

Final Report of Minor Research Project

**Household characteristics and Forest Resource Dependency
in the forest villages of Laokhowa Wildlife Sanctuaries.**



**Submitted to
University Grants Commission**

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CERTIFICATE

This is to certify that the final report on UGC Minor research project entitled **“Household characteristics and Forest Resource Dependency in the forest villages of Laokhowa Wildlife Sanctuaries”** is a record of bonafide research work carried out by Sri Kulen Chandra Das, Assistant Professor of Economics, Nowgong Girls’ College, Nagaon, Assam. A copy of the final report of Minor Research Project has been kept in the library of Economics of the College.


Principal

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Content:

1. Introduction.
2. Review of Literature
 - 2.1. Ecosystem Services of Forests and Forest Dependency
 - 2.2. The Major Causes of Change
 - 2.3. Conservation of Forest and Environment
 - 2.4. Sustainable Management of Forest Resources.
3. Data source and methodology.
4. Household Characteristics and Forest Resource Dependency.
5. Summary and findings.
6. References/ Bibliography.

CHAPTER I
INTRODUCTION

INTRODUCTION

1. BACKGROUND:

Natural resources are components of the natural environment, which fulfill functions in eco-system processes, and which are also useful or beneficial for humans. In other words, matters supplied exclusively by nature and redressed by human actions are called Natural Resource. According to Gouldie "that fraction of the matter found in natural environment and is worth consumption by human being are called Natural Resource". Thus, geographical location of a country, its size, topography, climate, vegetation, soil, wind, water, animal wealth, minerals, solar light, etc. are its natural resources (Jat, 2007). Some of these are suitable for longer period of time and others like coal, petroleum, etc. are for short period only.

Natural Resources are derived from the environment and can be classified as biotic and abiotic on the basis of origin; as potential and actual on the basis of stage of development and as renewable and non-renewable on the basis of renewability. Resources have always been used by human societies and arguably even non-human societies to a limited degree. What have changed over time and space is the variety of resources used and the magnitude of resources extracted from natural systems and consumed (Wikipedia, 2013).

Pannerselvam (2008) discussed the natural resources to be the ingredients that provide the inputs for production and consumption. With population and consumerism growing all over the world, the stock of natural resources has severely been affected. Therefore, the question of natural resource adequacy is gaining momentum. However, Field (2001) remarked that it was not a new concern. Before the industrial revolution, when economies were tied more closely to the local resource endowments, fear of local shortages of items such as food, fodder, fuel wood, and water were very common. When the industrial revolution did arrive, with its heavy reliance on coal, concern shifted to the possibility that the resources, since it was non-renewable, would grow scarce.

We cannot live without nature and therefore need to understand the fact that the resources are limited. Extraction beyond a certain limit creates problems like depletion of the resources culminating into environment pollution and ecological imbalance. This is, indeed, not a country specific problem, but the whole globe is experiencing it. Given the harnessing process of natural resources and the characteristic pattern of their exploitation and use, the interaction between human society and nature has thus

unveiled three aspects of the man-nature problem (Mishra, 2001). Firstly, the technological and economic aspects relating to the depletion of natural resources; secondly, the ecological aspects, concerning environmental pollution and disturbance of biological balance; and thirdly, the socio-political aspect relating to conservation and management of natural resources, and to the preservation of irreplaceable resources.

The economic growth of a region depends upon the proper exploitation of its natural resources. The resources like land; water, minerals, forests, fisheries and livestock are the natural gifts and are transformable into tangible wealth on exploitation to produce agricultural, industrial and energy outputs. These are the most significant ingredients for stimulating the economic growth of the region.

Forest resource is one of the most important components of natural resources. Forests are the precious gift of nature (Ramakrishnan, 2004). The State of the World Forest (SOFO, 1995) explains forests to be a complex ecosystem capable of providing a wide range of economic, social and environmental benefits. Forests provide products and services which contribute directly to the well-being of people everywhere and are vital to our economies, our environment and our daily lives. While forests and woodlands are now recognized as essential for human life, their benefits and services are valued differently by different people and different groups. The world's total forest area in 2010 is estimated to be just over 4 billion hectares, which is 31% of the total land area, corresponding to an average of 0.6 ha of forest per capita (FAO, 2010). About 55 percent of the world's forests are located in developing countries, with the remaining 45 percent in developed countries. Analyzing the state of the forest in Asia and Pacific region, the FAO forest report says "While forest area will stabilize and increase in most of the developed countries and some of the emerging economies, the low and middle income forest rich countries will witness continuing decline as a result of expansion of agriculture, including the production of bio fuel feedstock" (FAO, 2009).

Many Asian developing countries have not only experienced rapid economic growth in the past but also have rapidly lost or degraded their valuable natural resources base. Man, while drawing resources from the environment, continue to strengthen his economic system, but at the same time use to change the physical environment, depending on his interest, knowledge, technological development and strength. But, there is always a limit for physical conversion of environment beyond which the natural resources start depleting rather than generating. Consequently, today there are several environmental problems and natural resource management related issues that

There is realisation of this interface between forest and forest dwelling communities among the researchers. Panayotou and Ashton (1992) understood that the interaction between forest and forest dwelling communities received increasing attention from social scientists and policy makers due to its significance from the view point of community welfare and sustainable forest management. Community-forest relation assumes importance in social development policies also because people who depend on forest for their livelihood suffer from geographical isolation and social exclusion. Panta et. al., (2009) in a study in Central Terai of Nepal found that the rural poor tend to be disproportionately dependent on forest resources in the sense that a higher proportion of their total income comes from forest resources. She further noticed that lack of alternative energy sources and high profit margins of fuel wood economy are important causes of deforestation. Hegde and Enters (2000) observed that the poor fringe villagers depend on forest mostly due to non-availability of any meaningful alternative sources of livelihood. The overall socio-economic up-liftment of forest dependent community will reduce human pressure on Protected Areas (PAs) and promote conservation of biological diversity. However, Shylajan and Mythili (2007) opined that the intensity of extraction of various products and forest dependency may vary among different communities, among households within communities and between locations in the forest. This view was earlier held by World Bank (2006), which represented that the degree and nature of dependence on forests and livelihood options differs from one community to another. Villages closer to towns tend to rely less on forests for livelihoods and more on agriculture and wage labor. Villages in more remote areas tend to rely more on agriculture and forestry. Subsistence products, in particular fuel wood and fodder, are the main contributors to local livelihoods from the forests. It is apparent now that the most forest fringe communities depend primarily on agrarian based economies, with forests playing an important supporting role by providing subsistence fuel wood, fodder and limited NTFPs on a seasonal basis for some people and serving as a safety net for others.

Different State of the Forest Reports published by Food and Agricultural Organisation show a gloomy picture of the forest cover of the world. The Global Forest Resources Assessment 2010 which was released in October, 2010, noted that the overall rate of deforestation remained alarmingly high, although the rate is slowing down. In India also the forest cover shows a negative change in between 2000 and 2005 from 67,782 to 67,709 thousand hectares only to show a slight increase in next five years to 68,434 thousand hectares (SFR, 2005). Most of the researchers attributed free grazing, open access to fuel wood cutting and poor maintenance of forests by forest department to such environmental degradation.

Therefore, extensive and reliable qualitative and quantitative knowledge about forest ecosystem and forest and people interface are indispensable for developing appropriate strategies and programmes to conserve and manage the forest, which is decreasing over the years. Collection and extraction of different forest products, extensive grazing, encroachment for cultivation due to increase in population and their ever increasing demands, logging, jhuming, etc. are some of the pressures the people put on the forest resources resulting into forest cover loss. Looking into multiple and important use of the forest resources hence, emphasis would be given in this study on how and to what extent the forest fringe people depend on this resource for their subsistence livelihood and how to manage it sustainably.

It would, indeed, be imperative here to define forest dependency since the study would be designed to investigate upon the forest dependency and its implication. Narain (2005) defined resource dependency as the fraction of total income derived from common property resources. Dependence is measured as the ratio of households' income derived from natural resources in a given year to its total income in that year. According to Velded (2004), dependence is usually defined as share of overall income derived from natural resource use. Thus, the nature and extent of forest dependency of the fringe people on the forest resources will be the subject matter of this study. The ecosystem services derived from this important natural resources and the livelihood linkage is one of the important aspects to be analysed in the study.

2. OBJECTIVES OF THE STUDY:

For designing an incentive based mechanism for the conservation of forest which benefits the forest depending community, it is crucial to know the benefits that accrue to the society from the extraction of forest resources. Forest conservation offers a variety of benefits such as direct use values, indirect use values, option values and existence or non-use values. For most of the products there are no proper markets for transaction, and hence economic valuation becomes difficult. They are not properly accounted for in the total value. Keeping this in the background, the present study attempts:

- To assess and evaluate the consumption pattern of the natural resources by the fringe people and its impact on the environment.
- To examine the extent and nature of dependence on forest by various local communities in a protected areas and factors influencing the dependence. Emphasis will be given on the household characteristics of the forest dependent families.

CHAPTER II
REVIEW OF LITERATURE

REVIEW OF LITERATURE

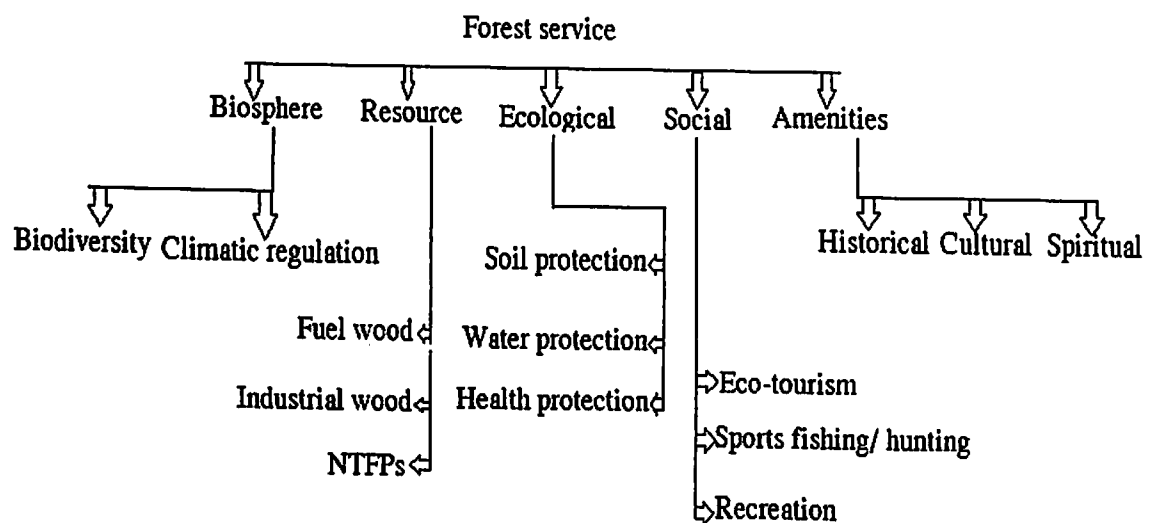
2.1. Ecosystem services (ESS) of forest and forest dependency: An ecosystem is a dynamic complex of plant, animal, and microorganism communities and the non-living environment interacting as a functional unit. Humans are an integral part of ecosystems. Ecosystems provide a variety of benefits to people, including provisioning, regulating, cultural, and supporting services. Provisioning services are the products people obtain from ecosystems, such as food, fuel, fiber, fresh water, and genetic resources. Regulating services are the benefits people obtain from the regulation of ecosystem processes, including air quality maintenance, climate regulation, erosion control, regulation of human diseases, and water purification. Cultural services are the nonmaterial benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences. Supporting services are those that are necessary for the production of all other ecosystem services, such as primary production, production of oxygen, and soil formation (Hassan, 2005). Forest as an ecosystem provides us tremendous benefits and services.

The demand for all these ecosystem services is now so great that tradeoffs among services have become the rule. A country can increase food supply by converting a forest to agriculture, for example, but in so doing it decreases the supply of services that may be of equal or greater importance, such as clean water, timber, ecotourism destinations, or flood regulation and drought control (Carpenter, 2005). Lan (2002) says this demand to be basically for increased population and their ever increasing demand for such services. High population density is one of the threats to a country's natural resources and long term persistence of its biological diversities, he says. With the increased population their demands on ecosystems will grow still greater in the coming decades. This formidable increase in demand for and consumption of biological and physical resources would put massive pressure on ecosystems and the services they provide. The capability of the ecosystem to provide the desired services has been dwindling. This degradation of ecosystem services is exacerbated by the associated loss of the knowledge and understanding held by local communities— knowledge that sometimes could help to ensure the sustainable use of the ecosystem.

Forests and woodlands supply essential services to human wellbeing across the world, and human-forest interactions manifest themselves in many direct and indirect ways, each depending variously on the amount of forest, its condition, and its distribution over the landscape. Forests can serve as reservoirs, sinks and sources of greenhouse gases and thus have a significant role in moderating the flux of greenhouse

gases between the land and the atmosphere (FAO, 1999). Forests not only provide for timber and fuel wood and other material resources, but for a wider set of public goods and services such as water retention, soil erosion prevention, biodiversity conservation, carbon sequestration, recreation etc. It is further estimated that more than 1 billion people, mostly poor, depend on forests in varying ways for their livelihoods (Kamanga, 2009).

The following flowchart shows us different services forests provide with the human being:



Source: Trivedi et al., 2005

The environmental and social services of forests and trees include, among others the conservation of biological diversity, carbon storage and sequestration for mitigation of global climate change, soil and water conservation, provisions of employment and recreational opportunities, enhancement of agricultural systems, improvement of urban and peri-urban living conditions and protection of natural and cultural heritage. These services have received increasing emphasis and in some cases, global legal commitment since the UNCED.

It is important here to know that the forests help in balancing oxygen and carbon dioxide level in atmosphere, regulate earth's temperature regime and hydrological cycle. Forests increase local precipitation and water holding capacity of soil, thus, preventing drought situation. Vegetation cover provided by forest impedes the velocity of runoff on soil surface checks soil erosion, silting and landslides, thus reducing the danger of flood. The litter derived from fallen leaves maintain fertility of soil by returning the nutrients. Forests also act as a refuge to wild animals and provided

protection to them against strong, cold or hot and dry winds, solar radiation, rain and enemies (Trivedi et al., 2005).

People's lives have been intimately associated with the forests. They collect fuel wood, building materials (such as timber, bamboo, cane, grass, etc.) for dwelling houses, materials for construction of agricultural implements, furniture, utensils, besides many other useful articles (Ganguli, 2006). In quoting the recent Anthropological Survey of India report Madhab Gadgil said that there are substantial dependency of the people on the biomass. The report says, as quoted, that 5% of the communities being engaged in hunting-gathering; 7% in fishing; 2% in trapping birds; 2% in woodwork; 7% in basket and mat weaving; 3.5% in shifting cultivation; 20% in animal husbandry; and 50% in settled cultivation (Gadgil, 1993). Such dependency is basically due to the absence of gainful alternative sources of livelihood. A seminal study by Narain and others (2005) in the Jhabua district measures specific components of annual household income and subsequent dependence on natural resources, including forests. As household income increases, the share of income from agriculture declines, offset by increases in wage employment and home enterprise income. As a percentage of income from natural resources, income from fuel wood declines as household income increases. This is due largely to the fact that other forms of energy become more affordable as income increases and the opportunity cost of the time spent collecting fuel wood becomes too high. The share of fodder income from natural resource income increases with household income largely because richer families own more assets in the form of livestock (World Bank, 2006).

Forests and other uncultivated lands provide firewood, grazing and cut fodder for livestock, timber for buildings and agricultural implements and a variety of medicinal plants and other NTFPs for local consumption and sale (Menon, 2007). State of the World Forest recognised the fact that the environmentally fragile areas tend to be isolated and economically marginalized. Under such conditions, people generally have a relatively high dependence on local forest resources for various goods (FAO, 1999).

The poor people depend directly on natural resource environment for their livelihood (Nadkarni, 2001). In a report, World Bank estimates that fuel wood is a source of livelihood for more than 11 million people in India, making it the largest employer (formal and informal) in the Indian energy sector (World Bank, 2006). Gunatilake (1993) did an extensive study on the peripheral community of wilderness area and found that the poor and destitute peripheral communities of the forests were bound to extract a number of non-timber forest products (NTFPs) from the nearby reserves knowing the

fact that if they were caught they wouldn't be spared with impunity. In a similar way Mukherjee (2003) is also of the opinion that the poor local communities are associated with natural forests, woody landscape and community forests and of recent origin, social plantations or social forestry. In saying so she further stressed that local communities have historical ties with local forests, trees and CPRs which provide both direct and indirect benefits to them. The benefits provided by such natural resources are basic to such communities and amongst direct benefits, following are included:

- Food such as nuts, wild fruits, vegetables, leaves, flowers, roots, stems, honey, wild animals, insects, etc.
- Habitat and shelter
- Raw materials like bamboo, canes, fibers, oils, waxes, resins, gums, dyes and wood furniture and capital equipments for agriculture, artisanship, etc.
- Fuel wood
- Medicines and drugs
- Fodder such as grass, branches, twigs and leaves
- Grazing sites
- Means of livelihood, both seasonal and annual
- Shade
- Ornaments, religious items and cultural symbols
- Drought relief.

One has to keep in mind that over 65 per cent of the protected areas were characterized by human settlement and resource use (Kothari, 1989). These forest dwelling communities depend mostly on the tangible benefits of the forest like fuel wood, timber and non timber forest products, apart from all kinds of the intangible benefits they accrue from the forest without knowing about it. Forest and forest products are linked to household livelihood system in a variety of different ways to these people (Rawat, 2008). The role of non-timber forest products (NTFP) in the economic development of local communities and sustainable forest management has been documented by many researchers (Shylajan and Mythili, 2003) (Panayotou, 1992) (Das, 2005) (Gunatilake, 1993) (Quang, 2006) (Arnold and Perez, 2001).

At the global level, five major categories accounted for 90 percent of the total value of NWFP removals: food (51 percent), other plant products (17 percent), honey (11 percent), ornamental plants (6 percent) and exudates (4 percent). The value of the NWFP removals in the year 2005 was US \$ 16,839 mn for the world, though mostly the value of it remains underestimated for most of the countries and region. State of the Forest Report 2010 states that around 10 mn people are employed in forest

management and conservation, but many more are directly dependent on forests for their livelihoods (FAO, 2010). Rawat (2008) says that for most of the world's households, NTFPs provide essential food and nutrition, medicine, fodder, fuel, thatch, and construction materials, mulch and non-farm income. Some of them are outlined below:

Two major products for which the people depend overwhelmingly on forests are fire wood and fodder. The working group on an energy policy by the Planning Commission in 1979, as mentioned in the India State of Forest Report 1999, stated that fuel wood consumption in the year 1975-76 was 133.1 mn tones. As against this the recorded production of fire wood from forests was of the order of only about 19 mn tones. NSSO estimated the production of 30 mn tones from TOF (the private lands and gardens). How the gap between the demand and supply then got fulfilled – is a big question. Panta (2009), in an article, stated that since firewood is the only accessible source of households' energy at rural areas for poor and as they can't afford other resources they are dependent hugely on the forest for collection of firewood. It is accepted that most of the fire wood which is in the form of dead and dry wood, is extracted from forests on head-load by the villagers living adjoining the forests. The poor and destitute having no alternative source of livelihood are compelled to resort to such kind of collection. Such extraction goes unrecorded. The country report for the State of the World's Forest estimates the value of removal of fuel wood and NTFPs to be US\$7,095 and US\$ 133 respectively (FAO, 2010).

Grazing is another vital activity of the people of the peripheral area of forests across the country which put massive pressure on the existing forest resources. Most of the people don't practice stall feeding rather set their livestock free into the forest thereby putting huge pressure on to the already scarce forest resource. India with just a fortieth of the total land area of the world supports more than half its buffaloes, 15% of its goats and 4% of its sheep (Trivedi, 2005). It is for sure that it would be needed an enormous amount of fodder or grazing grounds for such a massive animal population.

Twelve and half million hectares of lands in India are recorded as permanent pasture and grazing lands. The livestock population which was 292 mn (including cattle population of 199 mn) in 1951 increased to 450 mn in mid 1990s. Livestock population has been increasing while the area under grazing lands has been decreasing all over India. Due to enormous grazing pressure, the grasslands have undergone a tremendous change (Yelda, 2011). Pasture and grazing lands are being overused. Deferred and rotational grazing was never introduced and lands were never allowed to regenerate. A substantial percentage of pasture and grazing lands has been encroached upon for agricultural and other purposes. The reduction in extent of pasture and grazing lands,

the loss in their productivity has led to more and more forests being used as grazing grounds. The total requirement of green fodder of 882 mn tones far exceeds the total availability of 434 mn tones (FSI, 1987). The gap has resulted in unlimited and unrestricted grazing in forest land. It is interesting to note here that Grazing occurs in the majority of the forest areas and has a strong adverse impact on forest lands (Kumar, 2000). For example grazing takes place in 83% of forest land in UP, 87% in West Bengal, 85% in Meghalaya, 70% in Orissa, 75% in Sikkim and 53% in Nagaland. The fringe communities don't practice stall feeding rather they use to set their cattle population free into the forest area and thus put enormous pressure on the forest ecosystem.

Apart from fuel wood and grazing, rural households also rely heavily on natural resources for other purposes. Inviting a reference to the World Resource Institute Kamanga (2009) says that as much as 20–25% of rural people's income may be derived from environmental resources in developing countries. Poor people typically engage more in low-return forest activities, but often fail to accumulate capital from such activities. He further states that converting forestland to agriculture may deprive poor people of natural resource access, as the conversion often implies a transition from communal to individual resource control. This can leave segments of rural people worse off than before, despite a total production increase for the country.

An extensive list of NTFPs has been given above which are collected by the fringe people from the forests across the world. Forests and forest products are linked to household livelihood system in variety of different ways. Socioeconomic research reveals that NTFPs become important in the livelihoods of many poor households who live in or near forests, especially in the tropics (Quang, 2006). NTFPs are used by rural communities as energy sources, food items, medicinal products, materials for household equipment, construction materials, as well as equipment and materials for agricultural activities (Illukpitiya, 2010). The use value of NTFPs has significant impact upon income and consumption flows in local economies; in particular, this value may have strong implications for the welfare of communities, which use these products for subsistence. For most of the world's households, NTFPs provide essential food and nutrition, medicine, fodder, fuel, thatch, and construction materials, mulch and non-farm income. These products are particularly important in relieving the "hunger periods" in the agricultural cycle, and in smoothing out other seasonal fluctuations. The women of the household are primarily the collectors of the NTFPs since in almost everywhere women are responsible for the household activities that involve forest –based foods and medicine, as well as fuel wood (Rawat, 2008). Boot also opines that indigenous and forest dependent people extract a wide range of products for subsistence and trade,

such as: edible fruits, nuts, medicines, construction materials, latexes, resins and so on (Boot, 1997). Fish is another important product that the people extract a lot.

Nadkarni (2001) wrote extensively on the poverty, environment and development in India. He states that continued poverty makes people dependent heavily on land and other available natural resources. India, though have improved much on alleviating poverty, he opines, a significant portion of total population still live in abject poverty as per government estimate. Consequently, the pressures of the poor people continue to remain on land, forest and fisheries. It is necessary to understand here the distinction between the pressure on land to raise food and production and pressure to earn a livelihood. Food items have been grown significantly but people have not been provided with the gainful livelihood opportunities. Therefore, the growing population along with the consistent poverty is putting pressure on land and the forests culminating into encroachment for different purposes. Attempt to encroach government forest lands for cultivation had been a regular phenomenon since independence. After independence, in order to foster economic development, government encouraged industrialization and emphasis was shifted from timber to pulpwood. For pulpwood, forest department was to provide raw-materials at a very low price and the industries did not have any interest to regenerate forest, even in lands earmarked for them to meet their needs. When industries exhausted raw material sources allotted earlier, they could get new areas for similar exploitation. Once a forest was exhausted, encroachers were tempted to extend cultivation into the cleared forests.

The World Bank did a study on eight villages of Assam and found out the villagers to be small-holder farmers, shifting cultivators and landless people. Across all the villages, 76% of households reported agriculture as the primary occupation. All the villagers use forest, primarily for subsistence fuel and fodder. Fuel wood supplies an average 79% of energy needs. Fodder from the forests provides about 64% of the feed requirements for domestic livestock. Gross values were Rs 2,440 for fuel wood and Rs. 10,992 for fodder per household per year. Poles play a minor role in forest livelihoods since bamboo occupy a significant role in domestic construction. Most communities collect a variety of non-timber forest products, mainly for subsistence use (World Bank, 2006).

2.2. The Forest cover change and factors responsible: In talking about change we basically talk both about negative and positive change of forest cover. As analysed above though the forest cover is declining for the world as a whole, but the trend of

change is not akin everywhere. The State of the World Forest Report represents a picture of regional difference of forest cover change. Developed countries are showing an increasing trend while the developing countries are showing a declining trend as far as forest resource is concerned. Though the loss of forest cover can be attributed to a number of factors but the gain is largely due to afforestation and reforestation programme taken up by the government concerned. The extensive plantation activities in and outside forest, effective protection by the JFM committees and regeneration of shifting cultivation areas, effective protection of forests by Village Forest Protection Committees (VFPC) and plantation activities undertaken by the state are the important factors contributing to increased forest cover in the country.

Every year, about 13 million hectares of forests are converted to other land use leading to biodiversity losses, soil erosion and massive CO₂ emissions. According to the World Bank report 1991, 60% of recent deforestation in the developing world may be for increasing non-forest use such as the agricultural activity, petroleum, etc. and 20% for household use of fuel wood (Hazra, 2008). The investigation of the processes of deforestation provided a wide literature, both at macro and micro levels. The direct and underlying causes of deforestation are agricultural prices and technologies, timber prices, institutions or property rights. Globally, most studies agree upon the fact that agricultural expansion is the leading direct factor of deforestation: farmers and firms convert forests to agriculture (Damette, 2011).

2.2.1. Population growth and Agricultural expansion: There are various causes of forest cover loss which are size, site and time specific. Some of such causes are: agricultural expansion, increase in population and their ever increasing demands culminating even into encroachment, large infrastructural projects resulting into resettlement and rehabilitation programmes, overexploitation of forest resources, abject poverty, etc. The major causes of change in forest cover in the tropics appear to be expansion of subsistence agriculture in Africa and Asia and large economic development programmes involving resettlement, agriculture and infrastructure in Latin America and Asia (FAO, 1996). This is primarily due to the population increase which leads to deforestation. Deforestation rates remain high and will probably increase in the coming years as the population grows and demand for new settlements, wood for construction, fuelwood, charcoal and food increases as a consequence (Amisah, 2009). Recently released information on the causes of deforestation over 1980-90 decade clearly shows rural population growth coupled with agricultural expansion and economic development programmes as major cause in forest cover change. High population growth and continued dependence on land will raise the pressure on forests,

especially in densely populated countries. The demand for food and to feed the world's increasing population will continue to put pressure on forest land (FAO, 1997). There is a continued pressure, particularly in developing countries, to convert forest land to other types of land use, particularly subsistence and commercial agriculture (Field, 2001) (Faham, 2008) which is also a prime factor for forest cover change.

2.2.2. Population and overexploitation: Increase in human population is one of the main reasons of deforestation in our country. Increased population raises the demand for different goods and services and given the natural resources, pressure would be tremendous on it resulting into overexploitation. Ramakrishnan (2004) says that rapid population growth and severe pressure on forested areas for agriculture, livestock grazing, fuel wood and other domestic needs of the rural area put pressures that also contribute to over exploitation of forest resources. In a similar way Kadekodi also talks about high population pressure along with overexploitation and alternative use of the resource as important contributing factors towards forest and other common property resource degradation (Kadekodi, 2004).

2.2.3. Urbanization: Urbanization, which is growing at a rate of 15 to 20 pc a year, is also one of the major factors contributing towards forest degradation or forest cover loss. Jhum in the NE region is also contributing to forest loss to some extent (FSI, 2011). Increased urbanisation, industrialization and mining have entailed indiscriminate felling of trees resulting denudation of forests. In a study by Jasmin and Chakraborty (2007) at Guwahati city says that the city has spread in the process of its growth towards the periphery. It also says that this process of urbanisation along with its increased population has created many problems for the city along with destruction of natural resources, which is posing a threat to the whole environment of the area. The depleted forest wealth would simply deprive the man of economic and environmental values offered by forest, as discussed earlier (Trivedi, et al, 2005).

2.2.4. Industrialisation: Nadkarni wrote India's post independence scenario to be dominated by massive industrialization culminating into huge deforestation leading to many environmental problems. Apart from the industry demand, hydro-electric projects, transmission lines, rehabilitation of people displaced by developmental projects, roads, mining and above all extension of cultivation by people in search of livelihood also made large demand on areas which were rich in forests (Nadkarni, 2001). Population growth, though, is a major factor, but not the only factor of forest degradation. Demand for wood and wood products will continue to increase in line with the growth in population and income. Increase population demands huge food grains

and to produce it huge area of land is needed. It finally leads to encroachment into forests area culminating into forest degradation. Permanent or settled cultivation is more injurious since the farmers don't apply measures for soil and water conservation on encroached land. He further states that the environment degradation is not always due to the pressure of the poor. The deforestation which took place in the nineteenth century and early twentieth century in the form of depletion of timber was mainly due to the pressure to meet the requirement of expanding railway network and wood requirement of urban area.

2.2.5. Poverty and deforestation: Though there is enough food to feed the growing population but the continuing poverty is still a source of pressure on land. This can get reflected in the form of encroachments into forests and other common lands for extending cultivable area and overexploitation of forests and fisheries (Nadkarni, 2001) (Tietenberg, 2004). With poverty more pervasive in forested areas, many people depend in large part on forests for their livelihood. Several studies substantiate that the poverty and unemployment are two of the most important factors leading to forest cover loss across the world (Mukul, 2007; Jodha, 2000; Adhikari, 2002).

Forest cover is decreasing in most of the states of India leading to overall decline of the forest areas of the country. India has the largest number of poor in the world, many of whom depend directly or indirectly on forests for a living. Poverty, as well as large and expanding human and livestock populations, puts unrelenting pressure on the forests of India. The consequence is severe degradation of the country's forest resources (Kumar, 2000).

Different studies reveal that the reasons of such degradation are state specific like management interventions like harvesting of short rotation crops followed by new regeneration/ plantations, forest clearances in some encroached areas, shifting cultivation and biotic pressure, submergence of forest areas in the catchments of the dams, shortening of shifting cultivation cycles and biotic pressure.

Nadkarni (2001) though, blames the poverty and the poor for forest degradation, but, unlike others, also in the view that the poor conserves the environment not by choice, but by chance. It would be interesting to note here, he holds, against the widely held view that the poverty or poor are the main cause of environmental degradation, but the poor people actually protect the environment. The consumption pattern of the poverty ridden people substantiates this argument. If the people of the developing countries reach the standard of living of American and Europeans and adopt their

lifestyles, it is doubtful that if the aggregate consumption of resources and the quality of environment could be sustained at all. In a similar line De and Kulirani (2007) says that due to better accessibility, profit motive and government policy the richer cause much damage to the environment. Giving examples of availability of cheap beef in fast food outlets and shrimp farming Samal (2007) says that in some cases, it is not the poverty but richness that led to forest degradation.

2.2.6. Awareness: Extensive forest areas were lost for different non-forest uses, particularly for agriculture, as is discussed earlier. People by and large and especially in the rural India have been ignorant of the benefits from forests, even though their life styles are intimately linked with the forest (Trivedi, et. al., 2005). Environmental awareness and public pressure have continued to have an impact upon all aspects of the forestry sector. De and Kulirani (2007) is of the opinion that due to limited access to education and awareness, tendency of population growth is higher which put more pressure leading to environmental resource degradation. On the other hand, in some instances, local people are knowledgeable about wildlife, are interested in their sustainable management, and are aware the links between their activities and wildlife conservation. But, the failure on the part of the local forest department officials to solicit local participation in the management of the sanctuary severely impacted the livelihoods of both the locals and wild animals as well (Ala Uddin et al. 2007).

2.2.7. Market linkage: It is also widely discussed a fact that the human and livestock are much greater than they used to be putting enormous pressure on the carrying capacity of the forest and other natural resources. The demand for forest products is also increasing due to a stronger market linkage (Rawat, 2008; Fox, 2007; Kuri, 2007).

NE India has its own specific causes of forest degradation. Generally, in the developing countries, poverty is the main reason for forest degradation which is not the cause in the NE India. Population growth is the main factor responsible for forest degradation in this part of the country. Growth of population is higher than the country not because of the natural rate of growth but due to migration from the neighboring countries. Increase in the population means increase in the density which necessitated more land and other basic necessities. To meet the daily necessities and habitation more land is needed which is the main cause of encroaching the forest land and forest degradation (Hazra, 2008). The main factors for deforestation in Assam were listed as: i) uncontrolled grazing, ii) indiscriminate jhuming, iii) indiscriminate felling of the trees by the settlers for household requirements and iv) unauthorized squatting. (Sinha, 2012).

In discussing the factors of deforestation, Ramakrishnan (2012), concluded that pressures to the external to the region have been primary causative factor for deforestation linked land degradation.

2.3. Conservation of forests and environment: Environmental protection in India was started long back. Kautilya's Artha Sastra enjoined the Kings to protect forests and wildlife, particularly elephants. The cultural values in favour of protection of environment were strong enough to give rise to the institutions of the Sacred Groves and Sacred Space, where exploitation of forest produce including wildlife is severely restricted. Scholars like Madhab Gadgil have contended that there did exist institutionalized patterns of sustainable use of common property land resources like forests at the grass root levels before the British entry into India (Nadkarni, 2001).

Saikia (2011) writes that conservation and wildlife management was a challenge during the colonial period. As the colonial government expanded its agrarian frontier it was obvious that vermin eradication became the official policy in regard to wildlife management. Large scale opening of agricultural land in the 1930s and 1940s had depleted the numbers of wild animals to the worst-ever level. Thus an increasing population and expanding land settlement must inevitably lead to the extinction of the wildlife: such is the process which civilized progress demands. A forest officer from Goalpara found the expanding agrarian frontier to be sole reason for the continued poaching and trespasses into the reserved areas. He further states that the colonial interest in the protection of wildlife is a much later phenomenon. For conservation not only the foresters but also the large flocks of colonial and non-colonial personnel took active interest. In Assam the earliest attempt came in the form of the establishment of game reserve as early as 1905. Since then it was a long journey and there grew a number of wildlife parks, sanctuaries, and so on in the post independence period.

There are a number of policies and acts for conserving the wildlife and wildlife habitat in India for which the different categories of PAs were declared under the Wild Life (Protection) Act, 1972. Protected Areas have long been the most effective and widespread measure for conserving forests and biodiversity. This prompted the protection of large number of forested areas from certain destruction by commercial, industrial or biotic forces (Kotahri, 2001).

Forests are conserved for various purposes. In India 25% of forests are conserved for production purposes. 16% of forests are for protection of soil, 29% are to conserve the biodiversity of the country and the remaining 30% are for multiple purposes. 12 pc

of the world's forests are designated primarily for the conservation of biological diversity (FAO, 2010). Biological diversity encompasses the variety of existing life forms, the ecological roles they perform and the genetic diversity they contain. National parks, game reserves, wilderness areas and other legally established protected areas cover approximately 12 pc of the world's forest area and more than 10 pc of the total forest area in most countries and regions. The primary function of these forests may be conservation of biological diversity, the protection of soil and water resources or the conservation of cultural heritage.

Illukpitiya (2001) took note of the global deforestation in his study. It says that globally, tropical forests are subject to high rates of degradation and deforestation, with current estimates indicating a loss of some 17 million ha, or more than 1% of the total forest area, per year. Protection is one of the methods of assuring the continuation of tropical forests. A fundamental problem for conservation and development programs is the lack of understanding about factors that govern the use of forest resources. Several studies have shown the diversity of resource use patterns across households living in forest margins.

The conservation of natural resources including forests in North East India has a different approach. As is well known that in this part of the country the natural resources including forests belong to different entity. Apart from the government forest department owning the forests, the community and in some cases private individuals also own the forests. It is interesting to note here that the forest resources under the hands of community and private individuals are in a much better shape than most of the government owned forests. The traditional knowledge of the indigenous people acts positively for conservation of forest resources. It is because of the fact that in this region forests, biodiversity and other natural resources become the foundation of peoples' sustenance. That explains why traditionally the communities that depend on them have protected them (Fenrnandez, 2012). There are a number of success stories of forest conservation among different tribes of the North East region. Sarma and Das (2009) in a study show some of such success stories where the Rabha, Bodo, Garo and Banai communities in Goalpara district have their traditional practices of community forestry. Such forest areas are protected and managed by the community under the leadership of Village Forest Committee (VFC). It is interesting to note that this VFC is basically formed by the villagers for the management of their forest. The Villagers have defined stake on such forest for collection of fuel wood, fodder, timbers etc. which can be collected under the defined norms set by the VFC. The practice of imposition of fine for violation of such norms and rules are prevalent everywhere. These groups of tribal

communities also consider such forests as buffer and boundary which helps protecting their cultural and ethnic identity by defending their habitation from the penetration of other non-tribal communities. Perhaps due to a number of positive aspects of community forestry Kothari (2002) was of the opinion that without interference, self initiated process of forest regeneration and protection by communities are to be recognised and facilitated.

2.4. Sustainable management of forest resources: It has been observed from the above discussion that the local or fringe communities of a wilderness area are dependent on that resources in a myriad of ways. The characteristics and degree of dependencies, indeed, is site specific. This dependency has significant bearings on the available forest and other natural resources on the earth. High food and fuel prices, which are the result of increasing population and their ever increasing demand, will favour continued forest clearance for production of agricultural crops and livestock for food, feed and bio-fuel to meet the global demand. At this juncture how the remaining and the scarce resources are to be managed sustainably is a million dollar question. Many governments or individual officers are realizing that the survival needs of communities must be allowed to be met from PAs or acceptable alternatives must be provided in place. This realization motivated Mr A. K. Banerjee, a government forest official, to carry out the Arabari experiment of West Bengal in the 1970 which culminated into a new management structure for the forest resources in the form of Joint Forest Management (JFM). Notwithstanding, many officials are sharply critical of traditional resource uses of villagers, and do not understand the cultural significance of the event. On the other hand, villagers universally label the forest department as corrupt and inefficient, and are not fully conversant of the pressure under which the department staff has to work. This happens so because the protected areas have maximum restrictions on the use of forests by local people. When the people live in an isolated and self-contained economy, there was no problem. When, however, outside markets forces penetrated these economies and started hiring the forest dwellers as agents for poaching and smuggling, human habitation began to be seen as a nuisance. Even if one or two of the forest dwellers are so used for illegal purposes, the entire groups come under suspicion. Zealous foresters tried to relocate the forest dwellers on the fringes of natural parks, which deprived even the innocent forest dwellers of their rights to traditional sources of livelihood. Concern for conservation here conflicted with local interests of the poor people aggravating their poverty resulting into intolerance and conflicts. This intolerance between the department and the fringe people has its own history and the present form of prejudice is the legacy of this history.

Nadkarni (2001) wrote extensively on how the forest dwellers were in tussle with the department for years and how it culminated into forest degradation and different policy as such. He wrote that the British government went about systematically to establish control over forests and isolate local people from forest and their control over forests as far as possible. The forest department was formally created in 1864 with Dietrich Brandish, a German, as the first IG of forests. The Government Forest Act of 1865 empowered the government to declare any forest as government property. The forest legislation was made more comprehensive and stringent through the Indian Forest Act of 1878, classifying the forests into Reserved, Protected and Village forests. The government held absolute right of ownership in the Reserve Forests. Protected forests were those which were yet to be surveyed, but the local people's access and privilege were permitted for the time being. It was in case of village forests that the rights of locals were conceded in respect of grazing. Though the local people had full access to village forests and limited access to protected forests, the area under both was very limited. The bulk of forests area was placed under the reserved category. This meant extreme pressure on village forests and alienation of local people from forests. The alienation of the locals led to serious discontent and protests movements as it adversely affected the local economy. They did not have any responsibility in the management of forests, especially the reserve forests. To compensate for the loss of rich forests, the government began to transfer huge areas from revenue department to the forest department. This did not necessarily increase the actual forest, but led to deprivation of locals of their grazing areas and pastures.

This deprivation and alienation are still the factors behind the outbreak of conflict or tension between the fringe community and the department. Nevertheless, it is now well understood a fact that without the cooperation of the fringe community the sustainable management of the forest resource is a distant dream. Eventually, there needs to be a gradual shift towards participatory management institutions, which involves the Forest Department and local communities as equal partners in decision making and implementations.

As such, the interaction between forest and forest dwelling communities received increasing attention from social scientists and policy makers due to its significance from the view point of community welfare and sustainable forest management (Shylajan and Mythili, 2003). Even this has been conceded by the government policy document also. Assam Forest Policy, 2004 says forest conservation programmes shall remain a myth without active support and co-operation of the people. It is therefore, essential to inculcate in the people an awareness of the value of

the trees, forests and wild life and their contribution towards not only a healthy environment but also towards their poverty alleviation (Assam Forest Policy, 2004).

Kothari (2001) says a centralized bureaucracy-dominated approach to conservation is doomed to failure in the new circumstances that India finds itself in. firstly, new macro-economic policies responding to the globalization process that is sweeping the world are essentially in contradiction to conservation and sustainable use of natural resources. The same government which declares a PA is now willing to sacrifice it at the altar of 'development' and 'economic growth'. Moreover, the local communities everywhere are no longer willing to take things as lying down they want and rightly so, a voice in making the decisions that affect their lives.

Consequently, the concept of participatory management of forest has been gaining popularity in the last part of twentieth century. The State of the World's Forest 2009, says in the same spirit that as income rise the demand for forest environmental services will rise along with the demand for conservation involving the local communities (FAO, 2009). The essentials of participatory management are that the fringe or local community would not be ignored in decision making along with their essential needs that have been fulfilled from the nearby forest area.

Therefore, Gunatilake categorically said economic needs of a rural community in a developing country would make it difficult to set aside a forest without allowing its resources to be used (Gunatilake, 1993).

Managing these forests is no easy task. An ecological understanding of the area especially the impacts of various human activities on elements of local biodiversity and on the ecosystem as a whole is also weak in most areas especially amongst the managers of PAs. Indeed vast majority of management decisions, including those to curb human use, have been done on the basis of assumptions and generalizations, not solid research or evidence from site specific circumstances. That is perhaps why, research (especially long term) has often shown these decisions to be mistakes and to have caused unintended negative consequence (Kothari, 2001). The manager must decide not only how to maximize yields on a given amount of land, but also when to harvest and replant. A delicate balance must be established among the various possible uses of forests (Tietenberg, 2004). For designing an incentive based mechanism for the conservation of forest which benefits the forest depending community, it is crucial to know the benefits that accrue to the society from the extraction of NWFPs. Forest

conservation offers a variety of benefits such as direct use values, indirect use values, option values and existence or non-use values (Krutilla, 1967).

Provision of environmental services will remain the main justification for forestry, especially for arresting land degradation and desertification, protecting watersheds and improving the urban environment. Institution building, particularly at the local level, is needed in order to facilitate an integrated approach to resource management (FAO, 2009).

It is observed that as far as forest management is concerned there is complete lack of coordination and cooperation among the line agencies. Kothari (2001), therefore, says that the crucial need is for institutional structures which could ensure regular coordination within and amongst the various governmental departments which have a bearing on the habitats or species sought to be conserved. In all the PAs and other areas studied so far, we found a sever lack of interaction and joint planning between the Forest department on the one hand and other government agencies on the other. In this juncture, there is a crucial role to be played by the outside agencies. NGOs and other voluntary institutions have been instrumental in mediating between villagers and wildlife officials, gathering data, helping local communities to organize for their rights and keeping a watchdog eye on local activities. Independent experts have also helped to make scientific assessments, though, as mentioned above, the research done till now is far from adequate.

CHAPTER III

DATA SOURCE AND METHODOLOGY

DATA SOURCE AND METHODOLOGY

The study was based on both the primary and the secondary sources of data.

Secondary data collection: Secondary data for the study were collected from various sources like books, journals, survey reports of various governmental and non-governmental organizations, census reports, statistical handbooks, management plan of the sanctuaries, relevant web sites, etc.

Primary data collection: Secondary data were not sufficient therefore primary data were collected through PRA exercise for a proper analysis of the situation. The primary data were collected in the following manner:

Phase	Strategy	Target
Phase – I	Reconnaissance visit to the study area	to get a bird's eye view of the area along with basic information
Phase – II	Selection of key informants	To gather information about the NTFPs collected and extracted from the forests.
Phase – III	PRA	To collect information about the collection and marketing of NTFPs.

All the forest villages were taken into consideration for assessing various kind of dependency of the villagers on the WLSs, but, the villages were prioritised on the basis of the degree of pressures they put. Population pressure, close vicinity to the forest, socio-economic condition of the people (literacy rate, women literate), etc. were the parameters for selection of the villages. This was done in consultation with the key informants.

The primary data were collected through household survey. For the purpose systematically designed structured question schedule was used along with the audio-visual aids and field notes and micro observation of the study area. The questionnaire was prepared covering various ecological, social and economic parameters. Enough care was taken to interview different people of all age groups to collect more reliable information. The Participatory Rural Appraisal (PRA) techniques like, key informants, focused group discussion, seasonality analysis, etc. were applied for extraction of primary data.

In practice collecting sound and accurate data on forest use from the interview turned out to be difficult. Interviewees were often reserved and hesitated to answer detailed questions, as they were generally aware of the regulations of the government/ forest

department. Those who invaded and cleared forests or collected forest products risked severe punishment. Hence, in this situation, additional information were collected by direct observation in the village, forest boundary and in major markets located around the sanctuaries. For collection of such data photographic evidences were of great help. Moreover, informal conversation with villagers helped a lot.

Study area:

There are seven Tangya and one forest village in the Laokhowa WLS. The study was limited to cover only five TVs out of the seven. The profiles of the villages are placed in the table given below:

Villages studied

Name of the village	Year of establishment	Location	Relative location	Total household	Total population	Total area of the village
Laokhowa TV	1951	92°47'12"N and 26°31'51' E	North eastern part of the PA	48	209	449
Sutirpar TV	1953	92°38'19" N and 26°30'93' E	Western most part of the sanctuary	61	429	619
Sunsahar TV	1953	92°44'22"N and 26°29'35' E	Southern part of 14 mile camp	31	144	539
Nalkata TV	1953	92°45'31"N and 26°29'44' E	Southern part of 14 mile camp	20	120	325
Barunguri TV	1959	92°47'31"N and 26°30'41' E	Eastern part of the PA	19	130	298

SELECTION OF SITE/ STUDY AREA

The taungya villages of Laokhowa Wild Life Sanctuary (WLS) have a huge population pressure and low standard of living; most of the people live below poverty line. The livelihood

activities for most of the families are directly related with the forest resources. Moreover, livelihood requirements like fuel wood, fodder, use of various NTFPs etc. are extracted from the protected area.

The conservation of forest land for non-forestry use is also one of the biggest problems prevailing in the study area. Beside this, the people living in Taungya village use the sanctuary land for agriculture, fisheries etc. apart from using for settlement purpose. Thus, it also creates pressure on the WLS.

The study area has a completely degraded landscape, with encroachment as a major threat followed by extraction of resources etc. Thus, it is a suitable area for conducting the study for the mention topic.

SELECTION OF TANGYA VILLAGE

The study was conducted in 5 taungya village of Laokhowa WLS. The condition for selection of village was based on:

- 1) **Size/Population of village:** Before selecting the tangya village for study we kept in mind the population size of the village, so that the impact on forest can be identified keeping in view the population or the size of village. E.g. the Sutirpar tangya village has the highest population whereas the Nalkata and Barunguri tangya villages have the lowest number of population and household.
- 2) **Community based:** Based on community tribes, etc we have selected the village. In this study out of 4 tangya village 2 are Bodo and remaining 2 are Tiwa dominated village.
- 3) **Spatial equilibrium:** Villages were chosen in such a manner so as to cover the whole WLS area.

SELECTION OF SAMPLE

- 1) Random sampling method was used in selecting the sample size for collecting data.
- 2) The survey was done in two categories:
 - a) **Community level survey:** In community level survey the respondent were Gaon burah, EDC president, Children, Adult, Youth and Women of the village. The data collected represent the view of the community as a whole.

- b) **Household level survey:** In household level survey 10% household were randomly selected out of total household for survey and the household members were interviewed on their socio economic condition, their dependency on forest etc.

Method for selecting 10% household

- a) The household with various population sizes were taken into account.
b) The household with different infrastructure facilities were selected. E.g.: The houses made up of thatch, mud and the houses made up of bricks, cement etc.

Significance of the study:

The study will be helpful in knowing the interrelationship between socio-economic condition of the people and the deforestation. If the relationships between the two components are positive it indicates that, the poor socio economic condition leads to more dependency of people on forest for surviving which results in deforestation. Thus, the study will help the forest department and the ministries to put forward some policy for the improvement of socio-economic condition of the people living in the fringe and the forest village so that the condition of these people can be improved which will put less pressure on the resources. Apart from this the awareness camping will also be helpful in this regards.

Example: Education department will setup school, college for providing education to the children, it will help in creating awareness and building the manpower or developing skill of the future generation who depend less on the forest resources for their survival. Presently, the government has made this type of attempt by introducing Sarvsiksha Abhiyan etc.

This study is helpful in grasping the attention of other, in point that, the socio- economic condition is also one of the major causes of deforestation. Moreover, it will also be helpful in spreading the knowledge about the condition of forest village people and their impact on the Laokhowa Wildlife Sanctuary.

It will also help the forest department in making some policy or rule in collection of the resources by poor people & implementing ban on the collection by the richest one.

Limitation of the study:

The investigator of this project was very keen to do a proper and fruitful study and also very sanguine about its outcome. But, both tangible and intangible factors operated upon and made the investigator himself very suspicious about its outcome. Some limitations can be cited as below:

- Time Factor: The investigator's work was limited by the time factor. The college assignment and classes made the investigator slow in going to the field. The monsoon period also stood as hurdle in going to the field.
- Selection of the villages: Due to the time factor many households having good production and productivity could not be covered. In that sense the sample size may be small to have any generalized inference.

CHAPTER IV

Household characteristics and Forest Resource Dependency

HOUSEHOLD CHARACTERISTICS AND FOREST RESOURCE DEPENDENCY

In the Laokhowa Wildlife Sanctuary the Taungya villages were established by the British in the middle of the twentieth century. People were brought to settle here mainly to work as a laborer in the reserved forest and they were engaged in plantation activities. But with the passage of time people got divided and settled in different places and the name of the villages were given accordingly.

Laokhowa WLS has seven taungya villages and one forest village. Laokhowa, Sunsahar, Nolkata, Barunguri, Kaliadinga, Lalung Gaon, Haldia Suti are the taungya villages and Salpara is the forest village. For the present study five taungya villages were taken. The following table shows different time frame and about the Locational description of the village.

Name of Taungya Village	Year of Establishment	Longitude	Latitude	Relative Location	Total land area of the village		
					B	K	L*
Haldiyasuti	1953	92°38'19" N	26°30'93"E	Western most part of Laokhowa Wildlife Sanctuary(LWLS)	619	3	18
Nalkata	1953	92°45'31"N	26°29'44"E	Southern part of 14 mile camp	325	2	2
Sunsahar	1953	92°44'22"N	26°29'35"E	Southern part of 14 mile camp	539	0	15
Boronguri	1959	92°47'31"N	26°30'41"E	Eastern part of L wls, share its boundary with Borunguri APC camp.	298	1	1
Loakhowa	1951	92°47'12"N	26°31'51"E	North eastern part of L wls	449	3	18

Source: Records of Gorajan Range Office (Laokhowa)

*B- Bigha, K- Katha, L- Lussa.

The above table shows the absolute and relative location of the village studied, with their latitude and longitudinal value. The Haldiyasuti village is situated in extreme western part of Laokhowa wildlife sanctuary, where as the Nalkata & Sunsahar village in southern part of 14-mile camp, similarly, Laokhowa and Borunguri Village in Northeastern part and Eastern part of Sanctuary respectively. Beside this, the table also shows the year of establishment. But according to villagers of Nalkata and Sunsahar it said that they are the oldest resident of laokhowa Sanctuary. Haldiyasuti village is the largest village among all the villages studied having an area of 619 followed by Sunsahar having an area of 539 bighas.

Necessary village information

Name of Taungya Village	Development Block	Panchayat	Revenue Circle	Sub beat office	Gaon Burah(Village head)	EDC president
Haldiyasuti	Haldiyasuti	Haldiyasuti	Juria	Sutirpar	Sadhan Mahila
Nalkata	Laokhowa	Salpara	Kaliyabor	Singimari	Kaluram Doimari	Pulakanta Balari
Sunsahar	Laokhowa	Salpara	Kaliyabor	Singimari	Kaluram Doimari	Pulakanta Balari
Borunguri	Laokhowa	Borunguri	Kaliyabor	Singimari	Khargeswar Dolmari
Loakhowa	Laokhowa	Loakhowa	Kaliyabor	Laokhowa	Indra Kauwar	Banjit lalung

**Source: Interview of Gaon Burah & Forest Ranger

Different information have been shown in the table above like the Development Block, Panchayat, Sub Beat office, in which the respective village fall. Beside this, the table also provides the information regarding the Gaon Burah and EDC president. In Haldiyasuti village and Borunguri village yet the EDC had not been formed.

The following table shows the composition of the population community wise. Haldiya suti village is inhabited by both the Tiwa and Bodo community. Likewise, Nalkata Sunsahar and Barunguri are Bodo community village whereas the Laokhowa is a Tiwa village.

Name of Taungya Village	Tribes
Haldiyasuti	Tiwa and Bodo
Nalkata	Bodo
Sunsahar	Bodo
Borunguri	Bodo
Loakhowa	Tiwa

1. Haldiyasuti village: Halidiyasuti village has three division which form a village in itself. The three villages were namely, Bichghoriya, Dosghoriya, Panchghoriya. Among this 3 small clusters Bichghoriya is the only village with the Bodo community population and the rest two are dominated by the Tiwa population. It is said by the people that, according to the number of household the village were given name. These entire three villages jointly forms Taungya village called Haldiyasuti.

2. Sunsahar village: It was established in the year 1919. But, officially it was established in the year 1953.

The Sunsahar village is located in the southern part of 14 miles APC camp, in the west Nalkata village is located where as in the north is embankment and 14 miles APC camp towards east Sonaikhusi APC camp is present whereas, at the south agricultural field.

The Sunsahar village falls under the Laokhowa development Block and Panchayat. Kaluram Doimari is the village head man and the EDC president is Phulakanta Balari. The EDC was formed in the year 2004. The village falls under the jurisdiction of the Singimari sub beat office.

Sunsahar village comprises of Bodo community and they speak both the Bodo and Assamese language.

3. Nalkata village was established in the year 1953 with 92 number of household by the forest officials. It is situated in the southern part of Nalkata APC camp. Towards east Sunsahar village is located at south the agricultural field is located and at the north APC camp along with embankment.

Nalkata village falls under the Laokhowa development block and Salpara panchayat and Singimari sub beat office. The name of village head man is Kaluram Doimari and that of EDC president is Pulakanta Balari

Nalkata village comprises of Bodo community people. They mostly speak Bodo and Assamese language.

4. Borunguri village is situated in the eastern side of Laokhowa wildlife sanctuary. Towards east Borunguri APC camp is located and at the south there is agricultural field. Towards north is the Laokhowa Wildlife sanctuary.

The people of this village were originally from the Bhurbandha, who due to the problem of flood migrated to Kaliadinga but as they had to face the allegation from the Muslim community people about the illegal timber felling etc. they had been shifted to new place and settled there in 1959 with 12 number of households and the name of this village became Borunguri Taungya village.

Boronguri village falls under the Laokhowa development block and Borunguri panchayat. Borunguri village is under Koliabor revenue circle and the Singimari sub beat office.

Khargeswar Bordoloi is the village head man. EDC president is yet to be appointed.

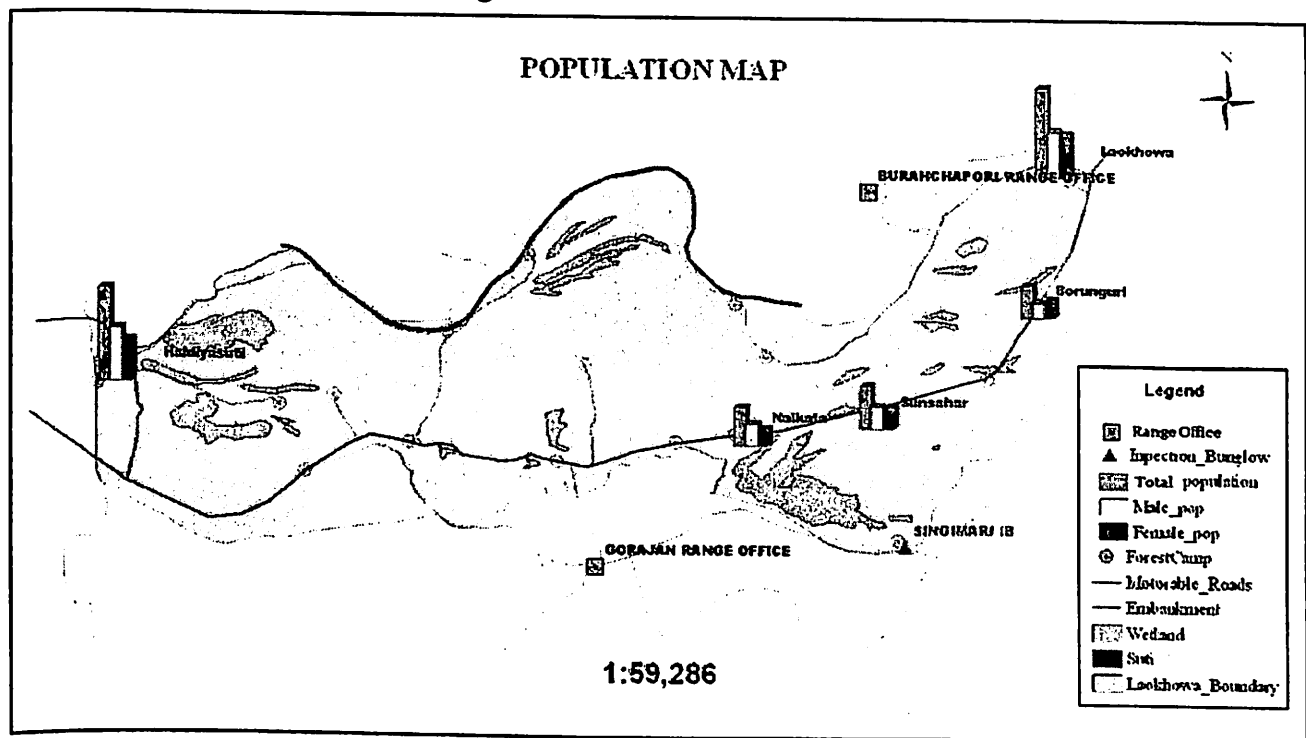
Boronguri village comprises of Bodo community people who mostly speak Bodo and Assamese language

- Laokhowa village: Laokhowa is the traditional Tiwa village which is situated in the extreme north eastern side of sanctuary. Laokhowa village was established in the year 1951 with 268 number of household.

Laokhowa village falls under the Laokhowa development block and panchayat. It is under Koliabor revenue circle and Laokhowa sub beat office. The village headman is Indra Kuwar and Banjit Lalung is the EDC president. The EDC was formed in the year 2004.

Laokhowa village comprises of Tiwa population who mostly speak Tiwa and Assamese language.

Population of the studied villages:

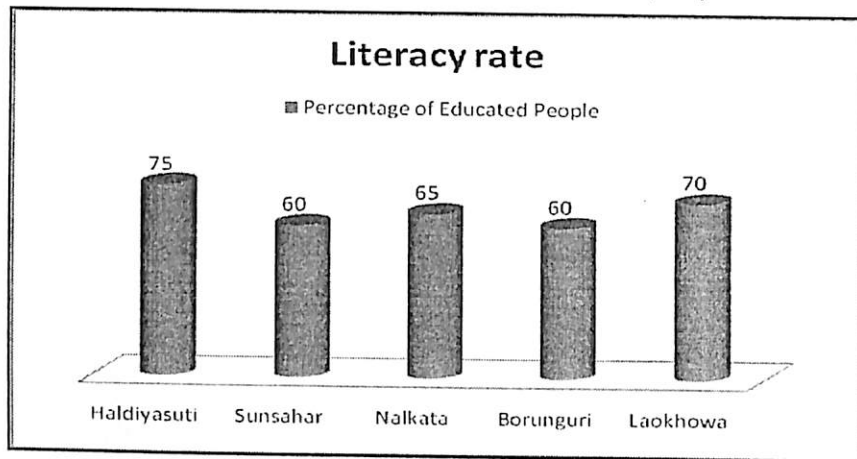


The above map represents the population pattern of the studied village. It is clearly seen from the map that the population of Laokhowa village is highest and the Boronguri village has the lowest population. And if we see the male female ratio, the Boronguri village has the highest male female ratio, followed by Sunshar, Nalkata, Laokhowa and Haldiyasuti village. Haldiyasuti village has the lowest sex ratio. It may be due to the cultural aspect as Boronguri and Sunshar are dominated by bodo population group who give more importance to girl child.

Education:

Education is also one of the important factors for conservation aspects. It is assumed that the educated people are more aware regarding the conservation of natural resources.

Fig: Showing the Percentage of literate people

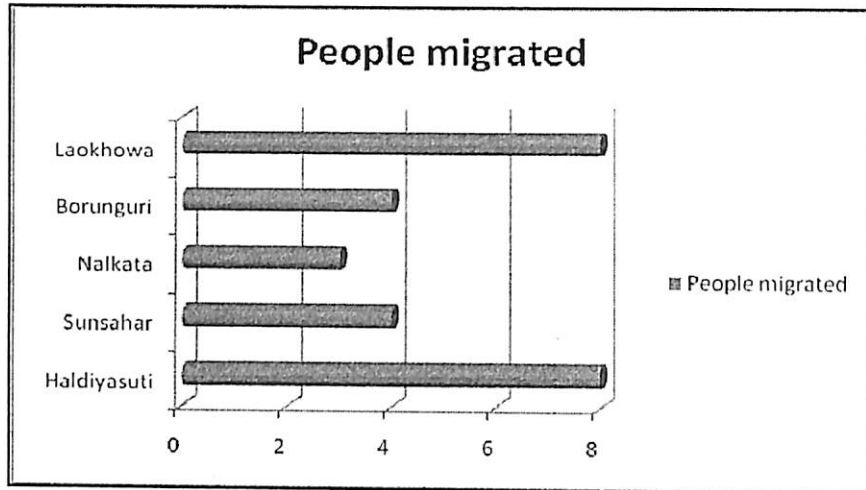


Source: primary information collected from the villagers.

It's apparent from the above figure that Haldiyasuti village has the highest literacy rate followed by Laokhowa, Nalkata & Sunsahar. 75% of the total populations are literate in Haldiyasuti. Thus, it can be said that, the people of Haldiyasuti are more educated and hence indicate that they are more aware in aspect of conservation.

Migration:

Migrations are both intra-state and inter-state. People do migrate in search of jobs to places like, Shillong, Nagaon town, Tinsukia, Guwahati, Kerala, Mumbai, etc. Of course, they do visit the village at least once in two years.



More people of Haldiyausti and the Laokhowa taungya village migrate from the village to get engaged as labourers, driver, security guards, etc. Population pressures, low land man ratio, less employment opportunity, are some of the main causes of their migration.

Incidence of poverty:

Village Name	Number of family	Number of BPL households
Haldiyausti	56	61
Sunsahar	28	31
Nalkata	17	20
Boronguri	14	18
Laokhowa	40	45

The table shows the poverty status as being perceived by the villagers. According to them most of the people of the village is living below poverty line and they are not properly benefited from the government schemes. Incidence of poverty is the highest in Haldiyausti village, which is 91% followed by Sunsahar, Laokhowa, Nalkata and Barunguri which is 90%, 88%, 85% and 77% respectively.

BPL Scheme:

The people living below poverty line are getting benefit of the following schemes:

- a) **Anapurna Schemes:** Under this schemes the people get the basic items at a lower price like:

Name of items	Quantity provided	Rupees (per kg/l)
Rice	30 kg	7
Kerosene	2.5 l	12
Sugar	3 kg	16

b) IAY: Under this scheme the people living BPL got houses.

But according to the people they are not satisfied with the schemes, they pointed out some fault which are as follows:

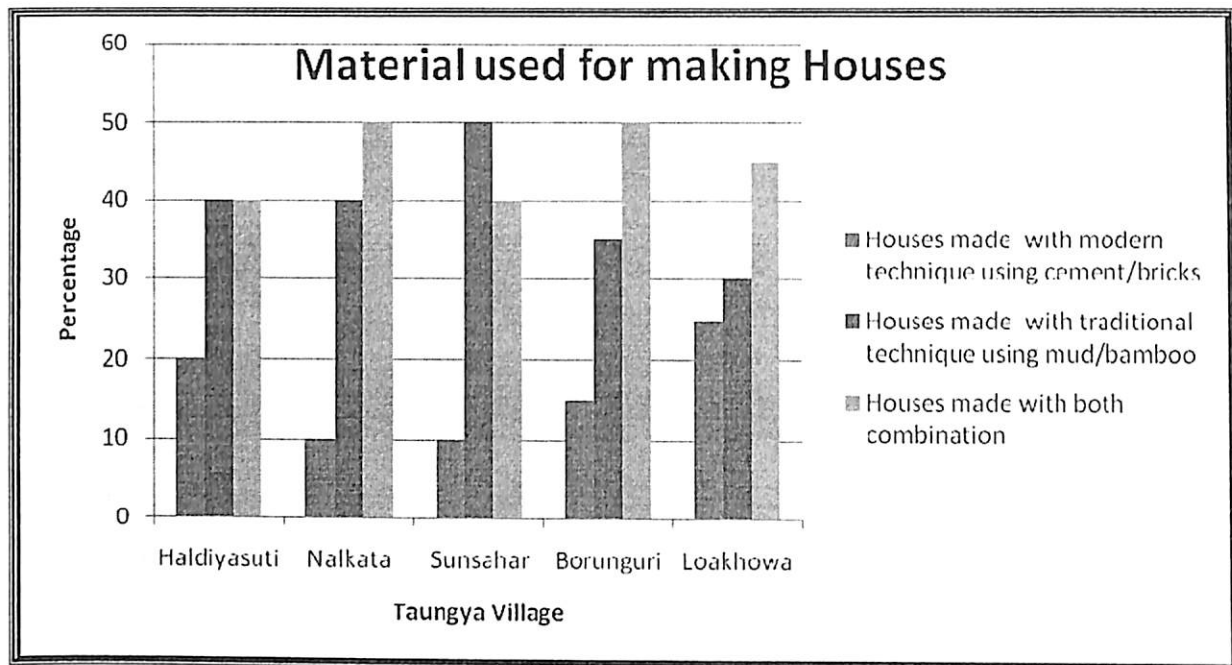
- 1) Total quantities are not allotted to people as written on card.
- 2) Black marketing: people are of the opinion that, the products are selling in black market to the richer section, due to which they don't get the actual benefit.

Housing Pattern/Structure:

The entire villages are having similar kind of housing pattern/ structure, with separate kitchen, granary house, cattle shed etc. the only differences lies in position of this houses. Usually the front parts of houses are left for gardening. The cattle shed and granary is constructed in the front side of the houses and the backside is left for plantation, where as the middle part is utilized for making bed rooms and kitchen. The plantation area is used for planting trees, which is utilized as fuel woods, vegetables etc.

These houses are made up with material like cement, bricks, mud, thatch, bamboo, tin, GI sheet etc. The villages have been categorised in three parts depending upon the uses of materials as:

- 1) Houses made up with the uses of cement and bricks
- 2) Houses made up with the uses of mud, bamboo etc
- 3) Houses made up with the combination of both the materials.



****Source: Community Survey of Village**

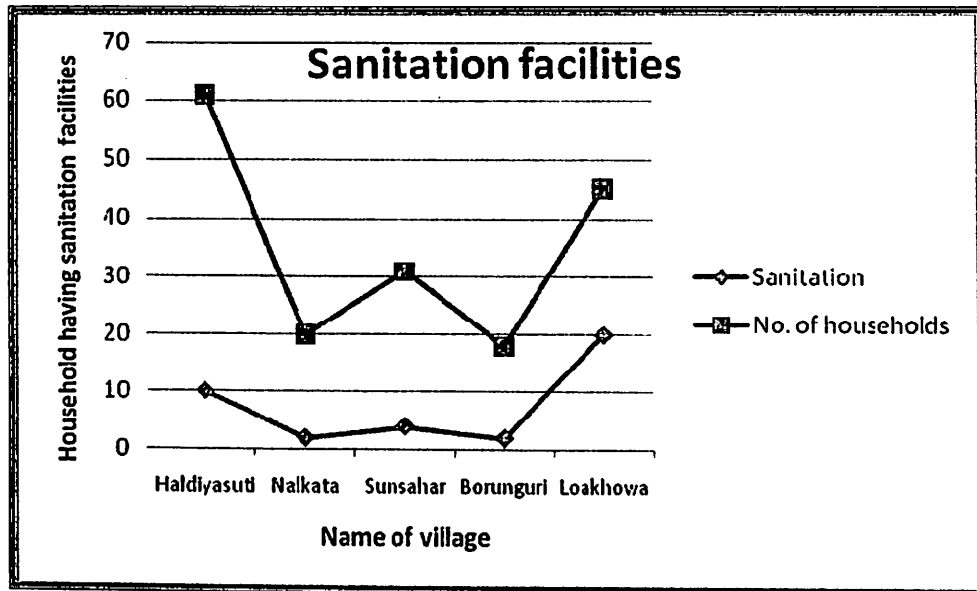
From the above graph it is clear that the, Laokhowa Taungya village is in better condition where most of the houses are made with the use of modern materials followed by Haldiyasuti Taungya village. The village of Nalkata and Sunshar Taungya village still use the traditional materials like, mud, bamboo etc. for making houses. Thus, it is clear from this that, the people of Nalkata and Sunshar depend more on the forest for extracting thatch, bamboo, timber etc. for building houses or for repairing of houses every year. Thus, there extraction is more as compare with other villages and so their pressure is more on wildlife sanctuary.

Apart from this, the figure also describes the poor socio economic condition of the people of Nalkata and Sunshar village. As, they are poor they could not afford modern materials or do not want to spend money on purchasing such material thus, for them it is much easier to collect the material from the forest for repairing or making their houses. Moreover, as Sunshar and Nalkata is the village where there is water logging or flood problem thus, due to this also the people are not interested in building their houses by using modern technique.

Drinking water and Sanitation:

The main source of drinking water in every village is tube well. Each and every household are having tube well and in some cases 2, 3 household are using one tube well. In Sunshar and Nalkata village they don't have the habit of filtering water, they use to directly drink water from the tube well thought it is said that there are more iron content in the water. Besides this, the village of Nalkata and Sunshar are mostly affected by the flood and throughout the month, they have to drink water from the tube well, which is mostly affected by the flood. Due to

which they suffer from many diseases. However, the filtering habit is there in Laokhowa and Haldiyasuti village. Apart from tube well, well is also an important source of drinking water for some household.



****Source: Data collected during survey (based on community survey)**

It's depicted from the above graph that there is a poor sanitation facilities prevailing in the village. Only few household had the sanitation facilities which had been provided through the government schemes. Among all the villages, Loakhova Taungya village had improved sanitation facilities. Thus, for other household there is need for the generation of such schemes otherwise it would hamper the health condition of the people especially women.

Various services	Distance from the village (meters)					People opinion about services their satisfaction				
	Haldiyasuti	Sunshar	Nalkata	Borunguri	Laokhowa	Haldiyasuti	Sunshar	Nalkata	Borunguri	Laokhowa
Health (modern facilities)	300	4000	4000	In village	150	No medicine doctor facilities **Condition is same	Walk a distance **Condition is deteriorate	Not treat well **Condition is deteriorate	Needed some medicine **Improved condition	Good condition **Improved condition
P. School	300	200	500	200	100	Less no. of teacher **Improved	Less no. of teacher teacher	No proper time to management	Good	Good
H. School	300	3000	3000	1000	200	**Improved			**Improved	**Improved
LFD	100	300	400	100	100	Improved	Improved due to patrolling	Improved	Same	Same
Forest	200	600	700	800	800	same	Deteriorate	Deteriorate	Deteriorate	Deteriorate
FPS	200				200	Not get the commodity	Deteriorate	Sell the commodity in black	Not get the allotted amount of product	Deteriorate

Infrastructural facilities

*P. school- Primary school, H. school- High school, LFD- Local forest department, FPS- Fair price shop

**compare the development of services during the last five year (Improve/deteriorate/ same)

Source- The information collected from individual through interview.

The above table describes the condition of various services which the villages have, and also their distance from the village as well as the opinion of the people about these services and also what people think about the development of these services during last five years. From the above we can find that the village of Haldiyasuti is not far from these institutions, it means they need not have to travel a long distance for availing such facilities. Whereas, the people of sunsahar, Nalkata, have to travel long for such purposes. Especially in case of health sector the people of Sunshahar and Nalkata have to travel about 4 kms which create problem for them and thus, they have to depend on the traditional healer for their treatment. Beside this, the people also opine that the services provided by these institutions are insufficient and need to be improved especially in case of health, primary school, fair price shop. In case of health sector both the Doctors and medicines are rarely available there. Similarly, student-teacher ratio in the school is also very high. Fair price shop is also not working properly.

About the forest department they have said that the condition has improved over the last couple of years infrastructure seems to be increased along with the patrolling by the staff, though forest cover has not been increased. Only the Haldiyasuti village has comparatively a good forest cover beside their village.

Transport and communication

The transport and communication system in Sunshahar and Nalkata village is very rudimentary. The people have to walk miles to reach hospital, schools, etc. during the flood seasons. Boat is the main transport system during flood for the villagers. According to villagers, lots of problems are faced by the children while going to school; similarly the problems are also faced by the women and other for going to hospital. There were cases where the pregnant woman needs to walk 4 km distance to reach hospital for her delivery case.

Whereas, the Borunguri, Haldiyasuti and Laokhowa villages are well connected with Kaccha road, which is motorable even in flood season. And these roads are well connected with the pukka road also. Push cart, cycle, motor cycle are the means of transportation whereas, mobile and post office for the communication.

Energy use

Name of village	Source of Energy	Uses	Average weekly need (Kg/l)	Market price
Haldiyasuti	Fuel wood	Cooking, Heating	15	15/- per kg
	Kerosene	Lighting	3	35/- in retail 15/- in FPS (Per liter) *electricity was operational in year 1985
	Electricity	Lighting, cooling	---	150
	LPG	Cooking	1 cylinder	350
Sunsahar	Fuel wood	Cooking, Heating	25	
	Kerosene	Lighting	5	
	LPG	Cooking	1 cylinder	
Nalkata	Fuel wood	Cooking, Heating	20	
	Kerosene	Lighting	5	
Borunguri	Fuel wood	Cooking, Heating	20	
	Kerosene	Lighting	8	
	LPG	Cooking	1 cylinder	
Laokhowa	Fuel wood	Cooking, Heating	30	
	Kerosene	Lighting	3	
	Electricity	Lighting, cooling	---	200
	LPG	Cooking	1 cylinder	

Fuelwood is the most important source of energy for the people. They use fuelwood for cooking purpose, and the LPG is available to 1 to 2 household, in Haldiyasuti, Borunguri, Laokhowa & Sunsahar village. There is no electricity in Sunsahar, Nalkata & Borunguri village. Kerosene are used for lighting purposes, which is bought by them mainly through local market at rupees 35 in retail & at rupees 15 at fair price shop. The fuelwood are basically collected from forest and from their home gardens. Some of them also use to buy it from market.

The above table shows us, the source of energy use for various purposes by the villagers. Along with it the table also shows the, average quantity of sources used by the village, which is calculated with ratio of total quantity required by household and total number of household.

The table shows that the peoples' dependency on fuelwood is more, and it is mainly used for cooking and heating purposes. The average requirement of fuelwood is more in Laokhowa, which use 30 kgs of fuelwood in a week, followed by Sunsahar. But as most of the people of

taungya village live below poverty level therefore, they are not in a position to buy it from market. Moreover, their home garden is not so big which will provide such a huge amount. So, it is obvious that they depend on forest for fuelwood.

Correlation analysis

Correlations					
		Household_ol d_records	Area_villag e_oldrecor ds	Household_ne w_records	Area_villag e_newreco rds
Household old_records	Pearson Correlation	1	.860	.792	.741
	Sig. (2-tailed)		.140	.208	.259
	N	4	4	4	4
Area_village_ol d_records	Pearson Correlation	.860	1	.972*	.921
	Sig. (2-tailed)	.140		.028	.079
	N	4	4	4	4
Household new_records	Pearson Correlation	.792	.972*	1	.986*
	Sig. (2-tailed)	.208	.028		.014
	N	4	4	4	4
Area village_newreco rds	Pearson Correlation	.741	.921	.986*	1
	Sig. (2-tailed)	.259	.079	.014	
	N	4	4	4	4

*. Correlation is significant at the 0.05 level (2-tailed).

The above table shows the correlation between the number of household and the area of village. It is clear from the above table that, there is a perfect positive correlation between the number of households and the area of the village. Thus, it can be said that with the increase in the households the area of village has also been increased. And if the household number is continue to increase in future it may lead to more pressure on land and hence, may lead to encroachment.

Occupational structure:

Most of the villagers depends on the forest for their livelihood the villagers are agriculturalist by the occupation and some of them are engaged in other non- farm activities. The livelihood pattern or the occupational structure of the village can be classified into two groups:

- 1) Farm employment
- 2) Nonfarm employment

Farm employment

a) Agriculture:

Every household of studied villages is engaged in the agricultural activities. Around 90% of populations in each village are engaged in agricultural activity. Agriculture acts as a primary occupation for the people. The people of Haldiyasuti, Sunsa har, Nalkata practices agriculture seasonally, because of water logging problem where as the people of Barunguri, Laokhowa village practices twice in a year. Thus, due to water logging, and change in soil and other physical component, the village differ in structure of cropping pattern & variety of crops from one another and hence, the productivity of the crops.

Cropping pattern

Name of the village	Name of the crops	Crops variety	Productivity (per Bigha)	Consumption Sale/ own	Average Sale (Last year) per household	Sale price of last year (per quintal)	Market	Mode of transportation
Haldiyasuti	Rice	Boro, HYV, 8, 14, 9 No.	30-40 mound	Both(10 % people don't sell)	20-25 mound	800	Sutirpar, juriya, Nagaon	Push cart, horse cart, Auto
	Jute		7-10 mound	sell	25-30 mound	800	Nagaon	Do
	Mustard seed		2 mound	sell	14 mound	800	Do	Do
Sunsa har	Rice	Ijon, Bora, Juha, Badal nail, Manu har, Tangrai, Katihali, Uli bao, Khukua, bao, 8, 9, 14 Nos	10-12 mound	Both (30%)	25-30 mound	800	Laokhowa, Sutirpar, Nagaon	Push cart is used to transfer the material from village then Tata mobile, auto are used to send the products to market
Nalkata	Rice	Same as above	10-15	Both (40%)	25-30 mound	800	Same as above	Same as above

Borun guri	Rice	Bao, Aahu, Boro	20-25	Both (35%)	10-15 mound	800	Laokhowa , Own village, Nagaon	Tata mobile, Auto, Push cart
	Jute		8-10 mound	sell	30-35 mound	1000	Do	Do
Laowk howa	Rice	Bao Aahu Boro	7-8 mound	Both (60%)	5-6 mound	800	Do	Do
	Jute		8-10	sell	20-25	800		
	Mustard oil		2	sell		1500		

* Table 1: represents the average which is calculated from the household survey data.

**Source: Primary data collected during Survey.

The above table describes the cropping pattern of the studied villages. Rice and Jute are the two prime crops which are grown mainly in the area. For the production of jute each & every village has the same productivity but it differs in case of rice production. Here, we can see that, Sunshar, Nalkata village, experiment with number of varieties of rice, and thus, for practicing new varieties of rice, they got maximum amount for their production i.e. Rs. 800 for per quintal of rice. But, due to seasonal flood, these villages are able to cultivate rice only once in a year. The same situation exist in Haldiyausti village, the people of Haldiyausti village also do cultivation of rice once in a year. But, from last 3-4 years, due to change in the pattern of monsoonal rain, the people are now cultivating two varieties of crops at a same time on same plot of land. Due, to this, if there is crop failure of one variety, then also another variety is left out which can show the expected production.

Apart from this, they are also using the variety like Bao rice which can be cultivated in water logging areas. Whereas, the people of Sunshar and Nalkata do also the fishing activities. As, Laokhowa and Barunguri village is not having such problem thus, they are practicing rice cultivation twice in a year.

Beside, the cultivation of these two crops the people also cultivate some crops like mustard seed, Lin seed etc along with seasonal vegetables, like, carrot, cabbage, chilly etc.

The table also provides the information that, the villagers use to sell their products in local market and Nagaon town, the transportation cost for supplying the products to the market have to be born by the people itself, expect in case where the middle man or the traders buy the products from village itself. We can also find out the consumption pattern of the households from the above table, in Haldiyausti village, 10% of people do not sell their product it means, they cultivate that much amount, which is eaten up by them. Similarly, the

percentage of such household is increase in case of Laokhowa village, which is 60%. Thus, for Laokhowa near about 60% of the households have no extra earning from the agriculture (especially rice). However, they do cultivate jute, mustard oil, etc. from which they got extra income. Apart from this, the people also use the residue of rice as a fodder for cow.

The table shows us, the productivity of land of the studied village. Thus, it is clear that, the land of Haldiyasuti is more productive than that of other village. One bigha land of Haldiyasuti produce 30-40 mounds of rice similarly, the productivity of land in case of Laokhowa is less compared with all the village i.e. only 7-8 mounds production in 1 bigha of land.

Chemical Inputs

Name of village	Name of Fertilizer	Amount use (1bigha)	Cost (1 kg)	Name of Pesticides use	Amount use (1bigha)	Cost	Year of using	Remarks
Haldiyasuti	Urea	10 kg	7	Thiodin	100 gm	25	10	They also use manure like cow dung According to them, the productivity remains same.
	Super potash	5 kg	20	Furadon	100 gm	25		
	Dubi	5 kg	15					
Sunsahar	Urea	10 kg	7	Thiodin	100 gm	25	12	Use organic manure Decrease the productivity
	Super potash	5 kg	20					
Nalkata	Urea	8 kg		Thiodin	100gm	25	12	Use organic manure Decrease the productivity
				Furadon	100gm	25		
Borunguri	Urea	7 kg	8	Furadon	100 gm	25	10	Use organic manure Same level of productivity
Laokhowa	Urea	5 kg	8	Thiodin	100 gm	35	15	Decrease the productivity
	DAP	3 kg	12	Rogar	100gm	25		
				Furadon	100gm	25		

**Source: Primary interview from villagers

It is seen from the above table that all the villages use chemical inputs in their agricultural fields. It has been said that this trend has been there for last 15 years in some villages. For the

application of such inputs the farmers are mainly dependent on the advice given by the shopkeepers. No agricultural department officers visit their villages from whom such kind of advice can be expected. There is every possibility that such indiscriminate use of chemical inputs will have different impacts on the health of the people as well as the environment.

Irrigation

Village name	Source of irrigation	No. of STW	Total Irrigated land (Bigha)	Number of Household
Haldiyasuti	Shallow tube well	15	353	61
Sunsahar	Shallow tube well	9	240	20
Nalkata	Shallow tube well	2	128	31
Borunguri	Shallow tube well	10	190	18
Laokhowa	Shallow tube well	14	258	45

For doing the Bodo cultivation, ample amount of water is a pre-requisite. It's seen from the above table that all the villages have quite a good number of STW (Shallow Tube Wells) for the purpose. Farmers not having such facility can avail it from others' paying a good amount of paddy per bigha which differs village to village.

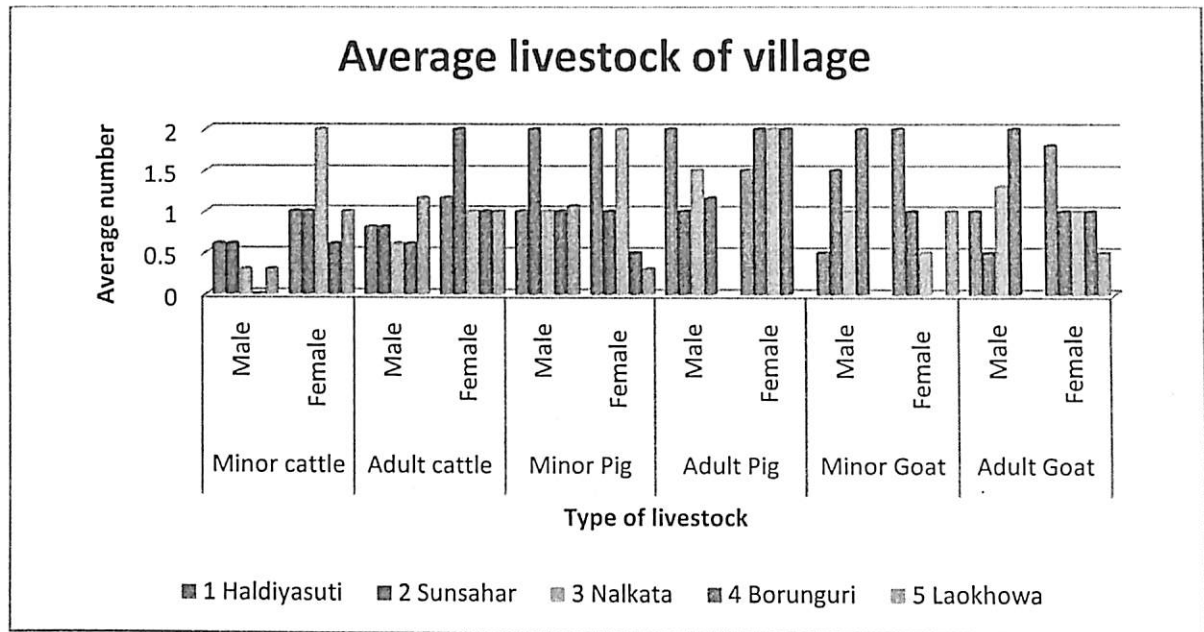
Agricultural Equipments:

The villagers use the agricultural equipments like Tractor, Power Tiller etc. on rent. Tractor charges 200 rupees for tilling/plowing one bigha of land where as for power tillers charges Rupees 150. Beside this, the villagers also use traditional equipment to till soil, for plowing, sowing etc. beside this, they also hire labour into their field (Muslim labour from neighbor village) at a rate of rupees 100 - 200 per day, and the labourer works for 8 hours a day.

b) Animal Husbandry

The people of studied villages also perform animal husbandry. The villages with bodo communities are mostly engaged in piggery activities. Women are mostly engaged in this kind of activities. They form small self help group for such purpose. Apart from this they also have other livestock.

Livestock information:



The above figure represents the average livestock information of the village. There is higher number of minor cattle in Nalkata and adult cattle in sunshar village. In Sunsahar, Nalkata and Haldiyasuti village are having highest number of minor pig and the Borunguri village have the Adult pig. It is due to the domination of bodo tribes, who use to practices piggery. Similarly, Borunguri and Haldiyasuti village are having highest number goat population.

In interview it was said by the villagers that, for feeding cattle they need 10-15 kg of grass each day. They usually leave their cattle, goat, etc. free in forest area in the morning and by evening they return back to village. Some of them practices stall feeding also. Thus, it put lots of pressures on the protected areas.

c) Fisheries:

Fishery is one of the most important livelihood opportunities for the villagers of all the villages studied. The people do plant small trees on the bank of the fisheries. Most of this activity is done on commercial basis. For the people of Sunsahar, Nalkata and Haldiyasuti village Fisheries is an important occupation during the flood seasons. Apart from this, the Borunguri and Laokhowa village also practices fishing activities but for own consumption. Whereas, for other village, it is an important source of livelihood they practices it for commercial purposes as well. Apart from this, some household have permanent fishing pond, other do practices fisheries in flood seasons. Beside this, people of the village also collect fish from the sanctuaries, though seasonally, which they use for self consumption as well as for commercial purposes.

The varieties of fishes which the people use for fisheries as well as they collect it from protected areas are as follows:

Fishes Varieties

Local Name	Scientific Name	Family
Raho	<i>Labeo rohita</i>	Cyprinidae
Bahu	<i>Catla Catla</i>	Cyprinidae
Mirika	<i>Cirrhinus mrigala</i>	Cyprinidae
Chitol	<i>Notopterus chitala</i>	Notopteridae
Kandhuli	<i>Notopterus notopterus</i>	Notopteridae
Borali	<i>Wallago attu</i>	Siluridae
Aari	<i>Aoricthyas aor</i>	Bagridae
Saal	<i>Channa morulius</i>	Opheocephalidae
Soal	<i>Channa striatus</i>	Opheocephalidae
Gorai	<i>Channa Punctatus</i>	Opheocephalidae
Cheng	<i>Channa amaphibious</i>	Opheocephalidae
Chengeli	<i>Channa Gachua</i>	Opheocephalidae
Puthi	<i>Puntius sp.</i>	Cyprinida
Bheseli	<i>Colisa sota</i>	Cyprinida
Kawai	<i>Anabus tesfudineus</i>	Auabantidae
Magur	<i>Clarius batrachus</i>	Claridae
Singi	<i>Heteropneutes fossilis</i>	Heteropneustidae
Singara	<i>Mystus tengra</i>	Bagridae
Bami	<i>Mastoceunbalus armatus</i>	
Tora	<i>Mastoceunbalus aculeatus</i>	
Pabha	<i>Ompok pabo</i>	
Mali	<i>Labeo calbasu</i>	
Khalihona	<i>Colisa fasiata</i>	
Dorikona	<i>Rasbora daniconius</i>	
Bahpotia	<i>Aillia coilia</i>	
Bhagun	<i>Labeo bata</i>	
Misa	<i>Pinaeus monodon</i>	
Chanda	<i>Chanda ranga</i>	
Khaloibhangi (Gedgedi)	<i>Nandus nandus</i>	
Kakila	<i>Xenentodon cancila</i>	
Chelkona	<i>Oxygester bacaila</i>	
Botikora	<i>Lepidocephalus guntia</i>	
Kunhri	<i>Labeo gonius</i>	
Cheniputhi	<i>Puntius sarana</i>	
Gethu (Bagh Maas)	<i>Botia derio</i>	

Nonfarm activities:

a) Weaving

Weaving is practiced by all the households of the study area. They weave their own clothes for which they don't depend on the market. Though, it is widespread, but people do it generally in a subsistence manner, not for commercial purpose.

In last 2-3 months about 10-12 people had sold their products in market. The middlemen use to come to the village & purchase the product at cheaper rate, and sale it in the big market & earn more profit. The cloths made by this people are having more demand in outside market. Especially in Jagiroad, Nagaon, etc. town. Products they made are: Gamusha, Chadar, Woolcloth, Mekhla, Dokhna, Arona, Selong cloth, Eri cloth, etc.

They earn profit by selling the products but sometimes they feel if they would have directly exported to these markets then they could earn more. But, for that they need some facilities which are lacked in the village.

- a) Transportable road
- b) Finance
- c) Linkage with the markets.

b) Business

The people of the study village are also engaged in small business activities, like shopkeeper, vegetable seller, fish seller, cloth seller etc. For Haldiyasuti village, and Laokhawa village the distance between village & market place is not so far (Sutirpar market & Laokhawa market respectively) then, for them shop keeping is more profitable.

The following table shows the types of business where people are engaged;

Village Name	Type of Business
Haldiyasuti	Shopkeeper, vegetable seller
Sunsahar	Vegetable seller, fish seller, shopkeeper
Nalkata	Cloth selling, Vegetable seller, fish seller, shopkeeper
Borunguri	Shopkeeper, cloth selling
Laokhawa	shopkeeper

There are very less percentage of people in the studied village who are engaged in business related activities for their livelihood. The percentages of the people engaged in each village in business sector are presented by the following graphs:

People engaged in petty business

Name of Village	People engaged in business
Haldiyasuti	5
Sunsahar	4
Nalkata	5
Borunguri	6
Laokhowa	4

People engaged in the business activity are less in the villages as shown in the above table though there is enough scope for this.

c) Service

Around 2 to 3% of people are engaged in service sector in each village, most of them are engaged in defense, driver, power line service etc. Apart from this, 1 or 2 people from each village are engaged in forest department. Some female are now being engaged as Anganbari workers, Ashakarmi, etc.

The numbers of people engaged in different services are as follows:

In Haldiyasuti only 8 people are engaged in different kinds of services. Similarly, the number of persons engaged in services are 2 people each in Nalkata and Sunsahar, 3 in Barunguri and 4 in Laokhowa.

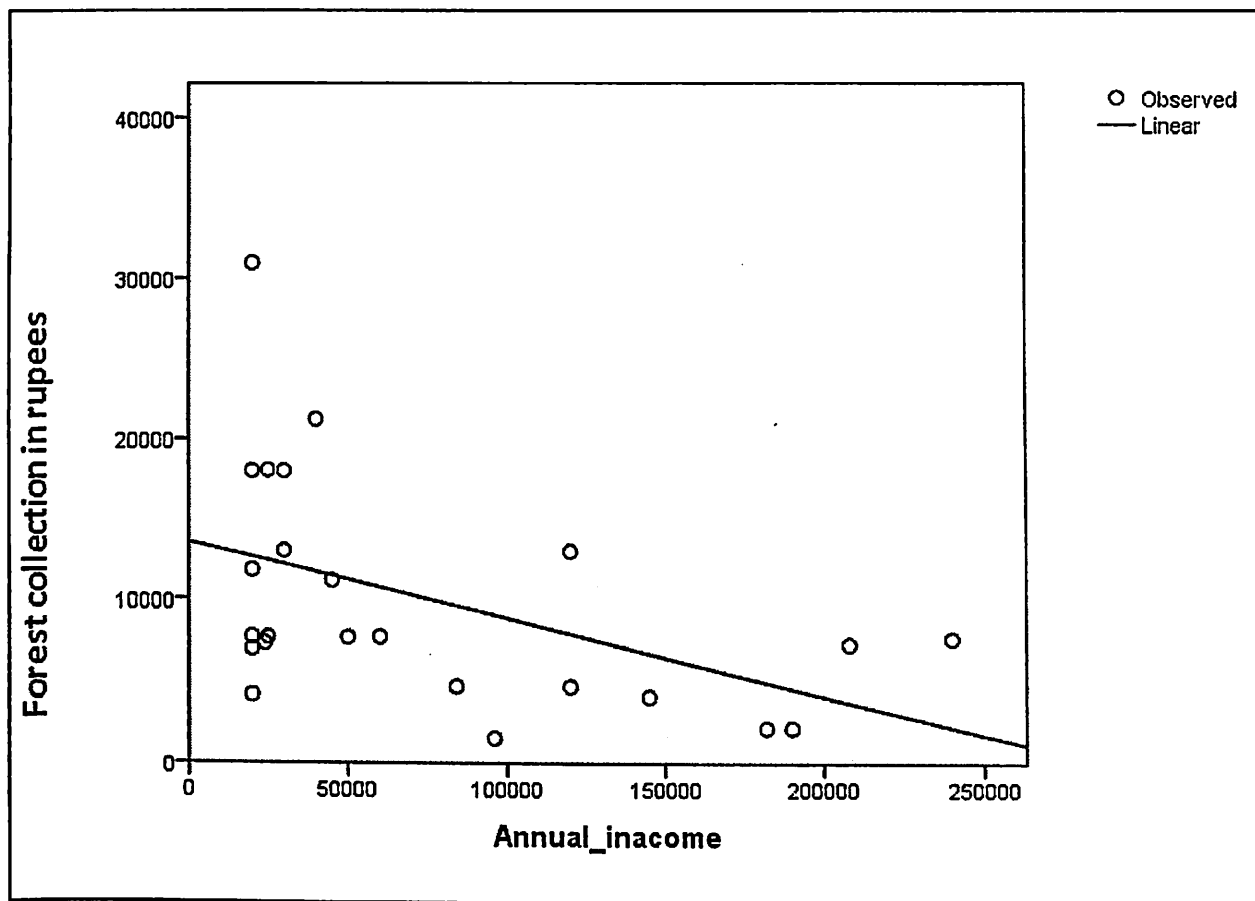
REGRESSION ANALYSIS:

Model Summary and Parameter Estimates

Dependent Variable: Forest collection (in Rupees)


Equation	Model Summary					Parameter Estimates	
	R Square	F	df1	df2	Sig.	Constant	b1
Linear	.217	6.082	1	22	.022	13541.256	-.047

The independent variable is Annual income.



The above graph represents the regression analysis of the interviewed families which is done on two components. The annual income is taken as the independent variable and the income from forest collection as dependent variable. The line on graph represents the linear line, which is a downward sloping line; indicate the negative relationship between the two variables. Thus, it is clear that, the less the annual income of the people the more is the collection of forest products and vice versa. So, it can be said that, the family with poor condition are dependent more on the forest resources, and as per the study most of the household are fall below the poverty line so, their dependency on forest resource is more which pressurize the PA.

From the above graph it is also seen that, if the people are having more income then also there is dependency on forest resources it is because the houses of such group of people are very near to the forest area. Apart from this, the size of family also influences the dependency of people on forest resources.



CHAPTER V
SUMMARY AND FINDINGS

SUMMARY AND FINDINGS

The study was conducted on the Laokhowa wildlife sanctuary. This study was based on the hypothesis that the poor the socio economic condition of the people more is the dependency on the forest resource and other resources available in the region and vice versa.

Thus, to carry out the study, 5 Taungya villages were selected, depending on the size of village, number of population, community, location etc.

The socio economic data along with the forest dependency data (resources collected by the villagers from the forest area) were collected, through personal interview from the villager, forest ranger and staff, village head man etc which is the primary data and some secondary data were also collected from mandal office, village headman, range office, divisional office, agricultural university (shillongni). This data were used for analyzing purposes.

Throughout the study we found that, all the families of Taungya village were settled starting from the year 1919, and with the passage of time they got split in small groups and formed their own village. The Taungya villages present in the region are dominated by two major groups of people Bodo and Tiwa groups.

We have also founded that, most of the people living in the villages use traditional type of building materials for making their houses. And most of them depend on the forest resources for the collection of building materials. Beside this, they also need forest materials for making boat at the time of flood.

Drinking water and sanitation facilities is very poor. Tube well is the only source of drinking water having high iron content. Most of the people of the villages are not having sanitation facilities specially Borunguri, Sunsahar, Nalkata village so, due to which they are bound to use open space.

Most of the people of the area are living below poverty line. Most of them are primary producers and a large percentage of the people are agricultural laborers. Some of them own petty business. Poor people don't have other alternative livelihood options and hence are more dependent on the forest resources for their livelihood.

Though the literacy rate is high in the villages, but female literacy is poor. But, there is room to increase the literacy rate among the villagers and if it increases it can be expected that the awareness among the villagers about the natural resource conservation would definitely rise.

Youths use to migrate, in the absence of alternative livelihood options, to other places in search

of jobs. But, there is no permanent migration from the village to the other places.

Agriculture acts as the main occupation of the people in each and every village, along with agriculture people are also engaged as a wage laborer, in business and service. The history of use of chemical inputs on the agricultural field is not very recent. For last 15/20 years they have been using this. Though the productivity increased initially, it started declining later on as was observed and told by the villagers. Subsequently, people are using more and more doses of chemicals having health impact. The farmers are basically poor and most of them belong to BPL category.

Along with agriculture the people are also engaged in the fisheries, animal husbandry activities. Fisheries are mostly done during the flood seasons by all the villages.

The people use to extract resources from the sanctuary, but the people from the Sunsahar and the Nalkata village use to reach beyond the extraction zone for collecting the resources as compared with the other three villages. Thus, it can be said that, the people of Sunsahar and Nalkata village exerts more pressure on the PA.

It has also being seen from the study that, the people are dependent on the forest resources. But the poorer people depend more than that of richer groups. Beside this, among the BPL or APL category of people it was also found in the study that, the household which is nearer to the sanctuary depend more or collect more resources from the sanctuary. The collection of materials from the forest is also depending to a large extent on the size of the family. If the family size is more than the particular household use to extracts from resources from the forest area.

SUGGESTION FOR IMPROVEMENT OF VILLAGE ECONOMY

For improvement of the economy two types of measures can be taken:

1. Short term
2. Long term

Short term measures can be taken immediately and it will require less time for implementation, with the existing resources. Whereas the long term measures will need some times for its implementation & providing results.

Short term: the short terms measures are explained below:

1. The women in the study area are expert weavers. They prepare different kinds of dresses and sell it as and when get a chance. Therefore, if it can be done in an organised way it will help all of them to generate some amount of profit. It can be done in a cooperative basis. Both producers and consumers cooperative may work.

Long term: the long term measures as envisaged discussing with the people of the area are:

1. **Transportation facilities:** The villages have kacha road, (except Borunguri) which become unmotorable during flood season. Due to which the working load of people increases as they have to walk a long distance. Thus, for improving the condition, proper road network is required.
2. **Nursery development:** The people of the Sursahar and the Nalkata village want to develop nursery. They have, some experience regarding nursery plantation, as in the past also they conducted this type of activities.

In Nursery plantation, they should plant mixed varieties of trees, with different period of maturities like, mango, sal, guava, marigold plant etc. so, that they can able to sell the product like fruits and flowers as well as they can get the product of some quick growing trees.

3. **Bee farming and other such activities:** Training can be provided for bee farming, the area is best suitable for the bee farming, the development of floriculture and the fruit bearing trees will help in bee farming.

The process of extracting, manufacturing of the product etc. can be provided. Apart from this, the linkage between the market & the village can be developed or they can do the marketing with EDC committee.

4. **Providing electricity:** No electricity in the village of Sursahar and Nalkata whereas, the neighbor village of Salpara has it. Thus, with grid connection electricity facilities can be provided in the Sursahar and the Nalkata village.

The Rajiv Gandhi rural electric program can be implemented in the village which will provided then with the solar power facilities.

5. **Modern way of agriculture:** Modern way of practicing agriculture can provide the high production as well as it will be a scientific method for cultivation which will reduced any impact on environment with reduction in time load for cultivation. The villagers can be provided with the experience of modern way of cultivation or cultivating the agriculture with adoption of modern tools & technique like tractor, etc

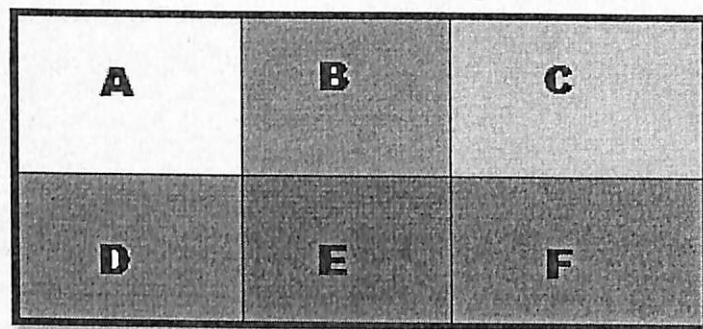
Implementing new method like, crop rotation, mixed cropping etc. The adoption of new crops at the waterlogged area, cultivation of two crops on same field at a same time, during drying period cultivation of less water required crops etc. Though the villagers are using the chemical fertilizer but, the use of fertilizer and pesticides should be use as recommended by the experts from the agricultural department etc. beside this organic manure can also be used can also be helpful in improving the production.

6. **Marketing:** The production of commodity alone is not going to improve the socio economic condition of people until there is a best market strategy which will be required to grapes the market demand, for that the linkage between village and the market had to be established. The EDC committee can established the link with the market. Where, the people of the village can do business by involving the EDC. As, the EDC consist of the forest department member, panchayat, general people etc therefore, EDC can help to set up the link with the market as well as to provide some training program to the people.
7. **Health care:** In Nalkata and Sunsahar Village there is no health care centre, people have to walk 4 to 5km to reach hospital. There is no health care centre, in the village. Thus, there is urgent need for the establishment of the health care centre.
8. **Education:** Education regarding the women rights, equal participation etc should be provided apart from this it will help in gaining employment.

Suggestion of the improvement of forest resources

- 1) **Making policies of some norms for Fishing:**
 - a) Training can be provided in catching fish in a more sustainable way.
 - b) Making rule that only mature fish can be catch, no small or juviline should be catch.
 - c) In winter season the fishing should be banned in the wild life sanctuary, as, that period is breeding period for the fishes.
- 2) **Agroforestry practices** can be implemented in the village, which will result in the cultivation of crops and tree on the same plot of land. Thus, regrowing the vegetation cover as well as food crops to full fill their livelihood opportunities. Some fruits bearing trees can be planted to get benefit, even he fuelwood can be used from such tree, which will reduced the pressure on the wild life sanctuary for fuelwood collection.
- 3) **Making policies of some norms for Grazing:** Some systematic policies or norms can be made for grazing, like some area have to be demarcated for grazing purpose where the cattle can graze.

Rotational grazing



Rotational grazing could be encouraged by making the grazing zone into different small plots as shown in the diagram. Thus, it will in one hand lead to adjust pressure on a small portion of land, and on the other it will provide enough time to again regenerate the grasses for grazing.

Apart from the above mention technique, the system of stall feeding should be introduced in the village.

- 4) **Collection of NTFPs:** The NTFPs collection should be done in a sustainable manner. The collection of product from the WLS should be done with the permission of forest department. The forest department should allocate some region from where they can collect the materials and there should be some rule and regulation for collecting materials like:
 - a) All the material should be collected only in that amount which will not affect the quantity of material or environment of the WLS. As most of the living creature depends on some plants and trees of WLS. Thus, the collection of material should not affect the habitat of the living creature.
 - b) Tax imposition from the resources collected, above a certain limit (use of commercial purpose) so that, the rupees can be used for maintenance of forest resource.
 - c) There should be perfect coordination between the forest department and the local people.

- 5) **Education and awareness** is of great importance for the future of the forest.

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