

Baseline Survey Report

Name of the project

Inani Protected Forest Area (PFA) Co-management

Implementing entity

Society for Health Extension and Development (SHED),

Teknaf, Cox's Bazar

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 “**Inani Protected Forest Area (PFA) Co-management** ” implemented by **Society for Health Extension and Development (SHED)**, Teknaf, Cox’s Bazar partner NGO of Arannayk Foundation. The survey was designed to observe the socio-economic conditions of the local people and current status of the biodiversity resources especially timber, fuel, medicinal plants, wildlife and their uses in and around Inani Protected Forest Area. The area in and around Inani is both rich in biodiversity and under extreme threat of loss due to cyclonic damage, illegal logging and fuel wood collection. The project initially assumed that due to different natural disasters and ignorance of the people many beneficial and useful natural resources, which have sufficient timber, fuel and medicinal values, are destroying and endangering, which are very much important for human lives, natural conservation, prevention of climate changes, biodiversity, ecological balance and conserving eco-system etc. Bangladesh has a number of plant species which have high timber, fuel and medicinal value as well as great impact on ecology and biodiversity. In this connection the proposed base line survey tried to gather information on the current status of the homesteads and owned or leased hilly lands to which the local people depend for their timber, fuel and medicinal products and income. The survey also tried to appraise the biodiversity of the homesteads and the hills.

Objectives of the baseline survey:

- To assess the socioeconomic conditions of the community people living in and around Inani.
- To identify the biodiversity available in the homesteads and hilly areas of the study area.
- To identify the lost/endangered biodiversity from homesteads and hilly areas.

Methodology of the baseline survey:

The baseline survey was conducted at the homestead and hilly areas of the proposed project area of SHED in Inani PFA, under Cox’s bazaar South Forest Division, a hill forest zone with semi-evergreen and sub-tropical forest types, to assess the forest resources, households’ economic status, their dependence on forest resources and gender role in agro forestry practices.

Homestead survey: Homestead survey was conducted with a pre-structured questionnaire in the study area. A total of 100 households were surveyed from eight villages/settlements in and around Inani PFA, namely, **Bara Inani (n= 13), Falia para (n= 13), Ruppoti (n= 13), Harinmara (n= 13), Jummapara (n= 12), Patuartek (n= 12), Sonar para (n= 13) and Khairatipara (n= 11)** villages from where project participants will be selected by SHED from the study area. The head of each selected household was interviewed to gather required information. Focus Group Discussions (FGD) was also arranged in the study area to know the peoples’ perception about biodiversity loss, conservation and alternative income generating activities. The collected data were analyzed and presented in the result section.

Description of the study area:

The project location includes part of Inani and Ukhia Ranges of Teknaf (Figure-1) covering an estimated 7,000 hectares of existing natural tropical forests planned to be declared as a Protected Forest Area (PFA) in the legal status of a National Park plus about 3,000 hectares of surrounding Reserve Forests for social forestry activities. The Inani Range includes roughly 7,700 hectares and is situated just north of the Teknaf Game Reserve. East of the Inani Range is the Ukhia Range, which also includes an estimated 7,000 hectares. There are about 21 villages/settlements in and around the Inani PFA of which 8 villages/settlement paras were selected randomly for the baseline survey. Most of the settlements were located in the plain lands in and around the reserve forests. However some paras were located in the hills of the reserve forests like Khairatipara where most of the people illegally occupied and enjoying the use rights of hilly lands and the reserve forest areas and established their homesteads and tree plantations there. The people of the study area usually are poor and depend on agriculture, fuel wood collection, tree husbandry, and other income generating activities like daily labour for their livelihood. They usually grow paddy, betel leaf, vegetables, spices and trees in the plains and hills. Most of the people of the locality have established Supari (Photo 1) garden in and around their homesteads and earning considerable income from that. Some of them have already established tree plantations of Garjon, Segun, Gamar, etc. but can not harvest those as they do not have legal rights to those lands.

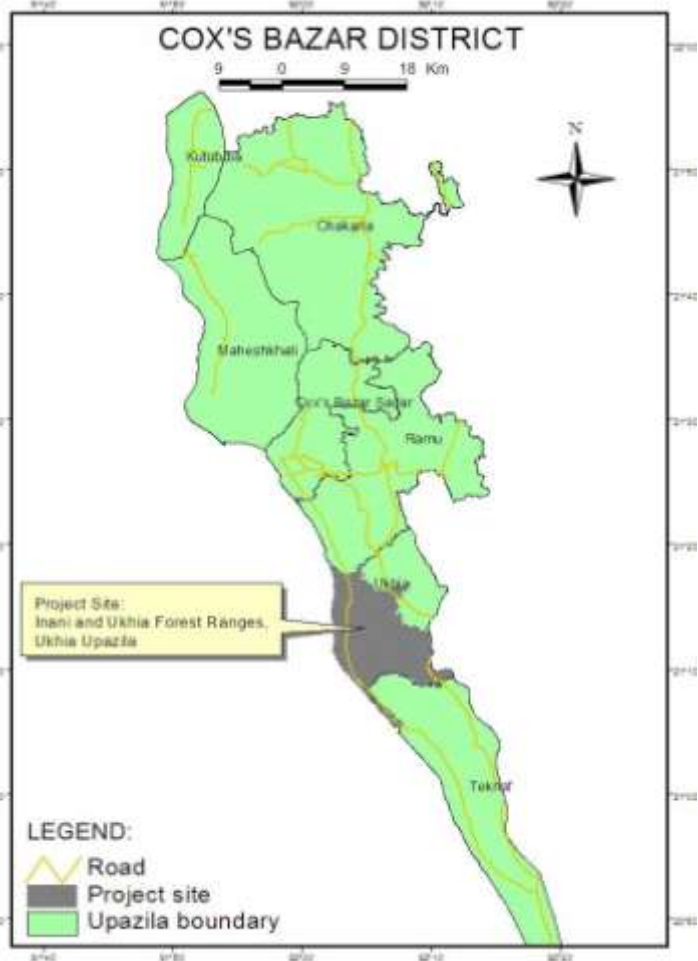


Figure 1: Location of the proposed Inani PFA Co-management Project



Photo 1: Typical homesteads with different land uses in the study area showing Supari (*Areca catechu*) garden in and around the homesteads both in plains and hills and agricultural crops (Paddy field).

Results:

Respondents' age, family size, earning members, land resources and education level

The result of the survey shows that the average age of the respondent is 40 years and they are most responsible person of the community. Average family size in the study area is 6.26 of which 55 percent male and the rest 45 percent female members (Table 1). On average each family has 1.68 earning members of which 99 percent (1.67) is male and the rest 1 percent (0.01) is female (Table 1). This result shows the backwardness of the community in relation to women development and empowerment. This result does not seem real as women in our society at least work at home and earn some income. The result may mean that either women are not allowed to work outside or due to male dominance women's income is not recognized. Community or social development cannot be achieved fully if women empowerment is not achieved. So this is important area where **SHED** can work on. Land resources occupied by each family in the study area is 97.12 decimals of which higher percentage of lands occupied by homestead (48%) followed by crop land (40%) and tree areas (11%). However they also have substantial tree areas in the homesteads that make total tree areas on average 41 decimals (42%). However, average land resources occupied by each family are higher in Bara Inani (200.38 decimals) and lower in Falia para (49.46 decimals) (Table 2). Educational status of the respondents shows that 50 percent of them are literate of which most of them have at least primary level education (38%) and the rest 12% have got secondary or higher education. It is interesting to see that there is no graduate found in the study area (Table 3).

Table 1: Distribution of respondent households by respondents' age, family size and earning member (values in the parentheses denote percentages).

Village name	Respondents' Age	Family size			Earning members		
		Male	Female	Total	Male	Female	Total
Bara Inani (n= 13)	53.23	5.08 (55)	4.23 (45)	9.31 (100)	2.46 (100)	-	2.46 (100)
Falia para (n= 13)	35.62	2.31 (48)	2.46 (52)	4.77 (100)	1.38 (100)	-	1.38 (100)
Ruppoti (n= 13)	37.85	3.46 (54)	3.00 (46)	6.46 (100)	1.46 (100)	-	1.46 (100)
Harinmara (n= 13)	32.54	2.38 (55)	1.92 (45)	4.31 (100)	1.23 (100)	-	1.23 (100)
Jummapara (n= 12)	32.92	3.50 (56)	2.75 (44)	6.25 (100)	1.67 (100)	-	1.67 (100)
Patuartek (n= 12)	43.17	3.33 (60)	2.25 (40)	5.58 (100)	1.92 (100)	-	1.92 (100)
Sonar para (n= 13)	44.69	3.85 (59)	2.69 (41)	6.54 (100)	1.69 (100)	-	1.69 (100)
Khairatipara (n= 11)	29.91	3.91 (57)	3.00 (43)	6.91 (100)	1.55 (94)	0.09 (6)	1.64 (100)
Total (n= 100)	38.93	3.47 (55)	2.79 (45)	6.26 (100)	1.67 (99)	0.01 (1)	1.68 (100)

Table 2: Distribution of respondent households by land resources (in decimals).

Village name	Homestead						Crop land (g)	Tree/bush area (h)	Bamboo area (i)	Total Tree/bamboo areas (j=b+h+i)	Total land (k=f+g+h+i)
	Dwelling unit (a)	Tree area (b)	Animal shed (c)	Yard (d)	Pond (e)	Total Homestead (f=a+b+c+d+e)					
Bara Inani (n= 13)	5.38 (2.69)	43.54 (21.73)	2.31 (1.15)	4.62 (2.30)	5.62 (2.80)	61.46 (30.67)	107.85 (53.82)	29.23 (14.59)	1.85 (0.92)	74.62 (37.24)	200.38 (100)
Falia para (n= 13)	3.00 (6.07)	18.46 (37.33)	0.38 (0.78)	2.00 (4.04)	2.15 (4.35)	26.00 (52.57)	17.69 (35.77)	5.77 (11.66)	-	24.23 (48.99)	49.46 (100)
Ruppoti (n= 13)	18.37 (18.40)	10.62 (10.64)	0.87 (0.87)	1.42 (1.43)	3.49 (3.50)	34.77 (34.84)	49.77 (49.87)	15.00 (15.03)	0.27 (0.27)	25.88 (25.93)	99.81 (100)
Harinmara (n= 13)	31.08 (44.92)	14.31 (20.68)	0.12 (0.17)	0.42 (0.60)	0.20 (0.29)	46.12 (66.66)	18.52 (26.77)	4.46 (6.45)	0.08 (0.12)	18.85 (27.25)	69.18 (100)
Jummapara (n= 12)	22.83 (30.23)	6.21 (8.22)	0.60 (0.79)	2.39 (3.17)	5.63 (7.45)	37.66 (49.86)	32.29 (42.75)	2.67 (3.53)	2.92 (3.86)	11.79 (15.61)	75.53 (100)
Patuartek (n= 12)	3.83 (4.60)	25.92 (31.12)	0.08 (0.10)	2.00 (2.40)	1.42 (1.70)	33.25 (39.93)	38.33 (46.04)	11.67 (14.01)	0.02 (0.02)	37.60 (45.16)	83.27 (100)
Sonar para (n= 13)	6.62 (7.73)	43.00 (50.27)	1.15 (1.35)	4.00 (4.68)	-	54.77 (64.03)	12.31 (14.39)	15.38 (17.99)	3.08 (3.60)	61.46 (71.85)	85.54 (100)
Khairatipara (n= 11)	7.73 (6.80)	72.27 (63.60)	-	4.55 (4.00)	-	84.55 (74.40)	29.09 (25.60)	-	-	72.27 (63.60)	113.64 (100)
Total (n= 100)	12.43 (12.80)	28.70 (29.54)	0.71 (0.73)	2.65 (2.72)	2.34 (2.40)	46.81 (48.20)	38.47 (39.61)	10.80 (11.12)	1.04 (1.07)	40.53 (41.73)	97.12 (100)

Note: Values in the parentheses denote percentages.

Table 3: Distribution of respondents by educational level (values in the parentheses denote percentages).

Village name	Education							
	Illeterate	Literate					Sub total	Total
		Primary	Secondar	SSC	HSC			
Bara Inani (n= 13)	4 (31)	7 (54)	2 (15)			9 (69)	13 (100)	
Falia para (n= 13)	9 (69)	3 (23)	1 (8)			4 (31)	13 (100)	
Ruppoti (n= 13)	7 (54)	4 (31)	1 (8)		1 (8)	6 (46)	13 (100)	
Harinmara (n= 13)	1 (8)	9 (69)	2 (15)	1 (8)		12 (92)	13 (100)	
Jummapara (n= 12)	5 (42)	5 (42)	1 (8)	1 (8)		7 (58)	12 (100)	
Patuartek (n= 12)	8 (67)	3 (25)	1 (8)			4 (33)	12 (100)	
Sonar para (n= 13)	11 (85)	2 (15)				2 (15)	13 (100)	
Khairatipara (n= 11)	5 (45)	5 (45)			1 (9)	6 (55)	11 (100)	
Total (n= 100)	50 (50)	38 (38)	8 (8)	2 (2)	2 (2)	50 (50)	100 (100)	

Occupation

Respondent households' were analyzed according to their family occupation. It is seen that agriculture and tree farming (55%) is the major primary occupation in the study area followed by other occupation including daily labour, rickshaw puller, masonry, carpenter, surveyor, poultry, fishing, foreign job etc. (23%), business (20%). People of Patuartek (92%), Harinmara (85%) and Ruppoti (77%) are mostly dependent on agriculture and tree farming. Few families (22%) were found to have secondary occupation of which most of them are involved in other occupation category (12%) and farming (6%) (Table 4).

Table 4: Distribution of respondent households by occupation (in percentage) in the study area (Far.= Agriculture and tree farming, Busi.= Business, Ser.= Service).

Village name	Primary Occupation (%)					Secondary Occupation (%)				
	Far.	Busi.	Ser.	Others	Total	Far.	Busi.	Ser.	Others	Total
Bara Inani (n= 13)	54	15	15	15	100	8	15	0	8	31
Falia para (n= 13)	31	15	0	54	100	0	0	0	8	8
Ruppoti (n= 13)	77	15	0	8	100	8	8	0	23	38
Harinmara (n= 13)	85	15	0	0	100	0	0	0	38	38
Jummapara (n= 12)	42	25	0	33	100	8	0	0	8	17
Patuartek (n= 12)	92	8	0	0	100	0	0	0	0	0
Sonar para (n= 13)	31	54	0	15	100	0	8	0	0	8
Khairatipara (n= 11)	27	9	0	64	100	27	0	0	9	36
Total (n= 100)	55	20	2	23	100	6	4	0	12	22

Family income

Analysis of the family income by the respondent households' show that average family income in the study area is 86530 Taka/year of which maximum amount of the income (41%) including 26% income from crops and 13% income from tree products comes from farming followed by other category (34%). However, average family income was found highest in Sonar para village (139154 Taka/year) and lowest in Harinmara village (48200 Taka/year) (Tables 5).

Table 5: Distribution of households' family income (Taka/year) in the study area (values in the parentheses denote percentage of total income)

Village name	Farm						Business	Service	Others	Total
	Agriculture	Trees	Fishing	Dairy	Poultry	Sub-total				
Bara Inani (n= 13)	44884.62 (32.40)	11323.08 (8.17)	1538.46 (1.11)	2538.46 (1.83)	1153.85 (0.83)	61438.46 (44.35)	15384.62 (11.11)	18461.54 (13.33)	43230.77 (31.21)	138515.38 (100)
Falia para (n= 13)	2692.31 (4.08)	1653.85 2.51	-	-	7692.31 (11.66)	12038.46 (18.25)	9615.38 (14.58)	-	44307.69 (67.17)	65961.54 (100)
Ruppoti (n= 13)	37846.15 (49.52)	9961.54 (13.03)	384.62 (0.50)	-	76.92 (0.10)	48269.23 (63.16)	7692.31 (10.07)	-	20461.54 (26.77)	76423.08 (100)
Harinmara (n= 13)	30000.00 (62.24)	1623.08 (3.37)	-	-	76.92 (0.16)	31700.00 (65.77)	5000.00 (10.37)	-	11500.00 (23.86)	48200.00 (100)
Jummapara (n= 12)	18750.00 (38.81)	3625.00 (7.50)	-	-	41.67 (0.09)	22416.67 (46.40)	6666.67 (13.80)	-	19233.33 (39.81)	48316.67 (100)
Patuartek (n= 12)	31000.00 (33.21)	26583.33 (28.48)	-	-	-	57583.33 (61.70)	24583.33 (26.34)	4166.67 (4.46)	7000.00 (7.50)	93333.33 (100)
Sonar para (n= 13)	3923.08 (2.82)	26769.23 (19.24)	-	-	-	30692.31 (22.06)	52615.38 (37.81)	7384.62 (5.31)	48461.54 (34.83)	139153.85 (100)
Khairatipara (n= 11)	10909.09 (13.86)	7045.45 (8.95)	-	-	-	17954.55 (22.81)	10909.09 (13.86)	10909.09 (13.86)	38945.45 (49.47)	78718.18 (100)
Total (n= 100)	22685.00 (26.22)	11073.00 (12.80)	250.00 (0.29)	330.00 (0.38)	1175.00 (1.36)	35513.00 (41.04)	16690.00 (19.29)	5060.00 (5.85)	29267.00 (33.82)	86530.00 (100)

Plant diversity

Table 6 shows the plant diversity present in the homesteads of the study area. A total of 33 different plant species were found in the homesteads and hills of the study area. Usually the community people are more dependent on crops and tree products that are grown in and around the homesteads and hilly areas occupied or owned by them. Among plant diversity different timber, fruit and medicinal species are found growing.

Table 6: Analysis of the plant diversity present in the study area

Sl. No.	Species name	Scientific name	Species frequency		Species Density (%)	Relative Density (%)
			No. of trees	Households (%)		
1	Achargula	<i>Grewia microcos</i>	86	11	0.86	0.26
2	Akashmoni	<i>Acacia auriculiformis</i>	820	17	8.20	2.47
3	Am	<i>Mengifera indica</i>	929	90	9.29	2.80
4	Amloki	<i>Phyllanthus embelica</i>	72	13	0.72	0.22
5	Amra	<i>Spondius dulcis</i>	14	4	0.14	0.04
6	Bamboo	<i>Bambusa vulgaris</i>	2429	29	24.29	7.33
7	Banana	<i>Musa sapientum</i>	640	18	6.40	1.93
8	Bel	<i>Aegle marmelos</i>	153	11	1.53	0.46
9	Bori	<i>Zizyphus mauritiana</i>	51	19	0.51	0.15
10	Dumur	<i>Ficus semicordata</i>	19	5	0.19	0.06
11	Gamar	<i>Gmelina arborea</i>	757	27	7.57	2.28
12	Garjon	<i>Dipterocarpus turbinatus</i>	1638	40	16.38	4.94
13	Jam	<i>Syzygium cumini</i>	113	27	1.13	0.34
14	Jambura	<i>Citrus grandis</i>	17	8	0.17	0.05
15	Jarul	<i>Lagerstroemia speciosa</i>	11	5	0.11	0.03
16	Jhau	<i>Casuarina equisetifolia</i>	8	8	0.08	0.02
17	Kadom	<i>Anthocephalus chinensis</i>	2	2	0.02	0.01
18	Kamranga	<i>Averrhoa carambola</i>	7	3	0.07	0.02
19	Kanthal	<i>Artocarpus heterophyllus</i>	916	21	9.16	2.76
20	Koroi	<i>Albizia procera</i>	89	14	0.89	0.27
21	Lebu	<i>Citrus aurantifolia</i>	79	25	0.79	0.24
22	Litchu	<i>Litchi chinensis</i>	374	11	3.74	1.13
23	Mahagoni	<i>Swietenia mahagoni</i>	216	16	2.16	0.65
24	Narikel	<i>Cocos nucifera</i>	527	69	5.27	1.59
25	Neem	<i>Azadirachta indica</i>	64	8	0.64	0.19
26	Painna gula	<i>Flacourtia jangomas</i>	43	11	0.43	0.13
27	Papaya	<i>Carica papaya</i>	48	9	0.48	0.14
28	Payara	<i>Psidium guajava</i>	424	31	4.24	1.28
29	Pitali	<i>Trewia nudiflora</i>	26	7	0.26	0.08
30	Rain tree	<i>Albizia saman</i>	29	4	0.29	0.09

31	Segun	<i>Tectona grandis</i>	1303	32	13.03	3.93
32	Supari	<i>Areca catechu</i>	21209	92	212.09	63.98
33	Telsur	<i>Hopea odorata</i>	34	9	0.34	0.10
Total			33147		331.47	100.00

It is evident that **Supari** (92%), **Am** (90%) and **Narikel** (69%) were found dominating in the homesteads and hills of the study area (Table 6). Species density was found excessively highest for **Supari** (212.09) compared to other species followed by **Bamboo** (24.29), **Garjon** (16.38%), **Segun** (13.03) and **Am** (9.29). In total species density was found 331.47 in the study area which seems not very good from bio-diversity point of view. In case relative density highest percentage was also observed for **Supari** (63.98%) followed by **Bamboo** (7.33%), **Garjon** (4.94), **Segun** (3.93) and **Am** (2.80%) (Table 6). It is interesting to see that the species density and relative density is excessively higher for Supari (212.09% & 63.98%) compared to other plant species (Table 6). This is because the local people are planting this species at greater numbers to get economic benefits. Almost all of the households (99.7%) responded that the plant species are planted by themselves and only very few (0.30%) responded that they are naturally occurring (Table 7). Most of the households (73%) have planted these species in the plain lands followed by hilly (16%) and both plain and hilly lands (11%) (Table 7). Among the agricultural crops the households responded that they also grow **paddy** (68%), **vegetables** (59%), **spices** (28%) and **betel leaf** (12%) (Table 8).

Table 7: Distribution of respondent households by mode of occurrence (%) and land types for tree growing (%).

Village name	Mode of occurrence (%)			Land types for tree growing (%)			
	Planted	Natural	Total	Plain	Hilly	Plain & Hilly	Total
Bara Inani (n= 13)	99.62	0.38	100	85	0	15	100
Falia para (n= 13)	100.00	0.00	100	77	8	15	100
Ruppoti (n= 13)	100.00	0.00	100	77	0	23	100
Harinmara (n= 13)	99.62	0.38	100	85	0	15	100
Jummapara (n= 12)	98.33	1.67	100	92	8	0	100
Patuartek (n= 12)	100.00	0.00	100	83	0	17	100
Sonar para (n= 13)	100.00	0.00	100	62	38	0	100
Khairatipara (n= 11)	100.00	0.00	100	18	82	0	100
Total (n= 100)	99.70	0.30	100	73	16	11	100

Table 8: Distribution of respondent households (%) by agricultural crops.

Agricultural Crops	Households (%)
Betel leaf	12
Paddy	68
Vegetables	59
Spices	28

Income from tree products

The respondents in the study area were asked to know the cost and benefit from tree products grown by them annually. It is found that on average each family earns a net benefit of 29697 (Taka/year) from fruits and 1674 (Taka/year) from timbers that give them a total net benefit of 31371 Taka/year (Table 9). This income from tree resources was not included in the family income of the respondent households in Table 5 as they did not mention this as family income. If this income is included in family income the total income will be higher and share of tree resources' income will definitely be higher.

Table 9: Distribution of respondent households by income from tree products (Taka/year/per household) grown by them.

Village name	Income from fruits			Income from timber			Total income		
	Cost	Benefit	Net benefit	Cost	Benefit	Net benefit	Cost	Benefit	Net benefit
Bara Inani (n= 13)	2715	22269	19554	415	7269	6854	3131	29538	26408
Falia para (n= 13)	46	6538	6492	138	231	92	185	6769	6585
Ruppoti (n= 13)	3150	21692	18542	154	1538	1385	3304	23231	19927
Harinmara (n= 13)	-	4077	4077	-	-	-	-	4077	4077
Jummapara (n= 12)	1225	5800	4575	-	-	-	1225	5800	4575
Patuartek (n= 12)	2125	33250	31125	-	-	-	2125	33250	31125
Sonar para (n= 13)	271	141385	141114	146	4692	4546	417	146077	145660
Khairatipara (n= 11)	-	6745	6745	5	-	-5	5	6745	6741
Total (n= 100)	1206	30903	29697	112	1785	1674	1317	32688	31371

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 respondent households usually collect fuel wood. The village people were found to collect 128 mounds of fuel wood per year travelling a distance of 2 kilometre and spending about 2.5 hours (150 minutes) a day on average (Table 10). The households also opined that they collect fuel wood mostly from government forests (72%) followed by own source (22%) and market place (6%) (Table 10).

Table 10: Distribution of respondent households by the collection of forest resources

Village name	Resource type	Collection Source (%)			Distance travel (Km)	Time spent (minute)
	Fuel wood (Mound/year)	Government forest	Own forest	Market place		
Bara Inani (n= 13)	150	62	38	0	1.66	120
Falia para (n= 13)	131	69	8	23	3.62	205
Ruppoti (n= 13)	147	69	23	8	1.50	175
Harinmara (n= 13)	91	38	54	15	1.93	162
Jummapara (n= 12)	174	67	33	0	1.23	97
Patuar tek (n= 12)	126	100	0	0	2.54	93
Sonar para (n= 13)	98	77	15	0	1.59	105
Khairatipara (n= 11)	112	100	0	0	2.55	249
Total (n= 100)	128	72	22	6	2.07	150

Lost Species

The homestead survey tried to find out the species that are lost from the homesteads and hilly regions of the study area. The respondent households were asked to identify the name(s) of the lost species from their homesteads and hilly lands. It is found that a total of 15 tree species were identified by the respondents that were lost from the locality. Among the lost species Garjon (70%), Telsur (41%), Chapalish (28%), Civit (28%), Hona gula (23%) and Achargula (15%) are the mostly answered plant species that are lost from the study area (Table 11).

Table 11: Respondents' perception (% households) about lost species in the study area.

Species name	Village name								Total
	Bara Inani	Falia para	Ruppoti	Harinmara	Jumma para	Patuar tek	Sonar para	Khairati para	
Achargula	7.69	30.77	-	7.69	8.33	33.33	-	36.36	15
Babla	7.69	-	23.08	15.38	16.67	41.67	-	-	13
Badhi	7.69	23.08	15.38	30.77	16.67	16.67	-	-	14
Chapalish	15.38	15.38	7.69	53.85	8.33	16.67	84.62	18.18	28
Civit	53.85	15.38	38.46	7.69	8.33	66.67	-	36.36	28
Fuljhumari	-	-	-	-	8.33	-	-	18.18	3
Garjon	100	38.46	46.15	76.92	8.33	91.67	100	100	70
Gutguttia	7.69	-	30.77	7.69	16.67	50.00	-	-	14
Hona gula	-	23.08	107.69	30.77	16.67	-	-	-	23
Jaganagula	7.69	23.08	15.38	23.08	8.33	-	-	-	10
Jam	23.08	7.69	7.69	-	16.67	-	-	-	7
Jarul	15.38	46.15	15.38	-	8.33	-	-	18.18	13
Jhau	-	-	-	-	-	8.33	-	9.09	2
Koroi	7.69	-	15.38	7.69	41.67	-	-	-	9
Telsur	53.85	7.69	38.46	-	33.33	66.67	53.85	81.82	41

Causes of and problems faced due to loss of species

The respondents were also asked to identify the causes of and problems faced due to loss of plant species from the study area. It is found that fuel wood collection (50%) is identified as the major cause of biodiversity loss followed by homestead building or encroachment (33%), illicit felling (31%), illegal occupancy by Forest Department (27%) and permit issued by FD (23%) in the study area (Table 12). The respondent households were also identified a lot of problems they are facing due to biodiversity loss from the study area. Most of them (97%) answered that they face problems due to biodiversity loss (Table 13). Some of the mentionable problems identified by majority of the respondents are less rainfall (68%), increasing temperature (52%), soil erosion (32%), sea level expansion (31%) and water level rise (28%) (Table 13).

Table 12: Distribution of respondent households (%) by the causes for bio-diversity loss in the study area.

Reasons for loss of biodiversity	Village name								Total
	Bara Inani	Falia para	Ruppoti	Harinmara	Jumma para	Patuar tek	Sonar para	Khairati para	
Illicit felling	85	38	54	0	17	50	0	0	31
Permit by forest Department	54	15	46	0	42	25	0	0	23
Fuel wood collection	62	69	54	92	58	58	0	0	50
Lack of proper maintenance by Forest Department	62	15	8	46	8	25	0	0	21
Illegal occupancy by Forest Department	46	8	31	62	42	25	0	0	27
Cut for Supari garden	0	0	0	0	0	0	54	27	10
Lack of awareness	0	0	8	15	8	17	15	0	8
Deforestation	0	0	0	0	0	0	31	9	5
Population pressure	23	8	15	62	42	25	0	0	22
Homestead building / encroachment	8	85	38	46	50	33	0	0	33
Lack of alternate income	23	8	23	23	17	33	0	0	16

Table 13: Distribution of respondent households (%) by the problems faced due to bio-diversity loss in the study area.

Village name	Difficulty faced		Type of difficulty faced				
	Yes	NO	Less rainfall	Increasing temperature	Sea level expansion	Soil erosion	Water level rise
Bara Inani (n= 13)	92	8	62	46	62	46	8
Falia para (n= 13)	100	0	54	85	0	46	8
Ruppoti (n= 13)	100	0	69	46	31	46	46
Harinmara (n= 13)	100	0	69	31	46	38	62
Jummapara (n= 12)	100	0	75	33	33	42	58
Patuartek (n= 12)	92	8	83	33	25	25	42
Sonar para (n= 13)	100	0	92	92	0	8	0
Khairatipara (n= 11)	91	9	36	45	55	0	0
Total (n= 100)	97	3	68	52	31	32	28

Recommendation for biodiversity conservation

The respondent households were asked to know their perception about how to overcome the loss of biodiversity from the study area. It is evident that most of the households responded to plant indigenous species (65%) followed by providing gas supply (38%), extending government support (31%), introducing social or community forestry (30%) and forming committee to protect forests (25%) and stopping illicit felling (21%) (Table 14). Most of the respondents will consider to plant species that have more economic value when they are to choose species to plant in and around their homesteads and hills (Table 15). Segun (77%), Neem (60%), Akashmoni (31%) and Gamar (30%) are some the preferred species by the respondent household to plant in the study area (Table 16). The respondents were also asked to know whether they have lack of technical knowledge in planting trees. Most of them (82%) opined that they do not have any problem of technical knowledge and only 18% opined about having problem of technical knowledge. Important problems faced by them are how to plant trees (12%) and how to identify good species (6%) (Table 17).

Table 14: Distribution of respondent households by their recommendation for biodiversity conservation.

Village name	Recommendation by respondents (%)					
	Social or community forestry	Form committee for forest protection	Extend government support	Planting indigenous species	Stop illicit felling	Provide gas supply
Bara Inani (n= 13)	31	23	23	69	15	23
Falia para (n= 13)	38	46	8	69	15	31
Ruppoti (n= 13)	62	15	8	85	8	31
Harinmara (n= 13)	23	31	8	77	31	54
Jummapara (n= 12)	42	42	8	67	17	33
Patuartek (n= 12)	33	33	8	67	25	50
Sonar para (n= 13)	8	8	100	62	15	31
Khairatipara (n= 11)	0	0	91	18	45	55
Total (n= 100)	30	25	31	65	21	38

Table 15: Distribution of respondent households by their considerations in planting tree species

Village name	Respondents' consideration in planting trees			
	All types of species	Species which are needed for family uses	All indigenous species	Species which have more economic value
Bara Inani (n= 13)	46	0	0	100
Falia para (n= 13)	62	0	15	100
Ruppoti (n= 13)	62	15	23	92
Harinmara (n= 13)	69	8	8	92
Jummapara (n= 12)	67	8	17	92
Patuartek (n= 12)	58	8	17	83
Sonar para (n= 13)	69	8	15	92
Khairatipara (n= 11)	27	9	0	100
Total (n= 100)	58	7	12	94

Table 16: Distribution of respondent households by their preferred species (%) to plant.

Species name	Village name (%)								Total (%)
	Bara Inani	Falia para	Ruppoti	Harinmara	Jumma para	Patuartek	Sonar para	Khairati para	
Akashmoni	31	15	31	46	42	25	31	27	31
Gamar	54	8	46	31	50	8	23	18	30
Garjon	15	0	23	15	50	0	0	9	14
Litchi	0	0	0	0	0	0	0	9	1

Mahagoni	0	0	0	0	0	0	0	18	2
Neem	69	92	46	62	58	50	54	45	60
Segun	100	85	62	69	75	75	100	45	77
Supari	23	8	15	23	25	33	54	9	24

Table 17: Distribution of responded households by problem of technical knowledge during planting.

Village name	Do you face problem of technical knowledge?		Type of problem(s)	
	Yes	No	How to plant trees	How to identify the good species
Bara Inani (n= 13)	8	92	8	8
Falia para (n= 13)	23	77	23	8
Ruppoti (n= 13)	15	85	15	0
Harinmara (n= 13)	23	77	38	23
Jummapara (n= 12)	42	58	33	0
Patuartek (n= 12)	17	83	0	0
Sonar para (n= 13)	15	85	8	8
Khairatipara (n= 11)	0	100	0	0
Total (n= 100)	18	82	16	6

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 18 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 most of the activities (81%) followed by female member(s) (14%) in the study area (Table 18). It is interesting to see that percentage of hired labour (5%) working in different agro-forestry activities of the homesteads are very low. Although women involvement is low compared to men but women are particularly taking part at comparatively higher percentage in harvesting of spices (32%), processing (26%), harvesting of fruits (20%) and choice of species (18%) in the study area (Table 18).

Table 18: Distribution of labour (%) in homestead agro-forestry activities.

Agro-forestry activities	Male		Female		Total
	Own	Hired	Own	Hired	
Planning	84	0	16	0	100
Choice of species	82	0	18	0	100
Seedling collection	85	3	12	0	100
Propagation	83	9	8	0	100
Planting	85	6	9	0	100
Nursing	85	5	11	0	100
Fertilizer	92	1	7	0	100
Weeding	78	8	14	0	100
Harvesting	77	4	19	0	100
Trees	78	13	9	0	100
Fruits	78	2	20	0	100
Vegetables	81	0	19	0	100
Spices	64	3	32	1	100
Medicinal plants	86	0	14	0	100
Processing	74	0	26	0	100
Selling	76	16	8	0	100
Total	81	5	14	0	100

Social/Development organizations working in the study area

The study also tried to find out the organisations working in the study area for social and/or other development. It is found that there are at least 6 government approved nongovernmental organizations (NGOs) working in the study area for providing loans to the villagers (Table 19). Major organizations working in the study area and percentage households involved are ASA (12%) and BRAC (7%) (Table 19).

Table 19: Distribution of NGOs activity in the study area.

NGO name	Activity	Household responded (%)
BRAC	Loan	7
Uddipon	Loan	1
ASA	Loan	12
SDI	Loan	1
Krishi Bank	Loan	1
Baro Bangladesh	Loan	1
Total		23

Focus Group Discussion (FGD):

The baseline survey also attempted to find out the opinion of the community people through Focus Group Discussion (Photo 2). The objective of the FGD was to identify how the community people think about biodiversity conservation and social development in general. The result of the FGD shows that people of the study area are involved in different income generating activities, such as, rickshaw pulling, fishing, snail & pearl collection and selling, shop keeping, fish culture, vegetable trading, supari trading (Table 20). FGD also suggest that permit issued by Forest Department (FD) at different times, illicit felling, carelessness of FD, fuel wood collection and encroachment of reserve forest areas by local people are some of the important reasons for biodiversity loss in the study area (Table 20).

Table 20: Results of Focus Group Discussion (FGD)

Questions	Answers
Alternate income	Rickshaw pulling; Fishing; Snails & pearls collection and selling; Shop keeping; Fish culture; Vegetable selling; Supari trade; etc.
Reasons for biodiversity loss	Permit issued by FD; Illicit felling; Carelessness of FD; Fuel wood collection; Encroachment; etc.
Lost plant species	Garjon, Telsur, Civit, Dharmara, Chapalish, Jarul, etc.
Lost wildlife	Guishap, Elephant, Deer, Goyal/Bison, Tiger, Python, Bagdash, etc.
How to conserve biodiversity?	Land and tree tenure to encroachers inside reserve forest individually or in a group; supply free seedlings; planting indigenous tree species; planting more trees; etc.
Species preference to plant	Supari, Segun, Gamar, Akashmoni, Garjon, Chapalish, Telsur, Jarul, Civit, Achargula, Fuljhumuri, Bamboo, etc. and species that provide more money.
Government initiative to be taken	Land and tree tenure to encroachers inside reserve forest ; assist local people in tree planting; strengthen FD with more staff; etc.
NGO initiative to be taken	Loan and free seedling (Timber and fruit) distribution; Training; etc.



Photo 2: Focus group discussions.

FGD concludes that Garjon, Telsur, Civit, Dharmara, Chapalish, Jarul are some of the important tree species and Guishap/Grey lizard (*Varanus bengalensis*), Elephant, Deer, Goyal/Bison, Tiger, Python, Bagdash/Civet are some of the important wildlife species that are lost from the reserve forest areas of Inani (Table 20). Providing land and tree tenure to encroachers inside reserve forest individually or in a group to accommodate the people who have already encroached the forests and exercising use rights for long time, supplying free seedlings, planting more and more trees and planting indigenous tree species are some of the recommendations by the FGD to conserve the lost biodiversity in the area. Supari, Segun, Gamar, Akashmoni, Garjon, Chapalish, Telsur, Jarul, Civit, Achargula, Fuljhumuri, Bamboo and other species that provide more money are generally preferred by the people to plant in and around their homesteads and hills. According to FGD the government can take initiative to give land and tree tenure to encroachers inside reserve forest, assist local people in tree planting and strengthen FD with more staffs to conserve biodiversity and NGOs can provide loan and free seedlings (both timber and fruit species) to the villagers and train them to plant and manage trees (Table 20).

Conclusion:

Finally, it can be said that the people of the study area are mainly dependent on agro-forestry products they get from their homesteads and hilly areas (Tables 5, 8, 9 & 10). The people of Ruppoti, Harinmara and Patuartek are mostly depended on agro-forestry activities (Table 5). They have planted Supari in and around their homesteads and earning considerable income included in the income from tree products (Table 5). Fuel wood collection, encroachment or illegal occupation and illicit felling are important causes of biodiversity loss identified by the respondent households in the study area (Table 12). However, Supari plantation was also identified as the important cause of biodiversity loss in the locality. In some villages betel leaf production appeared as important source of their livelihood. Supari, Segun, Gamar, Akashmoni, Garjon, Chapalish, Telsur, Jarul, Civit, Bamboo and other species that provide more money are generally preferred by the people to plant in and around their homesteads and hills (Tables 15, 16 & 20). The respondent households have realised the effects of biodiversity loss as they are facing some problems or difficulties like, less rainfall, sea level rise and higher temperature (Table 13). So they are now interested to plant and restore their homestead biodiversity with those species specially the indigenous one which will enrich biodiversity and be useful for their family purposes and can earn extra income for the family (Table 15). Again, involvement of the women in different income generating activities and agro-forestry activities are very low (Table 18) which might be due to backwardness of the society and lack of education. The local people want to have some legal rights on the land they occupied in any form. If this project can successfully implement their activities in the study area it will bring a positive impact on the biodiversity of the region and help people earn extra money from producing plant resources that will enrich the biodiversity of the region and certainly improve the environmental quality of the locality.