# Baseline Survey Report

**Name of the project**

Homestead Agro Forestry through Improved Management Practices

**Implementing entity**

Prattashy

Partner NGO of Arannayk Foundation

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**Introduction:**

This report describes the baseline survey result designed to establish the initial conditions of the project **"Homestead Agro Forestry Through Improved Management Practices"** implemented by Prattashy, partner NGO of Arannayk Foundation. The survey was designed to observe the current status of the biodiversity resources in homesteads of the project participants and as well as in the neighbouring reserve or protected forests. The project initially assumed that homesteads are getting divided due to vast population growth. At the same time people are setting up new habitations, mills and factories by destroying hills, natural forests and local kinds of trees. Moreover, due to the lack of awareness and to get more profit people are planting fast growing plants in their homesteads. These trees do not support our biodiversity. Most of the inhabitants live beside the hilly areas and a good number of people are directly and indirectly dependent on the forest resources. They use forest fuel woods, cultivate forest land and use other forest resources in many ways. As a result biodiversity of the homesteads and the forests are decreasing day by day. In this connection the proposed base line survey tried to gather information on the current status of the homestead and neighbouring forests to which rural people depend for their timber, fuel and income. The survey also tried to appraise the biodiversity of both the forests. Current stock of the forests and peoples' dependence on forests was also assessed.

**Objectives of the baseline survey:**

- To assess the current status of both homestead and community/reserve forests.
- To identify the biodiversity currently available in both homestead and community/reserve forests.
- To identify the lost/endangered biodiversity from homestead and community/reserve forests.

**Methodology of the baseline survey:**

The baseline survey was conducted in two parts. First part (A) includes assessment of community/ reserve forests nearby project area and the second part (B) includes homestead survey with a pre-structured questionnaire format to assess the homestead forests, households' economic status, their dependence on forests resources and gender role in homestead agro forestry practices.

***Part A- Assessment of community or reserve forests*:** To measure the level of stockings in the reserve forest areas a total of 30 main plots (10m X 10m) from two Range (Sitakunda and Mirsari Range) situated near the study area were selected by systematic sampling procedure for tree measurement and 120 sub plots (4 sub plots of 2m X 2m in size at 4 corners of each main plot) were also selected for regeneration study. Two imaginary grid lines were considered 100m away from the edge of the forest along the length of the forest and main plots were selected from the grid lines at every 100m interval. Diameter at breast height (Dbh) and total height of all trees in a sample plot were measured using Diameter-tape and

Spiegel Relascope. For regeneration study all the seedlings were counted and recorded on the data sheet according to species from the sub plots. Forest officials and local people in or nearby the forests were also asked to determine the lost biodiversity from forests.

***Part B- Homestead survey*****:** Homestead survey was conducted with a pre-structured questionnaire in the study area. A total of 50 households were surveyed taking 25 each from both Sitakunda and Mirsarai Upazila randomly from the study area. The head of the each selected household was interviewed to gather required information. In the absence of the head of the family the female head or any adult member of the family were interviewed.

The collected data were analyzed and presented in the result section.

**Results:**

***Part A- Assessment of reserve forests:***

The study area is situated near the reserved forest areas of Sitakunda and Mirsari Range under Chittagong North Forest Division. People of the study area frequently go inside the forests and collect their desired resources for sale or own consumption. Usually neighbouring people travel on foot 5-6 kilometre on average to go inside the forests to collect forest resources. Field visits to this forests show that most of the areas of the forests are bushy having scattered trees, herbs and shrubs (Photo 1a). However Forest Department has taken initiative to reforest the barren areas and planted with some selected tree species to bring the forest under tree cover (Photos 1b & 1c). It is found from the field survey that Akashmoni (20%) is the main tree species followed by Gamar (14%) and Chickrassi (9%) in Sitakunda range and Akashmoni (30%), Teak (25%), Dharmara (10%) and Goda (9%) are the major tree species found in Mirsarai range (Table 1). It is observed that stem per hectare is higher in Sitakunda (1740) compared to Mirsarai (1393). Plant diversity was also found higher in Sitakunda (36 species) compared to Mirsarai (12 species) Upazila. Photo 2 shows some of the evidences how people of Mirsarai collecting and using forest resources. Some of the endangered tree species like Gorjon, Chakua koroi, Tetua koroi, Goda, Dharmara and Gutgutia (Table 1) were also found in the study area, although very few in numbers but shows the positive attitude of the forest department to conserve these endangered species in the forests. It is found that local people are collecting and storing forest resources particularly fuelwood, bamboos, sungrass etc. openly from the forests on shoulder loads (Photo 2). From the conversation with the forest dependent people it is clear that people who are dependent on agriculture with no other secondary occupation are more dependent on forests.

**Table 1:** Forest stockings in the study area (values in the parentheses denote percentage)

| Species name | Sitakunda | | Mirsari | | Total | |
|---|---|---|---|---|---|---|
| | No. of stems | Stems/ha | No. of stems | Stems/ha | No. of stems | Stems/ha |
| Akashmoni | **51(19.54)** | **340** | **63 (30.14)** | **420** | 114 (24.26) | 380 |
| Amloki | 10 (3.83) | 67 | - | - | 10 (2.13) | 33 |
| Asar gula | 3 (1.15) | 20 | - | - | 3 (0.64) | 10 |
| Boichi | 4 (1.53) | 27 | - | - | 4 (0.85) | 13 |
| Bokul | 1 (0.38) | 7 | - | - | 1 (0.21) | 3 |
| Bora (Moss) | - | - | 5 (2.39) | 33 | 5 (1.06) | 17 |
| Bormala | 5 (1.92) | 33 | - | - | 5 (1.06) | 17 |
| Boropata | 2 (0.77) | 13 | - | - | 2 (0.43) | 7 |
| Borta | 7 (2.68) | 47 | 7 (3.35) | 47 | 14 (2.98) | 47 |
| Chakua koroi | 3 (1.15) | 20 | - | - | 3 (0.64) | 10 |
| Champa | 7 (2.68) | 47 | - | - | 7 (1.49) | 23 |
| Chatian | 6 (2.30) | 40 | - | - | 6 (1.28) | 20 |
| Chickrassi | **24 (9.20)** | **160** | - | - | 24 (5.11) | 80 |
| Debdaru | 1 (0.38) | 7 | - | - | 1 (0.21) | 3 |
| Dhakijam | - | - | 6 (2.87) | 40 | 6 (1.28) | 20 |
| Dharmara | 2 (0.77) | 13 | **20 (9.57)** | **133** | 22 (4.68) | 73 |
| Dumur | 3 (1.15) | 20 | - | - | 3 (0.64) | 10 |
| Eucallyptus | 4 (1.53) | 27 | - | - | 4 (0.85) | 13 |
| Gamar | **36 (13.79)** | **240** | 13 (6.22) | 87 | 49 (10.43) | 163 |
| Goda | - | - | **18 (8.61)** | **120** | 18 (3.83) | 60 |
| Gorjon | 3 (1.15) | 20 | - | - | 3 (0.64) | 10 |
| Gutgutia | - | - | 10 (4.78) | 67 | 10 (2.13) | 33 |
| Jam | 13 (4.98) | 87 | 11 (5.26) | 73 | 24 (5.11) | 80 |
| Jhau | 1 (0.38) | 7 | - | - | 1 (0.21) | 3 |
| Kat badam | 10 (3.83) | 67 | - | - | 10 (2.13) | 33 |
| Krishnachura | 4 (1.53) | 27 | - | - | 4 (0.85) | 13 |
| Lohakat | 5 (1.92) | 33 | - | - | 5 (1.06) | 17 |
| Menda | - | - | 1 (0.48) | 7 | 1 (0.21) | 3 |
| Minjiri | 3 (1.15) | 20 | - | - | 3 (0.64) | 10 |
| Mohua | 1 (0.38) | 7 | - | - | 1 (0.21) | 3 |
| Naglingam | 1 (0.38) | 7 | - | - | 1 (0.21) | 3 |
| Neem | 4 (1.53) | 27 | - | - | 4 (0.85) | 13 |
| Pine | 4 (1.53) | 27 | - | - | 4 (0.85) | 13 |
| Pitali | 4 (1.53) | 27 | - | - | 4 (0.85) | 13 |
| Radachura | 5 (1.92) | 33 | - | - | 5 (1.06) | 17 |
| Rita | 6 (2.30) | 40 | - | - | 6 (1.28) | 20 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Roktan | 4 (1.53) | 27 | - | - | 4 (0.85) | 13 |
| Sil koroi | - | - | 3 (1.44) | 20 | 3 (0.64) | 10 |
| Simul | 8 (3.07) | 53 | - | - | 8 (1.70) | 27 |
| Sonalu | 8 (3.07) | 53 | - | - | 8 (1.70) | 27 |
| Teak | - | - | **52 (24.88)** | **347** | 52 (11.06) | 173 |
| Tetua Koroi | 6 (2.30) | 40 | - | - | 6 (1.28) | 20 |
| Unknown spp. | 2 (0.77) | 13 | - | - | 2 (0.43) | 7 |
| **Total** | **261 (100)** | **1740** | **209 (100)** | **1393** | **470 (100)** | **1567** |

(a)

(b)

(c)

**Photo 1**: Current state of reserved forests in Mirsarai Range.

**Photo 2**: Collection of forest resources (fuelwood, bamboos, sungrass, etc.) by the local people from nearby reserved forest areas in Mirsarai.

*Regeneration status*

The forest survey also tried to look at the regeneration that is naturally coming on the forests. It is found that regeneration status of both Sitakunda and Mirsari range are good containing 8000 seedlings/ha in Sitakunda compared to 8333 seedlings/ha (Table 2). The diversity of the regenerating plants is good in Sitakunda (26 species) compared to Mirsarai (9 species). Jam (9%), Bhadi (9%), Bohera (8%) and Boropata (8%) are regenerating in greater percentage in Sitakunda while Teak (44%), Goda (17%), Dharmara (12%) and Gamar (9%) are regenerating in greater percentage in Mirsarai range. Overall the regeneration status of both the forests is good.

**Table 2**: Regeneration status of the reserved forests nearby the study area.

| Species Name | Sitakunda Range | | Mirsarai Range | |
|---|---|---|---|---|
| | Seedlings/ha | % | Seedlings/ha | % |
| Asar gula | 417 | 5 | - | - |
| Akashmoni | 500 | 6 | - | - |
| Amloki | 583 | 7 | - | - |
| Arshogandha | 125 | 2 | - | - |
| Ashok | 83 | 1 | - | - |
| Bamboo | 167 | 2 | - | - |
| Batna | 250 | 3 | - | - |
| Bhadi | **708** | 9 | - | - |
| Bohera | **667** | 8 | - | - |
| Boichi | 42 | 1 | - | - |
| Bormala | 167 | 2 | - | - |
| Boropata | **667** | 8 | - | - |

| | | | | |
|---|---|---|---|---|
| Borta | 125 | 2 | - | - |
| Boruna(Moss) | - | - | 83 | 1 |
| Cicus | 250 | 3 | - | - |
| Dharmara | 375 | 5 | **1000** | 12 |
| Gamar | - | - | **708** | 9 |
| Goda | - | - | **1375** | 17 |
| Gutgutia | - | - | 375 | 5 |
| Horinagoda | 333 | 4 | - | - |
| Horitaki | 83 | 1 | - | - |
| Jam | **750** | 9 | 542 | 7 |
| Jibon | 42 | 1 | - | - |
| Kadam | - | - | 167 | 2 |
| Kuruch | 333 | 4 | - | - |
| Menda | 125 | 2 | 417 | 5 |
| Pisla | 83 | 1 | - | - |
| Puti jam | 250 | 3 | - | - |
| Rita | 167 | 2 | - | - |
| Teak | - | - | **3667** | 44 |
| Toon | 125 | 2 | - | - |
| Uri Amm | 583 | 7 | - | - |
| **Total** | **8000** | **100** | **8333** | **100** |

*Economic plants and lost biodiversity*

The survey also tried to identify other economic plants to which people are dependent to generate income or save money by using them for their own purposes. It was found that people nearby forest usually use sungrass (thatching materials), bamboos (construction material, fuel, handicrafts, and other implements), pitli patha, cane (making handicrafts, mat and other implements), ful jaro (broom), lebu (fruit), peara (fruit) and banana (fruit, vegetable). Many people were found to go and collect these economic plants from the forests and there by maintain there life. Local people inside the forests engaged in forest resource extraction and collection were asked to know their judgment about biodiversity loss. All of them opine that the forests are losing its biodiversity day by day and Gorjon, Sonalu, Kadam, Udal, Menda, Telsur, Buisal, Dhakijam, Puti jam, Kui jam, Gab, Kau, Damul, Lota Am already became rare or endangered in the forests of Sitakunda and Mirsarai (Table 3).

**Table 3:** List of economic plants and lost species in the study area.

| Range | Economic plants | Lost species |
|---|---|---|
| Sitakunda | Bamboo, Peara, Sungrass (Thatching), Ful jaro (broom), Gondapatil, Nilkanto, Lajjaboti (Medicinal) etc. | Gorjon, Sonalu, Kadam, Udal, Menda, Telsur, Buisal, Dhakijam, Puti jam, Kui jam, Gab, Kau, Damul, Lota Am |
| Mirsarai | Ful jaro (broom), Sungrass, Cane, Pitli patha (wrapping materials), Banana, Dumur, Kanardigi, Chundal | |

*Status of wildlife*

Information regarding wildlife shows that Deer, Monkey, Bon morag, Porcupine, Mothura, Fox, Owl, Pig, and Snakes are some of the wildlife usually seen by the local people to their adjacent forests. However the forests were the home of Bear, Elephant in the recent past (Table 4).

**Table 4**: Presence or absence of wildlife in the study area.

| Range | Wildlife seen by the local people | | | | |
|---|---|---|---|---|---|
| | Present | 5 years ago | 10 years ago | 15 years ago | 20 years ago |
| Sitakunda | Deer, Monkey, Snakes, Porcupine, Pig, Bon morag | Deer, Python, Monia, Kakatua, Porcupine | Bear, Deer | - | - |
| Mirsarai | Deer, Beji, Pig, Monkey, Snakes, Mothura, Fox, Owl | Bon morag, Pig | Bon morag | Elephant | - |

***Part B- Household survey:***

*Family size, sex and education*

The result of the survey shows that average family size in the study area is 5.12 of which 50 percent male and the rest 50 percent female members. In case of education 66 percent of the family members were found literate and the rest 34 percent were illiterate (Table 5). The literacy rate is found higher in Mirsarai Upazila (75%) compared to Sitakunda Upazila (57%).

**Table 5**: Distribution of respondent households by family size, sex and education (values in the parentheses denote percentages)

| Upazila | Village | Familly size | Sex | | Education | |
|---|---|---|---|---|---|---|
| | | | Male | Female | Literate | Illiterate |
| Sitakunda | **Baroaolia (n= 2)** | 4.00 | 2.00 (50) | 2.00 (50) | 3.00 (75) | 1.00 (25) |
| | **Moidam mahdebpur (n= 4)** | 4.50 | 2.25 (50) | 2.25 (50) | 3.75 (83) | 0.75 (17) |
| | **Porba naralia (n= 3)** | 5.67 | 2.67 (47) | 3.00 (53) | 2.00 (35) | 3.67 (65) |
| | **Hasnabad (n= 4)** | 3.75 | 1.75 (47) | 2.00 (53) | 2.75 (73) | 1.00 (27) |
| | **Moidam salimpur (n= 5)** | 5.80 | 3.60 (62) | 2.20 (38) | 3.00 (52) | 2.80 (48) |
| | **Gulikhil (n= 7)** | 5.14 | 2.14 (42) | 3.00 (58) | 2.43 (47) | 2.71 (53) |
| | **Sub total (n= 25)** | **4.92** | **2.44 (50)** | **2.48 (50)** | **2.80 (57)** | **2.08 (42)** |
| Mirsarai | **Ragunutpur (n=6)** | 4.50 | 2.50 (56) | 2.00 (44) | 3.67 (81) | 0.83 (19) |
| | **Shika durgapur (n=1)** | 7.00 | 2.00 (29) | 5.00 (71) | 5.00 (71) | 2.00 (29) |
| | **Janadanpur (n=4)** | 5.25 | 2.50 (48) | 2.75 (52) | 2.75 (52) | 2.50 (48) |
| | **East-durgapur (n=5)** | 5.60 | 2.80 (50) | 2.80 (50) | 5.00 (89) | 0.60 (11) |
| | **Katachara (n=1)** | 3.00 | 2.00 (67) | 1.00 (33) | 1.00 (33) | 2.00 (67) |
| | **Nijtaluk (n=3)** | 8.67 | 5.33 (62) | 3.33 (38) | 6.33 (73) | 2.33 (27) |
| | **Jamalpur (n=5)** | 4.20 | 1.80 (43) | 2.40 (57) | 3.40 (81) | 0.80 (19) |
| | **Sub total (n= 25)** | **5.32** | **2.72 (51)** | **2.60 (49)** | **4.00 (75)** | **1.32 (25)** |
| **Total (n= 50)** | | **5.12** | **2.58 (50)** | **2.54 (50)** | **3.40 (66)** | **1.70 (34)** |

*Land holdings*

Analysis of the total land holdings suggest that each family in the study area possess a total of 117.13 decimals of land of which 60 percent (70 decimals) of land is used for agricultural

purposes followed by 25 percent (29.32 decimals) tree/bush area (private forests) and 13 percent (15.37 decimals) homestead area (Figure 1, Table 6). Total land holdings was found much higher in Mirsarai Upazila (170.04 decimals) compared to Sitakunda Upazila (64.22 decimals) and this high amount of land is used mostly for trees (an average tree area of 55.76 decimals compared to only 2.88 decimals in Sitakunda Upazila), agricultural purposes (an average agricultural land of 89.24 decimals in Mirsarai compared to 50.76 decimals in Sitakunda) and homestead area (an average homestead area of 21.76 decimals in Mirsari compared to 8.98 decimals in Sitakunda). The tree areas (private forests) is an important land use in the study area specially in East Durgapur and Nijtaluk village of Mirsarai Upazila which are mostly leased or rented land (Table 6). Homestead areas were found more or less same in both the Upazilas consisting of a house, fore and/or back yard, area for trees and vegetables and sometimes with animal shed (Photo 3).

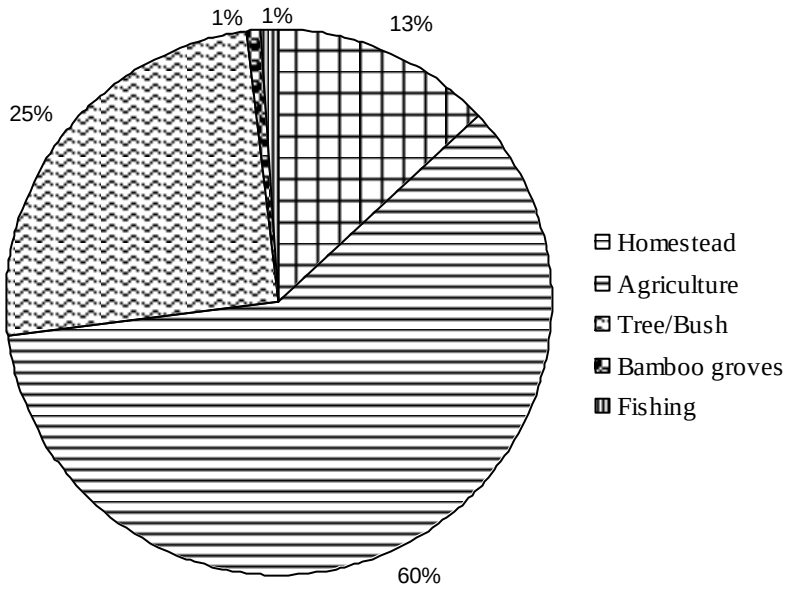


**Figure 1**: Distribution of average household land uses (%) in the study area.

(a) (b)

**Photo 3**: Typical homesteads in the study area.

**Table 6:** Distribution of land holdings (in decimals) by land use categories (TLH= Total land holdings, HL= Homestead land, Al= Agricultural land, TB= Tree/bush area, BG= Bamboo grove, FL= Fishing area) (Values in the parentheses indicate percentages).

| Upazila | Village | TLH | HL | AL | TB | BG | FL | others |
|---|---|---|---|---|---|---|---|---|
| Sitakunda | **Baroaolia (n= 2)** | 101.5 (100) | 10.5 (10) | 45 (44) | 35 (34) | 0.5 (0) | 0 (0) | 10 (10) |
| | **Moidam mahdebpur (n= 4)** | 51.25 (100) | 6 (12) | 45 (88) | 0 (0) | 0.25 (0) | 0 (0) | 0 (0) |
| | **Porba naralia (n= 3)** | 26 (100) | 9.33 (36) | 16.67 (64) | 0.00 | 0.00 | 0.00 | 0.00 |
| | **Hasnabad (n= 4)** | 88.75 (100) | 12.5 (14) | 74.25 (84) | 0.00 | 1.25 (1) | 0.75 (1) | 0.00 |
| | **Moidam salimpur (n= 5)** | 16.8 (100) | 10.2 (61) | 6 (36) | 0.4 (2) | 0.00 | 0.2 (1) | 0.00 |
| | **Gulikhil (n= 7)** | 97.21 (100) | 7.21 (7) | 88.86 (91) | 0.00 | 0.57 (1) | 0.57 (1) | 0.00 |
| | **Sub total (n= 25)** | **64.22 (100)** | **8.98 (14)** | **50.76 (79)** | **2.88 (4)** | **0.44 (1)** | **0.32 (0)** | **0.8 (1)** |
| Mirsarai | **Ragunutpur (n=6)** | 102 (100) | 13 (13) | 27.67 (27) | 60 (59) | 1.33 (1) | 0.00 | 0.00 |
| | **Shika durgapur (n=1)** | 14 (100) | 12 (86) | 0.00 | 0.00 | 2 (14) | 0.00 | 0.00 |
| | **Janadanpur (n=4)** | 106.25 (100) | 13.5 (13) | 92.5 (87) | 0.00 | 0.25 (0) | 0.00 | 0.00 |
| | **East-durgapur** | 280.2 (100) | 53.8 | 120 | 105. | 1.2 | 0.00 | 0.00 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **(n=5)** | | (19) | (43) | 2 (38) | (0) | | |
| | **Katachara (n=1)** | 132 (100) | 12 (9) | 120 (91) | 0.00 | 0.00 | 0.00 | 0.00 |
| | **Nijtaluk (n=3)** | 503.33 (100) | 28 (6) | 285 (57) | 169 (34) | 1.33 (0) | 20 (4) | 0.00 |
| | **Jamalpur (n=5)** | 31.4 (100) | 7 (22) | 24 (76) | 0.2 (1) | 0.2 (1) | 0.00 | 0.00 |
| | **Sub total (n= 25)** | **170.04 (100)** | **21.76 (13)** | **89.24 (52)** | **55.76 (33)** | **0.88 (1)** | **2.4 (1)** | **0.00 (0)** |
| **Total (n= 50)** | | **117.13 (100)** | **15.37 (13)** | **70 (60)** | **29.32 (25)** | **0.66 (1)** | **1.36 (1)** | **0.4 (0)** |

*Occupation*

Respondent households' were analyzed according to their family occupation. It is seen that other category (46%) consisting of driving, daily labour, handicrafts making, fishing, foreign job, electrician etc. is the major primary occupation followed by agriculture (28%), service (14%) and business (12%). However, most of the family (66%) also dependent on secondary occupation for their sustenance where agriculture (30%) is the main occupation in secondary occupation category (Table 7).

*Family income*

Analysis of the family income by the respondent households' show that average family income in the study area is found 138976 Taka/year of which majority of the income 109444 Taka/year (79%) comes from primary sources and 29532 Taka/year (21%) from secondary sources. However, the average family income of Mirsarai Upazila (158192 Taka/year) was found higher than Sitakunda Upazila (119760 Taka/year) (Tables 8 and 9).

**Table 7:** Distribution of respondent households by occupation (in percentage) in the study area

| Upazila | Village | Primary Occupation | | | | |
|---|---|---|---|---|---|---|
| | | Agriculture | Service | Business | Others | Total |
| Sitakunda | Baroaolia | 50 | 50 | 0 | 0 | 100 |
| | Moidam Mahdebpur | 50 | 0 | 25 | 25 | 100 |
| | Porba Naralia | 67 | 0 | 0 | 33 | 100 |
| | Hasnabad | 25 | 50 | 25 | 0 | 100 |
| | Moidam Salimpur | 0 | 20 | 20 | 60 | 100 |
| | Gulikhil | 0 | 0 | 0 | 100 | 100 |
| | Sub total | 24 | 16 | 12 | 48 | 100 |
| Mirsarai | Ragunutpur | 33 | 33 | 0 | 33 | 100 |
| | Shika Durgapur | 0 | 0 | 0 | 100 | 100 |
| | Janadanpur | 25 | 0 | 0 | 75 | 100 |
| | East Durgapur | 60 | 20 | 20 | 0 | 100 |
| | Katachara | 100 | 0 | 0 | 0 | 100 |
| | Nijtaluk | 33 | 0 | 0 | 67 | 100 |
| | Jamalpur | 0 | 0 | 40 | 60 | 100 |
| | Sub total | 32 | 12 | 12 | 44 | 100 |
| Total | | 28 | 14 | 12 | 46 | 100 |

| Upazila | Village | Secondary Occupation | | | | |
|---|---|---|---|---|---|---|
| | | Agriculture | Service | Business | Others | Total |
| Sitakunda | Baroaolia | 50 | 50 | 0 | 0 | 100 |
| | Moidam Mahdebpur | 25 | 0 | 0 | 0 | 25 |
| | Porba Naralia | 0 | 0 | 0 | 0 | 0 |
| | Hasnabad | 50 | 0 | 25 | 0 | 75 |
| | Moidam Salimpur | 0 | 0 | 20 | 40 | 60 |
| | Gulikhil | 43 | 0 | 0 | 29 | 71 |
| | Sub total | 28 | 4 | 8 | 16 | 56 |
| Mirsarai | Ragunutpur | 50 | 0 | 0 | 33 | 83 |
| | Shika Durgapur | 100 | 0 | 0 | 0 | 100 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | **Janadanpur** | 75 | 0 | 0 | 0 | 75 |
| | **East Durgapur** | 0 | 0 | 60 | 40 | 100 |
| | **Katachara** | 0 | 0 | 0 | 0 | 0 |
| | **Nijtaluk** | 33 | 0 | 0 | 33 | 67 |
| | **Jamalpur** | 0 | 0 | 0 | 60 | 60 |
| | **Sub total** | 32 | 0 | 12 | 32 | 76 |
| **Total** | | 30 | 2 | 10 | 24 | 66 |

**Table 8**: Distribution of households' family income (Taka/year) in the study area (values in the parentheses denote percentage of total income)

| Upazila | Village | Primary income | Secomndary income | Family income |
|---|---|---|---|---|
| **Sitakunda** | **Baroaolia (n= 2)** | 60000 (63) | 36000 (37) | 96000 (100) |
| | **Moidam mahdebpur (n= 4)** | 84000 (97) | 2500 (3) | 86500 (100) |
| | **Porba naralia (n= 3)** | 58000 (100) | 0 (0.0) | 58000 (100) |
| | **Hasnabad (n= 4)** | 95000 (73) | 36000 (27) | 131000 (100) |
| | **Moidam salimpur (n= 5)** | 133200 (79) | 34800 (21) | 168000 (100) |
| | **Gulikhil (n= 7)** | 100286 (77) | 30857 (23) | 131143 (100) |
| | **Sub total (n= 25)** | **95120 (79)** | **24640 (21)** | **119760 (100)** |
| **Mirsarai** | **Ragunutpur (n=6)** | 87500 (82) | 19000 (18) | 106500 (100) |
| | **Shika durgapur (n=1)** | 48000 (57) | 36000 (43) | 84000 (100) |
| | **Janadanpur (n=4)** | 82500 (70) | 36000 (30) | 118500 (100) |
| | **east-durgapur (n=5)** | 163200 (71) | 67200 (29) | 230400 (100) |
| | **Katachara (n=1)** | 54000 (100) | 0 (0.0) | 54000 (100) |
| | **Nijtaluk (n=3)** | 272000 (82) | 60000 (18) | 332000 (100) |
| | **Jamalpur (n=5)** | 101040 (91) | 10120 (9) | 111160 (100) |
| | **Sub total (n= 25)** | **123768 (78)** | **34424 (22)** | **158192 (100)** |
| **Total (n= 50)** | | **109444 (79)** | **29532 (21)** | **138976 (100)** |

**Table 9**: Distribution of family income (Taka/year) according to occupation (PI= Primary income and SI= Secondary income) (Values in the parentheses denote percentage household responded)

| Occupation | Sitakunda (n= 25) | | Mirsarai (n= 25) | | Total (n= 50) | |
|---|---|---|---|---|---|---|
| | PI | SI | PI | SI | PI | SI |
| Agriculture | 61000 (24) | 30571 (28) | 124500 (32) | 39750 (32) | 92750 (28) | 35161 (30) |
| Service | 104000 (16) | 36000 (4) | 84000 (12) | - | 94000 (14) | 18000 (2) |
| Business | 120000 (12) | 54000 (8) | 116000 (12) | 92000 (12) | 118000 (12) | 73000 (10) |
| Others | 103000 (48) | 64500 (16) | 136200 (44) | 33325 (32) | 119600 (46) | 48913 (24) |
| Average | 95120 (100) | 24640 (56) | 123768 (100) | 34424 (76) | 109444 (100) | 29532 (66) |
| Total average | 119760 (50) | | 158192 (50) | | 138976 (100) | |

*Plant diversity*

Table 10 shows the plant diversity present in the homesteads of Sitakunda and Mirsarai Upazila. It is evident that Am (88%) was found dominating in the homesteads of Sitakunda followed by Narikel (44%), Peara (36%), Eucalyptus (36%), Jam (32%) and Koroi (32%) (Table 10). Species density was found highest for Am (5.96). In case relative density highest percentage observed for Am (34.33%) followed by Peara (10.14%) and Eucalyptus (8.06%). On the other hand, Am (88%) was found most frequently available species followed by Narikel (84%), Kantal (68%), Supari (68%), Jam (64%) and Peara (48%) in Mirsarai Upazila (Table 10). From biodiversity point of view a total of 37 different plant species were found growing in Mirsarai Upazila and 27 different plant species were found growing in Sitakunda Upazila (Table 10). In total species density was found much higher in Mirsarai Upazila (65.16) compared to Sitakunda Upazila (17.36) (Table 10).

**Table 10**: Comparative analysis of plant diversity present in the study area

| Name of species | Sitakunda Upazila (n= 25) | | | Mirsarai Upazila (n= 25) | | |
|---|---|---|---|---|---|---|
| | Frequency (% household) | Species Density | RD (%) | Frequency (% household) | Species Density | RD (%) |
| **Akashmoni** | 16 | 0.64 | 3.69 | 24 | 2.92 | 4.48 |
| **Am** | **88** | **5.96** | **34.33** | **88** | **10.36** | **15.90** |
| **Amloki** | 4 | 0.04 | 0.23 | 8 | 0.12 | 0.18 |
| **Amra** | 4 | 0.08 | 0.46 | 20 | 0.2 | 0.31 |
| **Apple** | 0 | 0 | 0.00 | 4 | 0.04 | 0.06 |
| **Ata** | 0 | 0 | 0.00 | 4 | 0.08 | 0.12 |
| **Bhadi** | 4 | 0.04 | 0.23 | 8 | 0.16 | 0.25 |
| **Banana** | 4 | 0.2 | 1.15 | 0 | 0 | 0.00 |
| **Barta** | 0 | 0 | 0.00 | 16 | 0.36 | 0.55 |
| **Chalta** | 0 | 0 | 0.00 | 4 | 0.04 | 0.06 |
| **Dalim** | 0 | 0 | 0.00 | 4 | 0.04 | 0.06 |
| **Eucalyptus** | **36** | **1.4** | **8.06** | 32 | 5 | 7.67 |
| **Gab** | 8 | 0.12 | 0.69 | 32 | 2.4 | 3.68 |
| **Gamar** | 4 | 0.04 | 0.23 | 8 | 0.4 | 0.61 |
| **Horitaki** | 0 | 0 | 0.00 | 16 | 0.16 | 0.25 |
| **Jalpai** | 4 | 0.2 | 1.15 | 32 | 1.4 | 2.15 |
| **Jam** | **32** | 0.72 | 4.15 | **64** | **2.96** | **4.54** |
| **Jambura** | 4 | 0.04 | 0.23 | 12 | 0.2 | 0.31 |
| **Kadam** | 4 | 0.04 | 0.23 | 4 | 0.04 | 0.06 |
| **Katbadam** | 4 | 0.04 | 0.23 | 0 | 0 | 0.00 |
| **Kamranga** | 16 | 0.48 | 2.76 | 24 | 0.44 | 0.68 |
| **Kantal** | 28 | 0.68 | 3.92 | **68** | **6.32** | **9.70** |
| **Kao** | 0 | 0 | 0.00 | 4 | 0.04 | 0.06 |
| **Khejur** | 0 | 0 | 0.00 | 16 | 0.32 | 0.49 |
| **Koroi** | **32** | **1.04** | **5.99** | 44 | 6.36 | 9.76 |
| **Kul** | 28 | 0.84 | 4.84 | 28 | 0.88 | 1.35 |
| **Litchi** | 8 | 0.08 | 0.46 | 0 | 0 | 0.00 |
| **Lotkon** | 0 | 0 | 0.00 | 4 | 0.04 | 0.06 |
| **Mahagoni** | 0 | 0 | 0.00 | 32 | 9.24 | 14.18 |
| **Mehedi** | 4 | 0.04 | 0.23 | 0 | 0 | 0.00 |
| **Minjiri** | 0 | 0 | 0.00 | 4 | 0.2 | 0.31 |
| **Narikel** | **44** | **1.24** | **7.14** | **84** | **3.08** | **4.73** |
| **Peara** | **36** | **1.76** | **10.14** | **48** | **2.68** | **4.11** |
| **Pitraj** | 0 | 0 | 0.00 | 4 | 0.08 | 0.12 |
| **Raitreee** | 4 | 0.08 | 0.46 | 24 | 1 | 1.53 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Supari** | 16 | 1 | 5.76 | **68** | **6.84** | **10.50** |
| **Tal** | 0 | 0 | 0.00 | 4 | 0.04 | 0.06 |
| **Teak** | 8 | 0.36 | 2.07 | 8 | 0.16 | 0.25 |
| **Tentul** | 4 | 0.04 | 0.23 | 8 | 0.08 | 0.12 |
| **Toon** | 0 | 0 | 0.00 | 12 | 0.32 | 0.49 |
| **Tula** | 4 | 0.16 | 0.92 | 8 | 0.16 | 0.25 |
| **Total** | - | **17.36** | **100.00** | **-** | **65.16** | **100.00** |

*Lost Species*

The homestead survey tried to find out the species that are lost from the homesteads of the study area. The respondent households were asked to tell the names (s) of the lost species from their homesteads. It is found that respondents from Mirsarai mentioned 17 and from Sitakunda 6 timber and fruit species that have already lost from their homesteads. Households in Mirsarai responded that Tentul (40%), Kao (36%), Amra (24%), Chalta (24%) and Tal (12%) are the main species that are lost and in Sitakunda Silkoroi (12%), Bahera (8%), Jam (8%) and Ata (8%) are the main species that are lost from their homesteads (Table 11).

**Table 11**: List of lost species with their frequencies by Upazila in the study area.

| Sl. No. | Sitakunda (n= 25) | | | Mirsarai (n= 25) | | |
|---|---|---|---|---|---|---|
| | **Lost species** | **Households responded** | **Frequency (% Household)** | **Lost species** | **Households responded** | **Frequency (% Household)** |
| 1 | **Ata** | 1 | 4 | **Amra** | 6 | 24 |
| 2 | **Bohera** | 2 | 8 | **Barta** | 2 | 8 |
| 3 | **Gorjan** | 1 | 4 | **Bet** | 1 | 4 |
| 4 | **Jam** | 2 | 8 | **Bot** | 1 | 4 |
| 5 | **Khejur** | 1 | 4 | **Chalta** | 6 | 24 |
| 6 | **Silkoroi** | 3 | 12 | **Dalim** | 1 | 4 |
| 7 | - | - | - | **Dewa** | 1 | 4 |
| 8 | - | - | - | **Garjon** | 1 | 4 |
| 9 | - | - | - | **Golapjam** | 1 | 4 |
| 10 | - | - | - | **Jam** | 2 | 8 |
| 11 | - | - | - | **Jambura** | 1 | 4 |
| 12 | - | - | - | **Kao** | 9 | 36 |
| 13 | - | - | - | **Khejur** | 2 | 8 |
| 14 | - | - | - | **Koroi** | 1 | 4 |
| 15 | - | - | - | **Tal** | 3 | 12 |
| 16 | - | - | - | **Tentul** | 10 | 40 |
| 17 | - | - | - | **Tula** | 1 | 4 |

*Benefits from plant resources*

The respondent households were surveyed to explore the benefits they earn from plant resources present in their homesteads. It is found that households in Mirsarai earn higher income (18106 Taka/year) compared to Sitakunda (3203 Taka/year) selling fruit, fuel and timber. This is due to higher amount of timber that is felled from the homesteads and sold to the market (Tables 12 and 13). Usually households in the study area earn most of the money by selling fruits (Narikel, Supari, Kao, Gab, Peara and Am), timber (Koroi, Eucalyptus, Kantal, Mahogony, Akashmoni, Jam, Am, Gab etc.), fuel (Raintree, Bhadi, Kadam), patipata and bamboo. Table 13 shows the distribution of income from the different plant resources. It is seen that most of the households (68%) earn an amount of 6127 Taka/year from trees, 88% of the households earn an average net benefit of 1949 Taka/year from vegetables and more than half of the respondent households (56%) earn 846 Taka/year from spices grown in the homesteads of the study area (Table 13). It is also observed that households in Mirsarai earn higher income from trees, vegetables and spices compared to households in Sitakunda (Table 13).

**Table 12**: Distribution of households' benefits from different perennial plant species

| Sl. No. | Sitakunda | | | | Mirsarai | | | |
|---|---|---|---|---|---|---|---|---|
| | **Species** | **Household responded (%)** | **Total Benefit (Tk./year)** | **Average benefit (Tk./year)** | **Species** | **Households responded (%)** | **Total benefit (Tk./Year)** | **Average benefit (Tk./year)** |
| 1 | **Patipata** | 4 (16) | 2600 | 650 | **Minjiri** | 2 (8) | 6000 | 3000 |
| 2 | **Bamboo** | 4 (16) | 2750 | 688 | **Supari** | 3 (12) | 1630 | 543 |
| 3 | **Eucalyptus** | 1 (4) | 9000 | 9000 | **Kadam** | 3 (12) | 3500 | 1167 |
| 4 | **Kantal** | 2 (8) | 6000 | 3000 | **Patipata** | 6 (24) | 16000 | 2667 |
| 5 | **Koroi** | 9 (36) | 39000 | 4333 | **Bamboo** | 2 (8) | 3950 | 1975 |
| 6 | **Am** | 8 (32) | 35200 | 4400 | **Eucalyptus** | 2 (8) | 14000 | 7000 |
| 7 | **Narikel** | 2 (8) | 1100 | 550 | **Kantal** | 3 (12) | 21000 | 7000 |
| 8 | **Jam** | 1 (4) | 3000 | 3000 | **Koroi** | 4 (16) | 25000 | 6250 |
| 9 | | | | | **Raintree** | 1 (4) | 50000 | 50000 |
| 10 | | | | | **Toon** | 1 (4) | 35000 | 35000 |
| 11 | | | | | **Am** | 2 (8) | 15000 | 7500 |
| 12 | | | | | **Gab** | 2 (8) | 4500 | 2250 |
| 13 | | | | | **Mahogony** | 2 (8) | 11500 | 5750 |
| 14 | | | | | **Akashmoni** | 2 (8) | 4500 | 2250 |
| 15 | | | | | **Narikel** | 1 (4) | 500 | 500 |
| 16 | | | | | **Bhadi** | 1 (4) | 1000 | 1000 |
| 17 | | | | | **Kao** | 1 (4) | 5000 | 5000 |
| 18 | | | | | **Amra** | 1 (4) | 500 | 500 |
| 19 | | | | | **Jam** | 2 (8) | 9000 | 4500 |
| 20 | | | | | **Dewa** | 1 (4) | 1000 | 1000 |
| **Total** | | **21 (84)** | **98650** | **3203** | **Total** | **13 (52)** | **228580** | **18106** |

*Collection of forest resources*

The respondent households were asked to know the type and quantity of forest resources from the neighbouring forests. It is observed that small percentage of respondent household (4%) mainly from Sitakunda is collecting an average of 2 maunds of timber travelling 6 km and spending 4 hours a day. Some of the households (14%) are collecting 41 maunds of fuel travelling 5 Km and spending 4 hours a day. Only 2% respondent said that they collect 1 bundle of sungrass travelling 4 km and spending 4 hours a day from the neighbouring forests (Table 14). Analysis of the income earned from collecting forest resources shows that households involved in forest resource collection earn an amount of TK. 6408 per year which is only 4.15% of their total family income (Table 15). Income from homestead resources (8923 Taka/year) comprises 5.78% of the total family income of the responded households.

**Table 13**: Distribution of benefits (in Taka/year) earned from homestead plant resources (TB= Total benefit, TC= Total costs, NB= Net benefits, IHR= Income from homestead plant resources) (values in the parentheses denote percentage household responded)

| Upazila | Village | Trees | Vegetables | | | Spices | | | IHR |
|---|---|---|---|---|---|---|---|---|---|
| | | TB | TC | TB | NB | TC | TB | NB | |
| Sitakunda | Baroaolia (n= 2) | 7925 (100) | 2155 | 6325 | 4170 (100) | 2250 | 5850 | 3600 (100) | 15695 |
| | Moidam Mahdebpur n= 4) | 6800 (100) | 1425 | 6063 | 4638 (100) | 1450 | 4875 | 3425 (50) | 14863 |
| | Porba Naralia (n= 3) | 4567 (67) | 587 | 1567 | 980 (100) | 450 | 1150 | 700 (67) | 6247 |
| | Hasnabad (n= 4) | 3650 (75) | 1675 | 6363 | 4688 (100) | 700 | 2800 | 2100 (75) | 10438 |
| | Moidam Salimpur (n= 5) | 3120 (80) | 370 | 1384 | 1014 (80) | 200 | 700 | 500 (20) | 4634 |
| | Gulikhil (n= 7) | 1671 (86) | 1383 | 4903 | 3520 (100) | 750 | 1529 | 779 (43) | 5970 |
| | Sub total (n= 25) | 3946 (84) | 1200 | 4332 | 3132 (96) | 828 | 2402 | 1574 (52) | 8652 |
| Mirsari | Ragunutpur (n= 6) | 825 (33) | 269 | 1242 | 973 (83) | 19 | 80 | 61 (67) | 1858 |
| | Shika Durgapur (n= 1) | 1000 (100) | 330 | 1300 | 970 (100) | 100 | 800 | 700 (100) | 2670 |
| | Janadanpur (n= 4) | 3000 (25) | 140 | 575 | 435 (75) | 74 | 383 | 309 (75) | 3744 |
| | East Durgapur (n= 5) | 26226 (100) | 670 | 1720 | 1050 (60) | 46 | 120 | 74 (40) | 27350 |
| | Katachara (n= 1) | 0 (0) | 20 | 300 | 280 (100) | 10 | 80 | 70 (100) | 350 |
| | Nijtaluk (n= 3) | 14667 (67) | 365 | 1183 | 818 (67) | 0 | 0 | 0 (0) | 15485 |
| | Jamalpur (n= 5) | 2920 (40) | 211 | 740 | 529 (100) | 20 | 74 | 54 (100) | 3503 |
| | Sub total (n= 25) | 8307 (52) | 321 | 1088 | 767 (80) | 34 | 154 | 120 (60) | 9195 |
| **Total (n= 50)** | | **6127 (68)** | **761** | **2710** | **1949 (88)** | **431** | **1278** | **847 (56)** | **8923** |

**Table 14**: Collection of forest resources per year from the neighbouring forests by the households in the study area ($Q_t$= Quantity of timber in maunds, $Q_f$= Quantity of fuel in maunds, $Q_b$= Quantity of bamboo in culms, $Q_s$= Quantity of sun grass in bundles, D= Distance in kilometres, T= time in hours per day)

| Upazila | Village | Timber | | | Fuel | | | Bamboo | | | Sun grass | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Qt | D | T | Qf | D | T | Qb | D | T | Qs | D | T |
| Sitakunda | **Baroaolia (2)** | 23 (100) | 6 | 4 | 900 (100) | 6 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Moidam Mahdebpur (4)** | 0 | 0 | 0 | 26 (75) | 5 | 3 | 0 | 0 | 0 | 12 (75) | 5 | 3 |
| | **Porba Naralia (3)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Hasnabad (4)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Moidam Salimpur (5)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Gulikhil (7)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Sub total (25)** | 2 (8) | 6 | 4 | 76 (20) | 5 | 3 | 0 | 0 | 0 | 1 (12) | 5 | 3 |
| Mirsarai | **Ragunutpur (6)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 (33) | 4 | 4 |
| | **Shika Durgapur (1)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Janadanpur (4)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **East Durgapur (5)** | 0 | 0 | 0 | 30 (20) | 3 | 6 | 0 | 0 | 0 | 6 (20) | 3 | 6 |
| | **Katachara (1)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 6 |
| | **Nijtaluk (3)** | 0 | 0 | 0 | 2 (33) | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Jamalpur (5)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Sub total (25)** | 0 | 0 | 0 | 6 (8) | 4 | 6 | 0 | 0 | 0 | 1 (12) | 4 | 4 |
| **Total (50)** | | **1 (4)** | **6** | **4** | **41 (14)** | **5** | **4** | **0** | **0** | **0** | **1 (12)** | **4** | **4** |

Note: values in the parentheses represents % of households collecting the particular resource

**Table 15**: Distribution of income from forest and homestead plant resources by the households in the study area ($Q_t$= Quantity of timber in maunds, $Q_f$= Quantity of fuel in maunds, $Q_s$= Quantity of sun grass in bundles, SV= Sale value in Taka, IFR= Income from forest resources per year in Taka, TFI= Total family income per year in Taka)

| Upazila | Village | Timber | | Fuel | | Sun grass | | IFR (a) | IHR (b) | Family Income (c) | TFI (a+b+c) | IFR as % of TFI | IHR as % of TFI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Qt | SV | Qf | SV | Qs | SV | | | | | | |
| Sitakunda | Baroaolia (2) | 23 | 4500 | 900 | 135000 | 0 | 0 | 139500 | 15695 | 96000 | 251195 | 55.53 | 6.25 |
| | Moidam Mahdebpur (4) | 0 | 0 | 26 | 2625 | 12 | 84 | 3469 | 14863 | 86500 | 104832 | 3.31 | 14.18 |
| | Porba Naralia (3) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6247 | 58000 | 64247 | 0.00 | 9.72 |
| | Hasnabad (4) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10438 | 131000 | 141438 | 0.00 | 7.38 |
| | Moidam Salimpur (5) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4634 | 168000 | 172634 | 0.00 | 2.68 |
| | Gulikhil (7) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5970 | 131143 | 137113 | 0.00 | 4.35 |
| | Sub total (25) | 2 | 360 | 76 | 11220 | 1 | 135 | 11715 | 8652 | 119760 | 140127 | 8.36 | 6.17 |
| Mirsarai | Ragunutpur (6) | 0 | 0 | 0 | 0 | 1 | 83 | 83 | 1858 | 106500 | 108441 | 0.08 | 1.71 |
| | Shika Durgapur (1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2670 | 84000 | 86670 | 0.00 | 3.08 |
| | Janadanpur (4) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3744 | 118500 | 122244 | 0.00 | 3.06 |
| | East Durgapur (5) | 0 | 0 | 30 | 4500 | 6 | 750 | 5250 | 27350 | 230400 | 263000 | 2.00 | 10.40 |
| | Katachara (1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 350 | 54000 | 54350 | 0.00 | 0.64 |
| | Nijtaluk (3) | 0 | 0 | 2 | 250 | 0 | 0 | 250 | 15485 | 33200 | 347735 | 0.07 | 4.45 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 0 | | | |
| | **Jamalpur (5)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3503 | 111160 | 114663 | 0.00 | 3.06 |
| | **Sub total (25)** | 0 | 0 | 6 | 930 | 1 | 170 | 1100 | 9195 | 158192 | 168487 | 0.65 | 5.46 |
| **Total (50)** | | **1** | **180** | **41** | **6075** | **1** | **153** | **6408** | **8923** | **138976** | **154307** | **4.15** | **5.78** |

*Distribution of labour in homestead agro-forestry activities*

The household survey also tried to identify the labour involvement in homestead agro-forestry activities especially on women involvement. Table 16 shows the different agro-forestry activities in the homesteads with the labour involvement based on sex and hired labour. It is found that male member (s) of the household perform 50 percent of the total activity followed by female member(s) (29%) and hired labour (21%) in Sitakunda Upazila and 64 percent of activities are performed by the hired labour followed by male (21%) and female member(s) (15%) of the households in Mirsarai Upazila. It is interesting to see that women are participating in higher percentage in Sitakunda (29%) compared to Mirsarai (15%) and households in Mirsarai are more dependent on hired labour (64%) compared to that of Sitakunda (21%) (Table 16). It is also seen that women are particularly taking part at higher percentage in propagation, choice of species, planning and vegetables harvesting in the homesteads.

**Table 16**: Distribution of labour (%) in different agro-forestry activities in the study area (M= Male member of the family, F= Female member of the family, H= hired labour)

| Plantation activities | Sitakunda | | | | Mirsarai | | | |
|---|---|---|---|---|---|---|---|---|
| | M | F | H | Total | M | F | H | Total |
| **Planning** | 59.60 | 39.60 | 0.80 | 100 | 54.00 | 46.00 | 0.00 | 100 |
| **Choice of species** | 52.40 | 46.80 | 0.80 | 100 | 57.20 | 38.80 | 4.00 | 100 |
| **Seedling collection** | 58.20 | 36.00 | 5.80 | 100 | 1.20 | 2.80 | 96.00 | 100 |
| **Propagation** | 40.91 | 51.82 | 7.27 | 100 | 52.00 | 25.00 | 23.00 | 100 |
| **Planting** | 39.60 | 35.20 | 25.20 | 100 | 13.20 | 20.00 | 66.80 | 100 |
| **Nursing** | 49.08 | 18.83 | 32.08 | 100 | 12.08 | 9.16 | 78.76 | 100 |
| Watering | 37.92 | 30.00 | 32.08 | 100 | 15.60 | 13.40 | 71.00 | 100 |
| Fertilizing | 45.83 | 13.54 | 40.63 | 100 | 21.20 | 16.40 | 62.40 | 100 |
| Weeding | 41.25 | 16.67 | 42.08 | 100 | 16.00 | 14.40 | 69.60 | 100 |
| Pruning | 63.33 | 21.67 | 15.00 | 100 | 4.40 | 1.60 | 94.00 | 100 |
| Thinning | 57.08 | 12.29 | 30.63 | 100 | 3.20 | 0.00 | 96.80 | 100 |
| **Harvesting** | 43.94 | 26.65 | 29.41 | 100 | 21.08 | 11.80 | 67.12 | 100 |
| Trees | 36.82 | 4.55 | 58.64 | 100 | 2.40 | 0.00 | 97.60 | 100 |
| Fruits | 49.17 | 36.67 | 14.17 | 100 | 14.40 | 10.40 | 75.20 | 100 |
| Vegetables | 45.83 | 38.75 | 15.42 | 100 | 46.43 | 25.00 | 28.57 | 100 |
| Medicinal plants | - | - | - | - | - | - | - | - |
| **Processing** | 46.40 | 36.40 | 17.20 | 100 | 0.00 | 0.00 | 100.00 | 100 |
| **Seelling** | 62.00 | 30.20 | 7.80 | 100 | 56.00 | 16.00 | 28.00 | 100 |
| **Total** | **50** | **29** | **21** | **100** | **21** | **15** | **64** | **100** |

*Social/Development organizations working in the study area*

The study also tried to find out the organisations working in both Sitakunda and Mirsarai for social and/or other development. It is found that there are at least 13 government approved nongovernmental organizations (NGOs), samity and local club working in the study area for different kinds of activities (Table 17). Major organizations working in the study area are ASA, BRAC, Prattashy, CODEC, Grameen Bank, CSS, IPM etc. The activities by these NGOs include mainly loan, social development, plantation etc. It is found that most of the respondent households are the members of Prottashy (96%) followed by Grameen Bank (16%) (Table 17). It is found that among the respondent households on average 1.48 members in Sitakunda and 1.24 members in Mirsarai are engaged with NGOs activities as active member.

**Table 17**: List of organizations and household members engaged with those organizations (values in the parentheses denote % households engaged).

| Organisation | Sitakunda | Mirsarai | Total | Group Members | Legal Status | Activities |
|---|---|---|---|---|---|---|
| **ASA** | 4 (16) | 1 (4) | 5 (10) | 22-60 | Govt. Approved NGO | Loan |
| **BRAC** | 1 (4) | - | 1 (2) | 30 | Govt. Approved NGO | Loan |
| **CODEC** | 1 (4) | - | 1 (2) | 15 | Govt. Approved NGO | Loan |
| **CSS** | 2 (8) | - | 2 (4) | 15 | Govt. Approved NGO | Loan |
| **Grameen Bank** | 4 (16) | 6 (20) | 10 (16) | 10-80 | Govt. Approved NGO | Loan |
| **IPM** | - | 1 (4) | 1 (2) | 28 | Govt. Approved NGO | SD |
| **Jonoseba** | 1 (4) | - | 1 (2) | 25 | Govt. Approved NGO | Loan |
| **MARUF** | - | 8 (8) | 8( 4) | 22 | Govt. Approved NGO | Social Development |
| **Multipurpose** | - | 4 (4) | 4 (2) | 50 | Govt. | Loan |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | Approved NGO | |
| **Prottashy** | 24 (96) | 19 (72) | 43 (84) | 16-21 | Govt. Approved NGO | Loan |
| **Rabar Dam Samity** | - | 1 (4) | 1 (2) | 25 | Govt. Approved NGO | Roadside Plantation |
| **Sandhani** | - | 1 (4) | 1 (2) | 12 | Govt. Approved NGO | SD |
| **TMSS** | - | 1 (4) | 1 (2) | 20 | Govt. Approved NGO | Loan |
| **Average** | 1.48 | 1.24 | | | | |

**Conclusion:**

Finally, it can be said that the people of the study area are mainly dependent on agro-forestry products they get from the homesteads, agricultural products from their own or rented land and forest resources they collect from the neighbouring forests. In doing so they are destroying the reserved forest areas and ultimately the forests lost its most of the biodiversity including both plants and animals. It is a great concern for us that our most of the native valuable species namely, Gorjon, Sonalu, Kadam, Udal, Menda, Telsur, Buisal, Dhakijam, Puti jam, Kui jam, Gab, Kau, Damul, Lota Am are almost extinct from the neighbouring forests of the study area and as a result some of the important wildlife species like Bear, Elephant have become extinct from the forests. The Forest Department has taken initiative to plant the barren or degraded forest areas but the result is not still remarkable. Although different NGOs are working in the study area to restore the rich biodiversity of the homesteads through agro-forestry activities but still a lot of work has to be done with proper planning in both the homesteads and the forests.

It is also observed from both the forest and homestead surveys that people who are engaged with any NGOs are not destroying the forests rather people who are not active member of any organisation and who have no secondary source of income are going and collecting different resources from the reserve forests. So it may be concluded that the NGOs activities should be increased in the neighbouring villages of the reserve forest areas of Bangladesh creating awareness about the rich biodiversity, the need for biodiversity conservation and their environmental, social and economic benefits for the people and also creating alternative source(s) of income for the rural poor.