CHAPTER -3

METHODOLOGY AND DATA COLLECTION

Chapter 3

Methodology and Data Collection

3.1 Database of the Study

The database of the present study is based on both the primary and secondary sources of data. The investigator collected secondary data from the published and unpublished source, whereas primary data was generated from the field survey. The secondary sources of information were collected from the publication of different government and non -government organisations. While collecting secondary sources of information, consulted the Forest Department's working plan reports, Government of Assam, Census of India, District Census Handbook of Assam, Indian State Forest Reports, Agriculture Statistic, and other important documents prepared by state and Central Government. For the purpose of village-level information, the records were consulted from Community Development Block, Circles and Forest divisions of Kokrajhar district.

The secondary sources of data are important for analysing the socio-economic variable of the forest dwellers, but it has limited information on resource dependence on forest and its impact on biodiversity conservation in the study area. Therefore, to fill up this gap of secondary data, the researcher collected the relevant information of primary data through random sampling techniques. Complete enumeration is not possible for researcher due to limitations of time, money and energy.

The information from the sample households' primary data is the basic source of the major analytical part of the study. Due to the vastness of data, the primary data has been generated through the mode of a direct personal interview with the

help of schedule. The question on schedule has been designed in such a way where the maximum and reliable information could be collected. The basic information of the schedule includes:

1. Socio-economic and demographic condition of forest villagers, especially caste, sex, age, family size, occupation, land holding and educational qualification.

2. Benefit from forest product (FP) including the benefit from non-timber forest products (NTFP), especially fodder, firewood, honey, wild edible green leaves and medicinal herbs.

3. Benefit from the non-forest product (NFP) includes earning from agriculture, horticulture and plantation.

4. Opinion on deforestation, environmental change, responsibility, traditional knowledge, custom, religion and practices.

3.2 Sample Design

For the collection of primary information, the sample selection is regarded as an integral part of the methodology. Thus, to simplify the process of sample collection, multi-stage sampling is conducted during the study. The important stages undertaken for the collection of sample are-stage-I, selection of the district of Assam, stage-II, selection of forest division, stage-III selection of reserve forest, stage-IV, selection of sample village, and finally, selection of sample household.

The process of sample selection has been presented with the flow chart no.3.1. Similarly, the sample design has been presented with the flow chart no.3.2.
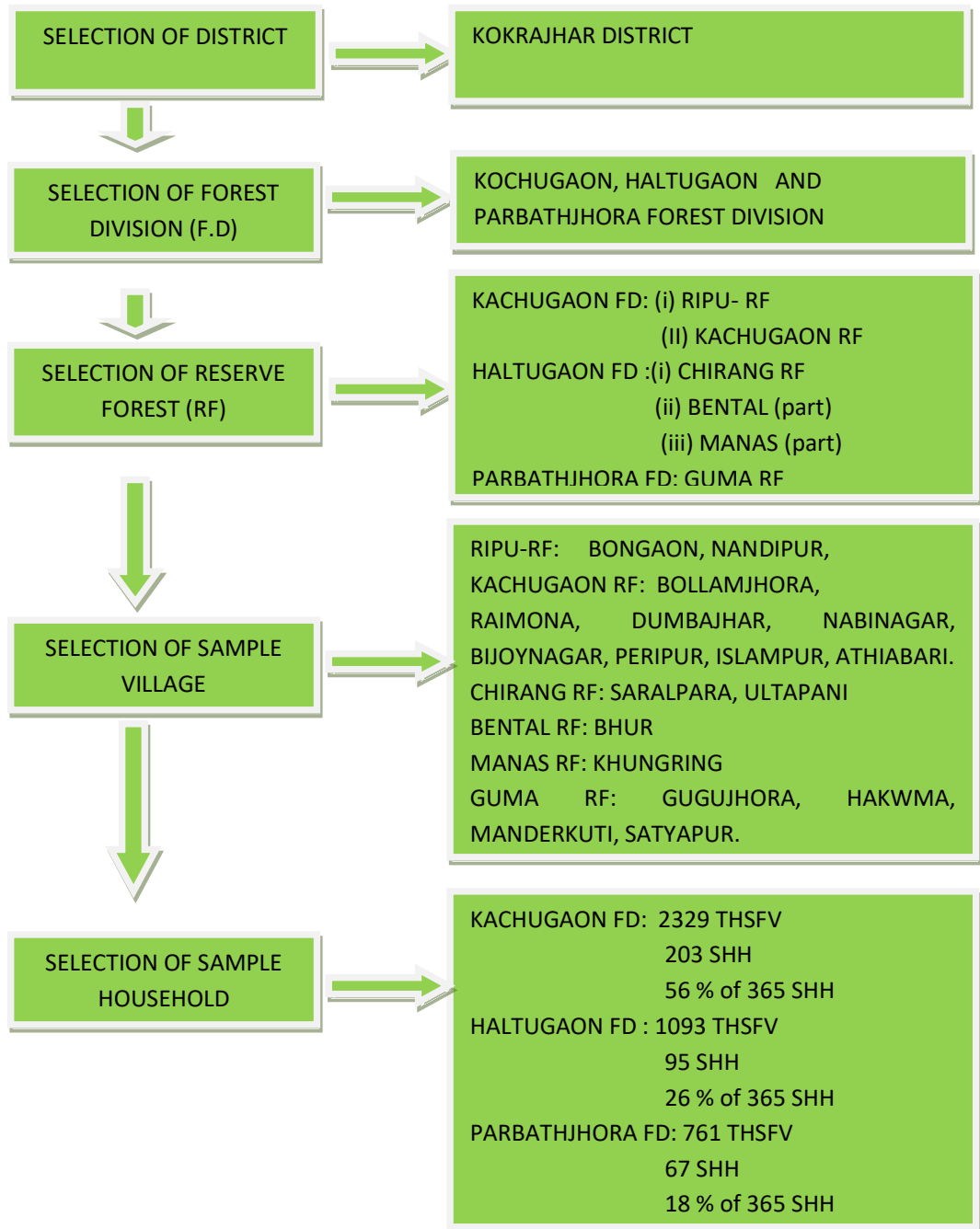
Chart No.3.1

Flow chart of sample selection

Selection of District

↓

Selection of Forest Division

↓

Selection of Reserve Forest

↓

Selection of Sample Village

↓

Selection of Sample household

Chart No.3.2

Flow chart of sample design

SELECTION OF DISTRICT	→	KOKRAJHAR DISTRICT
SELECTION OF FOREST DIVISION (F.D)	→	KOCHUGAON, HALTUGAON AND PARBATHJHORA FOREST DIVISION
SELECTION OF RESERVE FOREST (RF)	→	KACHUGAON FD: (i) RIPU- RF (II) KACHUGAON RF HALTUGAON FD :(i) CHIRANG RF (ii) BENTAL (part) (iii) MANAS (part) PARBATHJHORA FD: GUMA RF
SELECTION OF SAMPLE VILLAGE	→	RIPU-RF: BONGAON, NANDIPUR, KACHUGAON RF: BOLLAMJHORA, RAIMONA, DUMBAJHAR, NABINAGAR, BIJOYNAGAR, PERIPUR, ISLAMPUR, ATHIABARI. CHIRANG RF: SARALPARA, ULTAPANI BENTAL RF: BHUR MANAS RF: KHUNGRING GUMA RF: GUGUJHORA, HAKWMA, MANDERKUTI, SATYAPUR.
SELECTION OF SAMPLE HOUSEHOLD	→	KACHUGAON FD: 2329 THSFV 203 SHH 56 % of 365 SHH HALTUGAON FD : 1093 THSFV 95 SHH 26 % of 365 SHH PARBATHJHORA FD: 761 THSFV 67 SHH 18 % of 365 SHH

Note: TSHFV= Total sample household of forest village, SHH=Sample household.

3.2.1 Selection of District

As mention in Chapter 1, the Kokrajhar district has the maximum number of forest villages among the 28 districts of Assam. Since these villages were established during the time of British rule, the researcher choose the district to find the present scenario of the man-nature relationship in general and forest resources use and its impact on biodiversity in particular.

As per the census 2011, the district's total geographical area is 3296 sq. km. which is accounted for 4.2 per cent out of the total area of Assam (78,438.00 sq.km.). It has 1107 sq. km (34 per cent) of forest area (FSI, 2015). The population of the district is 887,142 person of which 832,201 (93.81 per cent) resides in rural areas, and 54,941 (6.19 per cent) are in urban areas. Out of the district's total population, 3.33 per cent is Schedule Caste (SC) and 31.41 per cent is Schedule Tribe (ST) population. The literacy rate is 65.22 per cent of the district, out of which 75.45 and 56.53 per cent of male and females are literate, respectively (Census, 2011). There is 11 Community Development (CD) block in the district consisting of 1068 villages including 15 uninhabited villages. Out of total villages, 145 (13.58 %) villages were recognised as forest village which are concentrated in three forest divisions namely Kachugaon, Haltugaon and Parbathjora of Kokrajhar District.

3.2.2 Selection of Forest Division

There are three-forest divisions in the Kokrajhar district viz; Kachugaon, Haltugaon and Parbathjhora forest division. In this stage, all the three-forest divisions have been selected for the present study.

3.2.3 Selection of Reserve Forest

In this stage, the existing reserve forest of the three forest divisions viz. Kachugaon, Haltugaon and Parbathjhora of Kokrajhar district were selected.

There are 24 reserve forests in the three forest division in the district, out of that only 6 reserve forests have recognised forest villages (table 3.1). Therefore, all the 6 reserve forests have been considered for the present study. The details of the reserve forest were shown in the following table 3.1.

Table No. 3.1

Name of Reserve Forest having Forest Village in Kokrajhar District

Sl. No	Name of Forest Division	Name of Reserve Forest	No. of Forest Village	Sample Villages
1	Kachugaon division	Ripu-RF	18	2
		Kachugaon RF	88	8
2	Haltugaon division	Chirang RF	21	2
		Begtal (part)	02	1
		Manas (pt)	02	1
3.	Prbathjhora division	Guma RF	14	4
		Total	145	18

Source: Profile on forest and wildlife of Bodoland Territorial Council. Published by Forest Department BTC, Kokrajhar

3.2.4 Selection of Sample Village

The sample villages were selected keeping in mind for equal representation of reserve forest of the three forest division viz. Kachugaon, Haltugaon and Parbatjhora of Kokrajhar district. The data of the 2011 census has been taken as the basis of the selection of sample villages. Considering that, the 145 forest villages were too large in number for an individual researcher, so the sample village was selected purposively for equal representation irrespective of the size of the forest village. Thus, the total sample of eighteen forest villages (table 3.1) representing all the reserve forest was finally selected. Among these, two forest

villages are from Ripu -reserve forest; eight are from the Kachugaon reserve forest, two forest village from the Chirang reserve forest, one each from the Bangtal and Manas part of the reserve forest and four forest villages of Guma reserve forest were selected respectively. In order to provide equal representation of reserve forest, at least one forest village has incorporated irrespective of the number of forest villages in the reserve forest. Thus, part of Bengtal and Manas reserve forest has represented by one village each. Since these villages are mostly populated by several ethnic groups like Bodo, Rabha, Oraon, Santhal, and Nepali, care was taken to include all these in the sample, which was one of the bases of the selection of the sample village. The other important criteria for the selection of sample village are:

(i)   The distance of villages from its nearest forest.
(ii)   Distance from Subdivision /District Town

As per the Forest Department Government of Assam, there are 499 forest villages in Assam, out of which 145 (29.05 per cent) forest villages are in the Kokrajhar district. Among these, 18 forest villages of the Kokrajhar district are selected for the sample. Table 3.2 summarizes the selection of sample villages.

For the present study, out of 145 forest villages only officially recognised and established before the 1980s has been considered as sample village. Forest villages were established after the 1980s also, but they have been excluded from the present study.

A pilot survey was conducted before doing the field survey formally. During the survey, it was found that most of the villagers access two nearest Subdivision/district towns for their various official requirements. These towns are identified as Gosaigaon sub-division and Kokrajhar district town, respectively. The selections of sample villages have been given in table no.3.2.

Table 3.2

Selection of sample village and household of the three forest divisions of

Kokrajhar district

Name of Reserve Forest	Name of Sample Villages	Pop. Size	Household		Distance from nearest Sub.div./ District town (km)	Distance of village from nearest forest (km)	Ethnic Community
			Total Household	Sample House hold			
Ripu-RF	Bongaon	1159	226	20	65	2	Bodo,Oraon
	Nandipur	835	165	14	28	2	Bodo
Kachugaon - RF	Bollamhjora	1798	357	31	65	3	Bodo, Santhal
	Raimona	1169	217	19	62	2	Bodo
	Dumbazar	1342	268	23	60	3	Bodo, Oraon
	Nabinagar	1797	365	32	25	3	Bodo
	Bijoynagar	809	167	15	25	3	Bodo
	Peripur	183	34	3	25	3	Santhal
	Islampur	603	115	10	25	3	Rabha
	Athiabari	2055	415	36	28	3	Boro, Rabha
Chirang-RF	Saralpara	3486	689	60	85	1	Nepali
	Ultapani	766	147	13	60	2	Bodo,Nepali
Bengtal-RF	Bhur	237	48	4	45	3	Bodo
Manas-RF	Khungring	1073	209	18	55	2	Bodo
Guma- RF	Gugujhora	550	101	9	13	2	Santhal
	Hakwma	808	185	16	18	3	Bodo
	Manderkuti	1465	275	24	20	3	Bodo, Santhal
	Satyapur	937	200	18	15	2	Bodo, Nepali
	Total	21072	4183	365			

Source: District Census Handbook, Kokrajhar, 2011

3.2.5 Selection of Sample Household

The sample households were selected from the entire 18 sample forest villages. The unit of the survey was households, and only one respondent was taken from each family, preferably the head of the family. For the determination of sample households, Slovin's formula has been used, as shown below:
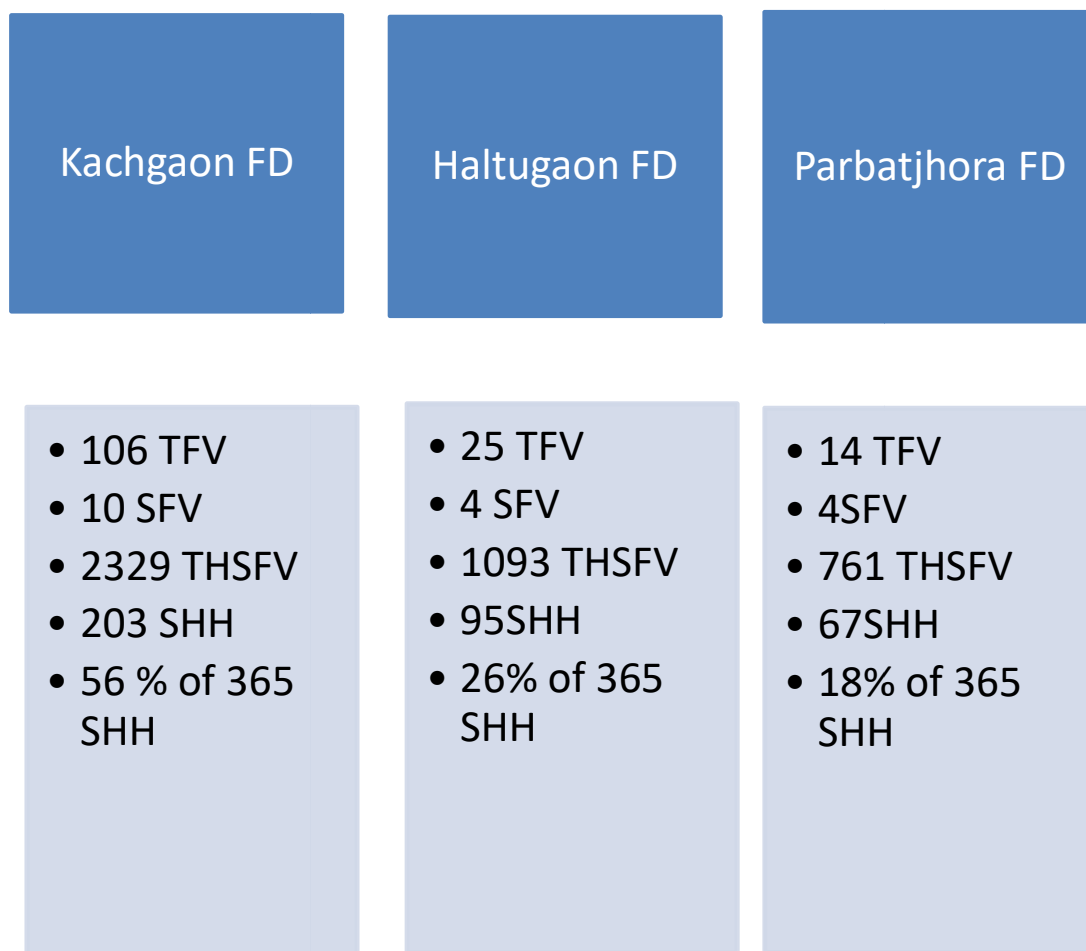
$$n = \frac{N}{1 + Ne^2}$$

Where, n = number of the sample, N = total number of population, and e = margin of error or probability of committing an error in sample selection. This formula is used by choosing 95 per cent confidence level with a population size of 4183 number of households. This level of confidence will give 0.05 per cent margin of error. Thus the total sample of the household is:

$$n = \frac{4183}{1 + 4183(0.0025)}$$
$$n = \frac{4183}{11.4575}$$
$$n = 365$$

Table 3.2 shows the details of the village's wise sample household obtained by applying the Slovins formula. In, Kachugaon forest division, out of 2329 households, 203 sample household from both Ripu-reserve forest and Kachugaon reserve forest were selected for the interview, out of which 20 households were from Bongaon village, 14 from Nandipur, 31 from Bollamjhora, 19 are from Raimona, 23 from Dumbazar, 32 from Nabinagar, 15 households from Bijoynagar, 3 are from Peripur, 10 from Islampur and 36 households from Athiabari were selected. Similarly, for the Haltugaon forest division, 95 households from Chirang reserve forest, Bental reserve forest and Manas reserve forest were selected, out of which 60 households were from Saralpara,13 from Ultapani, 4 from Bhur and 18 households from Kungring villages were taken respectively. Lastly, in the Parbatjhora forest Division, 66 households were selected as a sample from Guma Reserve Forest. Among these, 9 are from Gugujhora, 16 from Hakwma, 24 from Manderkuti and 18 from Sataypur were

selected as samples. Thus, altogether 365 households were considered for interview from all the three forest division of the district.

Chart No.3.3

Flowchart of Sample household

Kachgaon FD	Haltugaon FD	Parbatjhora FD
• 106 TFV • 10 SFV • 2329 THSFV • 203 SHH • 56 % of 365 SHH	• 25 TFV • 4 SFV • 1093 THSFV • 95SHH • 26% of 365 SHH	• 14 TFV • 4SFV • 761 THSFV • 67SHH • 18% of 365 SHH

[Notes: TFV = Total Forest Village, SFV = Sample Forest Village, TSHFV = Total Sample Household of Forest Village, SHH = Sample Household.]

3.3 Use of Variable and Statistical Tools

As per the requirement of the present study, the chapter wise description of variables and uses of statistical tools have been explained briefly as follows:

3.3.1 Variables and Statistical Tool Use in Chapter-4

Chapter IV is mainly based on the dependence on forest resources by the dwellers of forest village. Thus, in order to assess the dependence on forest resources, the benefit obtained by forest dwellers from both the timber and non-timber forest product (NTFP) was calculated. Timber product includes all types of valuable trees, and non-timber product (NTFP) includes firewood, honey, wild edible green leaves, medicinal herbs, and fodder. But for the present study, the benefit from timber product is excluded due to unreliable data. For the calculation of benefit from non-timber forest products (NTFP), the quantity of non-timber forest product collected by households was multiplied by the ongoing local market price. Similarly, the cost of forest product is calculated through the actual expenditure incurred of collecting the forest products such as fodder, firewood, medicinal herbs, honey and wild edible green leaves. The grazing benefits have been calculated on the basis of the available number of livestock of households and then converted into standardised animal units using the standard cattle equivalent units (Mishra & Sharma, 1990). The structure of standard animal units is that an adult cattle is considered as 1 unit while a young one is considered 0.6 units. Similarly, an adult Buffalo is considered as 1.25 units, and a young one is considered as 0.6 units. On average, 13 kg of green and dry fodder was required for adult cattle. The total quantity of fodder is multiplied with the existing local market price of fodder for an idea about grazing benefits.

The revenue from the non-forest product (NFP) includes earning from agriculture, horticulture and plantations. For these, revenue is obtained by selling the total product at the prevailing market rate of price. At the same time, the production cost of the non-forest product is also calculated by assessing the actual cost of production such as-labour wage, seeds, fertiliser, fencing and others.

After the assessment of both revenue and cost of forest and non-forest product, the researcher tries to find out the extent of dependence on forest

resources by the dwellers of the forest. Therefore, the Net Benefit (NB) of the households is used for the present purpose.

Net Benefit (NB) or Profit Model:

$$NB = TR - TC$$

Where

TR = Total Revenue of both forest and non-forest products.

TC = Total Cost of both forest and non-forest products. Total cost also include implicit and explicit cost

NB = Net Benefit/ profit

3.3.2 Variables and Statistical Tool Use in Chapter-5

Chapter-V deals with the Socio-Economic status of forest villagers of Kokrajhar district. Thus the information about economic and demographic variables, namely- caste, sex, age, family size, occupation, land holding and educational qualification, were collected to see the status of forest villagers.

Further, to see the relationship between households' socio-economic and demographic variables with that of the total benefit obtained from forest products, the regression analysis was used to check the association of attributes with forest income.

Regression Model:

$Y_i = \beta_0 + \beta_1 In\ FS + \beta_2\ In\ AGE + \beta_3 In\ LH + \beta_4\ In\ DFF + \beta_5 HT + \beta_6 OFH + \beta_7 CASTE + \beta_8 SEX + \beta 9LT + U$

Where,

[1]Yi = Total benefit obtained from the forest resources by the *i*th sample households.

In FS = Log of Family size of sample households (in numbers), In AGE = Log of Age of respondents (in numbers), In LH = Log of Land holding in hectares, In DFF = Log of Distance of villages from nearest forest. OFH = Occupation of the family head, HT = House type, CASTE = Caste, SEX = Gender of the respondent, LT = Literacy or Educational Qualification of the respondents.

Here, house type has been classified as 1 for Pucca house and 0 for Non-pucca house. Literacy or education level of the head of the family is considered- 0 for illiterate and 1 for literate. For the literate, we have classified into four types, lower primary (LP), High school, higher secondary, and degree, respectively. For occupation, we have put 1 for agriculture, 0 for non-agriculture. Non- agriculture has been classified as service, business and wage /agriculture labourer. Similarly, in the caste system, we put 1 for Schedule Tribe (ST), 0 for non-ST. Non- ST includes the Schedule Caste (SC), Other Backward Class (OBC) and General category, respectively.

β_0 is constant of the model.

β_1, $\beta2$, β_3, β_4, β_5, β_6, β_7, β_8 and $\beta9$ are the coefficient of the variables family size, age, land holding, distance, occupation, house type, caste, sex and literacy respectively.

3.3.3 Variables and Statistical Tool Use in Chapter - 6

As per the requirement perceive by the researcher, in this chapter, the Chi-square test was used to check whether the difference in response to attribute

---

[1] The benefit of forest resources is obtained from the extract of forest viz. firewood, honey, green leaves and fodder. The total quantity collected forest recourses are multiplied with the existing market price to obtain the revenue.

related to biodiversity conservation and environment were associated with nine socio-economic variables viz., age, caste, sex, family size, occupation, literacy, house type, landholding and firewood.

Further, the Chi-square test was also used to check whether the difference between the individual respondent's participation and involvements related to biodiversity conservation was associated with variables viz., age, caste, sex, family size, occupation, literacy, house type, landholding and firewood.

The formula of the Chi-square test is:

$$\chi^2 = \sum (O_i - E_i)^2 / E_i$$

Where, χ^2 = chi squared, O_i = observed value and E_i = expected value

Notes: Out of nine socio-economic and demographic variables, three variable, namely family sizes, age of the respondent and total land holdings, were capture in the absolute figure. Family size was divided into- less than 5 and more than 5 members of family, (ii) age of the respondents were divided into- age group between 15 - 59 years and age group of 60 years and above, and (iii) landholding was divided into-less than 15 bighas and more than 15 bighas of land.

Similarly, to see the roles played by the dwellers of forest village in general and Schedule Tribe (ST) in particular towards forest conservation, simple descriptive statistical methods has used.