# CHAPTER - 6

## Villagers' Dependencey on Forest

### 6.1 Introduction

In general, forest villagers lived in fringe and interior of forests areas with fairly and dense forest cover. The forests of this study area is not only a source of employment and income for but also it provides so many Non Timber Forest Products (NTFPs) to the local forest villagers and fringe people which make forest an great contributor to the rural economy. It also plays an important role to get shape of villagers separate social and cultural life. Villagers living in forest depend upon forest for a variety of goods and livelihood needs. These includes collection of edible fruits, tubers, roots flowers and leaves for food and medicines; firewood for both selling and cooking purpose; wood materials for agricultural implements, house construction and fencing; fodder (grass and leave) for livestock and grazing of livestock in forests; and collection of a range of marketable Non-Timber Forest Products (NTFPs).

Several NTFPs were found to be extracted in the different study sites of KFD of Burdwan District, 23 major types of Non-Timber Forest Products (NTFPs) were recorded during survey at the present observation which includes different forms of grass, dyes, honey, oil, wax, resin, gum, bamboo, broom, food items (leaf, fruit, seed, herb, stem), paper, basket, cotton, brush, ornamental, worship, leaves (sal, kendu, datepalm), marriage rituals, sap and flour (Bauri, et al., 2015). It is observed that more than 54 % of total families are sustaining livelihoods from sell of Non-Timber Forest Products (NTFPs). In addition, poor and marginalized villagers use small timber for edible roots and tubers, thatch for roof; house construction; mushrooms, leaf litter and leaves, fruits and flowers as alternative of staple foods especially during lean seasons; medicinal plants for healing etc. (Das, 2005). Here the activities of forests and dependency of villagers has been analyzed and summarized on the basis of data and information collected from the field survey of sample households of flowers, tubers, roots and leaves for food and medicines; firewood for own use cooking and selling purpose in the market; timber and branches for agricultural implements, house construction and fencing; fodder (grass and leave) for livestock and grazing of livestock in forests; and collection of a range of marketable non-timber forest products.

### 6.2 Forest as source of Non-Timber Forest Products (NTFPs)

The Non-Timber Forest Product (NTFPs) has been defined, all biological materials, other than timber, which are being collected from forests for human use purpose. It may be included firewood (which is not timber), fodder (grass and leave), fruits, flowers, tubers, roots and dry leaves, green leaves for fuel, food and medicines; resins, roots, herbal plants, gums, honey. According to Shvidenko et al. (2005), Non-wood forest products (NTFPs) are defined as goods of biological origin other than timber wood, obtained from forests, other forests land, and from trees outside the forests. Ii can be classified in a number of broad categories based on their end use: fodder for domestic animals; medicines; perfumes and cosmetics; edible products; colorants; utensils, and construction materials; handicrafts, ornamentals; and exudates like gums, resins, and latex. Overall, it plays a vital role in the everyday life and social well-being of hundreds of millions of people worldwide besides in the national economies of many countries (Shvidenko et al., 2005). The type, number and nature of NTFPs vary from one geographical area to another based on the physical conditions. Considering the socio-cultural importance of NTFPs in forests livelihoods, Wickens (1991) believes that NTFPs are all the biological components that may be turned out from natural ecosystems, managed plantations, etc. and be marketed, be used within the household, or have cultural, religious and social importance. The NTFPs have an important role in forests livelihoods in the south-western part of the State (Tewari and Campbell, 1995). The NTFPs have a great importance within the household economy of forest villagers. In India over 50 million villagers are depends on NTFPs for cash income and other subsistence (Hegde et al., 1996). The poor condition of road and transportation system, distance among remote forest villages and the local market and service centre, limited availability of manufacturing and consuming products are reasons for the high levels of dependence on NTFPs of forest inhabitants. It is because of these reasons; the importance of NTFPs for household needs in the interior forest villages of Alipurduar District is distinctly higher. So forest villagers are highly depending on the collection of NTFPs for their domestic as well as commercial purpose. In this connection it can be mentioned that as per the forest working plan prescription, collection of Minor Forest Produces (MFPs) or Non-Timber Forest Produce (NTFPs) of any kind is allowed from any part of the forests but no quarry for sand, gravel and stone should be made without previous approval of the Divisional Forest Officer or Local Range or Beat officer. There are many NTFPs available in the forests of this study area but no systematic study is conducted

regarding the quantity of NTFP available and its regeneration status. There is no definite extraction procedure adopted for its collection. Very easily forest villagers go inside the forest and collect NTFPs according to their collection capacity and demand. The importance of NTFPs may be classified in to two categories; i. NTFPs for household needs for livelihood, ii. NTFPs for commercial or marketing purposes by which villagers earning money to fulfil their livelihood demand. The some important NTFPs which have been collected by villagers are bamboo, pan leaves, dry branches, dry leaves, purundi fruits, naglata, lycopodium stick, totola pods and seeds, lali fruit, odal fruit, fern bud, cane, cane fruits, simul floss and floral axis, mahogony floral axis, broom stick, golden and sponge mushrooms and thatch etc. Besides, there are some medicinal plants which are being seldom used by villagers to recover diseases such as fever, bone and join fracture, stomach, skin diseases and insect bite etc.

Based on the commercial and domestic importance, details of the amount of NTFPs collection, market value, availability as well as valuable NTFPs are given in the table below (table 6.1).

**Table 6.1** Some important NTFPs collected by sampled households.

| Name/ nature of Plants | Name of NTFPs | Season | Households use | Commercial use | Quantity of NTFPs Collected in a year/ household | Monetary value |
|---|---|---|---|---|---|---|
| Fire wood | Benches | All season | Yes | Yes | 1800 kg to 2000 kg | Rs.10/ kg |
| Tree | Leaf | Winter | Yes | No | 360 to 400 sack | - |
| Bamboo | Stem | All season | Yes | Yes | 20 to 25 piece | Rs. 90/ ba |
| Grass/ fodder | Stem | All season | Yes | Yes | 400 kg to 450 kg | Rs. 5/ kg |
| Haritaki | Fruit | Summer | Yes | Yes | 16 kg to 20 kg | Rs.20/ kg |
| Shrub | Benches | Winter | Yes | Yes | 360 kg to 400 kg | Rs.8/ kg |
| Climber | Stem | Winter | Yes | Yes | 300 kg to 350 kg | Rs.8/ kg |
| Golden and Sponge Mushroom | Stem & flower | Winter | Yes | Yes | 25 kg to 30 kg | Rs. 25/ kg |
| Jam | Fruit | Summer | Yes | Yes | 18 kg to 20 kg | Rs.25/ kg |
| Cane | Stem | All | Yes | Yes | 250 kg to 300 kg | Rs. 45/ kg |
| | fruit | season | | | 15 kg to 18 kg | Rs.10/ kg |
| Orchards | Stem & flower | Winter | Yes | Yes | 20 kg to 25 kg | Rs.12/ kg |
| Pan | Leaves | Summer | Yes | Yes | 25 to 30 barra | Rs35/ barra |
| Medicinal Plants | Leaf & Stem | All season | Yes | No | 5 kg to 7 kg | - |
| Purundi | Fruits | Summer | Yes | | 12 kg to 15 kg | Rs8/ kg |

(Prepared by the researcher based on field survey, 2017)

Respondents collect their fruits, fodder, firewood, branches and leaves from surrounding forest. However more than half of the villagers are entirely dependent on NTFPs of forest, while others associates with agricultural and horticulture practice in their own agreement land or engage as agricultural labour and tea garden wage labourers. Besides, everyday, at least one person from each household goes into the contiguous forest to collect green fodder for livestock, leaves, dry branches as well as firewood for fuel and other purpose. Villagers also employed to collect cane, cane fruits, bark, bamboo, roots, leaves of sal, teak, simul, gamaree for commercial purpose as well as own consumption during whole of the year. Each household picked up 360 to 400 sack of leaf per year. Villagers are engaged whole of the year to collect green leaves mainly for livestock rearing. Dry leaves are mostly used as kitchen fuel purpose and very little for other purpose that is to make fencing and roof shading. Household earned between Rs. 900.00 to 1200.00 by selling cane and cane fruits per month, Rs. 200.00 to 250.00 by climber, Rs. 160.00 to 190.00 by grass, Rs. 240.00 to 300.00 by shrub, Rs. 150.00 to 190.00 by bamboo, Rs. 1000.00-to 1300.00 by firewood (table 6.1). Villagers also collected different kinds of fruit and flowers which are also used for households needs as well as selling purpose through which they could earned extra supporting amount by selling Haritaki, jam, Purundi from which they earned Rs. 8.00 to 10.00 per kg by Purundi, Rs.35.00 to 40.00 per kg by jam, Rs. 25.00 to 35.00 per kg by Haritaki and Rs. 35 per barra of Pan leaves.

### 6.2.1 Uses of medicinal plants

From field study total 121 numbers of species of plants were found to be used as medicinal purpose by forest villagers of Alipurduar District. The experience and uses of medicinal plants are being transmitted traditionally for first aid medicine of treatment from generation to generation. Medicinal plants are another set of important NTFPs that have been utilizing by human beings especially tribal people. A total 14 species of herbal plants belonging to 11 families were recorded that normally used to cure different ailments in the day-to-day life (Sarmah, 2010). The table 6.2 (Appendix D) of plants is arranged according to their scientific name, local name, parts used and medicinal uses for which disease. Among different plant parts used for the preparation of medicine (table 6.2), such as leaves of different trees were found to be the most frequently used plant parts to remove the diseases like as acalypha indica leaf for nasal and nounds, justicia adhatoda L. for chronic bronchitis, cough and cold, lippia alba (Mill.) for skin disease; roots of crinum amoenum were used to remove jaundice and diarrhea, glycosmis

arborea DC for fever, hepatopathy, eczema, skin diseases, wounds, liver disorder; whole plant of ammannia baccifera for fever and child diseases, B. Ammannioides for bone fracture and menstrual disorder, bark of acacia catechu for stomachache, gmelina arborea for vomiting and Diarrhea etc. Besides rhizome, fruit, latex, flower, flower bud, root bark and stem of different trees also were used to remove various diseases.

### 6.3 Forest as source of fodder

The fodder is a prime food item of livestock and livestock rearing is depends on availability of fodder. In this study livestock rearing considered as an important sector and source of economy of forest villagers. The livestock is feeding and maintaining for milk, cash income by selling of old cow, calf, sheep, pig and goats, and also to provide organic manure for agricultural fields. The feeding, maintenance and rearing of livestock is impracticable without fodder which is consuming from the forest. In this connection it is reported that about 60 % of buffaloes and cattle and 90 % of goats and sheep populations' depended on forests for green fodder (Nayak, 2001). The quantity of fodder collecting and consuming from the nearby forest depends on number, size and variety of livestock, nature of feeding as well as quantity of fodder availability from the agricultural side. The livestock are both stall feed and open grazed. The buffalos are mostly stall feed while goats, cows and sheep are grazed openly.

The villagers obtained green and dry fodder from various sources and fed per day in summar and rainy season has been given in table 6.3, where average of each village has been calculated. It is seen that lowest per day quantity of dry fodder fed to livestock was 1.24 kg ± 0.85 kg which is noticed in Chunabati village where small size of the land holding capacity observed. While it was 4.54 kg ± 0.35 kg is recorded in Gadhadhar village which is maximum due to advantages low lying and plain area location as well as medium size of land holding capacity. The total quantity of dry fodder fed was collected from own agricultural lands and villagers fed by-products of different crops as dry fodder to animals. The lowest quantity (average) of green grass fodder and green leaves fodder obtained from field was 1.24 kg ± 0.89 kg and 0.92 kg ± 0.21kg per day which is noticed in Suni and Raimatang village respectively. While, the highest quantity (average) of green fodder of grass and leaves was 2.37 kg ± 0.65 kg and 2.55 kg ± 0.35 kg per day which is observed in Lehra and Garo Basti village respectively.

**Table 6.3** Fodder collections in summer season for livestock (kg/ day).

| Sl. No. | Forest village | Dry fodder | | Green fodder | | | |
|---|---|---|---|---|---|---|---|
| | | From field | From forest | From field | | From forest | |
| | | Grass | Leaves and Grass | Leaves | Grass | Leaves | Grass |
| 1 | Suni | 2.23 ± 0.25 | - | 1.84 ± 0.47 | 1.24 ± 0.89 | 3.45 ± 0.93 | 4.38 ± 0.37 |
| 2 | Garo Basti | 3.42 ± 0.45 | - | 2.55 ± 0.35 | 1.57 ± 0.67 | 3.12 ± 0.25 | 3.45 ± 0.82 |
| 3 | Lehra | 3.55 ± 0.31 | - | 1.57 ± 0.75 | 2.37 ± 0.65 | 3.53 ± 0.89 | 5.49 ± 0.39 |
| 4 | Nimati & Dabri | 3.58 ± 0.15 | - | 1.57 ± 0.54 | 1.34 ± 0.56 | 3.52 ± 0.69 | 4.56 ± 0.25 |
| 5 | Poro (N) | 4.35 ± 0.32 | - | - | - | 2.35 ± 0.65 | 4.49 ± 0.85 |
| 6 | Gadhadhar | 4.54 ± 0.35 | - | 1.65 ± 0.87 | 2.27 ± 0.53 | 2.54 ± 0.38 | 3.56 ± 0.75 |
| 7 | Gangutia H.A | 2.56 ± 0.25 | - | - | - | 4.45 ± 0.32 | 4.78 ± 0.65 |
| 8 | Adma H.A | 2.67 ± 0.46 | - | - | - | 5.47± 0.31 | 4.89 ± 0.88 |
| 9 | Chunabati H.A | 1.24 ± 0.85 | - | - | - | 5.34 ± 0.33 | 4.66 ± 0.77 |
| 10 | Bhutri F.basti H.A | 1.56 ± 0.75 | - | - | - | 4.23 ± 0.69 | 3.59 ± 0.15 |
| 11 | Raimatang H.A | 2.23 ± 0.55 | - | 0.92 ± 0.21 | 1.26 ± 0.88 | 3.45 ± 0.66 | 5.34 ± 0.67 |
| 12 | Santrabari H.A | 2.67 ± 0.73 | - | - | - | 3.17± 0.95 | 4.78 ± 0.38 |
| 13 | Gudamdabri | 3.78 ± 0.38 | - | - | - | 4.56 ± 0.73 | 4.57 ± 0.25 |
| 14 | Bhutiabasti | 1.45 ± 0.37 | - | - | - | 4.12 ± 0.61 | 4.67 ± 0.81 |
| 15 | Sankosh | 3.35 ± 0.39 | - | 1.79 ± 0.27 | 1.62 ± 0.55 | 3.56 ± 0.71 | 4.43 ± 0.43 |
| 16 | Balapara | 3.59 ± 0.21 | - | 1.45 ± 0.31 | 1.29 ± 0.47 | 3.59 ± 0.37 | 5.23 ± 0.31 |
| 17 | Lapraguri | 2.45 ± 0.28 | - | 1.25 ± 0.39 | 1.34 ± 0.95 | 4.33 ± 0.64 | 3.65 ± 0.29 |
| **Average** | | **2.89 ± 0.41** | | **0.86 ± 0.24** | **0.84 ± 0.36** | **3.81 ± 0.59** | **4.50 ± 0.53** |

N.B: (Mean ± SD), H.A=High altitude location.

(Calculated by the researcher based on field survey, 2017).

The lowest average quantity of green fodder of leaves received from forest was 2.35 kg ± 0.65 kg per day and 3.45 kg ± 0.82 kg per day in case of grass which is identified in Poro and Garo Basti village. The highest average quantity of green fodder of grass and leaves acquired from forests was 5.49 kg ± 0.39 kg and 5.47 kg ± 0.31 kg per day which has been found in Lehra and Adma village. A comparative line graph is (figure 6.1) shown the per day fodder collection of forest villagers between dry fodder from field and green fodder from forest in summer season. It is observed that the green fodder line is located over the dry fodder line which referred that villagers collected and depended more on green forest fodder of forest than dry fodder in summer. The highest quantity of green fodder collection was 5.18 kg per day which is found in Adma and the lowest quantity obtained was 2.51 kg per day which is found in Gadhadhar village respectively.

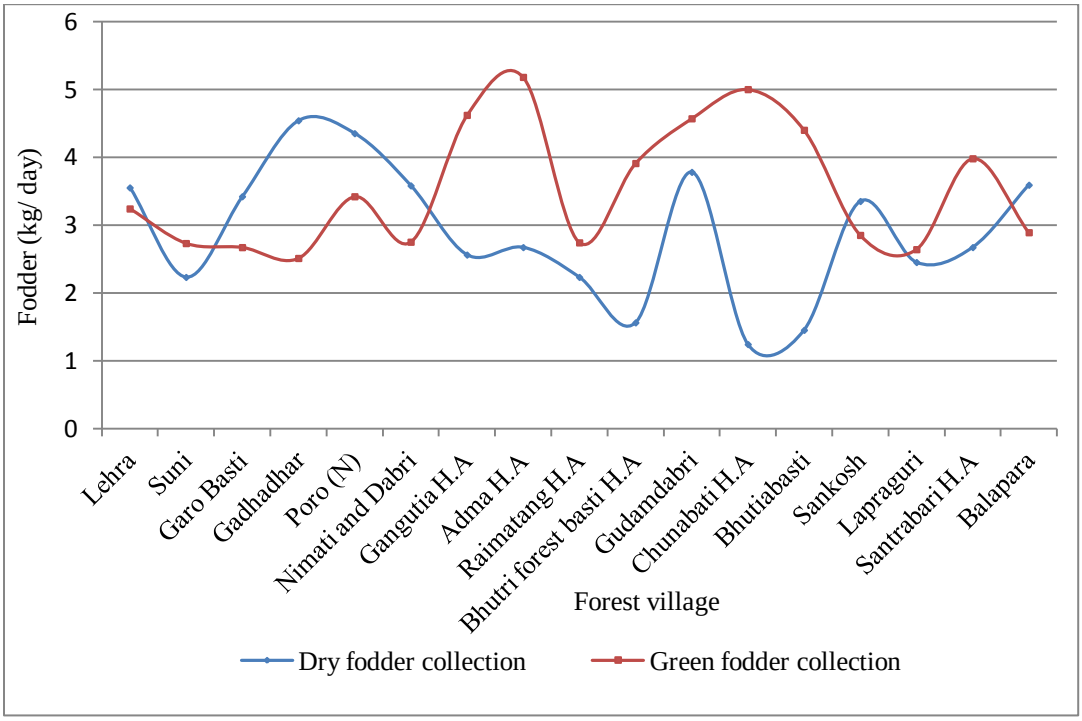


**Figure 6.1** Dry and green fodder collection in summer season for livestock (kg/ day).

**Plate 6.1** Green leaves collected by villagers as fodder in Chunabati village.

The fodder collection in winter season is presented in table 6.4, the analysis expressed that villagers collecting and feeding of dry fodder quantity is comparatively less in winter than summer season. The average highest quantity of dry fodder fed of grass was 4.98 kg ± 0.62 kg

per day and lowest quantity was 1.78 kg ± 0.91 kg which is observed in Poro (N) and Chunabati respectively.

**Table 6.4** Fodder collection in winter season for livestock (kg/ day).

| Sl. No. | Forest village | Dry fodder | | Green fodder | | | |
|---|---|---|---|---|---|---|---|
| | | From field | From forest | From field | | From forest | |
| | | Grass | Leaves and grass | Leaves | Grass | Leaves | Grass |
| 1 | Suni | 2.93 ± 0.65 | - | 1.51 ± 0.27 | 1.14 ± 0.55 | 3.15 ± 0.43 | 4.18 ± 0.32 |
| 2 | Lehra | 3.98 ± 0.39 | - | 1.37 ± 0.35 | 2.27 ± 0.45 | 3.13 ± 0.39 | 4.89 ± 0.49 |
| 3 | Gadhadhar | 4.94 ± 0.85 | - | 1.73 ± 0.52 | 2.21 ± 0.33 | 2.24 ± 0.23 | 3.26 ± 0.65 |
| 4 | Garo Basti | 3.88 ± 0.95 | - | 2.47 ± 0.17 | 1.47 ± 0.47 | 3.10 ± 0.15 | 2.95 ± 0.72 |
| 5 | Nimati and Dabri | 3.89 ± 0.65 | - | 1.47 ± 0.36 | 1.31 ± 0.54 | 3.32 ± 0.39 | 4.26 ± 0.21 |
| 6 | Poro (N) | 4.98 ± 0.62 | - | - | - | 2.25 ± 0.45 | 4.29 ± 0.15 |
| 7 | Gangutia H.A | 2.86 ± 0.35 | - | - | - | 4.35 ± 0.22 | 4.29 ± 0.35 |
| 8 | Adma H.A | 2.87 ± 0.56 | - | - | - | 5.37± 0.21 | 4.19 ± 0.78 |
| 9 | Raimatang H.A | 2.73 ± 0.82 | - | 0.76 ± 0.12 | 1.23 ± 0.37 | 3.25 ± 0.16 | 4.74 ± 0.47 |
| 10 | Bhutri forest basti H.A | 1.88 ± 0.87 | - | - | - | 4.21 ± 0.39 | 3.19 ± 0.25 |
| 11 | Santrabari H.A | 2.81 ± 0.82 | - | - | - | 2.97± 0.87 | 4.41 ± 0.48 |
| 12 | Gudamdabri | 3.93 ± 0.89 | - | - | - | 4.46 ± 0.63 | 3.97 ± 0.75 |
| 13 | Chunabati H.A | 1.78 ± 0.91 | - | - | - | 4.74 ± 0.53 | 3.86 ± 0.87 |
| 14 | Balapara | 3.90 ± 0.45 | - | 1.41 ± 0.21 | 1.19 ± 0.27 | 3.21 ± 0.33 | 4.73 ± 0.42 |
| 15 | Sankosh | 3.69 ± 0.73 | - | 1.69 ± 0.17 | 1.52 ± 0.51 | 3.56 ± 0.71 | 4.13 ± 0.33 |
| 16 | Lapraguri | 2.96 ± 0.78 | - | 1.21 ± 0.31 | 1.32 ± 0.75 | 3.93 ± 0.74 | 3.11 ± 0.19 |
| 17 | Bhutiabasti | 1.79 ± 0.57 | - | - | - | 3.82 ± 0.51 | 4.17 ± 0.21 |
| **Average** | | **3.28 ± 0.69** | | **1.51 ± 0.28** | **1.52 ± 0.47** | **3.59 ± 0.43** | **4.04 ± 0.45** |

N.B: (Mean ± SD), H.A= High altitude location.

(Calculated by the researcher based on field survey, 2017).

The per day maximum and minimum quantity of green fodder of leaves from field was 2.47 kg ± 0.17 kg and 0.76 kg ± 0.12 kg of Raimatang and Garo Basti respectively but in case of green grass fodder it was 2.27 kg ± 0.45 kg in Lehra and 1.14 kg ± 0.55 kg in Suni village. However it is also noticed that per day highest and lowest quantity of green fodder consumption of leaves from forest was5.37 kg ± 0.21 kg and 2.24 kg ± 0.23 kg of Adma and Gadhadhar village respectively where as in case of green grass fodder it was 4.89 kg ± 0.49 kg in Lehra village and 2.95 kg ± 0.72 kg in Garo Basti. From the above discussion it is acquired that amount of green leaves and grass collected from forests was significantly higher than that of leaves and grass obtained from field and other sources. However, field and owned land was the only source of dry fodder of villages under study while forest is the one and only source of green fodder for livestock. It is also identified that per day fodder collection of leaves and grass is more in

summer comparatively than winter season. The graph (figure 6.2) shows the per day fodder (kg) collection of forest villagers where it is observed that the green fodder line is raised over the dry fodder line except Lehra, Suni, Garo and Gadhadhar village which indicated that villagers are depend more on green forest fodder of forest than dry fodder in winter. The average highest quantity of green fodder (leaves & grass) collection was 4.78 kg per day which is found in Adma and the lowest collection obtained was 2.36 kg per day which is found in Gadhadhar village respectively.

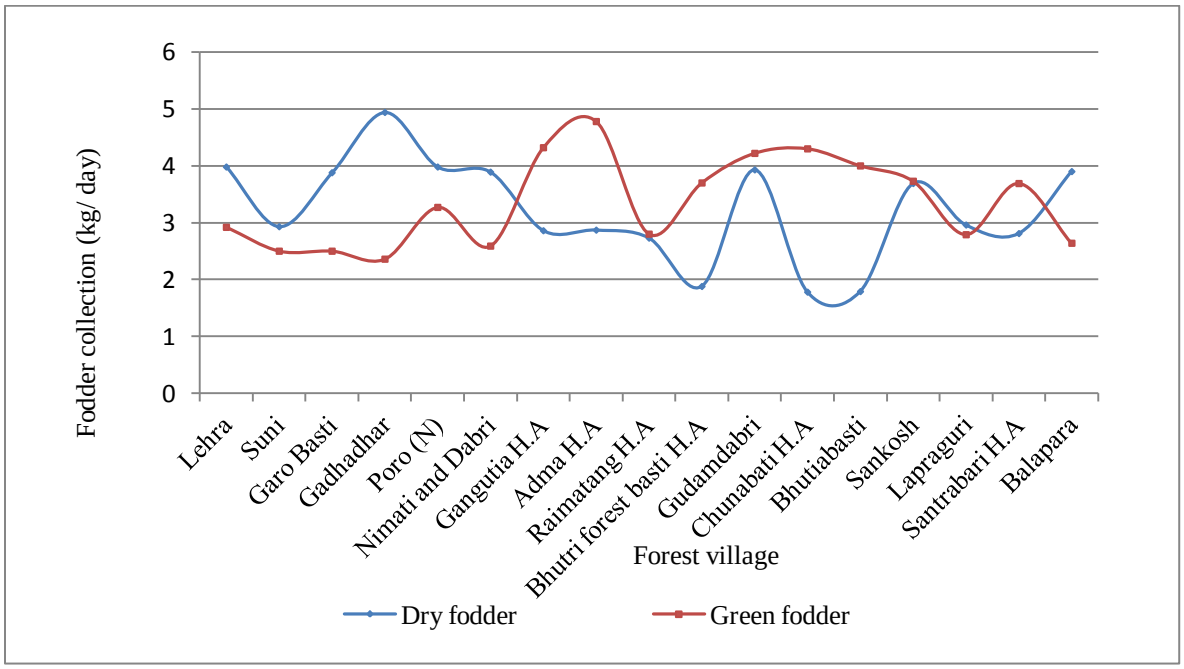


**Figure 6.2** Dry and green fodder collection in winter season for livestock (kg/ day).

### 6.3.1 Time spent and distance covered for collection of fodder from the forest

The villagers moved toward nearest surroundings for dry and green fodder of animals which include uncultivated land, waste land, common land, pastures and forests. Where limited quantity of dry and green fodder is collected from agricultural field, common open land, and waste land; there green leaves, twigs and grasses are collected from forests. The forest is the prime source of green fodder and almost major portion of requirement obtained from the forests. Even forests has been utilized whole of the year and fodder is collected regularly for various purpose. The time spent of fodder consumption from the nearby forest has been considered in hours for per day and the number of days in a year. During calculation of the time of spent, hours, days have been considered which is given for fodder collection (table 6.5).

**Table 6.5** Time spent to collect fodder.

| Sl. No. | Forest village | For dry fodder | | For green fodder | | | |
|---|---|---|---|---|---|---|---|
| | | Time spent to field | Time spent to field | Time spent to field | | Time spent to forest | |
| | | hrs/ day | days/ year | hrs/ day | days/ year | hrs/ day | days/ year |
| 1 | Lehra | 1.54 ± 0.59 | 94.23 ± 2.45 | 0.37 ± 0.31 | 81.23 ± 4.51 | 2.11 ± 0.23 | 275.45 ± 3.41 |
| 2 | Suni | 1.56 ± 0.53 | 92.43 ± 2.83 | 0.53 ± 0.24 | 84.53 ± 3.85 | 2.15 ± 0.11 | 297.23 ± 3.31 |
| 3 | Garo Basti | 2.12 ± 0.45 | 96.13 ± 3.95 | 1.10 ± 0.27 | 97.32 ± 2.97 | 2.10 ± 0.14 | 299.12 ± 3.42 |
| 4 | Gadhadhar | 2.14 ± 0.55 | 91.83 ± 2.56 | 0.73 ± 0.32 | 89.42 ± 3.71 | 2.21 ± 0.13 | 226.24 ± 2.65 |
| 5 | Poro (N) | 1.58 ± 0.42 | 95.23 ± 2.18 | - | - | 2.15 ± 0.41 | 306.31 ± 2.15 |
| 6 | Nimati and Dabri | 1.29 ± 0.45 | 91.23 ± 3.47 | 0.67 ± 0.33 | 85.56 ± 3.64 | 2.21 ± 0.31 | 302.34 ± 3.21 |
| 7 | Gangutia H.A | - | - | - | - | 2.35 ± 0.23 | 312.22 ± 3.39 |
| 8 | Adma H.A | - | - | - | - | 2.37± 0.25 | 321.31 ± 3.75 |
| 9 | Raimatang H.A | 1.19 ± 0.57 | 95.23 ± 3.28 | 0.47 ± 0.23 | 82.52 ± 3.34 | 2.25 ± 0.19 | 298.41 ± 3.43 |
| 10 | Bhutri forest basti H.A | - | | - | - | 2.21 ± 0.49 | 310.71 ± 4.15 |
| 11 | Gudamdabri | 2.23 ± 0.56 | 96.23 ± 2.85 | 0.45 ± 0.33 | 84.57 ± 3.24 | 2.56 ± 0.47 | 286.33 ± 2.75 |
| 12 | Chunabati H.A | - | - | - | - | 2.54 ± 0.56 | 324.43 ± 3.87 |
| 13 | Bhutiabasti | - | - | - | - | 2.52 ± 0.52 | 308.47 ± 3.21 |
| 14 | Sankosh | 2.29 ± 0.52 | 97.23 ± 2.86 | 0.63 ± 0.47 | 81.32 ± 4.71 | 2.56 ± 0.54 | 289.89 ± 4.53 |
| 15 | Lapraguri | 2.36 ± 0.58 | 93.23 ± 3.90 | 1.00 ± 0.42 | 88.54 ± 2.85 | 2.53 ± 0.46 | 267.67 ± 3.19 |
| 16 | Santrabari H.A | - | - | - | - | 2.59 ± 0.36 | 301.23 ± 4.48 |
| 17 | Balapara | 1.21 ± 0.45 | 98.23 ± 3.89 | 0.71 ± 0.23 | 87.63 ± 3.42 | 2.21 ± 0.38 | 286.42 ± 3.42 |
| **Average** | | **1.15 ± 0.45** | **61.25 ± 5.70** | **0.67 ± 0.32** | **86.24 ± 3.62** | **2.33 ± 0.34** | **294.93 ± 3.43** |

N.B: (Mean ± SD), H.A= High altitude location**.**

(Calculated by the researcher based on field survey, 2017).

The average maximum and minimum time spent in collection of dry fodder from field is about 2.36 hrs ± 0.58 hours and 1.19 hrs ± 0.57 hrs per day of households of Lapraguri and Raimatang villagers respectively and the average maximum and minimum days spent is about, 98.23 ± 3.89 days and 91.23 ± 3.47 days in a year which is identified in villagers of Balapara and Nimati and Dabri. Villagers were following both two sector of field and forest for green fodder. The average maximum and minimum time spent to the field is found in Garo Basti (1.10 ± 0.27 hrs/ day) and Lehra (0.37 ± 0.31 hrs/ day) villages as well as their average maximum and minimum day spent is observed about 97.32 ± 2.97 days/ year (Garo Basti) and 81.23 ± 4.51 days/ year (Lehra). Most of the green fodder of livestock requirement is being fulfilled from forest, so naturally they were spending maximum time to the forests than field to collect green fodder. The table 6.5 shows that The average maximum and minimum time spent to the forest in collection of green fodder is about 2.59 ± 0.36 hrs and 2.10 ± 0.14 hrs per day which identified in the household of Santrabari and

Garo Basti village. And the average maximum and minimum day spent in collection of green fodder is about 324.43 ± 3.87 days/ year and 226.24 ± 2.65 days/ year which is found in Chunabati and Gadhadhar village.

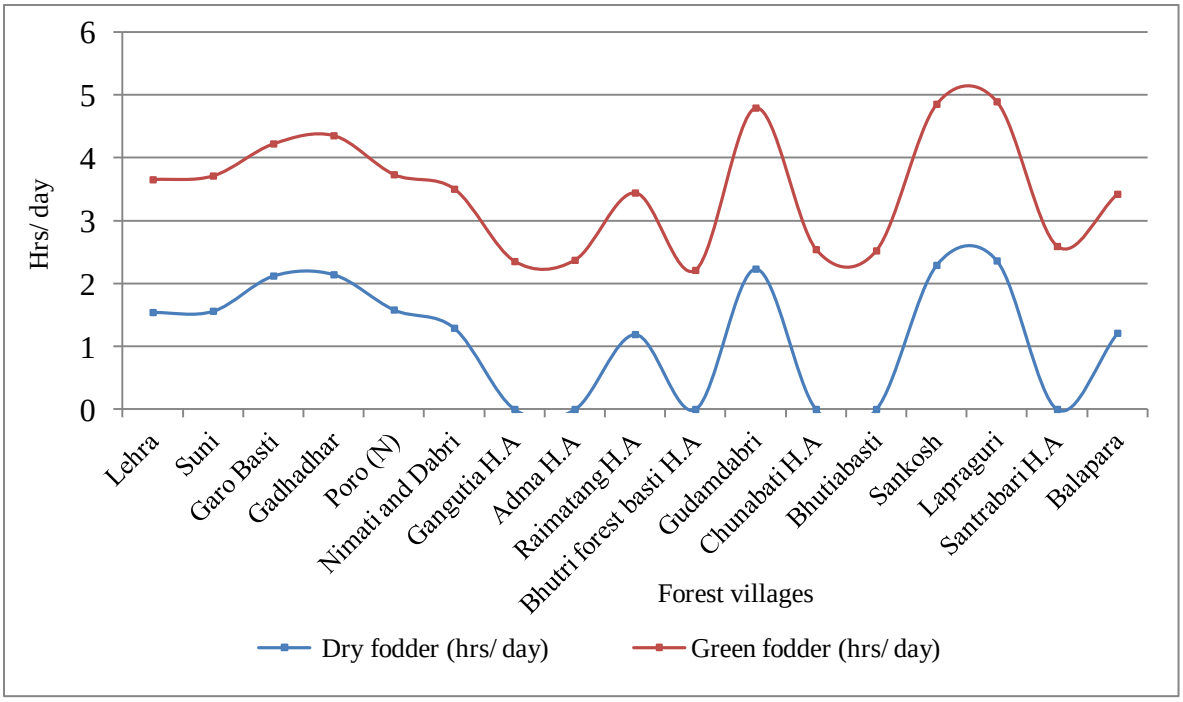


**Figure 6.3** Time spent to collect dry and green fodder.

The figure 6.3 shows that the line graph of time spent to the forest for green fodder is located over time spent for dry fodder from field which identified that villagers are very much depend on surrounding forest than field for fodder. There is a variation in distance covered in bringing dry fodder and green fodder from the field and forests. The table 6.6 shows that the average maximum and minimum distance covered in collection of dry fodder from field is about 2.96 ± 0.48 km/ day and 1.08 ± 0.49 km/ day of households of Lapraguri and Lehra villagers respectively. And the average maximum and minimum distance covered from forest is about, 284.20 ±7.56 km/ year and 101.52 ± 4.53 km/ year which is identified in Balapara and Lehra villagers. The average maximum and minimum distance covered in collection of green fodder from field is about 2.86 ± 0.62 km/ day and 1.07 ± 0.43 km/ day which depicted in the household of Gadhadhar and Lehra village and it is 244.47 ± 9.65 km/ year and 86.67 ± 5.45 km/ year in the household of Balapara and Lehra villagers respectively. The average maximum and minimum distance covered in collection of green fodder from forests is about 1.04 ± 0.15 km/ day and 0.21

± 0.12 km/ day which identified in the household of Gadhadhar and Bhutri forest basti village and it is 271.70 ± 11.46 km/ year and 65.10 ± 4.37 km/ year in the household of Gudamdabri and Bhutri forest basti respectively.

**Table 6.6** Distance covered to collect fodder.

| Sl. No. | Forest village | For dry fodder | | For green fodder | | | |
|---|---|---|---|---|---|---|---|
| | | Distance covered from field | Distance covered from forest | Distance covered from field | | Distance covered from forest | |
| | | km/ day | km/ year | km/ day | km/ year | km/ day | km/ year |
| 1 | Lehra | 1.08 ± 0.49 | 101.52 ±4.53 | 1.07 ± 0.43 | 86.67 ± 5.45 | 0.75 ± 0.12 | 206.25 ± 13.13 |
| 2 | Suni | 1.23 ± 0.52 | 113.16 ±5.34 | 1.21 ± 0.65 | 101.64 ± 6.55 | 0.72 ± 0.10 | 213.84 ± 11.21 |
| 3 | Garo Basti | 1.48 ± 0.53 | 142.08 ±9.21 | 1.37 ± 0.17 | 132.89 ± 5.47 | 0.50 ± 0.11 | 149.50 ± 6.51 |
| 4 | Gadhadhar | 2.11 ± 0.85 | 192.01 ±3.31 | 2.11 ± 0.52 | 187.79 ± 8.33 | 1.04 ± 0.15 | 235.04 ± 12.44 |
| 5 | Poro (N) | 2.48 ± 0.93 | 235.60 ±4.51 | - | - | 0.25 ± 0.12 | 76.50 ± 4.13 |
| 6 | Nimati & Dabri | 1.59 ± 0.22 | 144.69 ±7.44 | 1.57 ± 0.55 | 133.45 ± 4.54 | 0.32 ± 0.16 | 96.64 ± 6.22 |
| 7 | Gangutia H.A | - | - | - | - | 0.35 ± 0.12 | 109.20 ± 8.32 |
| 8 | Adma H.A | - | | - | - | 0.37± 0.11 | 118.77 ± 6.39 |
| 9 | Raimatang H.A | 2.73 ± 0.52 | 259.35 ±9.23 | 2.56 ± 0.19 | 209.92±10.34 | 0.25 ± 0.16 | 74.5 ± 4.35 |
| 10 | Bhutri F. basti H.A | - | - | - | - | 0.21 ± 0.12 | 65.10 ± 4.37 |
| 11 | Gudamdabri | 2.93 ± 0.69 | 281.28 ±5.73 | 2.86 ± 0.62 | 240.24 ± 9.76 | 0.95 ± 0.10 | 271.70 ± 11.46 |
| 12 | Chunabati H.A | - | - | - | - | 0.74 ± 0.13 | 239.76 ± 8.35 |
| 13 | Bhutiabasti | - | - | - | - | 0.82 ± 0.12 | 252.56 ± 10.14 |
| 14 | Sankosh | 2.69 ± 0.43 | 260.93 ±6.39 | 2.66 ± 0.19 | 215.46 ± 8.53 | 0.70 ± 0.14 | 202.30 ± 9.42 |
| 15 | Lapraguri | 2.96 ± 0.48 | 275.28 ±4.43 | 2.76 ± 0.58 | 242.88 ± 5.59 | 0.65 ± 0.14 | 173.55 ± 6.24 |
| 16 | Santrabari H.A | - | - | - | - | 0.55 ± 0.17 | 165.55 ± 8.23 |
| 17 | Balapara | 2.90 ± 0.42 | 284.20 ±7.56 | 2.81 ± 0.29 | 244.47 ± 9.65 | 0.80 ± 0.13 | 228.80 ± 12.31 |
| **Average** | | **2.13 ± 0.57** | **208.19 ± 6.15** | **2.09 ± 0.42** | **179.54 ± 7.42** | **0.59 ± 0.13** | **169.39 ± 8.42** |

N.B: (Mean ± SD), H.A=High altitude location.

(Calculated by the researcher based on field survey, 2017).

### 6.4 Forest as source of fuel wood

Forest villagers are collecting fire wood as prime NTFP from nearby forest to fulfil households need. Interestingly, all villagers are entirely dependent on forest wood for fuel. It is reported that the use of trees by small farmers in two villages in Eastern Gujarat where the direct uses of trees identified were fuel-wood, agricultural implements and house construction and providing a valuable additional source of income by sale. Households have become self-sufficient in fuel wood thereby saving of time spent on fuel wood collection (Conroy, 1994). A study based on

information gathered from 743 households spread over eight states of India, reported that bulk of the rural energy (75.77 per cent) requirements was met by forest wood fuel (Prasad et al., 1999). Fuel wood is generally used for cooking of foods, preparation of food for animals and to keep the houses warm during winter season especially it is found among high altitude sited villages. The consumption of fire wood is found to different amount throughout the season. The table 6.7 gives an idea of fuel wood consumption of average of villages of household per day and per month during summer and winter season separately.

**Plate 6.2** Wood collected by villagers as fuel at Gudamdabri village.

It is clear that villagers use substantially more quantity of fuel wood during winters than summer season. Thereafter consumption of fire wood recorded higher during winter season than summer. The average per day consumption of fire wood of each household was 3.99 ± 0.67 kg in winter and 3.29 ± 0.68 kg in summer. In winter the per day minimum and maximum quantity of fire wood consumption was 3.23 ± 0.98 kg and 4.96 ± 0.59 kg found in Lehra and Sankosh respectively where in summer it was 2.78 ± 0.81 kg and 4.03 ± 0.72 kg in Lapraguri and Adma. The consumption of fire wood per household per month recorded maximum of 145.68 ± 16.21 kg in Adma village and minimum 96.91 ± 29.42 kg in Lehra village in winter which was 120.91 ± 21.63 kg in Adma and 83.43 ± 24.31 kg in Lapraguri in summer season. In high altitude area of the Buxa hill where per household per day average was recorded from 3.36 kg ± 0.61 kg to 4.86 kg ± 0.54 kg in winter and 3.22 ± 0.78 kg to 4.03 kg ± 0.72 in summer. It is important to

note that the quantity of fire wood requirement is too high due to lack of alternative source of fuel energy such as kerosene, LPG, electricity and other sources. So villagers choose fire wood for daily use as only the alternative source of energy.

**Table 6.7** Season-wise consumption of fire-wood.

| Sl. No. | Forest village | Winter | | Summer | |
|---|---|---|---|---|---|
| | | kg/ day | kg/ month | kg/ day | kg/ month |
| 1 | Lehra | 3.23 ± 0.98 | 96.91± 29.42 | 2.81 ± 0.54 | 84.32 ± 16.21 |
| 3 | Garo Basti | 3.78 ± 0.75 | 113.31 ± 22.51 | 3.31 ± 0.59 | 99.32 ± 17.72 |
| 2 | Suni | 3.39 ± 0.74 | 101.69 ± 22.44 | 3.04 ± 0.43 | 91.30 ± 12.90 |
| 17 | Balapara | 3.89 ± 0.58 | 106.73 ± 17.45 | 2.94 ± 0.88 | 88.23 ± 26.41 |
| 5 | Poro (N) | 3.91 ± 0.84 | 117.23 ± 25.22 | 3.29 ± 0.72 | 98.65 ± 21.61 |
| 4 | Gadhadhar | 3.76 ± 0.69 | 112.83 ± 20.73 | 2.96 ± 0.89 | 88.87 ± 26.74 |
| 6 | Nimati and Dabri | 3.67 ± 0.40 | 110.12 ± 12.36 | 3.34 ± 0.47 | 100.32 ± 14.11 |
| 16 | Santrabari H.A | 4.19 ± 0.61 | 125.65 ± 18.32 | 3.22 ± 0.78 | 96.48 ± 23.47 |
| 7 | Gangutia H.A | 4.76 ± 0.77 | 142.36 ± 23.76 | 3.98 ± 0.71 | 119.43 ± 21.33 |
| 8 | Adma H.A | 4.86 ± 0.54 | 145.68 ± 16.21 | 4.03 ± 0.72 | 120.91 ± 21.63 |
| 9 | Raimatang H.A | 3.36 ± 0.64 | 100.81 ± 19.28 | 3.08 ± 0.47 | 92.47 ± 14.11 |
| 12 | Chunabati H.A | 4.79 ± 0.73 | 143.72 ± 21.91 | 3.46 ± 0.38 | 103.84 ± 11.45 |
| 10 | Bhutri F. basti H.A | 4.56 ± 0.51 | 136.87 ± 15.34 | 3.86 ± 0.79 | 115.85 ± 23.76 |
| 11 | Gudamdabri | 3.26 ± 0.67 | 97.83 ± 20.14 | 2.87 ± 0.76 | 86.11 ± 22.83 |
| 14 | Sankosh | 3.63 ± 0.59 | 108.89 ± 17.74 | 3.09 ± 0.89 | 92.82 ± 26.76 |
| 13 | Bhutiabasti | 4.14 ± 0.75 | 124.11 ± 22.61 | 3.37 ± 0.67 | 101.21 ± 20.11 |
| 15 | Lapraguri | 3.36 ± 0.68 | 100.82 ± 20.41 | 2.78 ± 0.81 | 83.43 ± 24.31 |
| **Average** | | **3.99 ± 0.67** | **119.74 ± 20.34** | **3.29 ± 0.68** | **98.64 ± 20.32** |

N.B. (Mean ± SD), H.A=High altitude location.

(Calculated by the researcher based on field survey, 2017).

### 6.4.1 Type of fuel-wood used

There are many different types of the fuel wood used by the villagers. The fuels are obtained in the forms of twigs, branches, dead dry wood, fallen wood and log wood. The villagers promote to use the wood which is available in the forest and suit to use easily as fuel. Most of the household used more than one types of fuel-wood such as dry leaves, branches and twigs. It was mostly the mixture of fallen dry wood and branches which most of the household used. As a matter of rights and concessions, the forest villagers are allowed to collect the dry leaves, dry fallen wood and small twigs and branches for fuel from nearby forest. The small logs of wood are also available but collecting in illegal way. At the aggregated level, as many as almost all of 878 households used dry or dead wood, branches and twigs as common fuel wood. But few of them used specific type more and more such as dry leaves, branches and logs. The information collected about the difference of fuel wood consumption reveals that in the high altitude where

population is concentrated remotely around the forest, the fuel wood consumption is higher than plain area villagers and the Adma, Bhutri, Raimatang, Santrabari and Chunabati are such type of village. These villagers opted branches and logs as prime fuel. During field study for the information about fuel wood, the villagers were asked to indicate their preferred of fuel trees. In most of the cases they mentioned about locally suitable trees like sal, teak, simul, jarul as the most preferred trees. Since sal and teak are very common, widely grown trees and available, so almost all respondents preferred that leaves, branches and log of these trees as a good fuel. In the lower elevation area simul, jarul, sisoo were the most preferred trees.

### 6.4.2 Time taken and distance covered for fuel wood collection

The fuel wood collection is one of the most important activities of the villagers where fuel wood used for both consumption and selling purpose. The forest is the only single field of source for fuel wood since the contribution in fuel requirement is insignificant from any other source than forest. The households of each village covered a particular distances and spent sufficient time of the day for collecting fuel wood. Now they felt that the deforestation and run out of forests cover makes fuel collection more difficult. Therefore distances to be covered for fuel wood collection increased day by day consequently, more time is to be devoted by the inhabitants for this activity.

**Plate 6.3** Collection of dry leaves as fuel at Sankosh village.

During field survey, it was reported that average hour utilized for collecting fuel-wood among households were 1 hrs to 2.30 hrs per day depending upon requirement, family size; and terrain characteristics and distance of the forest from the village. The average maximum and minimum time spending is identified on 2.09 ± 0.32 hrs/ day and 1.04 ± 0.31 hrs/ day of Chunabati and Lehra village respectively (table 6.8). It was also found that fuel wood collection requires 2 days to 3 days per week of each household and the average maximum and minimum days is on 129.57 ± 15.67 days/ year and 95.23 ± 14.90 days/ year of Bhutia basti and Lapraguri village respectively.

**Table 6.8** Time taken and distance covered.

| Sl. No. | Forest village | Time spent | | Distance covered | |
|---|---|---|---|---|---|
| | | Hrs/ day | Days/ year | Km/ day | Km/ year |
| 1 | Lehra | 1.04 ± 0.31 | 104.23 ± 12.45 | 1.05 ± 0.22 | 127.92 ± 10.23 |
| 2 | Suni | 1.13 ± 0.32 | 112.43 ± 11.83 | 1.02 ± 0.12 | 114.24 ± 13.24 |
| 3 | Garo Basti | 1.32 ± 0.45 | 126.13 ± 13.95 | 0.75 ± 0.34 | 94.59 ± 9.32 |
| 4 | Gadhadhar | 1.14 ± 0.55 | 111.83 ± 10.56 | 1.54 ± 0.52 | 172.21 ± 16.14 |
| 5 | Poro (N) | 1.53 ± 0.42 | 105.23 ± 12.18 | 0.85 ± 0.41 | 89.45 ± 14.23 |
| 6 | Nimati and Dabri | 1.49 ± 0.41 | 121.23 ± 13.47 | 1.32 ± 0.46 | 160.02 ± 11.31 |
| 7 | Gangutia H.A | 1.56 ± 0.67 | 127.12 ± 18.57 | 0.65 ± 0.21 | 171.61 ± 12.33 |
| 8 | Adma H.A | 2.01 ± 0.67 | 109.23 ± 10.45 | 0.57 ± 0.15 | 258.87 ± 6.39 |
| 9 | Raimatang H.A | 1.12 ± 0.54 | 116.23 ± 13.28 | 1.05 ± 0.21 | 126.53 ± 14.35 |
| 10 | Bhutri forest basti H.A | 2.05 ± 0.23 | 103.53 ± 14.36 | 0.71 ± 0.32 | 94.21 ± 14.37 |
| 11 | Gudamdabri | 1.22 ± 0.52 | 117.23 ± 12.85 | 0.95 ± 0.11 | 111.36 ± 13.56 |
| 12 | Chunabati H.A | 2.09 ± 0.32 | 108.35 ± 13.56 | 0.42 ± 0.16 | 221.03 ± 6.45 |
| 13 | Bhutiabasti | 1.57 ± 0.58 | 129.57 ± 15.67 | 0.78 ± 0.26 | 274.68 ± 10.24 |
| 14 | Sankosh | 1.29 ± 0.51 | 107.23 ± 12.86 | 1.70 ± 0.23 | 182.29 ± 9.43 |
| 15 | Lapraguri | 1.36 ± 0.46 | 95.23 ± 14.90 | 1.75 ± 0.24 | 166.65 ± 8.54 |
| 16 | Santrabari H.A | 1.48 ± 0.45 | 98.74 ± 17.34 | 0.85 ± 0.27 | 162.92 ± 12.63 |
| 17 | Balapara | 1.21 ± 0.37 | 108.23 ± 16.89 | 1.83 ± 0.13 | 198.06 ± 5.34 |
| **Average** | | **1.45 ± 0.46** | **111.87 ± 13.83** | **1.44 ± 0.33** | **160.39 ± 11.06** |

N.B. (Mean ± SD), H.A=High altitude location.

(Calculated by the researcher based on field survey, 2017).

It was also reported that average distance covered for collecting fuel-wood were 0.42 km to 1.83 km per day depending upon forest density, season, terrain characteristics and distance of the forest from the village. The average maximum and minimum distance covered is identified on 1.83 ± 0.13 km/ day and 0.42 ± 0.16 km/ day in Balapara and Chunabati. It was also found that fuel wood collection requires 2 days to 3 days per week of each household and the average maximum and minimum distance is on 274.68 ± 10.24 km/ year and 94.21 ± 14.37 km/ year of Bhutia basti and Bhutri forest basti respectively.

### 6.4.3 Relation between fuel wood consumption and distance

It is observed from the table 6.9, that villagers' of Chunabati and Balapara covered minimum and maximum distance of 12.6 km/ month and maximum 54.9 km/ month for fuel wood collection respectively where amount of fuel wood consumption is noticed 123.78 kg/ month and 97.48 kg/ month. So, it is clear that if distance of village is far away from forest cover, then consumption of fuel wood is decreased and if it is too closer then consumption of fuel wood is increased due to close proximity and less distance. This opposite relation also observed in other sampled villages. So it can be explained that there is negative correlation between distance covered and fuel wood consumption. These negative correlation relations are shown in the scatter diagram (figure 6.4) below along with regression line of estimated fuel wood consumption.

**Table 6.9** Calculation of estimated fuel wood consumption in respect of distances covered.

| Sl. No. | Forest village | Distance covered (km/ month) | Fuel wood consumption (kg/ month) | Estimated fuel wood consumption (kg/ month) Yc = a +bx |
|---|---|---|---|---|
| 1 | Lehra | 31.05 | 90.615 | 107.53 |
| 2 | Suni | 30.06 | 96.495 | 108.25 |
| 3 | Garo Basti | 22.50 | 106.32 | 113.70 |
| 4 | Gadhadhar | 46.20 | 100.85 | 96.61 |
| 5 | Poro (N) | 25.50 | 107.94 | 111.53 |
| 6 | Nimati and Dabri | 39.60 | 105.22 | 101.37 |
| 7 | Gangutia H.A | 19.50 | 130.895 | 115.86 |
| 8 | Adma H.A | 17.10 | 133.295 | 117.59 |
| 9 | Raimatang H.A | 31.50 | 96.64 | 107.21 |
| 10 | Bhutri forest basti H.A | 21.30 | 126.36 | 114.56 |
| 11 | Gudamdabri | 28.50 | 91.97 | 109.37 |
| 12 | Chunabati H.A | 12.60 | 123.78 | 120.83 |
| 13 | Bhutiabasti | 23.40 | 112.66 | 113.05 |
| 14 | Sankosh | 51.00 | 100.855 | 93.15 |
| 15 | Lapraguri | 52.50 | 92.125 | 92.07 |
| 16 | Santrabari H.A | 25.50 | 111.065 | 111.53 |
| 17 | Balapara | 54.90 | 97.48 | 90.34 |

(Calculated by the researcher based on field survey, 2017).

By looking the below scatter diagram (figure 6.4) it may be described that distance covered and fuel wood consumption are correlated. Further, correlation is negative because the trend of the points is downward going from the upper left side corner to the lower right side corner of the diagram. The diagram also indicates that the degree of relationship which is higher because the

all plotted points are near to the trends line which shows perfect negative correlation ship between distance and fuel wood consumption. Although, Karl Pearsons's method applied and calculated where correlation coefficient value was '- 0.675', which again indicates high negative correlation between distance cover and fuel wood consumption.

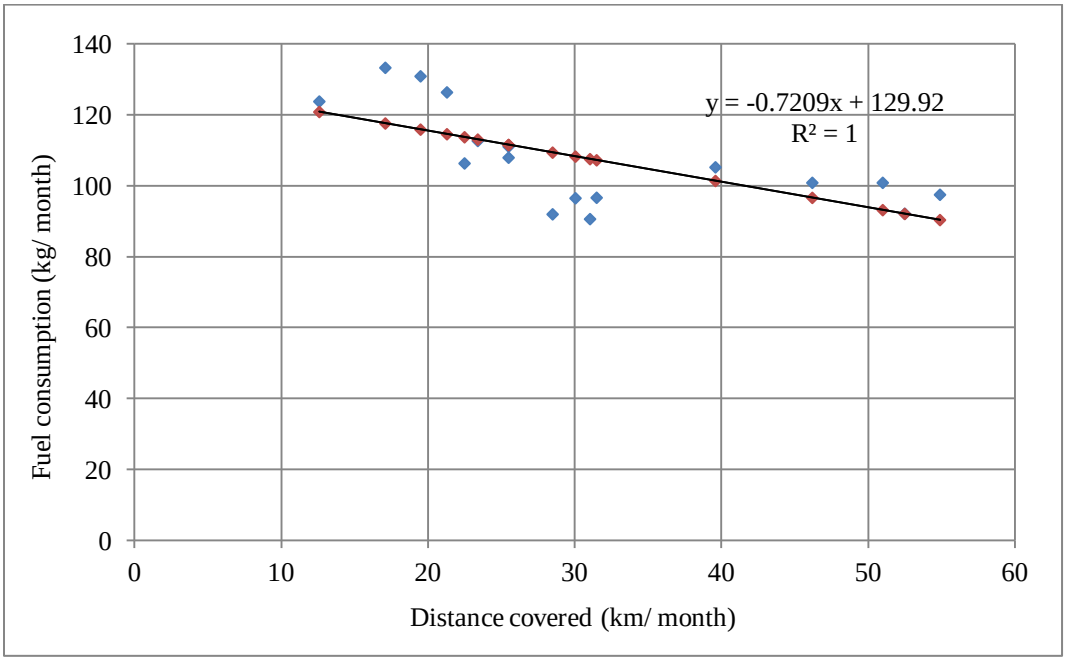


**Figure 6.4** Regression line showing relationship between fuel-wood consumption and distance covered.

### 6.5 Forest as source of timber

The timber is one of the important livelihood forest resources which are used for various purposes. In forest areas, timber and branches of trees are main element for house construction such as it is utilised for doors, windows, wall, platform and stair of houses. It is also used to prepare wood bridge, wooden tower, entresol and fence of house premise. Most of the houses are prepared as long heighted two storey houses where the timber of trees has been used as pillar of the house (plate 6.4). The ground floor is used as cattle shed and storage of fuel wood, water tank as well as garage for other purpose. Although, cattle shed is also made by wood besides the house separately to avoid the pollution. The first floor is allotted for the living purpose mainly as bed room, dining room, kitchen, open space. It is also stated that first floor is relatively save from the wild animal attack. The walls, windows, doors and floors of ground and first floor are made of wooden planks whereas stones and mud are used only for floor of ground floors and

tins, polythene, banana leaves and other tree leaves are used for roof making purpose according to their economic capacity. A limited number of households use banana grass and other leaves as thatching but tin and wood is a common component for roofing purpose almost in all the cases. The required wood is either received from contiguous forest as free basis those are agreement holder or by paying concessional price or as a claim basis on traditional rights of forest inhabitants or auction price or labour or collected unauthorized way. The main woods used for house construction are sal, sisoo and teak which are available and lifelong in this climate.

**Plate 6.4** Timber used for house construction at Gangutia village.

### 6.5.1 Timber used in house construction

The obtained information from sampled survey about the number of households using wood for house construction such as doors, windows, walls and floors shows that as many as 87.70 % of the households used tin and wood for house construction, 6.61 % used thatched and wood, 5.69 % used concrete wall with tin (table 6.10). The village wise percentage of households using timber for house construction varies from 100 % to 17.86 % where in Bhutiabasti, Gangutia, Bhutri forest basti and Lapraguri village it is covered 100 % of using timber. The Gitanjeeli project provided concrete wall house to all households of Suni and Lehra villages with tin shed so there are only 17.86 % and 31.82 % households who using timber for other purpose. Villages of high altitude such as household of Raimatang, Bhutiabasti, Gangutia, Adma, Santrabari and Chunabati used comparatively more timber than low-lying and plain area. Thus, it is noticed that

the altitude is prime factor which enhanced timber used for house construction. Also the number of rooms, size of the family or settlement house type, however, has affected the use of timber. The households at higher elevations are forced and bound to utilise the forest wood as house construction material because of lack of alternatives of house building material such as bricks, irons, soils and cement at that location and for this inhabitants depends on plain area market of Kalchini, Alipurduar, Hamiltongaunj with any cost, although transport is a big obstacle for it. So it is identified, that types of trees, nature of terrain and availability of timber also recognizes as dependent factor of timber use.

**Table 6.10** House construction material used (village-wise).

| Sl. No. | Forest village | Stone & tin | Wood & tin | Pucca (concrete with tin) | Thatched and wood | Tiled & wood | Total sampled households |
|---|---|---|---|---|---|---|---|
| 1 | Lehra | - | 7 (31.82) | 15 (68.18) | - | - | 22 (100%) |
| 2 | Suni | - | 5 (17.86) | 23 (82.14) | - | - | 28 (100%) |
| 3 | Garo Basti | - | 65 (90.28) | - | 7 (9.72) | - | 72 (100%) |
| 4 | Gadhadhar | - | 45 (71.43) | - | 18 (28.57) | - | 63 (100%) |
| 5 | Poro (N) | - | 57 (93.44) | 4 (6.56) | - | - | 61(100%) |
| 6 | Nimati and Dabri | - | 61 (89.71) | - | 7 (10.29) | | 68 (100%) |
| 7 | Gangutia H.A | - | 55 (100) | - | - | - | 55 (100%) |
| 8 | Adma H.A | - | 51 (92.73) | - | 4 (7.27) | - | 55 (100%) |
| 9 | Raimatang H.A | - | 47 (85.45) | - | 8 (14.55) | - | 55 (100%) |
| 10 | Bhutri forest basti H.A | - | 45 (100) | - | - | - | 45 (100%) |
| 11 | Gudamdabri | - | 58 (92.06) | - | 5 (7.94) | | 63 (100%) |
| 12 | Chunabati H.A | - | 52 (96.30) | - | 2 (3.70) | - | 54 (100%) |
| 13 | Bhutiabasti | | 30 (100) | - | - | - | 30 (100%) |
| 14 | Sankosh | - | 53 (88.33) | 4 (6.67) | 3 (5) | - | 60 (100%) |
| 15 | Lapraguri | - | 47 (100) | - | - | - | 47 (100%) |
| 16 | Santrabari H.A | | 61 (93.85) | 4 (6.15) | - | - | 65 (100%) |
| 17 | Balapara | - | 31 (88.57) | - | 4 (11.42) | - | 35 (100%) |
| **Total** | | | **770 (87.70 %)** | **50 (5.69 %)** | **58 (6.61%)** | | **878 (100 %)** |

H.A=High altitude location, (Calculated by the researcher based on field survey, 2017).

### 6.5.2 Types of trees used as source of timber

The type of trees used as sources of timber has been collected through sampled study to consider the tree species which are most frequently used for timber. The respondents of 17 villagers specified different types of wood they used. Out of 878 respondents, about 553 households (62.98 %) used both sal and teak, 124 households (14.12 %) teak, sissu and sidha, 81 households (9.22 %) sissu, odal, 73 households (8.31 %) khair, Jarul and neem, 47 households (5.35 %) sidha, semal, simul and neem etc. for house as well as other uses. The teak, sal and sisoo are

popular timber in higher and middle altitudes household such as Adma, Chunabati of high altitude villagers and Sankosh, Santrabari, Raimatang, Gangutia and Bhutri forest basti of middle altitudes villagers while gamaree, khair, sidha and neem are very common used in lower altitudes areas. The sal and teak were popular and valuable tree species of timber for all respondents since its lifelong than other timber.

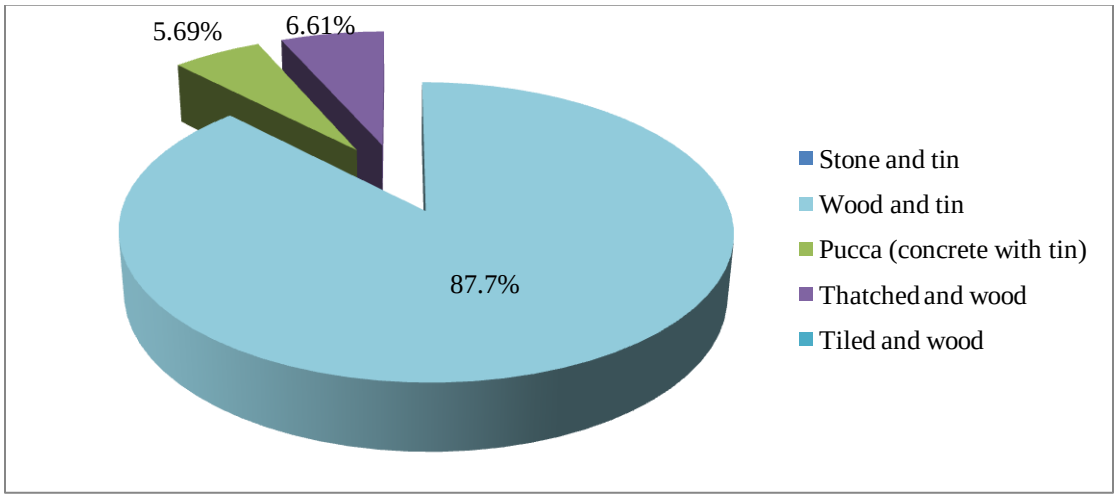


**Figure 6.5** House construction material used.

### 6.5.3 Methods of obtaining timber for house construction

In 1894 cultivators were first allowed to settle in the forest in connection with the scheme of taungya sowings. About 1904 establishment of forest villages became a regular policy and very large numbers of forest villagers were allowed to settle in the forests of Alipurduar District (Das, 2000). Forest villagers were found very useful for undertaking cultural operations in the forest and also for fire protection purpose. Initially there was no sufficient control over the forest property and villagers within forest or near the forest had been consumed forest and forestland as common resource considering it as their own property. A villager might cultivate and number of cattle he might keep according to capacity (Ninth working plan of Jalpaiguri Forest Division, Vol. I, 2009).

In 1912 rules were made to limiting the cultivation and homestead land to 2.5 acres in plains, and 1.5 acres in hills per family (Das, 2000). Later the Indian Forest Act, 1927 was the important regulating act of the forests of India where village forest considered being included as a category of forest and extensive rights for fuel and fodder etc were allowed for villagers (Rahman, 2000). After the independence, the government has fixed a certain quantity of timber,

called free grant, to be given to the forest villagers and residents of forest contiguous villages. As a result the forest villagers have been provided with wooden departmental quarters in most cases. Constructions of wooden huts have been started from the year 1947-48 and have continued till 1960-61 (Das, 2000). Forest villagers cultivate their land and rare large number of cattle. Later the villagers are also permitted to get additional timber on concessional price as an agreement holder for certain small demands (PD) like repairing of houses, extra room purpose, fence making, pillar making or other agricultural implements. Besides if the demands of timber needs of the households are not fulfilled through these methods, the additional amount is to be complete by either buying the timber at commercial rates, or auction basis or through unauthorized gathering from the nearby forest.

**Table 6.11** Methods of obtaining timber for house construction (households-wise).

| Sl. No. | Forest village | Free grant basis | Concessional price basis | Auction basis | Purchase from markets | Un-auth-orized collection |
|---|---|---|---|---|---|---|
| 1 | Lehra | 15 (68.18) | 05 (22.73) | 02 (9.09) | - | - |
| 2 | Suni | 18 (64.29) | 05 (17.86) | 03 (10.71) | - | 02 (7.14) |
| 3 | Garo Basti | 64 (88.89) | 05 (6.94) | - | - | 03 (4.17) |
| 4 | Gadhadhar | 50 (79.37) | 11 (17.46) | - | - | 02 (3.17) |
| 5 | Poro (N) | 54 (88.52) | 03 (4.92) | 4 (6.56) | - | - |
| 6 | Nimati and Dabri | 60 (88.24) | 5 (7.35) | 03 (4.41) | - | - |
| 7 | Gangutia H.A | 53 (96.36) | 02 (3.64) | - | - | |
| 8 | Adma H.A | 51 (92.73) | 3 (5.45) | - | - | 01 (1.82) |
| 9 | Raimatang H.A | 44 (80.00) | 7 (12.72) | 02 (3.64) | - | 02 (3.64) |
| 10 | Bhutri forest basti H.A | 39 (86.67) | 5 (11.11) | - | - | 01 (2.22) |
| 11 | Gudamdabri | 54 (85.71) | 5 (7.95) | 02 (3.17) | | 02 (3.17) |
| 12 | Chunabati H.A | 50 (92.60) | 2 (3.70) | - | - | 02 (3.70) |
| 13 | Bhutiabasti | 27 (89.99) | 03 (9.99) | - | - | - |
| 14 | Sankosh | 54 (90.00) | 3(5.00) | 3 (5.00) | - | - |
| 15 | Lapraguri | 44 (93.62) | - | - | - | 03 (6.38) |
| 16 | Santrabari H.A | 62 (95.38) | - | 3 (4.62) | - | - |
| 17 | Balapara | 32 (91.43) | 3 (8.57) | - | - | - |
| **Average** | | **771** | **67** | **22** | | **18** |
| **%** | | **87.81 %** | **7.63 %** | **2.51 %** | | **2.05 %** |

H.A=High altitude location, (Calculated by the researcher based on field survey, 2017).

It is observed that 87.81 % of households obtained the timber as free grant through forest department for house construction (table 6.11). Another 7.63 % of the households purchased at concessional price through negotiation with the local forest office for extra demand; and 2.51 % collected through auction basis as well as 2.05 % of households were engaged to fulfil other extra needs of timber in unauthorized way. It is observed that average 186.92 ± 3.98 cft. timbers

obtained as free grant through forest department for house construction (table 6.12). Another 10.50 ± 2.23 cft purchased at concessional price after negotiation with the local forest office, 2.11 ± 0.57 cft collected through auction basis and 0.35 ± 0.04 cft timbers collected in unauthorized way to fulfil extra demand. The consumption of timber wood per household as free grant basis recorded maximum of 202.45 ± 3.21 cft in Lapraguri village and minimum 176.55 ± 4.78 cft in Lehra village, concessional price basis it is 15.59 ± 2.56 cft in Raimatang village and 09.12 ± 1.43 cft in Chunabati village, auction basis it is 5.97 ± 0.91 cft in Raimatang and 2.21 ± 1.25 cft in Poro (N) and in unauthorized way it is 0.95 ± 0.075 cft in Adma and 0.38 ± 0.091 cft in Suni. There is no option observed in purchase of wood from the market.

**Table 6.12** Amount of timber obtained for house construction (households-wise).

| Sl. No. | Forest village | Free grant basis (cft) | Concessional price basis (cft) | Auction basis (cft) | Purchase from markets (cft) | Unauth-orized collection (cft) |
|---|---|---|---|---|---|---|
| 1 | Lehra | 176.55 ± 4.78 | 14.57 ± 2.26 | 5.92 ± 1.25 | - | - |
| 2 | Suni | 179.23 ± 3.35 | 12.59 ± 3.06 | 4.84 ± 1.47 | - | 0.38 ± 0.091 |
| 3 | Garo Basti | 183.42 ± 4.41 | 10.49 ± 3.41 | - | - | 0.57 ± 0.085 |
| 4 | Gadhadhar | 181.54 ± 3.55 | 9.78 ± 1.86 | - | - | 0.76 ± 0.077 |
| 5 | Poro (N) | 184.35 ± 4.36 | 11.23 ± 2.12 | 2.21 ± 1.25 | - | - |
| 6 | Nimati and Dabri | 183.58 ± 3.45 | 12.21 ± 2.32 | 2.57 ± 0.94 | - | - |
| 7 | Gangutia H.A | 195.26 ± 3.75 | 9.48 ± 2.46 | - | - | - |
| 8 | Adma H.A | 196.61 ± 4.26 | 10.52 ± 1.77 | - | - | 0.95 ± 0.075 |
| 9 | Raimatang H.A | 185.23 ± 3.35 | 15.59 ± 2.56 | 5.97 ± 0.91 | - | 0.43 ± 0.083 |
| 10 | Bhutri F. basti H.A | 194.31 ± 3.86 | 11.76 ± 2.87 | - | - | 0.48 ± 0.086 |
| 11 | Gudamdabri | 179.89 ± 5.31 | 14.53 ± 2.92 | 2.87 ± 1.11 | - | 0.78 ± 0.079 |
| 12 | Chunabati H.A | 197.23 ± 4.45 | 09.12 ± 1.43 | - | - | 0.77 ± 0.036 |
| 13 | Bhutiabasti | 181.45 ± 3.38 | 12.54 ± 2.41 | - | - | - |
| 14 | Sankosh | 176.95 ± 4.32 | 14.93 ± 3.56 | 5.79 ± 0.97 | - | - |
| 15 | Lapraguri | 202.45 ± 3.21 | - | - | - | 0.79 ± 0.065 |
| 16 | Santrabari H.A | 200.67 ± 4.63 | - | 3.61 ± 1.25 | - | - |
| 17 | Balapara | 183.89 ± 3.26 | 09.21 ± 2.87 | - | - | - |
| **Average** | | **186.92 ± 3.98** | **10.50 ± 2.23** | **2.11 ± 0.57** | **-** | **0.35 ± 0.04** |

N.B. (Mean ± SD), H.A=High altitude location,
(Calculated by the researcher based on field survey, 2017).

### 6.5.4 The quantity of timber required for house construction

The quantity of timber used by households and for how long the wood stayed lasts as houses material and the time at which replacement require, all is depend on age and height of trees. The trees which have 5 feet to 10 feet girth measured and at a height of 35 feet to 45 feet are considered as standard and good quality timber for construction. The number of trees are

depends on the good tree species such as if the species are simul, jarul, khai, sidha and neem, then the number of trees required will be more as compared to other trees of sal, teak, sissu etc.

**Table 6.13** Amount of timber used and replacement in house construction.

| Sl. No. | Forest Village | Amount of timber (cft) used for house construction (per household) | Average period for replacement of timber (years) |
|---|---|---|---|
| 1 | Lehra | 197.04 ± 8.29 | 45.81 ± 4.54 |
| 2 | Suni | 197.04 ± 7.97 | 41.21 ± 3.43 |
| 3 | Garo Basti | 194.48 ± 7.91 | 39.01 ± 4.59 |
| 4 | Gadhadhar | 192.08 ± 5.49 | 42.96 ± 3.89 |
| 5 | Poro (N) | 197.79 ± 7.73 | 46.12 ± 5.72 |
| 6 | Nimati and Dabri | 198.36 ± 6.71 | 43.41 ± 4.47 |
| 7 | Gangutia H.A | 204.74 ± 6.21 | 35.98 ± 4.71 |
| 8 | Adma H.A | 208.08 ± 6.11 | 34.03 ± 2.72 |
| 9 | Raimatang H.A | 207.22 ± 6.90 | 46.76 ± 4.47 |
| 10 | Bhutri forest basti H.A | 206.55 ± 6.82 | 33.86 ± 5.79 |
| 11 | Gudamdabri | 198.07 ± 9.42 | 39.87 ± 4.76 |
| 12 | Chunabati H.A | 207.12 ± 5.92 | 33.46 ± 4.38 |
| 13 | Bhutiabasti | 193.99 ± 5.79 | 51.04 ± 2.67 |
| 14 | Sankosh | 197.67 ± 8.85 | 43.76 ± 3.89 |
| 15 | Lapraguri | 203.24 ± 3.28 | 52.78 ± 2.81 |
| 16 | Santrabari H.A | 204.28 ± 5.88 | 37.88 ± 3.78 |
| 17 | Balapara | 193.10 ± 6.13 | 42.94 ± 4.88 |
| **Average** | | **200.06 ± 6.82** | **41.70 ± 4.21** |

N.B. (Mean ± SD), H.A=High Altitude

(Calculated by the researcher based on field survey, 2017).

The average sort out in this study, however, gives an idea of the quantity of timber wood required in different locations and altitudes. The quantity of timber used is more in high altitude than in low-lying and plain area. The availability and types of timber, terrain character, climate and non-availability of alternatives are responsible factors for the variation of consumption of wood. The villagers' of Gangutia, Bhutri forest basti, Bhutiabasti, Adma, Raimatang, Chunabati, Santrabari and Lapraguri consumed more quantity of timber because it is the only available material for construction and all types of rooms are made by woods. While the bricks, woods, tins, bamboos are used as house materials in comparatively low lying and plain region and such villages are Gadhadhar, Nimati and Dabri, Gudamdabri and Garo Basti. The average used amount of timber wood per household for house construction is recorded of 200.06 ± 6.82 cft and average number of years for replacement of timber is 41.70 ± 4.21 years (table 6.13). The average maximum and minimum amount of timber used for house construction (per household)

is identified of 208.08 ± 6.11 cft in Adma and 193.10 ± 6.13 cft in Balapara. The timbers has been used for the construction of houses is generally changed after the damaged of about more or less between 33 to 53 years as stated by respondents and average maximum and minimum number of years for replacement of timber is observed 52.78 ± 2.81 years in Lapraguri and 33.46 ± 4.38 years in Chunabati village.

### 6.6 Other wood needs and the use of forest

There are some special needs which are being fulfilled by collection of branches and woods from the neighbouring forest. The needs of agriculture related implements such as harrows for cultivation, wood plough and rod poles of wood for vegetable creepers and fence, sit benches for house and shop and bulk fire wood for the occasional purpose such as wedding ceremony, birth party and cremation activity etc. have been fulfilled by forest wood. The huge quantity of wood needed for cultural and social ceremonies although it depends on size and number of invitees of occasion. Therefore, villagers could not able to response the actual fire wood requirement. However, it has been depicted that an average of 5 to 6 quintal of extra fire wood is needed for each of these kinds of occasions. Relatives of organizers either contribute some amount of wood or pay for it individually or go together to the nearby forest to collect required amount of wood through unauthorized way. Although sometimes the concerned family collects it on concessional rate by taking permission from local forest authority/ beat and range office as forest agreement holder. The requirement of forest wood as well as small branches for agricultural appliance is a common phenomenon and for that purpose almost 4 to 5 small size trees are acquired for each household every year as respondents replied during field survey. It is also mentioned that branches of trees are mainly used to making hedges and protective poles around the agricultural field. Again this required amount of branches has been received after granting permission or through negotiation with local office of Forest Department, but in most of the time, villagers enter to surrounding forest and collect it through illegal or invisible way.

### 6.7 Forest as source of employment

Forest villagers never thought their livelihood economy and existence without forests. It is, however, considered that the forest offered more or less some employment opportunity to for their livelihood. Forest, no doubt generates a considerable amount of income but most of its income gone to the Government side through silviculture tree felling by Forest Department. Even

most of the permanent workers, contractors come from outside who were deployed for tree felling, lumbering works, as a result villagers do not get financial assistance except casual or contractual basis work of labour. Although the FPCs and EDCs members of Joint forest Management committee (JFMC) are getting financial support through beneficiaries sharing of different activities, nursery, plantation, cleaning of weeds, loan for farming work etc. During the field survey it has also been identified that about 141 household members out of 878 household (chapter 8 and table 8.31) were engaged in forestry activities being member of FPCs and EDCs committees, Self Help Group members, or employed as casual, contractual labour for official activities such as nursery supervisor, day and night guard, seed collectors, tourist guide etc. In this connection it is reported that for almost six months in a year, the tribals in Western Ghat Zone of Maharashtra were engaged. Due to uninterrupted rain in the rainy seasons, the tribals got relatively better employment in the summer off-farm works such as hunting, collection of NTFPs and works under employment guarantee scheme. The forest plays alone and offered them for more than 30 % of the total man days (Suryawanshi, 1992).

### 6.8 Conclusion

The study indicated that forest villagers are very much depended upon forests for basic livelihood needs. The NTFPs is very much inevitable for villagers' economic support. So gathering and selling of NTFPs are the permanent source of income for forests inhabitants of this area. The study also revealed that the forest is used as prime source of green fodder for livestock grazing and the cattle feeding on plants, leaves, grass and twigs; and the grass, leaves and twigs are cut off to be brought home for further used. It is to be noted that fuel wood is the common source of domestic energy for forest villagers and forest is the only source of fuel wood and except it, villagers' daily life may be stopped any time. It is also clear that timber is the prime forest produce which also used as component of house construction as well as to make doors, windows, walls, pillar, upper floors, stairs, agricultural tools, fence etc. Besides the study showed that a good number of the collected plants has been used for the treatment of multiple diseases, such as Andrographis paniculata (kalmegh; Chirata) are used for the treatment of stomach, fever, liver, skin and ulcer diseases; Cadiospermum helicacabum (Lataphatkari; Sibjhul; Bhado) for the treatment of rheumatism, snake bite diseases; and other more than 100 plants are used to treat many diseases.

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