

**FOREST RESOURCES UTILISATION IN KAMRUP  
DISTRICT, ASSAM: A STUDY OF FOREST DEPENDENT  
VILLAGES  
(ABSTRACT)**

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## **Introduction**

Man depends a lot on nature. Forest is a natural resource which is not only a source of biomass-based materials like food, fodder, timber, medicines, etc. but also has cultural, spiritual and religious values associated with it. Nevertheless, forests are integral to global weather systems and the world's oxygen supply and they serve as watersheds that absorb water and prevent soil erosion. Human dependency on forest has been defined as "people directly dependent on forest resources for livelihood". This category refers to people partially or wholly dependent on forest for subsistence. It does not include people dependent on the tree products from small private or village plots.

"Forest dependent" means dependent on forest / wood land / tree derived goods and services. Utilisation of water, fuel wood, shelter, medicinal plants and culinary herbs, nutritionally important forest fruits and other foods, timber, fodder, dry-season grazing, the broad suite of non timber forest products (NTFPs) such as bamboos, rattans, gums resins, latex, oils, etc are important to these communities. The 'forest communities' referred here would mean the people living in the forest villages of Reserved Forests which came up as a necessity at the time that these forests were notified as Reserved Forests.

A significant percentage of global population has a direct relationship with forest and trees. In every region of the world there are communities that live within or immediately adjacent to forested areas and who depend on them for sustenance. It has been estimated that one quarter of the world's poor depend directly or indirectly on forest for their livelihood. The nature of dependence varies in nature and pattern in different parts of the world. It is because of reasons more than these that such populations are dependent on forest resources.

More recently, the economic potential of NTFPs has been sharply debated in the literature, with some authors arguing that the role of NTFPs as engines of local development which is greatly exaggerated. Much of the empirical literature concludes that NTFPs are neither the main driver nor an impediment to development, but rather that it plays an important supplemental or fallback role. Such studies are to be based on a geographical concept in which 'man-environment' relationships may be highlighted in terms of protection of forested areas. It also fosters the optimal use of resources for the survival of the forest dwellers and act as sustainable livelihood options.

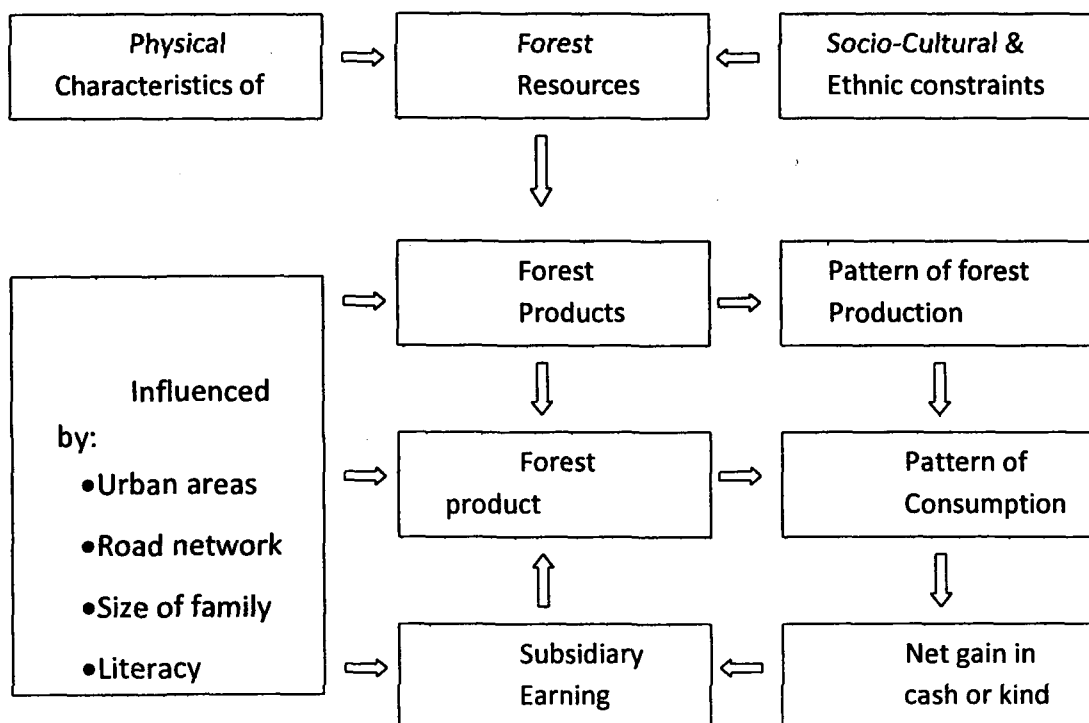
Influence of better road network and closer links with the urban centres have created more livelihood opportunities in the recent past. It is known that humans are increasingly urban dwellers and the link between the natural environment, products and services derived from renewable resources can almost be forgotten. However, the importance of forest for the people who are living in and around it is enormous no matter where the location is. Their understanding of attitude towards the forest is often overlooked. These communities, especially in developing countries are understandably dependent on forest resources at varying degrees while taking advantage of the apparent prosperity of the urban linkage. Forests are not only regarded as a source of timber, firewood, fodder and non-timber forest products (NTFPs like bamboo, bamboo shoot, rhizomes, roots, medicinal plants, honey, broom, cane, etc) but also for sustenance by the forest dwellers.

Forests and forest products are linked to household and livelihood systems in a variety of ways. Forest products commonly contribute to meeting food and other basic needs, are a source of supplementing inputs into the agricultural activities, help households control exposure to risk

of various kinds and constitute an integral part of the habitat in conjunction to social and cultural structure of those living within that environment.

It is, therefore, necessary to consider how use or sale of material products such as forest foods is conditioned by this broader context of inter-relationships between people and their forest environment. This broader framework is likely to reflect other important attributes of the forest and the processes whereby people transform the forest into a productive system designed to meet their particular needs while at the same time using it sustainably.

In the present study it is intended to examine some of these goods and services from the forest which are generally not considered in many research attempts.



**Fig- 1.1: Inter-relationship of Forest Dwellers with their Environment**

### **Background of the Study Forest Village:**

In Assam, reservation of vast areas of forestland was undertaken by the British. After the formulation of Forest Regulation Act 1891 (vol. -1) considerable importance was given to the scientific and systematic management of the forests. Initially the authorities had to face certain problems with respect to manpower as density of population in or near the forest areas were remarkably low. In fact, most of the forest areas were devoid of human habitation excepting few dispersed pockets of indigenous ethnic population. Habitation was an acute problem as most of the areas were highly infested by diseases like malaria and kalazar.

Communication facilities were conspicuous by their absence and the forest areas were lying at a considerable distance from the commercial and administrative centres. It was therefore a difficult task to mobilize labour force for planting, harvesting and silvicultural operations. The local people were then shy to earn their livelihood by engaging themselves as labourers, however poor they may be. However, the situation contributed largely to non-availability of a stable labour force for maintaining forestry related activities. Against this backdrop, the forest authorities felt the urgency of establishing a regular labour force and the concept of establishing forest villages gained momentum. Forest villages were set up in the periphery of the Reserved Forests.

The first forest village in Assam was established in 1901-1902 in Longai Reserve, Sylhet (now in Bangladesh). By year 1902-1903, 15 forest villages were established. Their number increased to 90 in 1905-1906 and 145 in 1913-1914. Today the total number of forest villages are 524 including 60 Nos. of Tangia villages (which were not in the purview of this research) having a total population of 164261 comprising 20694 families covering 52950 hectares of forestland and extending jurisdiction of almost all the 23 districts.

People, who live inside forests, often living as hunter-gatherers or shifting cultivators and are dependent on forests for their livelihood primarily on a subsistence basis, may be defined as dependent on forests. People in this category are mostly indigenous peoples or people from minority ethnic groups, like Rabhas, Garos, Boros and Oraons besides some General and Scheduled Caste communities. They are, thus, usually outside both the political and economic mainstream. People living inside the reserve forests of the study area can be regarded as dependent on forest resources. These people, as mentioned earlier have been settled through Government initiatives (Forest Department) to carry out plantation and maintenance of forest areas in the nascent stages – a stage when a number of facilities were provided. Their population now has grown over the years and some settlements are now nearby roads and other amenities.

As these communities reside within the Reserve Forest and are away from urban centres, road inaccessibility and lesser access to education may have caused a higher incidence of forest dependency particularly among these ethnic groups makes them more vulnerable socially and economically.

**Statement of Problem:**

Forests have traditionally been seen as valuable resources because they provide timber. Earlier the main focus of forest management has been on commercial logging, and a major objective of forest valuation has been to calculate potential timber revenues and profits and to balance these against the physical costs of forestry. As forest conservation has become a priority, economists have begun to rethink the profitability of forests. They now realize that the cost and benefits of the forests extend far beyond the profits of commercial logging. Although ecological values, and ways of measuring them, have become a generally accepted component of forestry

economics and management, the use of forest products by local households for subsistence has largely been ignored in the development of forest valuation methodologies.

For a long time neither economists nor decision-makers have fully acknowledged the value of forests for subsistence or considered livelihood dependence to be a factor in forest conservation. Yet information about domestic forest use values and their role in local livelihoods forms an integral part of forest conservation planning. By failing to value forest use at subsistence levels, a large proportion of the forests products are disregarded and their vital role in supplementing local livelihoods have never been focussed. This underestimates the total economic value of forests. It also leads to the danger that forest management systems will unfairly penalise local households by cutting off vital sources of subsistence and livelihoods.

The condition of communities living in the forest villages is very precarious, as they do not get the benefit of various welfare schemes due to non-availability of the title land in their favour. The forest villages are beyond the jurisdiction of the Community and Rural Development Block authorities and therefore these villages cannot avail for any welfare scheme. On the other hand, the Forest Department to which these areas belong have not been able to provide these communities with better amenities and facilities.

It is essential to review all relevant literature which has bearing on the topic. Each research has a formal and systematic structure which generates appropriate norms for evaluating its outcome. In this connection, a review of previous related research work will help the research to formulate a satisfactory structure of the undertaken research work. This is essential to find out what data and other materials, if any, are available for operational processes. In this background, a detail review of works available from different sources at a global and local scale like,

academic journals, books, conference proceedings, government reports, website, etc. has been attempted by the researcher.

**Objectives:**

- a. To identify the different type of forest resources used by the different communities in the study area;
- b. To understand the mechanism of production, consumption and distribution forest resources of different communities; and
- c. To assess the degree of dependence of these communities on forest resources.

**Research Questions:**

The forest communities living in the different forests and specially Govt. Reserved Forests have been sustaining their livelihoods through the utilisation of forest products and services. These villages are growing in population size and may barely be able to sustain in future with the already allotted resources. The lands allotted to them for sustenance are now under great pressure. Understanding the need to make forest areas better, it is required to find out how the poor rural communities living in such forests are utilising the resources of their surroundings. On the basis of this the following research questions have been kept in mind:

a. Given the number of forest villages, it is required to understand where these villages are located, their nature of concentration and which are the communities that inhabit these villages.

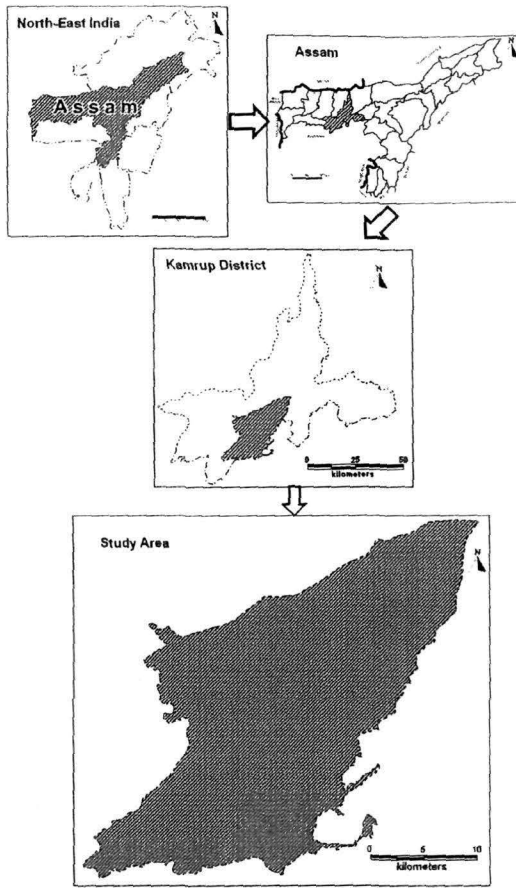
b. The population living in forest villages have been depending much on these forest resources for their survival and practically have no other resources. In what way these poor communities utilise the allotted resources under the pressure of their own growing population vis-à-vis the extremely limited resources.

**Study Area:**

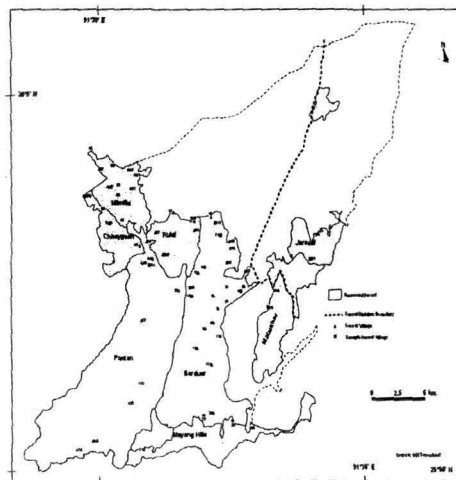
The district is situated in the lower Brahmaputra valley of Assam between 25°44' N and 26°51' N latitudes and 90°56' E and 92°10' E longitudes. It occupies a total area of 4, 35,009 hectares (4345 sq km) which accounts for 5.5 percent of the state. It is bounded by Darrang and Nowgaon district on the east and Nalbari with some parts of Goalpara district on the west. The northern boundary is marked by the Kingdom of Bhutan and southern one by Meghalaya State. The study is concerned with Reserve Forests of Kamrup Districts where forest villages are located. These Reserve Forests are in the southern part of Kamrup district comprising East and West Forest Division. Within these two Forest Divisions there are 54 Reserve Forests. The total area of southern part of Kamrup district is recorded 2, 82,800 hectares (2828 sq km). The forest villages are located mostly in West Forest Division and concentrated in only seven Reserve forests. There is only one forest village in the East Forest Division. The total area where the forests village located is 57,770 hectares (577.7 sq km).

**Sample Design and Methodology:**

The basic purpose of the present study is to examine the forest resource utilization by the forest dependent villages (known as village forest or forest village) created in Reserve Forests (R.F.). Since secondary data is not available greater emphasis is laid on to the collection of data from the field through random sampling techniques. It is true that complete enumeration is not possible for an individual researcher due to limitations of money, time and energy. At the same time, the survey of that kind is not required in the context of a universe characterized by homogeneous conditions. In this a part of the universe can explain the reality and as such sampling becomes an indispensable tool for a researcher.



**Location map of Study Area**



**Reserve Forests, Forest Villages and Sample Forest Villages Located Study Area**

Conventional economic valuation techniques are ill-equipped to deal with rural subsistence economies. Most valuation methods not only depend on a market paradigm, but rely on a particular view of markets which is based on cash sales and purchases in developed centres. There have been few attempts to value forest use for subsistence and, with few exceptions, they have been concerned almost entirely with products which are traded or are closely related to other traded products. They look at people's behaviour in actual, surrogate hypothetical markets where goods are freely brought and sold in cash. While forest use in rural areas is focused on collected products such as fuel wood, pasture, wild foods and medicines (used within the household) which are not bought or sold for cash and hence the conventional valuation methods have limited validity. It is impossible to find market prices for such products. It is also often equally difficult to apply the prices of substitutes for these goods, both because of their unique characteristics and because there are frequently no local markets at which substitutes are available or affordable. To find out the willingness of the people to pay for (or to accept compensation for the loss of) collected forest resources is also inappropriate in a non-cash economy where livelihoods depend on irreplaceable forest resources. A question therefore emerges on the use of conventional price-based methods or market paradigms for valuing forest use at subsistence levels in rural developing economies. Even if there is opportunity to obtain some price which could be applied to forest products, there would be serious practical problems in using techniques that applies value to each unit of forest product use. There are usually no complete records of forest use and it is difficult to carry out observations over long periods or details are insufficient to get a clear idea of the total quantities of forest products involved. As such there is a need to value forests products not only for the subsistence it provides to poor

communities but also the present requirements that products should be used in a sustainable manner.

In the present work, the samples are drawn in such a way that successful explanation of the forest resource utilization by the forest dependent people of the study area can be achieved with valid and reliable conclusions. Therefore, the sample design to be used in the present study has been decided by the researcher considering the basic objectives of the inquiry proposed earlier along with other related factors. The various stages involved in designing the sample are presented below.

#### **1.6.1 Selection of Villages as Sample:**

The selection of forest villages in the Reserved Forests for detail investigation has been taken up in the following manner.

a. Selection of Reserved Forests: Out of 54 Reserved Forests only 8 of them have forest villages. Hence, all the 8 Reserved Forests have been considered to be taken into consideration.

b. Selection of Villages: There are 61 forest villages in the 8 Reserved Forests. At least one village from each Reserved Forest have been considered as sample village. Since these villages are mostly populated by several ethnic groups, care was taken to include all these ethnic groups in the samples, which was one the basis of selection of the sample villages. As a result of this exercise, 13 villages from 8 Reserved Forests were taken as sample villages for the present research work. The important criteria adopted for the selection of villages, keeping in mind the ethnic representation, are as follows

- i. Distance from the urban centre; and
- ii. Accessibility from metal roads.

It was found that most of the villagers access three urban centres for their needs. On the basis of this, three urban centres were identified, namely, 1) Chhaygaon, 2) Mirza, 3) Rani and the distance of these villages from the nearest urban centre was considered.

However, using the proposed criteria, the distance from the nearest urban centre, accessibility and ethnic community representation of sample villages, the detailed investigation of the samples was carried out. Since the items of the universe of the present are homogeneous and attempted to be studied intensively, the present sample could be expected to yield a real representation of the intended universe.

#### **1.6.2 Selection of Sample Households:**

Villages have been classified with respect to distance from the nearest urban centre and accessibility from the nearest metalled road as explained above. The households were then randomly chosen keeping in mind the following:

- i. Household size
- ii. Literacy rate

In the selection of the households, no statistical technique has been used, rather personal judgment, building familiarity and trust with the local people has been applied. This was done by conducting a small gathering with the help of village headman and learned persons of the villages. It helped in convincing the purpose of the survey.

The first aim was to build a large and comprehensive picture of local livelihood options (forest sources like collecting/ gathering, fishing from forest, etc., are termed as forest products and other benefits from forest sources were considered forest associated activities. On the other hand, cropping and animal husbandry including petty businesses, government and private jobs, etc were classified as non-forest sources) used by different households. Observations were made

in the field for forest products collection and peoples' involvement in daily activities. This enabled to obtain a general picture of the village households.

The second was an attempt focused on selecting of households. In order to obtain a broad and representative picture of mechanism of village livelihoods and forest resource use, households were selected on the basis of economic status, ethnic group and occupation. Keeping these points in mind a sample of 50 percent from each village was taken and a total of 404 sample households were considered. Household interviews were conducted using a prepared questionnaire.

#### **Attributes of Forest and Non-Forest Products:**

Attributes have been generally grouped in two categories namely, products and activities. These attributes are elaborated in the following paragraphs.

The forest attributes are grouped as:

(i) Forest Products: Forest products means natural vegetation and aquatic life forms collected from the reserved forest by the household on a regular basis to meet their needs.

(ii) Forest associated activities: Forest associated activities means the earning source from the reserved forest on regular basis other than the natural vegetation and aquatic life form collections.

The contribution of forest resources in the livelihood of the people of forest village is the main concentration of the present study. To derive the appropriate contribution of forest sources, all the possible relevant attributes are taken into account while collecting data and information during field work. Emphasis was laid on those attributes which contribute to the livelihood of the people living in the study area. Data and information are collected for the year 2005—2006 from the surveyed households.

Similarly, Non-Forest attributes are also grouped as products and activities. There are many products as well as activities in the Non- Forest sector but attributes considered in this

study are relevant to the study area on which data and information collected from the field. These attributes do contribute significantly to the livelihoods of the inhabitants of the reserved forests of this area. These have been grouped as follows:

(iii) Non-Forest Products means plant and animal cultivated or grown by the forest villagers.

(iv) Non- Forest Activities means earning source other than the cultivated or grown and Forest source i.e. off farm.

### **Importance of Attributes:**

The total annual source of livelihood and earning from the listed attributes are termed as production of the households. The products from forest sources comprise of five major items. The non-timber forest products comprise mainly of six types. Activities of the inhabitants that are associated with the forest are of four major types while the fifth includes a number of other minor activities. On the other hand the non-forest products are generally activities produced from agricultural fields allotted to the inhabitants. Other produces includes arecanut, fruits, livestock and processed products like liquor as well as other minor products. The non-forest activities comprises of five items like government and private jobs, petty and small business, etc.

It was therefore, necessary to find out a relevant method suitable for the area under consideration for the purpose of understanding resource use and to interpret the livelihood pattern. In this regard, since there is no suitable technique to estimate the utilisation of forest resources of the area, the following method would be applied.

This would entail the estimation of:

- i. the 'production pattern of households' from forest products
- ii. the 'consumption pattern of households' from forest products
- iii. the 'subsidiary benefit derived by households' from forest products

### **Estimation and Calculation of Forest Production:**

Data collected from the sample households was in raw form. Most of the data of forest products were in the local terms like bundle, *mutha*, *bhag*, *bhar*, *thela*, *mond* etc. These were then standardised to kilograms and then converted to monetary terms and finally in percentage terms. Some of the products were brought from the weekly markets and measured to get more accurate estimation. The collection pattern of products varies from household to household eg., daily, every alternate day, weekly, monthly and seasonally and also in terms of type of products. These were all taken in to account while calculating the total amount of each household's annual production from forest.

Since forest resources contributes part of the total production, it was necessary to take Non-Forest sources of production into consideration. In order to arrive at an understanding of the contribution of forest products to the livelihood of these households, emphasis was laid on the relevant attributes.

### **Household Consumption Estimation:**

Household consumption of forest food products was estimated by measuring the amount consumed per meal by a household taking in to account the size of the family. This was done by visiting sample households before preparing their meals. The households were also asked to estimate their consumption per meal of different types of food products which were collected/produced from forest as well as homestead. The estimation of the contribution of forest and non-forest products per head per meal in consumption was recorded. While estimating the consumption of forest and non-forest products, seasonality was also kept in mind focussing on the consumption pattern of the households on a weekly, monthly or yearly basis. Consumption of non-forest products like rice and vegetables were considered as these are the major produces



from allotted lands. The data collected is computed, standardised and converted to monetary terms for the calculation of per head consumption.

### **Calculation of Subsidiary Benefit:**

In fact, the present study aims at understanding the reliance of forest villagers on forest products. The method, as mentioned above, would estimate the 'production' and 'consumption' patterns of the households from forest and non-forest sources. In order to understand how much these inhabitants depend on the forest for sustaining themselves it was necessary to segregate the forest and non-forest components. To arrive at an explanation of the 'subsidiary benefits' obtained by the inhabitants of the forest villages a new matrix was generated from a forest product based differential technique.

Subsidiary benefit from resources is derived by deducting total forest product consumption from the total forest product production/collection as:

$$[S_{Fh}] = [P_{Fh}] - [C_{Fh}]$$

Where,

$[S_{Fh}]$  is an array of subsidiary benefits derived from forest sources

$[P_{Fh}]$  is an array of production/collection of items from forest sources

$[C_{Fh}]$  is an array of items consumed from forest sources

Subsidiary benefit would show how much is gained in monetary terms these communities are deriving from the forest sources for survival or for uplifting their livelihood.

To synthesise the observations a Multiple Regression equation in the form of 'Stepwise calculation' was also performed to draw results of the determinants and their priorities in influencing the three sets of forest data, namely production, consumption and subsidiary benefit.

The following formula was used :

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \dots\dots\dots b_nX_n$$

Where,

a= Constant

b<sub>n</sub>= Coefficient that indicate rate of changes of Y with respect to determinants X<sub>n</sub>

Y = Forest products

**Other Sources of Data:**

Beside the primary data collected from the field through household schedules, secondary data have been used in the present study. These are collected from different sources including various governmental and non-governmental publications. Working plan of Reserve Forests from the Forest Department, Government of Assam, Census of India publications, Survey of India Topographic map from the Department of Geography, NEHU, Landuse maps from Assam Remote Sensing Application Centre, Guwahati, Assam and Satellite Imagery (IRS-2005) from Aaranyak, Guwahati were used to assess the current status of forest area of present study.

**Construction of Maps and Diagrams:**

All maps have been constructed in the GIS environment. Old maps and referred maps have been geocoded to perform suitable overlays and arriving at generalised conclusions. Appropriate diagrams had been constructed after appropriate statistical exercises were completed using Microsoft Excel.

**Organisation of the Research Material:**

The entire material of the thesis has been coherently arranged into six chapters. Since the statement of the problem, objectives, literature review and methodology are prerequisites of the thesis, these aspects have been arranged in Chapter I. Obviously, the geographical aspects of

forest ecology and its management are the background material for a research to understand cause-effect relationship is given in Chapter-II. Chapter-III deals with the forest production and collection while Chapter IV deals with the consumption of forest products. Chapter V deals with the understanding of benefits derived from the forest either for their survival or to improve their livelihood. Last but not the least, in Chapter-VI the results are summarised with an aim to forward answers to the questions posed and attempt at synthesizing the results for generalisation.

### **Findings and Conclusions**

Three main components of the present research work namely, production, consumption and subsidiary benefits have been discussed from the preceding chapters. The role of ethnicity has also been pointed out and it does precipitate out that the cultural influence does play importantly in the extraction of forest products from the concerned forest areas. The discussion in Chapter V clearly indicates that the inhabitants of the forest villages derive benefits from the forests around them.

It is seen from the preceding chapters that the most deprived sections of the households produce much of the forest products. The households far from the urban centres, away from good roads and those with low literacy levels draw more from the forest. It is interesting to note that even households with the least number of persons too draw more from forest resources. As far as consumption is concerned the same pattern is seen. From this postulate, it may be deduced that households located far from urban centres, away from good roads coupled with low literacy rates as well as the small households would derive the maximum benefit from the forest which is true for this particular case. Hence they depend more on the forest for their survival. It would also be appropriate to state that most of the deprived section of the population of this area depends highly on forest products. An exception may be made to very large households (> 13 persons/household) where it seen that they are consuming all collected products but not deriving

any benefits from forest products at all. It is therefore imperative that the large households, though they have the manpower to exploit the forest, they are not doing so since they have other livelihood options to depend on. It is therefore very necessary to understand at this juncture which of the determinants is most influential and important in the derivation of benefits from the forest products. To understand this, a Stepwise Regression analysis was carried out to bring out the most influential determinant that determines production, consumption and subsidiary benefits from forest products. Of course, not forgetting the ethnic influence on the patterns of production and consumption, the ultimate benefit derived by the inhabitants of this area can be synthesised in the few paragraphs below.

**Synthesis:**

Since production and consumption are dependent on different parameters it needs to be understood up to what degree the parameters are responsible for determining the changes and variability.

In order to isolate the most influential factor that determines production, consumption and subsidiary benefit from forest products a statistical analysis of the samples was initiated.

Using a stepwise regression analysis on the four determinant strata, it was found that household size plays a significant role in determining the production of forest products in the study area. The rate of change of the forest products collected per household is observed highest while considering household size. It was also observed that nearness to the urban centre also exerts a smaller effect.

It would therefore mean that though the people here are of different ethnic groups, size of the family actually determines the forest products collection. Though ethnicity plays its own role in the collection of products from the forest, the nearness to the urban centre exerts another

impact due to the fact that sale of products is more pronounced in such areas rather than those which are far away from it. Household size plays an important role here as all households whether small or large draw from the forest according to their needs.

Similarly, when consumption was subjected to the regression analysis, the size of the family assumes an important role as household size accounts for about 72 percent of the variability of the multi-factor distribution. It may be noted here that as the family size grows larger, the consumption also gets more voluminous. It therefore assumes great importance in the determination of the consumption patterns of the family as well as in the collection of forest products. As these materials are available almost free from nature, people tend to supplement their nutrition needs much more by these. At the same time, it may be noted that larger households are able to spare more man power to collect goods from the forest rather than smaller households which depend for their daily requirement on labour or other means of survival. However, looking at the over dominating effect of the household size on consumption of forest products, it may be pointed out that distance from the urban centre, good roads and literacy rates do not have much effect on consumption of forest products. All households invariably consume forest products especially food items and fuel, as these form part of their daily needs. Accessibility to good roads displays a mild effect which expresses the fact that proximity to good roads can either reduce or enhance consumption of forest products since the supply of other non-forest materials is facilitated by better roads.

As far as subsidiary benefits are concerned, it was observed that the village dwellers depend more on the non-forest products. They are supplementing their requirements from the forest. The role played by the two factors namely, household size and proximity to the urban centre is observed but is not so significant and comparable to the range of coefficients derived in

the above two regression analysis series. Though household size is an important factor in the production and consumption patterns of the forest dwellers, the same factor does not overwhelmingly decide the subsidiary benefits derived. In fact, distance from the urban centre is more pronounced in the derivation of benefits which explains that urban influence is one factor determining the withdrawal rates from the forest, however not ignoring the role played by the number of family members for the same.

In general the findings of the present work are discussed in the following paragraphs.

### **Findings:**

1. Household size is an important determinant in the production and consumption of forest products. However, as far as the derivation of subsidiary benefits from forest products, this determinant is just one of the important factors. The role played by the distance from the urban centre is more prominent in this respect as the requirement of poorer section of the society is much more demanding in the present context of the term. This section of the society is attempting to extend their purchasing power through 'purposeful savings' which attracts them to draw more from forest sources rather than directly consuming all collected products.
2. The overall extraction levels from the forest (Forest products & Forest associated activities) indicates that the General community draws 6 percent and for the other communities it varies from 19 to 34 percent, (Rabha 20%, Boro 24%, Garo 28% Oraon 29% and SC 34%). This reveals vast differences between the tribes and General as well as Scheduled castes. At times these inhabitants are engaged as labourers for lifting sand, crushing stones and other daily wage assignments by contractors and other employers in return for cash earning which has been classed as Forest associated activities.

3. Rabhas and Garos are involved in the collection of most of the listed products wherever their households are located. On the other hand the General castes and Scheduled Castes draw the least from the forest. However both these communities draw heavily from the aquatic pool of resources and rely largely on firewood available from forest sources for their domestic fuel needs.

4. However, considering forest products, the dependency levels of the Garo tribe is highest reaching up to 25.1 percent while the General Caste depend for about 5.2 percent through collection. This is most probably a sustainable extraction on which these communities can depend, if the forests are being maintained and deforestation strictly prohibited.

5. The information collected indicates that the communities living in forest villages are not eroding forest resources since they do not extract timber. They are extracting only the regenerated minor products that are naturally replenished every year.

6. The villages located far off from the good roads and far off from the urban centres tend to draw more than those villages which are nearer to urban areas and closer to metalled roads. The range varies from 12 – 28 percent. It may also be mentioned here that there is a varying degree of extraction from forests by different sizes of households. The medium sized households draw maximum while very big sized households draw the minimum (11 – 27 %). On the other hand, when literacy levels are considered, the households with very high literacy rates take the minimum from the forest while the households with very low literacy rates draw the maximum (12 – 28%).

7. These communities require much more than what they extract from forest sources. About 70 percent is substituted by non-forest related activities but their lives are made much easier by relying on forest goods and services for which they given the right to do so. For poorer

households their drawing from the forest is much more. However this does not mean that this is completely consumed. It may at times serve as a source of income to supplement the needs of these households which are much more.

8. Forests provide a number of services to the people relying on it. Different types of products are drawn which include food, fuel, construction materials for shelter, medicinal herbs, raw materials for craft, broom etc. There are as many as 35 items used as food, 11 varieties of fruits and 20 varieties of edible aquatic life-forms used by these communities. Besides these there are another 19 types of medicinal plants. Last but not the least their only source of fuel (firewood) on which these communities depend comes from the forest.

9. Charcoal produced by the destructive distillation of wood is being produced by the Garos. This is an exceptional case of cash benefit generation in the study area from this crudely processed product.

10. It may also be mentioned that the animals like cattle, goats and pigs which the inhabitants are rearing are consuming the fodder available from the forest without any account. There is a need to assess this further.

11. As far as the mechanism of drawing/collection of the products, traditional methods have been used. The products are usually used raw while some are crudely preserved though never been value added. These communities, specially the tribes have a lot of knowledge about the forest products and their uses. Their collection is also based on traditional knowledge. Most of the collections are not gender specific. However, the male members specifically collect products like bamboo, thatch, palm leaves, cane and broom stick during the winter season.

## **Conclusions**

1. The communities of forest villages depend on the Reserved Forests for their subsistence right from the time they were allowed to occupy these areas. They, in fact, were part of the efforts for the upkeep of forests and specifically the Reserved Forests.
2. They provided the much needed work force for the better management of these forests which was so essential. After about a hundred years, their existence is being questioned as these communities have grown in population and the spirit of their formation possibly at stake.
3. In general, the people of living in the forest villages are poor. In earlier days they did not even have contact with the outside world. They are still secluded even now.
4. The use of forest products adds a crucial dimension to a diversified livelihood base of most households. The direct-use value and regular domestic use of these products is in the same order of magnitude as cash incomes from sale as well as from forest associated activities. In spite of this they are not extracting from the forest beyond sustainable limits which clearly shows their intimate relationship with the forest.
5. The concept of a safety net role of forest products and NTFPs needs to be differentiated. A 'daily net' is the outcome of a product collected on a daily basis for supplementing daily necessities. On the other hand an 'emergency net' is a livelihood strategy under stress. People therefore, extract the forest products, NTFPs, firewood, aquatic animals, crush stone and produce charcoal because of lack of alternative income-earning opportunities, retrenchment, poverty, and the need for cash income.

6. Though household size is an important factor in the determination of being dependent on forest products, the population located far from the urban centre depend more on the forest goods and services and are most vulnerable.

**Suggestions:**

1. To meet the socio-psychological imbalance, suitable developmental measures based on empirical study on these backward forest villages living within Reserve Forest, are the need of hour. Forest villager's involvement on the development of forests should be made. Forest villagers are not to be alienated from the forest resources. However, it is important that these areas be covered under some welfare schemes through the Forest Department since these areas do not fall within the jurisdiction of the Panchayati Raj mechanism.

2. The clear linkage between forest resources and livelihood dependence demonstrated by this study clearly shows the need to understand and support the forest dependent communities for forest conservation/ management in order to sustain both people and forests. By doing so the need for these communities in the spirit of the creation of Forest villages would be relevant.

3. Forest dependency should be linked with protection of the forest ecosystem in order to maintain and enrich the productivity. Promoting sustainable management of forest food resources presents the opportunity to integrate forest management with improved food security for the forest dwellers. There are compelling reasons to develop and more fully utilize forest resources in a sustainable manner while the opportunity to do so still exists. Therefore, conservation and development should be given priority to improve food security and well being by helping these communities secure the use of forest products.

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FOREST RESOURCES UTILISATION IN KAMRUP  
DISTRICT, ASSAM: A STUDY OF FOREST  
DEPENDENT VILLAGES

By

DEBRAJ SARMA



SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENT OF THE DEGREE OF DOCTOR OF PHILOSOPHY  
OF THE  
NORTH-EASTERN HILL UNIVERSITY  
SHILLONG  
2009

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I, **Shri Debraj Sarma** hereby declare that the subject matter of this thesis is the record of work done by me, that the contents of this thesis did not form basis of the award of any previous degree to me or to the best of my knowledge to anybody else, and that the thesis has not been submitted by me for any research degree in any other University/Institute.

This is being submitted to the North-Eastern Hill University for the degree of Doctor of Philosophy in **Geography**.

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## Chapter-I

### Introduction

Man depends a lot on nature. Forest is a natural resource which is not only a source of biomass-based materials like food, fodder, timber, medicines, etc. but also has cultural, spiritual and religious values associated with it. Nevertheless, forests are integral to global weather systems and the world's oxygen supply and they serve as watersheds that absorb water and prevent soil erosion. Human dependency on forest has been defined as "people directly dependent on forest resources for livelihood" (FAO 2005). This category refers to people partially or wholly dependent on forest for subsistence. It does not include people dependent on the tree products from small private or village plots.

"Forest dependent" means dependent on forest / wood land / tree derived goods and services. Utilisation of water, fuel wood, shelter, medicinal plants and culinary herbs, nutritionally important forest fruits and other foods, timber, fodder, dry-season grazing, the broad suite of non timber forest products (NTFPs) such as bamboos, rattans, gums resins, latex, oils, etc are important to these communities. The 'forest communities' referred here would mean the people living in the forest villages of Reserved Forests which came up as a necessity at the time that these forests were notified as Reserved Forests.

Reserved Forests are such forests notified by the Government under Clause 4(a & b) of the Indian Forest Act, 1927 which states that 'The State Government may constitute any forest-land or waste-land which is the property of Government, or over which the Government has proprietary rights, or to the whole or any part of the forest

produce of which the Government is entitled, a reserved forest in the manner hereinafter provided’.

A significant percentage of global population has a direct relationship with forest and trees. In every region of the world there are communities that live within or immediately adjacent to forested areas and who depend on them for sustenance. It has been estimated that one quarter of the world’s poor depend directly or indirectly on forest for their livelihood (World Bank 2000a). The nature of dependence varies in nature and pattern in different parts of the world (Warner 2000). It is because of reasons more than these that such populations are dependent on forest resources.

More recently, the economic potential of NTFPs has been sharply debated in the literature (Pérez and Byron 1999), with some authors arguing that the role of NTFPs as engines of local development which is greatly exaggerated (Southgate 1998, Wunder 2001). Much of the empirical literature concludes that NTFPs are neither the main driver nor an impediment to development, but rather that it plays an important supplemental or fallback role (Godoy et al. 2000, Pattanayak and Sills 2001). Such studies are to be based on a geographical concept in which ‘man-environment’ relationships may be highlighted in terms of protection of forested areas. It also fosters the optimal use of resources for the survival of the forest dwellers and act as sustainable livelihood options.

Influence of better road network and closer links with the urban centres have created more livelihood opportunities in the recent past. It is known that humans are increasingly urban dwellers and the link between the natural environment, products and services derived from renewable resources can almost be forgotten. However, the importance of forest for the people who are living in and around it is enormous no

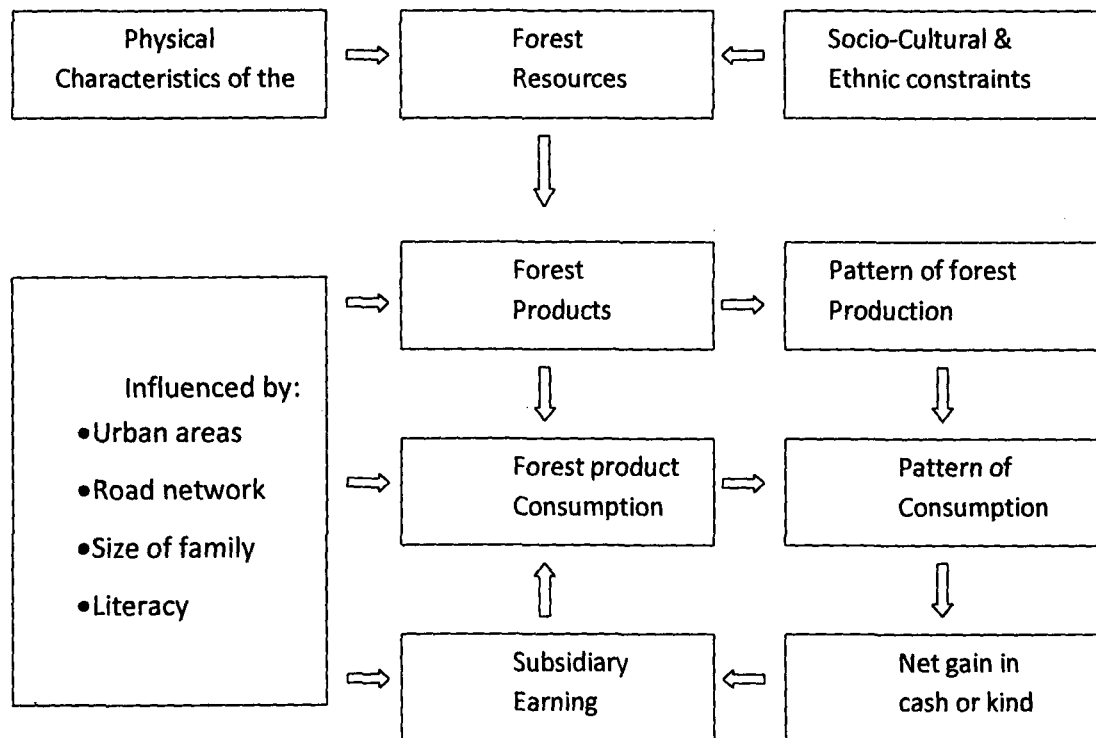
matter where the location is. Their understanding of attitude towards the forest is often overlooked. These communities, especially in developing countries are understandably dependent on forest resources at varying degrees while taking advantage of the apparent prosperity of the urban linkage. Forests are not only regarded as a source of timber, firewood, fodder and non-timber forest products (NTFPs like bamboo, bamboo shoot, rhizomes, roots, medicinal plants, honey, broom, cane, etc) but also for sustenance by the forest dwellers.

Forests and forest products are linked to household and livelihood systems in a variety of ways. Forest products commonly contribute to meeting food and other basic needs, are a source of supplementing inputs into the agricultural activities, help households control exposure to risk of various kinds and constitute an integral part of the habitat in conjunction to social and cultural structure of those living within that environment. However and Levin (1992) has pointed out that in southern Thailand 'villagers conceptualize non-timber forest products as both concrete and intangible'. The inclusion of conceptual as well as physical goods in discussions about NTFPs by farmers suggests that to rural communities forests are a product to be considered in totality and for which physical, extractable non-timber forest products are only a limited subset. The sum of the parts in this case is not worth near as much as the presence of the whole.

It is, therefore, necessary to consider how use or sale of material products such as forest foods is conditioned by this broader context of inter-relationships between people and their forest environment. This broader framework is likely to reflect other important attributes of the forest and the processes whereby people transform the

forest into a productive system designed to meet their particular needs while at the same time using it sustainably (Davies and Richards 1991).

In the present study it is intended to examine some of these goods and services from the forest which are generally not considered in many research attempts.



**Fig- 1.1: Inter-relationship of Forest Dwellers with their Environment**

**Background of the Study Forest Village:**

In Assam, reservation of vast areas of forestland was undertaken by the British. After the formulation of Forest Regulation Act 1891 (vol. -1) considerable importance was given to the scientific and systematic management of the forests. Initially the authorities had to face certain problems with respect to manpower as density of population in or near the forest areas were remarkably low. In fact, most of the forest areas were devoid of human habitation excepting few dispersed pockets of

indigenous ethnic population. Habitation was an acute problem as most of the areas were highly infested by diseases like malaria and kalazar.

Communication facilities were conspicuous by their absence and the forest areas were lying at a considerable distance from the commercial and administrative centres. It was therefore a difficult task to mobilize labour force for planting, harvesting and silvicultural operations. The local people were then shy to earn their livelihood by engaging themselves as labourers, however poor they may be.

Another constrain was the absence of regular flow of labour force in the forest areas. Due to diseases, adverse climatic conditions and distance, the people had to move from place to place. Enough land was lying vacant and the nomadic villagers did not face many problems in establishing new villages whenever it was needed. However, the situation contributed largely to non-availability of a stable labour force for maintaining forestry related activities. This resulted to occasional suspension of plantation work. Against this backdrop, the forest authorities felt the urgency of establishing a regular labour force and the concept of establishing forest villages gained momentum. Forest villages were set up in the periphery of the Reserved Forests.

The first forest village in Assam was established in 1901-1902 in Longai Reserve, Sylhet (now in Bangladesh). The eligibility condition laid down by the forest authorities was the adaptability to work in hostile ecological setting. The successful experiment of this idea of forest villages encouraged the authorities to establish more such villages, so much so that a major decision was taken at conservators' level for establishment of forest villages in all cultivable areas of all Reserved Forests. Thus by year 1902-1903, 15 forest villages were established. Their number increased to 90 in

1905-1906 and 145 in 1913-1914. Today the total number of forest villages are 524 including 60 Nos. of Tangia villages (which were not in the purview of this research) having a total population of 164261 comprising 20694 families covering 52950 hectares of forestland and extending jurisdiction of almost all the 23 districts (Government Report. 1991).

At the time creation of the forest village each family was allotted 5 bighas of land which included homestead land. Besides this, each working member living in that family was entitled another 10 bighas of land. However, the ceiling was fixed at 35 bighas per family and nominal payment had to be made for the allotted land to the Forest Department as revenue. There was no right for transfer of land and the families enjoyed only the right to use and occupancy. In lieu of the facilities offered by the Forest Department, the forest villagers were required to render 5 days free labour and 20 man-days of paid labour in a year at the prevailing approved rate of wages. The villagers enjoyed other facilities in kind such as free grazing of cattle, 10 cartloads of firewood annually, house building materials like thatch, bamboo, *ikra*, etc. which are free of royalty. The annual lease, however, have had to be renewed by the Forest Department regularly on an annual basis.

The Forest Department imposed restrictions on the entry of outsiders to the Reserve Forest areas. As the forest villages are set up at far flung areas without infrastructural facilities like good roads, potable water, schools, shops etc., the inhabitants of these villages could not visit the nearby weekly *hats* even for their petty purchases because of difficult communication system as well as fear from wild animals. Thus to cater to the needs of the villagers, the Forest Department allowed entry to barbers, teachers, shopkeepers etc., and they were allotted 5 bighas

of homestead land only within the forest village where they would settle. The detail of this is provided in Appendix-Ia.

The concept of 'forest dependency' is highly problematic. Although it is possible to refer loosely to any people who rely on forest products for their livelihood as being to some extent 'forest dependent', this loose usage obscures fundamental distinctions between different types of relationships. Byron and Arnold (1997) have presented a fundamental critique of the use of the term 'forest dependency', arguing that it is more useful to present a typology of different types of users. They make a crucial distinction between people who rely on forest use and have no alternative, and those who use forest products or engage in economic activities involving forests, but do so as a matter of choice.

People, who live inside forests, often living as hunter-gatherers or shifting cultivators and are dependent on forests for their livelihood primarily on a subsistence basis, may be defined as dependent on forests. People in this category are often indigenous peoples or people from minority ethnic groups. They are, thus, usually outside both the political and economic mainstream. People living inside the reserve forests of the study area can be regarded as dependent on forest resources. These people, as mentioned earlier have been settled through Government initiatives (Forest Department) to carry out plantation and maintenance of forest areas in the nascent stages – a stage when a number of facilities were provided.

**Ethnic Composition:**

Most of these were indigenous peoples or people from different ethnic groups like Rabhas, Garos, Boros and Oraons besides the General and Scheduled Caste communities. They were and are, more or less directly reliant on forests for livelihood

purposes since they are far away from markets, etc. With the passage of time, things have changed. Their population has grown over the years and some settlements are now nearby roads and other amenities.

Although there are various ethnic groups within the Reserve Forest, the multi-ethnic composition is not complex in regard of language as they can communicate through the state language (Assamese) though they have their own dialect. However, ethnic distinctions do remain. Often due to their remote location, these rural ethnic groups have comparatively less access to government services such as health, education, agricultural extension, and infrastructure. As a result, development impacts can have marginalizing effects on the isolated ethnic livelihood options. As these communities reside within the Reserve Forest and are away from urban centres, road inaccessibility and lesser access to education may have caused a higher incidence of forest dependency particularly among these ethnic groups makes them more vulnerable socially and economically.

### **1.1 Statement of Problem:**

Forests have traditionally been seen as valuable resources because they provide timber. Earlier the main focus of forest management has been on commercial logging, and a major objective of forest valuation has been to calculate potential timber revenues and profits and to balance these against the physical costs of forestry. As forest conservation has become a priority, economists have begun to rethink the profitability of forests. They now realize that the cost and benefits of the forests extend far beyond the profits of commercial logging. Although ecological values, and ways of measuring them, have become a generally accepted component of forestry economics and management, the use of forest products by local households for

subsistence has largely been ignored in the development of forest valuation methodologies.

For a long time neither economists nor decision-makers have fully acknowledged the value of forests for subsistence or considered livelihood dependence to be a factor in forest conservation. Yet information about domestic forest use values and their role in local livelihoods forms an integral part of forest conservation planning. By failing to value forest use at subsistence levels, a large proportion of the forests products are disregarded and their vital role in supplementing local livelihoods have never been focussed. This underestimates the total economic value of forests. It also leads to the danger that forest management systems will unfairly penalise local households by cutting off vital sources of subsistence and livelihoods.

The condition of communities living in the forest villages is very precarious, as they do not get the benefit of various welfare schemes due to non-availability of the title land in their favour. The forest villages are beyond the jurisdiction of the Community and Rural Development Block authorities and therefore these villages cannot avail for any welfare scheme. On the other hand, the Forest Department to which these areas belong have not been able to provide these communities with better amenities and facilities.

There are around 3,000 forest villages in the country out of which more than 500 villages have been converted into revenue villages during the last four years. There are about 499 forest villages in Assam, 85 in Mizoram, 62 in Tripura and 23 in Meghalaya (Times of India, Saturday, November 24, 2007).

These villages under condition are inhabited by many tribes which include Rabhas, Garos, Boros and Oraons besides the General and Scheduled Caste communities. Rabhas dominate these settlements. While considering the different ethnic group distribution more than 65 percent of the total population are Rabhas. The five other groups besides the Rabhas are General (10.25%), SC (1.28%), Oraon (4.44%), Boro (6.73%) and Garo (12.22%).

### **1.2 Survey of Literature:**

It is essential to review all relevant literature which has bearing on the topic. Each research has a formal and systematic structure which generates appropriate norms for evaluating its outcome. In this connection, a review of previous related research work will help the research to formulate a satisfactory structure of the undertaken research work (Saravanel 2002). This is essential, as Kothari (1996) points out, to find out what data and other materials, if any, are available for operational processes. Robert and Verdoorn (1962) said that knowing what data are available often serves to narrow the problem itself as well as the techniques that might be used. Moreover, reviewing of works already done is also useful for indicating the type of difficulties that might be encountered in the present study as also the possible analytical shortcomings. In this background, a detail review of the works available at different sources like academic journals, books, conference proceedings, government reports, website, etc. has been attempted by the researcher. The following relevant research work has been reviewed from different sources in connection of present research.

### **Literature Reviewed:**

Forests and forest products are linked to household livelihood systems in a variety of different ways. Forest products commonly contribute to meeting food and other basic needs, are a source of income and of inputs into the agricultural system, help households control exposure to risk of various kinds, and constitute an integral part of the habitat and of the social and cultural structure of those living within that environment. In the present study accounted to examine just some of these goods and services from the forest. However, as Levin (1992) has pointed out, in writing about southern Thailand: Villagers conceptualize non-timber forest products (benefits) as both concrete and intangible. The inclusion of conceptual as well as physical goods in discussions of non-timber forest products (NTFPs) by farmers suggests that to rural communities forests are a product to be weighed and measured and for which physical, extractable non-timber forest products are only a limited subset. The sum of the parts in this case is not worth near as much as the presence of the whole.

It is therefore necessary to consider how use or sales of material products such as forest foods are conditioned by this broader context of interrelationships between people and their forest environment. This broader framework is likely to reflect other important attributes of the forest, and the processes whereby people transform the forest into a productive system designed to meet their particular needs. In a recent study in Sierra Leone, Davies and Richards (1991) noted that for the local people:

Documented historical evidence on pre-colonial forest use in South Asia is relatively scarce. The available literature varies in terms of quantity and quality. This variation, combined with the wide regional diversity of South Asia, make generalisations very difficult. However a substantial literature argued that the forest-

based locals in different part of South Asia had a tradition of growing trees and managing their neighbouring forests without the stimulus of outside interventions (Elwin 1963, cited in Anderson and Huber 1988). Many others argue that “to a vast number of local people the forest is their well loved home, their livelihood ...their existence”. The underlying argument is that under such conditions there exists a close link between local communities and the nearby forest. People have sufficient access to the forest to fulfil their supplementary requirements and they practiced a localised, informal, and culturally determined pattern of resources and sustainability of production (Fernandes & Kulkarni 1983, Fernandes *et.al.*1988, Guha 1989, Nadkarni *et.al.*1989, Gadgil1985, 1987, 1989).

Earning from forest products is often important as a supplement to other income sources. A large number of households generate part of their income from selling forest products, often on a part time basis when farm production is not enough to provide food self-sufficiency all the year round. Much forest based income-generating activity is seasonal. Some products can only be gathered at certain times of year. Sometimes collection of forest produces seems to emerge as a primary activity due to the present demands and price factor. This leads to seasonal fluctuation of labour availability and such income may contribute to the purchase of farm inputs or food between harvests. Income from forest products is often used to obtain inputs for other activities that contribute to livelihoods like purchasing of seeds, hire of extra labour for cultivation or generate working capital for trading activities (Leach & Fairhead 1994). The rural poor often collect process and sell forest products (e.g. mats and baskets and selling fuel wood) in the absence of sufficient employment opportunities.

In Thailand the government tried to conserve forests by closing it to the public in 1990. This caused major changes in the access to food for the villagers, as they used the forest both directly for food collection and indirectly as a source of income. It was identified that there were extremely poor households whose rice production was insufficient to cover their yearly food requirements. Hence, they were the most vulnerable to food insecurity. These households relied on work as day labourers. The irony is that the promoted income generation projects focused on animals while these food insecure households were not able to benefit since they have neither land nor animals (Kunarattanapruk *et al.* 1995).

In South China, some pockets of evergreen broad leaved forest still remain despite centuries of massive forest clearance and conversion. An important reason for their continued existence is the ecosystem's intimate association with one or several material, cultural or ecological values of local people (Menzie's 1994). The composition of these "pristine" forests have been modified by long term preferential selection of some species over others in the course of harvesting, planting, hunting and gathering (Richardson 1990, Fellowes and Hau 1997). Many decision makers have focused narrowly on the natural aspect of forests and marginalized their importance to people. It is necessary to build a solid knowledge base about the integration of protected areas and local people, in order to preserve the ecological integrity of many nature reserves in China (Harkness 1998, Herrold 1999, Coggins 2000, 2002).

Forest and woodlands cover 35 percent of global land area despite centuries of felling to clear land for agriculture or to provide timber (WWF & IUCN 1996). Forests are important for their biodiversity, their role as 'lungs of the earth' and as natural capital sustaining the livelihoods of many people. Large numbers of people in

the developing countries are relying on forests as source of livelihood and many others regard economic activities related to forests an attractive livelihood option. There are cases where forests continue to be central to livelihood systems, local people are or should be the main stakeholders. Meeting their needs on a sustainable basis should be the principal objective of forest management, and this should be reflected in control and tenure arrangements (Peluso and Padoch 1996).

Accessibility of forest resources correlates with where local people live. People who live farther away from a forest use fewer of its resources while household, socio-economic background, such as size or wealth, plays an important role in resource utilization (Boer and Baquete 1998, Scott.1998). Some social factors, such as ethnic group and in/out-migration, also influence the resource-use pattern (Amend and Amend 1995, Boer and Baquete 1998).

Forests are important natural capital. Developmental efforts in the past have primarily focussed on building up of natural capital. This was done without paying equal attention how these assets, such as forests, combined with other assets can sustain livelihoods, especially among the poor. 'This oversight has resulted in gaps in understanding the contribution of forest products to sustainable livelihoods' (DFID 1999).

Food security is a very important aspect of livelihood. Forest is the source of a variety of foods that supplement and complement what is obtained from agriculture. It is also a source of fuel wood with which to cook food or boil water, and a wide range of traditional medicines and other hygiene products. Majority of rural households in developing countries, and a large proportion of urban households, depend on plant



and animal products of forest to meet some part of their nutritional, cooking and/ or health needs (Byron and Arnold 1999).

Much of the forest areas that are commercially exploited their clean products and services are located in relatively remote areas inhabited by ethnic minority groups whose economies still depend largely on shifting cultivation and collection of forest products. For many of these people, the forest has long served as an essential source of basic needs. These products can be bartered or sold for the cash needed to pay taxes or school fees or to purchase necessities, including food in the “hungry season” after harvest stores are exhausted (Deanna Donovan 1999).

More specifically, socio-economic research reveals that NTFPs become important in the livelihoods of many poor households who live in or near forests, especially in the tropics. Many of these studies find that the livelihoods of poor households still depend on NTFPs from fallow and natural forest relatively more than the other groups (Sills et al. 2003, Tickin 2004, Osman et al. 2000, Roderick and Hirsch 2000, Belcher and Kusters 2004).

Some forest food, especially leafy vegetables and wild animals, are used on a year-round basis in rural communities (Fleuret 1979 and Tallantaire 1975). Both found that wild leaves are essential ingredients of the daily diet on a year-round basis. Fleuret (1979) in her study of wild leaf plants in Lushoto, Tanzania, found that vegetable relishes are essential elements of the Shamba people's diet. She found that introduced cultivated vegetables were not replacing wild leaf relishes because people preferred the taste of wild leaves and they were traditionally important. In addition, wild leaves are valued because they are cheap and accessible. Newman (1975) found that the Sandawe consume gathered plants with 45percent of their meals on a year-

round basis. The use of gathered plants is not seasonal. He found that at least two or three different species were used on a monthly basis. Thus, while the use of specific species may be seasonal, overall they rely on the year-round supply of forest food products to supplement their diet. The most well documented and important use of forest foods is in meeting seasonal food needs. Most agricultural communities suffer from seasonal nutrition gaps known as "hunger periods". They generally occur at the end of the dry season and the beginning to middle of the rainy season (Longhurst 1985, Hussain 1985, Ogbu 1973, Chambers and Longhurst 1986).

Much of the house construction in the rural areas (and in many urban areas) in developing countries involves use of forest products. Although wood is mostly used for door frames and poles for the frame of mud walls, this frame is typically bound together using canes, lianas, raffias or twines made from other fibrous plants, and roofs are commonly covered with grass, bamboo, reeds or leaves. Bamboo is commonly used where it is easily available. It was reported that in Bangladesh over 70 percent of rural dwellings use bamboo as the prime building material (Dunham 1992, cited in Wells *et al.* 1994).

A recent review (Wells *et al.* 1994) notes that such usage of the forest is closely associated with poverty. There is substantial evidence pointing to the fact that vast majority of households in the rural areas are built with unprocessed organic materials because they are available at little or no cost ... often gathered free of charge from the householder's own farm or from forest and common lands.

There is observed widespread use of forest products for medicinal and other health purposes by rural households and at times by urban families. Very large

number of forest plants, and often some animal products, are frequently used by a community. For example, 214 instances of medicinal use of plants were reported in a community in Sierra Leone (Davies and Richards 1991), and 150 medicinal plants were observed in a location in Vanuatu (Olsson 1991). Even in the relatively species-poor sal forests of West Bengal, 47 species have been recorded as being used in 42 villages (Malhotra *et al.* 1993).

Particularly in the developing countries, the main constraint in restoring degraded land is that communities depend on the resources and harvest wood products or graze their flock/ herds on these lands (Gadgil 1998). Enhancing biomass production in such areas becomes possible if it helps the local communities to sustain their livelihoods. Initiation of different ethical trading initiatives may benefit rural people in different ways. The nature of these benefits to different categories of forest dependent people may be investigated using the sustainable rural livelihoods (SRL) framework devised by Scoones (1998). The SRL framework recognises that benefits cannot only be measured in terms of production or income, and are not simply the result of a single intervention or project. Rather, livelihoods are made up of the capabilities, assets (including both material and social resources) and activities required for a means of living and can be considered sustainable when they can cope with and recover from stresses and shocks. At the same time these communities must be able to maintain or enhance capabilities and assets both now and in the future without undermining the natural resources base.

Many researchers have sought to quantify the value of NTFPs. Tewari (2000) reviews the motivations and policy implications of these valuation efforts, and Wollenberg (2000) reviews the methodological challenges of obtaining accurate data

on quantities and prices. NTFP value can be calculated per hectare of forest (returns to land) or per household (returns to labour). Initially, researchers typically combine botanical or ethno-botanical information with market price data to find the potential value of NTFP production (Godoy and Bawa 1993, Peters et al. 1989). Secondly, researchers try to (a) track through small samples of households with frequent visits to record quantities and prices, (b) rely on respondent recall about quantities and prices of household surveys, or (c) elicit values directly using stated preference methods (Shyamsundar and Kramer 1996). Recent studies that carefully tracked household income conclude that NTFPs contribute between 10 and 60 percent of full income (Cavendish 2000, Kvist et al. 2001, Reddy and Chakravarty 1999).

A common hypothesis is that poorer households are more dependent on the forests (Godoy et al. 1995, Reddy and Chakravarty 1999). The relationship between NTFP collection (quantities or gross value) and socio-economic characteristics including income or wealth has been analyzed most often with cross-tabulations and graphical methods (Bahuguna 2000, Cavendish 2000, Godoy et al. 1995, Hegde and Enters 2000, Takasaki et al. 2000). Many of these studies find that poor households depend relatively more on NTFPs, conditional on an array of other socio-economic and geographical characteristics.

The common finding that the poor depend relatively more on NTFPs raises questions about the role of NTFPs in economic development. In the early 1990s, there was great interest in NTFPs as a basis for sustainable development (Nepstad and Schwartzman 1992, Plotkin and Famolare 1992). Currently, this focus is subdued while it may be important and relevant for North East India.

In India the way of life, culture, arts and crafts and the occupation of the bulk of the rural people lean heavily on the environment leading to innumerable products derived from the forest. The main occupation of the people is agriculture. Indian agriculture is depends on forests for (a) energy i.e., fuel wood, fodder for animals, (b) agricultural implements viz., wooden ploughs and wooden rafts, (c) food items like forest fruits, vegetables, etc., (d) housing which are made of bamboo, small timber, thatch, (e) medicinal herbs, (f) recreation, rituals etc. A large part (90%) of the wood produce in the country is used as a fuel wood in rural areas which is the only source of domestic energy. Thus it would be no exaggeration to say that welfare of the rural people of India in general and hill people in particular depends substantially on forest resources and their utilisation (Shah 1988).

Non-wood forest products (NWFPs) are important to some tribal indigenous groups. For example in West Bengal, tribal groups collect 27 forests based commercial products, 39 plant food and 47 medicinal herbs. NWFPs account for 70 percent of India's exports and demand for phyto-chemicals is expected to increase in future as a new frontier of trade. However it is very important to create propagation centres for a sustainable collection/extraction with proper intellectual property rights regime for further safeguard. Commercialisation of natural resources is critical for sustainable livelihoods. Moreover, sustainable use of natural resources has a direct impact on the improvement of natural capital (Ahmed 1997).

Another example from Karnataka gives an explanation of dependence of people on forest resources. It was found that the poor depended on the forest more than the non-poor. It was however amazing to know that the poor depended on common property forest resources to an extent of 24 percent while the dependence of

non-poor was about 15 percent. The study also states that with economic development the dependence of the poor on forest resources would reduce but the pace of economic development will take its own time. The idea to conserve forests and reviving the common property is a positive approach. However, joint management of such resources need to encourage communities in safeguarding the common resources and preventing the new trends of privatisation (Nadkarni 1997).

In response to growing pressure on forest, several traditional institutions and systems of forest protection and management emerged during the earlier part of the century. However these have declined over time but are re-emerging in response to degradation of biomass-resources and failure of the state policies and programmes (Ravindranath & Sudha, 2000). Some afforestation programmes were dominated by exotic species where planning and implementation was largely done by the Forest Department with marginal or no participation of communities. It was observed that the cost of re-vegetation was so high while the benefit flow to local communities is much lower than estimated. The National Forest Policy of 1988 recognized the importance of ecological functions of forests and rights of forest dependent communities. Joint Forest Management (JFM) is a major initiative post-forest policy, initiated since 1990 to enhance community participation in forest management (Ravindranath *et.al.* 2003).

North Eastern Region of India comprises of hill and mountains (60%), plains (28%) and plateau areas (12%). The plains of this region which are largely wide river valleys account for about 68,700 km<sup>2</sup> and about 1, 50,000 km<sup>2</sup> is hilly (Taher 1986). The whole region is characterized as forest-hill region with the greenest vegetation in

the Brahmaputra valley. It was observed that the population of the region is dependent primarily on nature and forest (Maiti & Chakrabarti 2002).

It is common knowledge that the economy of North-East region remained dominated by forest based activities. Shifting cultivation, which originated during Neolithic period, is still practiced in many areas and at least 1.5 percent of the region still practices this type of cultivation. Alpine pasture constitutes 14.7 percent of the total geographical area of the North-Eastern Region. Besides, there are different kinds of forest ownership system in this region. Forests are owned by religious groups, tribal communities, village communities and even individuals, besides forest acquisitioned by government and classified as reserved or protected forests. Almost half of the total population and three-fourth of the population of the rural areas in North-East India would be depending on forest for their food, fodder, fuel, shelter, fibre, timber etc. (Maiti & Chakrabarti 2002).

Among the important minor forest products of Assam, mention may be made of bamboo, cane, thatch, stone, sand, patidoi, honey, orchids, agar etc. Mention may be made of the value of bamboo which is an important minor forest product of Goalpara, Haltugaon, Dhubri, South Kamrup, Darrang and Nowgaon. Statistical data of some of these minor forest products are not available partly due to unscientific exploitation, utilization and local consumption (Sarma 1991).

The minor forest products like sand, stone, boulders, gravels of Assam plays a conspicuous part in the contribution to the growth of both internal and external trade. The minor forest products like the major ones provides various types of employment from skilled to a large number of unskilled labourers who are dependent greatly on it for their livelihood. There are a number of people employed in the extraction,

collection and transportation of minor forest products, however, statistics are not available in regard to total number of people engaged in these occupations probably due to their sporadic growth, inaccessibility etc (Sarma 1991).

Fruits, vegetables, mushrooms, other edibles, thatch grass, fodder, bamboo, fuelwood, including soil and stones are important NTFPs which are regularly extracted by the villagers from the Reserve Forest of Kamrup Districts (Barik et al. 2006). As a result of evolving NTFP research agenda, it is now broadly acknowledged that people's dependence on forest may vary in different settings and that there is no uniform category of "forest dependent" people (Wollenberg and Ingles 1998), Byron and Arnold (1999).

### **1.3 Objectives:**

- a. To identify the different type of forest resources used by the different communities in the study area;
- b. To understand the mechanism of production, consumption and distribution forest resources of different communities; and
- c. To assess the degree of dependence of these communities on forest resources.

### **1.4 Research Questions:**

The forest communities living in the different forests and specially Govt. Reserved Forests have been sustaining their livelihoods through the utilisation of forest products and services. In the southern part of Kamrup Dist, Assam, a number of these could be found. These villages are growing in population size and may barely be able to sustain in future with the already allotted resources. The lands allotted to them for sustenance are now under great pressure. Understanding the need to make forest areas better, it is required to find out how the poor rural communities living in such

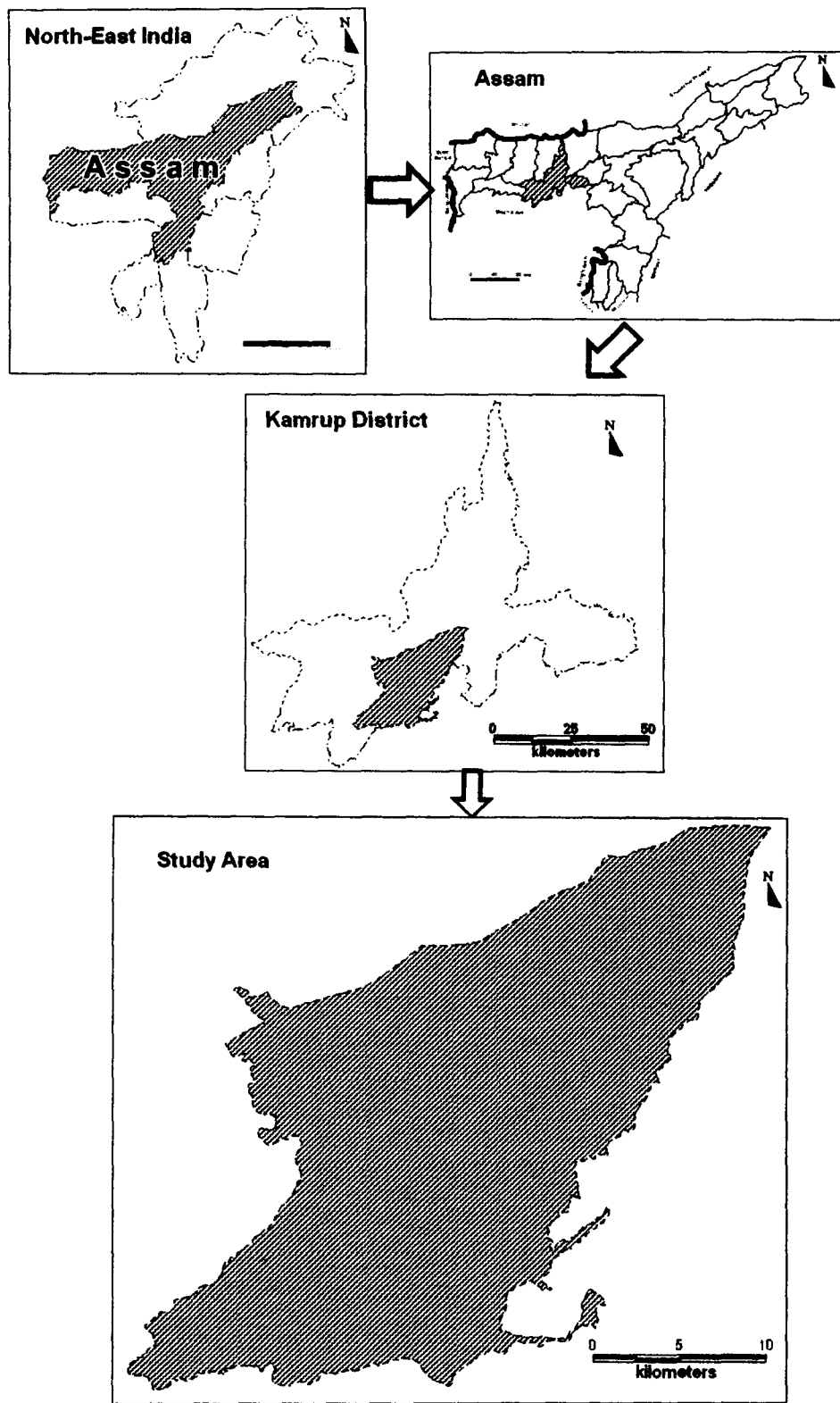
forests are utilising the resources of their surroundings. On the basis of this the following research questions have been kept in mind:

a. Given the number of forest villages, it is required to understand where these villages are located, their nature of concentration and which are the communities that inhabit these villages.

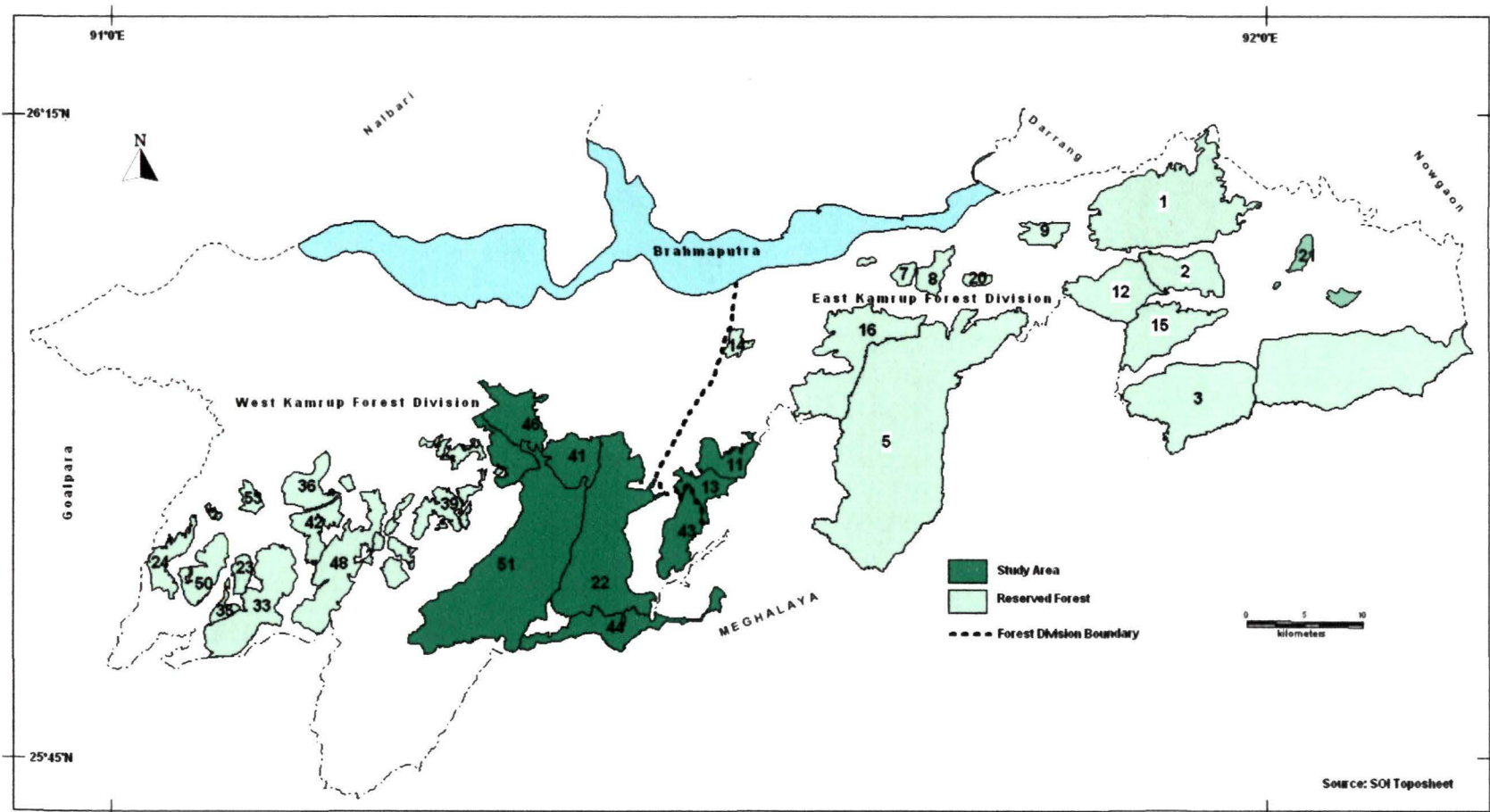
b. The population living in forest villages have been depending much on these forest resources for their survival and practically have no other resources. In what way these poor communities utilise the allotted resources under the pressure of their own growing population vis-à-vis the extremely limited resources.

### **1.5 Study Area:**

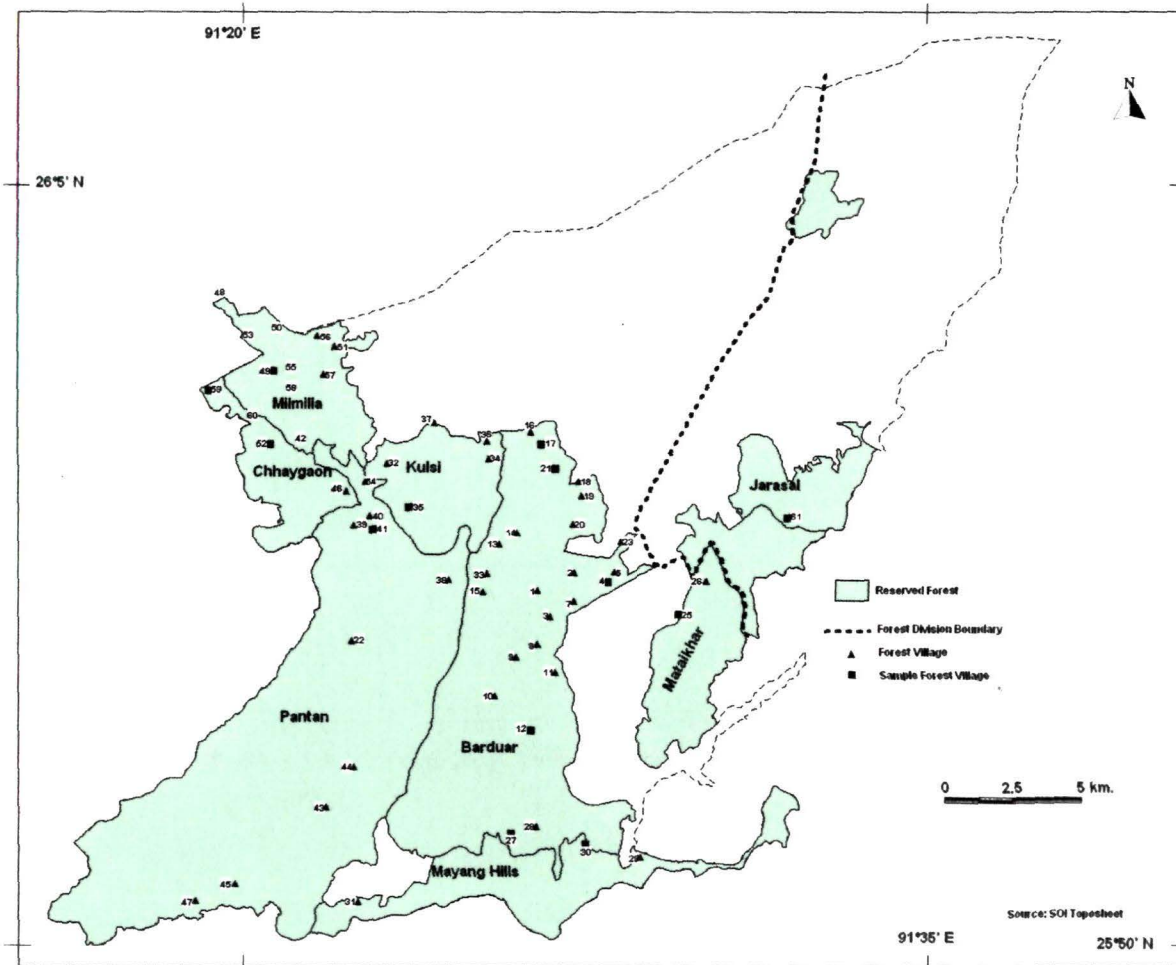
The district is situated in the lower Brahmaputra valley of Assam between 25°44' N and 26°51' N latitudes and 90°56' E and 92°10' E longitudes. It occupies a total area of 4, 35,009 hectares (4345 sq km) which accounts for 5.5 percent of the state. It is bounded by Darrang and Nowgaon district on the east and Nalbari with some parts of Goalpara district on the west. The northern boundary is marked by the Kingdom of Bhutan and southern one by Meghalaya State (Fig.-1.2). The study is concerned with Reserve Forests of Kamrup Districts where forest villages are located. These Reserve Forests are in the southern part of Kamrup district comprising East and West Forest Division. Within these two Forest Divisions there are 54 Reserve Forests (Fig.-1.3). The total area of southern part of Kamrup district is recorded 2, 82,800 hectares (2828 sq km). The forest villages are located mostly in West Forest Division and concentrated in only seven Reserve forests. There is only one forest village in the East Forest Division. The total area where the forests village located is 57,770 hectares (577.7 sq km) (Fig. - 1.4).



**Fig.-1.2: Location map of the Study Area**



**Fig-1.3: Location of Reserve Forests in Kamrup District**



**Fig.-1.4: Reserve Forests, Forest Villages and Sample Forest Villages Located Study Area**

### **1.6 Sample Design and Methodology:**

The basic purpose of the present study is to examine the forest resource utilization by the forest dependent villages (known as village forest or forest village) created in Reserve Forests (R.F.). Since secondary data is not available greater emphasis is laid on to the collection of data from the field through random sampling techniques. It is true that complete enumeration is not possible for an individual researcher due to limitations of money, time and energy (Kothari 1990). At the same time, the survey of that kind is not required in the context of a universe characterized by homogeneous conditions. In this a part of the universe can explain the reality and as such sampling becomes an indispensable tool for a researcher.

Conventional economic valuation techniques are ill-equipped to deal with rural subsistence economies. Most valuation methods not only depend on a market paradigm, but rely on a particular view of markets which is based on cash sales and purchases in developed centres. There have been few attempts to value forest use for subsistence and, with few exceptions (Kramer et al. 1992), they have been concerned almost entirely with products which are traded or are closely related to other traded products (Godoy et al. 1993). They look at people's behaviour in actual, surrogate hypothetical markets where goods are freely brought and sold in cash. While forest use in rural areas is focused on collected products such as fuel wood, pasture, wild foods and medicines (used within the household) which are not bought or sold for cash and hence the conventional valuation methods have limited validity. It is impossible to find market prices for such products. It is also often equally difficult to apply the prices of substitutes for these goods, both because of their unique characteristics and because there are frequently no local markets at which substitutes

are available or affordable. To find out the willingness of the people to pay for (or to accept compensation for the loss of) collected forest resources is also inappropriate in a non-cash economy where livelihoods depend on irreplaceable forest resources. A question therefore emerges on the use of conventional price-based methods or market paradigms for valuing forest use at subsistence levels in rural developing economies. Even if there is opportunity to obtain some price which could be applied to forest products, there would be serious practical problems in using techniques that applies value to each unit of forest product use. There are usually no complete records of forest use and it is difficult to carry out observations over long periods or details are insufficient to get a clear idea of the total quantities of forest products involved. As such there is a need to value forests products not only for the subsistence it provides to poor communities but also the present requirements that products should be used in a sustainable manner.

In the present work, the samples are drawn in such a way that successful explanation of the forest resource utilization by the forest dependent people of the study area can be achieved with valid and reliable conclusions. Therefore, the sample design to be used in the present study has been decided by the researcher considering the basic objectives of the inquiry proposed earlier along with other related factors. The various stages involved in designing the sample are presented below.

#### **1.6.1 Selection of Villages as Sample:**

In order to select villages for detail investigation, it was necessary to obtain the permission from the Forest Department, Government of Assam since this study is entirely in the Reserve Forest (RF) area and without the help of Forest Department officials it would not have been smooth sailing.

The selection of forest villages in the Reserved Forests for detail investigation has been taken up in the following manner.

a. Selection of Reserved Forests: Out of 54 Reserved Forests only 8 of them have forest villages. Hence, all the 8 Reserved Forests have been considered to be taken into consideration.

b. Selection of Villages: There are 61 forest villages in the 8 Reserved Forests. At least one village from each Reserved Forest have been considered as sample village. Since these villages are mostly populated by several ethnic groups, care was taken to include all these ethnic groups in the samples, which was one the basis of selection of the sample villages. As a result of this exercise, 13 villages from 8 Reserved Forests were taken as sample villages for the present research work. The important criteria adopted for the selection of villages, keeping in mind the ethnic representation, are as follows

- i. Distance from the urban centre; and
- ii. Accessibility from metal roads.

As per records of the Forest Department, Government of Assam, there are 61 forest villages in Kamrup District (11.64 % of the total forest villages of Assam). It is also important to note that these 13 villages represented 21.31 percent of total forest village of Kamrup District. Thus, the proportion of villages taken up as samples from district is larger than the proportion of forest villages in Kamrup District, Assam. Table No - 1.1 summarises the selection.

During the pilot survey (prior to detail survey) an inquiry was conducted. It was found that most of the villagers access three urban centres for their needs. On the

basis of this, three urban centres were identified, namely, 1) Chhaygaon, 2) Mirza, 3) Rani and the distance of these villages from the nearest urban centre was considered.

**Table No- 1.1: Basic Information of the Sample Villages**

Name of R.F. (Total Village Forest)	Name of the Sample Village	Population Size	Households			Distance from nearest town (Km)	Metal Road Accessibility Km	Ethnic Community
			THH	SH	%			
Barduar (24)	1. Japangbari	256	41	21	51.22	30	8	Rabha
	2. Borjhar	388	56	28	50.00	23	3	Rabha, Oraon
	3. Dimali	184	32	16	50.00	22	1	Rabha
	4. Nalbari	860	151	76	50.33	24	3	Rabha, Boro, Gn.
Milmila (10)	1. Akchelia	244	44	22	50.00	5	0	Rabha, Gn. SC.
Pantan (11)	1. Sanyasi	388	71	36	50.70	14	6	Rabha, Garo
Chhaygaon (3)	1. Khalpakhal	182	34	17	50.00	11	5	Garo
	2. Paglapara	234	53	27	50.94	7	0	Rabha
Kulsi (5)	1. Kahua- bahatpur	642	142	71	50.00	13	5	Rabha
Mayang Hill (5)	1. Rajapara I	244	44	22	50.00	33	10	Rabha
	2. Hatigar	146	24	12	50.00	31	9	Rabha
Mataikhar (2)	1. Hanapara	170	25	13	52.00	20	3	Rabha
Jarasal (1)	1. Joypur	432	86	43	50.00	9	3	Rabha, Garo.

NB: R.F.=Reserved Forest, THH=Total Households, SH= Sample Households, Gn.= General, SC=Scheduled Caste

There were certain limitations relating to security for which the Forest Department did not permit selection of some more interior villages, which could have enhanced the achievement the desired result. However, using the proposed criteria, the distance from the nearest urban centre, accessibility and ethnic community representation of sample villages, the detailed investigation of the samples was carried out. Since the items of the universe of the present are homogeneous and attempted to be studied intensively, the present sample could be expected to yield a real representation of the intended universe.

### 1.6.2 Selection of Sample Households:

Villages have been classified with respect to distance from the nearest urban centre and accessibility from the nearest metalled road as explained above. The households were then randomly chosen keeping in mind the following:

- i. Household size
- ii. Literacy rate

**Table No-1.2: Sample Household Classification according to Determinant Strata**

Determinant strata	No. of Household	% to T.H.H	Population size (persons)	% to T.P.	Average size population /Household	Average Land Holding/ HH(ha)
<b>1. Distance from nearest urban centre (in Km)</b>						
< 10 (nearest)	92	22.77	455	20.82	4.95	0.98
10—20 (nearer)	124	30.69	606	27.73	4.89	0.90
20—30 (far)	133	32.92	801	36.66	6.02	0.92
> 30 (very far)	55	13.61	323	14.78	5.87	0.87
<b>Total</b>	<b>404</b>	<b>100</b>	<b>2185</b>	<b>100</b>		
<b>2. Accessibility from metal road (in Km)</b>						
< 2 Km. (easy accessible)	65	16.09	331	15.15	5.09	0.81
2--4 Km. (accessible)	160	39.60	925	42.33	5.78	1.00
4--6 Km. (partly accessible)	88	21.78	412	18.86	4.68	0.83
> 6 Km. (inaccessible)	91	22.52	517	23.66	5.68	0.95
<b>Total</b>	<b>404</b>	<b>100</b>	<b>2185</b>	<b>100</b>		
<b>3. Household size (persons)</b>						
1—3 (very small)	56	13.86	148	6.77	2.64	0.74
4—6 (small)	253	62.62	1241	56.80	4.91	0.88
7—9 (medium)	78	19.31	595	27.23	7.63	1.05
10—12 (big)	13	3.22	141	6.45	10.85	1.18
> 13 (very big)	4	0.99	60	2.75	15.00	2.61
<b>Total</b>	<b>404</b>	<b>100</b>	<b>2185</b>	<b>100</b>		
<b>4. Literacy Rate (in %)</b>						
0--20	62	15.35	289	13.23	4.66	0.81
20--40	88	21.78	460	21.05	5.23	0.90
40--60	114	28.22	661	30.25	5.80	0.96
60--80	90	22.28	499	22.84	5.54	0.92
80--100	50	12.38	276	12.63	5.52	0.96
<b>Total</b>	<b>404</b>	<b>100</b>	<b>2185</b>	<b>100</b>		

In the selection of the households, no statistical technique has been used, rather personal judgment, building familiarity and trust with the local people has been applied. This was done by conducting a small gathering with the help of village headman and learned persons of the villages. It helped in convincing the purpose of the survey.

The first aim was to build a large and comprehensive picture of local livelihood options (forest sources like collecting/ gathering, fishing from forest, etc., are termed as forest products and other benefits from forest sources were considered forest associated activities. On the other hand, cropping and animal husbandry including petty businesses, government and private jobs, etc were classified as non-forest sources) used by different households (Table No-1.2). After becoming familiar with the local people, general questions, informal interviews as well as simple observations were done during the day. Observations were made in the field for forest products collection and peoples' involvement in daily activities. This enabled to obtain a general picture of the village households.

The second was an attempt focused on selecting of households. In order to obtain a broad and representative picture of mechanism of village livelihoods and forest resource use, households were selected on the basis of economic status, ethnic group and occupation. Keeping these points in mind a sample of 50 percent from each village was taken and a total of 404 sample households were considered (Table No-1.2). Household interviews were conducted using a prepared questionnaire (Appendix-Ib).

### **1.6.3 Attributes of Forest and Non-Forest Products:**

Attributes have been generally grouped in two categories namely, products and activities. These attributes are elaborated in the following paragraphs.

The forest attributes are grouped as:

- (i) Forest Products
- (ii) Forest associated activities.

The contribution of forest resources in the livelihood of the people of forest village is the main concentration of the present study. To derive the appropriate contribution of forest sources, all the possible relevant attributes are taken into account while collecting data and information during field work. Emphasis was laid on those attributes which contribute to the livelihood of the people living in the study area (Table-1.3). Data and information are collected for the year 2005—2006 from the surveyed households.

(i) **Forest Products:** Forest products means natural vegetation and aquatic life forms collected from the reserved forest by the household on a regular basis to meet their needs.

(ii) **Forest Associated Activities:** Forest associated activities means the earning source from the reserved forest on regular basis other than the natural vegetation and aquatic life form collections.

Similarly, Non-Forest attributes are also grouped as products and activities. There are many products as well as activities in the Non- Forest sector but attributes considered in this study are relevant to the study area on which data and information collected from the field. These attributes do contribute significantly to the livelihoods

of the inhabitants of the reserved forests of this area. These have been grouped as follows:

(iii) **Non-Forest Products:** means plant and animal cultivated or grown by the forest villagers.

(iv) **Non- Forest Activities:** means earning source other than the cultivated or grown and Forest source i.e. off farm.

#### **1.6.4. Importance of Attributes:**

Attributes listed on Table No-1.3 are the data source of livelihood and benefits generated by the households living in all sample villages. The total annual source of livelihood and earning from the listed attributes are termed as production of the households. The products from forest sources comprise of five major items. The non-timber forest products comprise mainly of six types. Activities of the inhabitants that are associated with the forest are of four major types while the fifth includes a number of other minor activities. On the other hand the non-forest products are generally activities produced from agricultural fields allotted to the inhabitants. Other produces includes arecanut, fruits, livestock and processed products like liquor as well as other minor products. The non-forest activities comprises of five items like government and private jobs, petty and small business, etc. However, as mentioned earlier most valuation methods depend mostly on a market paradigm. Literature available for these estimations convey that methods used have relied on data of markets based on cash sales and purchases. Only few attempts have been made to value forest use for subsistence (Kramer et al. 1992). They have been concerned almost entirely with products which are traded or are closely related to other traded products (Godoy et al. 1993).

**Table No-1.3: Name of the Attributes**

Attributes	Units	Remarks
<b>A. Forest sources</b>		
(i). Forest products		All these are converted in to monetary terms for comparison and further study.
a. Firewood	Kg	
b. Edible Forest vegetable	Kg	
c. Aquatic life-forms	Kg	
d. Charcoal	Kg	
e. NTFPs		
i. Bamboo	Piece	
ii. Thatch	Bundle	
iii. Palm leaves I (Tokopat)	Bundle	
iv. Palm leaves II (Japipat)	Bundle	
v. Cane	Piece	
vi. Broomstick	Bundle	
(ii). Forest associated activities		
a. Handicraft	Rs.	
b. Medicine practitioner (Kabiraj)	Rs.	
c. Sand collecting labour from river	Rs.	
d. Stone crushing	Rs.	
e. Other labour and Wages	Rs.	
<b>B. Non-Forest sources</b>		
(i). Products		
a. Paddy Rice	Kg	
b. Arecanut	Kg	
c. Cultivated vegetable	Kg	
d. Fruits	Kg	
e. Liquor	Rs.	
f. Animal	Rs.	
g. Others	Rs.	
(ii). Activities		
a. Government Services	Rs.	
b. Private Job	Rs.	
c. Daily labour	Rs.	
d. Petty business and shop	Rs.	
e. Carpenter	Rs.	

\*Cost of grass is not calculated as sale of grass do not exist in study area so it does not add to their direct income. Grass consumption is calculated to obtain and add to the extent of forest resource utilization since animal keeping is part and parcel of rural livelihood.

It was therefore, necessary to find out a relevant method suitable for the area under consideration for the purpose of understanding resource use and to interpret the livelihood pattern. In this regard, since there is no suitable technique to estimate the utilisation of forest resources of the area, the following method would be applied. This would entail the estimation of:

- i. the 'production pattern of households' from forest products
- ii. the 'consumption pattern of households' from forest products
- iii. the 'subsidiary benefit derived by households' from forest products

#### **1.6.5. Estimation and Calculation of Forest Production:**

Data collected from the sample households was in raw form. Most of the data of forest products were in the local terms like bundle, *mutha*, *bhag*, *bhar*, *thela*, *mond* etc. These were then standardised to kilograms (Appendix-Ic) and then converted to monetary terms and finally in percentage terms. Some of the products were brought from the weekly markets and measured to get more accurate estimation. The collection pattern of products varies from household to household eg., daily, every alternate day, weekly, monthly and seasonally and also in terms of type of products. These were all taken in to account while calculating the total amount of each household's annual production from forest.

Since forest resources contributes part of the total production, it was necessary to take Non-Forest sources of production into consideration. In order to arrive at an understanding of the contribution of forest products to the livelihood of these households, emphasis was laid on the relevant attributes.

#### **1.6.6 Household Consumption Estimation:**

Household consumption of forest food products was estimated by measuring the amount consumed per meal by a household taking in to account the size of the family. This was done by visiting sample households before preparing their meals. The households were also asked to estimate their consumption per meal of different types of food products which were collected/produced from forest as well as homestead. The estimation of the contribution of forest and non-forest products per head per meal in consumption was recorded. While estimating the consumption of forest and non-forest products, seasonality was also kept in mind focussing on the consumption pattern of the households on a weekly, monthly or yearly basis. Consumption of non-forest products like rice and vegetables were considered as these are the major produces from allotted lands. The data collected is computed, standardised and converted to monetary terms for the calculation of per head consumption.

#### **1.6.7 Calculation of Subsidiary Benefit:**

In fact, the present study aims at understanding the reliance of forest villagers on forest products. The method, as mentioned above, would estimate the 'production' and 'consumption' patterns of the households from forest and non-forest sources. In order to understand how much these inhabitants depend on the forest for sustaining themselves it was necessary to segregate the forest and non-forest components. To arrive at an explanation of the 'subsidiary benefits' obtained by the inhabitants of the forest villages a new matrix was generated from a forest product based differential technique.

Subsidiary benefit from resources is derived by deducting total forest product consumption from the total forest product production/collection as:

$$[S_{Fh}] = [P_{Fh}] - [C_{Fh}]$$

Where,

$[S_{Fh}]$  is an array of subsidiary benefits derived from forest sources

$[P_{Fh}]$  is an array of production/collection of items from forest sources

$[C_{Fh}]$  is an array of items consumed from forest sources

Subsidiary benefit would show how much is gained in monetary terms these communities are deriving from the forest sources for survival or for uplifting their livelihood.

An attempt was made to synthesise the observations. To accomplish this, a Multiple Regression equation in the form of 'Stepwise calculation' was also performed to draw results of the determinants and their priorities in influencing the three sets of forest data, namely production, consumption and subsidiary benefit. The following formula was used :

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \dots\dots\dots b_nX_n$$

Where,

a= Constant

$b_n$ = Coefficient that indicate rate of changes of Y with respect to determinants  $X_n$

Y = Forest products

#### **1.6.8 Grass Consumption of Animals:**

In the study area household partially depends not only on forest but also animals, there no stall feeding system except for pigs. Animals are allowed to graze freely in the forest. The households keeping pigs feed the animals from the collection

of forest food. The estimated forest grass consumption based on according to body weight and age of animal (Ranjhan 1990). For the body weight of 100kg. required DM (dry matter) consumption is 2.5kg. To get 2.5kg DM the requirement of green grass is 12.5kg (average).

Live Body weight of animal according to Shaeffer's formula:

$$L \times G^2 / 300 \text{ (in pounds)}$$

Where, L= Body length in inches, (from point of shoulder to pin bone)

G= Girth around chest at the highest point of trunk (Shastry 1976).

Pounds is converted to Kg. i.e. 2.21lb= 1kg. Taking in to account this formula few cattle of different age groups are measured and average weight of different age group are estimated as follows.

**Table No- 1.4a: Average Body weight of Cattles on the basis of Age**

Sl no.	Age group (Cattle)	Average body weight (kg)
1	< 1 year	12—70
2	1—2 years	70—120
3	2—3 years	120—200
4	> 3 years	> 200

**Table No- 1.4b: Average Body weight of Goats on the basis of Age**

Sl no.	Age group (Goat)	Average body weight (kg)
1	< 1 year	10
2	1—3 years	17

(Bora 1983)

**Table No- 1.4c: Average Body weight of Pigs on the basis of Age**

Sl no.	Age group (Pig)	Average body weight (kg)
1	< 1 year	23
2	1—2 years	40-- 45

(Phookan 2002)

#### 1.6.8 Other Sources of Data:

Beside the primary data collected from the field through household schedules, secondary data have been used in the present study. These are collected from different

sources including various governmental and non-governmental publications. Working plan of Reserve Forests from the Forest Department, Government of Assam, Census of India publications, Survey of India Topographic map from the Department of Geography, NEHU, Landuse maps from Assam Remote Sensing Application Centre, Guwahati, Assam and Satellite Imagery (IRS-2005) from Aaranyak, Guwahati were used to assess the current status of forest area of present study.

#### **1.6.9 Construction of Maps and Diagrams:**

All maps have been constructed in the GIS environment. Old maps and referred maps have been geocoded to perform suitable overlays and arriving at generalised conclusions. Appropriate diagrams had been constructed after appropriate statistical exercises were completed using Microsoft Excel.

#### **1.7 Organisation of the Research Material:**

The entire material of the thesis has been coherently arranged into six chapters. Since the statement of the problem, objectives, literature review and methodology are prerequisites of the thesis, these aspects have been arranged in Chapter I. Obviously, the geographical aspects of forest ecology and its management are the background material for a research to understand cause-effect relationship, it is given in Chapter-II. Chapter-III, IV and V deals with the analysis and interpretation of forest and non-forest production, their consumption by the households living in the forest villages and the understanding of benefits derived from the forest either for their survival or to improve their livelihood. Last but not the least, in Chapter-VI the results are summarised with an aim to forward answers to the questions posed and attempt at synthesizing the results for generalisation.

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## Chapter II

### Geographical Personality of Forests and their Utilisation

Geographical personality of an area may be described by interpreting the physiographic attributes and socio-economic activities of the people living in a particular region. Forest and forest products are important for the present work to provide a background of the study area and for the explanation of forest resource utilization as well as the degree of dependency of the households of forest villages living in the southern bank of Brahmaputra.

Geologically, the basement of the entire region is similar to those of the Meghalaya plateau which is a detached part of the Deccan plateau composed of Gondwana rock mass. Major portion of the region has been built up by alluvial deposits of recent to sub-recent origin on the Pre-Cambrian rock basement (Barman, 1986). The study area includes two major physiographic zones (Das 1980) namely,

- i. Part of the Middle Plain belonging to the south bank of Brahmaputra river which is composed of alluvial deposits; and
- ii. The Southern Foothill zone comprising of the extended spurs of Khasi Hills composed of red ferruginous soils and usually encompassing isolated monadnocks and wetlands (including *beels*) covered by forests.

#### 2.1 Climate:

Describing the weather and climatic conditions of North East India, Borthakur (1986) remarked that the entire region has distinctive climatological attributes which are not comparable with any other part of the sub-continent. This distinctiveness, according to him, has resulted mainly from the region's geographical location and its physiography. Based on these local conditions, he has classified the region's climate into four main types, viz, humid continental severe winter, moist in all seasons and

short summer (Dfh); sub-tropical monsoon, mild and dry winter, warm and humid summer (Cwb); sub-tropical monsoon, mild and dry winter (Cwa); and sub-tropical monsoon with with very heavy rain (Cwm). Assam is under the influence of the Cwb type of climate. Assam in general, enjoys a climate characterized by adequate rain during summer and cold foggy winter associated with highly humid atmosphere. Each year could be roughly divided into four seasons. The cold season starting from November and ending around February with practically no rain. This is followed by the pre-monsoon season associated with mild to severe thunderstorms from March to May. This represents a hot season with the earlier half of this season being relatively dry, the latter half of the season there occurs quite a few thunder storms with light rain. These storms cause considerable damage to the forest resulting in wind fallen or mid broken trees. Occasionally, all immature seeds of Sal in the area are blown off the trees by such storms. The period from June to about the beginning of October is influenced by the south west monsoons. It depends much on the appearance monsoon trough over northern India. As soon as the trough reaches the Himalayas, monsoon breaks in the northeast India. High rainfall, high temperature and humidity accompany the southwest monsoon. October and the early part of November constitutes the post monsoon season. Following the monsoon withdrawals, light unsteady winds are experienced which become northeasterly (Barthakur 1986, Gazetteer, 1990).

The region receives an average rainfall of 400mm to 900mm during the months of April-May. During monsoon season the average annual rainfall ranges between 1500mm and 2600mm. The average minimum and maximum temperature recorded are 10°C and 30°C respectively with relative humidity of more than 86

recorded are 10°C and 30°C respectively with relative humidity of more than 86 %.

This climate is congenial for the luxuriant growth of mixed deciduous forests.

## **2.2 The Forests:**

The forest region and forest resources are the main component of the present study. The Reserve Forests of study area are located mostly in the hilly areas and also covering small portion of the flood plain of the Brahmaputra. The hills are in fact a continuation in the form of spurs of Khasi Hills. The forests over plain areas are located over alluvial deposits locally known as '*taris*' and these are transversely eroded by numerous narrow, winding low lying tracts which are known as '*julis*'. The *taris* are usually the result of gradual jutting out and levelling of the various spurs and sub spurs of hilly formations into the plains and *julis* are continuation of the valleys between these spurs.

As mentioned in Chapter I there are altogether 54 Reserve Forests in the southern part of Kamrup District comprising East and West Forest Division. There are only 8 Reserved Forests where forest villages are located. (Fig-1.3 & 1.4). There are 61 forest villages in the 8 Reserve Forests of these two Divisions of the District. Out of these, there are 60 forest villages concentrated in 7 Reserved Forests of Kamrup West Division while only 1 forest village is in the Kamrup East Division. All the 8 Reserved Forests have been included in the present work and 13 sample villages have been considered.

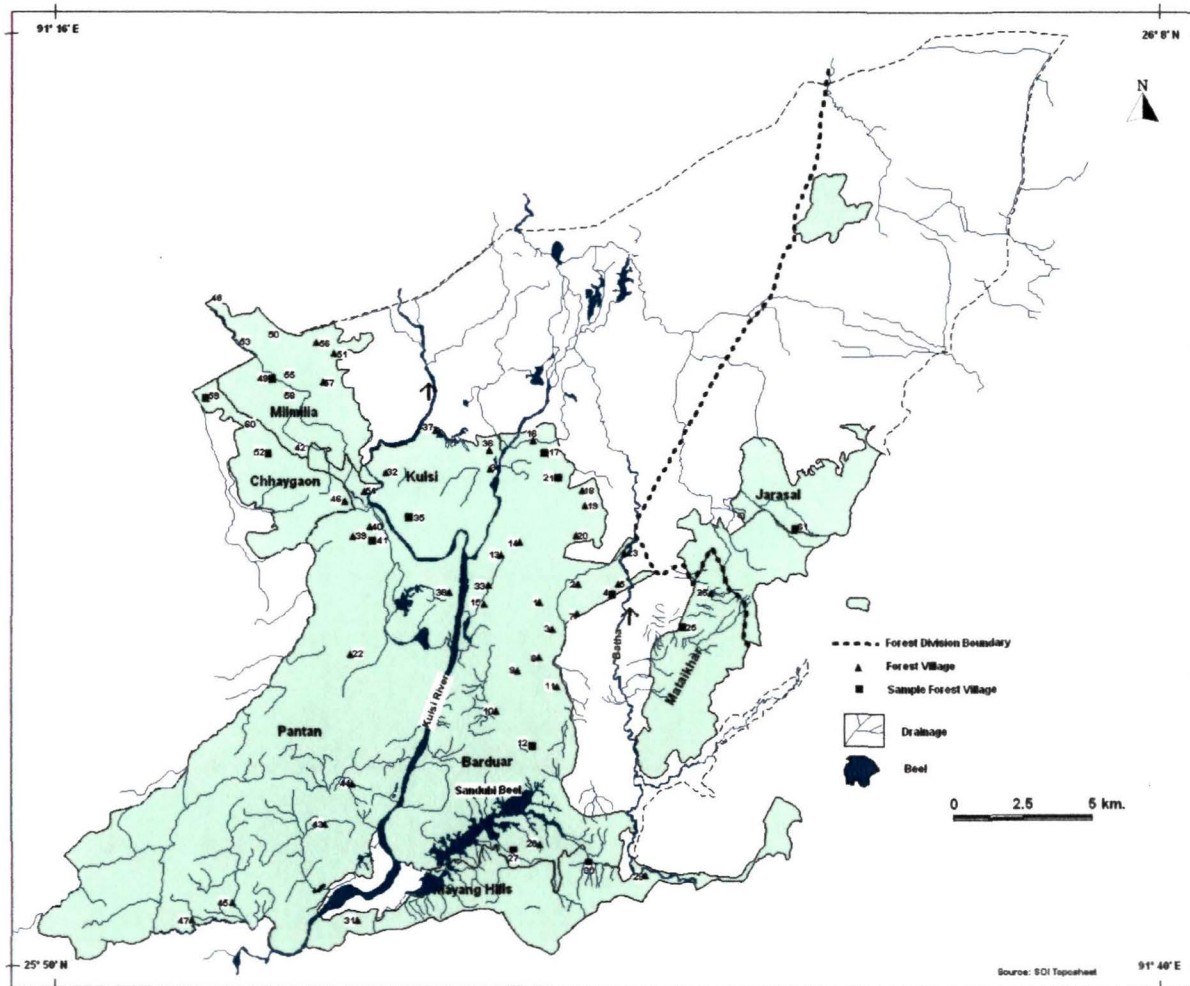
### **2.2.1 Drainage and water bodies:**

Drainage and water bodies form an important physical basis for the growth of natural vegetation and socio-economic condition of any region. The same applies to the study area. Drainage and water bodies are source of water for drinking and

household use for human as well as animal. Drainage is relevant in the present context with reference to soil erosion, sand deposition and development or removal of fertile soils. It is also important for water transport and various economic activities like agriculture, fishing, and sand collection from stream.

The Kulsi is the main tributary flowing to the Brahmaputra river in this part of the district (Fig-2.1). This tributary originates from West Khasi Hills, Meghalaya at an elevation of about 1500 m above mean sea level (M.S.L) and flowing northwards to meet the river Brahmaputra near Nagarbera. It traverses partly in Meghalaya and partly in Assam. The length of the river in Meghalaya is about 120 km. while in Assam it is about 135 km. This river is fed by three important streams namely the Khri, the Krishniya and the Umsiri. All these three streams originate on the same hill ranges. These three streams are again joined by a number of hilly rills, rivulets and streams until they combine to meet at the Ukiam '*beel*', a big depression with water. From this *beel* the combined water flows towards the Brahmaputra by taking the name Kulsi for a distance of about 20 km. This river marks the eastern and western boundary of Pantan and Borduar Reserved Forests respectively.

Kulsi river then bifurcates into two branches near the Kulsi village. The western arm is again divided into two near the village Hatigar. The left arm is known as the Khorkhori and the right arm flows as Kulsi which demarcates the eastern and western boundary of Kulsi Reserved Forest. Khorkhori river marks the eastern boundary of Chhaygaon and Milmilia Reserved Forests. It crosses the N.H. 37 near Chouseholdsaygaon and enters in to the flood plain of the Brahmaputra. The eastern most branch of Kulsi river, on the other hand, is joined by two important tributaries,



**Fig.-2.1: Drainage, Forest Villages and Reserve Forests of Study Area**

namely, the Batha and the Ranigodam. This branch crosses the N.H. 37 near Kukurmara. Other important perennial tributaries of Brahmaputra river in the southern bank in the Kamrup district are the Singra and Basistha. The Singra originates in East Garo Hills and after traversing about 60 kilometers and it joins the Brahmaputra. The Basistha is another tributary originating from West Khasi Hills and joins the Brahmaputra near Guwahati. Its total length is about 35.2 kilometers.

In the Brahmaputra valley there are a number of wetlands or *beels* that support the needs of the local population. The *beels* which are significant in the study area are Sandubi, Kendili, Sapekhaiti and Kandhula.

#### **2.2.2 Type of Forests:**

The different types of forest in the area as per classification of Forest Department (Govt. of Assam) based on (Champion and Seth, 1968) and as mentioned in Working Plan of these Reserved Forests can be summed in the following paragraphs.

**(i) Eastern Hill Sal Forests- Khasi Hills Sal:** As the name implies, this type of forest occurs in the Rani, Garbhanga, Jarasal, Maliata, Kawasing, Mataikhar, Mayang Hill Reserved Forests. A large part of these forests is covered by *Shorea robusta* (local name: Sal) and associated with Bamboo which are concentrated in patches and groups along the ridge and spurs. The valleys and the middle slopes are occupied by a number of broad leaved species and bamboos (Ref: Appendix IIa).

This type of forest is found mostly in the south eastern part of the study area along the Foothill zone. Soils of these areas are usually Fine Typic Kandihumults and Fine loamy Typic Dystrochrepts. Slopes in this area range between 300 to 600 m/km (Fig. 2.2).

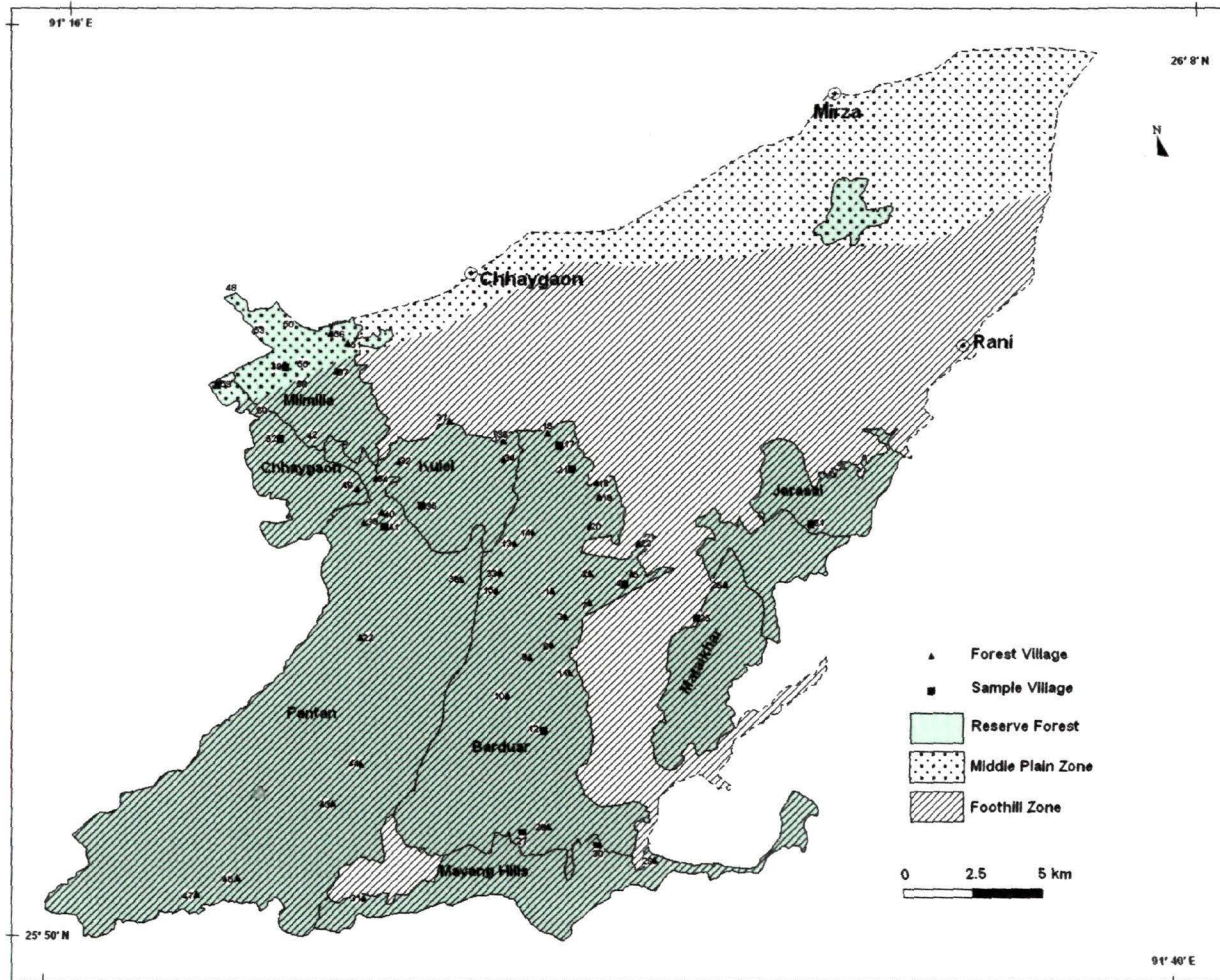
Some local names of forest products commonly available are *Makarisal*, *Haldu*, *Amlakhi*, *Gamari*, *Kako bamboo*, *Dheki-lata*, *Bhedelata* and *Bon-marich*.

(ii). **Moist Plains Sal Forest –Kamrup Sal:** Generally lower slope of the foot hills and the *taris* in alluvial plains are covered by this type of forest. This type occurs mainly in Pantan, Barduar, Khorkhori, Kawasing and Mataikhar, Chouseholdsaygaon and part of Jarasal Reserved Forests. Common products comprise Sal, Makarisal, Jia, etc. There are great variations in the ground cover. In comparatively young Sal areas, areas subjected to annual burning and having a more open canopy, *Imperata cylindrica* (Thatch) form the main ground cover. In more moist locations ferns occurs with occasional cane.

This type of forest is found mostly in the south western part of the study area along the Foothill zone. Soils of these areas are usually Fine Typic Kandihumults and Fine loamy Typic Dystrochrepts. Slopes in this area range between 300 to 600 m/km.

(iii). **Moist mixed deciduous forest:** The middle slope of the hills and ridges are occupied by this type of forest. In Sal dominated reserves this type of forest is characteristic of the drier slopes and ridges of the hills with conspicuous absence of Sal in patches and groups.

The principal occupying the top canopy are *Makarisal*, *Sida*, *Ahoi*, *Odal*, *Siris*, *Amara*, *Am*, *Amlokhi*, *Bagari*, *Bel*, *Poma* etc. In the cooler aspects and valleys under this type of forest, the middle story is occupied by Kekowa Bamboo and along the streams by another type *Neouhouzeaua dullooa* (Dalu Bamboo). Along the lower slopes of the foot hills as well as the plains, in open locations thatch predominates as ground cover. Climbers are rather abundant in the mixed deciduous forest.



**Fig.-2.2: Physiographic Zones and Reserved Forests of Study Area**

This type of forest is found to be mixed in the southern part of the study area along with the Sal forests mentioned above in the Foothill zone.

**(iv). Evergreen patches:** This type of forests occurrence is very limited. This type occurs in patches, mainly in the hill slopes along banks of perennial streams and in shady moist pocket, mostly situated in locations far away from habitations and not subject to any biotic interference in the shape of grazing, fire etc.

Climax formation was represented by *Nahar* patches in this area which is now history. Only very few *Nahar* trees are found here and there. Probably these patches vanished during the hay day of Railway sleeper supply era. These occur mostly in the Foothill zone.

*Borthekera* occasional Canes, Saw grass, Ferns, *Kako* and *Dalu* bamboos and climbers are found sporadically.

**(v). Wet miscellaneous formation:** These occurs in the form of a belt along the banks of streams and edges of depressions as well as the marshy/ swampy depressions (known as “*julis*”) originating as a valley between two spurs in the hills and ending far in to the plains between the highland *taris*. The natural vegetation in the *julis* is being annually annihilated by very rapid expansion of paddy cultivation and is likely to be extinct if this trend continues. This formation is found scattered in the Foothill and Middle Plain zones. The soils of the Flood Plain are fine but poorly drained and are classed as Fine to Fine silty aeric Haplaquepts. This area is almost flat.

*Koroi*, *Khokon*, *Ajhar*, etc. beside these some of the climbers are found as in the entire type of forest.

**(vi). Secondary Euphorbiaceous Scrub:** The extent of area under this type of vegetation occurs in abandoned *Jhuned* (Shifting cultivation) areas. This vegetation is

scattered in Kulsī, Pantan, Milmīlia, Chhaygaon Reserved Forests. Occasional *Kadam* trees are found and the area under this type is rather limited. This formation is found scattered in the Foothill zone.

(vii). **Moist Sal Savannah:** As the name implies it occurs as pockets or patches of grass lands, in the *taris* over the plain areas in association with Sal, usually adjacent to villages or cultivated fields. Trees grow scattered along with grass. Some of the commonly found are *Kum*, *Bhela*, *Amlokhi*, *Dudhi*, *Bagari* etc. Thatch grass is common along with herbs and shrubs. Principal Grass is Thatch, some other herbs and shrubs are found in association with grasses. Climbers in such areas are absent.

**Table No- 2.1: Forest Range wise Area under Different Forest Type (ha)**

Types of Forest	West Division		East Division	
	Bamunigaon Range Kulsī &	Loharhat Range	Rani	Total area
1. Eastern Hill Sal-Khasi Hills Sal	2628.00	805.00	2769.00	6202.00
2. Moist Plains Sal –Kamrup Sal.	1957.00	1453.00	816.00	4226.00
3 Moist mixed deciduous forest including pockets of evergreen patches.	9243.00	4459.00	4396.00	18098.00
4. Wet miscellaneous formation including open Beel, Nullas, and Stream beds etc.	778.00	722.00	13.00	1513.00
5. Jhumed over areas-part under secondary Euphorblaceous Scrub	6.00	-	312.48	318.48
6. Moist Sal Savanna	164.00	10.00	-	174.00
7. Area under plantations.	429.00	256.00	-	685.00
8. Area under cultivation, Forest village, Encroachments etc.	3427.00	784.00	245.00	4456.00
<b>Total Area</b>	<b>18632.00</b>	<b>8489.00</b>	<b>8551.48</b>	<b>35672.48</b>

Source: Department of Forest (FD), working plan for East and West Division. (Government of Assam).

**Table No- 2.2: Reserved Forests (RF) with Forest Village Distribution, Area, Population and Forest Stock**

Sl. No.	Name of R F	Area of RF (ha)	No. of Forest Villages	Total Population (persons)	Land Allotted to Forest Village (ha)	Stock of Forest (%)	
						Degraded	Well Stocked
1	Pantan	11280.86	10	3868	445.70	50	50
2	Barduar	7670.58	24	7863	1022.46	40	60
3	Kulsi	1860.11	6	2829	254.94	50	50
4	Milmila	1917.21	11	2795	141.40	55	45
5	Chhaygaon	1294.21	2	1020	23.40	60	40
6	Mayang Hills	2134.24	5	1063	51.69	40	60
7	Mataikhar	1685.61	2	335	26.60	N. A	
8	Jarasal	1256.68	1	450	61.52	N.A	
	<b>Total</b>	<b>29099.50</b>	<b>61</b>	<b>20223</b>	<b>2027.71</b>		

Source: Department of Forest 2004. (Government of Assam) & Census 2001.

#### 2.4 Collection of Forest Products and Period/Season:

There are varieties of forest products which are used by the people living in the reserve forest of Kamrup District.

Period of wild vegetable collection was recorded from the surveyed village households and is represented in the following tables. People collect different types of products for different purposes, e.g., food products like edible vegetable, fruits and fish. For construction and domestic use products like Bamboo, thatch, cane, broomstick (*phuljharu*) etc are collected. Some of these products are collected throughout the year while some are during certain period. The following (Table No.2.3) shows the forest products (edible vegetables) collected by the people at different period/season of the year.

The products mentioned in the above table are the wild food products collected by the local people from their neighbouring forest area. There are some

products mentioned in the table which could be obtained throughout the year, while some are available only in certain period of the year.

**Table No- 2.3: Period of Forest Products (food/vegetable) Collected by the Local People**

Sl. no	Local Name	J	F	M	A	M	J	J	A	S	O	N	D
1	Gonkachu	→	→	→	→	→	→	→	→	→	→	→	→
2	Nibisi leaves	→	→	→	→	→	→	→	→	→	→	→	→
3	Bonkacku	→	→	→	→	→	→	→	→	→	→	→	→
4	Bhadailata	→	→	→	→	→	→	→	→	→	→	→	→
5	Narasingha	→	→	→	→	→	→	→	→	→	→	→	→
6	Betar gage	→	→	→	→	→	→	→	→	→	→	→	→
7	Kalful	→	→	→	→	→	→	→	→	→	→	→	→
8	Masumdari leaves	→	→	→	→	→	→	→	→	→	→	→	→
9	Tejpat	→	→	→	→	→	→	→	→	→	→	→	→
10	Bahika tita	→			→	→	→	→	→	→	→	→	→
11	Kumujatenga				→	→	→	→	→	→			
12	Marmoti				→	→	→	→	→	→			
13	Nekhamtenga				→	→	→	→	→	→			
14	Nun barenga				→	→	→	→	→	→			
15	Paniphutuki				→	→	→	→	→	→			
16	Bhurkandi				→	→	→	→	→	→			
17	Kesethuri				→	→	→	→	→	→			
18	Dhekia				→	→	→	→	→	→			
19	Bah gage				→	→	→	→	→	→			
20	Manimoni					→	→	→	→	→			
21	Poisak					→	→	→	→	→			
22	Meteka					→	→	→	→	→			
23	Kalmau					→	→	→	→	→			
24	Kathphula				→	→	→	→	→				
25	Oal kachu				→	→	→	→					
26	Mau alu				→	→	→	→					
27	Gang tara				→	→	→	→					
28	Gash alu									→	→	→	→
29	Narad alu									→	→	→	→
30	Kadeli									→	→	→	→
31	Haldia									→	→	→	→
32	Akhari phul				→	→	→						
33	Mejenga	→	→									→	→
34	Bon marich	→	→									→	→

**Table No- 2.4: Period of Fruits Collection Recorded From the Surveyed Households**

Sl. no	Local Name	J	F	M	A	M	J	J	A	S	O	N	D
1	Amlakhi						→	→	→	→	→	→	→
2	Mango					→	→	→	→				
3	Kathal					→	→	→	→				
4	Amara					→	→	→	→				
5	Thekara					→	→	→	→				
6	Jam					→	→	→	→				
7	Bel					→	→	→	→				
8	Hilikha	→	→	→			→	→	→	→	→	→	→
9	Bhoira						→	→	→	→	→	→	→
10	Lotoko												
11	Bagari	→	→	→								→	→
12	Owtenga										→	→	→

The above table illustrates the available fruits in the surrounding forest of the village households, which are been collected according to the period of its availability.

**Table No- 2.5: Period of NTFPs Collection for Domestic Uses**

Sl. no	Local Name	J	F	M	A	M	J	J	A	S	O	N	D
1	Kher	→	→	→								→	→
2	Bah	→	→	→								→	→
3	Japipat	→	→	→								→	→
4	Tokopat	→	→	→								→	→
5	Bet	→	→	→								→	→
6	Phuljharu	→	→	→								→	→

These are the accessible NTFPs which are been collected in the above mention period of the year. Except thatch (*kher*) and broomstick (*phuljharu*) others are available throughout the year but collection is done only during the mention period.

**Table No- 2.6: Uses of Medicinal Plant by the Local People**

Sl. no.	Local Name	Used for
1	Hiju juice (leaf)	Infant breathing problem
2	Bhettita root	Infant breathing problem
3	Bhet tita, Hiju leaf	Eyes
4	Wild onion	Stomach pain
5	Um ki tari (rhizome)	Vomiting
6	Am tree (bark juice)	Piles
7	Baknal trees(bark)	Fracture
8	Nirkutita(cimber stem)	Worm
9	Sirka branch(tree)	Mixed for various use
10	Bagh nalar sal	Fracture
11	Octikharroot	Mixed for various use
12	Sajana sal (bark)	Mixed for various use
13	Har jur	Fracture
14	Tukuna bark	Mixed for various use
15	Kaur bhatar alu	Jaundice
16	Octikhar astakh	
17	Sal (Bark)	Red eyes
18	Amlakhi	Tonic , cold
19	Sarpagondha	Insanity, root is used as Tonic
20	Hilikha	Cough

These are forest plants collected by the local people for the medicinal use. They are collected occasionally according to purpose and requirement. There are few local herbs medicine practitioner known as *kabiraj* who collects frequently as usually people depends on *kabiraj* for certain treatments.

These are the varieties of aquatic life usually collected by the local people living in the forest environment of the study area. Some of these aquatic lives are available throughout the year while some are in a particular period. Whichever are available throughout the year, on the basis of extent of availability the quantity, the frequency of collection varies according period mentioned in the table (Table No. 2.7).

**Table No- 2.7: Period of Aquatic Life form Collection by the Local People**

Sl. no	Local Name	J	F	M	A	M	J	J	A	S	O	N	D
1	Garoi	→	→	→	→	→	→	→	→	→	→	→	→
2	Kaori	→	→	→	→	→	→	→	→	→	→	→	→
3	Puthi	→	→	→	→	→	→	→	→	→	→	→	→
4	Khalihana	→	→	→	→	→	→	→	→	→	→	→	→
5	Sol	→	→	→	→	→	→	→	→	→	→	→	→
6	Sal	→	→	→	→	→	→	→	→	→	→	→	→
7	Kuchia	→	→	→	→	→	→	→	→	→	→	→	→
8	Barali	→	→	→	→	→	→	→	→	→	→	→	→
9	Rou	→	→	→	→	→	→	→	→	→	→	→	→
10	Bami	→	→	→	→	→	→	→	→	→	→	→	→
11	Singra	→	→	→	→	→	→	→	→	→	→	→	→
12	Darikana	→	→	→	→	→	→	→	→	→	→	→	→
13	Batia	→	→	→	→	→	→	→	→	→	→	→	→
14	Khalpok	→	→	→	→	→	→	→	→	→	→	→	→
15	Magur	→	→	→	→	→	→	→	→	→	→	→	→
16	Sengeli	→	→	→	→	→	→	→	→	→	→	→	→
17	Singee	→	→	→	→	→	→	→	→	→	→	→	→
18	Moa	→	→	→	→	→	→	→	→	→	→	→	→
19	Kakora (Crab)												
	a.Khena kekora												
	b.Hana kekora												
	c. Jamuna kakora												
	d. Sil kekora (hilly area)												
20	Hamuk (Snail)												
	a. Dhandala hamuk												
	b. Nigariya hamuk												
	c. Jhanai hamuk												
	d. Dhan hamuk												

Collection aquatic life according to availability

→ More      - - → Less

**2.5 Agriculture:**

The present pattern of agricultural land use in Assam is an outcome of long continued human settlement and culture. Within the state, diverse ecological setting of

river valleys, hills, and ridges and other micro physiographic units combined with varying socio-economic factors have produced significant spatial variation in the pattern of agricultural land utilization (Bhagabati, 1990). However, in Assam agricultural land use basically means the cultivation of soil for growing crops only, leaving insignificant areas for grasslands, horticulture, pisciculture and dairy farming unlike the developed agricultural regions of the world (Bhagabati, 2002). Agricultural practices here generally exhibit a kind of farming which may be called small scale agriculture. The small size of land holding that is too fragmented into several scattered plots creates a situation quite detrimental to adoption of modern agricultural practice. Such characteristics along with other adverse socio-economic factors limit the size of agriculture output resulting in a disability of the sector to keep pace with the increasing demand for crops (Bhagabati, 1990). On rough estimate (save the intensive irrigated areas) the minimum subsistence land for a family under present condition can be considered to be four hectares (Singh and Dhillon, 1984). According to agricultural census, 1990-1991, nearly 95 percent of the operational holdings of Assam are below 4 hectares size. The average size of operational land holdings in Assam is 1.28 hectares.

There is no exception with general situation of Assam in regards of agricultural pattern and land holding in the study area of Kamrup District. However, the agricultural output here may be as low as any other part of Assam, since people living in the forest village still practice traditional agricultural system.

### **2.5.1. Major Crops:**

Since component of population is rural and their main occupation is agriculture, paddy is the main crop in the area. Among the paddy the following rice are cultivated.

**(i). Winter Rice (*Sali*):** *Sali* rice is the main food crop cultivated by almost all the households in the study area. It is transplanted in prepared soil from nursery beds in June/July- August and harvested in November-December.

**(ii). Autumn Rice (*Ahu*):** Few households in the study area cultivate this type of rice depending on suitability of land and water supply. This type of rice is usually sown in February-March and harvested in July-August. *Ahu* rice is cultivated by both transplantation and broadcast methods.

**(iii). Summer Rice (*Boro*):** This type of rice is grown in the low-lying marshy lands during the winter and harvested just before the arrival of first wave of flood in June – July. It has been observed that here people use spade instead of plough for tilting the land. Usually bullock cannot draw the plough because of the marshy sticky soils. Few households living in the inhabited areas of Barduar and Mayang hill Reserve Forest practice this type of cultivation.

### **2.6 Population:**

There are 61 forest villages in the Kamrup district comprising East and West Kamrup forest divisions. Out of 61 villages there were 41 villages inhabited in 1951 and 57 in 1961 (Govt. Census). Presently all the villages are inhabited with a total population of 20223 comprising 3125 households (2001 census), covering 2027.71 hectares of forestland and extending within the jurisdiction of 8 Reserve Forest (RF).

**Table No- 2.8: Decade-wise Human Population of forest villages**

Year	HH	TP	TM	TF	Average Land Holding/HH (ha)
1951	516	2977	1548	1429	3.93
1961	986	5363	2799	2564	2.06
1971	1648	10153	5224	4929	1.23
1991	2175	13513	6845	6668	0.93
2001	3125	20223	10302	9921	0.65

Source (Census, government of India)

TH= Total household, TP= Total population, TM= Total male, TF = Total female  
NB: There was no census in 1981.

**Table No- 2.9: Ethnic Composition of Sample village**

Ethnic Communities	No. of Household	% to T.H.H	Population size (persons)	% to T.P.	Average Person per Household	Average land holding/ HH (ha)
Rabha	272	67.33	1422	65.08	5.23	0.93
Boro	31	7.67	147	6.73	4.74	0.74
Garo	49	12.13	267	12.22	5.45	0.99
General	34	8.42	224	10.25	6.59	0.66
Oraon	13	3.22	97	4.44	7.46	1.61
SC	5	1.24	28	1.28	5.60	0.75
Total	404	100	2185	100		

All the 61 forest villages are located in Pantan, Barduar, Kuls, Milmila, Chhaygaon, Mayang Hill, Mataikhar and Jarasal R.Fs. Jarasal is the only R.F. of Kamrup East Division having forest village (for distribution of villages ref. Table 2.2). Both the forest divisions are in the southern bank of Kamrup District. Less than 7 percent of the area under these 8 reserve forest are occupied by the forest villages.

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## **Chapter III**

### **Forest and Non-Forest Production**

The forest people are scattered all over the world. Some of them are living in and around forest areas. They are dependent for their livelihood on the products of the forest. The contribution of forests to household is difficult to determine. People living in the forests besides consuming what they have collected do sell whatever extra that they have to meet their daily requirements with those not available in the forest.

Forest dwellers of Kamrup district have been found to consume a number of forest products like edible vegetables, fish, etc. Non Timber Forest Products (NTFPs) and firewood are found to be used in many ways including supplementing their daily needs or in a way as a subsidiary earning.

The basic purpose of the present work is to study the existing extent of utilization of forest resources by the households living in the forest villages for their livelihood. It is not possible to understand the extent of utilization of forest resources without obtaining the amount of production from various sources of the households. Production here is intended to mean both forest and non-forest produces. Forest resources contributes part of the total production, therefore non-forest sources of production is also taken in to account in order to establish, examine and analyze the share of forest resources in each household's requirements. In order to achieve the given end, the emphasis is given on to the relevant attributes, which can successfully clarify the contribution of forest resources to the household.

Forest products collection is an exclusive responsibility of members of the immediate household. It is a regular phenomenon. Either one or many forest products are collected for one or the other purpose e.g. firewood is collected once or twice in a week as most of the household do not have sufficient place to store it for longer time. Fish and edible vegetables are collected almost every alternate day depending on the family size and household requirement. In a rural economy, agriculture and forest have salutary contributions to income and welfare of people (Sahu 1986).

The households of forest villages involved in the collection of forest products and forest activities have been observed. This revealed a close relationship between the households and the forest. The villagers indicated that collection from the forest not only substitutes the needs of the households but fills the gap of essential requirements like firewood for fuel, edible forest vegetable, aquatic life form, etc. Bamboo, thatch, cane, broomstick etc., are meant for housing material and household need. These products are collected either due to lack of purchasing capacity, taste or it even is a source of income. Forest associated or forest based activity like sand collection, stone crushing, craft, medicine (local herb practitioner) and other daily wage activities are important sources of earning for a significant number of households living in the forest villages. This is a common phenomenon by which they earn for their livelihood or gain additional employment. In most cases agriculture is the main occupation of the households which they are practicing in allotted lands within the Reserved Forests where the villages are located. Besides agriculture, they are employed as daily wage earners within as well as outside the village. There are few households whose members are employed as government servants and some

others engaged in petty businesses who could be considered more affluent in the villages.

### **3.1. Intensity and Mechanism of Production/ Collection from Forest Sources:**

From the above discussion it has been found that the intensity of production/collection varies to some extent according to determinants, On the other hand more or less similar mechanism followed by the households as they live in a homogeneous ecological condition. The intensity and mechanism of forest products collection for the livelihood of the households living in forest village of study area is discussed for the following major components.

#### **3.1.1. Fire Wood:**

Wood is as important source of fuel in forest villages. (Ganesan 1993, Uma Shankar et al. 1998a, Uma Shankar 2000). The Forest Department has traditionally recognized two categories, viz., firewood and dry sticks for collection by inhabitants of forest villages. Firewood includes driftwood and large branches and deformed wood left behind from the trees that were logged for timber. On the other hand, dry sticks include only dead branches of any species lying on the forest floor. Besides, trees that fell in remote areas due to natural causes and not collected by the Forest Department for long time which can be used as firewood. Firewood are usually chopped or cut into pieces at place of occurrence with a traditional axe and knife (*Dau*). These are carried, after putting them together in bundles, either on head or *bhar* (made from Bamboo where two bundles can be carried). In the plain areas cart (*Thela*) or Bicycles are also used to carry firewood. Households involved in the collection of firewood from the forest in different determinant strata vary from 84 to 100 percent and contributes 3.35 to 7.1 percent of the households' average production

(Appendix III). Female members of households usually collect twigs and dry branches of trees. Villagers cover up to 10 km. distance to collect firewood. Firewood is collected mainly for the household consumption except for some very poor households which derive economic benefits out of it through sale.

### **3.1.2. Edible Forest Vegetable:**

Traditionally forest dwellers are habituated in collecting varieties of wild edible vegetables from forest to meet household food requirements throughout the year. Edible fruits of all kinds, leaves, roots, tubers, constitute the items of food (Sahu 1986). There are households who depend up to 100 percent on forest vegetable; it has share 1 to 5 percent of average production (Appendix III). Equipment used in collection of forest vegetables are sickle, knife and spade while basket made of bamboo are used for carrying or even some carry by wrapping in an old cloth. Time spent for wild food collection varies depending upon the purpose of household and season. Usually in the farming season the later half of the day is utilized for the forest food collection, if it is only for domestic consumption. However those households which earn from the collection spend almost one entire day or two before the weekly market day for the purpose. The poor, landless households whose members are frequently unemployed gather forest food at an average of five days a week, as compared to those households of moderate economic status, which gathered food for two or three days a week. Households located in less accessible areas and away from the township collect maximum amount of wild and green edibles from forest. There is no such restriction from the Forest Department on collection of the forest vegetables. Most of the household hardly can afford to cultivate in the own land because of expenses, low productivity, insufficient land. Both male and female members are

involved in collecting forest vegetable, but during summer season mostly female members collect the edible vegetables for the household.

### **3.1.3. Aquatic Life form:**

Aquatic life forms are viewed as a source of food and income by forest villagers. Villagers use traditional and simple equipments to catch fish like nets, locally made *jakhoi*, *sepa*, *stick* and hooks (locally made from bamboo and cane).

Almost all rivers, streams and *beels* are common fishing sites like Kulsinadi, Bathanadi, Kharkhari, Sandubi *beel*, etc. In summer they catch fishes, etc., from paddy fields also. Fishing is done by both the male and female members mostly in the early morning hours or in between farming chores. Fishing also is a common pastime of the forest villagers.

### **3.1.4. Household Building, Fencing and Handicraft Material:**

Produces generally collected by the forest villager are Bamboo, Thatch, palm leaves (*Japipat* & *Tokopat*), Cane and Broomstick. These products are collected during a particular season i.e. from November to February. Mostly male members of the households are involved in collection of these products. Entire day spent for the collection of these products as they have to cover 10 to 15 km for collection. Knife, sickles (*Daus*) are use for cutting and carried by bamboo made *bhar*.

### **3.1.5. Forest Associated Activities:**

Forest associated activities are mainly stone crushing, sand collecting labourer and wage labour. Sand collecting labourers are engaged by the contractors (locally known as *Mahaldar*) as daily wage labourers to collect sand from river and loading it to the truck which is then transported and supplied to other places for construction. Stone collected from forest are crushed at home manually and sold from home itself.

These are cash income earning sources of some households which depends mostly on the side of the road or river bank. Wage labourers are sometimes employed by the Forest Department and contractors for cutting wood, cleaning the forest and for plantation. There are also a few households who earn their livelihood from traditional natural herbal medicine practice.

### **3.2. Ethnic Component:**

The degree and nature of dependence on forests and livelihood options differ from one community to another (Adolfo Brizzi et al. 2006). Tribal people generally dwell in forested and hilly areas. They depend on forests for their cultural, spiritual, and to varying degrees, economic needs. Existence of small average land holdings, low productivity of agriculture and limited opportunities to earn non-farm income and from other sources leads to migration which is an important coping strategy for people in forest villages. The forest villages of Kamrup District represent a distinct geo-cultural region and are home to many ethnic groups of Assam (Fig-3.1a &b). The Rabhas, Boros, Garos, the Oraons have been recorded in the forest villages of the study area. The General Caste and Scheduled Caste (SC) constitutes less than 10 percents of total population in the forest villages of Kamrup districts. The dominant group in forest villages of Kamrup District have been found to be the Rabhas (table 1.2). Seven villages are populated only by Rabhas and two Garo dominated villages were found in the study area. Besides these, most of the villages are having a mixed population comprising of different ethnic groups along with the Rabhas. Looking at the production of forest and non-forest products, it would be very interesting to find from the following paragraphs how each community responds to such a phenomenon.

### **3.2.1. Sources of Production (Forest and Non-Forest):**

Concerning the community and production, as has been mentioned above the Rabha community is the dominant and it constitutes more than 65 percent of the total population. The other ethnic groups are represented nominally with Garos (12 %) and Boros (7 %). From the table below, it could be inferred that their production amounts to more than Rs.83,000/- per household for general caste while the Boros produce least amounting to about Rs.33,000/- per household in monetary terms.

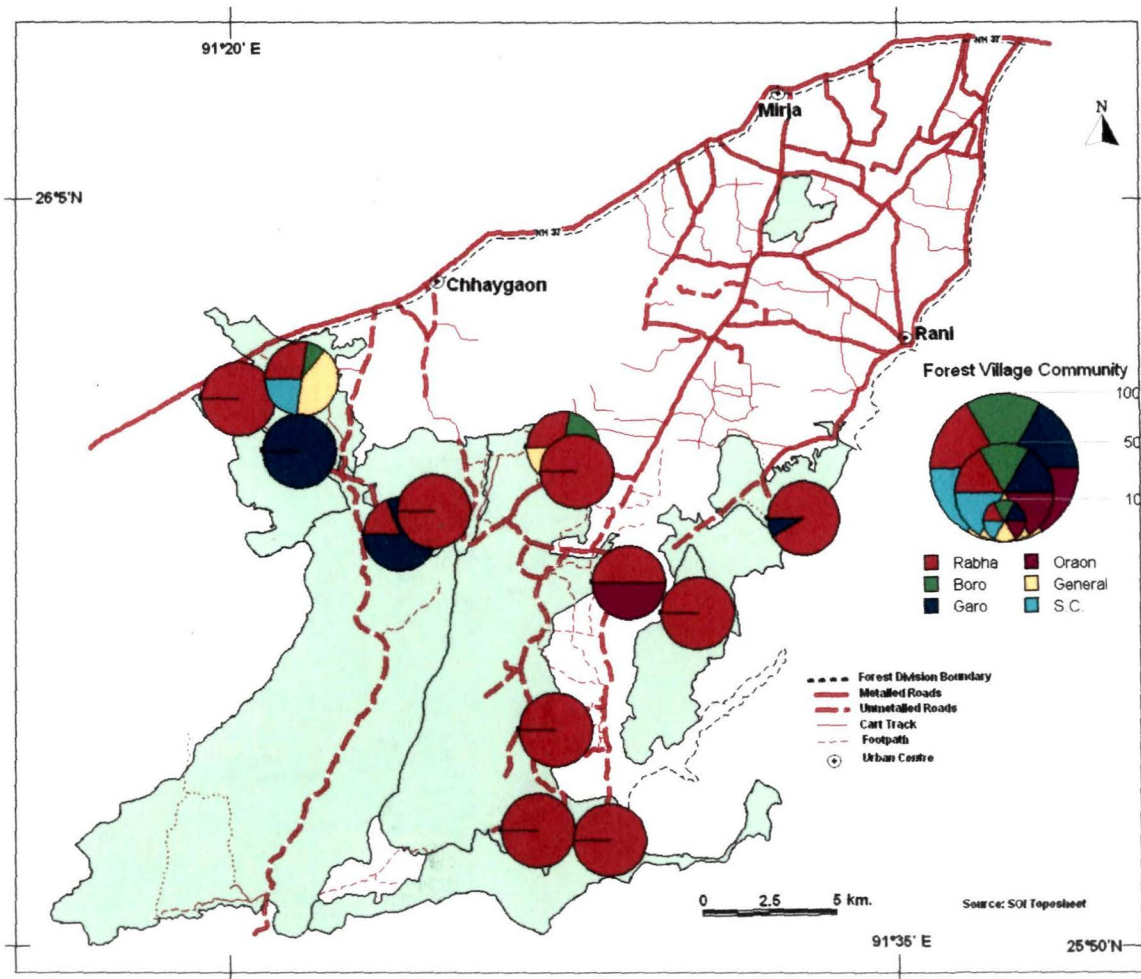
It is interesting to find that the Scheduled Castes depend more on direct forest products while people of General caste depend the least on such products. It is important to note that the Garos, Boros, Rabhas and Oraons depend much less on forest products as compared to the Scheduled Castes.

The synoptic view of the Table No - 3.1 gives a clear understanding that inhabitants of forest villages depend for their livelihood on forest and non-forest products though a large share of their requirements are met from non-forest sources it may be of relevance to point out that the supplementary share that forest products provide is vital for the survival of the population in these forest villages

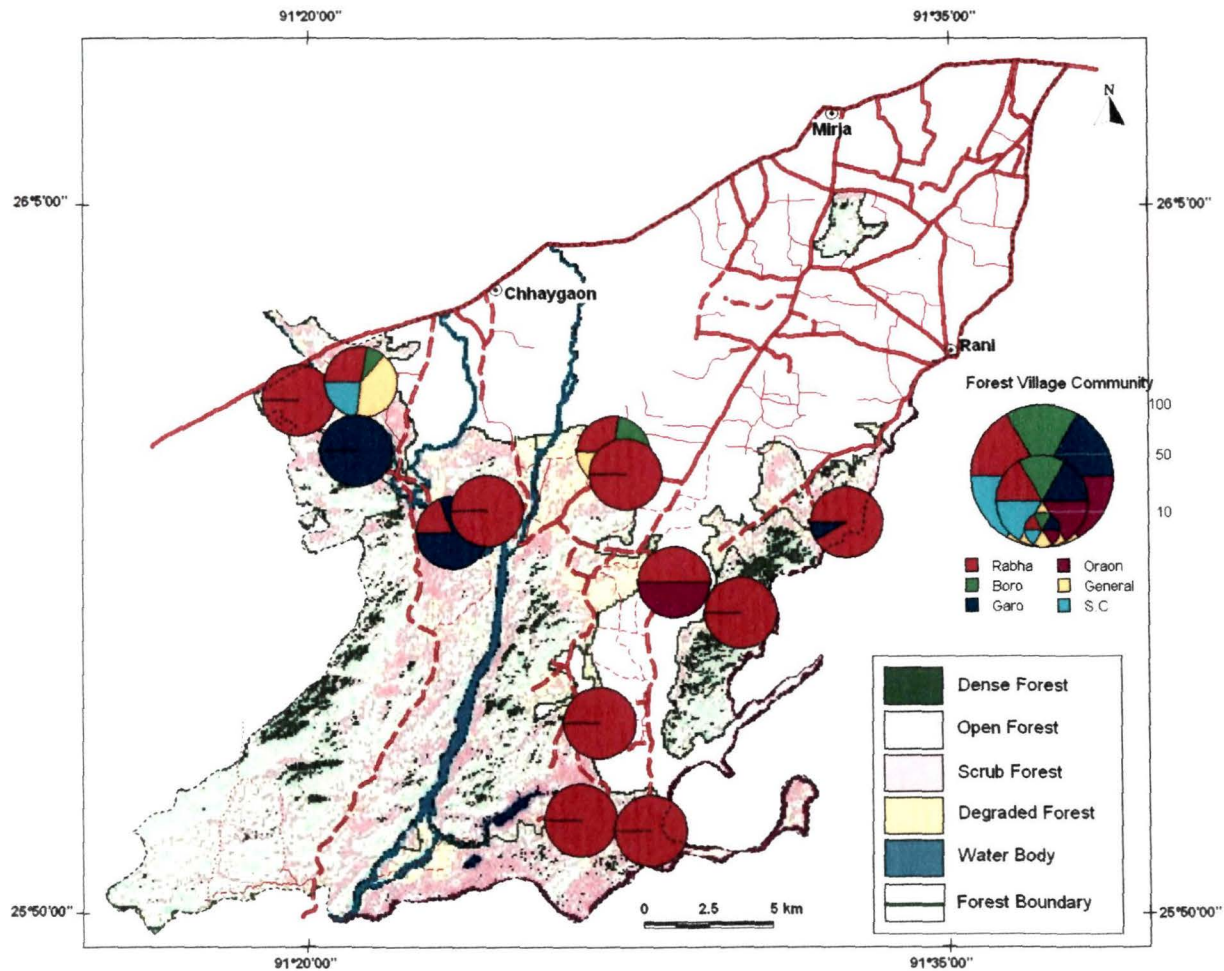
While considering these modes of production it would be more informative if the forest and non-forest products are analysed in greater detail. This is done in the following paragraphs.

**Table No-3.1: Ethnic Community wise Annual Sources of Production per Household in terms of Rs. & %**

Sources	Ethnic Community											
	General		SC		Oraon		Rabha		Boro		Garo	
	Rs.	(%)	Rs.	%	Rs.	%	Rs.	(%)	Rs.	(%)	Rs.	(%)
<b>a) Forest</b>												
Products	4345.29	5.23	3768.80	9.35	8878.92	15.49	7973.83	15.66	6641.03	19.75	10641.37	25.13
Associated activities	555.88	0.67	10080.00	25.00	7467.69	13.03	2126.47	4.18	1277.42	3.80	1110.20	2.62
<b>a) Subtotal</b>	<b>4901.17</b>	<b>5.90</b>	<b>13848.80</b>	<b>34.35</b>	<b>16346.61</b>	<b>28.52</b>	<b>10100.31</b>	<b>19.84</b>	<b>7918.45</b>	<b>23.55</b>	<b>11751.57</b>	<b>27.75</b>
<b>b) Non -Forest</b>												
Products	22003.65	26.49	7271.20	18.03	25484.62	44.46	19048.07	37.01	14629.29	43.50	15823.59	37.37
Activities	56170.59	67.61	19200.00	47.62	15483.22	27.01	22221.14	43.04	11083.87	32.96	14765.31	34.87
<b>b) Subtotal</b>	<b>78174.24</b>	<b>94.10</b>	<b>26471.20</b>	<b>65.65</b>	<b>40967.84</b>	<b>71.47</b>	<b>41269.21</b>	<b>80.05</b>	<b>25713.16</b>	<b>76.46</b>	<b>30588.90</b>	<b>72.24</b>
<b>Total (a+b)</b>	<b>83075.41</b>	<b>100</b>	<b>40320.00</b>	<b>100</b>	<b>57314.50</b>	<b>100</b>	<b>51369.50</b>	<b>100</b>	<b>33631.61</b>	<b>100</b>	<b>42340.47</b>	<b>100</b>



**Fig.-3.1a: Forest Cover and Ethnic Communities**



**Fig.-3.1b: Forest Cover and Ethnic Communities**

### **3.2.2. Forest Based Production:**

As mentioned above most forest villages need the vital support from forest products to cope up with daily requirements. Ethnic communities like Rabhas and Garos extract most of the forest product range available while only Garos produce wood charcoal. Both these tribes exploit the forest products for handicrafts too. The Rabhas are the only tribe which exploit forest products for medicinal purposes. The Oraons extract limited forest products and use bamboo and thatch only, while the Boros and people belonging to Scheduled Caste and General Caste extract edible forest products and firewood.

All communities are involved in the extraction of sand. People belonging to Scheduled Caste and General Caste are not found to be involved in collecting minor products like sal latex, honey etc., and as daily wage labourers of the Forest Department. It may also be mentioned here that the Scheduled Castes, though less in population are more involved in sand collection than the other ethnic groups.

The tribes in Assam, Jharkhand, and Madhya Pradesh are among the poorest groups in India. The higher incidence of poverty in tribe inhabited regions is related to their low bargaining capacity, lack of proportional political representation, the poor quality of local governance and their constrained access to forest, land, and water (Shah and Sah 2004). Forest resources have a substantial amount of contribution in the livelihood of ethnic communities living in the forest villages of Kamrup district.

**Table No- 3.2: Ethnic Community wise Annual Forest Production of Produces and Associated Activities per Household in term of Rs. & %**

Sources	General		SC		Oraon		Rabha		Boro		Garo	
	Rs.	(%)	Rs.	(%)	Rs	%	Rs.	(%)	Rs.	(%)	Rs.	(%)
<b>a) Produces</b>												
Fire wood	747.06	15.24	1568.00	11.32	2621.54	16.04	2379.41	23.56	3015.48	38.08	3108.57	26.45
Charcoal	0	0	0	0	0	0	0	0	0	0	464.69	3.95
Edible leafy vegetable	55.59	1.13	64.80	0.47	805.85	4.93	984.11	9.74	501.68	6.34	1298.20	11.05
Edible non leafy vegetable.	30.88	0.63	36.00	0.26	447.69	2.74	546.07	5.41	278.71	3.52	721.22	6.14
Aquatic life	3511.76	71.65	2100.00	15.16	4661.54	28.52	3331.99	32.99	2845.16	35.93	3440.82	29.28
Bamboo	0	0	0	0	34.62	0.21	76.65	0.76	0	0	197.96	1.68
Thatch	0	0	0	0	307.69	1.88	518.38	5.13	0	0	1240.82	10.56
Palm leaves(1)	0	0	0	0	0	0	5.79	0.06	0	0	0	0
Palm leaves(2)	0	0	0	0	0	0	49.08	0.49	0	0	19.90	0.17
Cane	0	0	0	0	0	0	22.79	0.23	0	0	40.00	0.34
Broomstick	0	0	0	0	0	0	59.56	0.59	0	0	109.18	0.93
<b>a) Subtotal</b>	<b>4345.29</b>	<b>88.66</b>	<b>3768.80</b>	<b>27.21</b>	<b>8878.92</b>	<b>54.32</b>	<b>7973.83</b>	<b>78.95</b>	<b>6641.03</b>	<b>83.87</b>	<b>10641.37</b>	<b>90.55</b>
<b>b) Associated activities</b>												
Herb practices	0	0	0	0	0	0	330.88	3.28	0	0	0	0
Craft	0	0	0	0	0	0	119.12	1.18	0	0	91.84	0.78
Sand labour.	555.88	11.34	10080	72.79	7236.92	44.27	625.37	6.19	1083.87	13.69	171.43	1.46
Stone crush	0	0	0	0	0	0	723.53	7.16	0	0	0	0
Others & wages	0	0	0	0	230.77	1.41	327.57	3.24	193.55	2.44	846.94	7.21
<b>b) Subtotal</b>	<b>555.88</b>	<b>11.34</b>	<b>10080.00</b>	<b>72.79</b>	<b>7467.69</b>	<b>45.68</b>	<b>2126.47</b>	<b>21.05</b>	<b>1277.42</b>	<b>16.13</b>	<b>1110.20</b>	<b>9.45</b>
<b>Total (a+b)</b>	<b>4901.18</b>	<b>100.00</b>	<b>13848.80</b>	<b>100.00</b>	<b>16346.62</b>	<b>100.00</b>	<b>10100.30</b>	<b>100.00</b>	<b>7918.45</b>	<b>100.00</b>	<b>11751.57</b>	<b>100.00</b>

### **3.2.3 Non- Forest Production:**

Irrespective of community, traditional agriculture is the primary occupation. As such highest share of products comes from rice other important crops like arecanut and livestock. All communities except for the Garos produce vegetables. On the other hand the Oraons do not produce fruits. It is interesting to note that only Oraons, Rabhas and Boros brew local liquor while the other communities do not process any liquor.

In the activities sector, it is a revealing fact that the Oraons and Scheduled Castes are not employed in Government jobs and are also not as enterprising since they do not own shops or petty business. The Scheduled Castes are also not found to be involved as masons or carpenters. However, certain percentage of all communities has been absorbed in private jobs. Among the private jobs, people are engaged mostly as salesmen, drivers, household servants, tea stall, watchman, tea garden (Oraons), and a few as IV grade workers in farms. This is reflected in Table No-3.3.

**Table No- 3.3: Ethnic Community wise Annual Non- Forest Production of Produces and Activities per Household in term of Rs. & %**

Sources	General		SC		Oraon		Rabha		Boro		Garo	
	Rs.	(%)	Rs.	%	Rs	%	Rs.	(%)	Rs.	(%)	Rs.	(%)
<b>a) Produces.</b>												
Rice	7600.00	9.72	1240.00	4.68	14738.46	35.98	6609.56	16.02	4670.97	18.17	5118.37	16.73
Arecanut	3600.00	4.61	1920	7.25	1338.46	3.27	3986.35	9.66	2670.97	10.39	3648.98	11.93
Vegetable	3321.29	4.25	1831.2	6.92	3973.85	9.70	1726.06	4.18	1726.06	6.71	515.43	1.69
Fruits	276.47	0.35	260	0.98	0	0	316.54	0.77	403.23	1.57	1795.92	5.87
Liquor	0	0	0	0	1772.31	4.33	1548.09	3.75	851.61	3.31	0	0
Animal	3764.71	4.82	1480.00	5.59	2700.00	6.59	3218.82	7.80	3161.29	12.29	2775.51	9.07
Others	3441.18	4.40	540	2.04	961.54	2.35	1642.65	3.98	1145.16	4.45	1969.39	6.44
<b>a) Subtotal</b>	<b>22003.65</b>	<b>28.15</b>	<b>7271.20</b>	<b>27.46</b>	<b>25484.62</b>	<b>62.22</b>	<b>19048.07</b>	<b>46.16</b>	<b>14629.29</b>	<b>56.89</b>	<b>15823.59</b>	<b>51.73</b>
<b>b) Activities</b>												
Govt. job	12352.94	15.80	0	0	0	0	11046.69	26.77	3019.35	11.74	4408.16	14.41
Private job	6823.53	8.73	19200.00	72.53	12153.85	29.67	2461.03	5.96	2129.03	8.28	1959.18	6.40
Daily labour	1058.82	1.35	0	0	2238.46	5.46	2988.42	7.24	3580.65	13.93	1744.90	5.70
Business &shop	33235.29	42.51	0	0	0	0	4997.06	12.11	1580.65	6.15	5183.67	16.95
Masons & Carpenters	2700.00	3.45	0	0	1090.91	2.66	727.94	1.76	774.19	3.01	1469.39	4.80
<b>b) Subtotal</b>	<b>56170.59</b>	<b>71.84</b>	<b>19200.00</b>	<b>72.53</b>	<b>15483.22</b>	<b>37.79</b>	<b>22221.14</b>	<b>53.84</b>	<b>11083.87</b>	<b>43.11</b>	<b>14765.31</b>	<b>48.26</b>
<b>Total (a+b)</b>	<b>78174.24</b>	<b>100</b>	<b>26471.20</b>	<b>100</b>	<b>40967.84</b>	<b>100</b>	<b>41269.21</b>	<b>100</b>	<b>25713.16</b>	<b>100</b>	<b>30588.90</b>	<b>100</b>

### **3.3. Production in different Determinant Strata:**

In order to understand the nature of production, households in the study area have been classified taking into consideration four determinant strata. The households of the study area were classified on the basis of the following:

1. Distance from nearest urban centre
2. Their accessibility to metal roads
3. Household size and
4. Literacy.

This has been expressed in Chapter I (Table No-1.2) and discussed in the following paragraphs.

#### **3.3.1 Classification of Households for Production Pattern by Distance from the Urban Centre:**

In order to examine the characteristic of attributes of forest and non-forest products and activities performed by the household on the basis of their distances from the nearest urban centre, the households have been classified in to four categories as follows :

- i) Nearest (0—10 km. from urban centre)
- ii) Near (10—20 km from urban centre)
- iii) Far (20—30 km. from urban centre) and
- iv) Very far (30 km. and above from urban centre).

By accounting for the number of households in each class (Ref. Table No-1.3), the average values of each attribute have been calculated. The contribution of the forest and non-forest products and activities is accounted for each category to understand their importance in the patterns of production.

### 3.3.1.1. Sources of Production by Distances (Forest and Non-forest):

The proximity of the households to the urban areas is seen to have influenced their lifestyle. Although all the households of study area are in Reserve forests (R.F.), the distance from the town has influenced in the collection/ extraction of forest products in general. Table No-3.4 indicates that households located farther away from the urban centre extract more resources from the forest.

**Table No- 3.4: Distance wise Annual Sources of Production per Household in terms of Rs. & %**

Sources	Distance from Urban Centre							
	Nearest (Ns)		Near (Nr)		Far (F)		Very far (V.F)	
	Rs.	(%)	Rs.	(%)	Rs.	(%)	Rs.	(%)
<b>a) Forest</b>								
Forest products	5498.64	8.11	9011.75	22.84	6813.50	13.22	11834.82	23.56
Forest associated activities	2638.04	3.89	475.81	1.21	3657.74	7.10	920.00	1.83
<b>Subtotal (a)</b>	<b>8136.68</b>	<b>12.00</b>	<b>9487.56</b>	<b>24.05</b>	<b>10471.24</b>	<b>20.32</b>	<b>12754.82</b>	<b>25.39</b>
<b>b) Non -Forest</b>								
Products	18270.96	26.96	15842.42	40.15	20674.50	40.12	18287.24	36.40
Activities	41354.35	61.03	14132.26	35.81	20388.85	39.56	19194.55	38.21
<b>Subtotal (b)</b>	<b>59625.30</b>	<b>87.99</b>	<b>29974.68</b>	<b>75.96</b>	<b>41063.35</b>	<b>79.68</b>	<b>37481.79</b>	<b>74.61</b>
<b>Total (a+b)</b>	<b>67761.99</b>	<b>100</b>	<b>39462.23</b>	<b>100</b>	<b>51534.59</b>	<b>100</b>	<b>50236.60</b>	<b>100</b>

However, there are exceptions where activities vary vis-à-vis collection of products. While assessing the livelihood value of forest goods, use provides practical

information and it demonstrates the significance of forest products in households income, especially for resource poor households who have very few alternatives. Households closer to urban centre tend to use less of forests products for livelihoods while they depend more on agriculture and wage labour. People in more remote areas tend to rely more on agriculture and forestry (Adolfo Brizzi et al 2006).

The Table No-3.4 shows a significant role of urban areas in changing the domestic pattern of production. For example, the households living in close vicinity of urban centre generate more than 87 percent production from non-forest sources. However degree of dependency on forest increases as distance from the town increases. The households' annual income varies from one distance class to another, the farther their distance from town, the contribution of forest sources increases reaching a maximum of 25.39 percent.

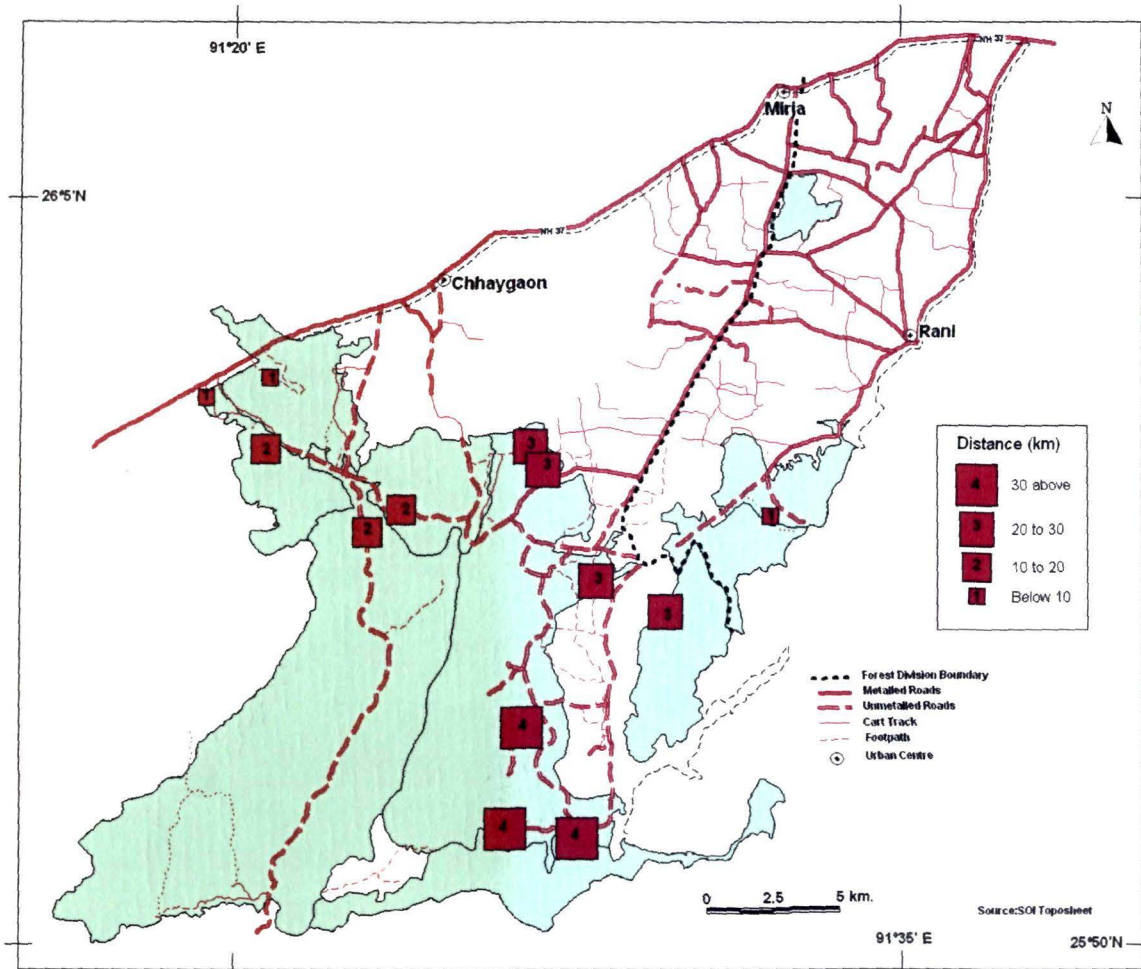
Households of forest villages situated at the Near distance class from the urban centre has considerably lowest annual average production, from the table it is clear that the contribution from the non-forest activities is comparatively less. These households have little or no livelihood alternatives source of income other than agriculture and collection of forest products. Due to their geographical location, most of the households remain isolated due to the bifurcated course of river Kushi which renders Kahua-Bahatpur village more remote than the rest of the distance classes (Fig-3.2a &b). The maximum households of this distance class have no direct access to roads therefore the actual distance to reach the nearest town is longer hence, their higher dependency on forest products.

It is imperative that people living in these Reserved Forests will still depend on natural products for their survival and may be it might contribute more towards their production in future. However, it may even have adverse effects on the ecological balance of these forests.

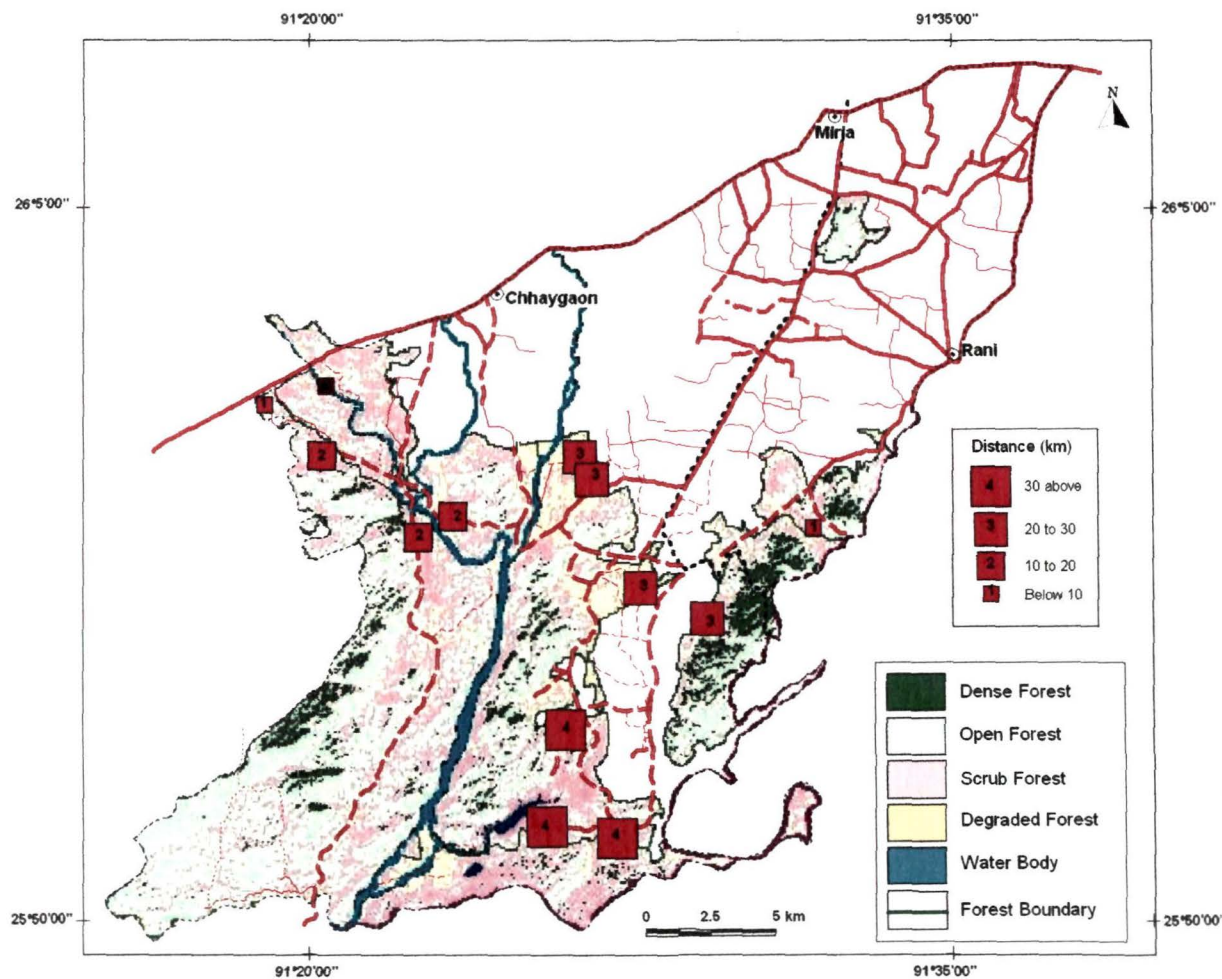
There is a great need to find out which are the products that are in great demand by these communities. This would also reveal how urban influence tends to augment peoples' needs. Production in monetary terms from forest sources has been estimated to be Rs. 8136.00 for households living near the town. On the other hand it was estimated to be Rs. 12754.00 for those which are far from the urban centre. After having understood the overview of the contribution of forest and non-forest modes of production, it is necessary to consider the contribution of the former in detail.

#### **3.3.1.2. Forest Production:**

It has been observed from the above that urban influence on production of forests is definite. An analysis of forest associated produces and activities would reveal much of the contribution made by these across all distance classes. Since share of production from different products and activities varies within as well as among all the distance classes, the following discussion would explain the share of each forest product and related activities of the households.



**Fig.-3.2a: Urban Centre Distances from Forest Villages**



**Fig.-3.2b: Urban Centre Distances from Forest Villages and Forest Cover**

Forest resources play an important role to meet the household basic need of the forest dwellers. Considering the (Table No-3.5) it has been observed that forest products like fish, firewood and edible forest vegetable meet the daily requirements of the households. Aquatic animals and firewood constitute the highest share in production percentage as these are locally available and collected throughout the year. Edible forest vegetables occupy the third position. Items like bamboo, thatch, japipat, tokopat, cane and broomstick are less conspicuous since these items are collected seasonally to meet the specific purpose like construction, household use and for household crafts.

Again direct contribution from forest products is significantly higher than the forest associated activities in all the distance classes. It is interesting to note that households of nearest and far distance classes substantially rely on these activities i.e. 32.42 and 34.93 percent while the near and very far distance classes utilise only 5.02 and 7.21 percent from the same resources. This is probably because of ethnic community characteristics and locational characteristics of households in the Reserve Forest. Considering the distance criterion, the forest associated activities are least.

Extraction of sand, stone, medicinal plants and other products for crafts are not common in all distance classes. This reflects the kind of dependency of the forest dwellers mostly for food items rather on activities. Wage labourers depending on forest related activities like Departmental labour for cleaning forest, forest plantation and collecting of honey, sal oil, seeds etc. are not so significant but are present in all distance classes. Sometimes contractors employ such labourers for cutting trees.

**Table No- 3.5: Distance wise Forest Production of Produces and Associate Activities per Household in terms of Rs. & %**

Sources	Nearest		Near		Far		Very far	
	Rs.	(%)	Rs.	(%)	Rs.	(%)	Rs.	(%)
<b>a) Produces</b>								
Fire wood	2267.83	27.88	2767.10	29.17	2105.86	20.11	2336.00	18.31
Charcoal	0	0	183.63	1.94	0	0	0	0
Edible leafy vegetable	399.13	4.91	1292.52	13.62	580.60	5.54	1551.27	12.16
Edible non leafy Vegetable.	221.74	2.73	718.06	7.57	321.20	3.07	861.82	6.76
Aquatic life	2295.65	28.22	3333.87	35.14	3541.35	33.82	4690.91	36.78
Bamboo	25.82	0.32	90.52	0.95	24.81	0.24	260.91	2.05
Thatch	245.65	3.02	554.84	5.85	218.05	2.08	1589.09	12.46
Palm leaves (1)	1.63	0.02	0	0	0	0	25.91	0.20
Palm leaves (2)	7.07	0.09	7.66	0.08	6.95	0.07	214.55	1.68
Cane	9.13	0.11	18.39	0.19	4.51	0.04	80.73	0.63
Broomstick	25.00	0.31	45.16	0.48	10.15	0.10	223.64	1.75
<b>Subtotal (a)</b>	<b>5498.64</b>	<b>67.58</b>	<b>9011.75</b>	<b>94.98</b>	<b>6813.50</b>	<b>65.07</b>	<b>11834.82</b>	<b>92.79</b>
<b>b) Associated activities</b>								
Herb practises	0	0	0	0	676.69	6.46	0	0
Craft	0	0	40.32	0.43	6.77	0.06	563.64	4.42
Sand labour.	1757.61	21.61	0	0	1607.37	15.35	0	0
Stone collection	260.87	3.21	0	0	1299.25	12.41	0	0
Other & wage	619.57	7.62	435.48	4.59	67.67	0.65	356.36	2.79
<b>Subtotal (b)</b>	<b>2638.04</b>	<b>32.42</b>	<b>475.81</b>	<b>5.02</b>	<b>3657.74</b>	<b>34.93</b>	<b>920.00</b>	<b>7.21</b>
<b>Total (a+b)</b>	<b>8136.68</b>	<b>100.00</b>	<b>9487.56</b>	<b>100.00</b>	<b>10471.24</b>	<b>100.00</b>	<b>12754.82</b>	<b>100.00</b>

(N.B. palm leaves (1) & (2) local name *Tokopat* & *Japipat*)

It may be drawn from the above tables (Table No-3.5 ) that production from forest sources is estimated to be in between 12 to 25 percent a year for these households, increasing in value farther away from the urban centre. This is greater among poorer families and households with small farms and limited sources of income and subsistence.

### 3.3.1.3. Non-Forest Production:

It is evident from the earlier discussion that the share of non-forest production is higher than the share of forest products collected.

**Table No- 3.6: Distance wise Non-Forest Production of Produces and Activities per Household in terms of Rs. & %**

Sources	Nearest		Near		Far		Very far	
	Rs.	(%)	Rs.	(%)	Rs.	(%)	Rs.	(%)
a)Produces								
Rice	7194.57	12.07	4467.74	14.91	7996.99	19.47	6729.09	17.95
Arecanut	3534.78	5.93	4693.55	15.66	2666.17	6.49	4250.00	11.34
Vegetable	1643.78	2.76	619.84	2.07	2580.21	6.28	524.87	1.40
Fruits	126.09	0.21	1000.00	3.34	239.85	0.58	541.82	1.45
Liquor	730.43	1.23	812.90	2.71	1526.62	3.72	1808.73	4.83
Animal	3109.78	5.22	2725.00	9.09	3703.76	9.02	2912.73	7.77
Others	1931.52	3.24	1523.39	5.08	1960.90	4.78	1520.00	4.06
<b>Subtotal (a)</b>	<b>18270.96</b>	<b>30.66</b>	<b>15842.42</b>	<b>52.86</b>	<b>20674.50</b>	<b>50.34</b>	<b>18287.24</b>	<b>48.80</b>
b)Activities								
Govt. job	18152.17	30.44	7635.48	25.47	5666.17	13.80	6616.36	17.65
Private job	7082.61	11.88	0.00	0.00	3816.54	9.29	2876.36	7.67
Daily labour	3097.83	5.20	2419.35	8.07	2277.07	5.55	3490.91	9.31
Petty business	12043.48	20.18	3303.23	11.02	7195.49	17.52	5774.55	15.41
Masons & Carpenters	978.26	1.64	774.19	2.58	1433.59	3.49	436.36	1.16
<b>Subtotal (b)</b>	<b>41354.35</b>	<b>69.36</b>	<b>14132.26</b>	<b>47.14</b>	<b>20388.85</b>	<b>49.65</b>	<b>19194.55</b>	<b>51.20</b>
<b>Total (a+b)</b>	<b>59625.3</b>	<b>100.00</b>	<b>29974.68</b>	<b>100.00</b>	<b>41063.35</b>	<b>99.99</b>	<b>37481.78</b>	<b>100</b>

The economy of the study area is mostly agricultural and products like rice, arecanut, vegetables, fruits and liquor are produced. Besides, backyard animal husbandry is an important component.

It is important to point out here that besides production of different non-forest (cultivated and processed) items a substantial contribution is being made through other non-forest activities. This indicates that the forest dwellers though recognised to be residing in forest villages are not totally dependent on forest products only. At least about 50 percent of their activities are non-forest related. Government service and petty businesses contribute a larger share in this (Table No- 3.6).

Using the distance criterion, it may be drawn from the above tables that the households are dependent on non-forest activities. Their production is oriented to non-forest modes rather than complete dependency on forest products.

### **3.3.2. Classification of Households for Production Pattern by Accessibility from the Metalled Road:**

Accessibility is defined as the ability of people to reach a destination at which they carry out a given work (Mosley 1979). Recent research indicates that roads have significant outcomes for rural inhabitants: bringing economic activities and creating substantial benefits for those who live on the roadsides, as compared with those living in inaccessible “off-road” regions (Fairhead 1992, Porter1995, Porter 2002, Wilson 2004).Transportation services, market access, and increased mobility may result from living closer to a paved road than from living further away.

The households have been classified in to four categories as follows:

- i) Easy accessible (less than 2 Km.)
- ii) Accessible (2 – 4 Km.)
- iii) Partly accessible (4 – 6 Km.) and
- iv) Inaccessible (more than 6 Km.).

#### **3.3.2.1. Production Pattern by Accessibility from the Metalled Road:**

Since most of forest villages are located in interior part of the reserve forest the villages has no good road leading to the villages with regular communication. Accessibility for the present is taken as the distance of a household from the nearest metalled road. There are few households located nearby the National Highway (NH-37) (Fig-3.3a &b).

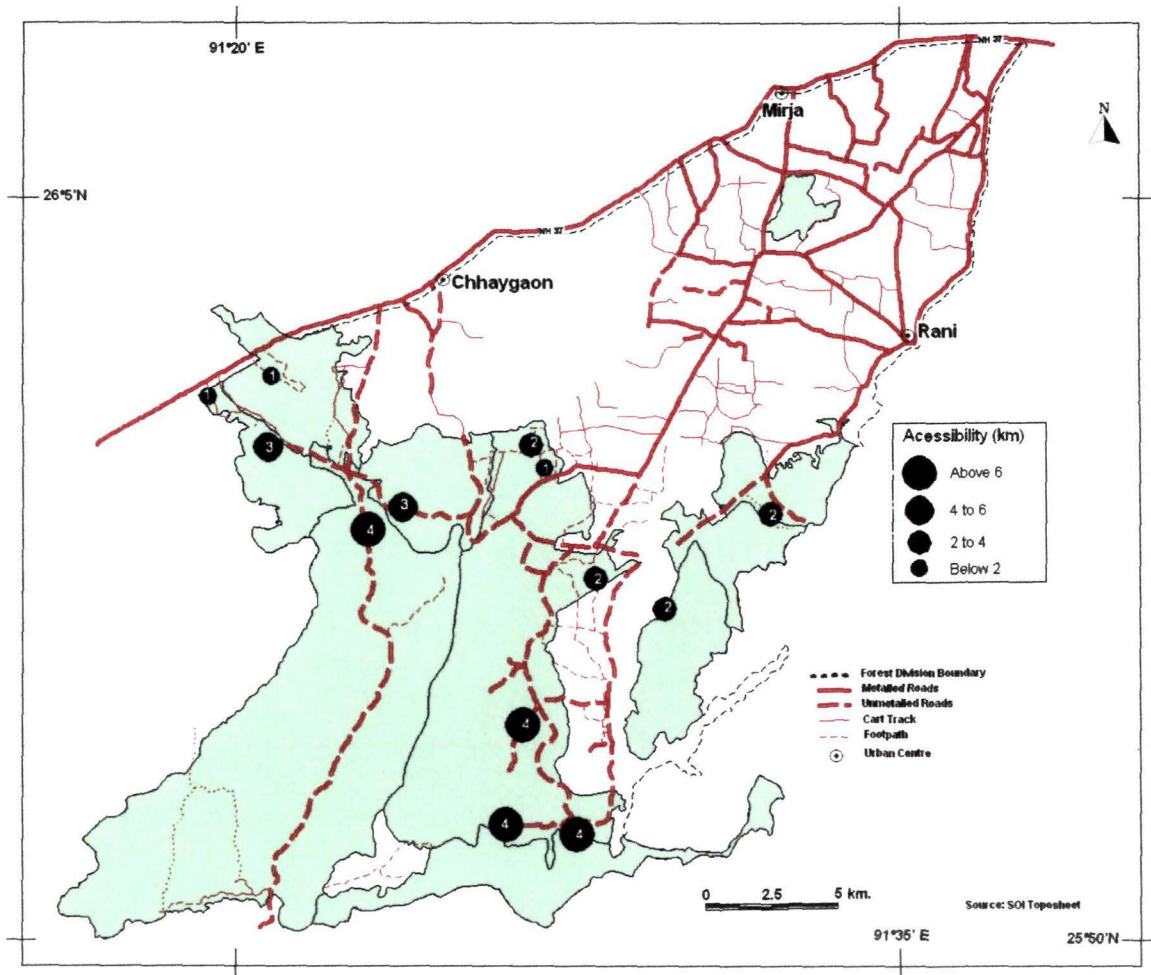
### 3.3.2.2. Sources of Production according to Accessibility: (Forest and Non-forest)

Road communication is regarded the most important aspect for any type of development. Less access to road communication is expected to be reciprocated with low production. The role of accessibility in the annual household production can be understood from the following discussion.

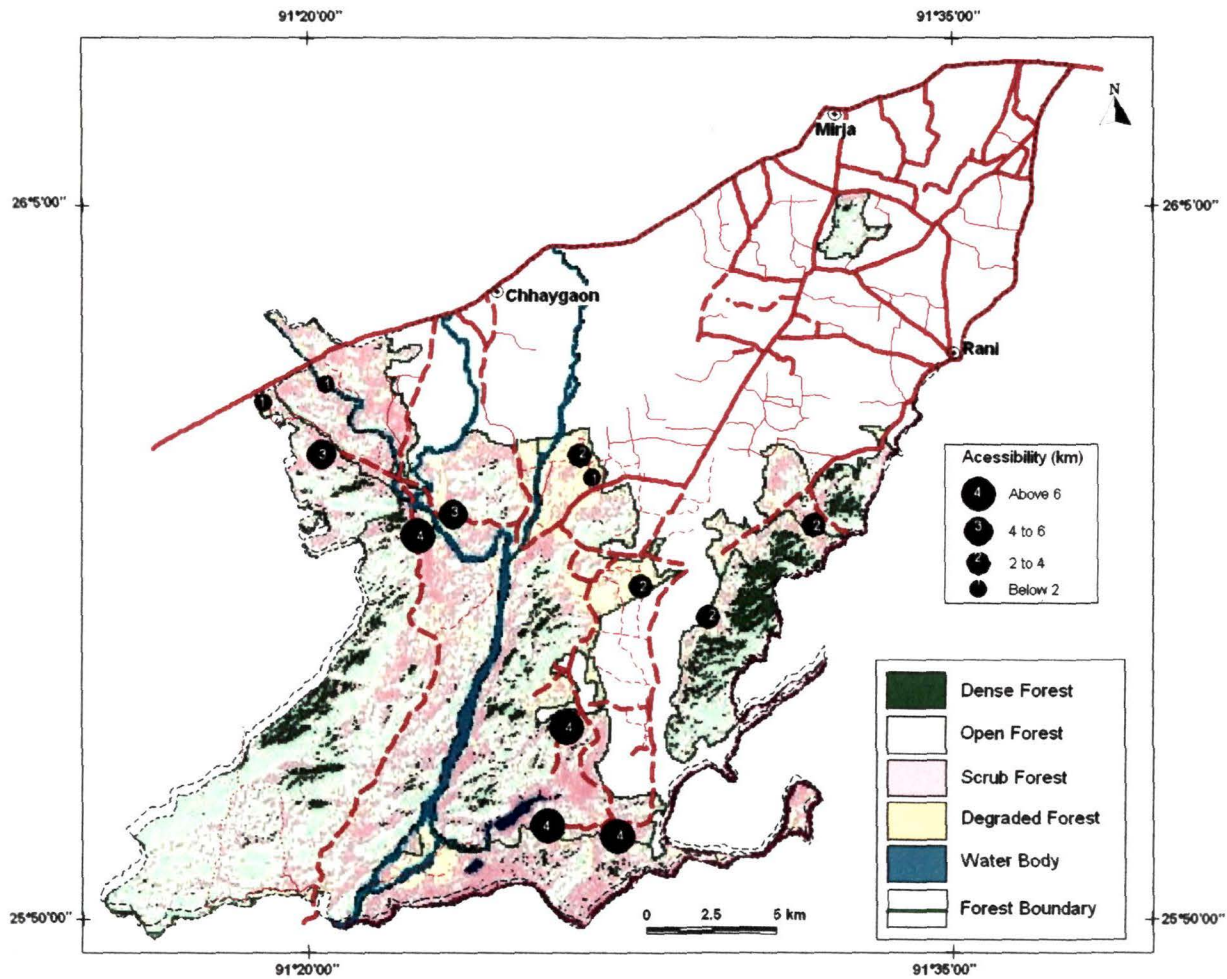
**Table No- 3.7: Accessibility and Annual Sources of Production per Household in terms of Rs. & %**

Sources	Accessibility from Metal Road							
	Easy accessible		Accessible		Partly accessible		Inaccessible	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%
a) Forest								
Products	4923.75	9.56	6811.10	11.20	8106.67	20.10	11593.24	25.63
Associated activities	4343.08	8.43	2793.00	4.59	51.14	0.13	1154.95	2.55
a) Subtotal	9266.83	17.99	9604.10	15.79	8157.81	20.23	12748.19	28.18
b) Non Forest								
Products	14452.49	28.05	21820.15	35.89	16080.27	39.88	17180.74	37.98
Activities	27810.77	53.97	29377.19	48.32	16084.09	39.89	15304.40	33.83
b) Subtotal	42263.26	82.02	51197.34	84.21	32164.36	79.77	32485.14	71.81
Total (a+b)	51530.09	100.01	60801.4	100.00	40322.2	100.00	45233.32	100.00

Road accessibility seems to offer another explanation to the production patterns of the forest dwellers. From the above (Table No-3.7) it may be inferred that remote households, far from metal roads depend much more on forest products rather than those which are easily accessible. In this respect non-forest products and activities play a major role in the transformation of these forest dwellers. Therefore a detailed examination of the contribution of forest and non-forest products to such population is needed which will be elaborated in the following paragraphs.



**Fig.-3.3a: Metal Road Accessibility from Forest Villages**



**Fig.-3.3b: Metal Road Accessibility from Forest Villages and Forest Cover**

### 3.3.2.2. Forest Production:

As mentioned above, households away from better road linkage depend more on forest resources. While comparing the direct forest products and the related activities it was found that partly accessible and inaccessible cluster of households almost entirely depend on forest products (Table No-3.8). Their production levels are upto 99 percent of the forest products while forest associated activities contribute the minimum. This means that these clusters of households have not started extraction of sand or stones. This may also be explained by the absence of good roads that facilitate such activities.

**Table No- 3.8: Accessibility and Annual Forest Production of Produces and Activities per Household in terms of Rs. & %**

Sources	Easy accessible		Accessible		Partly accessible		Inaccessible	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%
<b>a) Produces</b>								
Fire wood	2005.54	21.64	2239.75	23.32	2602.73	31.90	2665.49	20.91
Charcoal	0	0	0	0	154.43	1.89	100.88	0.79
Edible leafy vegetables	312.37	3.37	585.23	6.09	1256.73	15.41	1483.52	11.64
Edible non-leafy vegetables	173.54	1.87	324.00	3.37	698.18	8.56	824.18	6.47
Aquatic life	2432.31	26.25	3275.63	34.11	3279.55	40.20	4206.59	33.00
Bamboo	0	0	33.91	0.35	15.06	0.18	266.48	2.09
Thatch	0	0	310	3.23	86.36	1.06	1632.97	12.81
Palm leaves (1)	0	0	0.94	0.01	0	0	15.66	0.12
Palm leaves (2)	0	0	9.84	0.10	0	0	140.11	1.10
Cane	0	0	9	0.09	0	0	73.85	0.58
Broomstick	0	0	22.81	0.24	13.64	0.17	183.52	1.44
<b>a) Subtotal</b>	<b>4923.76</b>	<b>53.13</b>	<b>6811.10</b>	<b>70.92</b>	<b>8106.67</b>	<b>99.37</b>	<b>11593.24</b>	<b>90.94</b>
<b>b) Associated activities</b>								
Herb practises	55.38	0.60	540	5.62	0	0	0	0
Craft	0	0	5.63	0.06	0	0	395.60	3.10
Sand labour.	1260.00	13.60	1834.88	19.11	0	0	0	0
Stone crash	3027.69	32.67	0	0	0	0	0	0
Other & wages	0	0	412.50	4.30	51.14	0.63	759.34	5.96
<b>b) Subtotal</b>	<b>4343.07</b>	<b>46.87</b>	<b>2793.00</b>	<b>29.08</b>	<b>51.14</b>	<b>0.63</b>	<b>1154.95</b>	<b>9.06</b>
<b>Total (a+b)</b>	<b>9266.83</b>	<b>100</b>	<b>9604.10</b>	<b>100</b>	<b>8157.81</b>	<b>100</b>	<b>12748.19</b>	<b>100</b>

It may be mentioned that households which are closer to metal roads depend less on forest products but tend to exploit the numerous available resources like sand and stones. Such households also depend on the forest mostly for food items and firewood.

It may therefore be deduced from this table that the households closer to better roads collect lesser forest products rather than those which are remotely placed. They utilise forest resources mostly for edibles along with supplemented income from associated forest activities. The households in remote areas draw much more variety from the forest to contain their needs but draw very little from associated forest activities. This reflects the important role of market forces.

#### **3.3.2.3. Accessibility and non-forest production:**

As inaccessibility increases production from non-forest sources decreases. Averages households irrespective of class primarily depend on traditional agriculture. Table No-3.9 shows the dominance as well as the share of contribution of each non-forest attribute.

Considering the non-forest sources of production, it could be inferred from the Table No-3.9 that the households closest to the roads do not entirely depend for their needs on locally produced agricultural products. This means that they now have an alternative production mode. The share of non-forest activities in their case is slightly above 65 percent which is a significant departure from the rest of the classes which depend on both modes of production almost equally.

From the above discussion, it could be understood that accessibility to good roads has led people to depend less on forest resources. Households tend to collect more of

forest products when they are not connected to good roads. It was found that those households which are beyond 6 km (inaccessible) from the metal roads are dependent on forest products and services and that too covering about 28 percent of their needs. This is indicative of the non-exploitative extraction of forest resources. However, poor households still exploit forest resources in order to make a living.

**Table No- 3.9: Accessibility and Annual Non-Forest Production of Produces & Activities per Household in terms of Rs. & %**

Sources	Easy accessible		Accessible		Partly accessible		Inaccessible	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%
<b>a) Produces</b>								
Rice	5044.62	11.94	8735.00	17.06	4397.73	13.67	5902.20	18.17
Arecanut	1560.00	3.69	3615.00	7.06	5229.55	16.26	3903.33	12.02
Vegetable	1520.18	3.60	2472.40	4.83	688.23	2.14	496.31	1.53
Fruits	178.46	0.42	199.38	0.39	613.64	1.91	1096.70	3.38
Liquor	1698.46	4.02	999.00	1.95	900	2.80	1330.55	4.10
Animal	2944.62	6.97	3670.63	7.17	2725	8.47	2932.97	9.03
Others	1506.15	3.56	2128.75	4.16	1526.14	4.74	1518.68	4.68
<b>a) Subtotal</b>	<b>14452.49</b>	<b>34.20</b>	<b>21820.15</b>	<b>42.62</b>	<b>16080.27</b>	<b>49.99</b>	<b>17180.74</b>	<b>52.91</b>
<b>b) Activities</b>								
Govt. job	8215.38	19.44	11810.00	23.07	10759.1	33.45	3998.90	12.31
Private job	5686.15	13.45	4935.00	9.64	0	0	1738.46	5.35
Daily Labour	3355.38	7.94	2277.19	4.45	2284.09	7.10	3197.80	9.84
Petty business & shop	8800.00	20.82	9331.25	18.23	2222.73	6.91	5841.76	17.98
Masons & Carpenters	1753.85	4.15	1023.75	2.00	818.18	2.54	527.47	1.62
<b>b) Subtotal</b>	<b>27810.77</b>	<b>65.80</b>	<b>29377.19</b>	<b>57.39</b>	<b>16084.09</b>	<b>50.00</b>	<b>15304.40</b>	<b>47.10</b>
<b>Total (a+b)</b>	<b>42263.26</b>	<b>100</b>	<b>51197.30</b>	<b>100</b>	<b>32164.36</b>	<b>100</b>	<b>32485.14</b>	<b>100</b>

### **3.3.3. Classification of Households for Production Pattern by Household Size:**

The 'household' has been defined as the economic entity of people who eat from the same kitchen and/or live from and/or contribute to the same budget.

Keeping in view the definition of households (which for instance includes migrants sending money to their wives, etc), household size varies between 1 to 16. These classes are made to examine the changes of resource utilization on the basis of household size.

The households have been classified into four categories as follows:

- i) Very Small (family size of 1—3 persons)
- ii) Small (family size 4 – 6 persons)
- iii) Medium (family size 7 – 9 persons)
- iv) Big (family size 10 – 12 persons) and
- v) Very Big (family size of 13 and above)

#### **3.3.3.1. Household Size and Sources of Production: (Forest and Non-Forest)**

It is a common phenomenon that as the size of household increases the overall production also has to increase to meet the household requirements. The production pattern of different sizes of households from both forest and non-forest sources is given in below (Table no-3.10). Though the forest production from one household class to another is increasing, it shows a proportionate decrease towards larger household size.

This means that household sizes have a significant role in the pattern of resource extraction. It is noticeable that big and very big household sizes have comparatively high

production than the rest of the classes of households. Very large households procure 89 percent from non-forest sources while extracting just 11 percent from forest sources. It evident from the preceding paragraph that distance, accessibility and even ethnicity influences on production pattern of household sizes. However, this may also not hold true as in the cases of households adopting joint family structure. The discussion of following paragraphs will enlighten the production pattern of different classes of households.

### **3.3.3.2. Household Size and Forest Production:**

The size of household seems to be significant in extracting products from forest sources. It is obvious from Table No -3.10 that, larger the household size, production from forest sources also increases. This could be possible as in bigger households the involvement of household members in extraction of forest resources may be more. Therefore depending on family sizes extraction of forest resources change.

It is to be noted that though household size determines the amount of forest resources extracted from the forest, the people at large harp mostly on non-forest products and activities. This is well illustrated in Table No-3.10.

The very big households collect only six types of products out of twelve from the list as compared to all other classes of households which collect more or less all the products from the list. This is indicative that these households are not collecting these items though they may still use them.

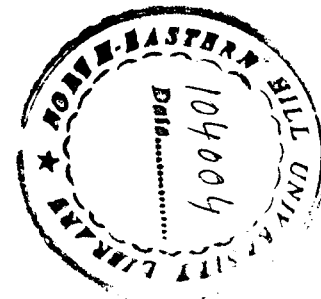
However, it should be pointed out that contribution of direct forest products is more than the forest associated activities in all the household classes (Table No-3.11).

**Table No- 3.10: Household Size and Annual Sources of Production per Household in terms of Rs & %**

Sources	Household Size									
	Very small		Small		Medium		Big		Very big	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	Rs.	%
a) Forest										
Products	4614.98	12.85	7311.54	15.20	10929.00	18.54	12109.50	11.92	14745.00	7.02
Activities	987.54	2.75	1967.30	4.09	4819.89	8.18	4523.08	4.45	8400.00	4.00
<b>a) Subtotal</b>	<b>5602.52</b>	<b>15.60</b>	<b>9278.84</b>	<b>19.29</b>	<b>15748.89</b>	<b>26.72</b>	<b>16632.58</b>	<b>16.37</b>	<b>23145.00</b>	<b>11.02</b>
b) Non- Forest										
Products	11640.94	32.42	17479.29	36.33	21046.82	35.71	37235.08	36.65	50335.00	23.97
Activities	18664.42	51.98	21352.60	44.38	22144.23	37.57	47730.77	46.98	136500.00	65.01
<b>b) Subtotal</b>	<b>30305.36</b>	<b>84.40</b>	<b>38831.89</b>	<b>80.71</b>	<b>43191.05</b>	<b>73.28</b>	<b>84965.85</b>	<b>83.63</b>	<b>186835.00</b>	<b>88.98</b>
<b>Total (a+b)</b>	<b>35907.88</b>	<b>100</b>	<b>48110.70</b>	<b>100</b>	<b>58939.90</b>	<b>100</b>	<b>101598.00</b>	<b>100</b>	<b>209980.00</b>	<b>100</b>

**Table No-3.11: Household Size and Annual Forest Production of Produces and Activities per Household  
in terms of Rs & %**

Sources	Very small		Small		Medium		Big		Very big	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	Rs.	%
<b>a) Produces</b>										
Fire wood	1881.43	33.58	2216.60	23.89	3129.23	19.87	2683.08	16.13	3800.00	16.40
Charcoal	44.64	0.80	55.34	0.60	66.67	0.42	0	0	0	0
Edible leafy vegetable	574.71	10.26	801.68	8.64	1280.77	8.13	1395.69	8.391	1620.00	7.00
Edible non leafy vegetable.	319.29	5.70	444.66	4.79	711.54	4.52	775.38	4.662	900.00	3.89
Aquatic life form	1526.79	27.25	3163.64	34.10	4592.31	29.16	6023.08	36.21	7800.00	33.70
Bamboo	20.54	0.37	66.60	0.72	149.36	0.95	65.38	0.393	125.00	0.54
Thatch	210.71	3.76	460.08	4.96	835.90	5.31	800.00	4.81	500.00	2.16
Palm leaves(1)	0	0	3.06	0.03	10.26	0.07	0	0	0	0
Palm leaves(2)	2.23	0.04	32.81	0.35	35.90	0.23	238.46	1.434	0	0
Cane	7.86	0.14	16.28	0.18	36.92	0.23	55.38	0.333	0	0
Broomstick	26.79	0.48	50.79	0.55	80.13	0.51	73.08	0.439	0	0
<b>a) Subtotal</b>	<b>4614.98</b>	<b>82.37</b>	<b>7311.54</b>	<b>78.80</b>	<b>10929.00</b>	<b>69.40</b>	<b>12109.54</b>	<b>72.81</b>	<b>14745.00</b>	<b>63.71</b>
<b>b) Associated activities</b>										
Herb practices	0	0	203.95	2.20	492.31	3.13	0	0	0	0
Craft	41.07	0.73	62.45	0.67	237.18	1.51	23.08	0.139	0	0
Sand labour.	562.50	10.04	592.65	6.39	2056.92	13.06	0	0	8400.00	36.30
Stone crushing	223.26	3.98	805.48	8.68	1341.18	8.52	4500.00	27.06	0	0
Other lab.& wages	160.71	2.87	302.77	3.26	692.31	4.40	0	0	0	0
<b>b) Subtotal</b>	<b>987.54</b>	<b>17.63</b>	<b>1967.30</b>	<b>21.2</b>	<b>4819.89</b>	<b>30.61</b>	<b>4523.08</b>	<b>27.19</b>	<b>8400.00</b>	<b>36.29</b>
<b>Total (a+b)</b>	<b>5602.52</b>	<b>100</b>	<b>9278.84</b>	<b>100</b>	<b>15748.90</b>	<b>100</b>	<b>16632.60</b>	<b>100</b>	<b>23145.00</b>	<b>100</b>



### **3.3.3.3. Household Size and Non- Forest Production:**

As stated earlier, agriculture is the main source of production. Rice is a major crop grown by all households to cover their food requirements. Besides, arecanut and livestock are other significant products which are most common to all households.

It is observed from the Table No- 3.12 that very large households do not depend much of their production on agricultural sources. This means that they have other sources of production and these households depend for their livelihood on businesses reflecting their entrepreneurship.

On the other hand all household classes are dependent on agricultural produce. This would mean that all household classes except for the very large households earn their living from different activities while at the same time draw as much from the forest to fill their livelihood gaps. This is indicative that these households are engaged in several activities not associated with the forest for cash income which is very essential for them and which enable them to have some purchasing capacity while at the same time manage for some savings by cultivated product of their own as well as drawing from the forest for their fuel and wild edibles.

**Table No- 3.12: Household Size and Annual Non- Forest Production of Produces and Activities per Household in term of Rs. & %**

Sources	Very small		Small		Medium		Big		Very big	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	Rs.	%
<b>a) Produces</b>										
Rice	4476.79	14.77	6047.04	15.57	7270.51	16.83	15069.23	17.74	26500.00	14.18
Arecanut	2742.86	9.05	3615.42	9.31	4223.08	9.78	5769.23	6.79	5250.00	2.81
Vegetable	577.50	1.91	1390.81	3.58	1895.03	4.39	3827.38	4.50	4585.00	2.45
Fruits	351.79	1.16	405.16	1.04	857.69	1.99	584.62	0.69	250.00	0.13
Liquor	771.43	2.55	1341.82	3.46	572.31	1.33	2215.38	2.61	3600.00	1.93
Animal	1752.73	5.78	3005.93	7.74	4067.95	9.42	5769.23	6.79	6900.00	3.69
Others	967.86	3.19	1673.12	4.31	2160.26	5.00	4000.00	4.71	3250.00	1.74
<b>a) Subtotal</b>	<b>11640.94</b>	<b>38.41</b>	<b>17479.29</b>	<b>45.01</b>	<b>21046.82</b>	<b>48.74</b>	<b>37235.08</b>	<b>43.83</b>	<b>50335.00</b>	<b>26.93</b>
<b>b) Activities</b>										
Govt. job	11301.82	37.29	7991.67	20.58	8702.56	20.15	24923.08	29.33	24000.00	12.85
Private job	1777.78	5.87	2759.68	7.11	5246.15	12.15	8769.23	10.32	0	0.00
Daily labour	2906.25	9.59	2699.41	6.95	2721.15	6.30	1269.23	1.49	0	0.00
Business &shop	2142.86	7.07	6818.97	17.56	4628.21	10.72	11846.15	13.94	108000.00	57.81
Masons & Carpenters	535.71	1.77	1082.87	2.79	846.15	1.96	923.08	1.09	4500.00	2.41
<b>b) Subtotal</b>	<b>18664.42</b>	<b>61.59</b>	<b>21352.60</b>	<b>54.99</b>	<b>22144.23</b>	<b>51.28</b>	<b>47730.77</b>	<b>56.17</b>	<b>136500.00</b>	<b>73.07</b>
<b>Total (a+b)</b>	<b>30305.36</b>	<b>100</b>	<b>38831.89</b>	<b>100</b>	<b>43191.1</b>	<b>100</b>	<b>84965.80</b>	<b>100</b>	<b>186835.00</b>	<b>100</b>

### **3.3.4. Classification of Households for Production Pattern by Literacy Levels:**

Literacy or education is also considered as a one of the determinants to examine the impact of literacy in the collection of forest products and forest activities in the livelihood of forest village households. Literacy is defined as “the total percentage of the people of an area at a particular time aged seven years or above who can read and write with understanding, taking the total population of the area (including below seven years of age) as the denominator” (Census, 1991). From each household percentage of literate calculated and they are classified in to five categories.

- i) Very Low (literate percentage from 0—20)
- ii) Low (literate percentage from 20 - 40)
- iii) Medium (literate percentage from 40 - 60)
- iv) High (literate percentage from 60 - 80) and
- v) Very High (literate percentage above 80)

#### **3.3.4.1. Sources of Production and Literacy: (Forest and Non-Forest)**

Literacy could be considered an important factor in changing the household production pattern. It was found that production increased as the household had higher number of literate members.

Therefore the role of education seems to be significant in changing the domestic pattern of production. Consequently, lesser the number of educated members in the households higher is the level of dependency on the forest resources and vice versa.

**Table No- 3.13: Literacy and Annual Sources of Production per Household in terms of Rs. & %**

Sources	Very low		Low		Medium		High		Very high	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Forest Products	8127.13	24.80	7991.83	17.91	8752.33	18.83	7249.81	11.59	6657.48	8.50
Associated activities	1202.47	3.67	2880.53	6.45	2717.89	5.85	2337.59	3.74	2476.84	3.16
<b>Subtotal (a)</b>	<b>9329.60</b>	<b>28.47</b>	<b>10872.36</b>	<b>24.36</b>	<b>11470.22</b>	<b>24.68</b>	<b>9587.40</b>	<b>15.33</b>	<b>9134.32</b>	<b>11.66</b>
<b>b) Non Forest sources</b>										
Products	14086.32	42.99	16959.45	38.00	19709.72	42.41	18455.50	29.51	21986.24	28.08
Activities	9350.00	28.54	16793.57	37.63	15291.91	32.91	34493.83	55.16	47186.08	60.26
<b>Subtotal (b)</b>	<b>23436.32</b>	<b>71.53</b>	<b>33753.02</b>	<b>75.63</b>	<b>35001.60</b>	<b>75.32</b>	<b>52949.33</b>	<b>84.67</b>	<b>69172.32</b>	<b>88.34</b>
<b>Total (a+b)</b>	<b>32765.92</b>	<b>100</b>	<b>44625.40</b>	<b>100</b>	<b>46471.90</b>	<b>100</b>	<b>62536.73</b>	<b>100</b>	<b>78306.64</b>	<b>100</b>

#### **3.3.4.2. Forest Based Production:**

Production from forest sources among illiterates and literates of households differ. Though the share of direct products is definitely larger than that of forest related activities literates tend to consume the available forest products rather than derive economic benefits out of it.

The households of medium class literacy level are comparatively the highest drawer of forest products. Table No- 3.14 suggests that the households having higher percentage of educated members, their source of revenue is remarkably being increased from the forest associated activities than from the forest products. It also suggests that most forest people are no longer merely hunters and gatherers and many farmers are no longer exclusively farmers. Within such diversified livelihoods, natural resource exploitation such as collection of NTFPs still may play an important role (Wiersum and Shackleton 2003). Keeping this in view, it cannot be generalised that these households do not derive substantial benefits from the forest. At least 11 percent production has been derived by the most literate class of households from the forest. As mentioned above aquatic life, firewood and edible vegetables are three major forest products extracted by these households (Table No-3.14).

**Table No- 3.14: Literacy and Annual Forest Production of Produces and Associated Activities per Household in terms of Rs. &(%)**

a)Forest Produces	Very low		Low		Medium		High		Very high	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Fire wood	2537.42	27.20	2542.73	23.39	2504.56	21.84	2096.44	21.87	2097.60	22.96
Charcoal	56.45	0.61	47.73	0.44	61.40	0.54	38.89	0.41	70.00	0.77
Edible leafy vegetable	1248.10	13.38	938.25	8.63	961.11	8.38	709.20	7.40	605.88	6.63
Edible non leafy vegetable.	690.48	7.40	521.25	4.79	533.95	4.66	394.00	4.11	336.60	3.69
Aquatic life	3203.23	34.33	3235.23	29.76	3815.79	33.27	3263.33	34.04	2856.00	31.27
Bamboo	40.73	0.44	82.39	0.76	94.30	0.82	80.28	0.84	74.50	0.82
Thatch	296.77	3.18	527.27	4.85	600.00	5.23	553.33	5.77	528.00	5.78
Palm leaves (1)	0	0	3.41	0.03	8.55	0.07	2.78	0.03	3.00	0.03
Palm leaves (2)	2.02	0.02	26.99	0.25	69.52	0.61	47.22	0.49	12.50	0.14
Cane	8.39	0.09	17.73	0.16	31.23	0.27	18.22	0.19	18.40	0.20
Broomstick	43.55	0.47	48.86	0.45	71.93	0.63	46.11	0.48	55.00	0.60
<b>Subtotal (a)</b>	<b>8127.13</b>	<b>87.11</b>	<b>7991.83</b>	<b>73.51</b>	<b>8752.33</b>	<b>76.30</b>	<b>7249.81</b>	<b>75.62</b>	<b>6657.48</b>	<b>72.88</b>
<b>b) Associated activities</b>										
Herb practices	0	0.00	477.27	4.39	0	0	533.33	5.56	0	0
Craft	46.77	0.50	114.77	1.06	147.37	1.28	40.00	0.42	70	0.77
Sand labour.	0	0.00	892.50	8.21	1315.26	11.47	1260.00	13.14	672	7.36
Stone crash	970.21	10.40	1225.53	11.27	666.67	5.81	204.26	2.13	1354.84	14.83
Other lab.& wages	185.48	1.99	170.45	1.57	588.60	5.13	300.00	3.13	380	4.16
<b>Subtotal (b)</b>	<b>1202.47</b>	<b>12.89</b>	<b>2880.53</b>	<b>26.49</b>	<b>2717.89</b>	<b>23.70</b>	<b>2337.59</b>	<b>24.38</b>	<b>2476.84</b>	<b>27.12</b>
<b>Total (a+b)</b>	<b>9329.60</b>	<b>100</b>	<b>10872.4</b>	<b>100</b>	<b>11470.2</b>	<b>100</b>	<b>9587.4</b>	<b>100</b>	<b>9134.319</b>	<b>100</b>

#### **3.3.4.3. Non-Forest Production:**

From the Table No- 3.13 it is observed that non-forest production dominates all across literacy classes. However, the more literate class depend more on non-forest production which reflects on their activities rather than direct forest production. This reflects the availability of different activities to more literate households and not merely the forest related activities. Hence their income generation too is raised by being employed elsewhere in other sectors of the economy. It is noteworthy that the less literate households earn their livelihood from non-forest products while the more literate households are dependent on non-forest activities.

Agriculture is the base of the rural economy and among the non-forest products rice is a significant produce which is common for all households. Government services assumes prominence in households of higher literacy classes while daily labour in lower literacy household classes. Private jobs and petty businesses assume increasing importance as the household's literacy level increases while the carpenter's job is preferred by members of the lower literacy households.

**Table No-3.15: Literacy and Annual Non- Forest Production of Produces and Activities per Household  
in terms of Rs. & %**

a) Produces	Very low		Low		Medium		High		Very high	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Rice	4037.10	17.23	6051.14	17.93	7117.54	20.33	6968.89	13.16	8348.00	12.07
Arecanut	3987.10	17.01	3790.91	11.23	3697.37	10.56	3373.33	6.37	3852.00	5.57
Vegetable	862.13	3.68	1288.48	3.82	1546.39	4.42	1873.36	3.54	1766.24	2.55
Fruits	398.39	1.70	419.32	1.24	473.68	1.35	493.26	0.93	572.00	0.83
Liquor	1316.13	5.62	1009.09	2.99	1495.79	4.27	906.67	1.71	960.00	1.39
Animal	2261.29	9.65	2945.98	8.73	3536.84	10.10	3054.44	5.77	4022.00	5.81
Others	1224.19	5.22	1454.55	4.31	1842.11	5.26	1785.56	3.37	2466.00	3.57
<b>a)Subtotal</b>	<b>14086.32</b>	<b>60.11</b>	<b>16959.45</b>	<b>50.25</b>	<b>19709.72</b>	<b>56.29</b>	<b>18455.50</b>	<b>34.85</b>	<b>21986.24</b>	<b>31.79</b>
<b>b) Activities</b>										
Govt. job	1548.39	6.61	6206.90	18.39	3209.73	9.17	15800.00	29.84	24352	35.20
Private job	735.48	3.14	1427.59	4.23	2631.58	7.52	6040.00	11.41	6204.08	8.97
Daily labour	3701.61	15.79	3068.18	9.09	3010.53	8.60	1808.33	3.42	1890.00	2.73
Petty business &shop	1622.58	6.92	5681.82	16.83	5271.93	15.06	10151.11	19.17	13540.00	19.57
Masons & Carpenters	1741.94	7.43	409.09	1.21	1168.14	3.34	694.38	1.31	1200.00	1.73
<b>Subtotal (b)</b>	<b>9350.00</b>	<b>39.89</b>	<b>16793.57</b>	<b>49.75</b>	<b>15291.91</b>	<b>43.69</b>	<b>34493.83</b>	<b>65.15</b>	<b>47186.08</b>	<b>68.20</b>
<b>Total (a+b)</b>	<b>23436.32</b>	<b>100</b>	<b>33753.00</b>	<b>100</b>	<b>35001.60</b>	<b>100</b>	<b>52949.33</b>	<b>100</b>	<b>69172.32</b>	<b>100</b>

**Conclusion:**

It may be concluded from the present description that forest and non-forest production seems to be over weighed by non-forest related activities. People being in the forest villages have adapted to contain their present needs by changing their livelihood strategies. A century back, most probably there was no need of markets. They could survive on daily collection of forest products and substantiate their usual needs by cultivating lands allotted to them. Each household had enough land for cultivation and there was enough collection from the forest to cover their daily needs at that point of time. The present scenario is completely different. Their needs have compounded not only because population is growing but the dependency on industrially manufactured goods like clothes, cooking oil, etc. and that their mobility is now guided by modern modes of transportation and so on. These are the goods and services they need to pay when they avail them. This is in fact the truth of their existence for which a number of activities have emerged besides collection of forest products. Almost any product related to construction is saleable and as result these communities have, through activities like collection of sand from river beds, crushing of stones, etc., utilised these avenues of economic activities for their survival. While production of forest and non-forest products has been documented it would be better understood if consumption of forest products by these forest communities are described. This is considered in the next chapter.

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## **Chapter IV**

### **Consumption of Forest Resources**

In the last chapter the entire gamut of production (forest and non-forest), have been discussed. Four major determinants and relevant attributes were considered to understand the share of forest resources which the households living in forest villages had access. To maintain the parity of data addressed to in the last chapter, the same classification has been followed in the current chapter pertaining to the determinants and their associated attributes

Having understood the production of these households, it was necessary to also find out their consumption as these households are fairly dependent on the forest area that they inhabit. As discussed in the introductory chapter, these households were surviving on allotted lands for many decades. Most of these people still depend on agriculture and collection of forest products. However, under the present circumstances, the inhabitants may not be in a position to sustain themselves due to growth of population and increased consumption with limited land resource.

It was observed from the last chapter that the households of forest villages are earning their livelihood mainly from non-forest related activities while at the same time depending on a certain amount on products collected from the forest. Rice and vegetables are the major non-forest items consumed and are produced by the villagers from their allotted plots of land. These have been taken into account to study the food security of these forest dwellers. It is important to point out here that a large section of the forest

dwellers depend approximately about 25 percent on products derived directly from forest sources.

More specifically, socio-economic research reveals that NTFPs (non timber forest products) become important in the livelihoods of many poor households who live in or near forests, especially in the tropics. Many of these studies find that the livelihoods of poor households still depend on NTFPs from fallow and natural forest relatively more than the other groups (Sills et al., 2003, Tickin, 2004, Osman et al., 2000, Roderick and Hirsch 2000, Belcher and Kusters 2004). It was also seen from the last chapter that the educationally advanced and prosperous households living in and near the forest collect the requirements from the forest in many ways.

In the present chapter an effort to understand the domestic consumption of the households is being attempted. While considering this, the forest products which are used by the households on regular basis have been taken in to account. This will give an estimated understanding of the forest products consumed directly by the forest dwellers. Rice and vegetables are also being considered as products consumed. It has been estimated that 80 percent of the population in the developing countries use forest products for subsistence, consumption and/or income (Johari et al. 1998). In order to achieve the desired objectives and to maintain parity of data, the classification of consumption had been made to be comparable with those of the last chapter.

#### **4.1. Intensity and Mechanism of Consumption:**

The above discussion reveals the pattern of forest products consumption of different stratum. The following discussion have been placed to understand the intensity

and mechanism of different forest products consumption by the forest dependent households living in Reserve Forest areas of the southern part of Kamrup District. Among all the NWFPs, the most common are used for food, fodder, medicine, and construction materials. Several others are used for farm tools, household baskets, sleeping mats, pillows, sponges and brooms (Arnold 1995). People in the villages traditionally consume the products they have collected from the forest.

#### **4.1.1. Fuel Wood:**

Fuel wood is the main and only source of energy used for household cooking, boiling and heating during winter irrespective of determinants and economic status. Fuel wood is collected from the forest for domestic use as there are no affordable alternative for fuel use. Dry leaves are used for lighting the fire. In summer dry twigs, branches of different varieties of trees available in the nearest distance of dwelling place are used, while in winter chopped wood and roots of the dry trees are used for domestic consumption as fire remains for longer period with larger pieces and emits more heat.

#### **4.1.2. Wild Edible Vegetables and Greens:**

The forest is a source of vegetables and greens are daily necessities of all households. On an average, households living in the forest gather food items for consumption for about three days a week. There are 34 species of wild vegetables which are commonly consumed by the households. Households located in less accessible and away from the urban centre collect maximum number and amount of wild and green edible from forest for daily consumption. Forest fruits, flowers, leaves, tubers, and roots form substantial part of food for tribes and rural poor forest dwellers. These fresh natural

products provide the required nutrients. Some of forest products are consumed directly, while some products are boiled, roasted or simply steamed. The forest dwellers have, over the years, developed recipes for making optimal use of such food items (Oberai 2005).

Traditionally processed forest food products (e.g. Bamboo shoot) also provide a year-round supplement to the diet. These could be stored for over a year. There are vast numbers of edible plant products garnered from forests, including seeds and nuts, leaves, fruits, roots and tubers, mushroom. Collectively they add diversity and flavour to the diet while providing protein, energy, vitamins and essential minerals. The contribution of forest foods to diets varies considerably from place to place. However, few studies have attempted to examine the frequency with which foods are consumed, the nutritional value of various foods, the prevalence of foods' use, or how resident populations value foods. There are a few household level analytic studies which help to illustrate the importance of these resources to local populations (Department of Forest Resource Management 1986, Hladik et al. 1987, Koagne 1986, Okafor 1981, Osei-Manu 1980).

Leaf and stem of *gonkachu* is consumed was once an important food item. The root of this had a good market value in recent past and was sold in local weekly market. Now this plant is rare and people collect it only for domestic consumption.

#### **4.1.3. Aquatic Life forms:**

Aquatic life mainly fish is viewed as a source of food and also income by the villagers. More than 70 percent households catch fish only for household consumption while less than 30 percent collect these for sale. The amount earned by selling would be

discussed in the next chapter. As it is common in most peasant societies, fish is served in both social and community functions. In summer most of households use to make dry fish to preserve for the lean period. Several forms of fish preservations are practiced enabling continuous supply throughout the year. Fish is smoked or treated with salt for short term preservation. The only form of long term method practiced by the tribes is to sun-dry the catches. From April to July the forest dwellers of the area are able to catch less fish and so their consumption too is lowered.

#### **4.1.4. Household Building Materials, Fencing Materials and Crafts:**

Bamboo is commonly used for constructing, repairing of dwelling place, cow sheds and fencing of the compound. It is the raw material for making of craft items as well as items of domestic use like basket, mat, sieve for cleaning of food items, big container for storing rice and household goods. Cane and bamboo are use for making household furniture like chair, tools and equipment for fishing (*sepa, jakhoi, jathi*, etc.), and as rope. Thatch, *japipat, tokopat* are used for roofing of houses and cowsheds. Few families use Tokopalm leaves for roofing the huts. Cane, *japipat* and *tokopat* are also used for making *Japi*, an umbrella like headgear for household use as well as for sale. There are four type of cane (*bet*) used for different purposes. *Sarainari bet* is used as a rope, *Hawka bet* to make *dala* (a basket like decorative piece), *Pakhari bet* is used for walking sticks and *Jang bet* for making furniture. Broomsticks are use for cleaning the dwelling place. It is also reported that in Bangladesh over 70 percent of rural dwellings use bamboo as the prime building material (Dunham 1992, cited in Wells *et al.*, 1994).

This is most probably the best locally available material which is most eco-friendly and accessible by the local population.

#### **4.1.5. Livestock, Pasture and Fodder:**

The forests are the sources of fodder for the cattle, goat and pig owners of the village communities. Cattle are reared mainly for crop cultivation practices (tilling soil, threshing of harvested paddy) and milk production. The fodder consisted of grasses, leaves of trees, etc. The animals are usually let loose in the forests without much supervision.

#### **4.2.1. Ethnic Communities and Consumption:**

Ethnicity defines the cultural traits of the communities living in the study area. Their consumption differs from one ethnic group to another in many ways. It has been already been mentioned that there are six ethnic communities and the table presented below would highlight the pattern of forest products consumption of different communities.

Thus, an overview of the consumption on ethnic lines has been considered as a background to understand the role forest and non-forest consumption through indications of the determinants.

##### **4.2.1.1. Forest Products Consumption:**

It is obvious that there would be a disparity in consumption of products by different ethnic communities living in the forest villages. Most of the rural areas use firewood as fuel for their households. The households of Scheduled Caste use more firewood for their domestic purposes (31.3 %) while the Garos use the least (21.5 %). It

was found that the Garos consume all the products from the list of items while the Schedule Castes consume the least. The Table No- 4.1 would describe the differences in the consumption pattern of the ethnic groups residing in the study area.

Most of these communities also consume the wild edibles from the forest. A number of these items like fish, crabs etc and wild vegetables are consumed. Considering this as a group of items, the Boros consume the maximum of 71.52 percent while the Garos consume a minimum of 65.90 percent. On the other hand, the General Castes and Scheduled Castes consume up to 70.09 and 68.72 percent respectively. It is interesting to note that as far as the wild edible vegetables are concerned, the Garos consume the maximum (22.6 %) while the least is consumed by the General Caste (1.5 %).

**Table No-4.1: Community wise Forest Products Consumption per Household in terms of Rs. & %**

Forest produces	General		SC		Oraon		Rabha		Boro		Garo	
	Rs.	(%)	Rs.	%	Rs.	%	Rs.	(%)	Rs.	(%)	Rs.	(%)
Fire wood	1723.53	29.91	1568.00	31.28	2141.54	26.27	1594.71	24.65	1443.87	28.48	1662.04	21.51
Edible leafy vegetable	55.59	0.96	54.00	1.08	805.85	9.88	809.14	12.50	501.68	9.90	1121.88	14.52
Edible non-leafy vegetable	30.88	0.54	30.00	0.60	447.69	5.49	448.86	6.94	278.71	5.50	623.27	8.07
Aquatic life	3952.94	68.59	3360.00	67.04	4476.92	54.91	3136.76	48.48	2845.16	56.12	3269.39	42.31
Bamboo	0	0	0	0	34.62	0.42	76.65	1.18	0	0	197.96	2.56
Thatch	0	0	0	0	246.15	3.02	344.85	5.33	0	0	742.86	9.61
Palm leaves (1)	0	0	0	0	0	0	4.14	0.06	0	0	0	0
Palm leaves (2)	0	0	0	0	0	0	10.57	0.16	0	0	4.08	0.05
Cane	0	0	0	0	0	0	15.15	0.23	0	0	25.31	0.33
Broomstick	0	0	0	0	0	0	29.78	0.46	0	0	79.59	1.03
<b>Total</b>	<b>5762.94</b>	<b>100</b>	<b>5012.00</b>	<b>100</b>	<b>8152.77</b>	<b>100</b>	<b>6470.61</b>	<b>100</b>	<b>5069.42</b>	<b>100</b>	<b>7726.37</b>	<b>100</b>

The other items of the above list like bamboo, thatch, etc are consumed maximum by the Garos (13.58 %) and minimum by the Oraons (3.42 %) while the rest of the ethnic groups do not directly consume them from forest sources.

#### 4.3.1.1. Distance from Urban Centre and Consumption Pattern:

As mentioned above, there is a need to understand the consumption pattern of the different distance classes of the forest dwellers of the study area. From the table (Table No-4.2), the overview of the consumption pattern portrays that more forest produces are consumed by households located far from the urban areas. This would mean that availability of forest products play an important role in determining their consumption pattern.

**Table No-4.2: Distance wise Annual Consumption per Household in terms of Rs. & %**

Consumption	Distance from Urban Centre							
	Nearest		Near		Far		Very far	
	Rs.	(%)	Rs.	(%)	Rs.	(%)	Rs.	(%)
Forest produces	5393.81	33.13	6507.76	39.01	6421.50	32.30	8477.87	40.93
Non –forest produces	10888.35	66.87	10174.68	60.99	13460.45	67.70	12237.24	59.00
Total	16282.16	100	16682.44	100	19881.95	100	20715.11	100

This shows that lesser the share of consumption from forest products, higher is the share from the non-forest products. It also indicates that the households nearer to the urban areas tend to depend more on market products rather than those household located far away from urban areas that apparently depend more on forest produce.

#### 4.3.1.2. Consumption of Forest Products:

In the table above the total forest and non-forest product consumption had been observed as an overview. Taking a closer look into the consumption of forest products only for the different distance ranges, it gives an understanding that there are three major products commonly used. These are aquatic animals, firewood and vegetables. It is seen that the different types of aquatic edible species form a major source of protein substitute for the forest dwellers. These are mainly for domestic consumption only however, there seem to be a relationship with availability and affordability of the concerned households. The Table No- 4.3 indicates that the households of two distance classes viz., nearest and far, depend substantially on this while consuming less of edible vegetables from the forest. Edible vegetables are very important diet for the people residing in the forest villages. Firewood is another forest produce being consumed by the households which is only source of fuel for these people.

**Table No-4.3: Distance wise Annual Forest Products Consumption per Household in terms of Rs. & %**

Forest Produces	Nearest		Near		Far		Very far	
	Rs.	(%)	Rs.	(%)	Rs.	(%)	Rs.	(%)
Fire wood	1492.17	27.66	1545.16	23.74	1732.93	26.99	1725.09	20.35
Edible leafy vegetable	398.54	7.39	996.39	15.31	564.36	8.79	1235.78	14.58
Edible non - leafy veg.	221.41	4.10	553.55	8.51	312.18	4.86	686.55	8.10
Aquatic life	2967.39	55.01	2932.26	45.06	3613.53	56.27	3523.64	41.56
Bamboo	25.82	0.48	90.52	1.39	22.93	0.36	260.91	3.08
Thatch	245.65	4.55	341.94	5.25	157.89	2.46	861.82	10.17
Palm leaves (1)	1.63	0.03	0	0	0	0	20.45	0.24
Palm leaves (2)	7.07	0.13	2.22	0.03	3.38	0.05	42.73	0.50
Cane	9.13	0.17	12.26	0.19	4.51	0.07	43.64	0.51
Broomstick	25	0.46	33.47	0.51	9.77	0.15	77.27	0.91
<b>Total</b>	<b>5393.82</b>	<b>100</b>	<b>6507.76</b>	<b>100</b>	<b>6421.50</b>	<b>100</b>	<b>8477.87</b>	<b>100</b>

In totality it would be worth mentioning that items like bamboo etc are relatively used in lesser quantity depending on distance since these items are scarce as one move towards the urban areas. It may also reflect not only the scarcity of the product but also that geo-cultural factors may be operating under such circumstances. It also gives an indication that consumption pattern of forest products for areas at the vicinity of the town seems to be significantly changing.

#### 4.3.1.3. Non-Forest Food Consumption:

It is important to estimate non-forest consumption to assess its contribution in the household's sustenance from the land allotted by Forest Department. Variation in consumption of rice cannot be taken into account with variation of distance from the vicinity of town or any other determinant.

**Table No- 4.4: Distance wise Annual Consumption of Non-Forest Products per Household in terms of Rs. & %**

Non-forest produces	Nearest		Near		Far		Very far	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Rice	9891.30	90.84	9758.06	95.91	12022.56	89.32	11745.45	95.98
Vegetable	997.04	9.16	416.61	4.09	1437.89	10.68	491.78	4.02
<b>Total</b>	<b>10888.35</b>	<b>100</b>	<b>10174.67</b>	<b>100</b>	<b>13460.45</b>	<b>100</b>	<b>12237.24</b>	<b>100</b>

Rice and vegetables are the two main produces of the households living in forest villages. These are mainly consumed except for vegetables which at times supplement income of these inhabitants. Rice is the staple food and usually these households do not have any surplus production from the limited land they hold.

#### 4.3.2.1. Accessibility and Consumption:

From the above discussion, it can be inferred that distance from the urban area does influence forest product consumption. Consumption depends a lot on household size. However, in the following paragraphs a general analysis of the influence of access to good road infrastructure would be attempted.

It is evident from the Table No- 4.5 that the consumption of non-forest products decreases towards the inaccessibility, whereas forest products consumption increases towards inaccessible areas. This is probably due to availability of items from forest sources. It can therefore be deduced that accessibility plays an important role in consumption pattern of forest and non-forest products.

**Table No- 4.5: Accessibility and Annual Consumption per Household in terms of Rs & %**

Consumption	Accessibility from nearest metal road							
	Easy accessible		Accessible		Partly accessible		Inaccessible	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Forest produces	5050.77	30.88	6382.44	33.17	5890.88	37.68	8295.03	41.20
Non-forest produces	11306.34	69.12	12856.60	66.83	9742.77	62.32	11838.95	58.80
<b>Total</b>	<b>16357.11</b>	<b>100</b>	<b>19239.04</b>	<b>100</b>	<b>15633.65</b>	<b>100</b>	<b>20133.98</b>	<b>100</b>

Households living in the inaccessible areas are more dependent on forest products than the easily accessible part as they have fewer choices than others from the forest sources to meet their daily basic and domestic needs.

#### 4.3.2.2. Accessibility and Forest Products Consumption:

Considering the accessibility parameter, households in areas far off from the good roads consume significant amounts of forest products exceeding the easily accessible areas by about 60 percent.

**Table No- 4.6: Accessibility and Annual Forest products Consumption per Household in terms of Rs. & %**

Forest Produces	Easy accessible		Accessible		Partly accessible		Inaccessible	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Fire wood	1510.77	29.91	1684.75	26.40	1508.18	25.60	1689.67	20.37
Edible leafy vegetable	311.54	6.17	571.73	8.96	937.64	15.92	1197.89	14.44
Edible non-leafy vegetable	173.08	3.43	316.50	4.96	520.91	8.84	665.49	8.02
Aquatic life	3055.38	60.49	3468.75	54.35	2809.09	47.69	3408.79	41.09
Bamboo	0	0	33.91	0.53	15.06	0.26	266.48	3.21
Thatch	0	0	272.50	4.27	86.36	1.47	903.30	10.89
Palm leaves (1)	0	0	0	0	0	0	12.36	0.15
Palm leaves (2)	0	0	2.81	0.04	0	0	28.85	0.35
Cane	0	0	9.00	0.14	0	0	43.08	0.52
Broomstick	0	0	22.50	0.35	13.64	0.23	79.12	0.95
<b>Total</b>	<b>5050.77</b>	<b>100</b>	<b>6382.44</b>	<b>100</b>	<b>5890.88</b>	<b>100</b>	<b>8295.03</b>	<b>100</b>

The remote households consume the whole range of forest products as listed in the Table No- 4.6 which is the characteristic of this class of households only. However, their consumption levels of the major forest produces like firewood, vegetables and edible aquatic life forms are proportionately less than that of the households living in easily accessible areas.

It may also be pointed out that households in the rest of the accessibility classes other than the inaccessible class do not collect all these products.

#### 4.3.2.3. Non-Forest Food Consumption:

Food consumption varies according to household size. The major two non-forest products consumed are rice and cultivated vegetables. The first two accessibility classes consume mostly cultivated vegetables.

**Table No-4.7: Accessibility and Non-Forest Products Consumption per Household in terms of Rs. & %**

Non-forest Produces	Easy accessible		Accessible		Partly accessible		Inaccessible	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Rice	10184.62	90.08	11543.75	89.79	9340.91	95.88	11362.64	95.98
Vegetable	1121.72	9.92	1312.85	10.21	401.86	4.12	476.31	4.02
<b>Total</b>	<b>11306.34</b>	<b>100</b>	<b>12856.60</b>	<b>100</b>	<b>9742.77</b>	<b>100</b>	<b>11838.95</b>	<b>100</b>

On the other hand in the inaccessible areas consumption of cultivated vegetable has lesser share but is compensated by edible forest vegetables.

#### 4.3.3.1. Household Size and Consumption:

Household size is another important parameter. It is important to examine its effects and establish the volume of consumption.

Non-forest products consumption of households varies according to its family size. It is natural that household size determines consumption. The share of non-forest consumption is more than 67 percent while forest products consumption is less than 33 percent for very big households. On the other hand very small size household consume more than 61 percent from non-forest and about 39 percent from forest (Table No- 4.8). As the household size increases the consumption of forest products tend to decrease. Therefore, the household size has significant role in consumption of food products.

**Table No- 4.8: Household Size and Annual Consumption per Household in terms of Rs & %**

Produce	Very small		Small		Medium		Big		Very big	
	Rs.	(%)	Rs.	(%)	Rs.	(%)	Rs.	(%)	Rs.	%
Forest	3614.18	38.90	5857.19	35.56	9246.54	36.01	11804.77	33.11	15945.00	32.70
Non-forest	5674.21	61.10	10615.50	64.44	16433.49	63.99	23850.46	66.89	32835.00	67.30
Total	9288.39	100	16472.66	100	25680.03	100	35655.23	100	48780.00	100

#### 4.3.3.2. Household Size and Forest Products Consumption:

From the above discussion it has been established that as the household size increases the consumption pattern also increases. In the following paragraphs a discussion of the consumption pattern of different household sizes would be taken up.

With regard to forest products consumption and household size it is obvious (Table No- 4.9) that there is variable consumption pattern depending on household size. The difference in forest products consumption between the very big and very small household size is more than 26 percent.

**Table No- 4.9: Household Size and Forest Products Consumption per Household in terms of Rs. & %**

Forest produces	Household Size									
	Very small		Small		Medium		Big		Very big	
	Rs.	(%)	Rs.	(%)	Rs.	(%)	Rs.	(%)	Rs.	%
Fire wood	1191.43	32.97	1477.31	25.22	2036.92	22.03	3052.31	25.86	3800.00	23.83
Edible leafy vegetable	381.86	10.57	664.86	11.35	1170.00	12.65	1224.00	10.37	1620.00	10.16
Edible non-leafy Vegetable	212.14	5.87	368.66	6.29	650.00	7.03	680.00	5.76	900.00	5.64
Aquatic life	1585.71	43.87	2943.08	50.25	4576.92	49.50	6507.69	55.13	9000.00	56.44
Bamboo	20.54	0.57	66.60	1.14	149.36	1.62	65.38	0.55	125.00	0.78
Thatch	196.43	5.43	288.54	4.93	566.67	6.13	246.15	2.09	500.00	3.14
Palm leaves (1)	0	0	1.88	0.03	8.33	0.09	0	0	0	0
Palm leaves (2)	0	0	6.42	0.11	17.31	0.19	7.69	0.07	0	0
Cane	6.43	0.18	11.38	0.19	26.15	0.28	6.15	0.05	0	0
Broomstick	19.64	0.54	28.46	0.49	44.87	0.49	15.38	0.13	0	0
<b>Total</b>	<b>3614.18</b>	<b>100</b>	<b>5857.19</b>	<b>100</b>	<b>9246.54</b>	<b>100</b>	<b>11804.77</b>	<b>100</b>	<b>15945.00</b>	<b>100</b>

It is very clear from the Table No- 4.9 that almost all households use forest products listed except for the very big and very small households. The very big class household consumes only five items from the list, namely firewood, forest vegetable, fish, bamboo and thatch while very small households do not consume palm leaves (1) and (2). All other classes of household consume more or less all types of forest products which are listed giving an impression that these items are necessary. On the other hand the very big households do not prefer some of these commodities since they are more affluent and are able to purchase the finished products. The very small households, on the other hand are mostly poor families who would prefer to collect food and housing items rather than craft items.

#### 4.3.3.3. Household Size and Non- Forest Food Consumption:

As already has been mentioned, rice and vegetables are cultivated non-forest principal food items which are regularly produced and consumed. The share of rice and

**Table No- 4.10: Household Size and Non-Forest Consumption per Household in terms of Rs. & %**

Consumption	Very small		Small		Medium		Big		Very big	
	Rs.	(%)	Rs.	(%)	Rs.	(%)	Rs.	(%)	Rs.	%
Rice	5285.71	93.15	9790.51	92.23	15256.41	92.84	21692.31	90.95	30000.00	91.40
Vegetable	388.50	6.85	824.95	7.77	1177.08	7.16	2158.15	9.05	2835.00	8.63
Total	5674.21	100	10615.46	100	16433.49	100	23850.46	100	32835.00	100

vegetables consumption seems to be more or less uniform among all the household sizes (Table No-4.10) indicating that these two items are the staple food of these inhabitants.

#### 4.3.4.1. Literacy and Consumption: (Forest and Non-Forest)

The literacy has been taken in to account to examine and understand the impact of literacy in the pattern of household's consumption. The difference in consumption considering both forest and non-forest products seems to be small but the trend of non-forest products consumption is slightly increasing as literate member of households increases (Table No-4.11).

**Table No- 4.11: Literacy and Annual Consumption per Household in terms of Rs. & %**

Consumption	Literacy									
	Very low		Low		Medium		High		Very high	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Forest produces	5917.77	37.60	6435.01	36.33	6955.18	35.63	6449.71	34.73	6323.78	34.40
Non-forest produces	9828.19	62.40	11279.30	63.67	12563.05	64.37	12119.47	65.27	12036.24	65.60
Total	15745.96	100	17714.31	100	19518.23	100	18569.18	100	18360.00	100

#### **4.3.4.2. Literacy and Consumption of Forest Products:**

From the forest products consumption (Table No-4.12) it is revealed that most households uniformly consume most of the forest products. It indicates that the inhabitants of these villages consume these products to some extent while at the same time trying to derive some benefit out of them.

Forest products like fish, firewood and wild edible vegetables are the most common for every household. It could be deduced from this table that these items are mostly the basic necessities and hence are consumed to a large extent. This would be discussed in detail in the next chapter.

#### **4.3.4.3. Literacy and Non-Forest Food Consumption:**

On the basis of percentage of literacy of households, the consumption pattern of non-forest products too are more or less homogeneous. The consumption pattern of basic food items has been found to be homogenous in all classes of determinants.

The consumption of the above products may vary according to the number of people in the household; however, there is no appreciable trend. It therefore seems that literacy levels have not much role to play in the consumption of the non-forest products.

**Table No- 4.12: Literacy and Forest Products Consumption per Household in terms of Rs. & %**

Forest produces	Very low		Low		Medium		High		Very high	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Fire wood	1534.84	25.94	1577.27	24.51	1692.63	24.34	1626.22	25.21	1619.20	25.60
Edible leafy vegetable	864.87	14.61	790.98	12.29	810.79	11.66	636.60	9.87	605.88	9.58
Edible non-leafy vegetable	477.58	8.07	439.43	6.83	450.44	6.48	353.67	5.48	336.60	5.32
Aquatic life	2796.77	47.26	3136.36	48.74	3484.21	50.10	3320.00	51.48	3312.00	52.37
Bamboo	40.73	0.69	82.39	1.28	90.13	1.30	80.28	1.24	74.50	1.18
Thatch	177.42	3.00	350.00	5.44	359.65	5.17	384.44	5.96	320.00	5.06
Palm leaves (1)	0	0	2.27	0.04	6.36	0.09	0.56	0.01	3.00	0.05
Palm leaves (2)	2.02	0.03	11.08	0.17	12.28	0.18	3.61	0.06	5.00	0.08
Cane	5.81	0.10	14.55	0.23	17.54	0.25	11.56	0.18	13.60	0.22
Broomstick	17.74	0.30	30.68	0.48	31.14	0.45	32.78	0.51	34.00	0.54
<b>Total</b>	<b>5917.77</b>	<b>100</b>	<b>6435.01</b>	<b>100</b>	<b>6955.18</b>	<b>100</b>	<b>6449.71</b>	<b>100</b>	<b>6323.78</b>	<b>100</b>

**Table No- 4.13: Literacy and Consumption of Non-Forest Products per Household in terms of Rs. & %**

Produces	Literacy									
	Very low		Low		Medium		High		Very high	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Rice	9290.32	94.53	10454.50	92.69	11587.72	92.24	11066.67	91.31	11040.00	91.70
Vegetable	537.87	5.47	824.73	7.31	975.33	7.76	1052.80	8.69	996.24	8.28
Total	9828.19	100	11279.23	100	12563.05	100	12119.47	100	12036.24	100

#### 4.4. Livestock and Fodder Consumption:

Raising livestock is part and parcel of the agricultural activity of forest dwellers households. These animals are usually allowed to graze freely in the forest. Cattle are reared mainly for crop cultivation practices and milk production. Most villagers raise goats, pigs, chickens, ducks both to supply household needs as to sell in the market. Animals, especially goats, pigs, chickens, ducks are often kept as security since they can always be sold in case of immediate need. The following tables specify grass consumed by the different animals from the forest.

##### 4.4.1. Fodder Consumption of Cattle (cow):

Animals raised by the villagers totally depend on free grazing in forest itself. There is normally no stall feeding system for the animals.

**Table No- 4.14: Average Annual Grass Consumption of Cattle (Cow) in the Study Area**

Age of Animal (Cow)	No. of Animals	Grass Consumed /day/ Animal in kg	Total Consumption /day in kg.	Annual Consumption in kg.
< 1 year	175	10	1750	630000
1—2 year				
2—3 years	180	15	2700	972000
> 3 years	1196	20	23920	8611200
<b>Total</b>	<b>1551</b>		<b>28370</b>	<b>10213200</b>

As cattle are raised mainly for agricultural purpose, cattle of age of more than 3 years are preferred. As the size and age of animal increases the consumption of grass also increases. The table No-4.14 shows as the age of cattle increases the consumption of grass also increases. The highest numbers of cattle are of age more than 3 years old. The number of cattle of the surveyed villages is 1551 and they approximately consume 10,000 tonnes of fodder annually.

#### 4.4.2. Fodder Consumption of Goat:

Goats are raised for income security of the households. Similarly, goats are allowed to graze freely in the forest. The grass consumption of goats also varies according to age.

**Table No- 4.15: Average Annual Grass Consumption by Goat**

Age of Animal (Goat)	No. of Animal	Grass Consumed per day/ Animal in kg	Per day total Consumption in kg.	Annual Consumption in kg.
< 1 year	130	1	130	46800
1—2 years	427	2	854	307440
> 2 years	53	3.5	185.5	66780
<b>Total</b>	<b>610</b>		<b>1169.5</b>	<b>421020</b>

As compared to cattle, the number of goats raised is less. The Table No- 4.15 shows that more goats are of age group of 1—2 years and very less are of more than 2 years old. These animals consume about 420 tonnes of fodder every year.

#### 4.4.3. Fodder Consumption of Pig:

Among the animal raised in the households of forest villages pigs are mostly stall-fed, but the fodder is mostly collected from forest and lesser part of fodder comes from waste and residue of household food. These animals also act like income security for the inhabitants of these villages.

**Table No- 4.16: Average Annual Grass Consumption by Pig**

Age of Animal (Pig)	No. of Animal	Grass Consumed per day/ animal in kg	Per day total Consumption in kg.	Annual Consumption in kg.
< 1year	82	2	164	59040
1—2 years	120	4	480	172800
> 2 years	100	5	500	180000
<b>Total</b>	<b>302</b>		<b>1144</b>	<b>411840</b>

As other animals, consumption of fodder by the pigs also depends on age and body weight. Pigs are also kept only for a specific time limit in order to obtain the salable body size. Raising pigs is not common as cattle and goats in the forest villages. Raising is pigs is not so popular as it is an expensive affair from both labour and money point of view which villagers cannot afford to do so.

#### Conclusion

In this chapter the consumption of items was considered. It is interesting to note that three major forest products are consumed by all households. These are firewood,

edible vegetables and aquatic life forms. Firewood is consumed by all households since this is a readily available and affordable fuel source. Most of the people here consume vegetables and the tribes have their own way of consuming them apart from the General and Scheduled Castes. Wild vegetable could be easily collected from the forest at different points of the year and these substantially make up for the food requirements of the inhabitants of these villages. Aquatic life forms of different kinds are being consumed by the villagers and of course fish is the major component. As far as the consumption of other items on ethnic lines, it could be concluded that the Garos consume the maximum number of items giving them an edge in the utilization of forest products over the other ethnic groups. The General and Scheduled Castes and the Oroans do not have such a distributed consumption of the forest products. Besides, a huge amount of fodder is being consumed by reared animals for which an approximate volume was estimated. This however, can be regarded as a free gift of nature.

This leads to the next chapter where the gains in terms of 'subsidiary benefits' would be discussed.

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## **Chapter-V**

### **Forest Products and Subsidiary Benefit**

In the preceding two chapters the issues of extraction and utilization of forest products have been dealt with in detail. While these have been discussed, there is a need to understand how much these inhabitants benefit from the forest. For so long, since the time these forest villages have been formed no research has been directed towards conservation and development initiatives.

To arrive at an understanding of benefits derived from such usage, two basic concepts and their interlinkage provide the analytical means to this end. The concept of understanding the 'draw' and 'reliance' was put forward. The concept of resource 'draw' reflects the volume of extraction. Resource draw relates directly to conservation concerns by capturing the amount of critical or scarce resources being extracted from the forest. The second is the concept of 'reliance' which reflects the income share associated with an activity, such as forest product extraction. Reliance corresponds to development concerns by capturing the importance of the activity as an income source to the people or communities involved in its extraction (Coomes et al. 2001).

In the present study, these concepts were used, however with elements of change to suit the local conditions and requirements. Production was brought in as a concept

reflecting 'draw' from the forest but at the same time considering forest associated activities like sand collection, stone crushing, etc. Again, consumption reflects the amount of usage which is partly considering the 'reliance' concept. Both production and consumption considered forest and non-forest components important.

In an attempt to understand how much of benefits the households are deriving from the forest products the concept of 'subsidiary benefit' was evolved which is the share that remains from production of forest products after subtracting consumption. However, the remaining share is a purposeful saving meant for deriving monetary benefits to supplement other needs by poor families. In the process of trying to understand the dependency levels of households on the forest produces, subsidiary benefits obtained could probably be a better mode of understanding how much people rely on forest resources. In a condition where there is subsistence it is not proper to measure any surplus generated but rather to assess the subsidiary benefits derived from the forest.

While trying to find out the changing contribution of forests to poor people's livelihoods, or attempting to envisage forest-related livelihood options the generalizations need to be carefully looked into. People may adopt many strategies to cope up with making a living (Nguyen Thi Yen *et al.* 1994). It may be mentioned that the non-forest produces substantiate the needs of the households of the study area to a tune of three

quarters of their needs. They have to purchase food from the market to supplement their requirements. This means that the land allotted to these households for production of rice etc., one century before do not match their present needs. In the consequent paragraphs it will be noted that these items are deficient for all the determinant classes considered which reflects their basic needs and the compulsory need to fill up these gaps. This is compensated through other activities. However, this is a complex matter of choice depending on location, accessibility to forest resources and forest associated activities, employment avenues (forest based) and self generated employment.

In this chapter, the subsidiary benefits obtained by the family from different sources, forest and non- forest (rice in particular), would be discussed to show the pattern of reliance of households on forests. These patterns are influenced by ethnicity, distance from the nearest town, road accessibility, family size as well as literacy. Earning from supplementary activities to fill the necessary gaps may be seasonal or throughout the year, or may be occasional as and when needed. The role of these activities depends on the availability and profitability of alternative employment. It also depends much on the availability of these products, access to the forest resource, the composition and condition of the forest resource as well as saleability in local markets (Falconer and Arnold 1989, Beer and McDermott 1989).

Non-timber forest products (NTFPs) cover a wide range of products with different characters. Some of these serve subsistence needs, others have important gap filling or

'safety net' functions and some provide regular cash income. Most of NTFPs are labour intensive and require little capital. Traditional skills are often required for extraction from natural forests. They provide generally poor prospects for market and price growth. Unfortunately, this combination makes the majority of NTFPs economically inferior products, yielding low returns for those engaging in their production though they are eco-friendly food items. Paradoxically, the characteristics that make NTFPs important and attractive to the poor are the ones that limit the potential for increasing NTFPs income (Charlie Shackleton and Sheona Shackleton 2004).

Most households exist in a situation within which their activities are influenced by an array of interrelated objectives, constraints, and other factors. Household livelihood options are likely to include pursuit of secure provision of food and other essential subsistence goods, cash for purchase of outside goods and services, savings, and social security. In examining household use of forest products, we therefore need to identify their usefulness in providing both foods that contribute to food self-sufficiency and saleable products that could supplement gaps to procure other needs and services. In doing so it is also necessary to consider whether, and if so how, activities based on forest products affect other aspects of a household's capacity to contribute to its food self-sufficiency.

Although most people today are more or less integrated into the modern market economy, shifting cultivation, hunting and gathering continue to be an important part of

their daily life (Brookfield et al. 1995). People in the study area are in a transition from a non-priced gathering economy to a monetary economy where in one hand they enjoy the benefits of nature's free gifts while on the other hand every other item they require calls for a capable purchasing power. These activities can be viewed in terms of subsistence and supplementary activities as well as their cultural practices (Cleary & Eaton 1992, Brookfield et al. 1995, Mertz et al. 1999). In this context, to the tribes living in this area the traditional cultural activities are equally important as livelihood issues while to the rest of the ethnic groups, livelihood issues are far more prioritized.

The poor, with limited labour and resources devote to forest product gathering, may also be able to increase their sales only by diverting supplies from subsistence use—as has been happening with bushmeat in West Africa (Townson 1995b, Falconer 1990). This is relevant in most cases in the study area where people tend to sell gathered forest products at local levels to substantiate their needs and requirements.

More widely, forest based activities are part-time employment avenues to poor households which cannot be food self-sufficient the whole year round. A study of lowland villages in the Philippines revealed similar conditions where 73 percent of the households could not generate enough food or cash income from agriculture to meet their basic needs. All village households collected forest products for supplementary and emergency income. (Siebert and Belsky 1985).

### **5.1. Ethnic Communities and Subsidiary Benefits from Forest Products:**

As mentioned earlier, the ethnic scenario offers a grater insight to the nature of withdrawal and gains available thereby. From the following table it can be understood how the ethnic groups living in the forest villages derive benefits from different forest products for their livelihoods.

It can be drawn from the above table that ethnicity plays an important role in the withdrawals from the forest resources. The table clearly shows that the Garo and Rabha communities benefit significantly from the forest resources while the General castes gaining none. It however does not mean that they do not depend on forest resources since they collect and consume and do not gain any monetary benefit. Though the Scheduled Castes are deriving minimal benefits from wild edibles, their consumption is much more than what benefits they derive. On the other hand the Boro community derives maximum benefit only from one commodity, i.e., firewood while the Oraon community beneficially gains from three products, i.e. firewood, fish and thatch. It is interesting to note that only the Garo community derive benefits from sale of charcoal which no other community in the study area is involved.

**Table No- 5.1: Ethnic Community and Annual Subsidiary Benefit from Individual Forest Produces per Household in terms of Rs. and %**

Forest Produces	Ethnic Composition of Forest Villages											
	General		SC		Oraon		Rabha		Boro		Garo	
	Rs.	(%)	Rs.	%	Rs	%	Rs.	(%)	Rs.	(%)	Rs.	(%)
Fire wood	0	0	0	0	480.00	66.10	784.71	52.20	1571.61	100.00	1446.53	49.62
Charcoal	0	0	0	0	0	0	0	0	0	0	464.69	15.94
Wild Edible	0	0	16.80	100.00	0	0	272.18	18.11	0	0	274.29	9.41
Aquatic life	0	0	0	0	184.62	25.42	195.22	12.99	0	0	171.43	5.88
Bamboo	0	0	0	0	0	0	0	0	0	0	0	0
Thatch	0	0	0	0	61.54	8.47	173.53	11.54	0	0	497.96	17.08
Palm leaves 1	0	0	0	0	0	0	1.65	0.11	0	0	0	0
Palm leaves 2	0	0	0	0	0	0	38.51	2.56	0	0	15.82	0.54
Cane	0	0	0	0	0	0	7.65	0.51	0	0	14.69	0.50
Broomstick	0	0	0	0	0	0	29.78	1.98	0	0	29.59	1.02
<b>Total</b>	<b>0.00</b>	<b>0.00</b>	<b>16.8</b>	<b>100.00</b>	<b>726.15</b>	<b>100.00</b>	<b>1503.22</b>	<b>100.00</b>	<b>1571.61</b>	<b>100.00</b>	<b>2915.00</b>	<b>100.00</b>

### **5.1.1. Community and Subsidiary Benefit from Forest Sources:**

From the discussion of forest products it has been found that the tribes are more dependent on forest products as compared to other ethnic groups living in the forest villages. The overall household benefit from the forest sources of the different ethnic communities can be understood by examining the following Table No-5.2. From the table it is very clear that the General caste population of the study area is only filling-the-gap by activities which are related to forest. As mentioned above though they collect forest products, such items are completely consumed. It also reflects that they are not much dependent on forest products and as they live in accessible areas they are sustaining themselves from non-forest activities (ref. Table. No-3.2). On the other hand the Scheduled caste and Oraon population depend almost totally on forest related activities like sand extraction. It is interesting to note that the households of other ethnic groups especially the Garos depend much on forest products up to about 43.4 percent while Rabhas and Boros about 22.3 percent respectively from the total produces. These ethnic groups depend on forest related activities which account for 4.9, 9.4 and 6 percent respectively.

**Table No- 5.2: Ethnic Community and Annual Subsidiary Benefit from Forest Produces and Associated Activities in terms of Rs. & %**

Forest Source	General		SC		Oraon		Rabha		Boro		Garo		Total
	Rs.	%	Rs.	%	Rs	%	Rs.	%	Rs.	%	Rs.	%	
Products	0	0	16.80	0.17	726.15	8.86	1503.22	41.41	1571.61	55.16	2915.00	72.42	6733.00
%	0		0.25		10.79		22.33		23.34		43.40		100
Associated activities	555.88	100	10080.00	99.83	7467.69	91.14	2126.47	58.59	1277.42	44.84	1110.20	27.58	22618.00
%	2.46		44.57		33.02		9.40		6.00		4.91		100
<b>Total</b>	<b>555.88</b>	<b>100</b>	<b>10096.80</b>	<b>100</b>	<b>8193.85</b>	<b>100</b>	<b>3629.69</b>	<b>100</b>	<b>2849.03</b>	<b>100</b>	<b>4025.2</b>	<b>100</b>	<b>29350.00</b>
%	1.89		34.40		27.92		12.37		9.71		13.71		100

### 5.1.2. Community and Subsidiary Benefit from Non-Forest Sources:

While considering subsidiary benefits from non-forest sources on ethnic lines it was found that these communities do not gain any from their food production. They rather gain negative benefit or in other words there is a deficiency. The main item produced is rice which is a staple food of the people. The following Table No- 5.3 expresses that rice produced from their allotted lands is deficient.

**Table No- 5.3: Community and Non-Forest Annual Subsidiary Benefit in %**

	General	SC	Oraon	Rabha	Boro	Garó
Rice	(%)	(%)	(%)	(%)	(%)	(%)
Production	100.00	100.00	100.00	100.00	100.00	100.00
Consumption	173.00	903.23	101.25	157.90	203.00	213.00
Deficit	73.00	803.00	1.25	57.90	103.00	113.00

From the above table, it may be pointed out that the Oraon tribe is having the least deficiency in rice while Rabhas and General Castes face moderate food deficiency. The Boros and Garos encounter substantial deficiency while the Scheduled castes suffer most. Taking the overall scenario from the above tables, it could be deduced that the minimal deficiency of food among the Oraons is caused by the larger land holdings per household (1.61 ha) on which the households could depend on as depicted in Table No-5.4 This is because this ethnic group follows joint family system and thereby could retain more land per household which is not so with other groups.

**Table No- 5.4: Ethnic Communities, Population Size and Land Holding**

<b>Ethnic Communities</b>	<b>No. of HH</b>	<b>% to T.H.H</b>	<b>Population Size (persons)</b>	<b>% to T.P.</b>	<b>Average Person/HH</b>	<b>Average Land holding/HH (ha)</b>
Rabha	272	67.33	1422	65.08	5.23	0.93
Boro	31	7.67	147	6.73	4.74	0.74
Garo	49	12.13	267	12.22	5.45	0.99
General	34	8.42	224	10.25	6.59	0.66
Oraon	13	3.22	97	4.44	7.46	1.61
SC	5	1.24	28	1.28	5.6	0.75
<b>Total</b>	<b>404</b>	<b>100</b>	<b>2185</b>	<b>100</b>		

The above table reiterates the fact that the Oraons, Garo and Rabhas have larger land holdings though the food deficit is reflected higher among the Garos. However, it may be mentioned that the Garos live in elevated areas and therefore do not have good agricultural lands. It may be mentioned that in some Garo villages most rice growing areas are swampy and cultivation is possible only in winter with relatively poor production.

### **5.2. Distance from Urban Centre and Subsidiary Benefit from Forest Products:**

A large number of households depend for their livelihood on forest products. Often the households save their collection purposefully either on a part-time or full-time basis to fill the gaps. Much of these activities are seasonal. Some products can only be gathered at certain times of year. Sometimes collection of forest produces seems to emerge as a primary activity due to the current domestic demands. This leads to seasonal

**Table No-5.5: Distance wise Annual Subsidiary Benefit of Individual Forest Products per Household in terms of Rs. and %**

Forest products	Nearest		Near		Far		Very far	
	Rs.	(%)	Rs.	(%)	Rs.	(%)	Rs.	(%)
Fire wood	775.65	99.88	1221.94	48.80	372.93	80.34	610.91	18.20
Charcoal	0	0	183.63	7.33	0	0	0	0
Wild Edible	0.91	0.12	460.64	18.40	25.26	5.44	490.76	14.62
Aquatic life	0	0	401.61	16.04	0	0	1167.27	34.77
Bamboo	0	0	0	0	1.88	0.40	0	0
Thatch	0	0	212.90	8.50	60.15	12.96	727.27	21.66
Palm leaves (1)	0	0	0	0	0	0	5.45	0.16
Palm leaves (2)	0	0	5.44	0.22	3.57	0.77	171.82	5.12
Cane	0	0	6.13	0.24	0	0	37.09	1.10
Broomstick	0	0	11.69	0.47	0.38	0.08	146.36	4.36
<b>Total</b>	<b>776.57</b>	<b>100</b>	<b>2503.99</b>	<b>100</b>	<b>464.17</b>	<b>100</b>	<b>3356.94</b>	<b>100</b>

fluctuation of labour availability and such activities can contribute to the purchase of farm inputs or food between harvests. Forest products are often sold and benefits accrued are used to obtain inputs for other activities that contribute to livelihoods like purchasing of seeds, hiring extra labour for cultivation or generate working capital for trading activities (Leach & Fairhead 1994). The Table No-5.5 presents the detail contribution of forest products to the annual household requirements on the basis of their distance from the nearest urban centre.

Individual forest products annual share as well as total household benefit from forest products seems to be significant. As distance increases from the urban centre, the contribution of listed products as well as trend of benefits are observed (Table No-5.5). The variation in subsidiary benefit accruing for the different distance classes as mentioned earlier in Chapter III can be understood from the following Table No- 5.6 Among the forest products, the benefit from firewood is the maximum while edible wild

vegetables provides benefit to all distance classes. Benefits from the aquatic life forms are seen only from near and very far distance classes. From the overall point of view the near and very far distance class are generating more subsidiary benefit from forest products than the other two distance classes. There is an observed variation in the contribution of forest products to people living at different distances from the urban centre. The people of two distinct distance classes (nearest and far) from the urban centre have comparatively lower subsidiary benefits from forest products for varied reasons. Most of these people have other livelihood options than collection of forest products which is reflected in the Table No-5.6.

#### **5.2.1. Distance and Subsidiary Benefit from Forest Sources:**

The above discussion reveals the benefit generated from forest products of the households according to distance from the urban centre. The following table presents the benefits accrued from forest products and forest associated activities of the households. It has been mentioned earlier that daily wage labour is a primary source of livelihood and has greater earning than the forest products gathering. It seems to be relevant and wherever any option exists people are benefited more. Considering the total benefits from the forest sources (Table No- 5.6) it becomes clear that households situated at nearest and far distance classes shows the similar nature and pattern of earning sources. On the other hand the near and very far distance classes have the similar character. It indicates that the availability of alternative sources of income helps in providing some choice in livelihood strategies to rural communities that depend on forest resources. However, the overall scenario suggests that benefit generation from forest sources seems

to be significant as distance increases from the urban centre. Considering the benefits derived in cash or kind from forest sources reflects the paltry sum received by the households but such alternatives are very important for those household having fewer livelihood choices.

**Table No- 5.6: Distance wise Annual Subsidiary Benefit from Forest Products and Forest Associated Activities in term of Rs. & %**

Forest Source	Distance from Urban Centre								
	Nearest		Near		Far		Very far		Total
	Rs.	(%)	Rs.	(%)	Rs.	(%)	Rs.	(%)	
products	776.57	22.74	2503.99	84.03	464.17	11.26	3356.94	78.49	7101.67
%	10.93		35.26		6.54		47.27		100
Associated activities	2638.04	77.26	475.81	15.97	3657.74	88.74	920	21.51	7691.59
%	34.30		6.54		47.56		11.96		100
<b>Total</b>	<b>3414.61</b>	<b>100</b>	<b>2979.80</b>	<b>100</b>	<b>4121.91</b>	<b>100</b>	<b>4276.94</b>	<b>100</b>	<b>14793.27</b>
<b>%</b>	<b>23.08</b>		<b>20.14</b>		<b>27.86</b>		<b>28.91</b>		<b>100</b>

The Table No- 5.6 shows the annual household benefit from the forest products and forest associated activities. The share of forest products contribution is more in near and very far distance classes where as share from forest associated activities is more in nearest and far distance classes. This is because of better road connectivity between nearest and far distance classes and the urban centres. Considering choices or possible livelihood options, the benefits derived from direct collection of forest produce is lesser than derived from forest associated activities. However, distance from the nearest urban centre play a significant role though accessibility would certainly increase the choices and options.

### 5.3. Accessibility and Subsidiary Benefit from Forest Products:

Roads are important for the development of any area. The effectiveness of accessibility in generating benefits for rural communities has been observed and is a common experience. It has been observed here that even households that sustain themselves from forest resources for their livelihood have benefited from infrastructural development. A comparative analysis of benefits derived by forest villages due to improvement in accessibility levels is presented in the Table No- 5.7.

**Table No- 5.7: Accessibility and Annual Subsidiary Benefit of Individual Forest Products per Households in terms of Rs. and %**

Forest products	Metal Road Accessibility							
	Easy accessible		Accessible		Partly accessible		Inaccessible	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Fire wood	494.77	99.74	555	86.18	1094.55	49.10	975.82	29.81
Charcoal	0	0	0	0	154.43	6.93	100.88	3.08
Wild Edible	1.29	0.26	21	3.26	496.36	22.26	444.31	13.58
Aquatic life	0	0	0	0.00	470.45	21.10	797.80	24.38
Bamboo	0	0	0	0	0	0	0	0
Thatch	0	0	37.5	5.82	0	0	729.67	22.29
Palm leaves (1)	0	0	0.94	0.15	0	0	3.30	0.10
Palm leaves (2)	0	0	7.03	1.09	0	0	111.26	3.40
Cane	0	0	0	0	0	0	30.77	0.94
Broomstick	0	0	22.5	3.49	13.64	0.61	79.12	2.42
<b>Total</b>	<b>496.06</b>	<b>100</b>	<b>643.97</b>	<b>100</b>	<b>2229.43</b>	<b>100</b>	<b>3272.93</b>	<b>100</b>

It is obvious from the Table No- 5.7 that benefits from forest produce increases with inaccessibility. This reflects the dependency of inaccessible households on forest resources though firewood is a common product that all classes depend on and where the poorest households use it for income generation besides consuming it. It may also be mentioned that a small number of households located near the Meghalaya border that have access to minor forest products like palm leaves (1) (tokopat), thatch and palm

leaves (2) (japipat) do withdraw these products for domestic consumption as well as for handicrafts.

### 5.3.1. Accessibility and Subsidiary Benefit from Forest Sources:

In an attempt to understand the gains offered by forest resources to households with different levels of road infrastructure it has been found that benefits are at times supplementary depending on the levels of availability of road infrastructure. This is indicated in the Table No-5.8 where the households avail opportunities to improve their livelihoods.

**Table No-5.8: Accessibility and Annual Subsidiary Benefit from Forest Produces and Forest Associated Activities in terms of Rs, & %**

Forest Source	Easy accessible		Accessible		Partly inaccessible		Inaccessible		Total Rs.&%
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	
Products	496.06	10.25	643.97	18.74	2229.43	97.76	3272.93	73.92	6642.40
%	7.47		9.69		33.56		49.27		100
Associated activities	4343.08	89.75	2793	81.26	51.14	2.24	1154.95	26.08	8342.20
%	52.06		33.48		0.61		13.84		100
<b>Total</b>	<b>4839.14</b>	<b>100</b>	<b>3436.97</b>	<b>100</b>	<b>2280.57</b>	<b>100</b>	<b>4427.88</b>	<b>100</b>	<b>14984.56</b>
%	32.29		22.94		15.22		29.55		100

It is imperative from the Table No-5.8 that the two inaccessible classes derive more benefits from forest produces rather than from associated activities. On the other hand, accessible areas that have other options, withdraw more from associated activities which provide higher income leading to better livelihood sustenance. While the trend of benefit derivation from forest products is higher towards inaccessible areas (49.3%) the reverse trend occurs in activities associated with the forest for which accessible areas (52.06%) stand to gain (Table No- 5.8).

#### **5.4. Household Size and Subsidiary Benefit from Forest Products:**

It is a universal fact that larger the family size, the household consumption would also be higher. The benefits derived from the forest products would depend much on the amount collected and the requirement of the household. Needs are more in larger households and it may be inferred that it may not be possible to sustain large households only by collections from forest resources. The support available to the households of different sizes from forest products are as follows.

From the Table No-5.9 very large households with 13 persons or more cannot sustain themselves from collection of forest produces only. All collection is being consumed and big households with 10 -12 persons could derive less benefits as compared to very small and small household having less than 6 persons. Considering the average household size of 5 – 7 persons it may be concluded that a majority of households are somewhat enjoying some benefits from forest products with a maximum benefit for very small households. However, very small households lack man power thereby leaning much on collected forest produce and as a result cannot reap the benefits offered by forest resources.

**Table No- 5.9: Household Size and Annual Subsidiary Benefit of Individual Forest Products per Household in terms of Rs. and %**

Forest products	Very small		Small		Medium		Big		Very big	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Fire wood	690.00	65.11	739.29	50.83	1092.31	%	0	0	0	0
Charcoal	44.64	4.21	55.34	3.81	66.67	64.92	0	0	0	0
Wild Edible	300.00	28.31	212.82	14.63	172.31	3.96	0	0	0	0
Aquatic life	0.00	0.00	220.55	15.17	15.38	10.24	267.08	23.05	0	0
Bamboo	0	0	0	0	0	0.91	0	0	0	0
Thatch	14.29	1.35	171.54	11.80	269.23	0	0	0	0	0
Palm leaves (1)	0	0	1.19	0.08	1.92	16.00	553.85	47.80	0	0
Palm leaves (2)	2.23	0.21	26.38	1.81	18.59	0.11	0	0	0	0
Cane	1.43	0.13	4.90	0.34	10.77	1.10	230.77	19.92	0	0
Broomstick	7.14	0.67	22.33	1.54	35.26	0.64	49.23	4.25	0	0
<b>Total</b>	<b>1059.70</b>	<b>100</b>	<b>1454.35</b>	<b>100</b>	<b>1682.44</b>	<b>2.10</b>	<b>57.69</b>	<b>4.98</b>	<b>0</b>	<b>0</b>

**Table No- 5.10: Household Size Annual Subsidiary Benefit from Forest Products and Associated Activities in terms of Rs, & %**

Forest Source	Very small		Small		Medium		Big		Very big		Total Rs.&%
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	Rs.	%	
Products	1059.73	51.80	1454.35	42.50	1682.44	25.9	1158.62	20.40	0	0	5355.13
%	19.79		27.16		31.42		21.64		0		100
Associated activities	987.54	48.24	1967.30	57.50	4819.89	74.13	4523.08	79.61	8400.00	100	20697.81
%	4.77		9.50		23.29		21.85		41		100
Total	2047.27	100	3421.65	100	6502.33	100	5681.69	100	8400.00	100	26052.94
%	7.86		13.13		25.00		21.80		32.00		100

#### **5.4.1. Household Size and Subsidiary Benefit from Forest Sources:**

From the Table No-5.10 it could be deduced that large households especially those of Oraons, General caste and Scheduled castes (ref Table No-1.2) where joint family system is normally followed, their benefits are found to be better. This is possible because there is always an extra hand dedicated for collection of forest products and generating benefits from forest related activities in joint families. These households on an average gain about 32 percent from the forest product collection and related activities while very small households suffer as they get a share of about 8 percent only.

However, under the given circumstances it does not mean that larger households would survive better as this would practically erode forest resources in the long run. It just portrays the growing extraction levels from forest related activities which are finite and are bound to exhaust one day.

#### **5.5. Literacy and Subsidiary Benefit from Forest Products:**

The study area is rural in nature and it has been found that the literacy rates are low. There are few exceptional households (12.4 %) whose members are literates (ref. Table No-1.2). However, this parameter does not have much to say about the relationship about the withdrawal of forest products. The following table displays the average number of literates in each household.

It is a consolation to find that households with maximum literates do not draw much benefit from the forest products though most of these are very large in size. A huge benefit has been drawn from the forest by families where literates' levels are about 50

percent of the household and at the same time these households happen to be large in size (ref. Table No-1.2).

Table No- 5.11 shows that as the literate people increase in the household the cash benefit from the forest products decreases. It indicates higher the number of literate person lesser the household cash benefit from forest products. Very high class of literate household does not have a share of cash benefit from wild edible and fish. High class literate households has no earning from fish, except these two classes of literate household all other class earn their cash income from all the listed commodities.

#### **5.5.1. Literacy and Subsidiary Benefit from Forest Sources:**

The Table No-5.11 indicates that higher the literate percentage of the household lower is the benefit from forest products.

Total cash benefit generated from the forest sources by the different classes of literate households gives a very stunning picture (Table No- 5.12). Medium and low literate class households have highest share of cash income that is more than 23 percent. On the other hand the cash benefit from forest associated activities increases as the number of literate persons of the household increases. Therefore it signifies that higher the literate person in the household cash income generation increases in forest associate activities while on the other hand it decreases from forest products. However, cash income generation from forest products seems to be significant for the households having lower literacy. Considering benefits accrued from forest associated activities, the households with higher literacy are gaining more. Forest products collection is found to be of labour intensive nature and have lower benefits though products are used directly

by the households. On the other hand forest associated activities have higher earning than forest products collection but meet the cash necessary for household needs.

Considering the combined effect of forest products and forest related activities, it would be found from the table below that household with the least number of literates depend mostly on forest produce rather than on forest associated activities. As mentioned earlier households of this class are those which range from very small to small in size. They have lesser manpower for alternative activities. Hence, they have to divide their workforce for the purpose. Given this choice, the members would consider collection a better option as the products can supplement food items as well as could be partly sold. As a consequence they draw large amounts from the forest (64.8%). Their share from the total is also large (30.6%).

On the other hand the households with the maximum number of literates seem to withdraw less forest produces. Over and above they still derive benefits which reflect the mode of their withdrawal from the forest. Besides, these households are extracting forest sources through various activities (75.8 %). However, their benefit share from the combined total is one of the lowest (17.3%) since most of their requirements are being compensated by adequate non-forest activities.

**Table No- 5.11: Literacy & Annual Subsidiary Benefit of Individual Forest Produces per Household in terms of Rs. and %**

Forest products	Very low		Low		Medium		High		Very high	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Fire wood	1002.58	45.38	965.45	62.01	811.93	45.18	470.22	54.88	478.4	60.58
Charcoal	56.45	2.56	47.73	3.07	61.40	3.42	38.89	4.54	70.00	8.86
Wild edible	596.13	26.98	229.09	14.72	233.82	13.01	112.93	13.18	0.00	0
Aquatic life	406.45	18.40	98.86	6.35	331.58	18.45	0	0	0	0
Bamboo	0	0	0	0	4.17	0.23	0	0	0	0
Thatch	119.35	5.40	177.27	11.39	240.35	13.37	168.89	19.71	208.00	26.34
Palm leaves 1	0	0	1.14	0.07	2.19	0.12	2.22	0.26	0	0
Palm leaves 2	0	0	15.91	1.02	57.24	3.18	43.61	5.09	7.5	0.95
Cane	2.58	0.12	3.18	0.20	13.68	0.76	6.67	0.78	4.8	0.61
Broomstick	25.81	1.17	18.18	1.17	40.79	2.27	13.33	1.56	21.00	2.66
<b>Total</b>	<b>2209.40</b>	<b>100</b>	<b>1556.82</b>	<b>100</b>	<b>1797.16</b>	<b>100</b>	<b>856.77</b>	<b>100</b>	<b>789.70</b>	<b>100</b>

**Table No-5.12: Literacy and Subsidiary Benefit from Forest Products and Forest Associated Activities in terms of Rs, & %**

Forest sources	Very low		Low		Medium		High		Very high		Total Rs. &%
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	Rs.	%	
Products	2209.35	64.80	1556.82	35.08	1797.16	39.80	856.77	26.80	789.70	24.20	7209.80
%	30.64		21.59		24.93		11.88		10.95		100
Associated activities	1202.47	35.20	2880.53	64.92	2717.89	60.20	2337.59	73.20	2476.84	75.80	11615.32
%	10.35		24.80		23.40		20.13		21.32		100
<b>Total</b>	<b>3411.83</b>	<b>100</b>	<b>4437.35</b>	<b>100</b>	<b>4515.05</b>	<b>100</b>	<b>3194.36</b>	<b>100</b>	<b>3266.54</b>	<b>100</b>	<b>18825.12</b>
%	18.12		23.57		23.98		16.97		17.35		100

### **5.6. Contribution of Non-Forest Products (cultivated rice):**

Traditional rice cultivation is the main activity of the people in the study area as anywhere in rural Assam. Due to various factors like lack of technology, traditional methods and size of land holding, households are not able produce sufficient rice from their cultivation to meet their household requirements. The households may frequently face adverse situations due to destruction of crops by floods and wild animals like elephants that destroy the cultivated crops. It has been observed that during the field work and also revealed by the villagers that, number of households have to rely more on forest to buy rice during such adverse situations to meet the essential household's basic requirements. It was noticed that households located at nearest distance from the urban centre have the lowest deficiency of cultivated rice (37.48%). This reveals fact that the households living away from the urban centre cannot produce sufficient rice to meet their annual household consumption. Adequate production of the staple food reduces the dependency of households on forest products.

Discussion of the benefits shared by the households with respect to forest products would be incomplete if land related non-forest produce is not considered. It may be pointed out here that the most important non-forest produce on which the households of the study area depend on is rice cultivation which is produced out of the land allotted by the Forest Department. The allotment of land was at the time of creation of the forest villages which dates back to 1951 and prior to it (ref. Chapter I). Considering the four determinants as indicators it was found that rice production was insufficient for the annual consumption of these households. Since household size is the most important

factor deciding food consumption, a focus on this determinant was attempted to find out food deficiency.

**Table No- 5.13: Household Size and Non-Forest Annual Rice Production and Consumption in %**

	Very small	Small	Medium	Big	Very big
Rice	%	%	%	%	%
Production	100	100	100	100	100
Consumption	118.07	161.91	209.84	143.95	113.20
Deficit	18.07	61.91	109.84	43.95	13.21

From the Table No- 5.13, it could be drawn that very small households up to 3 persons face a relatively small food deficit (18.07 %). Households with 4 – 9 persons encounter a much higher food deficit ranging from (61.9 – 109.8 %). Contrary to this households having more members than 9 face lower food deficits. This happened mostly due to the fact that the larger households (> 9 persons and above) are joint families and therefore their land fragmentation is less and they possess more land on the average. It is also observed that the larger households (especially General caste) which are normally affluent have the capacity to purchase agricultural land in revenue areas resulting to reduced food deficit.

### **Conclusion**

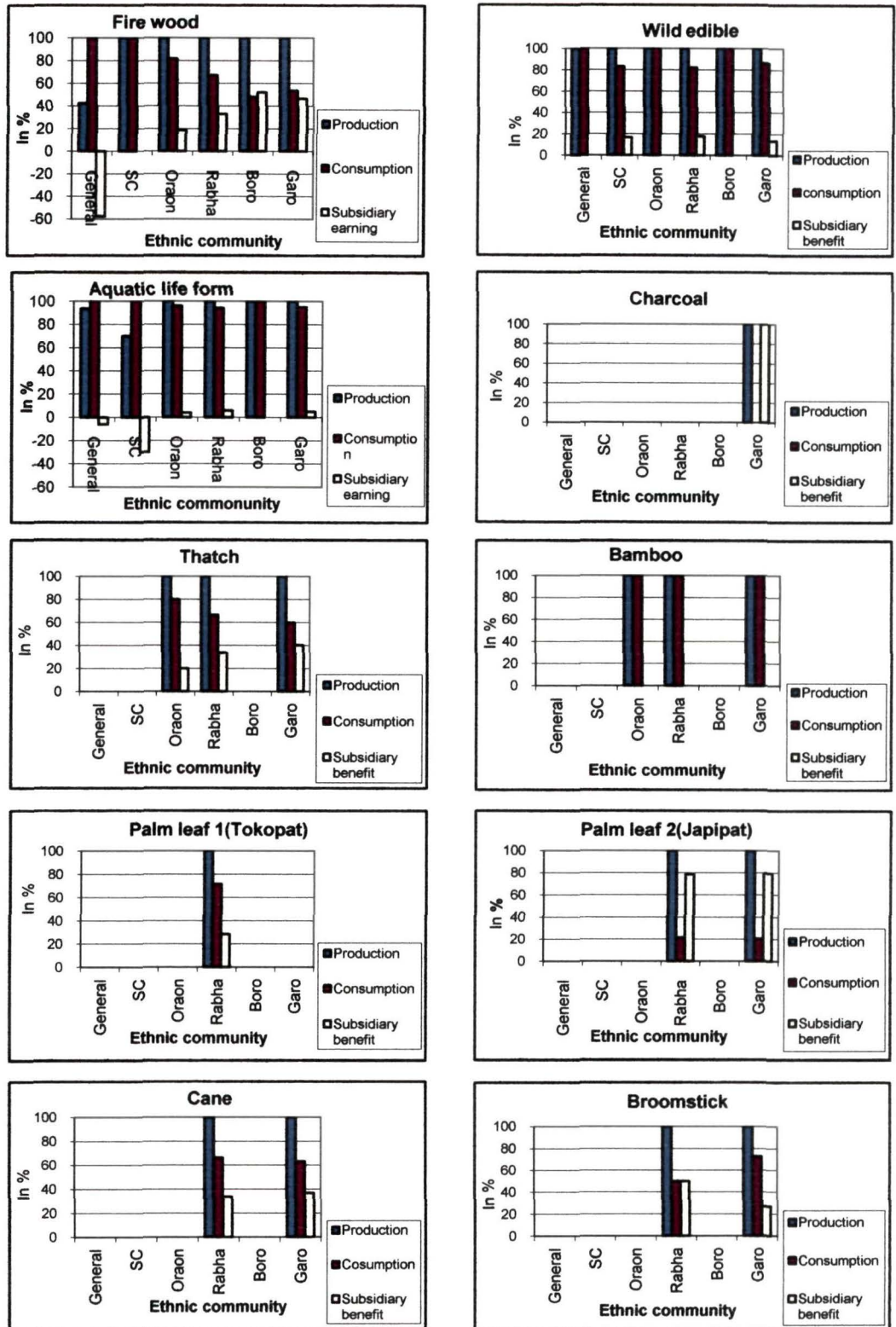
The subsidiary benefits discussed in this chapter reflects the gains and losses of the households. This has been arrived at considering the discussions in Chapter III and IV. It may also be mentioned here that the subsidiary benefits derived are negligible since most of the collected items are consumed rather than being used for monetary gains. From the following graphs 5.1, 5.2, 5.3, 5.4 and 5.5 it would be seen that benefit

derivation by the forest villagers span over different items. On ethnic lines (Fig. 5.1) the benefit derived from items like firewood is visible. However, the general community need to purchase an appreciable amount of firewood. In case of wild edible vegetables and aquatic life forms the benefit is small across all communities. These contribute to their daily requirements and much of it is consumed except for some amount which is saved purposefully. The Garos are the only community which derive 100 percent benefit from charcoal.

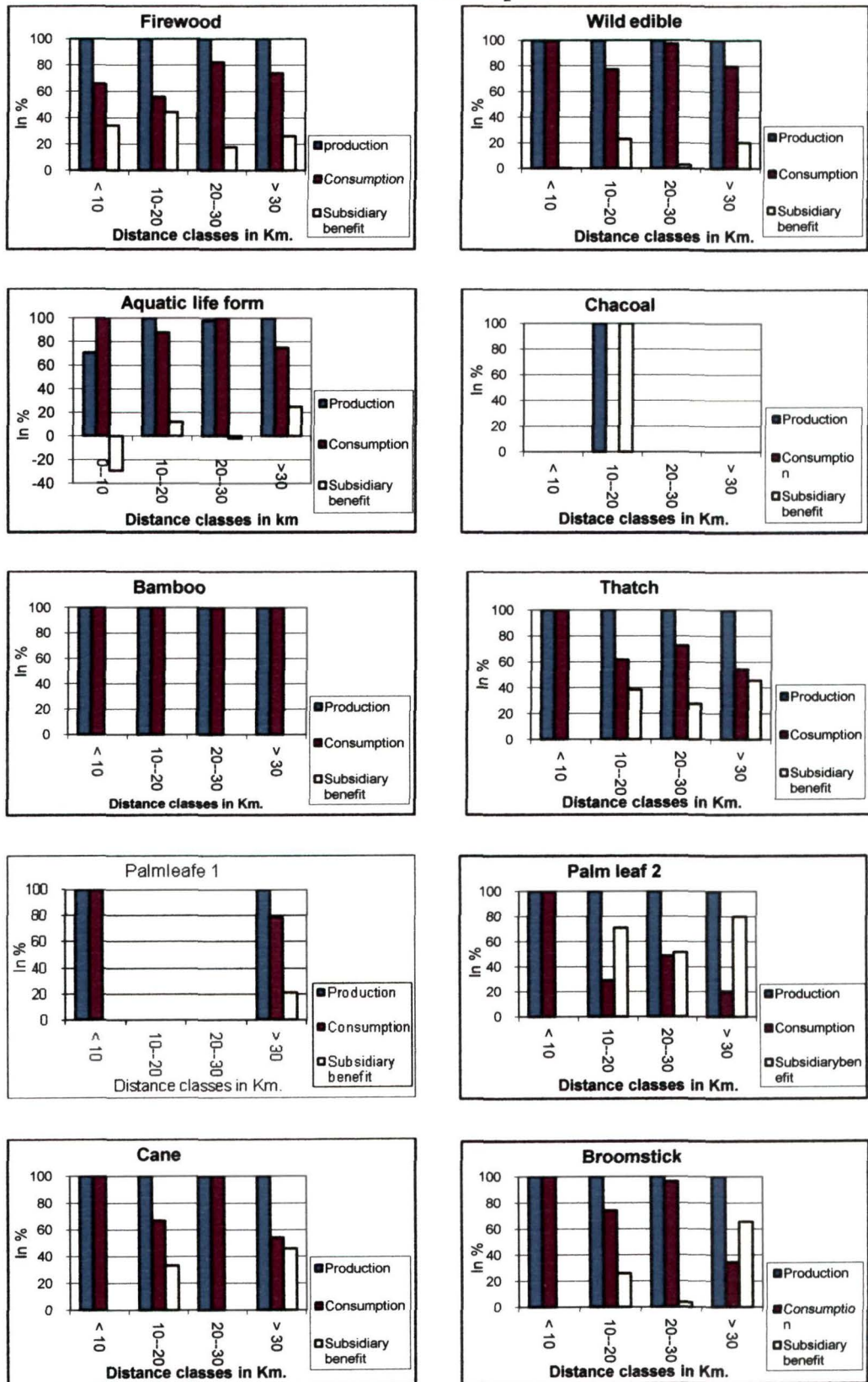
People living nearest to the urban centres seem to benefit much lesser than those living away from these centres (Fig.5.2). It also reflects that the extra which is required by such inhabitants is being purchased. Those who live away from the urban centres are most probably the suppliers of items demanded eg., aquatic life forms. Similar is the case with those living near good roads. Those living in remote areas derive maximum benefits from collected forest products (Fig.5.3). On the basis of household size (Fig.5.4) it is seen that the large households consume much of the collected items and even do not collect few forest products. Literacy rates however, portray a mixed reaction. Most households derive ample benefit from forest products, with the exception of households with high literacy rates (Fig.5.5).

As of now the withdrawal from the forest sources is about 25 percent. This seems to be a healthy relationship which will not harm the forest rather it is benefitting the communities. However, the withdrawal of other resources like sand lifting, stone crushing, etc., is posing a threat to the environment of these forests which is inevitable due to the fact that these people need to earn a livelihood.

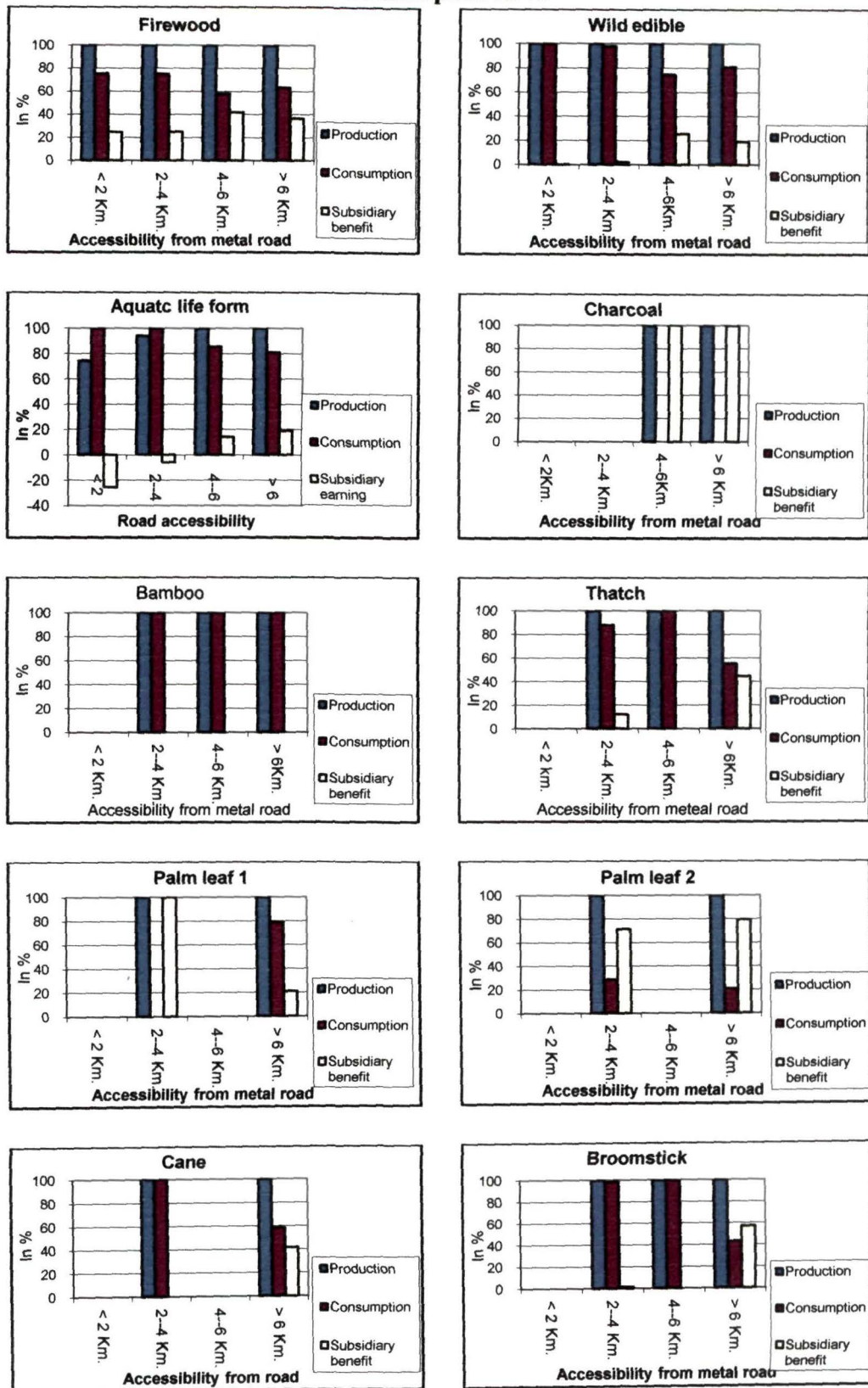
**Fig - 5.1.Ethnic Community and Benefit Derived after Consumption in %**



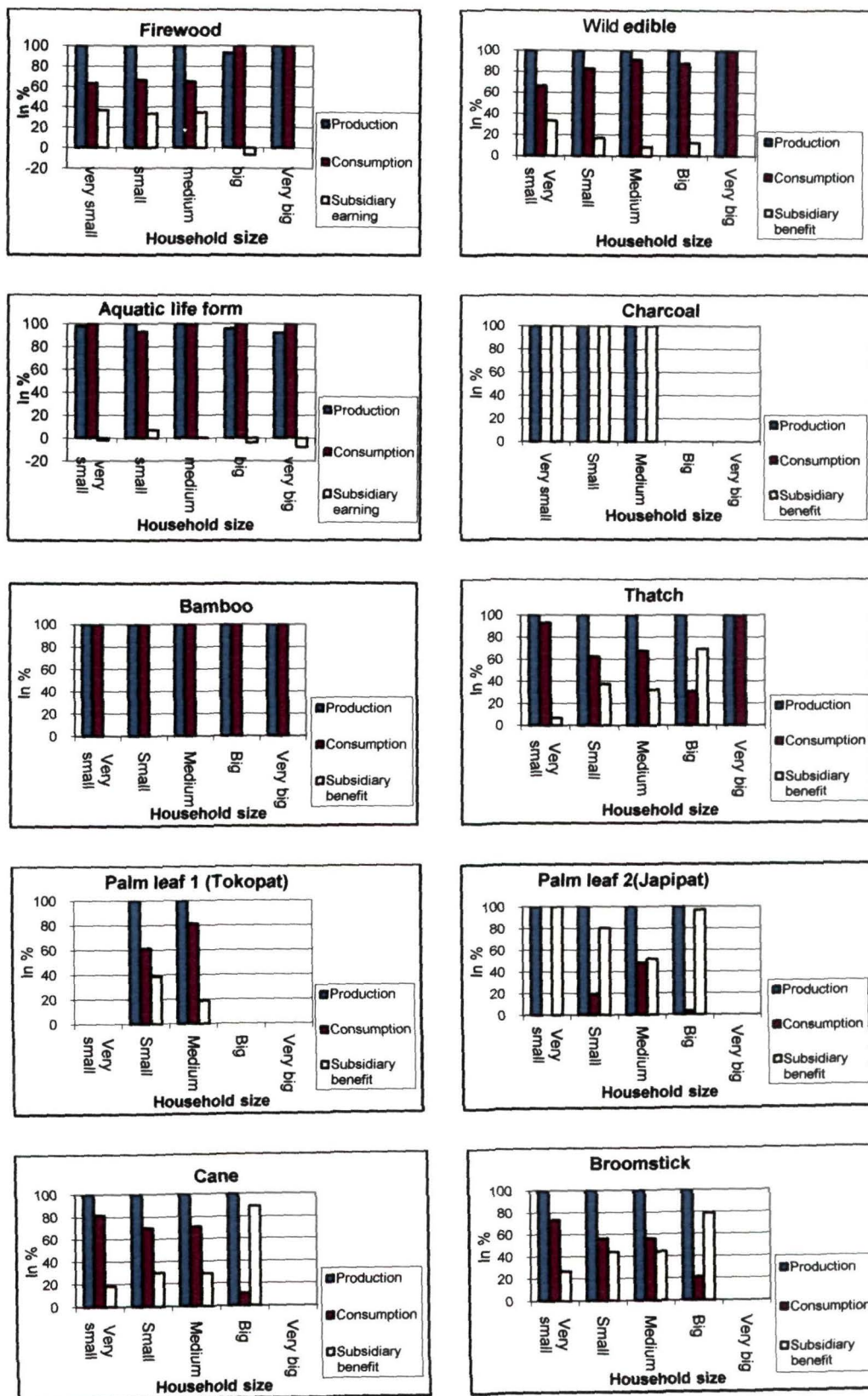
**Fig. - 5.2. Distance from Urban Centre and Benefit Derived after Consumption in%**



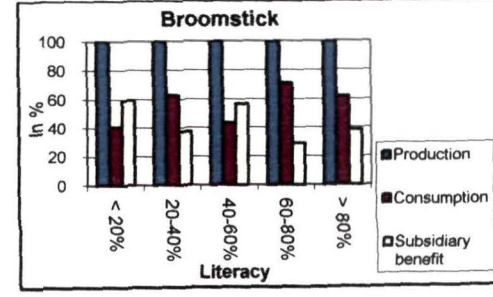
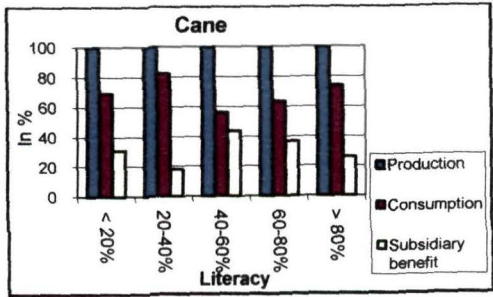
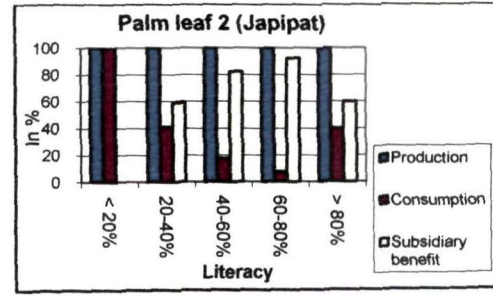
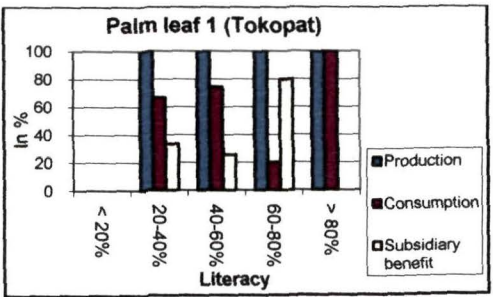
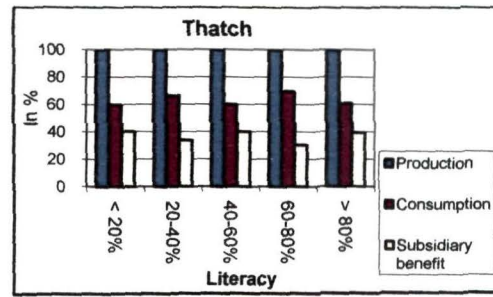
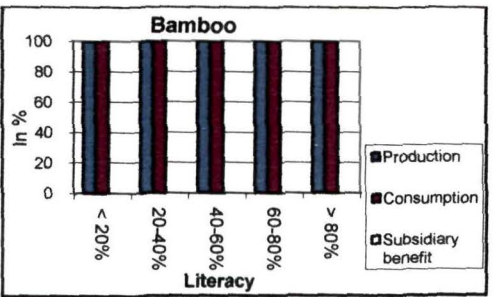
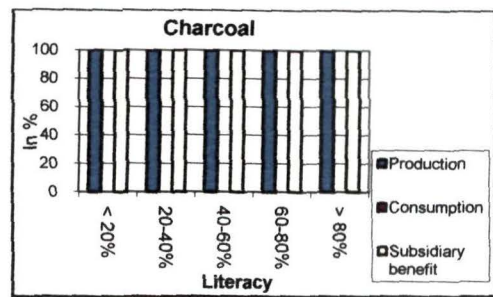
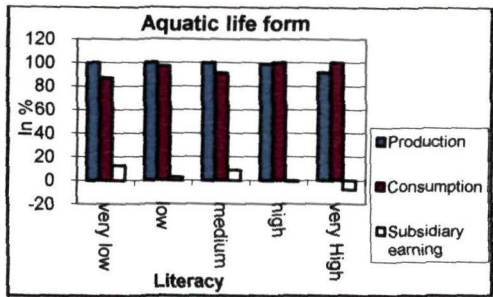
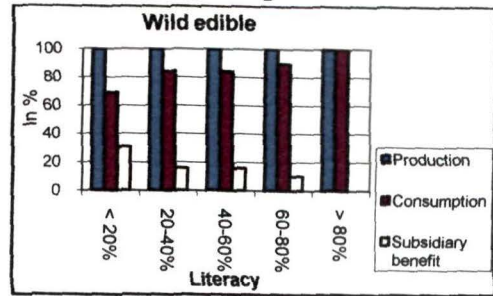
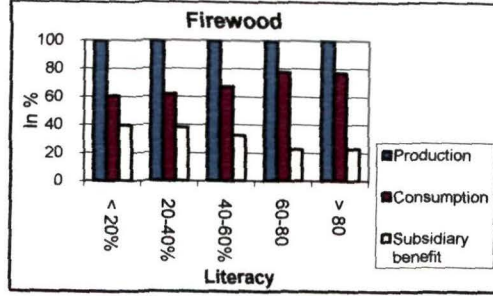
**Fig. - 5.3. Accessibility from Nearest Metal Road and Benefit Derived after Consumption in %**



**Fig.- 5.4 Household Size and Benefit Derived after Consumption in %**



**Fig. - 5.5. Literacy rate and Benefit Derived after Consumption in %**



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## Chapter VI

### Findings and Conclusions

Three main components of the present research work namely, production, consumption and subsidiary benefits have been discussed from the preceding chapters. The role of ethnicity has also been pointed out and it does precipitate out that the cultural influence does play importantly in the extraction of forest products from the concerned forest areas. The discussion in Chapter V clearly indicates that the inhabitants of the forest villages derive benefits from the forests around them.

It is seen from the preceding chapters that the most deprived sections of the households produce much of the forest products. The households far from the urban centres, away from good roads and those with low literacy levels draw more from the forest. It is interesting to note that even households with the least number of persons too draw more from forest resources. As far as consumption is concerned the same pattern is seen. From this postulate, it may be deduced that households located far from urban centres, away from good roads coupled with low literacy rates as well as the small households would derive the maximum benefit from the forest which is true for this particular case. Hence they depend more on the forest for their survival. It would also be appropriate to state that most of the deprived section of the population of this area depends highly on forest products. An exception may be made to very large households (> 13 persons / household) where it is seen that all collected products are consumed but

not deriving any benefits from forest products at all. It is therefore imperative that the large households, though they have the manpower to exploit the forest, they are not doing so since they have other livelihood options to depend on. It is therefore very necessary to understand at this juncture which of the determinants is most influential and important in the derivation of benefits from the forest products. To understand this, a Stepwise Regression analysis was carried out to bring out the most influential determinant that determines production, consumption and subsidiary benefits from forest products. Of course, not forgetting the ethnic influence on the patterns of production and consumption, the ultimate benefit derived by the inhabitants of this area can be synthesised in the few paragraphs below.

**Synthesis:**

Since production and consumption are dependent on different parameters it needs to be understood up to what degree the parameters are responsible for determining the changes and variability.

In order to isolate the most influential factor that determines production, consumption and subsidiary benefit from forest products a statistical analysis of the samples was initiated. However, it was thought that the ethnic element could not be considered as it represents qualitatively biased information. Four parameters namely, distance from urban centre, accessibility from metalled road, household size and literacy rate have been considered to be analysed by Stepwise Regression.

Using a stepwise regression analysis on the four determinant strata, it was found that household size plays a significant role in determining the production of forest

products in the study area. The rate of change of the forest products collected per household is observed highest while considering household size. It was also observed that nearness to the urban centre also exerts a smaller effect.

**Table No- 6.1: Stepwise Regression of Forest Products with respect to Literacy, Accessibility of Metal Road, Urban Centre and Household Size**

Independent variable	Starting value of forest production in Rs. (a)	Rate of changes in forest products (b)	Standard error of forest products (Rs/HH)	R <sup>2</sup> (%)	Increment (%)
X <sub>1</sub> Literacy Rate	10718.30	4.162	13.24	.0246	-.024
X <sub>1</sub> Literacy Rate		.82	13.44		
X <sub>2</sub> Accessibility from metal road	9455.40	368.34	192.78	.926	.901
X <sub>1</sub> Literacy Rate		1.756	13.159		
X <sub>2</sub> Accessibility from metal road		-17.650	207.587		
X <sub>3</sub> Distance from nearest urban centre	7055.73	228.436	51.519	5.568	4.642
X <sub>1</sub> Literacy Rate		15.00	11.755		
X <sub>2</sub> Accessibility from metal road		115.891	184.801		
X <sub>3</sub> Distance from nearest urban centre		124.241	46.837		
X <sub>4</sub> Household size	-864.968	1567.718	150.739	25.708	21.06

It would therefore mean that though the people here are of different ethnic groups, size of the family actually determines the forest products collection. Though ethnicity plays its own role in the collection of products from the forest, the nearness to the urban centre exerts another impact due to the fact that sale of products is more pronounced in

such areas rather than those which are far away from it. Household size plays an important role here as all households whether small or large draw from the forest according to their needs.

Similarly, when consumption was subjected to the regression analysis, the size of the family assumes an important role as household size accounts for about 72 percent of the variability of the multi-factor distribution (Table No- 6.2). It may be noted here that as the family size grows larger, the consumption also gets more voluminous. It therefore assumes great importance in the determination of the consumption patterns of the family as well as in the collection of forest products. As these materials are available almost free from nature, people tend to supplement their nutrition needs much more by these. At the same time, it may be noted that larger households are able to spare more man power to collect goods from the forest rather than smaller households which depend for their daily requirement on labour or other means of survival. However, looking at the over dominating effect of the household size on consumption of forest products, it may be pointed out that distance from the urban centre, good roads and literacy rates do not have much effect on consumption of forest products. All households invariably consume forest products especially food items and fuel, as these form part of their daily needs. Accessibility to good roads displays a mild effect which expresses the fact that proximity to good roads can either reduce or enhance consumption of forest products since the supply of other non- forest materials is facilitated by better roads.

**Table No- 6.2: Stepwise Regression of Consumption of Forest Products with respect to Literacy, Accessibility of Metal Road, Urban Centre and Household Size**

Independent variable	Starting value of forest consumption in Rs. (a)	Rate of changes in Forest product consumption (b)	Standard error of forest products (Rs/HH)	R <sup>2</sup> (%)	Increment (%)
X <sub>1</sub> Literacy Rate	6613.404	-2.465	4.727	0.068	0.068
X <sub>1</sub> Literacy Rate		-9.172	4.505		
X <sub>2</sub> accessibility from metal road	4913.667	495.745	64.582	12.87	12.80
X <sub>1</sub> Literacy Rate		-8.435	4.437		
X <sub>2</sub> accessibility from metal road		385.380	70.003		
X <sub>3</sub> Distance from nearest urban centre	4227.527	65.317	17.373	15.84	2.97
X <sub>1</sub> Literacy Rate		0.472	1.741		
X <sub>2</sub> accessibility from metal road		475.193	27.364		
X <sub>3</sub> Distance from nearest urban centre		-4.760	6.935		
X <sub>4</sub> Household size	-1099.59	1054.378	22.320	87.24	71.40

In order to understand the factors that govern the reliance of people on forest products, the array of data pertaining to benefits derived by people was also subjected to the regression analysis.

As far as subsidiary benefits are concerned, it was observed that the village dwellers depend more on the non-forest products. They are supplementing their requirements from the forest. The role played by the two factors namely, household size and proximity to the urban centre is observed but is not so significant and comparable to the range of coefficients derived in the above two regression analysis series. Though

household size is an important factor in the production and consumption patterns of the forest dwellers, the same factor does not overwhelmingly decide the subsidiary benefits derived. In fact, distance from the urban centre is more pronounced in the derivation of benefits which explains that urban influence is one factor determining the withdrawal rates from the forest, however not ignoring the role played by the number of family members for the same (Table No 6.3).

**Table No- 6.3: Stepwise Regression of Subsidiary Benefit from Forest Products with respect to Literacy, Accessibility of Metal Road, Urban Centre and Household Size**

Independent variable	Starting value of forest benefit Rs. (a)	Rate of changes (b)	Standard error of forest products (Rs/HH)	R <sup>2</sup> (%)	Increment (%)
X <sub>1</sub> Literacy Rate	4104.894	6.628	11.218	0.087	0.087
X <sub>1</sub> Literacy Rate		8.352	11.430		
X <sub>2</sub> accessibility from metal road	4541.737	-127.41	163.996	0.24	0.15
X <sub>1</sub> Literacy Rate		10.191	11.275		
X <sub>2</sub> accessibility from metal road		-403.03	177.862		
X <sub>3</sub> Distance from nearest urban centre	2828.206	163.119	44.142	3.53	3.29
X <sub>1</sub> Literacy Rate		14.528	11.177		
X <sub>2</sub> accessibility from metal road		-359.303	175.715		
X <sub>3</sub> Distance from nearest urban centre		129.001	44.535		
X <sub>4</sub> Household size	234.618	513.340	143.327	6.53	3.00

In general the findings of the present work is discussed in the following paragraphs.

**Findings:**

1. Household size is an important determinant in the production and consumption of forest products. However, as far as the derivation of subsidiary benefits from forest products, this determinant is just one of the important factors. The role played by the distance from the urban centre is more prominent in this respect as the requirement of poorer section of the society is much more demanding in the present context of the term. This section of the society is attempting to extend their purchasing power through 'purposeful savings' which attracts them to draw more from forest sources rather than directly consuming all collected products.
2. The overall extraction levels from the forest (Forest products & Forest associated activities) indicates that the General community draws 6 percent and for the other communities it varies from 19 to 34 percent, (Rabha 20%, Boro 24%, Garo 28% Oraon 29% and SC 34%). This is clearly displayed in Table No- 3.1. This reveals vast differences between the Tribes and General as well as Scheduled castes. At times these inhabitants are engaged as labourers for lifting sand, crushing stones and other daily wage assignments by contractors and other employers in return for cash earning which has been classed as Forest associated activities.
3. Rabhas and Garos are involved in the collection of most of the listed products wherever their households are located. On the other hand the General castes and Scheduled Castes draw the least from the forest. However both these communities draw heavily from the aquatic pool of resources and rely largely on firewood

available from forest sources for their domestic fuel needs. The Table No- 3.2 gives a clear picture of the scenario.

4. However, considering forest products, the dependency levels of the Garo tribe is highest reaching up to 25.1 percent while the General Caste depend for about 5.2 percent through collection. This is most probably a sustainable extraction on which these communities can depend, if the forests are being maintained and deforestation strictly prohibited.

5. The information collected indicates that the communities living in forest villages are not eroding forest resources since they do not extract timber. They are extracting only the regenerated minor products that are naturally replenished every year.

6. The villages located far off from the good roads and far off from the urban centres tend to draw more than those villages which are nearer to urban areas and closer to metalled roads. The range varies from 12 – 28 percent. It may also be mentioned here that there is a varying degree of extraction from forests by different sizes of households. The medium sized households draw maximum while very big sized households draw the minimum (11 – 27 %). On the other hand, when literacy levels are considered, the households with very high literacy rates take the minimum from the forest while the households with very low literacy rates draw the maximum (12 – 28%). These facts are evident from the Tables No- 3.4, 3.7, 3.10 and 3.13 respectively.

7. These communities require much more than what they extract from forest sources. About 70 percent is substituted by non-forest related activities but their lives are

made much easier by relying on forest goods and services for which they have been given the right to do so. For poorer households their drawing from the forest is much more. However this does not mean that this is completely consumed. It may at times serve as a source of income to supplement the needs of these households which are much more.

8. Forests provide a number of services to the people relying on it. Different types of products are drawn which include food, fuel, construction materials for shelter, medicinal herbs, raw materials for craft, broom etc. There are as many as 35 items used as food, 11 varieties of fruits and 20 varieties of edible aquatic life-forms used by these communities. Besides these there are another 19 types of medicinal plants. Last but not the least their only source of fuel (firewood) on which these communities depend comes from the forest.

9. Charcoal produced by the destructive distillation of wood is being produced by the Garos. This is an exceptional case of cash benefit generation in the study area from this crudely processed product.

10. It may also be mentioned that the animals like cattle, goats and pigs which the inhabitants are rearing are consuming the fodder available from the forest without any account. There is a need to assess this further.

11. As far as the mechanism of drawing/collection of the products, traditional methods have been used. The products are usually used raw while some are crudely preserved though never been value added. These communities, specially the tribes have a lot of knowledge about the forest products and their uses. Their collection is

also based on traditional knowledge. Most of the collections are not gender specific. However, the male members specifically collect products like bamboo, thatch, palm leaves, cane and broom stick (Table No-2.5) during the winter season.

### **Conclusions**

1. The communities of forest villages depend on the Reserved Forests for their subsistence right from the time they were allowed to occupy these areas. They, in fact, were part of the efforts for the upkeep of forests and specifically the Reserved Forests.
2. They provided the much needed work force for the better management of these forests which was so essential. After about a hundred years, their existence is being questioned as these communities have grown in population and the spirit of their formation possibly at stake.
3. In general, the people of living in the forest villages are poor. In earlier days they did not even have contact with the outside world. They are still secluded even now.
4. The use of forest products adds a crucial dimension to a diversified livelihood base of most households. The direct-use value and regular domestic use of these products is in the same order of magnitude as cash incomes from sale as well as from forest associated activities. In spite of this they are not extracting from the forest beyond sustainable limits which clearly shows their intimate relationship with the forest.

5. The concept of a safety net role of forest products and NTFPs needs to be differentiated. A 'daily net' is the outcome of a product collected on a daily basis for supplementing daily necessities. On the other hand an 'emergency net' is a livelihood strategy under stress. People therefore, extract the forest products, NTFPs, firewood, aquatic animals, crush stone and produce charcoal because of lack of alternative income-earning opportunities, retrenchment, poverty, and the need for cash income.
6. Though household size is an important factor in the determination of being dependent on forest products, the population located far from the urban centre depend more on the forest goods and services and are most vulnerable.

**Suggestions:**

1. To meet the socio-psychological imbalance, suitable developmental measures based on empirical study on these backward forest villages living within Reserve Forest, are the need of hour. Forest villager's involvement on the development of forests should be made. Forest villagers are not to be alienated from the forest resources. However, it is important that these areas be covered under some welfare schemes through the Forest Department since these areas do not fall within the jurisdiction of the Panchayati Raj mechanism.
2. The clear linkage between forest resources and livelihood dependence demonstrated by this study clearly shows the need to understand and support the forest dependent communities for forest conservation/ management in order to sustain both

people and forests. By doing so the need for these communities in the spirit of the creation of Forest villages would be relevant.

3. Forest dependency should be linked with protection of the forest ecosystem in order to maintain and enrich the productivity. Promoting sustainable management of forest food resources presents the opportunity to integrate forest management with improved food security for the forest dwellers. There are compelling reasons to develop and more fully utilize forest resources in a sustainable manner while the opportunity to do so still exists. Therefore, conservation and development should be given priority to improve food security and well being by helping these communities secure the use of forest products.

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## Appendix I.a.

### RULE FOR THE ESTABLISHMENT AND CONTROL OF FOREST VILLAGES UNDER SECTIONS 72(e), 74 AND 75

1. Forest village may be established within the limits of any reserved forest on sites the location of which shall be approved by the Conservator of Forests in writing.

2. Forest villages are designed for the purpose of providing a source of the suitable labour and for forming and maintaining plantations and taungyas, and no castes which are not habituated to living and working in the forest are eligible for admission. Divisional Forest Officers may admit new entrants to existing forest villages in accordance with the executive orders of the Conservator.<sup>1</sup>

3. The boundaries of all permanent forest villages will be demarcated by boundary pillars and shown in maps together with all interior details such as fields, homesteads, etc. and a register shall be maintained of the houses in each forest village.

1. Notification No. GFR. 224/42/2, dated the 24<sup>th</sup> august 1942 .

4. The Divisional Forest Officer is authorized to evict summarily from a forest village without payment of compensation anyone who does not comply with the rules or who refuses to carry out his orders so far as they are consistent with the rules or whose conduct impairs the harmonious working of the village. An appeal, however, shall lie to the Deputy Commissioner of the district, but in the event of the latter disagreeing with Divisional Forest Officer, the cause must be referred to the Conservator whose decision shall be final.

5. An allotment up to 5 Bighas of land to include homestead or bari will be first made for each resident household, to which will be added ten Bighas of land on account of each working member residing in that household, but no household should occupy more than thirty-five bighas of land. Thus a household containing three workers including the householder would be entitled to thirty-five bighas of land. The land given out to a household will not be reduced in extent during the householder's occupancy, if the members of his household become subsequently reduced in number. Non-resident villagers may similarly be allowed to cultivate up to a maximum of 30 bighas per household.

6. on the decease of a householder, the name of his male heir will be registered as a forest villager if he is considered by the Divisional Forest Officer to be suitable in all respects, or in cases where a daughter is the heiress the name of her husband should be recorded as the householder; if he is suitable for employment as a forest villager. The names of heirs who are minors will be recorded as forest villagers when they become fit for work or, in the case of females, when they marry husbands suitable for employment as forest

villagers, but nothing in this rule shall be held to recognize any heritable right in land allotted to a forest villager.

7. The subletting of land by a forest villager is not permissible in any circumstances, but with the permission of the Divisional Forest Officer, servants may be engaged to assist in agricultural operations and their names shall be recorded as temporary forest villagers.

8. Land revenue shall be levied for the land (excluding home-stead or bari<sup>1</sup>) given to a forest villager at such rates as have been approved by government.

9. Each adult forest villager shall, if called upon, render 20 days' labour per annum at the rate of wage locally current.

10. In addition to cultivating land at concessional rates of revenue for which an annual patta will be issued by the Divisional Forest Officer, each householder in a forest village will be allowed free grazing for all necessary plough cattle and ten head of other cattle, but this term shall not include buffaloes in cases where on account of proximity to plantations or other considerations they are likely to cause damage. Cattle belonging to outsiders shall not be allowed to be kept by a forest villager.

11. adult male forest villagers shall pay for all forest products taken by them at ordinary rates in force in the reserve forest concerned, but may be allowed to remove free of royalty sufficient building materials to erect and maintain their houses and 10 cart loads of fuel annually, if they elect to render<sup>1</sup> 5 days' labour in lieu of paying royalty. In case where in his opinion it is justifiable the Divisional Forest Officer may allow not more than one servant per household to remove forest produce to the above amount free of royalty without the obligation to render 15 days' labour.

12. Jumias may be admitted in to the reserves on condition that they sow with their crops the seed of such forest trees in such manner as the Divisional Forest Officer may direct; building material and 10 cart loads of fuel annually will be given to them free of charge but they will be liable to render 20 days' labour, if called upon, at the local rate of wages. Jumias who in addition cultivate rupit land, will be similarly required to sow tree seeds with their Jum crops. They shall liable to pay for building material and fuel required by them, but may commute the payment annually due for these by undertaking to maintain the forest seedling in each Jum, from being suppressed by weeds for a period of two years from the time cultivation is abandoned. They will still remain liable to render the 20 days labour at local rate of wages.

13. The forest department and its contractors shall have the first claim to the labour of forest villagers who shall not accept employment from any other department company or individual without the previous sanction of the Divisional Forest Officer.

14. The Forest Department may resume occupation of land allotted to a forest villager by giving six months notice to the occupier.

15. Separate work registers in addition to the ordinary muster rolls will be maintained for each village showing the amount and the nature of the work done by each villager. The village registers the work registers and the muster rolls will be inspected by the Divisional Forest Officer at the time of range and beat office inspections, and he will be responsible that the labour is being properly utilized. Labour for carrying baggages of officers must always be paid.<sup>1</sup>

1. Local government notification No. 5454-G.J., dated the 23<sup>rd</sup> August 1939.

16. Payments for work done should be made by a responsible officer at intervals which should not exceed a week except in special circumstances with permission of Divisional Forest Officer.

17. For each forest village the Divisional Forest Officer may with the sanction of the Conservator of Forest appoint a gaonbura or headman and if necessary, a watchman, and their suspension, punishment and dismissal shall be vested in the Divisional Forest Officer. The duties of such headman or watchman will be prescribed in each case by the Conservator of Forest who may exempt any of them from paying land revenue for any area upto 35 Bighas of land and from rendering any labour required by rules 9 and 11.

18. The Divisional Forest Officer with the previous sanction of the Conservator, may make such reasonable advances of cash or grain to any householder of forest village, as may be necessary to enable him to prepare or sow his land or purchase plough bullocks; all such advances will be recoverable with the interest at 6.25 percent per annum.

19. The Divisional Forest Officer may with the written permission of the Conservator excuse forest villagers who have become old or infirm, poor widows, minors incapable of work, or person who are for the time being whole time employees of the Forest Department, such as elephant attendants from rendering labour in exchange for forest produce removed for home consumption, and will forward a list of such exempted persons annually to the Conservator.

20. On request supported by 50 Percent or more of the villagers the Divisional Forest Officer may, with approval of the Conservator admits persons whose services are needed for the welfare of the forest villagers, e.g., a school teacher, a shop-keeper or a barber as residents of a forest village on the following terms:-

(1). An allotment up to 12 Bighas of land may be given to such a resident for homestead or bari but no rupit land will be allowed to him. No concession shall be allowed in respect of land revenue for land occupied by him but the Divisional Forest Officer shall consult the Deputy Commissioner in each case as to what would be an appropriate rate to charge, bearing in mind not only the character of the land occupied but the use to which it is put.

(2) The villagers and the Forest Department shall always have first claim on his services and he shall not work for person outside the village without the permission of the Divisional Forest Officer.

(3). He will be exempted from rendering any labour but will ordinarily be given forest produce free for his own use only in return for his services rendered to the villages on wages at the rates locally current.

(4). He shall be subject to such additional conditions as the Divisional Forest Officer may with the approval of the Conservator lay down in writing at the time of admission.

(5). He shall be liable to be evicted summarily by the Divisional Forest Officer, without payment of compensation, from a forest village for breach of any of the above terms or for breach of any provision of the Assam Forest Regulation or of the rules made there under in force at the time or for refusal to carry out his orders.

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## Appendix Ib

### NORTH EASTERN HILL UNIVERSITY DEPARTMENT OF GEOGRAPHY, SHILLONG HOUSEHOLD LEVEL QUESTIONNAIRE FOR FOREST RESOURCE UTILIZATION

1. Name of village    Name of forest    Forest Range    Forest Beat    Rev. Block    Forest Division    Panchayat    Post Office  
C&RD Block

.....  
.....

2. a. Name of HOF

b. Name of Respondent

c. Community:

d. Caste:

e. Religion:

3. Profile of Individual house hold:

Sl. No.	Sex	age	Education	Place of education	Occupation (specify)		Employer	Place of Work	Type of Work	Income /pm
					Forest	Non forest				
Head of family										

4. Assets owned: Cycle:

Thela:

Vehicle:

5. Distance from forest, market, urban centre & administrative centres & mode of transport

Distance from village (km)						
	Forest	Market	Urban centre	Beat office	Range office	DFO office
Transport						

6. Sources of Food item. (Amount in % or local unit), season

Food					Vegetable, fruits and other					Meat, fish, egg, milk and milk products					
Product	Use	Source	Unit	Season	Product	Use	Source	Unit	Season	Product	Animal	Use	Source	Unit	Season

NB: sources: 1. Agriculture 2. Jhum 3. Forest 4. Market 5. Others specify. 1. Name of forest:

place & name of market:

7. Household use of product name & amount in % or local unit

Fuel					Fodder for & livestock population							Medicine				
Product	Use	source	unit	season	product	Use	animals	Popn	source	Unit	season	Products	Use	source	unit	season

NB: source: 1. Allotted land 2. Forest 3. Market 4. Any other

8. Source of Household use product/ materials name & amount in % or local unit

Agrl. Implement					House construction, maintenance, broom etc.					Furniture / art craft/ handloom							
Product	Use	source	unit	Season		Product	Use	source	unit	season		Product	Use	source	unit	season	
				M	F					M	F					M	F

NB: Source: allotted land, forest, market, others. 1. If forest name of forest

2. Place of market

9. Products sold by the household and services render season and gender wise. (Amount in local unit or % earned in Rs.)

Work distribution, period, amount, source of production and place of sale												
Products	Use	Source	Amount	Earn	Season	Place	sold by		Specify Work distribution		Season	
							M	F	M	F		

All products Raw/finished like furniture, art & craft, handloom, livestock,

NB: source: allotted land, forest, any other. If forest Name of forest:



c. USES OF FOREST

User Group	Fulfilment of needs									
	Fodder		Fuel		Timber		NTFP		Land	
	Allotted	Forest area	Allotted	Forest area	Allotted	Forest area	Allotted	Forest area	Allotted	Forest area
Farmer										
Grazer										
Artisan/ craftsmen										
Cattle keeper/ stall feeder										
Labour										
Shifting cultivators										
Kabiraj (Dr)										

12. Self estimate of income level

13. Any other observations

## Appendix- I.c.

### Conversion and estimation from local units to Rupees

Production:

Conversion, calculation and estimation: conversion and estimation was done as follows-

(i). Firewood: villager collects firewood in Head load, Bhar , Thela, and cycle.

One Head load = 10kg.

One Bhar = 25kg.

One Thela = 5 Bhar = 125kg.

One cycle = 5 Bhar = 125kg.

Cost of firewood:

One Bhar (25kg.) -- Rs.10.00

Four Bhar (100kg.)-- Rs. 40.00

1kg. = 0.40

Total collection/production of firewood is calculated on the basis of weekly collection from each house hold. The weekly collection differs from household to household according to purpose and family size, depending on those two factors in some household collection varies once or twice in a week.

(ii).Edible vegetable: edible vegetable divided in two groups- (a) Leafy vegetable

(b). Non-leafy vegetable.

(a) Leafy vegetable: Weight varies one item to another as follows. (Local unit - Mutha and Bhag.)

4— Mutha or Bhag —1kg

6— Mutha or Bhag —1kg

8— Mutha or Bhag —1kg

Most of leafy vegetable are sold as above mention manner. According to that weight is measured and made one unit i.e. 6 Mutha or Bhag = 1kg. This estimation is used for consumption and amount sold.

Cost of vegetable: Cost of Mutha and Bhag varies from item to item and on selling condition. So average cost taken into account. Cost varies Rs. 1.00 –2.00, So Rs. 1.50 taken as average cost of each Mutha or Bhag.

1 Mutha or Bhag Rs. 1.50( average cost for each Mutha or Bhag.) weight varies from item to item.

So 8—Mutha cost— Rs. 12.00 i.e. for 1 kg.

6 —Mutha cost— Rs. 9.00 i.e. for 1 kg. 4 —Mutha cost— Rs. 6.00 i.e. for 1 kg.

From these three average cost is taken Rs. 9 per Kg.of forest vegetable.

(b) Non-leafy vegetable: Kachu, Banana flower, Bamboo shot, are the mostly available forest products.

Kachu production (collection) varies from 3kg. – 10kg. Per week

Banana flower: 3—10 Numbers. Weight of Banana flower varies according to size. It weight 400gram. to 1kg.each.

Bamboo shot: 2 to 10 Number per week. Weight 300gram to 1kg.

Cost: Kachu Rs. 5.00—Rs.6.00

Banana flower Rs. 3.00—Rs.6.00 per unit.

Bamboo shot Rs. 5.00 for three pieces.

Average estimated price is Rs. 5.00per kg. or per unit.

(iii). Aquatic life Cost: Rs.—50.00 per kg.

(iv). Bamboo: It is collected according to domestic requirement and few house hold for craft making.

Cost: Rs.—5.00 per Bamboo.

(v). Thatch: It is collected in Bhar system from forest.

1 Bhar = 20 Mutha.or 2 Bundle.

Bundle is taken as a unit of measurement. Cost: 1 Bundle—Rs. – 40.00

(vi). Japipat & Tokowpat: 1 Bhar = 8 Mutha or 2 Bundle.

Cost: 1 Bundle = Rs. 25.00

(vii)Broomstick: 10 Mutha = 1 Bundle.

Cost: 1 Bundle= Rs.-50.00

(viii). Cane: 1 Bundle = 15 pieces. One full cane = 3 pieces.

Cost: 1 Bundle = Rs. 40.00

(ix). Sand labour daily wage: Rs. 100.00.

(x)Stone per cm selling price: Rs. 400.00

(xi). Rice Cost: 1mond (40kg.) = Rs. 200.00

100kg. = Rs. 500.00

1kg. = Rs. 5.00

(xii). Arecanut: per beg: Rs. 600.00 (100kg)

(xiii). Daily labour wage: Rs. 50.00

(xiv). Charcoal: per kg. Rs. 3.00

Local unit = kilogram = rupees = percentage (price of item is taken from market where it is sold by the member of the household) this is applicable for both production and consumption.

Consumption estimation and calculation:

Taking in to account forest and non-forest vegetable, fish and rice consumption calculated from different size of households and derived the per head per week consumption as follows:

(i). Vegetable – 1.25kg.

(ii). Aquatic life – 0.250kg.

(iii). Rice – 8.33kg.

## Appendix II.a

### a) Common Species Available

Types of Forest	Species
1. Eastern Hill Sal-Khasi Hills Sal	<i>Shorea robusta</i> , <i>Dendrocalamus hamiltonii</i> , <i>Schima wallichii</i> , <i>Adina cordifolia</i> , <i>Emblica officinalis</i> , <i>Gmelina arborea</i> , with ground cover <i>Eupatorium odoratum</i> , <i>Zizyphus</i> , climber comprises of <i>Stenochleana palustre</i> , <i>Paederia scandens</i> , <i>Clematis cadmia</i> , etc.
2. Moist Plains Sal –Kamrup Sal.	<i>Lagerstromia parviflora</i> ground cover comprises of <i>Eupatorium</i> , <i>Desmedium</i> , <i>Premna</i> , etc. climber like <i>Accacia</i> , <i>Bauhinia</i> , <i>Butea</i> <i>Stenochleana palustre</i> , <i>Paederia scandens</i> , <i>Clematis cadmia</i> , etc.
3 Moist mixed deciduous forest including pockets of evergreen patches.	<i>Ficus religiosa</i> , <i>Sterculia villosa</i> , <i>Albizzia lebeck</i> , <i>Spondias pinnata</i> , <i>Mangifera indica</i> , <i>Emblica officinalis</i> , <i>Zizyphus mauritiana</i> , <i>Aegle marmelos</i> , <i>Neouhouzeaua dullooa</i>
4. Wet miscellaneous formation including open Beel, Nullas, and Stream beds etc.	Species – <i>Garcinia</i> , (local name: Borthekera) <i>Dysoxylum</i> , <i>Pillinia</i> , <i>Ciliata</i> , <i>Mesuaferrea</i>
5. Jhumed over areas-part under secondary Euphorblaceous Scrub	Koroi, Khokon, Ajhar, <i>Dellenia indica</i> , etc.
6. Moist Sal Savanna	Species – The pioneer species are <i>Macaranga denticulate</i> , <i>Albizzia chinensis</i> , <i>callicarpa arborea</i> etc., with occasional Kadam.
7. Area under plantations.	<i>Imperata cylindrical</i> and <i>Narenga porphyrocoma</i> etc.

Source: Department of Forest (FD), working plan for East and West Division. (Government of Assam).

**b) Edible Forest Products Collected by the Local People**

Sl. no	Local Name	Scientific Name
1	Gonkachu	
2	Dhekia- lata	<i>Stenochleana palustre</i>
3	Nibisi leave	NA
4	Bon Kachu	NA
5	Bhedelata	<i>Paederia scandens</i>
6	Narasingha	<i>Murraya koenigii</i>
7	Bamboo shoot	NA
8	Cane shoot	<i>Calamus viminalis</i>
9	Manimoni	<i>Centella asiatica</i>
10	Wild Banana flower	<i>Musa ornata</i>
11	Mosumdari leave	<i>Houttuynia cordata</i>
12	Sarpagondha	<i>Rauvolfia serpentina</i>
13	Poisak	<i>Basella rubra</i>
14	Oal Kachu	<i>Amorphophallus campanulatus</i>
15	Kathphula	<i>Agaricus sp</i>
16	Bahika tita	<i>Adhatuda Zeytanica</i>
17	Gash Alu	<i>Dioscorea alata</i>
18	Mau Alu	NA
19	Kumuja Tenga	NA
20	Marmoti	NA
21	Nun Barenga	NA
22	Paniphutuki	NA
23	Bhurkandi	NA
24	Narad Alu	NA
25	Kadeli	NA
26	Haldia	<i>Curcuma longa</i>
27	Gang tara	NA
28	Kesethuri	NA
29	Nekham tenga	NA
30	Meteka	<i>Eiebornia crassipes</i>
31	Kalmau	<i>Ipomoea aquatica</i>
32	Metha Alu	NA
33	Mezenga	NA
34	Akhari phul	NA
35	Tejpat	<i>Cinnamomum tamala</i>
36	Bon-marich	<i>Clematis cadmia</i>

**c) Forest Products Collected for Domestic Use**

Sl. no	Local Name	Scientific Name
1	Kher	<i>Imperata cylindrica</i>
2	Kako Bah	<i>Dendrocalamus hamiltonii</i>
3	Dalu Bah	<i>Neohouzeaua dullooa</i>
4	Jhapipat	<i>Acanthopanax trifoliatum</i>
5	Tokowpat	NA
6	Bet	NA
7	Phuljharu	NA

**d) Forest Fruits Collected by the Local People**

Sl. no	Local Name	Scientific Name
1	Aumlakhi	<i>Embllica officinalis</i>
2	Mango	<i>Mangifera indica</i>
3	Hilikha	<i>Terminalia belerica</i>
4	Bhoira	<i>Terminalia chebula</i>
5	Kathal	<i>Artocarpus heterophyllus</i>
6	Loteku	<i>Baccaurea spaida</i>
7	Amara	<i>Spondias pinnata (syn.S. Magnifera)</i>
8	Bagari	<i>Zizyphus jujuba</i>
9	Barthekera	<i>Garcinia pendunculata.</i>
10	Owtenga	<i>Dillenia indica</i>
11	Jam	<i>Syzygium Jamboos</i>
12	Mir-tenga	<i>Elaeagnus potifolia</i>
13	Bel	<i>Aegle marmelos</i>

**e) Medicinal Plants**

<b>Sl. no.</b>	<b>Local Name</b>	<b>Scientific Name</b>
1	Hiju juice (leaf)	<i>Euphorbia spendens</i>
2	Bhettita root	<i>Clerodendrum</i>
3	Bhet tita, Hiju leaf	NA
4	Wild onion	<i>Allium viscosum</i>
5	Um ki tari (like ginger)	NA
6	Mango tree(bark)juice	<i>Mangifera indica</i>
7	Baknal trees(bark)	NA
8	Nirkutita(cimber stem)	NA
9	Sirka branch(tree)	NA
10	Bagh nalar sal	NA
11	Octikharroot	NA
12	Sajana sal (bark)	NA
13	Har jur	NA
14	Tuk una bark	NA
15	Kaur bhatar alu	NA
16	Octikhar astakh	NA
17	Sal (Bark)	<i>Shorea robusta</i>
18	Amlakhi	<i>Emblica officinalis</i>
19	Sarpagondha	<i>Rauwolfia serpentina</i>
20	Hilikha	<i>Terminalia belerica</i>

f) Aquatic Life form

Sl. no.	Local Name	Scientific Name
1	Garoi	<i>Chanra punctutus</i>
2	Kaoi	<i>Anabsas tesudeneus</i>
3	Puthi	<i>Narbus stigma (Puntias sarana sopher)</i>
4	Khalihana	<i>Tricogaster faciatus</i>
5	Sol	<i>Ophiocephalus straitus</i>
6	Sal	<i>Ophiocephalus marulius</i>
7	Kuchia	<i>Amphipnenus cuchia</i>
8	Khalpok	NA
9	Barali	<i>Wallago attu</i>
10	Rou	<i>Labeo rohita</i>
11	Bami	<i>Mastacembalus armatus</i>
12	Singra	<i>Mystus Tengra</i>
13	Darikana	<i>(Esmas)Rashora donricus</i>
14	Batia	<i>Batia dario</i>
15	Magur	<i>Clarious batrachus</i>
16	Sengeli	<i>Cachual</i>
17	Singee	<i>Heteropneustes fossilis</i>
18	Moa	<i>Amblypharayngodon mola</i>
19	Kakora (Crab)	<i>Carucius species</i>
	a) Khena kekora	Do
	b) Hana kekora	Do
	c) Jamuna kakora	Do
	d) Sil kekora (hilly area)	Do
20	Hamuk (Snail)	<i>Pila globossa species</i>
	a) Dhandala hamuk	Do
	b)Nigariya hamuk	Do
	c) Jhanai hamuk	Do
	d) Dhan hamuk	Do

**Appendix: III**

**(a): Number and Percentage of Households Involved in each Attributes  
in the Study Area**

<b>Forest produces collection</b>	<b>No. of Household (HH) Involved</b>	<b>% of Total HH</b>	<b>Total HH</b>
Fire wood	375	92.82	404
Charcoal	18	4.46	404
Edible vegetable	338	83.66	404
Fish	392	97.03	404
Bamboo	129	31.93	404
Thatch	121	29.95	404
Palm leaves 1&2 ( <i>Tokowpat &amp; Japipat</i> )	57	14.11	404
Cane	102	25.25	404
Broomstick	122	30.20	404
<b>Forest associated activities</b>			
Kabiraj	4	0.99	404
Craft	25	6.19	404
Sand labour.	33	8.17	404
Stone crash	11	2.72	404
Daily wage labours.	21	5.20	404
<b>Non Forest products</b>			
Rice	359	88.86	404
Arecanut	336	83.17	404
Vegetable	404	100	404
Fruits	181	44.80	404
Liquor	78	19.31	404
Animal	375	92.82	404
<b>Non Forest activities</b>			
Govt.	39	9.65	404
Private	43	10.64	404
Daily Labour	170	42.08	404
Business &shop	63	15.59	404
Mason & Carpenter	21	5.20	404

b): Community wise number and percent (%) of Households involved in each Attributes

Sources of Production	General		SC		Oraon		Rabha		Boro		Garo	
	No. of HH	%	No. of HH	%	No. of HH	%	No. of HH	%	No. of HH	%	No. of HH	%
<b>Forest</b>												
Fire wood	14	41.18	5	100	13	100	264	97.06	31	100	48	97.96
Charcoal	0	0	0	0	0	0	0	0	0	0	18	36.73
Edible vegetable	3	8.824	1	20	13	100	245	90.07	29	93.55	46	93.88
Aquatic life	31	91.18	5	100	13	100	264	97.06	31	100	47	95.92
Bamboo	0	0	0	0	2	15.38	87	31.99	0	0	40	81.63
Thatch	0	0	0	0	2	15.38	85	31.25	0	0	34	69.39
Palm leaves 1&2	0	0	0	0	0	0	49	18.01	0	0	9	18.37
Cane	0	0	0	0	0	0	76	27.94	0	0	27	55.1
Broomstick	0	0	0	0	0	0	84	30.88	0	0	39	79.59
<b>Forest Associated Activities</b>												
Kabiraj	0	0	0	0	0	0	4	1.471	0	0	0	0
Craft	0	0	0	0	0	0	20	7.353	0	0	5	10.2
Sand labour.	2	5.882	3	60	7	53.85	16	5.882	4	12.9	1	2.041
Stone crash	0	0	0	0	0	0	11	4.044	0	0	0	0
wages labour	0	0	0	0	1	7.692	13	4.779	1	3.226	6	12.24
<b>Non Forest Products</b>												
Rice	29	85.29	4	80	12	92.31	244	89.71	27	87.1	43	87.76
Areca nut	29	85.29	4	80	10	76.92	229	84.19	24	77.42	40	81.63
Vegetable	34	100	5	100	13	100	272	100	31	100	49	100
Fruits	7	20.59	2	40	0	0	121	44.49	17	54.84	34	69.39
Liquor	0	0	0	0	5	38.46	68	25	5	16.13	0	0
Animal	28	82.35	4	80	13	100	225	82.72	27	87.1	32	65.31
Others	34	100	5	100	13	100	270	99.26	31	100	46	93.88
<b>Activities</b>												
Govt.	5	14.71	0	0	0	0	29	10.66	2	6.452	3	6.122
Private	8	23.53	2	40	5	38.46	24	8.824	3	9.677	1	2.041
Labour Days	6	17.65	0	0	4	30.77	125	45.96	19	61.29	16	32.65
Business &shop	14	41.18	0	0	0	0	36	13.24	4	12.9	9	18.37
Carpenter	5	14.71	0	0	1	7.692	11	4.044	1	3.226	3	6.122
Animal kept	32	94.12	4	80	13	100	248	91.18	31	100	40	81.63

(c): Distance wise number and % of Households involvement in each Attribute

Products	Nearest	Near	Far	Very far
	H.H & (%)	H.H & (%)	H.H & (%)	H.H & (%)
<b>Forest</b>				
Fire wood	89 (96.74)	119 (95.97)	112 (84.21)	55 (100)
Charcoal	0 (0)	18 (14.52)	0 (0)	0 (0)
Edible vegetable	65 (70.65)	116 (93.55)	104 (78.20)	55 (100)
Aquatic life	87 (94.57)	121 (97.58)	129 (96.99)	55 (100)
Bamboo	17 (18.48)	46 (37.10)	18 (13.53)	48 (87.27)
Thatch	20 (21.74)	40 (32.26)	18 (13.53)	48 (87.27)
<i>Tokowpat &amp; Japipat</i>	13 (14.13)	8 (6.45)	9 (6.77)	28 (50.91)
Cane	21 (22.83)	32 (25.81)	13 (9.77)	36 (65.45)
Broomstick	23 (25)	44 (35.48)	13 (9.77)	43 (78.18)
<b>Forest Associated Activities</b>				
Kabiraj	0 (0)	0 (0)	4 (3.01)	0 (0)
Craft	0 (0)	6 (4.48)	3 (2.26)	16 (29.09)
Sand labour.	12 (13.04)	0 (0)	21 (15.79)	0 (0)
Stone crash	1 (1.09)	0 (0)	10 (7.52)	0 (0)
Other lab.& wages	6 (6.52)	0 (0)	2 (1.50)	5 (9.09)
<b>Non -Forest Products</b>				
Rice	81 (88.04)	104 (83.87)	121 (90.98)	53 (96.36)
Areca nut	75 (81.52)	106 (85.48)	107 (80.45)	50 (90.91)
Vegetable	92 (100)	124 (100)	133 (100)	55 (100)
Fruits	14 (15.22)	89 (71.77)	43 (32.33)	35 (63.64)
Liquor	10 (10.87)	18 (14.52)	31 (23.31)	19 (34.55)
Animal	66 (71.74)	93 (75)	119 (89.47)	51 (92.73)
<b>Activities</b>				
Govt.	17 (18.48)	10 (8.06)	8 (6.02)	4 (7.27)
Private	15 (16.30)	0 (0)	19 (14.29)	9 (16.36)
Labour Days	36 (39.13)	50 (40.32)	54 (40.60)	30 (54.55)
Business & shop	11 (11.96)	17 (13.71)	23 (17.29)	12 (21.82)
Carpenter	3 (3.26)	4 (3.23)	12 (9.02)	2 (3.64)
Animal kept	79 (85.87)	109 (87.90)	119 (89.47)	53 (96.36)

## (d)Distance wise Individual Share of Production in Rs. and (%)

Products	Nearest		Near		Far		Very far	
	Rs.	(%)	Rs.	(%)	Rs.	(%)	Rs.	(%)
Forest								
Fire wood	2267.83	3.35	2767.10	7.01	2105.86	4.09	2336.00	4.65
Charcoal	0.00	0.00	183.63	0.47	0.00	0.00	0.00	0.00
Edible leafy vegetable	399.13	0.59	1292.52	3.28	580.60	1.13	1551.27	3.09
Edible non leafy vegetable.	221.74	0.33	718.06	1.82	321.20	0.62	861.82	1.72
Aquatic life	2295.65	3.39	3333.87	8.45	3541.35	6.87	4690.91	9.34
Bamboo	25.82	0.04	90.52	0.23	24.81	0.05	260.91	0.52
Thatch	245.65	0.36	554.84	1.41	218.05	0.42	1589.09	3.16
<i>Tokopat</i>	0.00	0.00	7.66	0.02	0.00	0.00	25.91	0.05
<i>Japipat</i>	7.07	0.01	0.00	0.00	6.95	0.01	214.55	0.43
Cane	9.13	0.01	18.39	0.05	4.51	0.01	80.73	0.16
Broomstick	25.00	0.04	45.16	0.11	10.15	0.02	223.64	0.45
<b>Forest Associated Activities</b>								
Kabiraj	0.00	0.00	0.00	0.00	676.69	1.31	0.00	
Craft	0.00	0.00	40.32	0.10	6.77	0.01	563.64	1.12
Sand labour.	1757.61	2.59	0.00	0.00	1607.37	3.12	0.00	0.00
Stone crash	260.87	0.38	0.00	0.00	1299.25	2.52	0.00	0.00
Other lab.& wages	619.57	0.91	435.48	1.10	67.67	0.13	356.36	0.71
Products								
<b>Non –Forest Products</b>								
Rice	7194.57	10.62	4467.74	11.32	7996.99	15.52	6729.09	13.39
Arecanut	3534.78	5.22	4693.55	11.89	2666.17	5.17	4250.00	8.46
Vegetable	1643.78	2.43	619.84	1.57	2580.21	5.01	524.87	1.04
Fruits	126.09	0.19	1000.00	2.53	239.85	0.47	541.82	1.08
Liquor	730.43	1.08	812.90	2.06	1526.62	2.96	1808.73	3.60
Animal	3109.78	4.59	2725.00	6.91	3703.76	7.19	2912.73	5.80
Others	1931.52	2.85	1523.39	3.86	1960.90	3.81	1520.00	3.03
Activities								
Govt.	18152.17	26.79	7635.48	19.35	5666.17	10.99	6616.36	13.17
Private	7082.61	10.45	0.00	0.00	3816.54	7.41	2876.36	5.73
Labour Days	3097.83	4.57	2419.35	6.13	2277.07	4.42	3490.91	6.95
Business &shop	12043.48	17.77	3303.23	8.37	7195.49	13.96	5774.55	11.49
Carpenter	978.26	1.44	774.19	1.96	1433.59	2.78	436.36	0.87
<b>Total</b>	<b>67760.36</b>	<b>100.00</b>	<b>39462.23</b>	<b>100.00</b>	<b>51534.59</b>	<b>100.00</b>	<b>50236.60</b>	<b>100.00</b>

### Appendix IV

#### a) Distance wise Annual Production, Consumption and Subsidiary Benefit Generated by the Households from Individual Forest Produces

Forest produces	Nearest		Near		Far		Very far	
	Rs.	(%)	Rs.	(%)	Rs.	(%)	Rs.	(%)
Fire wood (prod)	2267.83	100	2767.10	100	2105.86	100	2336	100
Fire wood (cons)	1492.17	65.80	1545.16	55.84	1732.93	82.29	1725.09	73.85
Subsidiary benefit	775.65	34.20	1221.94	44.16	372.93	17.71	610.91	26.15
Charcoal( prod)	0	0	183.63	100.00	0	0	0	0
Charcoal( cons)	0	0	0	0	0	0	0	0
Subsidiary benefit	0	0	183.63	100	0	0	0	0
wild edible (prod)	620.87	100	2010.58	100	901.80	100	2413.09	100
wild edible (cons)	619.96	99.85	1549.94	77.09	876.54	97.20	1922.33	79.66
Subsidiary benefit	0.91	0.15	460.64	22.91	25.26	2.80	490.76	20.34
Aquatic life (prod)	2295.65	100	3333.87	100	3541.35	100	4690.91	100
Aquatic life (cons)	2967.39	129.26	2932.26	87.95	3613.53	102.04	3523.64	75.1163
Subsidiary benefit	-671.74	-29.26	401.61	12.05	-72.18	-2.04	1167.27	24.88
Bamboo (prod)	25.82	100	90.52	100	24.81	100	260.91	100
Bamboo (cons)	25.82	100	90.52	100	22.93	92.42	260.91	100
Subsidiary benefit	0	0	0	0	1.88	7.58	0	0
Thatch (prod)	245.65	100	554.84	100	218.05	100	1589.09	100
Thatch (cons)	245.65	100	341.94	61.63	157.89	72.41	861.82	54.23
Subsidiary benefit	0	0	212.90	38.372	60.15	27.586	727.27	45.77
Tokopat(prod)	1.63	100	0	0	0	0	25.91	100
Tokowpat (cons)	1.63	100	0	0	0	0	20.45	78.95
Subsidiary benefit	0	0	0	0	0	0	5.45	21.05
Japipat (prod)	7.07	100	7.66	100	6.95	100	214.55	100
Japipat (cons)	7.07	100	2.22	28.95	3.38	48.65	42.73	19.92
Subsidiary benefit	0	0	5.44	71.05	3.57	51.35	171.82	80.08
Cane (prod)	9.13	100	18.39	100	4.51	100	80.73	100
Cane (cons)	9.13	100	12.26	66.67	4.51	100	43.64	54.05
Subsidiary benefit	0	0	6.13	33.33	0	0	37.09	45.95
Broomstick (prod)	25	100	45.16	100	10.15	100	223.64	100
Broomstick (cons)	25	100	33.47	74.11	9.77	96.30	77.27	34.55
Subsidiary benefit	0	0	11.69	25.89	0.38	3.70	146.36	65.45

**b) Accessibility wise Annual Production, Consumption and Subsidiary Benefit Generated by the Households from Individual Forest Produces**

Forest products	easy accessible		accessible		partly accessible		inaccessible	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Fire wood (prod)	2005.54	100	2239.75	100	2602.73	100	2665.495	100
Fire wood (cons)	1510.77	75.33	1684.75	75.22	1508.18	57.95	1689.67	63.39
Subsidiary benefit	494.77	24.67	555.00	24.78	1094.55	42.05	975.82	36.61
Charcoal (prod)	0	0	0	0	154.43	100	100.88	100
Charcoal (cons)	0	0	0	0	0	0	0	0
Subsidiary benefit	0	0	0	0	154.43	100	100.88	100
Wild edible (prod)	485.91	100	909.23	100	1954.91	100	2307.69	100
Wild edible (cons)	484.62	99.73	888.23	97.69	1458.55	74.61	1863.38	80.75
Subsidiary benefit	1.29	0.27	21	2.31	496.36	25.39	444.31	19.25
Aquatic life (prod)	2432.31	100	3275.63	100	3279.55	100	4206.593	100
Aquatic life (cons)	3055.38	125.62	3468.75	105.90	2809.09	85.65	3408.79	81.03
Subsidiary benefit	-623.08	-25.62	-193.13	-5.90	470.45	14.35	797.80	18.97
Bamboo (prod)	0	0	33.91	100	15.06	100	266.48	100
Bamboo (cons)	0	0	33.91	100	15.06	100	266.48	100
Subsidiary benefit	0	0	0	0	0	0	0	0
Thatch (prod)	0	0	310	100	86.36	100	1632.97	100
Thatch (cons)	0	0	272.50	87.90	86.36	100	903.30	55.32
Subsidiary benefit	0	0	37.50	12.10	0	0	729.67	44.68
<i>Tokowpat</i> (prod)	0	0	0.94	100	0	0	15.66	100
<i>Tokowpat</i> (cons)	0	0	0	0	0	0	12.36	78.95
Subsidiary benefit	0	0	0.94	100	0	0	3.30	21.05
<i>Japipat</i> (prod)	0	0	9.84	100	0	0	140.1099	100
<i>Japipat</i> (cons)	0	0	2.81	28.57	0	0	28.85	20.59
Subsidiary benefit	0	0	7.03	71.43	0	0	111.26	79.41
Cane (prod)	0	0	9	100	0	0	73.85	100
Cane (cons)	0	0	9	100	0	0	43.08	58.33
Subsidiary benefit	0	0	0	0	0	0	30.77	41.67
Broomstick(prod)	0	0	22.81	100	13.64	100	183.52	100
Broomstick (cons)	0	0	22.5	98.63	13.64	100	79.12	43.11
Subsidiary benefit	0	0	0.31	1.37	0	0	104.40	56.89

**c) Household size wise Annual Production, Consumption and Subsidiary Benefit Generated by the Households from individual Forest Produces**

Forest Produces	Very small (VS)		Small (S)		Medium(M)		Big(B)		Very big (VB)	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Fire wood (prod)	1881.4	100	2216.60	100	3129.23	100	2683.08	100	3800	100
Fire wood (cons)	1191.43	63.33	1477.31	66.65	2036.92	65.09	3052.31	113.76	3800	100
Subsidiary benefit	690	36.67	739.29	33.35	1092.31	34.91	-369.23	-13.76	0	0
Charcoal (prod)	44.64	100	55.34	100	66.67	100	0	0	0	0
Charcoal (cons)	0	0	0	0	0	0	0	0	0	0
Subsidiary benefit	44.64	100	55.34	100	66.67	100	0	0	0	0
Wild edible (prod)	894	100	1246.34	100	1992.31	100	2171.08	100	2520	100
Wild edible (cons)	594	66.44	1033.52	82.92	1820	91.35	1904	87.70	2520	100
Subsidiary benefit	300	33.56	212.82	17.08	172.31	8.65	267.08	12.30	0	0
Aquatic life (prod)	1526.8	100	3163.64	100	4592.31	100	6023.08	100	7800	100
Aquatic life (cons)	1585.71	103.86	2943.08	93.03	4576.92	99.66	6507.69	108	9000	115.4
Subsidiary benefit	-58.93	-3.86	220.55	6.97	15.38	0.34	-484.62	-8.05	-1200	-15.38
Bamboo (prod)	20.54	100	66.60	0	149.36	0	65.38	0	125	0
Bamboo (cons)	20.54	100	66.60	0	149.36	0	65.38	0	125	0
Subsidiary benefit	0	0	0	0	0	0	0	0	0	0
Thatch (prod)	210.71	100.00	460.08	100	835.90	100	800	100	500	100
Thatch (cons)	196.43	93.22	288.54	62.71	566.67	67.79	246.15	30.77	500	100
Subsidiary benefit	14.29	6.78	171.54	37.29	269.23	32.21	553.85	69.23	0	0
Tokopat (prod)	0	0	3.06	100	10.26	100	0		0	0
Tokowpat (cons)	0	0	1.88	61.29	8.33	81.25	0	0	0	0
Subsidiary benefit	0	0	1.19	38.71	1.92	18.75	0	0	0	0
Japipat (prod)	2.23	100	32.81	100	35.90	100	238.46	100	0	0
Japipat (cons)	0	0	6.42	19.58	17.31	48.21	7.69	3.23	0	0
Subsidiary benefit	2.23	100	26.38	80.42	18.59	51.79	230.77	96.77	0	0
Cane (prod)	7.86	100	16.28	100	36.92	100	55.38	100	0	0
Cane (cons)	6.43	81.82	11.38	69.90	26.15	70.83	6.15	11.11	0	0
Subsidiary benefit	1.43	18.2	4.90	30.10	10.77	29.17	49.23	88.89	0	0
Broomstick(prod)	26.79	100	50.79	100	80.13	100	73.08	100	0	0
Broomstick (cons)	19.64	73.33	28.46	56.03	44.87	56	15.38	21.05	0	0
Subsidiary benefit	7.14	26.67	22.33	43.97	35.26	44	57.69	78.95	0	0

**d) Literacy wise Annual Production, Consumption and Subsidiary Benefit Generated by the Households from individual Forest Produces**

Forest Produces	Very low		Low		Medium		High		Very high	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Fire wood (prod)	2537.4	100	2542.73	100	2504.56	100	2096.44	100	2097.60	100
Fire wood (cons)	1534.84	60.49	1577.27	62.03	1692.63	67.58	1626.22	77.57	1619.20	77.19
Subsidiary benefit	1002.58	39.51	965.45	37.97	811.93	32.42	470.22	22.43	478.40	22.81
Charcoal (prod)	56.452	100	47.73	100	61.40	100	38.89	100	70	100
Charcoal (cons)	0	0	0	0	0	0	0	0	0	0
Subsidiary benefit	56.45	100	47.73	100	61.40	100	38.89	100	70	100
Wild edible (prod)	1938.58	100	1459.50	100	1495.05	100	1103.20	100	942.48	100
Wild edible (cons)	1342.45	69.25	1230.41	84.30	1261.23	84.4	990.27	89.76	942.48	100
Subsidiary benefit	596.13	30.75	229.09	15.70	233.82	15.64	112.93	10.24	0.00	0
Aquatic life (prod)	3203.2	100	3235.23	100	3815.8	100	3263.3	100	2856	100
Aquatic life (cons)	2796.77	87.31	3136.36	96.94	3484.21	91.31	3320.00	101.74	3312.00	116
Subsidiary benefit	406.45	12.69	98.86	3.06	331.58	8.69	-56.67	-1.74	-456	-16
Bamboo (prod)	40.73	100	82.39	100	94.30	100	80.28	100	74.50	100
Bamboo (cons)	40.73	100	82.39	100	90.13	95.58	80.28	100	74.50	100
Subsidiary benefit	0	0	0	0	4.17	4.42	0	0	0	0
Thatch (prod)	296.77	100	527.27	100	600	100	553.33	100	528	100
Thatch (cons)	177.42	59.78	350	66.38	359.65	59.94	384.44	69.48	320	60.61
Subsidiary benefit	119.35	40.22	177.27	33.62	240.35	40.06	168.89	30.52	208	39.39
Tokowpat (prod)	0	0	3.41	100	8.55	100	2.78	100	3	100
Tokowpat (cons)	0	0	2.27	66.67	6.36	74.36	0.56	20.00	3	100
Subsidiary benefit	0	0	1.14	33.33	2.19	25.64	2.22	80	0	0
Japipat (prod)	2.02	100	26.99	100	69.52	100	47.22	100	12.5	100
Japipat (cons)	2.02	100	11.08	41.05	12.28	17.67	3.61	7.65	5	40
Subsidiary benefit	0	0	15.91	58.95	57.24	82.33	43.61	92.35	7.5	60
Cane (prod)	8.39	100	17.73	100	31.23	100	18.22	100	18.4	100
Cane (cons)	5.81	69.23	14.55	82.05	17.54	56.18	11.56	63.41	13.6	73.91
Subsidiary benefit	2.58	30.77	3.18	17.95	13.68	43.82	6.67	36.59	4.80	26.09
Broomstick(prod)	43.55	100	48.86	100	71.93	100	46.11	100	55	100
Broomstick (cons)	17.74	40.74	30.68	62.79	31.14	43.29	32.78	71.08	34	61.82
Subsidiary benefit	25.81	59.26	18.18	37.21	40.79	56.71	13.33	28.92	21	38.18

**e) Community wise Annual Production, Consumption and Subsidiary Benefit Generated by the Households from individual Forest Produces**

Forest produces	Rabha		Boro		Garó		General		Oraon		SC	
	Rs.	(%)	Rs.	(%)	Rs.	(%)	Rs.	(%)	Rs.	%	Rs.	%
Fire wood (prod)	2379.41	100	3015.48	100	3108.57	100	747.06	100	2621.54	100	1568.00	100
Fire wood (cons)	1594.71	67.02	1443.87	47.88	1662.04	53.47	1723.53	230.71	2141.54	81.69	1568.00	100
Subsidiary benefit	784.71	32.98	1571.61	52.12	1446.53	46.53	-976.47	-131	480	18.31	0	0
Charcoal (prod)	0	0	0	0	464.69	100	0	0	0	0	0	0
Charcoal (cons)	0	0	0	0	0	0	0	0	0	0	0	0
Subsidiary benefit	0	0	0	0	464.69	100	0	0	0	0	0	0
Wild edible (prod)	1530.18	100	780.39	100	2019.43	100	86.47	100	1253.54	0	100.80	100
Wild edible (cons)	1258	82.21	780.39	100	1745.14	86.42	86.47	100	1253.54	0	84	83.33
Subsidiary benefit	272.18	17.79	0	0	274.29	13.58	0	0	0	0	16.80	16.67
Aquatic life (prod)	3331.99	100	2845.16	100	3440.82	100	3511.76	100	4661.54	100	2100.00	100
Aquatic life (cons)	3136.76	94.14	2845.16	100	3269.39	95.02	3952.94	112.56	4476.92	96.04	3360.00	160
Subsidiary benefit	195.22	5.86	0	0	171.43	4.98	-441.18	-12.56	184.62	3.96	1260.00	-60
Bamboo (prod)	76.65	100	0	0	197.96	100	0	0	34.62	100	0	0
Bamboo (cons)	76.65	100	0	0	197.96	100	0	0	34.62	100	0	0
Subsidiary benefit	0	0	0	0	0	0	0	0	0	0	0	0
Thatch (prod)	518.38	100	0	0	1240.82	100	0	0	307.69	100	0	0
Thatch (cons)	344.85	66.52	0	0	742.86	59.87	0	0	246.15	80	0	0
Subsidiary benefit	173.53	33.48	0	0	497.96	40.13	0	0	61.54	20	0	0
Tokowpat (prod)	5.79	100	0	0	0	0	0	0	0	0	0	0
Tokowpat (cons)	4.14	71.43	0	0	0	0	0	0	0	0	0	0
Subsidiary benefit	1.65	28.57	0	0	0	0	0	0	0	0	0	0
Japipat (prod)	49.08	100	0	0	19.90	100	0	0	0	0	0	0
Japipat (cons)	10.57	21.54	0	0	4.08	20.51	0	0	0	0	0	0
Subsidiary benefit	38.51	78.46	0	0	15.82	79.49	0	0	0	0	0	0
Cane (prod)	22.79	100	0	0	40	100	0	0	0	0	0	0
Cane (cons)	15.15	66.45	0	0	25.31	63.27	0	0	0	0	0	0
Subsidiary benefit	7.65	33.55	0	0	14.69	36.73	0	0	0	0	0	0
Broomstick(prod)	59.56	100	0	0	109.18	100	0	0	0	0	0	0
Broomstick (cons)	29.78	50	0	0	79.59	72.90	0	0	0	0	0	0
Subsidiary benefit	29.78	50	0	0	29.59	27.1	0	0	0	0	0	0



Meeting with villagers prior to household survey  
(To build confidence with the villagers)



A View of forest products collection



Woman carrying forest edible



Man carrying forest products



Man carrying forest products (firewood)



Man carrying forest products



Bamboo collected from forest



Craft made from forest products



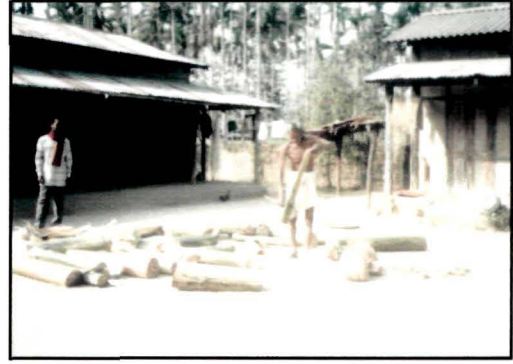
Craft made from forest products



Domestic use of forest products



Craft made from forest products & thatch



Banana tree collected for food



Fishing in stream & beel



Some commonly used medicinal plants



Man on a boat, view of Sundubi beel



Sundubi beel



Sand collection & loading from Kushi river



Animal grazing & Fishing



Stone crushing





Edible forest products & broomstick sold in the nearby weekly market



Products sold in the Weekly market & within the village

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