two stage stratified random sampling approach has been followed for the survey. The country has been stratified into 24 strata on the basis of large States or group of States/UTs. Within each stratum (State), a minimum of 40 villages were selected randomly in a stratified manner using three GIS layers at distances of 1 km, 3 kms and 5 kms from RFA/Green wash boundary, the villages were distributed equally in the four buffers. Within each selected village, 30 households including 15 households from above poverty line (APL) and 15 households from the below poverty line (BPL) have been selected randomly. Data from each selected household in the sample from a village was collected using pre designed forms. These selected households form the second stage sampling units. APL and BPL households identified through the list provided by the local administrative authorities or MNREGA website have been referred for observing their status as per the norms of Government of India. Any shortfall in one category has been compensated from another category. Further, in the villages with larger population, suitable number of hamlets-groups (HGs) based on population, have been identified in terms of physical landmarks and out of two randomly selected HGs, thirty households were selected. The following schematic diagram presents steps and work flow of the study.

**FIGURE 10.2** Schematic diagram presents steps and work flow of the study

The number of villages sampled in each State and UT are given in the following table.

**TABLE 10.1** State/UT wise number of villages selected for the study

S.No.	State/UTs	Stratum 0	Stratum 1	Stratum 2	Stratum 3	Total
1.	Andhra Pradesh	2	14	14	13	43
2.	Arunachal Pradesh	-	29	14	-	43
3.	Assam	-	15	13	12	40
4.	Bihar	-	12	14	14	40
5.	Chhattisgarh	5	20	20	20	65
6.	Goa	-	3	4	1	8
7.	Gujarat	5	21	18	18	62
8.	Haryana	-	12	12	16	40
9.	Himachal Pradesh	2	15	14	14	45
10.	Jammu & Kashmir	-	1	5	3	9
11.	Jharkhand	-	12	16	12	40

S.No.	State/UTs	Stratum 0	Stratum 1	Stratum 2	Stratum 3	Total
12.	Karnataka	1	15	16	15	47
13.	Kerala	-	13	14	13	40
14.	Madhya Pradesh	5	30	23	22	80
15.	Maharashtra	5	22	22	18	67
16.	Manipur	-	3	3	3	9
17.	Meghalaya	-	7	2	3	12
18.	Mizoram	-	11	1	-	12
19.	Nagaland	-	5	4	6	15
20.	Odisha	-	23	19	20	62
21.	Punjab	2	14	13	13	42
22.	Rajasthan	2	13	11	16	42
23.	Sikkim	-	10	2	-	12
24.	Tamilnadu	4	14	12	13	43
25.	Telangana	-	13	14	11	38
26.	Tripura	-	5	5	3	13
27.	Uttar Pradesh	-	14	13	15	42
28.	Uttarakhand	4	22	11	8	45
29.	West Bengal	-	17	11	12	40
30.	A & N Islands	-	11	-	-	11
31.	Dadra & Nagar Haveli	-	1	1	1	3
<b>Total</b>		<b>37</b>	<b>417</b>	<b>341</b>	<b>315</b>	<b>1110</b>

## 10.5 DATA ENTRY AND PROCESSING MODULE

A Data Entry and Processing Module has been developed by FSI for generating the estimates. The structured database is maintained in Microsoft SQL Server 2014. Estimates generated from the study are based on the population of the study villages extrapolated to 2019.

## 10.6 RESULTS

Results of the study are summarised in the following sub-sections.

**FIGURE 10.3** (a) Collection of fuel wood by households



**FIGURE 10.3** (b) Collection of fodder by households



### 10.6.1 State wise quantified estimation of dependence of people living in FFVs on forests for fuel wood, fodder, small timber and bamboo

Estimates of quantities of fuelwood, fodder, small timber and bamboo collected annually by the people living in the FFVs from the nearby forests is presented in Table 10.2

**TABLE 10.2** State/UT wise quantities of fuelwood, fodder, small timber and bamboo collected annually by the people living in the FFVs from forests

S.No.	State/UTs	Fuelwood ('000 tonnes)	Fodder ('000 tonnes)	Small Timber (cum)	Bamboo ('000 tonnes)
1.	Andhra Pradesh	2,789	25,043	81,808	14.74
2.	Arunachal Pradesh	44	528	1,314	0.40
3.	Assam	1,411	11,712	32,972	14.44
4.	Bihar	821	4,338	13,766	11.34
5.	Chhattisgarh	3,608	82,771	852,164	392.49
6.	Goa	30	35	2,699	0.31
7.	Gujarat	4,983	119,054	1,192,475	291.75
8.	Haryana	500	6,840	16,471	0.04
9.	Himachal Pradesh	593	3,256	11,264	0.59
10.	Jammu & Kashmir	1,299	14,018	19,763	0.09
11.	Jharkhand	7,372	55,482	183,240	50.54
12.	Karnataka	6,323	21,501	41,098	0.40
13.	Kerala	3,390	3,472	100,259	0.85
14.	Madhya Pradesh	7,663	222,720	1,473,754	630.66
15.	Maharashtra	9,539	157,136	862,138	128.67
16.	Manipur	39	262	8,618	2.92
17.	Meghalaya	93	220	5,821	0.90
18.	Mizoram	18	23	849	0.42
19.	Nagaland	278	488	12,225	1.09
20.	Odisha	9,186	56,035	376,521	110.79
21.	Punjab	456	4,269	18,758	0.09
22.	Rajasthan	8,560	112,708	82,433	3.70
23.	Sikkim	82	440	1,320	0.07
24.	Tamilnadu	1,752	20,123	102,566	2.35
25.	Telangana	1,969	15,958	1,541	6.86
26.	Tripura	700	1,588	8,468	3.50
27.	Uttar Pradesh	5,141	59,335	159,587	109.51
28.	Uttarakhand	4,076	32,119	38,801	2.43
29.	West Bengal	2,519	21,209	134,946	45.47
30.	A & N Islands	22	83	2,506	3.74
31.	Dadra & Nagar Haveli	33	274	8,057	3.10
<b>Total</b>		<b>85,290</b>	<b>1053,039</b>	<b>5,848,204</b>	<b>1,834.25</b>

**TABLE 10.3** State/UT wise quantities of fuelwood, fodder, small timber and bamboo removed from forests by the people living in FFVs in per capita per annum

S.No.	State/UTs	Population in FFVs*	Average Removal (per capita/annum)			
			Fuelwood (tonnes)	Fodder (tonnes)	Small Timber (cum)	Bamboo (tonnes)
1.	Andhra Pradesh	16,929,522	0.165	4.350	0.005	0.005
2.	Arunachal Pradesh	87,786	0.502	7.726	0.015	0.005
3.	Assam	6,469,538	0.218	3.751	0.005	0.007
4.	Bihar	2,415,714	0.340	5.956	0.006	0.009
5.	Chhattisgarh	12,772,615	0.283	6.497	0.067	0.031
6.	Goa	83,661	0.362	6.184	0.032	0.004
7.	Gujarat	21,875,737	0.228	4.928	0.055	0.013
8.	Haryana	2,425,740	0.206	5.095	0.007	0.004
9.	Himachal Pradesh	781,340	0.759	5.831	0.014	0.006
10.	Jammu & Kashmir	3,500,415	0.371	4.998	0.006	0.0005#
11.	Jharkhand	18,843,815	0.391	7.866	0.010	0.011
12.	Karnataka	16,293,496	0.388	4.113	0.003	0.005
13.	Kerala	7,296,407	0.465	3.601	0.014	0.004
14.	Madhya Pradesh	38,766,588	0.198	6.098	0.038	0.016
15.	Maharashtra	42,319,648	0.225	5.905	0.020	0.003
16.	Manipur	430,209	0.090	3.813	0.020	0.009
17.	Meghalaya	257,954	0.362	5.142	0.023	0.007
18.	Mizoram	38,675	0.461	7.972	0.022	0.016
19.	Nagaland	334,406	0.830	7.568	0.037	0.015
20.	Odisha	19,638,249	0.468	5.823	0.019	0.010
21.	Punjab	1,295,803	0.352	4.758	0.014	0.005
22.	Rajasthan	24,710,255	0.346	4.316	0.003	0.005
23.	Sikkim	139,576	0.588	5.432	0.009	0.007
24.	Tamilnadu	16,648,215	0.105	6.564	0.006	0.004
25.	Telangana	10,559,667	0.186	7.070	0.0001	0.006
26.	Tripura	980,226	0.714	6.590	0.009	0.005
27.	Uttar Pradesh	22,720,296	0.226	5.156	0.007	0.008
28.	Uttarakhand	6,189,670	0.659	5.922	0.006	0.015
29.	West Bengal	11,559,614	0.218	4.557	0.012	0.008
30.	A & N Islands	82,789	0.266	4.111	0.030	0.074
31.	Dadra & Nagar Haveli	108,638	0.299	5.139	0.074	0.029

\* Population in FFVs has been projected for the year 2019.

# Adequate data was not available

Based on the estimates in respect of fuelwood, fodder, small timber and bamboo presented in Table 10.2 and 10.3, analysis in respect of each of the above forest produced is briefly presented below.

### 10.6.2 Fuelwood

In terms of total removal of fuelwood by the people living in FFVs, the highest quantity of removal of fuelwood is estimated for Maharashtra followed by Odisha and Rajasthan.

In terms of average removal of fuelwood per capita in a year, the highest dependance is observed in Nagaland followed by Himachal Pradesh and Tripura.



A comparative analysis using the estimates of FSI's study conducted in 2011 (ISFR 2011) shows that the fuelwood consumption in terms of per capita per year at the national level has reduced from 294.28 kg/capita/year in 2011 to 278.21 kg/capita/year in 2019 which is a reduction of 5.46%. It is possible that Govt. schemes of promoting alternative fuels like LPG under Ujjawala scheme and non renewable energy have been effective in reducing fuelwood removal from forests to some extent.

### 10.6.3 Fodder

The quantity of removal of fodder, in terms of total removal, is estimated highest for Madhya Pradesh followed by Maharashtra and Gujarat.

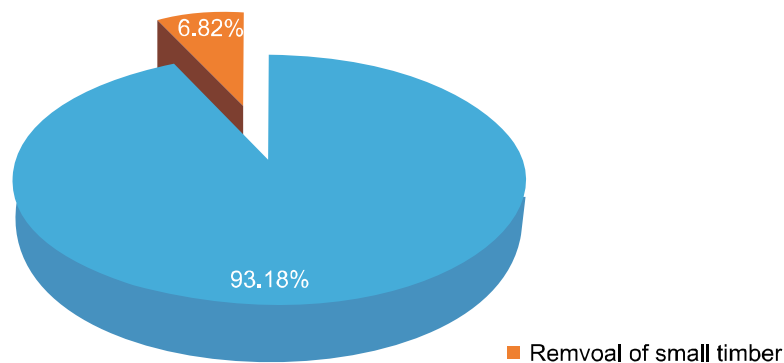
In terms of average removal of fodder per capita in a year, the highest dependence is observed in Mizoram followed by Jharkhand and Arunachal Pradesh.

### 10.6.4 Small Timber

As evident from the table above, the total removal of small timber is estimated highest for Madhya Pradesh followed by Gujarat and Maharashtra whereas, the average removal of small timber per capita in a year is observed highest in Dadra and Nagar Haveli followed by Chhattisgarh and Gujarat.

An analysis has been done to assess the removal of small timber from the recorded forests by the people living in FFVs against the average annual yield of timber at the national level. This has been done to get an indicative figure showing removal on this count as fraction of the total potential increment in the whole of the recorded forest areas in the country. For this, State wise annual yield has been estimated using the growing stock data of current assessment and average rotation age of the predominant species as given in the FSI Publication (1995)<sup>3</sup>. As per the analysis, the average annual yield at the national level is estimated 85.65 million cum, whereas, the annual removal of the small timber as given in the Table 10.2 is estimated 5.85 million cum which is 6.82% of the average annual yield at the national level. It is important to note here that the above fraction gives removal against the total yield from the whole RFAs of the country whereas, removal of small timber largely takes place from the forests close to the villages where the corresponding fraction would be several times higher.

**FIGURE 10.4** Annual removal of small timber by people in FFVs against the average yield at the national level



<sup>3</sup> FSI (1995), Extent, Composition, Density, Growing Stock and annual increment of India's Forests, Forest Survey of India.



### 10.6.5 Bamboo

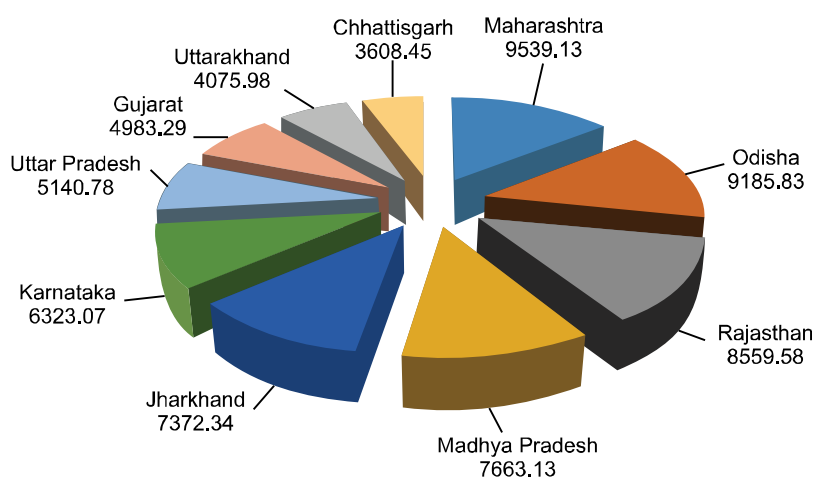
The total removal of bamboo from forest, by the people living in FFVs is estimated highest for Madhya Pradesh followed by Chhattisgarh and Gujarat.

In terms of average removal of bamboo per capita in a year, the highest dependence is observed in Andaman & Nicobar Islands followed by Chhattisgarh and Dadra & Nagar Haveli.

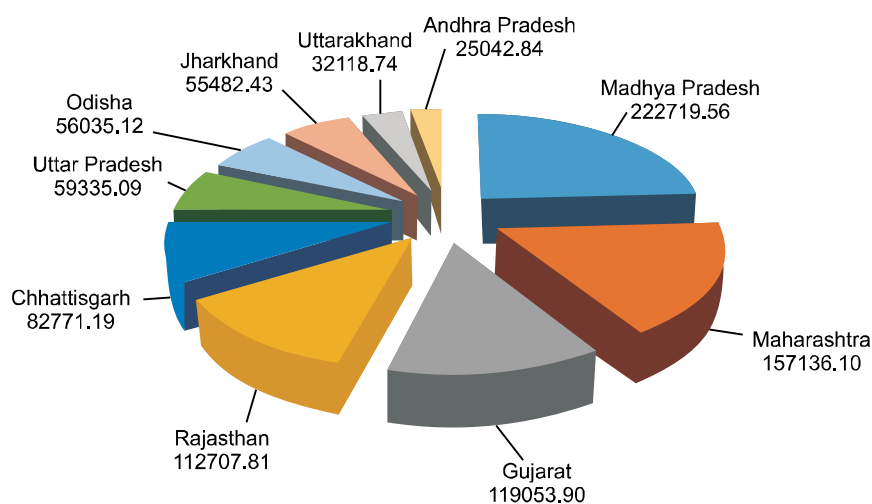
The top 10 States in terms of dependence of people on forests for fuelwood, fodder, small timber and bamboo are shown graphically in Figs 10.5 (a) to (d).

The top 10 States in terms of per capita dependence of people on forests for fuelwood, fodder, small timber and bamboo are shown graphically in Figs 10.6 (a) to (d)

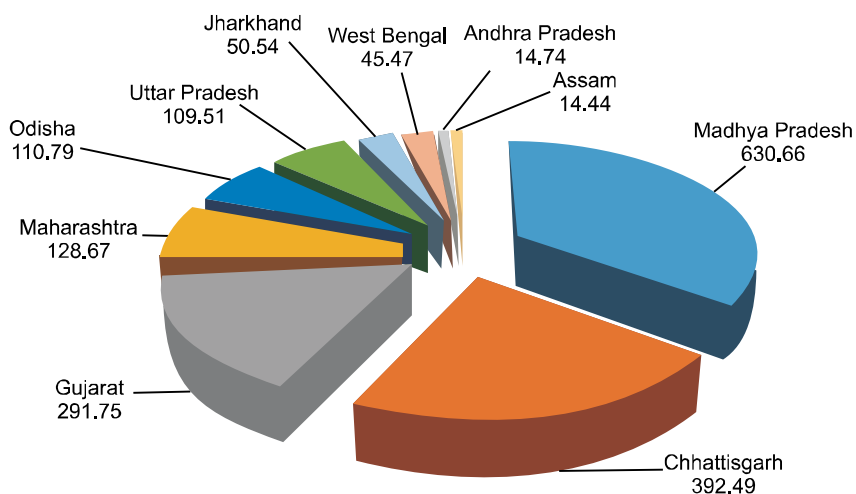
**FIGURE 10.5** (a) Top 10 states in terms of dependence on forests for fuelwood ('000 tonnes)



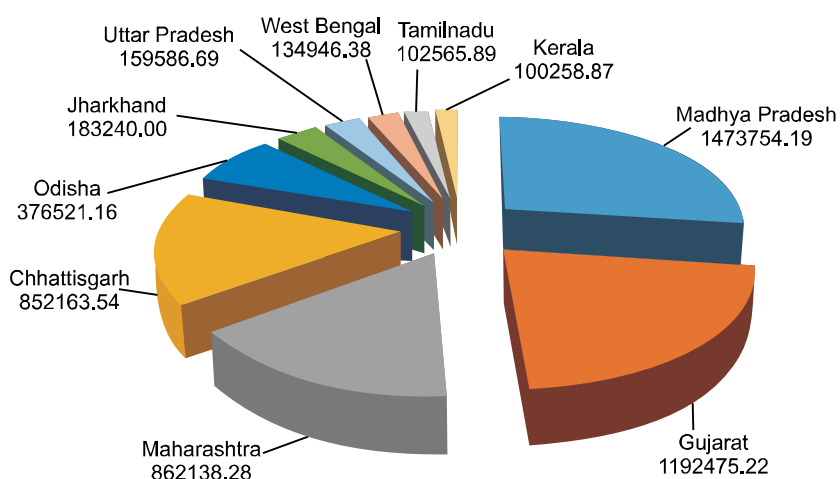
**FIGURE 10.5** (b) Top 10 states in terms of dependence on forests for fodder ('000 tonnes)



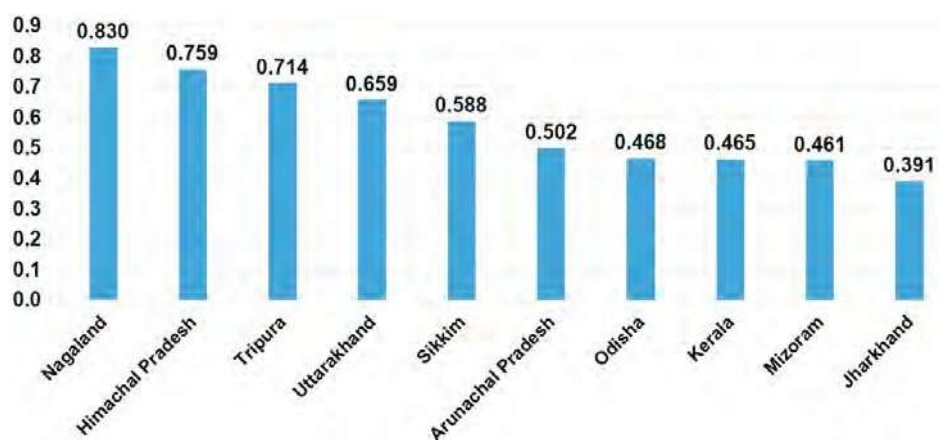
**FIGURE 10.5 (c)** Top 10 states in terms of dependence on forests for bamboo ('000 tonnes)



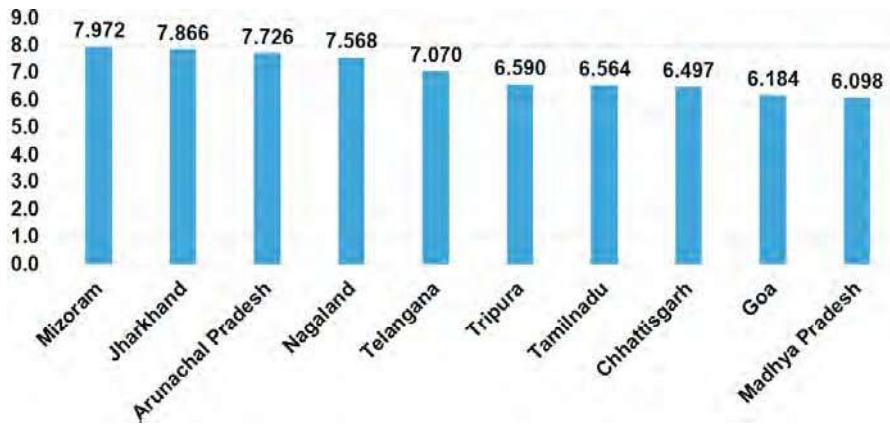
**FIGURE 10.5 (d)** Top 10 states in terms of dependence on forests for small timber (cum)



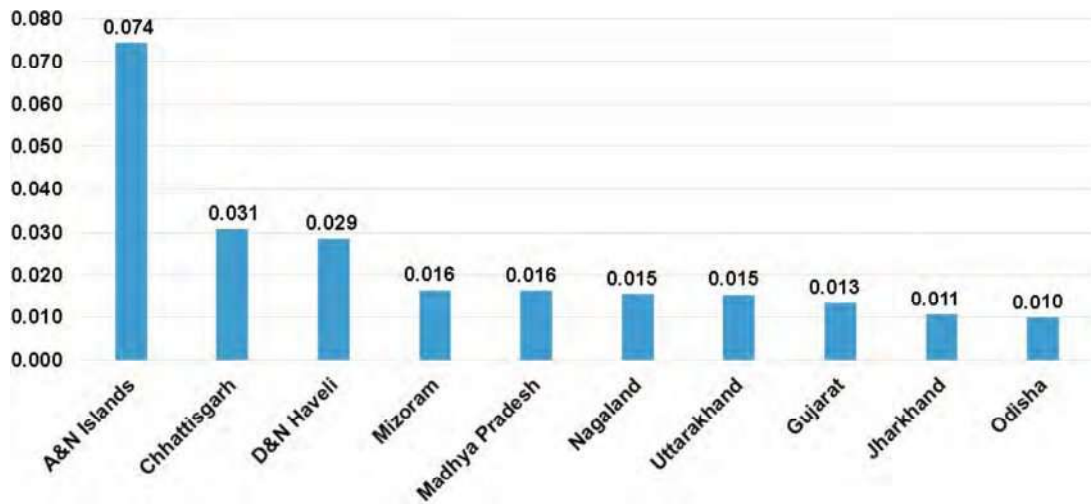
**FIGURE 10.6 (a)** Top 10 states in terms of per capita dependence on forests for Fuelwood (tonnes)



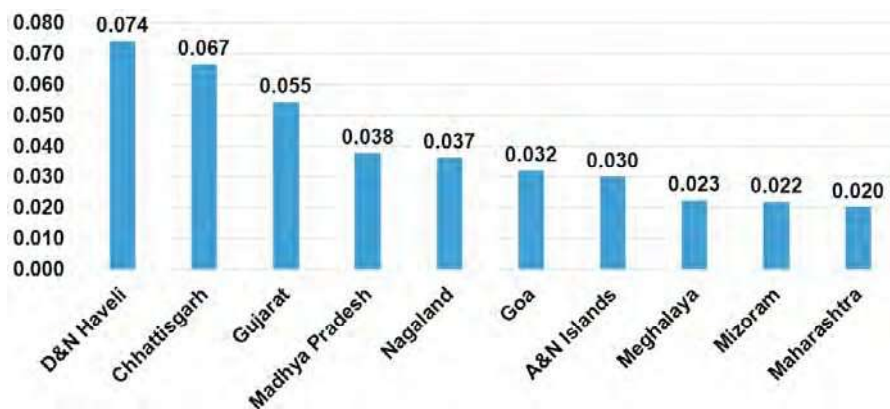
**FIGURE 10.6** (b) Top 10 states in terms of per capita dependence on forests for Fodder (tonnes)



**FIGURE 10.6** (c) Top 10 states in terms of per capita dependence on forests for Bamboo (tonnes)



**FIGURE 10.6** (d) Top 10 states in terms of per capita dependence on forests for small Timber (cum)



**FIGURE 10.7** Map showing location of sampled forest fringe villages for the Study

