

Baseline Survey Report

Name of the project

Homestead Agro Forestry through Improved Management Practices

Implementing entity

CODEC

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 CODEC, 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 following methodology were undertaken to conduct the study:

- i. Setting the action plan
- ii. Community consultation
- iii. Interview of different stakeholder
- iv. Finalize the report including the findings. It will also be enriched with the Check list, Questionnaire, Findings of the community consultation, other relevant documents.

The baseline survey will be conducted in two parts. First part (A) will include assessment of community/ reserve forests nearby project area and the second part (B) will include 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: Measurement of level of stockings in the reserve forest areas: A total of 20 main plots (10m X 10m) from two Beats (Lalutia Beat of Dohazari Range, Chandanaish and Srimai Beat of Patiya range, Patiya) situated near the study area were selected by systematic sampling procedure for tree measurement and 80 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 48 households were surveyed taking 23 from Chandanaish Upazila and 25 from Patiya 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 Lalutia Beat of Dohazari Forest Range, Chandanaish and Srimai Beat of Patiya Range under Chittagong South Forest Division. The area of Lalutia Beat and Srimai Beat is 1531 hectare and 3496 hectare respectively. 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 denuded and barren having only herbs and shrubs (Photo 1). 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 (Photo 2 & 3). It is observed that the periphery of the forests is taken under plantation and there are no plantation programs in the deep forests and most of the hills still remain barren (Photo 1). It is found from the field survey that Teak (42%) is the main tree species followed by Mahogany (30%), Chickrassi (9%), Sal (8%) and Gamar (7%) in Lalutia Beat, Chandanaish and Gora Neem (26%) is the main tree species followed by Chickrassi (25%), Akashmoni (23%) and Gamar (7%) in Srimai Beat, Patiya (Table 1). Mean tree dbh and height were found around 14 cm and 8 m respectively in Lalutia and 16 cm and 8.08 meter respectively in Srimai Beat. It is observed that stem per hectare is higher in Lalutia (2250) compared to Srimai (1820) which is also clear from Photo 3 that shows how people of Patiya are cutting trees from the forests. However,

volume per hectare was found higher in Srimai (374 m³/ha) compared to Lalutia (318 m³/ha) which might be due to the fact that the trees in Lalutia are older than Srimai (Table 1). Some of the endangered tree species like Gorjon, Chapalish, Sada koroï and Kala koroï 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 carrying out forest resources particularly timber, fuelwood, bamboos, sungrass etc. openly from the forests on head or shoulder loads (Photos 4, 5 & 6). Women and children were also found to do this (Photo 5). It was interesting to see an open depot nearby the forests where people store and sell their collected materials openly (Photo 5). This certainly shows the sign how desperately people are destroying the forests. Again it is clear that (Photos 3, 4, 5 & 6) people of Patiya are more dependent on forest resources than Chandanaish. It may be assumed that the reserve forest of Patiya is less protected than that of Chandanaish. 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)

Beat/ Range	Species	No. of stems	Mean DBH (cm)	Mean Ht (m)	Volume / stem (m ³)	Total Volume (m ³)	Stems/ ha	Volume/ ha (m ³ /ha)
Lalutia/ Dohazari	Teak	95 (42.22)	12.87	7.80	0.11	10.26	950	102.60
	Sada koroï	1 (0.44)	36.50	12.30	1.29	1.29	10	12.88
	Mahogany	67 (29.78)	15.26	8.33	0.17	11.21	670	112.09
	Sal	19 (8.44)	18.79	8.64	0.25	4.71	190	47.14
	Gamar	15 (6.67)	12.99	8.35	0.11	1.67	150	16.70
	Chapalish	5 (2.22)	15.42	8.72	0.16	0.82	50	8.24
	Gorjon	3 (1.33)	16.00	7.07	0.20	0.59	30	5.88
	Chickrassi	20 (8.89)	10.89	6.75	0.06	1.28	200	12.80
	Sub total	225 (100)	14.12	8.00	0.14	31.84	2250	318.38
Srimai / Patiya	Teak	2 (1.10)	5.20	5.70	0.01	0.02	20	0.24
	Sal	24 (13.19)	8.04	5.89	0.03	0.75	240	7.54

	Gamar	12 (6.59)	19.12	8.69	0.26	3.10	120	31.04
	Chickrassi	45 (24.73)	17.97	8.58	0.26	11.65	450	116.51
	Akashmoni	42 (23.08)	16.52	8.20	0.19	7.84	420	78.37
	Gora Neem	48 (26.37)	16.18	8.50	0.19	8.96	480	89.57
	Raintree	7 (3.85)	23.49	9.29	0.41	2.90	70	29.02
	Kala koro	2 (1.10)	30.85	13.9 0	1.07	2.14	20	21.35
	Sub total	182 (100)	16.14	8.18	0.21	37.36	1820	373.65
	Total	407	15.02	8.08	0.17	69.19	2035	345.95



Photo 1: Current state of reserved forests in the Srimai Beat, Patiya.

(a)



(b)



Photo 2: Showing status of plantations at (a) Lalutia Beat, Dohazari, Chandanaish and (b) Srimai Beat, Patiya



Photo 3: Evidence of tree cutting in Srimai Beat, Patiya
(a) (b)



(c)



(d)



(e)



(f)



Photo 4: Collection of forest resources (timber, fuelwood, bamboos, sungrass, etc.) on shoulder loads by the local people from nearby reserved forest areas in Patiya.

(a)



(b)



(c)



(d)



(e)

(f)



Photo 5: Collection of forest resources (a, b, c d) by the local people (man, women and children) from nearby reserved forest areas and open depot (e, f) nearby the forests to sell collected materials in Srimai Beat, Patiya.

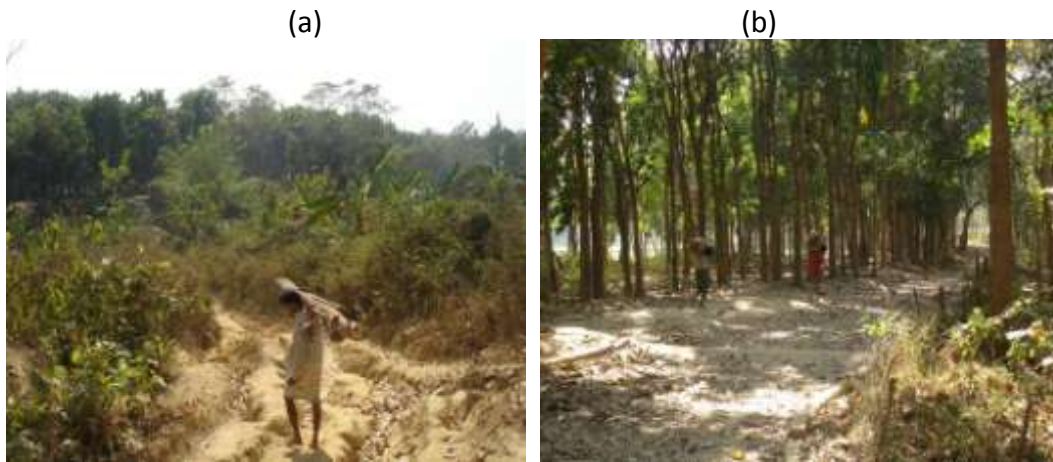


Photo 6: Collection of forest resources by the local people (man and children) from nearby reserved forest areas in Lalutia Beat, Dohazari, Chandanaish.





Photo 7: Different economic plants in the forests, (a) Biddri patha, (b) Banana collection, (c) Peara (Guava) and (d) Cane.

Regeneration status

The forest survey also tried to look at the regeneration that is naturally coming on the forests. It is found that Teak is the only regeneration in Lalutia Beat, Dohazari, Chandanaish with 319 coppice originated seedlings per hectare and Jam is the only regeneration in Srimai Beat, Patiya with a poor 13 seedlings per hectare (Table 2). Overall the regeneration status of the forests is very poor and this shows the overall degradation of the reserve forests areas of Chittagong South Forest Division.

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

Beat/Range	Species	No. of seedlings per ha
Lalutia/Dohazari	Teak	319
Srimai/Patiya	Jam	13

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), biddri patha (wrapping meat, fish or sweet and other commodities in the local market), cane (making handicrafts, mat and other implements), vines (fuel), 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 (Photos 4, 5, 6 & 7). 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, Chapalish, Barta, Pitraj, Bandarhola, Goda, Gutguttya, Civit, Sonalu, Chatian, Batna, Chickrassi, Am and Khejur already became rare or endangered in the forests of Chandanaish and Patiya (Table 3).

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

Beat/Range	Economic plants	Lost species
Lalutia/ Dohazari	Lebu (Citrus spp.), Peara, Jali Bet (Calamus spp.), Sungrass (Thatching), Vine (fuel), Assam lata (Medicinal), Banana (Fruit)	Gorjon, Chapalish, Barta, Pitraj, Bandarhola, Goda Gutguttya, Civit, Sonalu, Chatian, Batna, Chickrassi
Srimai/ Patiya	Ful jaro (broom), Bamboo, Sungrass, Melostoma (fuel), Jali bet Biddri patha (wrapping materials), Banana	Gorjon, Chapalish, Am, Gutguttya, Bandarhola, Khejur

Status of wildlife

Information regarding wildlife shows that Bon morag, Crow, Kite, Elephant, Pig, Snake, Fox, Monkey, Beji, Guishap, Korgosh (Rabbit) and Birds are some of the wildlife usually seen by the local people to their adjacent forests. However the forests were the home of Deer, Porcupine, Rhinoceros, Nil gai in the recent past (Table 4).

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

Beat/Range	Wildlife seen by the local people				
	Present	5 years ago	10 years ago	15 years ago	20 years ago
Lalutia/ Dohazari	Bon morag, Crow, Kite, Elephant, Pig, Snakes, Fox Monkey, Beji, Guishap, Korgosh, Birds	Deer, Porcupine	Rhinoceros	Nil gai	One horn Rhinoceros
Srimai/ Patiya	Bon morag, Elephant, Birds, Fox, Birds	Barking deer	Deer	-	-

Part B- Household survey:

Family size, sex and education

The result of the survey shows that average family size in the study area is 5.65 of which 52 percent male and the rest 48 percent female members. In case of literacy 63 percent of the family members were found literate and the rest 37 percent were illiterate (Table 5). It is interesting to see that the literacy rate is much higher in Patiya Upazila (82%) compared to Chandanaish Upazila (41%). This might be due to the fact that in Patiya Upazila people are more conscious and interested to send their children to school. The other reason might be due to the development processes that started long ago in Patiya Upazila than the Chandanaish Upazila.

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

Upazila	Village	Family size	Sex		Education	
			Male	Female	Literate	Illiterate
Chandanaish	Raijowara (n=5)	4.60	2.60 (57)	2.00 (43)	1.80 (39)	2.80 (61)
	S.Raijowara (n= 2)	5.50	2.50 (45)	3.00 (55)	2.50 (45)	3.00 (55)
	East Chandanaish (n= 4)	5.00	3.00 (57)	2.25 (43)	3.25 (62)	2.00 (38)
	East alahbad (n= 1)	4.00	2.00 (50)	2.00 (50)	0.00 (00)	4.00 (100)
	Gasbaria (n= 3)	7.67	3.67 (48)	4.00 (52)	2.67 (35)	5.00 (65)
	Kollamudo (n= 8)	5.25	2.38 (45)	2.88 (55)	2.00 (38)	3.25 (62)
	Sub total (n= 23)	5.39	2.70 (50)	2.70 (50)	2.22 (41)	3.17 (59)
Patiya	Haidgao(E) (n= 14)	6.29	3.43 (55)	2.86 (45)	5.50 (88)	0.79 (13)
	Korona(N) (n= 6)	5.00	2.50 (50)	2.50 (50)	3.67 (73)	1.33 (27)
	Shilpara (n= 3)	5.67	2.67 (47)	3.00 (53)	4.00 (71)	1.67 (29)
	Shikalbaha (n= 2)	6.00	4.00 (67)	2.00 (33)	5.00 (83)	1.00 (17)
	Sub total (n= 25)	5.88	3.16 (54)	2.72 (46)	4.84 (82)	1.04 (18)
Total (n= 48)		5.65	2.94 (52)	2.71 (48)	3.58 (63)	2.06 (37)

Land holdings

Analysis of the total land holdings suggest that each family in the study area possess a total of 149.09 decimals of land of which 45 percent (67.41 decimals) of land is used for agricultural purposes followed by 34 percent (50.69 decimals) tree/bush area (private forests) and 19 percent (28.03 decimals) homestead area (Figure 1, Table 6). Total land holdings was found much higher in Patiya Upazila (210.96 decimals) compared to Chandanaish Upazila (87.22 decimals) and this high amount of land is used mostly for trees (an average tree area of 93.79 decimals compared to only 7.58 decimals in Chandanaish Upazila) and agricultural purposes (an average agricultural land of 85.64 decimals in Patiya compared to 49.18 decimals in Chandanaish). The tree areas (private forests) is an important land use in the study area specially in Haidgao (N) and Korona village of Patiya Upazila which are mostly leased or rented land (Table 6). Homestead areas are 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 7).

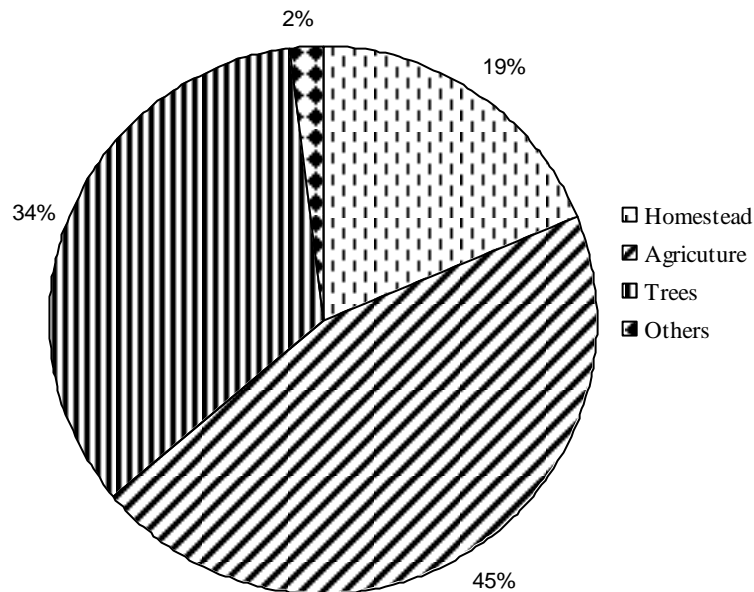


Figure 1: Distribution of average household land uses (%) in the study area.



Photo 7: Typical homestead with trees and crops in (a) Chandanaish and (b) Patiya

Occupation

Respondent households' were analyzed according to their family occupation. It is seen that agriculture (54%) is the major primary occupation followed by service (25%), business (10%) and others ((10%). However, most of the family (73%) also dependent on secondary occupation for their sustenance where others (40%) is the main occupation in secondary occupation category (Table 7). The others category includes daily labour, rickshaw puller, sewing at home, handicrafts making, and village doctor (quack) etc.

Family income

Analysis of the family income by the respondent households' show that average family income in the study area is found 167777 Taka/year of which majority of the income 114461 Taka/year (68%) comes from primary sources and 653316 Taka/year (32%) from secondary sources. However, the average family income of Chandanaish (218781 Taka/year) was found higher than Patiya (116774 Taka/year) (Table 8). Income distribution according to occupation shows that agricultural income is higher in Chandanaish (159833 Taka/year) compared to Patiya (63571 Taka/year) (Table 9).

Table 6: Distribution of land holdings (in decimals) by land use categories (values in the parentheses indicate percentages)

Upazila	Village	Land Holding	Homestead	Agriculture	Tree/Bush	Bamboo groves	Fishing	Others
Chandanaish	Raijowara (n=5)	113.40 (100)	32.60 (28.75)	68.00 (59.96)	8.4 (7.41)	1.6 (1.41)	0.8 (0.71)	2 (1.76)
	S.Raijowara (n= 2)	123.50 (100)	27.50 (22.27)	80.00 (64.78)	14 (11.34)	1 (0.81)	1 (0.81)	0 (0.00)
	East Chandanaish (n=4)	119.00 (100)	31.50 (26.47)	75.00 (63.03)	11 (9.24)	1.5 (1.26)	0 (0.00)	0 (0.00)
	East alahbad (n= 1)	28.00 (100)	20.00 (71.43)	0.00 (0.00)	4 (14.29)	0 (0.00)	4 (14.29)	0 (0.00)
	Gasbaria (n= 3)	40.67 (100)	22.00 (54.10)	13.33 (32.78)	3.33 (8.19)	0.66 (1.62)	0.66 (1.62)	0.69 (1.70)
	Kollamudo (n= 8)	98.75 (100)	32.75 (33.16)	58.75 (59.49)	4.75 (4.81)	2 (2.03)	0.5 (0.51)	0 (0.00)
	Sub total (n= 23)	87.22 (100)	27.73 (31.79)	49.18 (56.39)	7.58 (8.69)	1.13 (1.29)	1.16 (1.33)	0.45 (0.51)
Patiya	Haidgao(E) (n= 14)	593.86 (100)	27.64 (4.65)	248.57 (41.86)	306.50 (51.61)	0.57 (0.10)	8.43 (1.42)	2 (0.34)
	Korona(N) (n= 6)	161.67 (100)	39.67 (24.54)	51.67 (31.96)	68.67 (42.47)	0.67 (0.41)	1.00 (0.62)	0 (0.00)
	Shilpara (n= 3)	58.33 (100)	25.00 (42.86)	33.33 (57.14)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0 (0.00)
	Shikalbaha (n= 2)	30.00 (100)	21.00 (70.00)	9.00 (30.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0 (0.00)
	Sub total (n= 25)	210.96 (100)	28.33 (13.43)	85.64 (40.60)	93.79 (44.46)	0.31 (0.15)	2.36 (1.12)	0.50 (0.24)
Total (n= 48)		149.09 (100)	28.03	67.41 (45.21)	50.69	0.72 (0.48)	1.76	0.47 (0.32)

		(18.80)		(34.00)		(1.18)	
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Table 7: Distribution of respondent households by occupation (in percentage) in the study area

Upazila	Village	Primary Occupation (%)					Secondary Occupation (%)				
		Agriculture	Service	Business	Others	Total	Agriculture	Service	Business	Others	Total
Chandanaish	Raijowara (n=5)	13	0	0	9	22	9	0	0	0	9
	S.Raijowara (n= 2)	0	9	0	0	9	4	0	0	4	9
	East Chandanaish (n= 4)	4	4	9	0	17	0	0	0	13	13
	East alahbad (n= 1)	0	0	0	4	4	0	0	0	4	4
	Gasbaria (n= 3)	0	0	13	0	13	0	4	0	4	9
	Kollamudo (n= 8)	35	0	0	0	35	0	0	4	26	30
	Sub total (n= 23)	52	13	22	13	100	13	4	4	52	74
Patiya	Haidgao(E) (n= 14)	40	16	0	0	56	12	24	0	4	40
	Korona(N) (n= 6)	8	8	0	8	24	0	0	0	12	12
	Shilpara (n= 3)	8	4	0	0	12	0	4	0	8	12
	Shikalbaha (n= 2)	0	8	0	0	8	4	0	0	4	8
	Sub total (n= 25)	56	36	0	8	100	16	28	0	28	72
Total (n= 48)		54	25	10	10	100	15	17	2	40	73

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	Secondary income	Total family income
Chandanaish	Raijowara (n=5)	248000 (92)	21600 (8)	269600 (100)
	S.Raijowara (n= 2)	240000 (70)	102500 (30)	342500 (100)
	East Chandanaish (n= 4)	183500 (74)	66000 (26)	249500 (100)
	East alahbad (n= 1)	72000 (60)	48000 (40)	120000 (100)
	Gasbaria (n= 3)	120000 (77)	36333 (23)	156333 (100)
	Kollamudo (n= 8)	99750 (57)	75000 (43)	174750 (100)
	Sub total (n= 23)	160542 (73)	58239 (27)	218781 (100)
Patiya	Haidgao(E) (n= 14)	61857 (53)	55571 (47)	117429 (100)
	Korona(N) (n= 6)	63667 (69)	29000 (31)	92667 (100)
	Shilpara (n= 3)	76000 (61)	48000 (39)	124000 (100)
	Shikalbaha (n= 2)	72000 (54)	61000 (46)	133000 (100)
	Sub total (n= 25)	68381 (59)	48393 (41)	116774 (100)
Total (n= 48)	114461 (68)	53316 (32)	167777 (100)	

Table 9: Distribution of family income (Taka/year) according to occupation (PI= Primary income and SI= Secondary income)

Occupation	Chandanaish (n= 23)		Patiya (n= 25)		Total (n= 48)	
	PI	SI	PI	SI	PI	SI
Agriculture	159833 (52)	96000 (13)	63571 (56)	59500 (16)	108000 (54)	75143 (15)
Service	188000 (13)	25000 (4)	69111 (36)	100571 (28)	98833 (25)	91125 (17)
Business	154000 (22)	120000 (4)	-	-	154000 (10)	120000 (2)
Others	144000 (13)	75083 (52)	54000 (8)	39429 (28)	108000 (10)	61947 (40)
Average	160174 (100)	78471 (73)	64800 (100)	67667 (72)	110500 (100)	72914 (73)
Total average	218174 (48)		113520 (52)		163667 (100)	

Note: values in the parentheses denote percentage household responded

Plant diversity

Table 10 shows the plant diversity present in the homesteads of Patiya and Chandanaish Upazila. It is evident that Narikel (100%) and Supari (100%) were found in all the homesteads in Patiya followed by Am (88%), Raintree (84%), Jam (68%), Patipata (56%) and Kantal (48%) (Table 10). Species density was found highest for Supari (13.28) followed by Narikel (4.8) and Am (4.16). In case relative density highest percentage observed for Supari (29.67%) followed by Narikel (10.72%) and Am (9.29%). On the other hand, Am (91%) was found most frequently available species followed by Supari (57%), Bilombi (48%), Kamranga (43%), Peara (43%), *A. mangium* (39%), Gamar (39%) and Mahogony (35%) in Chandanaish Upazila (Table 10). It is interesting to see that homesteads of Patiya are full of native fruit species whereas that of Chandanaish are full of fast growing exotic species along with native species. Species density shows that Supari (7.17) is the main species present in the homesteads of Chandanaish followed by Gamar (3.74), *A. mangium* (3.30) and Am (3.13). Relative density of different species also shows that Supari (20.32) is the main tree species followed by Gamar (10.59), *A. mangium* (9.36), Am (8.87) and Mahogony (7.64) (Table 10).

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

Patiya (n= 25)				Chandanaish (n= 23)			
List of species	Frequency (% households)	Species Density	RD (%)	List of species	Frequency (% households)	Species Density	RD (%)
Akashmoni	4	0.24	0.54	<i>A. mangium</i>	39	3.30	9.36
Am	88	4.16	9.29	Am	91	3.13	8.87
Assargola	4	0.04	0.09	Amra	4	0.09	0.25
Ata	16	0.16	0.36	Ata	17	0.30	0.86
Bamboo	36	0.52	1.16	Bahera	9	0.13	0.37
Banana	12	0.64	1.43	Bamboo	22	0.65	1.85
Dumur	4	0.08	0.18	Banana	22	0.96	2.71
Gamar	28	1.32	2.95	Barta	9	0.09	0.25
Jam	68	1.36	3.04	Bilombi	48	0.65	1.85
Jambura	44	0.56	1.25	Cane	4	0.09	0.25
Kamala	4	0.04	0.09	Eucalyptus	13	0.87	2.46
Kamranga	12	0.16	0.36	Gab	17	0.35	0.99
Kantal	48	0.76	1.70	Gamar	39	3.74	10.59
Khejur	20	0.48	1.07	Gorjan	4	0.22	0.62
Koroi	32	1.16	2.59	Jalpai	9	0.13	0.37
Kul	40	0.64	1.43	Jam	17	0.57	1.60
Litchi	24	0.28	0.63	Jambura	4	0.09	0.25

Mandar	8	0.08	0.18	Kadam	4	0.09	0.25
Mahogany	32	3.44	7.69	Kamranga	43	0.83	2.34
Mahedi	4	0.04	0.09	Kantal	39	1.17	3.33
Modakmostan	4	0.08	0.18	Koroi	4	0.13	0.37
Mosambi	4	0.04	0.09	Kul	9	0.17	0.49
Narikel	100	4.80	10.72	Lebu	43	1.00	2.83
Neem	12	0.12	0.27	Litchi	4	0.09	0.25
Papya	44	1.12	2.50	Mahogany	35	2.70	7.64
Patipata	56	3.24	7.24	Narikel	35	1.48	4.19
Peara	28	1.08	2.41	Papya	13	0.35	0.99
Pitraj	12	0.16	0.36	Patipata	4	0.87	2.46
Raintree	84	3.48	7.77	Peara	43	1.48	4.19
Supari	100	13.28	29.67	Raintree	13	0.57	1.60
Teak	20	0.92	2.06	Sissoo	13	0.52	1.48
Tentul	8	0.08	0.18	Supari	57	7.17	20.32
Tula	12	0.12	0.27	Teak	13	1.13	3.20
Tulsi	8	0.08	0.18	Tulsi	9	0.22	0.62
Total		44.76	100	Total		35.30	100

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 Chandanaish mentioned 18 and from Patiya 12 timber and fruit species that have already lost from their homesteads. Households in Chandanaish responded that Bot (22%), Champa (22%), Haritaki (17%), Tal (17%), Arjun (13%) and Chapalish (13%) are the main species that are lost and in Patiya Khejur (36%), Bot (32%), Tal (12%), Am (8%), Basak (8%), and Tentul (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.	Chandanaish (n= 23)			Patiya (n= 25)		
	Lost species	Households responded	Frequency (% Household)	Lost species	Households responded	Frequency (% Household)
1	Amloki	1	4	Am	2	8
2	Arjun	3	13	Amloki	1	4
3	Barta	1	4	Barta	1	4
4	Bel	1	4	Basak	2	8
5	Bilati gab	1	4	Bot	8	32
6	Bot	5	22	Jalpai	1	4
7	Champa	5	22	Kerung	1	4
8	Chapalish	3	13	Khejur	9	36
9	Deshi gab	1	4	Koroi	1	4
10	Deshi Neem	1	4	Kul	1	4
11	Garjon	1	4	Tal	3	12
12	Haritaki	4	17	Tentul	2	8
13	Jalpai	1	4	-	-	-
14	Kaju Badam	1	4	-	-	-
15	Khejur	2	9	-	-	-
16	Painnagola	2	9	-	-	-
17	Tal	4	17	-	-	-
18	Tulshi	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 Chandanaish earn higher income (6582 Taka/year) compared to Patiya (1382 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, Peara and Am), timber (Teak, Gamar, Gorjon, Kantal, Mahogany, Sissoo, Jam, koroi etc.), fuel (Raintree), patipata and bamboo. Table 13 shows the distribution of income from the different plant resources. It is seen that most of the households (96%) earn an amount of 7683 Taka/year from trees and 2933 Taka/year from vegetables, almost half of the respondent households (46%) earn 2334 Taka/year from spices grown in the homesteads of the study area (Table 13). Income from medicinal plants is very nominal. Only one household (2%) in Patiya responded that he earns 130 Taka/year from medicinal plants. It is also observed that households in Chandanaish earn higher income from trees, vegetables and spices compared to households in Patiya (Table 13).

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

Sl. No	Patiya (n= 25)			Chandanaish (n= 23)		
	Species	Household responded (%)	Average benefit (Tk./year)	Species	Household responded (%)	Average benefit (Tk./year)
1	Narikel	18 (72)	2283	Narikel	2 (9)	1550
2	Supari	15 (60)	1391	Raintree	9 (39)	7444
3	Am	5 (20)	1040	Teak	1 (4)	4000
4	Peara	1 (4)	2500	Garjon	3 (13)	13333
5	Raintree	18 (72)	2700	Mahogony	1 (4)	12000
6	Papaya	3 (12)	967	Gamar	2 (9)	5500
7	Jambur	1 (4)	500	Patipata	2 (9)	1400
8	Koroi	2 (8)	1500	Bamboo	9 (39)	844
9	Teak	1 (4)	800	Sissoo	4 (17)	9750
10	Litchi	1 (4)	400	Kantal	3 (13)	10000
11	Jam	1 (4)	3000	-	-	-
12	Patipata	5 (20)	500	-	-	-
13	Bamboo	4 (16)	388	-	-	-
Average			1382	Average		6582

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 (21%) mainly from Chandanaish is collecting an average of 3 maunds of timber travelling 5 km and spending 6 hours a day. Some of the households (38%) are collecting 9 maunds of fuel travelling 5 Km and spending 6 hours a day. Another 21 % households responded to collect on average 80 culms of bamboo travelling 5 km and spending 6 hours a day. Only 2 % respondent said that they collect 8 bundles of sungrass travelling 10 km and spending 8 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. 5550 per year which is only 3.3% of their total family income (Table 15).

Table 13: Distribution of benefits earned from homestead plant resources (HH= Household responded, TB= Total benefit (Taka/year), TC= Total costs (Taka/year), NB= Net benefits (Taka/year))

Upazila	Village	Trees		Vegetables			Spices				Medicinal				
		HH (%)	TB	HH (%)	TC	TB	NB	HH(%)	TC	TB	NB	HH(%)	TC	TB	NB
Chandanaish	Raijowara (n= 5)	5 (100)	14480	5 (100)	2500	11600	9100	2 (40)	1000	4000	3000	0	0	0	0
	S.Raijowara (n=2)	2 (100)	11000	2 (100)	2250	5500	3250	1 (50)	1000	4000	3000	0	0	0	0
	East Chandanaish (n= 4)	4 (100)	13675	4 (100)	725	5175	4450	4 (100)	1425	5000	3575	0	0	0	0
	East alahbad (n=1)	1 (100)	1200	1 (100)	1200	4000	2800	0	0	0	0	0	0	0	0
	Gasbaria (n=3)	3 (100)	4533	2 (67)	350	2750	2400	1 (33)	800	3000	2200	0	0	0	0
	Kollamudo (n= 8)	8 (100)	7075	7 (88)	1993	8114	6121	7 (88)	1269	4871	3603	0	0	0	0
	Sub total (n= 23)	23(100)	9587	21 (91)	1702	7429	5726	15 (65)	1225	4607	3381	0	0	0	0
Patiya	Haidgao(E) (n= 14)	14(100)	6491	14 (100)	141	511	370	3 (21)	13	50	37	0	0	0	0
	Korona(N) (n= 6)	5 (83)	7290	6 (100)	525	1717	1192	2 (33)	30	130	100	1 (16)	20	150	130
	Shilpara (n= 3)	2 (67)	1550	3 (100)	133	583	450	2 (67)	20	175	155	0	0	0	0
	Shikalbaha (n= 2)	2 (100)	1250	2 (100)	150	650	500	0	0	0	0	0	0	0	0
	Subtotal (n= 25)	23 (92)	5779	25 (100)	233	820	587	7 (28)	20	109	89	1 (4)	20	150	130
Total (n= 48)		46 (96)	7683	46 (96)	904	3837	2933	22 (46)	842	3175	2334	1 (2)	20	150	130

Table 14: Collection of forest resources 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		
		Q _t	D	T	Q _f	D	T	Q _b	D	T	Q _s	D	T
Chandanais h	Raijowara (n= 5)	4 (80)	5	6	3 (80)	5	6	7 (40)	6	7	0	0	0
	S.Raijowara (n=2)	0	0	0	0	0	0	0	0	0	0	0	0
	East Chandanaish (n= 4)	0	0	0	0	0	0	0	0	0	0	0	0
	East alahbad (n=1)	0	0	0	2 (100)	4	6	0	0	0	0	0	0
	Gasbaria (n=3)	0	0	0	2 (33)	3	5	0	0	0	0	0	0
	Kollamudo (n= 8)	2 (100)	6	6	2 (88)	5	6	1 (63)	5	5	0	0	0
	Sub total (n= 23)	3 (43)	5	6	2 (57)	5	6	3 (30)	5	6	0	0	0
Patiya	Haidgao(E) (n= 14)	0	0	0	13 (21)	5	7	250 (14)	7	7	8 (7)	10	8
	Korona (N) (n= 6)	0	0	0	50 (33)	3	5	240 (17)	3	6	0	0	0
	Shilpara (n= 3)	0	0	0	0	0	0	0	0	0	0	0	0
	Shikalbaha (n= 2)	0	0	0	0	0	0	0	0	0	0	0	0
	Subtotal (n= 25)	0	0	0	28 (20)	4	6	247 (12)	6	7	8 (4)	10	8
Total		3 (21)	5	6	9 (38)	5	6	80 (21)	5	6	8 (2)	10	8

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

Table 15: Collection of forest resources 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, 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		Bamboo		Sun grass		IFR	TFI	IFR as % of TFI
		Q_t	SV	Q_f	SV	Q_b	SV	Q_s	SV			
Chandanai sh	Raijowara (n= 5)	4 (80)	80 0	3 (80)	450	7 (40)	280	0	0	1530	2696 00	0.6
	S.Raijowara (n=2)	0	0	0	0	0	0	0	0	0	3425 00	0.0
	East Chandanaish (n= 4)	0	0	0	0	0	0	0	0	0	2495 00	0.0
	East alahbad (n=1)	0	0	2 (100)	300	0	0	0	0	300	1200 00	0.3
	Gasbaria (n=3)	0	0	2 (33)	300	0	0	0	0	300	1563 33	0.2
	Kollamudo (n= 8)	2 (100)	40 0	2 (88)	300	1 (63)	40	0	0	740	1747 50	0.4
	Sub total (n= 23)	3 (43)	60 0	2 (57)	300	3 (30)	120	0	0	1020	2187 81	0.5
Patiya	Haidgao(E) (n= 14)	0	0	13 (21)	1950	250 (14)	1000 0	8 (7)	400	1235 0	1174 29	10.5
	Korona (N) (n= 6)	0	0	50 (33)	7500	240 (17)	9600	0	0	1710 0	9266 7	18.5
	Shilpara (n= 3)	0	0	0	0	0	0	0	0	0	1240 00	0.0
	Shikalbaha (n= 2)	0	0	0	0	0	0	0	0	0	1330 00	0.0

	Subtotal (n= 25)	0	0	28 (20)	4200	247 (12)	9880	8 (4)	400	1448 0	1167 74	12.4
	Total	3 (21)	60 0	9 (38)	1350	80 (21)	3200	8 (2)	400	5550	1677 77	3.3

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

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 49 percent of the total activity followed by female member(s) (43%) and hired labour (9%) in Chandanaish Upazila and 47 percent of activities are performed by the male member(s) of the family followed by hired labour (28%) and female member(s) (25%). It is interesting to see that women are participating in higher percentage in Chandanaish (43%) compared to Patiya (25%) and households in Patiya are more dependent on hired labour (28%) compared to that of Chandanaish (9%) (Table 16). It is also seen that women are particularly taking part at higher percentage in planning, choice of species and nursing of the agro-forestry plants 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	Chandanaish				Patiya			
	M	F	H	Total	M	F	H	Total
Planning	48	52	0	100	50	48	2	100
Choice of species	37	63	0	100	47	53	0	100
Seedling collection	55	45	0	100	56	8	36	100
Propagation	49	48	3	100	51	15	34	100
Planting	53	47	0	100	42	14	44	100
Nursing	42	48	11	100	45	24	30	100
Watering	27	71	2	100	44	30	26	100
Fertilizing	49	50	1	100	54	25	21	100
Weeding	40	60	0	100	47	36	16	100
Pruning	60	20	20	100	54	25	21	100
Thinning	33	37	30	100	28	6	67	100
Harvesting	58	37	5	100	42	34	25	100
Trees	50	32	19	100	24	0	76	100
Fruits	64	36	0	100	49	46	6	100
Vegetables	52	48	0	100	49	48	2	100
Medicinal plants	68	33	0	100	49	51	0	100
Processing	58	23	19	100	52	7	40	100
Seelling	50	13	37	100	65	3	32	100
Total	49	43	9	100	47	25	28	100

Social/Development organizations working in the study area

The study also tried to find out the organisations working in both Chandanaish and Patiya for social and/or other development. It is found that there are at least 14 government (GOs), 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, CODEC, Grameen Bank, Gono Muki, IPM, Momasi Ekatha Sangha etc. The activities include social service, social development, agro-forestry, loan, management training, sewing training, social works etc. It is found that most of the respondent households are the members of CODEC (98%) followed by ASA (25%), BRAC (25%), IPM (17%) and Gono Muki (13%) (Table 17). It is found that among the respondent households on average 2.6 members in Chandanasih and 2.12 members in Patiya 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).

Organization	Chandanaish	Patiya	Total	Group members	Legal Status	Activities
Anser/VDP	-	1 (4)	1 (2)	3	Govt. agency	Social service
ASA	13 (43)	2 (8)	15 (25)	16-25	Govt. Approved NGO	Social development
BRAC	14 (52)	-	14 (25)	25-30	Govt. Approved NGO	Agro-forestry, Loan, Social Development
Caritas	1 (4)	-	1 (2)	30	Govt. Approved NGO	Agro-forestry, Social Development
CODEC	28 (96)	25 (100)	53 (98)	30	Govt. Approved NGO	Agro-forestry, Social Development
Destiny 2000	-	1 (4)	1 (2)	60	Govt. Approved NGO	Loan
Grameen Bank	-	4 (16)	4 (8)	25	Govt. Approved NGO	Loan
Gono Muki	-	6 (24)	6 (13)	200	Govt. Approved NGO	Loan, Management training
IPM	3 (13)	5 (20)	8 (17)	25-75	Govt. Approved Samity	Sewing training

Momasi Ekatha Sangha	-	5 (20)	5 (10)	31	Local club	Social work, Management training
Megna	-	1 (4)	1 (2)	20	Local club	Social Development
NL Forum	-	1 (4)	1 (2)	20	Local club	Social works
Shabab Netha Sangotan	-	1 (4)	1 (2)	20	Local club	Social works
Tupi Sangotan	-	1 (4)	1 (2)	94	Local club	Social works
Average	2.6	2.12				

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, Chapalish, Barta, Pitraj, Bandarhola, Goda, Gutguttya, Civit, Sonalu, Chatian, Batna, Chikrassi are almost extinct from the neighbouring forests of the study area and as a result some of the important wildlife species like deer, rhinoceros and nil gai 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.