

**Socio-economic Baseline Survey and**  
**Biodiversity Assessment**

**Name of the project**

Coastal Biodiversity Conservation through Creating AIG Facilities

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## CHAPTER-ONE

### Introduction

#### 1. Introduction

##### 1.1 Background

The coastal zone of Bangladesh is endowed with a rich biodiversity of flora and fauna. The local inhabitants along the coast are dirt poor. Non-resident investors often indiscriminately exploit the rich resources. The mangroves along the coast are of high ecological significance. The indirect benefits of these mangroves overrule its direct benefits of timber and fuel-wood yields. The huge amount of detritus delivered by these mangroves into our estuarine water has caused our coast to be rich in aquatic resources, especially the fish resources. In the recent past shrimp farming has caused serious destruction of natural coastal mangroves. The depletion of the natural vegetation has increased the vulnerability of the coastal area to storms, cyclones and tidal surges. At some locations the natural rich coastal biodiversity has also got lost beyond recovery. The non-resident investors have been the key to such degradation while the poor locals have been burdened with higher adversities.

It is high time to intervene, sensitise the community, educate them about the importance and sustainable use of biodiversity, and, at the same time look for alternative income generating (AIG) activities, to release the pressure on the local natural resource, while using its biodiversity to generate more income and enhanced livelihoods.

A consortium of four organizations, Centre for Sustainable Development (CFSD), Development of Biotechnology and Environmental Conservation Centre (DEBTEC), Bangladesh Centre for Advanced Studies (BCAS) and Shushilan under the leadership of CFSD, has undertaken the project entitled Biodiversity Conservation Through Creating AIG Facilities under the Coastal Biodiversity Conservation program in the Paikgacha village of Paikgacha upazila under Khulna district, located at the south western part of Bangladesh. The area represents a typical coastal eco-system of Bangladesh. Overall objective of this project is to conserve the coastal biodiversity through alternative income generation (AIG) activities so that the coastal ecosystem starts to get enriched.

##### 1.2 Baseline Survey

To establish the baseline indicators a socio-economic survey was conducted covering samples of households in the project area. The survey was designed to find out the existing livelihood status of the



people, based on a set of various socio-economic parameters that would be monitored from time to time with a view to evaluating progress.

### **1.3 Scope of the baseline survey**

The aim of this baseline survey is to offer sufficient information to the other partners of the project for better planning and to identify the right types of natural resource conservation and management activities towards the uplift of the living standards of the local people. The present survey has two major components. These are:

- The socio-economic conditions prevailing in the project area and illustrated through baseline data collection.
- The biodiversity assessment of the project area with identified locations for future monitoring.

The socio economic survey measures the status of the local people in relation to land ownership, income, age, occupation and education. Besides land use pattern, income and occupation of the households are also highlighted in the report.

## CHAPTER TWO

### Methodology

#### 2. Methodology for the Baseline Survey

The survey methodology consisted of the following steps and components

- Preparation of the sampling frame to study the population
- Sampling procedure
- Development of the survey questionnaire
- Field survey for data collection
- Analysis and processing of data with baseline indicator and Report preparation

##### 2.1 Sampling Frame

The households within the study area Village Paikgacha were the target population for this baseline survey. A complete list of the households have been developed through total enumeration i.e census and other secondary sources (Union Council, for example) to generate the sampling frame. It was ensured that the sampling frame is free from any error like exclusion or duplication of any household. A format for listing all households was developed and accordingly data were collected from the project area. In addition to listing, basic household information such as household population, age, sex, landholding, religion, income etc. were collected from the field and recorded on the given form.

##### 2.2 Sampling Procedure

Based on the sampling frame, sample households were selected at random to avoid any bias in the survey. The sample survey covered 235 households from the study area.

##### 2.3 Survey Questionnaire

A questionnaire was developed to collect relevant information from the sampled households. In addition to basic socio-demographic data and information, there were several sections in the questionnaire dealing with specific issues to serve the project objectives like awareness on biodiversity, natural resource use, AIG and livelihoods systems and restoration issues etc. The draft questionnaire was finalized with necessary modification and in light of the lessons learned from the pre-testing exercise.

## 2.4 Field survey for data collection

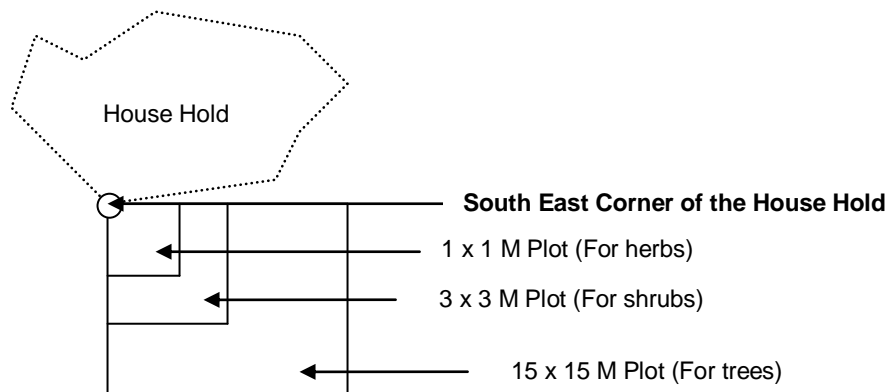
A team of field investigators were deployed to collect data/information from the sample households. The field team was trained on data collection format/questionnaire, the survey methods and interview technique. BCAS experts closely and regularly supervised the field survey to ensure the quality. A total of 955 household heads were interviewed and 235 questionnaires were administered during the field survey.

## 2.5 Data Processing and Analyses

The completed questionnaire was edited to remove any error and/or omissions committed during the field survey. Data/information from the completed questionnaires were entered into computer, to generate a database for statistical outputs (one-way and two-tables) and other descriptive statistics to be obtained using appropriate computer software (Acces/SPSS). The outputs were generated in accordance with the target variables of the baseline survey.

## 2.6 Biodiversity

For assessing biodiversity status Shanon-Weiner index was used, as this index takes into account both species richness and species evenness. To collect data for Shanon-Weiner index, 10percent of the detailed households were chosen at random. From 238 detailed households, the sample size for biodiversity index was 23 households. In each of the selected Household, the sampling plots were laid out as outlined below.



A peg of about 2.5 feet tall is driven to the Ground Level with 2 inches above the ground at the South East corner of the HH. The peg is the North East Corner of the Biodiversity Plot.

Plots 1 x 1, 3 x 3 and 15 x 15 M size were laid using the peg as the NE corner using the Compass. GPS reading of the NE corner of the plot is noted. Data sheet for each of the plot is as follows:

Plot No:

Name of the household owner:

GPS reading of NW of biodiversity plot

1 x 1 M plot (Herbs)

SI No	Name of the Species	Number

3 x 3 M plot (Shrubs)

SI No	Name of the Species	Number

15 x 15 M plot (Trees)

SI No	Name of the Species	Number

Name of the data collector:

Date:

Shanon-weiner index is calculated by using the following formula:

$$H = - \sum pi \ln pi$$

where, H = Biodiversity index (Shanon-Weiner)

$$pi = \text{proportion of i-th species} = \frac{\text{no. of i - th species}}{\text{total no. of species}}$$

and ln = natural log

Since the number of species is collected from different plot sizes i.e. 1 X 1 M for herbs, 3 X 3 M for shrubs and 15 X 15 M for trees; all these numbers are normalized to number per hectare. The biodiversity index for each of the plots is calculated separately and the biodiversity index of the Paikgacha village is calculated from the pooled data and average number of species from all 23 plots combined together.

## 2.7 Transect

Transect was carried out for faunal diversity and was done by a group of observers. The observer team had 4 persons designated for birds, herpetofauna, arthropods and common household animals. The bird observer counted chicken and common household, the animal observer counted ducks while goat, cows, dogs and cats. The arthropod observer kept record of species such as grasshopper, ants etc. The herpetofauna observer counted frogs, snakes, turtles etc. The observers walked along parallel lines or transects through the village households avoiding regular semi-pacca walkways. The total number of transects were three covering three distinct social coverage of the village namely Dakshin Para, Maddhya Para and Uttar Para. While walking once through each of the transects the observers recorded the estimated flushing distance each time a species is sighted. From this data, the average flushing distance is calculated, and twice this distance comprises the average strip width covered by the survey.

The average strip width multiplied by the length of all strips walked provides an estimate of the sample area actually traversed on foot. The relation of this sample area to the total tract area is used to expand the number of animals flushed to a population estimate for the area:

$$\text{Population of particular species (N)} = \left( \frac{\text{TotalArea}}{\text{SampleArea}} \right) \times \text{No.ofAnimalsSighted}$$

## CHAPTER-THREE

### Demographic and Socio-Economic Characteristics

#### 3.1 Household Population of the Project Area

The project area has 955 households with a total population of 4415 persons, including 2263 males and 2152 females. In other words, the percentages of males and females are 51.3 and 48.7 respectively (**Table 1**).

#### 3.2 Household Size and Sex - Ratio

Average number of persons per household in the project area was found to be 4.6 (Table-1). The sex ratio or, in other words, the number of males per 100 females is 105. (**Table-2**).

#### 3.3 Age Structure of Household Heads

About 13 percent of the household heads are over 65 years of age. About 2.7 percent are of 24 years of age. More than 84.3 percent belong to 25-64 years age group (**Table-3**).

#### 3.4 The Age Structure of Household Members

About 8.9 percent of the household members belong to the age group 0-4 years. Only 6.4percent of the population is of 60 years and above. The working age group (15-60 years) is 65percent of the population (**Table 4**).

#### 3.5 Religion of the Households

About 82.8percent of the households are Muslims (791 HH) and 17.2 percent are Hindus (164 HH). Most of the Hindu households are located at Madhya para of Village Paikgacha (**Table 5**).

### **3.6 Distribution of Household Members by Marital Status**

More than half, about 52.1 percent of the total population are married where the percentage of unmarried is 44.5 percent. A small fraction of the population is widow (only 2.6 percent) and 0.8 percent, separated (Table 6).

### **3.7 Education of Household Heads**

It has transpired that 15.6 percent of the household heads are illiterate, it is interesting to note that a quarter of the population (25.3 percent) are able to sign their names only, 5.9 percent household heads who can read only, 16.3 percent with primary education, 20.7 percent below, Secondary (those who studied in the high school but did not pass the Secondary School Certificate (SSC) Examination. Only 8.5 percent household heads have SSC level education, 4 percent have HSC level education. Bachelor and higher degree holders constitute only 3.7 percent of old household heads. The illiterates among the male and female at household level are 13.6 percent and 55.6 percent respectively. Bachelor or higher degree holders were not found among the female household heads (Table 7).

### **3.8 Education of Households Members**

The survey revealed that about 13.5 percent of the population were illiterates. About 15.2 percent people can sign only and 3.8 percent can read only. About 24 percent have primary level education and 30 percent secondary level education but not passed in the SSC examination (Table 8).

### **3.9 Relationship of Household Members with the Household Head**

Household members in general are related to the household head. His close relations are namely wife, son, daughter, father, mother, grandson and granddaughter etc. It is found that sons of household heads constitute 26 percent of the population surveyed. Wives and daughters come next accounting for about 20 percent and 15 percent of the population under study. Besides this others relationship is poorly distributed with husband followed by father, brother, sister etc (Table 9).

### **3.10 Distribution of Household Heads by Main Occupation**

Household heads in the project area are engaged in various occupations for earning income. The main occupation includes business, daily labour and drivers and shrimp culture. According to the survey business as main occupation has been mentioned by the highest percentage (27.8 percent). Daily labour, driving and shrimp culture are the main occupations for about 18.2 percent, 15.7 percent and 10.2 percent of the household heads. Agriculture, services and fishing have been mentioned as main occupation by about 8.8 percent, 7.3 percent and 4.6 percent of the household heads. Besides 3.1 percent household heads are managed in carpentry/masonry and 1.1 percent as village physicians (Table 10).

### **3.11 Distribution of Household Heads by Secondary Occupation**

In addition to a primary occupation, majority of the household heads also depend on a secondary occupation. About 75 percent household heads depend on secondary occupation. Daily labour happens to be the most important secondary occupation in the project area. Daily labour has been mentioned as secondary occupation by 28.3 percent households followed by business accounting for about 14 percent of the household head. Other secondary occupation includes livestock rearing 1.1 percent, service 1.0 percent, Carpentry 0.4 percent and handicrafts 2.7 percent only (**Table-11**).

### **3.12 Occupational status of Households members**

The survey shows that driving and shrimp business are the main occupation for 7.2 percent and 6.2 percent of the active population in the project area. Besides, 5.0 percent people are engaged in business/shop, 2.2 percent are agriculture, 3.6 percent are in shrimp culture and 3.3 percent in services. A relatively small number of the males are employed in different other occupations such as fishing, poultry/cattle rearing 0.5. Students constitute about 29percent of the male population. Among the females about 64.3percent are housewives and 25.5 percent are students. A small number of the females are engaged in other activities such as services (1.3percent), daily labour (1.3percent), handicrafts (1.1percent), poultry/cattle rearing (0.9percent) etc (**Table 12**).

### **3.13 Distribution of Household Members by Secondary Occupation**

In addition to a primary occupation, about 27.5percent of the males are also engaged in secondary occupation. With regard to secondary occupation, 16.5percent of the males are engaged in agriculture, 17.3percent in shrimp business, 7.2percent in shrimp culture, 23.7percent in daily labour, 5.8percent in fishing, 5.0percent in business, 8.6percent in poultry/cattle rearing, 5.0 percent in driving etc. Poultry and cattle rearing happens to be important secondary occupation for a significant number of the female (29.4percent) in the project area. Other secondary occupations for the females include handicrafts (8.2percent), small business and shop (2.2percent), daily labour (4.4percent), agriculture (0.7percent) etc (**Table 13**).

### **3.14 Land ownership pattern**

The collected data includes land under homestead, agriculture, shrimp culture and other purposes. Distribution of land ownership is characterized by extreme skeness in the project area. According to the survey 37.5 percent households own up to 1-5 decimal of land and 16 percent households own between 5-30 decimals. About 6 percent households have more than 500 decimals while the rest 35.8 percent



household own 30 to 300 decimals. The average size of land is 7.1 decimals for homestead, 50.7 decimals for agriculture and 23.9 decimals for shrimp culture (**Table 14**).

### **3.15 Household Income**

Annual household income ranges from less than Taka 3000 to more than Taka 15000. The average annual household income in the project area is Taka 44572 and the medium income is Taka 0.7 million. Annual income is less than Taka 15000 for about 10percent of the households and more than Taka 100000 for about 4percent of the households (**Table 15**).

### **3.16 Household Income from Different Sources**

Business contributes about 17percent to total income, the highest among different sources of income in the project area. Business is followed by leasing land for shrimp culture and services, which contribute to 13.9percent and 13.6percent of the total income respectively. Other important sources and their contribution to total income include during (12.7percent), shrimp culture (9.9percent), daily labour (7.6percent), agriculture (4.2percent), livestock/livestock product (3.5percent) (**Table 16**).

### **3.17 Average Annual Income of Households from Different Sources**

Average annual income from different sources show that it is highest (Tk.51065) from services, followed by shop (Tk.46857), boating (Tk.29333), driving (Tk.25851), shrimp culture (Tk.25843) and carpentry/masonry (Tk.25833). Income from boat workshop, shops, however, are derived by a relatively small number of the households (**Table 17**).

### **3.18 Annual Cash Income of Households from Different Sources**

The main sources of cash income for the households in the project area are shrimp culture (10.4percent), leasing out land for shrimp culture (16.1percent), business (19.7percent), driving (14.5), daily labour (8.6percent), services (13.6percent) etc. Besides, cash income is also derived from activities such as carpentry/masonry (1.5percent), boating (1.7percent), livestock/poultry (2.2percent) etc. Cash income from agriculture is almost insignificant which implies that agricultural produces are mainly used for domestic consumption while a small amount is sold in the market (**Table 18**).

### **3.19 Average Annual Cash Income of Households from Different Sources**

The average annual household income from different sources reflect that it highest (Taka 46875) from trading (shops/groceries) and which is followed by services (Tk.45474). The average annual household income from shrimp culture is Taka 27828 and from leasing out land is Taka 19257. Average annual household income from river transport is Taka 29333, from driving Taka 25969, from carpentry Taka

25833 from business Taka 25027. Average annual household income from other sources such as agriculture, fruits/vegetables, poultry is relatively less. It may also be noted that only a small number of households derive income from some sources including grocery/shop, river transport, agriculture carpentry etc (**Table 19**).

### **3.20 Household Expenditure Pattern**

Household expenditure pattern in the project area shows that rice is the main item for cash purchase accounting for 32 percent of the total household expenditure, while 14 percent goes for buying vegetables. This is probably because rice and vegetables production are only a marginal activity in the project area. The expenditure on other items includes 7.9percent for education, 7.1percent clothing, 5.8percent house maintenance, 5.8percent meat, 5.3percent fish, 4.7percent fuel and 4.9percent medical treatment (**Table 20**).

### **3.21 Household Expenditure**

The survey reveals, annual household expenditure varies from as low as Taka 5800 to as high as Taka 5.93 lakh. The average annual expenditure per household is Taka 42521 and the medium expenditure is Taka 32,700. The medium expenditure implies that 50percent of the households spend Taka 32700 or less per annum. Annual household expenditure is more than Taka 68000 for top percent of the household.

With regard to expenditure on different items, the households on average spend Taka 13501 for rice, the highest among all items. The average expenditure on other items includes Taka 6069 for vegetables, Taka 5022 for education, Taka 3502 for housekeeping/repairing and Taka 3045 for clothing (**Table 21**).

## CHAPTER-FOUR

### Natural Resources and Biodiversity

#### 4.1 Land use pattern of homesteads in the project area.

Homestead land per household ranges from only a decimal to 50. The average size of homestead land is 7.5 decimal in the project area. About 32percent households have homestead land upto 2 decimals only. Only 6percent of the homesteads in the project area are larger than 20 decimals in size (**Table 22**).

#### 4.2 Percentage Distribution of Households by Utilization of Land

The use pattern of household land in the project area demonstrates that the lion share land (63.1percent) is under shrimp culture done. About 20percent of the land is utilized for paddy cum shrimp culture. Land under agriculture accounts for only 8percent of the total household land. Besides, 5.5percent land is used as homestead, 1.5percent as pond, 0.5percent as bushes/jungles and 0.5percent as garden and nursery. Fallow land constitute only 0.5percent of the household land (**Table 23**).

#### 4.3 Distribution of Homestead Land

Household land under shrimp cultivation ranges from 7 decimals to 26.50 acres. The average size of shrimp culture land per household is 85.5 decimals. The survey shows 64percent household do not have any land under shrimp culture, 5percent households have up to 30 decimals, 15percent 30 to 100 decimals, 9percent 100-300 decimals, 3percent 300-500 decimals while 5percent household have more than 500 decimals in the project area (**Table 24, 25, 26**).

#### 4.4 Collection of Medicinal Plants

The survey findings revealed that more than half of the households (65percent) collect medicinal plants from nature. The remaining 35percent households do not collect such plants (**Table 27**).

#### 4.5 Use of Medicinal Plant

The survey shows that about 54percent households use Neem as medicinal plants, while Tulsi by 39percent households, Thankuni by 27percent households and Dumur by 15percent households. The average use per household of Dumur is 2.1 kg, Neem 1.1 kg, Telekachu 1.5 kg, Haritaki is 1.4 kg. Households also use various other medicinal plants (**Table 28**).

#### **4.6 Availability of medicinal plants in the Project Area**

Survey findings revealed that availability of medicinal plants species namely Akanda, Tulsi, Durba ghash, Motkila and Neem are considered adequate by more than 80percent of the respondents. Availability of Arjun, Shatamuli, Bantomal are considered mostly inadequate by a large majority of the respondents. Satomuli for example, is found inadequate by 100percent and Arjun by 67percent of the respondents (**Table 29**).

#### **4.7 Collection of Medicinal Plants from Nature**

More than 80percent of surveyed households collect vegetable from surrounding areas and nature whereas 18.7percent households do not collect vegetables from the gear space (**Table 30**).

#### **4.8 Collection of Vegetable Leafs**

Survey findings show that the annual collection Kachu, Kachu Sak and Olkachu per household is 5 kg or more. Annual collection of Baita Sak is 4 kg., Man Kachu 4.4 kg and Kalmi Sak 2.97 kg, Dheki sak is 0.66 kg, Nuni Sak 0.53 kg, Sechi Sak 2.98 kg for household consumption (**Table 31**).

#### **4.9 Availability of Vegetables**

They survey results shows that availability of some vegetables such as Kachu, Boita Sak, Kachu Sak, Helencha, Olkachu and Mankachu are considered adequate by more than 65percent of the respondents. Availability namely Kumra Sak, Sechi Sak and Nuni Sak are considered as inadequate by 100percent, 44.4percent, and 66.7percent of the respondents respectively (**Table 32**).

#### **4.10 Existence of Nursery**

It is observed from the household survey that there is no commercial nursery among the surveyed households in the project area (**Table 33**).

#### **4.11 Status of Trees**

Different fruit and timber trees that are commonly available in the project are mango, guava, dates, coconut, safeda, mehogani, blackberry sisukorai, palm etc. Besides, many other fruit and timber trees are also available in the area. It is found from the survey that 43percent households have mango trees, 52percent have date trees, 51percent have guava, 28percent have black berry trees. Among these households, the average number of mango trees is 5.8, date tree is 7.9 (**Table 34**).

#### **4.12 Tree Biodiversity in the Household Area**

According to the survey 67.7percent households have owned trees, among them 26percent households have fruit trees, 46.8percent households have timber trees and 60.4percent households have fruit cum timber trees. The average number of trees per household is 26.7, in other side the average number of fruit, timber and fruit cum timber trees per household is 15.5, 18.1, and 23.5 respectively (**Table 35, 36**).

#### **4.13 Degradation of Natural Resources**

Degradation of natural resources in the project area are attributable to various factors and causes. However, salinity intrusion and conversion of crop land into dump culture are considered the main causes of degradation by a large majority of the population. Population growth deforestation, water pollution also have significant contribution to degradation of natural resources. According to the survey, the contribution of activity intrusion to degradation is considered “very high” by 73percent of the respondents, “high” by 18percent of the respondents. Conversion of crop land into shrimp culture makes “very high” contribution to degradation, according to 64percent of the respondents. It is considered as a “high” and “medium” cause by 30percent and 5percent of the respondents respectively. Population growth as a cause degradation is considered “very high” by 45percent, “high” by 42percent, and “medium” by 12percent of the respondents. Other factors having significant contribution to degradation include; water logging, over use of natural resources, lack of alternative livelihoods, sedimentation of water bodies etc (**Table 37**).

#### **4.14 Use of Tree Residues/Branches/Leafs as fuel from Nature/Wild Source**

The survey reveals that 94 households collect tree residues/branches/leafs from wild resource to use as fuels in the project area (**Table 38**).

#### **4.15 Collection of Biomass Fuel from Different Sources**

Households in the project area collect biomass fuels from different sources including own land, community land, khas land etc. A majority of the households (86percent) collect fuel wood from own land. Collection of tree branches, tree leaf from own land has been reported by 65percent and 55percent of the respondents. About 50percent households, however, depend on khas land, for collection of straits bushes etc (**Table 39**).

#### **4.16 Status of Fuel Supply**

The survey reveals that of a dwindling supply of biomass fuels in the project area. Supply of fuel wood is considered “normal” by only 14percent of the respondents and it is found have decreased by 86percent of

the respondents. Supply tree leaves and branches are also found have decreased by a majority of the households in the project area (**Table 40**).

#### **4.17 Domestic Animals and Birds**

According to the survey, 68.1percent households have cock/hen, 52.8percent households have duck, 14.9percent have cow/ox and 22.5percent households have goat in the project area. The average number cock/hen per household is 10. The number of duck per household is 4 and that cow/ox 3.5 (**Table 41**).

#### **4.18 Poaching of Birds from Nature.**

During the survey, hunting of birds has been confirmed by 4.3percent of the respondents (**Table 42**).

#### **4.19: Hunting Birds in Different Seasons**

Hunting of birds goes on throughout the year including the winter. Different birds that are being hunted include king stock, the average number of birds per poacher per year average from 2.0 (in the case of Salik) to 67.0 (in the case Khoiry ) Besides, the average no Kingstock per pocher is 8.4 and that of Jalkocha 12percent (**Table 43**).

#### **4.20 Availability of Wild Animals**

All the respondents (100percent) have confirmed the availability of different wild animals in the project area. However, most of the various animals have gone either been extinct or endangered according to the opinion of the majority of the respondents. The existence of snake is considered adequate by 18percent of the respondents and it is considered “endangered” and “extinct” by 23percent and 60percent of the respondents respectively. The availability of fox is considered adequate by only 1percent of the respondents. The remaining 99percent consider it as either endangered or extinct. Mongoose and frogs are still widely available in the area. More than 90percent respondents think that availability of frogs and mongoose is adequate or normal in the area (**Table 44, 45**).

## CHAPTER-FIVE

### Environmental Problem Awareness and Information

#### 5.1 Level of Environmental Awareness

The survey objectives were also to assess the present level of environmental awareness among the local community in the project area. Survey findings revealed that all (100percent) respondents have knowledge and awareness of arsenic and safe drinking water. The percentages of respondents having the knowledge awareness of organic fertilizer, homestead gardening, catching fingerlings is more than 80percent. Respondents having the knowledge of birds and animal conservation laws was 69.9percent followed by environmental conservation laws 29.6percent. Awareness of world environment day was demonstrated by 32.7percent of the respondents.

More than 90 percent people practice the knowledge on arsenic free water, safe drinking water, health and sanitation. The practice of fingerling conservation is also quite high (80percent). Knowledge and awareness of health and sanitation issues were evidenced by 99.6percent of the respondents (**Table 46**).

#### 5.2 Sources for Environmental / Biodiversity Awareness Through Media

People get environmental related from various sources of which T.V. Radio, meetings/discussions and newspapers figure prominently. T.V. is the most important source (priority 1) for about 59percent respondents. Radio, meeting/discussion and newspapers have been mentioned as the most important sources by 27percent, 10percent and 4percent of the respondents respectively (**Table 47**).

#### 5.3 Major Environmental Problems in the Project Area

With regard to environmental problems in the project site, salinity has been mentioned as a severe problem by 94percent of the respondents. Arsenic contamination comes next which is identified as a severe problem by 71percent of the respondents. Water pollution is identified as a severe problem by 70percent of the respondents. Deforestation is classified as a severe problem by 49percent of the respondents. Siltation, riverbank erosion etc have also been identified as a severe problem by a significant number of the respondents (**Table 48**).

## CHAPTER-SIX

### AIG and Skilled Development

#### 6.1 Training Received and Practice

Survey results shows that highest percentages of households 73.2percent received training on poultry followed by shrimp culture 24.3percent, livestock 21.3percent. Besides training has received on male cultivation (1.7percent), crab fattening (2.6percent), nursery/ vegetable gardening (6.0percent), knitting nets (7.7percent), handicrafts (11.5percent), fish culture (15.7percent) and small business (19.1percent).

Poultry sector is the most successful sector for training because of 66.8percent skilled members practiced it as AIG in the project site. The percentage of trainees that utilized the skills in practiced by other sectors include shrimp culture 17.4percent, pond fish culture 10.2percent, small business 16.6percent is and handicrafts 5.1percent (**Table 49**).

#### 6.2 Household Members Trained on AIG

Survey findings show that at least one person was found skilled in any of the AIG related activity like poultry, homestead nursery/vegetable gardening, shrimp culture and crab fattening. Training has been received by both the male and female (**Table 50**).

#### 6.3 Training Needs

Household have identified different areas of training to improve their skill for income generating activities. Survey findings show that poultry training is considered top priority by the highest percentage (42.6percent) followed by shrimp culture (17.4percent). As top priority other areas of training include small business entrepreneurship development training 11.9percent, tailoring 8.1percent and handicrafts 5.1percent (**Table 51**).

#### 6.4 Involvement with Different Organizations (NGO/CBO)

Survey findings show that a number of local organizations are working in the area. It is revealed that 64.7percent household's members are involved with the local organizations (**Table 52**).



## **6.5 Average Year of Involvement with NGO/CBO and Status of Benefit**

Survey shows that household's members are involved with the organizations for a period 2- 6 years. A large majority of the respondents (86-100percent) are of the opinion that they have been benefited through their investment with the NGOs/CBOs. However, a small number of them mentioned of no such benefit from NGOs/CBOs (**Table 53**).

## **6.6 Sources of Household Loan**

It transpires from the survey that loans are borrowed by the households from different sources including Bank, NGO, moneylender, relative etc. Some households have borrowed multiple loans from different organizations. The average current loan from Bank is Taka 33189 and from NGO is Taka 18898. The average amount of loan from moneylender is Tk.21192 and from relative is Taka 7250 (**Table 54**).

## **6.7 Reasons for Loan**

Survey findings revealed that loan money is used for business purposes by the highest percentages (33.4percent) of the borrowers followed by purchase of vehicle (12.9percent), and shrimp business (7.5percent). Use of loan for agriculture, fish culture, livestock rearing, buy shop, repairing trawler is less than 5percent (**Table 55**).

## CHAPTER-SEVEN

### Biodiversity Assessment

#### 7.1 Biodiversity Index

The total number of plant species found in the 23 sample plots are 81 of which 23 are herbs, 12 are shrubs and 46 are tree species.

The overall biodiversity of the Paikgacha village as enumerated is 3.0259. The index shows this is very high biodiversity both in species richness and evenness. But if we calculate separately the biodiversity index of herb species is 2.5685 and biodiversity index of shrub species is 1.9008. On the other hand the biodiversity index for tree species is 3.0964. So, it is very clear that usual characteristics of village groves with high density of shrubs and very wide range of herbs is missing in Paikgacha village. The diversity of tree species is virtually holding up the biodiversity index. But the trees are also in danger without uniform age classes and absence of old aged trees. The native tree diversity will be lost as seed will not be easily available. The very young trees with age of less than 5 years in 15 X 15 M plots are incorporated in the calculation, but their survival is not ensured.

From general observation it seems that people are motivated towards tree plantation which is a positive sign. But special care should be taken for choosing the species. Commercial valuation coupled with native ecological balance should be the basis of species selection for plantation and people should be motivated as such. Since there are signs of salt water intrusion into the village and keeping in mind the climate change adaptations, species such as Koroi which are tolerant to salt and water stagnation can be promoted for plantation.

Old aged trees are also habitat for wild fauna specially birds and reptiles. The habitat of such species is in danger. It is also observed that people make dens for birds with broken earthen pots and birds actually breed in such arrangement. It shows how scarce the natural arrangements are. Similar efforts can be ensured to keep up the faunal biodiversity (**Table 56**).

#### 7.2 Transect

The total number of faunal species encountered through three sample transects are 33 of which 20 are birds, 3 are herpetofauna, 6 are arthropods and 4 are common household species. The estimated population sizes of the species are presented in the following table.

The transects are time and season sensitive. The estimation of population is never very reliable from the transects, especially for birds. But these estimations based on the surveyed data are very good comparison tools. The same transects, if surveyed after a period of 3 years in the same season, the estimations of the next survey will be indicative of the faunal biodiversity of the village. The two estimations will be analysed through statistical methods of comparison to identify species wise significance of difference. A simple comparison t-test would be effective for testing such difference (**Table 57**).

## LIST OF TABLE

**Table 1: Household, Population of the Project**

No. of Household	Total Population	Average Household Population	No. of Male	No. of Female
955	4415	4.62	2263 (51.3%)	2152 (48.7%)

**Table 2: Average Family Size and Sex Ratio**

Average family size	Sex Ratio
4.6	105.2

**Table 3: Age Structure of Household Heads**

Age	Number	Percentage
18-24	26	2.7
25-34	196	20.5
35-44	275	28.8
45-54	225	23.6
55-64	114	11.9
65+	119	12.5
Total	955	100.0

**Table 4: Age-Structure of Household Members**

Age	Number	Percentage
0-4	98	8.9
5-14	216	19.7
15-60	713	64.9

Age	Number	Percentage
60+	70	6.4
Total	1097	100.0

**Table 5: Distribution of Households by Religion**

Religion	Number	Percentage
Muslim	791	82.8
Hindu	164	17.2
Total	955	100.0

**Table 6: Distribution of Household Members by Marital Status**

Marital Status	Number	Percentage
Married	572	52.1
Unmarried	488	44.5
Divorced	-	-
Widow	29	2.6
Separated	8	0.8
Total	1097	100.0

**Table 7: Education of Household Heads**

Education Level	Total Number	Percentage	Male		Female	
			Number	%	Number	%
Illiterate	149	15.6	124	13.6	25	55.6
Can sign only	242	25.3	230	25.3	12	26.7
Can read only	56	5.9	54	5.9	2	4.4
Primary	156	16.3	154	16.9	2	4.4
Below SSC	198	20.7	195	21.4	3	6.7
SSC	81	8.5	80	8.8	1	2.2
HSC	38	4.0	38	4.2	-	-
BA and above	35	3.7	35	3.9	-	-
Total	955	100.0	910	1000.0	45	1000.0

**Table 8: Education of Household Members**

Education Level	Number	Percentage
Illiterate	134	13.5
Can sign only	151	15.2
Can read only	38	3.8
Primary	239	24.1
Below Secondary	294	29.7
SSC	73	7.4
HSC	31	3.1
BA and above	32	3.2
Total	992	100.0

**Table 9: Distribution of Household Members by Relationship with Household Heads**

Relationship	Number	Percentage
Own	235	21.4
Husband	2	0.2
Wife	218	19.9

Relationship	Number	Percentage
Son	287	26.2
Daughter	160	14.6
Father	13	1.2
Mother	47	4.3
Brother	11	1.0
Sister	4	0.4
Nephew	1	0.1
Niece	2	0.2
Grand son	39	3.5
Grand daughter	19	1.7
Daughter in law	45	4.1
Others	14	1.2
Total	1097	100.0

**Table 10: Distribution of Household Heads by Main Occupation**

Occupation	Number	Percentage
Shrimp culture	97	10.2
Agriculture	84	8.8
Business	265	27.8
Service	70	7.3
Daily labour	174	18.2
Fishing	44	4.6
Carpenter/Mason	30	3.1
Driver	150	15.7
Handicrafts	4	0.4
Livestock rearing	9	0.9
Doctor	10	1.1
Others	18	1.9
Total	955	100.0

**Table 11: Distribution of Household Heads by Secondary Occupation**

Occupation	Number	Percentage
Shrimp culture	48	9.2
Agriculture	131	25.1
Business	72	13.8
Service	5	1.0
Daily labour	148	28.3
Fishing	51	9.8
Mistri	2	0.4
Driver	27	5.2
Handicrafts	14	2.7
Livestock rearing	6	1.1
Doctor	7	1.3
Others	11	2.1
Total	522	100.0

**Table 12: Distribution of Household Members by Main Occupation**

Main Occupation	Male		Female		All	
	Number	%	Number	%	Number	%
Shrimp Culture	35	6.9	-	-	35	3.6
Shrimp business	55	10.9	2	0.4	57	5.9
Shrimp labour	5	1.0	1	0.2	6	0.6
Agriculture	21	4.2	-	-	21	2.2
Daily Labour	39	7.7	6	1.3	45	4.7
Fishing	7	1.4	1	0.2	8	0.8
Driver	66	13.1	-	-	66	6.9
Service	26	5.1	6	1.3	32	3.3
Small business	45	8.9	3	0.6	48	5.0
Handicraft	3	0.6	5	1.1	8	0.8



Main Occupation	Male		Female		All	
	Number	%	Number	%	Number	%
Student	147	29.1	117	25.5	264	27.4
Unemployed/old	29	5.7	12	2.6	41	4.2
Housewife	-	-	295	64.3	295	30.6
Poultry/Cattle rearing	3	0.6	4	0.9	7	0.7
Boating	3	0.6	-	-	3	0.3
Fish business	2	0.4	-	-	2	0.2
Others	19	3.8	7	1.6	26	2.8
<b>Total</b>	<b>505</b>	<b>100.0</b>	<b>459</b>	<b>100.0</b>	<b>964</b>	<b>100.0</b>

**Table 13: Distribution of Household Members by Secondary Occupation**

Secondary Occupation	Male		Female	
	Number	%	Number	%
Shrimp Culture	10	7.2	-	-
Shrimp business	24	17.3	-	-
Shrimp labour	3	2.2	-	-
Agriculture	23	16.5	1	0.7
Daily Labour	33	23.7	6	4.4
Fishing	8	5.8	7	5.2
Driver	7	5.0	-	-
Shop	3	2.2	3	2.2
Service	2	1.4	-	-
Small business	7	5.0	3	2.2
Handicraft	-	-	11	8.2
Student	-	-	-	-
Unemployed	-	-	-	-
Housewife	-	-	14	10.4
Poultry/Livestock rearing	12	8.6	89	65.9

Secondary Occupation	Male		Female	
	Number	%	Number	%
Boating	-	-	-	-
Fish business	-	-	-	-
Others	7	5.1	1	0.8
Total	139	100.0	135	100.0

**Table 14: Percentage distribution of Households by size of landholding in the project areas**

Size of land (decimal)	Number	Percentage	Type of land	Average land (decimal)
1-5	358	37.5	Homestead (n=955)	7.1
5-30	153	16.0	Agriculture (n=153)	50.7
30-100	136	14.2	Shrimp culture (n=464)	23.9
100-300	206	21.6	Others (n=82)	30.9
300-500	42	4.4	All	
500+	60	6.3		
Total	955	100.0		

**Table 15: Distribution of Household Heads by Annual Income**

Annual Income	Number	Percentage
Up to 15000	92	9.6
15000-25000	279	29.3
25000-35000	174	18.2
35000-50000	235	24.6
50000-75000	84	8.8
75000-100000	50	5.2
100000+	41	4.3
Total	955	100.0

**Table 16: Annual Income of Households from Different Sources**

Source	Total Annual Income (Tk.)	Percentage
Rice/Wheat	472150	3.9
Non rice crops	42000	0.3
Shrimp lease	1675400	13.9
Shrimp culture	1188800	9.9
Vegetables/Fruits	137320	1.2
Wood/Wooden items	45700	0.41
Fuel	166500	1.4
Fish	348500	2.9
Livestock/Milk	423300	3.5
Poultry	228873	1.9
Handicrafts	62400	0.5
Service	1634100	13.6
Daily labour	912800	7.6
Boating	176000	1.5
Driver	1525200	12.7
Business	2053200	17.1
Carpenter/Mason	155000	1.3
Shop	328000	2.7
Others	454200	3.7
Total	12029443	100.0

**Table 17: Average Annual Income of Households from Different Sources**

Source	Average Annual Income (Tk.)
Rice/Wheat (n=33)	14307
Non agriculture crops (n=3)	14000
Shrimp lease (n=87)	19257

Source	Average Annual Income (Tk.)
Shrimp culture (n=46)	25843
Vegetables (n=57)	985
Fruits (n=70)	1160
Wood (n=18)	2483
Wooden things (n=1)	1000
Fuel (n=136)	1224
Fish (n=69)	5051
Livestock/Milk (n=82)	5162
Poultry (n=151)	1516
Handicrafts (n=23)	2713
Service (n=32)	51065
Daily labour (n=67)	13624
Boating (n=6)	29333
Driver (n=59)	25851
Business (n=83)	24737
Mistri (n=6)	25833
Shop (n=7)	46857
Others (n=26)	17469

**Table 18: Annual Cash Income of Households from Different Sources**

Source	Total annual cash income (Tk.)	Percentage
Rice/Wheat	87500	0.8
Non agriculture crops	42000	0.4
Shrimp lease	1675400	16.1
Shrimp culture	1085300	10.4
Vegetables	6700	0.1
Fruits	19200	0.2
Wood	25200	0.2

Source	Total annual cash income (Tk.)	Percentage
Wooden things	-	-
Fuel	20500	0.2
Fish	188800	1.8
Livestock/Milk	113500	1.1
Poultry	110700	1.1
Handicrafts	56800	0.5
Service	1409700	13.6
Daily labour	894800	8.6
Boating	176000	1.7
Driver	1506200	14.5
Business	2052200	19.7
Carpentry	155000	1.5
Shop	328000	3.2
Others	448000	4.3
Total	10401500	100.0

**Table 19: Average Annual Cash Income of Households from Different Sources**

Source (n = No. of relevant households)	Average annual cash income (Tk.)
Rice/Wheat (n=7)	12500
Non agriculture crops (n=3)	14000
Shrimp lease (n=87)	19257
Shrimp culture (n=39)	27828
Vegetables (n=5)	1340
Fruits (n=8)	2400
Wood (n=3)	8400
Wooden things (n=0)	-
Fuel (n=16)	1281

Source (n = No. of relevant households)	Average annual cash income (Tk.)
Fish (n=21)	8990
Livestock/Milk (n=27)	4203
Poultry (n=54)	2050
Handicrafts (n=18)	3155
Service (n=31)	45474
Daily labour (n=66)	13558
River transport Boating (n=6)	29333
Driver (n=58)	25969
Business (n=82)	25027
Carpentry (n=6)	25833
Grocery Shop (n=7)	46857
Others (n=24)	18667

**Table 20: Annual Expenditure on Different Items**

Item	Total Annual Expenditure (Tk.)	Percentage
Rice	3172828	31.7
Vegetables	1426250	14.3
Wheat	17400	0.2
Fish	576720	5.8
Meat	533950	5.3
Cloth	712600	7.1
House making materials/ Repair	584820	5.8
Entertainment	150550	1.5
Education	793450	7.9
Transport	285450	2.9
Communication	325200	3.3
Treatment/ Medicine	491050	4.9
Kerosene	170786	1.7

Item	Total Annual Expenditure (Tk.)	Percentage
Electricity	184874	1.9
Fuel	465540	4.7
Others	101000	1.0
Total	9992468	100.0

**Table 21: Annual Expenditure on Different Items**

Different Items	Average Annual Expenditure (Tk.)
Rice (n=235)	13501
Vegetables (n=235)	6069
Wheat (n=12)	1450
Fish (n=230)	2507
Meat (n=232)	2301
Cloth (n=234)	3045
House making materials/ Repair (n=167)	3502
Entertainment (n=150)	1004
Education (n=158)	5022
Transport (n=203)	1406
Treatment/ Medicine (n=232)	2116
Kerosene (n=233)	733
Electricity (n=161)	1148
Communication (n=146)	2227
Fuel (n=230)	2024
Others (n=26)	3884

**Table 22: Average Household Land Size under different use**

Type of land	Average land (decimal)
Homestead (n=235)	7.5

Type of land	Average land (decimal)
Fruit garden/Nursery (n=12)	13.7
Shrimp culture (n=84)	240.2
Shrim+Paddy (n=23)	282.4
Agriculture (n=35)	73.3
Vegetables garden (n=30)	4.5
Pond (n=52)	9.3
Livestock/Poultry farm (n=17)	1.2
Market/Hat/Bazar/Shop (n=3)	1.0
Bushes and Jungle (n=1)	5.0
Fallow land (n=6)	24.3
Others (n=1)	10.0



**Table 23: Percentage Distribution of Households Land by Different Uses**

Utilization of Land	Total land (decimal)	Percentage
Homestead	1762	5.5
Fruit garden/Nursery	165	0.5
Shrimp culture	20173	63.1
Shrim+Paddy	6496	20.3
Agriculture	2565	8.0
Vegetable garden	135	0.4
Pond	485	1.5
Livestock/Poultry farm	20	0.1
Market/Hat/Bazar/Shop	3	0.01
Bushes and Jungle	5	0.02
Fallow land	146	0.5
Others	10	0.03
Total	31965	100.0

**Table 24: Distribution of Households by Size of Homestead Land**

Homestead land group (decimal)	Number	Percentage
1-2	74	31.5
2-5	77	32.8
5-10	37	15.7
10-20	32	13.6
20-50	15	6.4
Total	235	100.0

**Table 25: Distribution of Households by Shrimp Culture Land**

Shrimp culture land group (decimal)	Number	Percentage
No land	151	64.3
1-30	12	5.1
30-100	34	14.5
100-300	20	8.5
300-500	6	2.5
500+	12	5.1
Total	235	100.0

**Table 26: Distribution of Households by Total Land**

Total land group (decimal)	Number	Percentage
1-5	86	36.7
5-30	44	18.7
30-100	36	15.3
100-300	44	18.7
300+	25	10.6
Total	235	100.0

**Table-27: Collection Medicinal Plants from Nature**

Collection of medicinal plants	Number Households	%
Yes	152	64.7
No	83	35.3
Total	235	100.0

**Table 28: Use of Medicinal Plants from Nature**

Name of medicinal plants	% of households	Average collection of medicinal plants (gm)
Akanda	12.8	445
Anantamul	-	-
Bilai achra	-	-
Tulsi	39.1	665
Bontomal	0.8	300
Dadmardon	-	-
Durba ghas	5.5	328
Hartaki	1.7	1488
Dumur	14.5	2078
Kalomegh	3.0	329
Lojjaboti	1.3	133
Motkila	0.8	750
Nim	53.3	1156
Nisanda	15.3	621
Arjun	1.3	267
Pathorkuchi	14.0	358
Pipol	0.8	250
Satomuli	0.8	150
Telakucha	20.4	1530
Thankuni	26.8	330
Ulatkombol	0.4	250
Sarpagondha	-	-
Chandan	-	-
Others	1.3	483

**Table 29: Availability of Medicinal Plants from Nature**

Name of medicinal plants	Availability		
	Adequate	In-adequate	Total
Akanda	82.1	17.9	100.0
Anantamul	-	-	-
Bilai achra	-	-	-
Arhar	-	-	-
Tulsi	80.2	19.8	100.0
Bontomal	50.0	50.0	100.0
Chatim	-	-	-
Dadmardon	-	-	-
Durba ghas	72.7	27.3	100.0
Hartaki	66.7	33.3	100.0
Dumur	69.7	30.3	100.0
Kalomegh	66.7	33.3	100.0
Lojjaboti	66.7	33.3	100.0
Motkila	100.0	-	100.0
Nim	93.0	7.0	100.0
Nisanda	77.4	22.6	100.0
Arjun	33.3	66.7	100.0
Pathorkuchi	68.8	31.2	100.0
Pipol	100.0	-	100.0
Satomuli	-	100.0	100.0
Telakucha	76.1	23.9	100.0
Thankuni	50.8	49.2	100.0
Ulatkombol	-	-	-
Sarpagondha	-	-	-
Chandan	-	-	-
Others	100.0	-	100.0

**Table 30: Collection of Vegetables from Nature**

Collection of vegetable from nature	Number of household collecting vegetables	%
Yes	191	81.3
No	44	18.7
Total	235	100.0

**Table 31: Average Annual of Collection Vegetables (kg) per Household**

Name of Vegetables	Collect (gm)
Sechi sak	2889
Gechu	-
Kochu	5995
Kochu sak	5604
Boita sak	4000
Kumra sak	1000
Helencha	2363
Kalmi	2967
Thankuni	443
Olkochu	5000
Mankochu	4362
Dheki sak	650
Nuni sak	533
Others	5500

**Table 32: Availability of Collection of Vegetables from Nature**

Name of Vegetables	Availability		
	Adequate	In-adequate	Total
Sechi sak	55.6	44.4	100.0
Gechu	-	-	-
Kochu	72.9	27.1	100.0
Bota sak	66.7	33.3	100.0
Kumra sak	-	100.0	100.0
Kochu sak	80.0	20.0	100.0
Helencha	67.9	32.1	100.0
Kalmi	65.7	34.3	100.0
Thankuni	54.7	45.3	100.0
Olkochu	66.7	33.3	100.0

Name of Vegetables	Availability		
	Adequate	In-adequate	Total
Mankochu	87.5	12.5	100.0
Dheki sak	50.0	50.0	100.0
Nuni sak	33.3	66.7	100.0
Others	100.0	-	100.0

**Table 33: Distribution of Households Having Nursery**

Existing of Nursery	Number	Percentage
Yes	-	-
No	235	100.0
Total	235	100.0

**Table 34: Percentage Distribution of Households Having Own Trees**

Name of Trees	Percentage of households	Average number of own trees
Mango	43.0	5.8
Jam	28.1	1.6
Jack fruit	5.5	1.8
Lichu	1.7	1.2
Jalpai	1.7	1.2
Dalim	9.8	1.1
Kamranga	1.3	1.0
Badam	8.1	2.3
Sobeda	47.2	1.7
Lemon	14.9	3.3
Banana	20.0	15.0
Koromcha	2.5	1.0
Amra	7.7	1.2
Coconut	62.1	6.9
Supari	15.3	6.5

Name of Trees	Percentage of households	Average number of own trees
Ata	1.7	1.2
Simul	4.7	1.4
Chalta	1.7	1.3
Khoira babla	6.4	1.9
Rendi koroï	21.7	4.3
Sil koroï	13.6	3.7
Tetul	19.1	1.4
Jiga	7.2	6.9
Akashmoni	6.0	2.6
Sisu kora	36.6	5.5
Khoi	18.7	2.0
Chambul	6.0	2.7
Gewa	8.9	9.1
Bain	1.7	5.5
Kewra	7.2	3.0
Ora	1.3	1.3
Sal	0.8	2.0
Bamboo	6.0	31.9
Sajna	9.8	1.3
Bot	2.1	1.0
Arjun	0.8	1.0
Mehogoni	35.7	7.0
Boroi	20.0	1.7
Khejur	51.9	7.9
Tal	18.3	2.4
Jambura	3.4	1.1
Peara	51.1	3.8
Kadam	2.1	1.2
Bel	3.8	1.4



Name of Trees	Percentage of households	Average number of own trees
Debdaru	0.4	5.0
Mandar	0.4	1.0
Nim	8.1	4.0
Others	11.9	3.3

**Table 35: Average Number of Fruit, Timber and Fruit cum Timber Trees per Household**

Type of Tree	Average number of Trees		
	Fruit	Timber	Fruit cum Timber
Mature	6.3	8.4	11.6
Immature	6.7	7.7	10.1
Total	15.5	18.1	23.5

**Table 36: Status of Fruit, Timber and Fruit & Timber Trees Belongs to Households**

Category of Trees	Fruits Trees		Timber Trees		Fruit & Timber Trees		All trees	
	No.	%	No.	%	No.	%	No.	%
Mature	544	51.6	1172	51.4	1957	53.8	3673	52.6
Immature	511	48.4	1107	48.6	1679	46.2	3297	47.4
Total	1055	100.0	2279	100.0	3636	100.0	6970	100.0

**Table 37: Distribution of Households by Perceived Cause of Degradation of Natural Resources**

Causes	Extent of degradation				
	% of respondents				
	Low	Medium	High	Very high	Total
Agriculture land converted to shrimp farming	0.8	4.7	30.2	64.3	100.0
Lease system for shrimp cultivation	1.7	6.8	46.4	45.1	100.0
Population growth	1.3	11.9	41.7	45.1	100.0

Causes	Extent of degradation				
	% of respondents				
	Low	Medium	High	Very high	Total
Deforestation	4.7	32.3	32.8	30.2	100.0
Water pollution	1.3	23.0	37.9	37.8	100.0
Sedimentation of water bodies	12.1	46.5	31.5	9.9	100.0
Salinity intrusion	-	9.3	17.9	72.8	100.0
Water logging	21.6	40.9	30.2	7.3	100.0
Over use of natural resources	17.5	29.9	38.9	13.7	100.0
Lack of alternative livelihood opportunities	12.4	35.0	35.5	17.1	100.0
Lack of knowledge/technologies/awareness	10.3	50.4	27.3	12.0	100.0
Lack of proper planning	10.6	40.0	36.2	13.2	100.0
Poor vegetation management	10.2	39.2	38.3	12.3	100.0
Lack of appropriate land management	9.8	35.7	38.8	15.7	100.0
Others	-	-	50.0	50.0	100.0

**Table 38: Use of Residues/Branches/Leafs as fuel from Nature/Wild Source by Household**

Collection of biomass fuel	Number	Percentage
Yes	217	92.3
No	18	7.7
Total	235	100.0

**Table 39: Distribution of Households by Source of Collection of Biomass Fuels**

Type	Source							Total
	Own land	Community land	Khas land/other	Own+ Community land	Community + Khas land	Own+ Khas land	Own+ Community+ Khas/other	
Wood	85.6	8.2	4.1	2.1	-	-	-	100.0
Tree branches	64.5	12.5	14.0	7.0	-	2.0	-	100.0
Tree Leaf	54.6	14.5	17.9	7.2	-	4.8	1.0	100.0

Type	Source							Total
	Own land	Community land	Khas land/other	Own+ Community land	Community + Khas land	Own+ Khas land	Own+ Community+ Khas/other	
Straw	25.0	22.2	50.0	2.8	-	-		100.0
Bushes	21.9	25.0	50.0	3.1	-	-		100.0
Dholkolmi	9.5	33.3	52.4	4.8	-	-		100.0
Others	-	-	-	-	-	-		-

**Table 40: Distribution of Households of status of Fuel Supply**

Source	Percentage		
	Normal	Decreased	Largely decreased
Wood	14.0	60.9	25.1
Tree's branches	14.5	62.0	23.5
Tree's leaves	25.2	57.3	17.5
Straw	0.4	24.7	74.9
Cow dung	2.6	8.2	89.2
Bushes	-	51.5	48.5
Dholkolmi	1.7	42.8	55.5
Others	-	50.0	50.0

**Table 41: Average Number of Domestic Animals and Birds**

Domestic animals/Birds	% of Household own animal/bird	Average Number
Cock/Hen	68.1	9.7
Duck	52.8	4.1
Cow/ox	14.9	3.5
Goat	22.5	3.5
Ram	0.8	4.5
Buffalo	-	-
Pigeon	33.4	4.3

Domestic animals/Birds	% of Household own animal/bird	Average Number
Others	-	-

**Table 42: Status of Hunting Birds from Nature**

	Number	Percentage of the respondents
Yes	10	4.3
No	225	95.7
Total	235	100.0

**Table 43: Hunting Birds in Different Seasons**

Name of Birds	Season		
	Winter	Other Season	Average number of catch in a year
Ghugu	-	-	-
Salik	-	√	2.0
Kingstock	√	√	8.4
Bulbuli	-	-	-
Doel	-	-	-
Charoi	-	-	-
Mas ranga	√	√	2.7
Dahouk	-	-	-
Katango	-	-	-
Kadakohcha	√	-	6.0
Jalkocha		√	12.0
Pankor		√	2.0
Kain	-	-	-
Duburi	-	-	-
Khoiry		√	67.0

**Table 44: Availability of Wild Animals in Local Area**

Available	Number	Percentage
Yes	235	100.0
No	-	-
Total	235	100.0

**Table 45: Wild Animals in Local Area**

Name of Species	Percentage			
	Adequate	Endanger	Very low/Extinct	Total
Snake	18.3	22.6	59.1	100.0
Gui sap	1.7	27.0	71.3	100.0
Khatas	-	39.7	60.3	100.0
Frog	96.2	2.6	1.2	100.0
Ud/Vodor	0.9	22.3	76.8	100.0
Bagdasa	0.4	26.0	73.6	100.0
Girgiti	91.9	6.0	2.1	100.0
Fox	1.3	40.3	58.4	100.0
Kat biral	1.3	41.0	57.7	100.0
Bon biral	1.3	37.9	60.8	100.0
Bezi	93.5	1.4	5.1	100.0
Turtle	0.5	0.5	99.0	100.0
Others	-	20.0	80.0	100.0

**Table 46: Knowledge and Awareness on Different Environmental issue**

Subject	% of respondents heads knowledge and awareness			Use and practices (%)		
	Yes	No	Total	Yes	No	Total

Subject	% of respondents heads knowledge and awareness			Use and practices (%)		
	Yes	No	Total	Yes	No	Total
Arsenic free water	100.0	-	100.0	97.9	2.1	100.0
Safe drinking water	100.0	-	100.0	98.3	1.7	100.0
Health and sanitation	99.6	0.4	100.0	93.9	6.1	100.0
Improve stove	54.1	45.9	100.0	11.9	88.1	100.0
IPM	38.7	61.3	100.0	21.9	78.1	100.0
Organic fertilizer	80.5	19.5	100.0	36.3	63.7	100.0
Homestead garden	89.6	10.4	100.0	57.6	42.4	100.0
Birds and wild animals conservation law	69.9	30.1	100.0	73.0	27.0	100.0
Catch fingerling	81.5	18.5	100.0	81.8	18.2	100.0
Environmental Conservation law 1995	29.6	70.4	100.0	29.7	70.3	100.0
Environment Day	32.7	67.3	100.0	23.8	76.2	100.0
Participate any environment related programme /meetings	45.7	54.3	100.0	39.0	61.0	100.0
Ban on smoking	99.6	0.4	100.0	52.6	47.4	100.0
Others	66.7	33.3	100.0	50.0	50.0	100.0

**Table 47: Priority of different sources of information on environment**

Source	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	P-9
TV program	55.8	32.3	6.0	2.6	1.7	0.4	1.3	0.4	0.8
Radio program	26.8	44.7	20.8	3.4	1.2	1.7	-	0.4	-
Discussion/Meeting	9.8	9.8	8.1	17.4	22.6	13.2	13.2	3.4	2.1
NGOs & CBOs	0.4	2.1	9.8	14.5	17.0	23.5	14.5	8.9	10.2
Cinema/Documentary film	0.4	2.6	6.0	10.2	9.4	17.4	21.2	17.9	14.9
Cultural activities	-	0.4	3.0	4.2	14.5	17.4	21.7	22.7	16.2
News paper/Magazine	4.3	3.0	29.3	15.3	14.5	6.0	8.5	10.6	9.4
Community leaders	0.4	1.3	6.8	12.8	8.5	8.9	11.1	20.4	29.4
Govt. support (UP)	2.1	3.8	10.2	19.6	10.6	11.5	8.5	15.3	17.0

Source	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	P-9
Others	-	-	-	-	-	-	-	-	-
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

**Table 48: Percentage of environmental problem by different level in the project areas**

Problem	Severe	Medium	Low	Total
Salinity	93.6	6.0	0.4	100.0
Water pollution	70.2	28.9	0.9	100.0
Deforestation/ Bushes	48.7	46.6	4.7	100.0
Siltation	34.0	48.1	17.9	100.0
Riverbank erosion	23.0	43.8	33.2	100.0
Health & Sanitation	30.6	48.1	21.3	100.0
Arsenic	70.9	25.3	3.8	100.0
Others	15.4	84.6	-	100.0

**Table 49: Percentage of Households who received and practiced by training in different sectors**

Subject	Training received	Practiced by getting training
Poultry	73.2	66.8
Livestock	21.3	19.1
Nursery/ Vegetables garden	6.0	3.8
Shrimp culture	24.3	17.4
Mele cultivation	1.7	1.3
Crab fattening	2.6	2.1
Knitting net	7.7	3.4
Tailoring	11.1	7.2
Handicrafts	5.5	5.1
Fish culture in the pond	15.7	10.2
Small business	19.1	16.6
Others	8.9	3.8

**Table 50: Average trained members of Households**

Subject	Average skilled member per household	
	Male	Female
Poultry	1.0	1.1
Livestock	1.0	1.1
Nursery/ Vegetable garden	1.1	1.1
Shrimp culture	1.1	1.1
Male culture	1.0	-
Crab culture	1.0	1.0
Dry fish	-	-
Knitting net	1.0	-
Tailoring	1.0	1.1
Handicrafts	1.0	1.1
Fish culture in the pond	1.1	1.1
Small business	1.1	1.2
Others	1.3	1.6

**Table 51: Percentage Distribution of Households members for Training**

Subject	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	P-9	P-10	P-11	P-12
Poultry	42.6	28.9	16.6	6.4	2.6	1.7	1.1	-	-	0.4	-	-
Livestock	8.9	21.7	22.6	14.5	12.8	6.0	6.0	1.7	2.1	1.3	1.3	0.7
Nursery/Vegetable garden	1.3	4.7	4.7	17.0	16.2	18.7	11.9	11.1	5.1	2.1	3.4	3.8
Shrimp culture	17.4	9.4	14.9	14.5	10.6	9.8	8.5	7.2	2.6	2.1	0.3	3.0
Male cultivation	0.8	1.3	0.4	5.1	6.4	4.7	11.5	14.5	19.1	21.7	7.2	7.7
Crab culture	0.4	0.8	3.0	3.4	6.8	11.1	9.8	13.6	14.5	14.5	11.5	10.6



Subject	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	P-9	P-10	P-11	P-12
Dry fish	-	-	0.3	0.9	3.0	3.8	8.1	7.7	14.0	18.3	29.4	16.2
Knitting net	0.9	0.4	2.1	1.7	3.8	5.1	6.0	11.5	13.2	12.3	14.5	28.1
Tailoring	8.1	11.5	6.0	8.9	10.6	12.3	11.1	11.5	8.5	3.4	4.7	1.7
Handicrafts	5.1	6.4	8.1	5.1	5.5	8.5	8.5	13.6	10.6	9.8	11.1	7.7
Fish culture in the pond	2.6	9.8	11.5	12.3	10.6	9.4	9.8	4.3	4.3	9.8	9.8	6.0
Small business	11.9	5.1	9.8	10.2	11.1	8.9	7.7	3.3	6.0	4.3	6.8	14.5
Others	-	-	-	-	-	-	-	-	-	-	-	-
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

**Table 52: Involved with different organization (NGO/CBO)**

Involvement	Number	Percentage
Yes	152	64.7
No	83	35.3
Total	235	100.0

**Table 53: Average Year of involvement with NGO/CBO and perceived**

Type	Average year	Benefit		Total
		Yes	No	
General member	3.7	96.6	3.4	100.0
Loane	3.3	86.1	13.9	100.0
Training	4.1	100.0	-	100.0
Voluntary service	2.0	100.0	-	100.0
Education/ Awareness	-	-	-	-
Medical facilities	6.5	100.0	-	100.0
Others	-	-	-	-

**Table 54: Average Number of Loan and Taking Loan Amount from Different Sources**

Source	Average number of loan	Average amount loan (Tk.)	Average amount of loan at present (Tk.)
Bank	1.9	33189	12940
NGO	2.7	18898	7463
Mohajon (Moneylender)	1.5	21192	17083
Relative	2.5	7250	4750
Others	1.4	8929	5600

**Table 55: Causes of Taking Loan**

Causes	Percentage of the borrower
Business	33.4
To buy van/rickshaw/motor cycle/troller/boat	12.9
Shrimp culture	4.8
Shrimp business	7.5
Fish culture	1.4
Fish business	2.0
Agriculture	0.7
Livestock rearing	2.0
To recover loan	4.1
To buy land	6.1
To buy/make gher	2.1
To repair boat/troller	1.4
To buy shop	2.7
To make house	2.0
Treatment	4.1
Poverty	5.4
Others	7.4
<b>Total</b>	<b>100.0</b>

**Table 56: list of plant species**

Sl	Local	Total no in 23 plots	Conversion factor for Ha.	Total no in Ha.	Average per Ha.	$P_i$	$\ln P_i$	$P_i \ln P_i$
<b>1 X1 M</b>								
1	Ada Baran	23	10000	230000	10000	0.2160	-1.5325	-0.3310
2	Ambali	2	10000	20000	870	0.0188	-3.9749	-0.0747
3	Amrul	1	10000	10000	435	0.0094	-4.6680	-0.0438
4	Bon dhone	1	10000	10000	435	0.0094	-4.6680	-0.0438
5	Bon sul	1	10000	10000	435	0.0094	-4.6680	-0.0438
6	Bonbegun	1	10000	10000	435	0.0094	-4.6680	-0.0438
7	Data	2	10000	20000	870	0.0188	-3.9749	-0.0747
8	Durba	10	10000	100000	4348	0.0939	-2.3654	-0.2221
9	Genda	1	10000	10000	435	0.0094	-4.6680	-0.0438
10	Hatisur	8	10000	80000	3478	0.0751	-2.5886	-0.1945
11	Hodu	7	10000	70000	3043	0.0657	-2.7221	-0.1789
12	Kanai lata	6	10000	60000	2609	0.0563	-2.8762	-0.1621
13	Kheta shak	2	10000	20000	870	0.0188	-3.9749	-0.0747
14	Kochu	3	10000	30000	1304	0.0282	-3.5694	-0.1006
15	Lal shak	1	10000	10000	435	0.0094	-4.6680	-0.0438
16	Morich	1	10000	10000	435	0.0094	-4.6680	-0.0438
17	Noti shak	1	10000	10000	435	0.0094	-4.6680	-0.0438
18	Nuina Shak	1	10000	10000	435	0.0094	-4.6680	-0.0438
19	Sechi shak	7	10000	70000	3043	0.0657	-2.7221	-0.1789
20	Tipa	1	10000	10000	435	0.0094	-4.6680	-0.0438
21	Tometo	6	10000	60000	2609	0.0563	-2.8762	-0.1621
22	Unknown-1	1	10000	10000	435	0.0094	-4.6680	-0.0438
23	Unknown-2	1	10000	10000	435	0.0094	-4.6680	-0.0438
<b>3mX3m</b>								
24	Bera chita	39	1111	43333	1884	0.0407	-3.2017	-0.1303

Sl	Local	Total no in 23 plots	Conversion factor for Ha.	Total no in Ha.	Average per Ha.	$P_i$	$\ln P_i$	$P_i \ln P_i$
25	Cactus	3	1111	3333	145	0.0031	-5.7666	-0.0181
26	Chitki	4	1111	4444	193	0.0042	-5.4789	-0.0229
27	Foni Monosha	3	1111	3333	145	0.0031	-5.7666	-0.0181
28	Kola	7	1111	7778	338	0.0073	-4.9193	-0.0359
29	Lebu	5	1111	5556	242	0.0052	-5.2558	-0.0274
30	Mehdi	1	1111	1111	48	0.0010	-6.8652	-0.0072
31	Pepe	5	1111	5556	242	0.0052	-5.2558	-0.0274
32	Rangan	1	1111	1111	48	0.0010	-6.8652	-0.0072
33	Sech kanta	44	1111	48889	2126	0.0459	-3.0810	-0.1415
34	Shara	12	1111	13333	580	0.0125	-4.3803	-0.0548
35	Vet Chotga	15	1111	16667	725	0.0157	-4.1572	-0.0651
<b>15mX15m</b>								
36	Aam	60	44	2667	116	0.0025	-5.9898	-0.0150
37	Aamra	1	44	44	2	0.0000	-10.0841	-0.0004
38	Amloki	2	44	89	4	0.0001	-9.3910	-0.0008
39	Ata	1	44	44	2	0.0000	-10.0841	-0.0004
40	Babla	5	44	222	10	0.0002	-8.4747	-0.0018
41	Bansh	11	44	489	21	0.0005	-7.6862	-0.0035
42	Bel	1	44	44	2	0.0000	-10.0841	-0.0004
43	Bokul	1	44	44	2	0.0000	-10.0841	-0.0004
44	Bola	1	44	44	2	0.0000	-10.0841	-0.0004
45	Boroi	11	44	489	21	0.0005	-7.6862	-0.0035
46	Chambol	6	44	267	12	0.0003	-8.2923	-0.0021
47	Deb daru	1	44	44	2	0.0000	-10.0841	-0.0004
48	Dumur	10	44	444	19	0.0004	-7.7815	-0.0032
49	Eucalyptus	14	44	622	27	0.0006	-7.4450	-0.0044
50	Gaab	2	44	89	4	0.0001	-9.3910	-0.0008
51	Gewa	16	44	711	31	0.0007	-7.3115	-0.0049
52	Jam	22	44	978	43	0.0009	-6.9931	-0.0064

Sl	Local	Total no in 23 plots	Conversion factor for Ha.	Total no in Ha.	Average per Ha.	$P_i$	$\ln P_i$	$P_i \ln P_i$
53	Jambura	3	44	133	6	0.0001	-8.9855	-0.0011
54	Jhau	1	44	44	2	0.0000	-10.0841	-0.0004
55	Jibli	33	44	1467	64	0.0014	-6.5876	-0.0091
56	Jiga	15	44	667	29	0.0006	-7.3760	-0.0046
57	Jog dumur	4	44	178	8	0.0002	-8.6978	-0.0015
58	Kamini	1	44	44	2	0.0000	-10.0841	-0.0004
59	Kath badam	11	44	489	21	0.0005	-7.6862	-0.0035
60	Keora	15	44	667	29	0.0006	-7.3760	-0.0046
61	Khejur	123	44	5467	238	0.0051	-5.2719	-0.0271
62	Khoi	16	44	711	31	0.0007	-7.3115	-0.0049
63	Khor kesto	3	44	133	6	0.0001	-8.9855	-0.0011
64	Kodbel	4	44	178	8	0.0002	-8.6978	-0.0015
65	Koroi	3	44	133	6	0.0001	-8.9855	-0.0011
66	Mehogony	36	44	1600	70	0.0015	-6.5006	-0.0098
67	Narikel	42	44	1867	81	0.0018	-6.3464	-0.0111
68	Nim	33	44	1467	64	0.0014	-6.5876	-0.0091
69	Noil	3	44	133	6	0.0001	-8.9855	-0.0011
70	Pakur	3	44	133	6	0.0001	-8.9855	-0.0011
71	Peara	14	44	622	27	0.0006	-7.4450	-0.0044
72	Pipul	6	44	267	12	0.0003	-8.2923	-0.0021
73	Pitha Ora	3	44	133	6	0.0001	-8.9855	-0.0011
74	Sajna	12	44	533	23	0.0005	-7.5992	-0.0038
75	Shimul	4	44	178	8	0.0002	-8.6978	-0.0015
76	Sil Koroi	2	44	89	4	0.0001	-9.3910	-0.0008
77	Sissoo	65	44	2889	126	0.0027	-5.9097	-0.0160
78	Sobeda	10	44	444	19	0.0004	-7.7815	-0.0032
79	Supari	8	44	356	15	0.0003	-8.0047	-0.0027
80	Tal	44	44	1956	85	0.0018	-6.2999	-0.0116
81	Tentul	2	44	89	4	0.0001	-9.3910	-0.0008

SI	Local	Total no in 23 plots	Conversion factor for Ha.	Total no in Ha.	Average per Ha.	$P_i$	$\ln P_i$	$P_i \ln P_i$
				1064844	46298	1.0000		3.0259

**Table 57: Transect information**

Sl No	Name of Species	No.	Area Traversed		Sample Area (m <sup>2</sup> )	Total Area (m <sup>2</sup> )	Estimated Population
			Length (m)	Average Width (m)			
<b>Birds</b>							
1	Batang	1	1000	10	10000	250000	25
2	Bok	2	1000	25	25000	250000	20
3	Bulbuli	9	1000	7	7000	250000	321
4	Chil	13	1000	30	30000	250000	108
5	Chorai	4	1000	7	7000	250000	143
6	Doel	2	1000	6	6000	250000	83
7	Finge	14	1000	10	10000	250000	350
8	Gang chil	1	1000	25	25000	250000	10
9	Ghughu	1	1000	10	10000	250000	25
10	Hansh	22	1000	5	5000	250000	1100
11	Kak	39	1000	4	4000	250000	2438
12	Kath thokra	2	1000	20	20000	250000	25
13	Kobutor	7	1000	15	15000	250000	117
14	Murgji	37	1000	5	5000	250000	1850
15	Pecha	9	1000	15	15000	250000	150
16	Raj hansh	13	1000	5	5000	250000	650
17	Shalik	22	1000	7	7000	250000	786
18	Taroi Pakhi	1	1000	15	15000	250000	17
19	Titir	2	1000	20	20000	250000	25
20	Tutuni	8	1000	10	10000	250000	200
<b>Herpetofauna</b>							
21	Bang	4	1000	3	3000	250000	333
22	Girgiti	2	1000	3	3000	250000	167
23	Tiktiki	2	1000	2	2000	250000	250
<b>Arthropods</b>							

Sl No	Name of Species	No.	Area Traversed		Sample Area (m <sup>2</sup> )	Total Area (m <sup>2</sup> )	Estimated Population
			Length (m)	Average Width (m)			
24	Foring	166	1000	1	1000	250000	41500
25	Machi	20	1000	1	1000	250000	5000
26	Makrosha	4	1000	1	1000	250000	1000
27	Pani Foring	13	1000	2	2000	250000	1625
28	Pipra	289	1000	1	1000	250000	72250
29	Projapoti	17	1000	1	1000	250000	4250
<b>Common household species</b>							
31	Biral	2	1000	5	5000	250000	100
31	Goru	10	1000	15	15000	250000	167
32	Kukur	2	1000	10	10000	250000	50
33	Sagol	6	1000	6	6000	250000	250