

Baseline Survey Report

Name of the project

Restoration and Conservation of Biodiversity
in Barind Dhamoirhat Sal Forest, Naogaon

Implementing entity

Padakhep Manabik Unnayan Kendra
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 “**Restoration and Conservation of Biodiversity in Barind Dhamoirhat Sal Forest, Naogaon**” implemented by **Padakhep Manabik Unnayan Kendra**, 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 forests. Dhamoirhat Sal forests were the richest areas of biodiversity resources which have been destroyed by logging and fuel wood or other non-wood forest resource collection by the local people. The project initially assumed that homesteads are getting divided due to vast population growth. At the same time people are setting up new habitations by destroying natural forests and local kinds of trees. Most of the inhabitants live beside the forest areas and a good number of people are directly and indirectly dependent on the forest resources. They use forest fuel woods, collect fallen leaves, 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 socioeconomic conditions of the people living in the study area.
- To identify the biodiversity available in the homesteads and forests of the study area.
- To identify the lost/endangered biodiversity from homesteads and forests.

Methodology of the baseline survey:

The baseline survey was conducted at the homesteads and neighbouring Sal forest areas of the proposed project area of Padakhep at Omar Union and Dhamoirhat Union of Dhamoirhat Upazila, Naogaon District (Map 1) to assess the forest resources, households’ economic status, their dependence on forest resources & agricultural products and gender role in agro-forestry practices. The baseline survey was conducted in two phases. First, a homestead survey was conducted with a pre-structured questionnaire in the study area (Photo 1). A total of 50 households were surveyed from six villages randomly, namely, Bakharapur (n=8), Shekhaipur (n=10), Choto molla para (n=6) of Omar Union and Jatmammudpur (n= 6), Altadighi (13), Maisar (n=7) of Dhamoirhat Sadar Union from where project participants will be selected by Padakhep. The head of each selected household was interviewed to gather required information. Then a forest survey was conducted by passing through the neighbouring forest areas of Barind Dhamoirhat Sal Forest with a group of experts to identify and list the plant species present in the forests. Sample plots of 10mX10m were also taken randomly in the forests to measure the

growing stock of the forest. The collected data were analyzed and presented in the result section.



Map 1: Map showing the study area in Omar and Dhamoirhat unions of Dhamoirhat Upazila.

Results:

Part I: Homesteads survey

Respondents' age, sex and education level

The result of the household survey (Photo 1) shows that the average age of the respondent is 41 years and they are most responsible person of the community. Among the respondents most of them are male (82%) (Table 1). Educational status of the respondents' show that half of the respondents are illiterate (50%) and the rest (50%) are literate having only primary (36%) and secondary (14%) level education. There is no higher educated person among the respondents. It shows the poor level of education in the study area. However, literacy rate was found higher in Altadighi (69%) and Shekhaipur (60%) and lower in Bakharpur (25%) and Maisar (29%) village (Table 1). Analysis of the respondents' occupation shows that most of the families are engaged in agriculture (58%) followed by daily labourer and forest resource collection especially the fallen leaves and fuel wood (34%) as primary occupation. Few respondents (26%) are also found involved in secondary occupation that includes agriculture (18%) followed by daily labourer and forest resource collection (6%) (Table 2). However, all of the respondent

households are found to collect mainly fallen leaves from the forest floor (Photos 2a and 2b) and sometimes fuel wood including dead branches and twigs to use as fuel or sell in the market. This really shows the severity of dependency of the local people on the forests.

(a)



(b)



Photo 1: Homestead surveys in (a) Altadighi, Dhamoirhat Sadar union and (b) Shekhaipur of Omar union.

Table 1: Distribution of respondent households by respondents' age, sex and educational level (Note: M= male; F= Female) (values in the parentheses denote percentages).

Village name	Age	Sex			Education			
		M	F	Total	Illiterate	Primary	Secondary	Total
Bakharpur (n=8)	43	6 (75)	2 (25)	8 (100)	6 (75)	1 (13)	1 (13)	8 (100)
Shekhaipur (n=10)	38	8 (80)	2 (20)	10 (100)	4 (40)	6 (60)	0	10 (100)
Choto molla para (n=6)	42	3 (50)	3 (50)	6 (100)	3 (50)	1 (17)	2 (33)	6 (100)
Jatmammudpur (n=6)	55	6 (100)	0	6 (100)	3 (50)	2 (33)	1 (17)	6 (100)
Altadighi (n=13)	34	12 (92)	1 (8)	13 (100)	4 (31)	6 (46)	3 (23)	13 (100)
Maisar (n=7)	44	6 (86)	1 (14)	7 (100)	5 (71)	2 (29)	0	7 (100)
Total (n=50)	41	41 (82)	9 (18)	50 (100)	25 (50)	18 (36)	7 (14)	50 (100)

Table 2: Distribution of respondent households by occupation (Note: Agri.= Agriculture; Labour= daily labourer)(values in the parentheses denote percentages).

Village name	Primary occupation					Secondary occupation			
	Agri.	Labour	Business	Service	Total	Agri.	Labour	Business	Total
Bakharpur (n=8)	2 (25)	6 (75)	-	-	8 (100)	6 (75)	1 (13)	-	7 (88)
Shekhaipur (n=10)	4 (40)	5 (50)	1 (10)	-	10 (100)	2 (20)	-	-	2 (20)
Choto molla para (n=6)	2 (33)	4 (67)	-	-	6 (100)	-	-	1 (17)	1 (17)
Jatmammudpur (n=6)	6 (100)	-	-	-	6 (100)	-	2 (33)	-	2 (33)
Altadighi (n=13)	12 (92)	1 (8)	-	-	13 (100)	1 (8)	-	-	1 (8)
Maisar (n=7)	3 (43)	1 (14)	2 (29)	1 (14)	7 (100)	-	-	-	-
Total (n=50)	29 (58)	17 (34)	3 (6)	1 (2)	50 (100)	9 (18)	3 (6)	1 (2)	13 (26)

Family size, sex and earning member

Average family size in the study area is 4.3 of which majority of them are male (52%) and the rest (48%) are female (Table 3). Among the family members most of them were found in the younger age category of 0-30 years (60%). On average each family has 1.2 (29% of the total family size) earning members of which 1.1 are male (26% of the total family size) and 0.10 are female (3% of the total family size) (Table 3). This result shows that male members of the family are mostly the earning members. However, women are found to engage themselves in the collection of leaves and fuel wood from the neighbouring forests (Photos 2a and 2b).

Table 3: Distribution of respondent households by family size, sex and total earning members (Note: M= Male, F= Female, T= Total) (values in the parentheses denote percentages).

Village name	<10		10-20		20-30		30-40		40-50		>50		Total			Earning members		
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	T	M	F	T
Bakharpur (n=8)	0.6 (15)	0.5 (12)	0.5 (12)	-	0.3 (6)	0.5 (12)	0.5 (12)	0.5 (12)	0.1 (3)	0.1 (3)	0.4 (9)	0.1 (3)	2.4 (58)	1.8 (42)	4.1 (100)	1.0 (24)	-	1.0 (24)
Shekhaipur (n=10)	0.4 (10)	0.5 (12)	0.6 (14)	0.3 (7)	0.3 (7)	0.2 (5)	0.4 (10)	0.7 (17)	0.5 (12)	0.1 (2)	0.1 (2)	0.1 (2)	2.3 (55)	1.9 (45)	4.2 (100)	0.9 (21)	0.2 (5)	1.1 (26)
Choto molla para (n=6)	0.8 (21)	0.2 (4)	0.3 (8)	0.3 (8)	0.3 (8)	0.5 (13)	0.2 (4)	0.3 (8)	0.3 (8)	0.2 (4)	0.3 (8)	0.2 (4)	2.3 (58)	1.7 (42)	4.0 (100)	1.2 (29)	0.2 (4)	
Jatmammudpur (n=6)	-	0.7 (14)	0.3 (7)	0.7 (14)	0.7 (14)	0.5 (11)	0.3 (7)	0.2 (4)	-	0.5 (11)	0.7 (14)	0.2 (4)	2.0 (43)	2.7 (57)	4.7 (100)	1.3 (29)	0.2 (4)	1.5 (32)
Altadighi (n=13)	0.8 (18)	0.5 (11)	0.4 (9)	0.4 (9)	0.4 (9)	0.3 (7)	0.4 (9)	0.5 (11)	0.4 (9)	0.3 (7)	-	0.1 (2)	2.3 (54)	2.0 (46)	4.3 (100)	1.2 (27)	0.1 (2)	1.2 (29)
Maisar (n=7)	0.1 (3)	1.0 (23)	0.3 (6)	-	0.4 (10)	0.6 (13)	0.6 (13)	0.4 (10)	0.3 (6)	-	0.3 (6)	0.4 (10)	2.0 (45)	2.4 (55)	4.4 (100)	1.3 (29)	-	1.3 (29)
Total (n=50)	0.5 (12)	0.5 (13)	0.4 (10)	0.3 (7)	0.4 (9)	0.4 (9)	0.4 (9)	0.5 (11)	0.3 (7)	0.2 (5)	0.2 (6)	0.2 (4)	2.2 (52)	2.0 (48)	4.3 (100)	1.1 (26)	0.1 (2)	1.2 (29)

Land resources

Land resources occupied by each family in the study area is 122.1 decimals of which most of the lands are agricultural (74%) followed by homestead land (8%) and bamboo or tree areas (5%) (Table 4). The households of Omar Union especially in Bakharpur (16.8 decimals), Shekhaipur (27 decimals) and Choto molla para (48.9 decimals) were found to have less land resources and so they are found more dependent on daily labourer and collection of leaves and fuel wood from the forests compared to Dhamoirhat Sadar Union mainly in Jatmammudpur (346.9 decimals), Altadighi (167.5 decimals) and Maiser (163.9 decimals) who depend mainly on agriculture for their livelihood (Tables 2, 4 and 5).

Table 4: Distribution of respondent households by land resources (in decimals) (Note: DU= Dwelling unit; AS= Animal shed; Agri.= Agricultural land) (values in the parentheses denote percentages).

Village name	Homestead						Agri.	Bamboo areas	Tree areas	Total land
	DU	Trees	AS	Yard	Pond	Total				
Bakharpur (n=8)	2.1 (12)	1.0 (6)	0.4 (3)	1.0 (6)	-	4.5 (27)	12.3 (73)	-	-	16.8 (100)
Shekhaipur (n=10)	2.0 (7)	2.1 (8)	1.2 (4)	1.2 (4)	-	6.5 (24)	20.0 (74)	0.6 (2)	-	27.0 (100)
Choto molla para (n=6)	2.3 (5)	2.0 (4)	0.8 (2)	1.3 (3)	1.2 (2)	7.6 (16)	40.8 (83)	-	0.5 (1)	48.9 (100)
Jatmammudpur (n=6)	5.0 (1)	6.0 (2)	2.5 (1)	2.0 (1)	5.0 (1)	20.5 (6)	309.5 (89)	1.2 (0.3)	15.8 (5)	346.9 (100)
Altadighi (n=13)	4.0 (2)	2.3 (1)	1.2 (1)	1.6 (1)	1.8 (1)	10.9 (6)	147.7 (88)	7.0 (4)	1.9 (1)	167.5 (100)
Maisar (n=7)	3.2 (2)	3.8 (2)	0.7 (0.4)	1.6 (1)	0.7 (0.4)	10.0 (6)	145.4 (89)	1.4 (1)	7.0 (4)	163.9 (100)
Total (n=50)	3.1 (3)	2.7 (2)	1.1 (1)	1.4 (1)	1.3 (1)	9.6 (8)	106.8 (87)	2.3 (2)	3.4 (3)	122.1 (100)

Family income

Analysis of the family income of the respondent households' shows that average family income in the study area is 35289 Taka/year of which higher amount of income (40%) comes from agricultural crops and vegetables followed by labour or forest resource collection (38%) and business (13%) (Table 5). However, average family income was found much higher in Maiser (54171 Taka/year) which is mainly due to their involvement in business compared to other villages. The households of Altadighi were found to earn most of the family income from agriculture (88%) and the households of Bakharpur were found to earn most of their income from labour or forest resource collection (89%) (Table 5).

Table 5: Distribution of households' family income (Taka/year) in the study area (Note: FRC= Forest resource collection) (values in the parentheses denote percentage of total income)

Village name	Crops and vegetables	Timber and fruits	Labour/ FRC	Business	Others	Total income
Bakharpur (n=8)	2213 (6)	-	34050 (89)	-	1875 (5)	38138 (100)
Shekhaipur (n=10)	7126 (24)	-	14000 (48)	3500 (12)	4750 (16)	29376 (100)
Choto molla para (n=6)	6700 (25)	-	18667 (70)	1167 (4)	-	26533 (100)
Jatmammudpur (n=6)	12400 (39)	967 (3)	12500 (39)	-	6000 (19)	31867 (100)
Altadighi (n=13)	29662 (88)	423 (1)	1538 (5)	923 (3)	992 (3)	33538 (100)
Maisar (n=7)	17329 (32)	371 (1)	7143 (13)	24000 (44)	5329 (10)	54171 (100)
Total (n=50)	14209 (40)	278 (1)	13388 (38)	4440 (13)	2974 (8)	35289 (100)

Plant diversity

Table 6 list the plant species and the plant diversity measures present in the homesteads of the study area. A total of 28 different plant species were found in the homesteads of the study area (Tables 6). Among plant diversity different timber, fruit and medicinal species are found growing. It is evident that **Am** (88%), **Kantal** (64%), **Litchi** (44%), **Guava** (36%) and **Akashmoni** (30%) were found dominating in the homesteads of the study area (Table 6). Species density was found higher for **Eucalyptus** (667) followed by **Akashmoni** (370), **Bamboo** (110) and **Sal** (70) in the study area (Table 6). Total species density was found 1309 in the study area which is mainly due to the fast growing tree species like Eucalyptus and Akashmoni and this is a matter of great concern from biodiversity conservation point of view. In case relative density highest percentage was also observed for **Eucalyptus** (51) followed by **Akashmoni** (28.2), **Bamboo** (8.4) and **Sal** (5.3) in the study area (Table 6).

Table 6: Analysis of the plant diversity present in the study area (Note: Nos.= Number of trees/culms; HH%= Percentage households)

Sl. No.	Local name	Scientific name	Frequency		Species Density	Relative Density (%)
			Nos.	HH%		
1	Akashmoni	<i>Accacia auriculiformis</i>	5543	30	370	28.2
2	Am	<i>Mangifera indica</i>	250	88	6	0.4
3	Ata	<i>Spondias pinnata</i>	4	6	1	0.1
4	Bamboo	<i>Bambusa spp.</i>	660	12	110	8.4
5	Banana	<i>Musa sapientum</i>	80	8	20	1.5
6	Bel	<i>Aegle marmelos</i>	3	6	1	0.1
7	Boroi	<i>Zizyphus mauritiana</i>	13	18	1	0.1
8	Eucalyptus	<i>Eucalyptus camaldulensis</i>	2002	6	667	51.0
9	Guava	<i>Psidium guajava</i>	32	36	2	0.1
10	Gutguttiya	<i>Protium serratum</i>	1	2	1	0.1
11	Jalpai	<i>Elaeocarpus floribundus</i>	2	2	2	0.2
12	Jam	<i>Syzygium cumini</i>	8	14	1	0.1
13	Kadom	<i>Anthocephalus chinensis</i>	2	4	1	0.1
14	Kanthal	<i>Artocarpus heterophyllus</i>	95	64	3	0.2
15	Khejur	<i>Phoenix sylvestris</i>	23	14	3	0.3
16	Koroi	<i>Albizia procera</i>	1	2	1	0.1
17	Lebu	<i>Citrus spp.</i>	8	12	1	0.1
18	Litchi	<i>Litchi chinensis</i>	28	44	1	0.1
19	Mahagoni	<i>Swietenia mahagoni</i>	11	6	4	0.3
20	Minjiri	<i>Cassia siamea</i>	13	2	13	1.0
21	Narikel	<i>Cocos nucifera</i>	44	24	4	0.3
22	Papaya	<i>Carica papaya</i>	27	18	3	0.2
23	Sajne	<i>Moringa oleifera</i>	13	14	2	0.1
24	Sal	<i>Shorea robusta</i>	140	4	70	5.3
25	Segun	<i>Tectona grandis</i>	15	2	15	1.1
26	Supari	<i>Areca catechu</i>	4	6	1	0.1
27	Tal	<i>Borassus flabellifer</i>	21	14	3	0.2
28	Tentul	<i>Tamarindus indica</i>	2	4	1	0.1
Total			9045		1309	100

Income from tree and agricultural products

The respondents in the study area were asked to know the cost and benefit from plant products grown by them annually. The respondent households earn some money from fruits and timber selling and also grow some crops and vegetables for their own use and to get some extra income in their homesteads and agricultural lands. It is found that on average each family earns a total net benefit of 5774 Taka/year from plant and agricultural products including fruits

(118 Taka/year), timber (440 Taka/year), vegetables (5172 Taka/year) and spices (44 Taka/year) (Table 7).

Table 7: Distribution of respondent households by income from plant products (Taka/year/household) grown by them (Note: Ct= Cost; Bt= Benefit; NB= Net benefit).

Village name	Fruit			Timber			Vegetable			Spice			Total NB
	Ct	Bt	NB	Ct	Bt	NB	Ct	Bt	NB	Ct	Bt	NB	
Bakharpur (n=8)	-	-	-	-	-	-	2025	3988	1963	-	-	-	1963
Shekhaipur (n=10)	-	200	200	-	-	-	1222	3368	2146	150	200	50	2396
Choto molla para (n=6)	-	-	-	-	-	-	517	883	367	-	-	-	367
Jatmammudpur (n=6)	33	167	133	167	1000	833	42	100	58	-	-	-	1025
Altadighi (n=13)	-	38	38	77	385	308	13277	25423	12146	146	200	54	12546
Maisar (n=7)	57	429	371	286	2143	1857	12286	21000	8714	143	286	143	11086
Total (n=50)	12	130	118	80	520	440	5807	10980	5172	88	132	44	5774

Collection of forest resources

The respondent households were asked to know the type of forest resources they usually collect from the neighbouring forests. It is observed that respondent households usually collect fallen leaves from the forest floor and sometimes dead trees, branches or twigs. All of the respondent households (100%) in the study area were found to collect fuel wood (dead trees, branches, fallen twigs and leaves) travelling a distance of 0.6 kilometres. They usually spend about 3.1 hours a day on average in collecting forest resources (Table 8).

Table 8: Distribution of respondent households by the collection of forest resources (Note: HH%= Percentage households responded).

Village name	Fuel wood/ leaves		Distance (km)	Time spent/day (hour)
	HH%	Amount (Maund)		
Bakharpur (n=8)	100	105	0.6	2.4
Shekhaipur (n=10)	100	151	0.5	5.8
Choto molla para (n=6)	100	112	0.5	2.5
Jatmammudpur (n=6)	100	82	1.2	2.7
Altadighi (n=13)	100	115	0.4	2.4
Maisar (n=7)	100	149	0.4	2.4
Total (n=50)	100	121	0.6	3.1

Lost Species

The homestead survey tried to find out the species that are lost from the homesteads and forest areas of the study area. The respondent households were asked to identify the name(s) of the lost species from their homesteads and forests. It is found that a total of 11 tree species were identified by the respondents of the study area that were lost from the locality. Among the lost species Bohera (8%), Bot (8%), Pakur (8%) and Haritaki (6%) are the mostly answered plant species that are lost from the study area (Table 9).

Table 9: Frequency distribution of respondents' perception about lost species in the study area (Note: HH= Number of households responded).

Sl. No.	Locan name	Scientific name	HH	%
1	Bel	<i>Aegle marmelos</i>	2	4
2	Bohera	<i>Terminalia bellerica</i>	4	8
3	Bot	<i>Ficus benghalensis</i>	4	8
4	Chatim	<i>Alostonia scholaris</i>	1	2
5	Dumur	<i>Ficus semicordata</i>	1	2
6	Haritaki	<i>Terminalia chebula</i>	3	6
7	Jam	<i>Syzygium cumini</i>	2	4
8	Jongli boroi	<i>Ziziphus spp.</i>	2	4
9	Neem	<i>Azadiracta indica</i>	2	4
10	Pakur	<i>Ficus lacor</i>	4	8
11	Shimul tula	<i>Bombax ceiba</i>	2	4

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 lack of money (14%), population pressure (12%) and cut for building houses (12%) are some of the noticeable causes of biodiversity loss in the study area (Table 10). The respondent households were also identified a lot of problems they are facing due to biodiversity loss from the study area. Most of them (62%) answered that they face problems due to biodiversity loss (Table 10). Some of the mentionable problems identified by the respondents of the study area are less rain fall (16%) and occurrence of frequent flood and cyclone (12%) (Table 10).

Recommendation for biodiversity conservation

The respondent households were also asked to know their perception about how to overcome the loss of biodiversity from the study area. It is evident that mixed plantation (16%) and stop cutting trees (12%) are some of the important recommendation by the respondent households to conserve biodiversity in the study area (Table 10). Most of the respondents answered that they will consider all types of species (64%) and some of them will consider those species

having economic value (22%) when they were asked to mention their consideration for planting trees (Table 10)

Table 10: Frequency distribution of respondent households by the reason (s) and difficulty faced for biodiversity loss and recommendation for biodiversity conservation in the study area (Note: HH= households responded).

Reasons, difficulties and recommendations	Respondents' opinion	HH	%
Reason for biodiversity loss from the homesteads or forests	Population pressure	6	12
	Lack of money	7	14
	Fuel wood collection	2	4
	Cut for building houses	6	12
Difficulty occurred due to Biodiversity loss	Yes	19	38
	NO	31	62
Types of difficulties occurred due to biodiversity loss	Less rain fall	8	16
	Flood & cyclone	6	12
	Scarcity of fuel wood	3	6
	Production decreases	3	6
Recommendation for biodiversity conservation	Monetary help	3	6
	Mixed plantation	8	16
	Planting indigenous species	1	2
	Protection of planted tree	3	6
	Stop cutting tree	6	12
	Alternative income generation	1	2
Consideration for planting trees	All types of species	32	64
	Species needed for family use	4	8
	All indigenous species	1	2
	Species having economic value	11	22

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 11 shows the different agro-forestry activities in the homesteads with the labour involvement based on sex. It is found that both male and female member(s) of the household are performing most of the activities where male (73%), and female (27%) perform the total agro-forestry activities in the study area (Table 11). However in Bakharpur (male 54% and female 41%) and Jatmammudpur (male 56% and female 44%) most of the works are performed more or less equally by both male and female members of the family (Table 11).

Table 11: Distribution of labour (%) in homestead agro-forestry activities (Note: M= Male; F= Female; BP= Bakharpur; SP= Shekhaipur; CMP= Choto molla para; JP= Jatmammudpur; AD= Altadighi; Mai= Maisar).

Activities	Sex	Village name						
		BP (n=8)	SP (n=10)	CMP (n=6)	JP (n=6)	AD (n=13)	Mai (n=7)	Total (n=50)
Planning	M	54	80	75	50	77	86	70
	F	46	20	25	50	23	14	30
Choice of species	M	54	80	75	50	73	86	70
	F	46	20	25	50	27	14	30
Seedling collection	M	54	80	75	55	73	86	70
	F	46	20	25	45	27	14	30
Propagation	M	54	80	75	50	73	86	70
	F	46	20	25	50	27	14	30
Planting	M	54	80	75	50	73	86	70
	F	46	20	25	50	27	14	30
Nursing	M	54	80	75	50	73	86	70
	F	46	20	25	50	27	14	30
Fertilizer application	M	54	80	75	50	73	86	70
	F	46	20	25	50	27	14	30
Weeding	M	54	80	75	50	73	86	70
	F	46	20	25	50	27	14	30
Harvesting	M	54	78	75	51	73	86	69
	F	46	22	25	49	27	14	31
Trees	M	54	80	75	55	73	86	70
	F	46	20	25	45	27	14	30
Fruits	M	54	80	75	50	73	86	70
	F	46	20	25	50	27	14	30
Vegetable	M	54	80	75	50	73	86	70
	F	46	20	25	50	27	14	30
Spices	M	54	75	75	50	73	86	69
	F	46	25	25	50	27	14	31
Medicinal plants	M	54	75	75	50	73	86	69
	F	46	25	25	50	27	14	31
Processing	M	54	80	75	50	73	86	70
	F	46	20	25	50	27	14	30
Selling	M	100	100	100	100	100	100	100
	F	-	-	-	-	-	-	-
Total	M	59	82	78	56	76	87	73
	F	41	18	22	44	24	13	27

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 6 government approved nongovernmental organizations (NGOs) working in the study area for providing loans to the community people (Table 13). A total of 34% respondent households in the study area responded that they became members of the NGOs listed to get loan. ASA (16%) is the important NGOs working in the study area. Some of mentionable NGOs are BRAC, BRDB, Assroy, Credit Sun and Krishi Bank (Table 13).

Table 12: Distribution of NGOs activity in the study area.

NGOs	Total (n=50)	
	Household involved	Percentage (%)
BRAC	1	2
BRDB	3	6
ASA	8	16
Assroy	2	4
Credit sun	2	4
Krishi Bank	1	2
Total	17	34

Part II- Forest Survey:

Forest survey was conducted in Barind Dhamoirhat Sal Forest area of Dhamoirhat Upazilla, Naogaon. It was done by walking through the Sal forest areas with a group of experts and identifying and observing the species found in the forests and also identifying the regeneration status on the forest floor. Ethnic communities of Santal (Bakharpur and Choto molla para villages) along with the local people (Shekhaipur, Jatmammudpur, Altadighi and Maiser villages) are found living in or around the Sal forests. Both the local and ethnic people of the study area were found poor and very much dependent on forest resources. They are mostly agricultural labourer and forest resource collectors. They usually collect fuel wood and fallen leaves from the forest floor (Photos 2, 3 & 4) of the neighbouring Sal forest areas which they use for their cooking purposes and also sell in the market to earn extra income. A sac of leaves is sold at Tk. 15-20 in the market or locally to the neighbours or middlemen. Ethnic communities are found very poor and more dependent on forest for their livelihood compared to local people. People usually do not cut Sal trees in fear of forest officials who, if can be identified, put them in great troubles and harassment. The forest survey reveals that the remaining patches of Sal forests are in good condition but day by day the patches and the area are shrinking due to population pressure and illegal occupancy. Ethnic people sometimes occupy forest lands illegally and establish homesteads which then become very difficult for the forest officials to evict them from the reserve forests. Forest department are trying to occupy some patches where Sal trees are not growing naturally by planting some fast growing tree species like Eucalyptus,

Akashmoni, etc. (Photo 3e) under participatory forestry activities and this year some matured plantations have been harvested to earn money for both the forest department and the target beneficiaries (Photo 3f). They also tried to protect the forest from local people by planting canes (Photo 3b) along the periphery of the forest. But this was not successful all over the area. However this is not enough to conserve the Sal forests and protect the forest lands from illegal occupancy. The random sampling procedure to know the growing stock of the forests reveals that there are on average 3475 Sal trees per hectare (Table 13). The distribution of Sal trees in the forest shows that most of them (92%) are in the lower dbh (diameter at breast height) classes (less than 20 cm). There are very few trees (8%) having dbh greater than 20 cm forming a skewed distribution of individual trees in the forest (Table 13 and Figure 1). Very few Sal trees were found to have dbh more than 50 cm. However some bigger Sal trees were found growing in some places and the biggest one found having dbh of 69 cm (Photo 2d). Some giant trees (Shimul tula having dbh over 74 cm and Assatha) were found still growing showing their very existence in the natural forests in the past. Although the forest stockings (stems/ha) is not too bad for the natural forests but the most worrying thing is that there is very few or no regeneration of Sal in the forests (as evidenced by the clear forest floor) which is due to over exploitation of fallen leaves from the forest floor in the recent past there by reducing the possibility of germination of Sal seeds and growth of germinated seedlings (Photos 2 and 3). The forest survey shows that Sal is the dominant species of the forests composing more than 99 percent species of the forests. However some associate plants were also seen to grow in the forests. Among the associate plants in the Sal forests Assatha, Bohera, Bon Sonalu, Dhakijam, Dharmara, Duddya, Gamar, Hijal, Khair, Konnari, Mahua, Painna gula, Palash, Raj koroi, Shimul etc. were found growing. Some shrubs and herbs species including vines were also found growing in the forests (Photos 2a, 3a, 3b and 3c) and regeneration of less important tree species like Duddya have been found in large quantities in the forests. Among wildlife common birds like Dove, Kechkechi, Mag pai, Mayna, Shalik, Saru, Pecha and some common snakes are usually seen by the local people in the Sal forests (Table 14) which are decreasing in numbers gradually in and around the forests of the study area. Another concerning matter noticed during the forest survey is the digging and taking away the top soil of the forest floor to build houses (Photo 3d) which is creating erosion problem and also destroying the forest. Local people also do this intentionally at the periphery of the forest (Photo 3d) so that after dying of the Sal trees they collect this as fuel wood and convert the land into agricultural land. So interventions from both the government and the non-government initiatives in this respect has become urgent to restore these important forest resources by keeping the forest undisturbed at least for some period of time, make the local people aware about the resource depletion and creating alternative income generating opportunities for the community people to help support their livelihood.

Table 13: Distribution of Sal trees according to diameter classes (cm) in the Barind Dhamoirhat Sal forest

Diameter Class (cm)	Stems/ha (Nos.)	
	Frequency	Cumulative frequency
0-5	550 (15.83)	550 (15.83)
5-10	1325 (38.13)	1875 (53.96)
10-15	900 (25.90)	2775 (79.86)
15-20	425 (12.23)	3200 (92.09)
20-25	125 (03.60)	3325 (95.68)
25-30	113 (03.24)	3438 (98.92)
30-35	13 (00.36)	3450 (99.28)
35-40	13 (00.36)	3463 (99.64)
40-45	13 (00.36)	3475 (100)
Total	3475 (100)	

Figure 1: Distribution of sal trees in the Barind Dhamoirhat Sal forest (Stems/ha according to diameter classes)

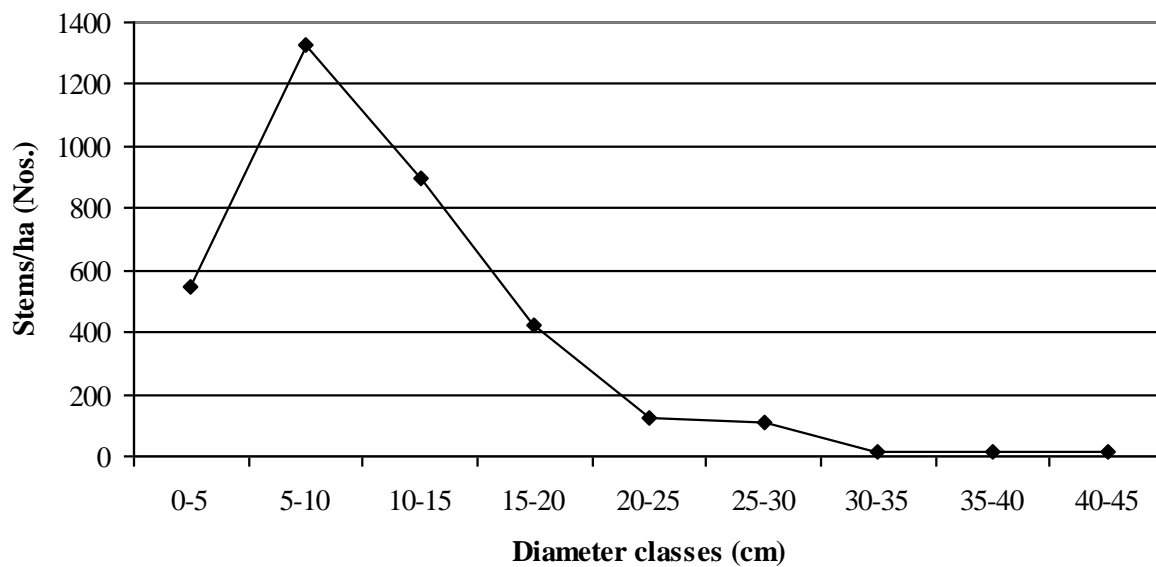


Table 14: List of plants and wildlife in the Barind Dhamoirhat Sal Forest.

Location	Major plants	Associate plants	Wildlife
Barind Dhamoirhat Sal Forest	Sal (<i>Shoerea robusta</i>)	Akashmoni Assatha Bohera Bon sonalu Dhakijam Dharmara Duddya Gamar Hijal Khair Konnari Mahua Painnagula Palash Raj koro Shimul	Dove Kechkechi Mag pai Mayna Pecha Saru Shalik Other birds Common Snakes



Photo 2: Collection of forest resources by the local people and present status of Dhamoirhat Sal Forests [(a) & (b) women and children collecting fallen leaves; (c, d, e & f) present condition of Sal forests having no or very few undergrowth; (f) biggest Sal tree (dbh= 69 cm) found in the study area].



Photo 3: Present status of the Sal forests [(a) showing undergrowth; (b) cane planted on the periphery to protect the forest from local intruder; (c) vines and undergrowth in the Sal forests; (d) collection of soil from the forest floor thereby threatening the existence of Sal trees; (e)

plantation of fast growing species; (f) harvested site of participatory forest plantation near the Sal forests].

Conclusion:

Finally, it can be said that the people of the study area are mainly dependent on agriculture (with 40% of total family income) and forest resource collection (with more than 38% of total family income) from the neighbouring forests (Tables 5, 7 & 8). However, the people of Bakharpur (with 89% of total family income) are found more dependent on forest resource collection and daily labour compared to other villages or paras (Table 5). **Am** (88%), **Kantal** (64%), **Litchi** (44%), **Guava** (36%) and **Akashmoni** (30%) were found dominating in the homesteads of the study area (Table 6). Species density was found higher for **Eucalyptus** (667) followed by **Akashmoni** (370), **Bamboo** (110) and **Sal** (70) in the study area (Table 6). Total species density was found 1309 in the study area which is mainly due to the fast growing tree species like Eucalyptus and Akashmoni and this is a matter of great concern from biodiversity conservation point of view. In case relative density highest percentage was also observed for **Eucalyptus** (51) followed by **Akashmoni** (28.2), **Bamboo** (8.4) and **Sal** (5.3) in the study area (Table 6). It is found that on average each family earns a total net benefit of 5774 Taka/year from plant and agricultural products including fruits (118 Taka/year), timber (440 Taka/year), vegetables (5172 Taka/year) and spices (44 Taka/year) (Table 7). All of the respondent households (100%) in the study area were found to collect fuel wood (dead trees, branches, fallen twigs and leaves) travelling a distance of 0.6 kilometres. They usually spend about 3.1 hours a day on average in collecting forest resources (Table 8). A total of 11 tree species were identified by the respondents of the study area that were lost from the locality. Among the lost species Bohera (8%), Bot (8%), Pakur (8%) and Haritaki (6%) are the mostly answered plant species that are lost from the study area (Table 9). Lack of money (14%), population pressure (12%) and cut for building houses (12%) are some of the noticeable causes of biodiversity loss in the study area. Most of respondents (62%) answered that they face problems due to biodiversity loss. Some of the mentionable problems identified by the respondents of the study area are less rain fall (16%) and occurrence of frequent flood and cyclone (12%) (Table 10). Mixed plantation (16%) and stop cutting trees (12%) are some of the important recommendation by the respondent households to conserve biodiversity in the study area (Table 10). Most of the respondents answered that they will consider all types of species (64%) and some of them will consider those species having economic value (22%) when they were asked to mention their consideration for planting trees (Table 10). It is found that both male and female member(s) of the household are performing most of the activities where male (73%), and female (27%) perform the total agro-forestry activities in the study area (Table 11). However in Bakharpur (male 54% and female 41%) and Jatmammudpur (male 56% and female 44%) most of the works are performed more or less equally by both male and female members of the family (Table 11). A total of 34% respondent households in the study area responded that they became members of the NGOs listed to get loan. ASA (16%) is the important NGOs working in the study area. Some of mentionable NGOs are BRAC, BRDB, Assroy, Credit Sun and Krishi Bank (Table 13). The forest survey reveals that the remaining patches of Sal forests are in good condition but day by day the patches and the area are shrinking due to population

pressure and illegal occupancy. Ethnic people sometimes occupy forest lands illegally and establish homesteads which then become very difficult for the forest officials to evict them from the reserve forests. Forest department are trying to occupy some patches where Sal trees are not growing naturally by planting some fast growing tree species like Eucalyptus, Akashmoni, etc. (Photo 3e) under participatory forestry activities. They also tried to protect the forest from local people by planting canes (Photo 3b) along the periphery of the forest. But this was not successful all over the area. However this is not enough to conserve the Sal forests and protect the forest lands from illegal occupancy. The random sampling procedure to know the growing stock of the forests reveals that there are on average 3475 Sal trees per hectare (Table 13). Some giant trees (Shimul tula having dbh over 74 cm and Assatha) were found still growing showing their very existence in the natural forests in the past. Although the forest stockings (stems/ha) is not too bad for the natural forests but the most worrying thing is that there is very few or no regeneration of Sal in the forests (as evidenced by the clear forest floor) which is due to over exploitation of fallen leaves from the forest floor in the recent past there by reducing the possibility of germination of Sal seeds and growth of germinated seedlings (Photos 2 and 3). The forest survey shows that Sal is the dominant species of the forests composing more than 99 percent species of the forests. However some associate plants were also seen to grow in the forests. Among the associate plants in the Sal forests Assatha, Bohera, Bon Sonalu, Dhakijam, Dharmara, Duddya, Gamar, Hijal, Khair, Konnari, Mahua, Painna gula, Palash, Raj koroi, Shimul etc. were found growing. Some shrubs and herbs species including vines were also found growing in the forests (Photos 2a, 3a, 3b and 3c) and regeneration of less important tree species like Duddya have been found in large quantity in the forests. Among wildlife common birds like Dove, Kechkechi, Mag pai, Mayna, Shalik, Saru, Pecha and some common snakes are usually seen by the local people in the Sal forests (Table 14) which are decreasing in numbers gradually in and around the forests of the study area. Another concerning matter noticed during the forest survey is the digging and taking away the top soil of the forest floor to build houses (Photo 3d) which is creating erosion problem and also destroying the forest. Local people also do this intentionally at the periphery of the forest (Photo 3d) so that after dying of the Sal trees they collect this as fuel wood and convert the land into agricultural land. So interventions from both the government and the non-government initiatives in this respect has become urgent to restore these important forest resources by keeping the forest undisturbed at least for some period of time, make the local people aware about the resource depletion and creating alternative income generating opportunities for the community people to help support their livelihood. If this project can successfully implement their planned activities in the study area including supported tree planting, providing training and supporting alternative income generating (AIG) activities it will bring a positive impact on the biodiversity of the region and help people earn extra income from producing plant resources and reducing dependency on forests which will enrich the biodiversity of the region and certainly improve the environmental quality of the study area.