Baseline Survey of Existing Flora and Fauna-Package-06

"Preparation of Development Plan for MirsharaiUpazila, Chittagong District: Risk Sensitive Landuse Plan" Project under Urban Development Directorate (UDD).

Interim Report

March 2018

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1 Introduction

The total area of Mirsharai upazila (Chittagong district) is 482.88 sq km (BBS), 509.80 sq km (GIS Data), located in between 22°39' and 22°59' north latitudes and in between 9I°27' and 91°39' east longitudes. It is, bounded by Trippura state of India, Chhagalnaiya and Feni Sadar upazilas on the north, Sitakunda upazila and Bay of Bengal on the south, Fatikchhari upazila on the east, Sonagazi and Companiganj upazilas on the west.

Mirsharai, the combination of lake and hilly area contains attractive scenic beauty on the southernmost part of Bangladesh. The most important attraction of the upazila is that one can travel MohamayaChara Lake by speed boat and explore hilly area and can enjoy Khoiyachora, Baghbiani, Napitachora, Sonaichora, Mithachora and Boyalia waterfalls. This area is located 192.2 km far from Dhaka and 4.5 hour bus journey. Anyone can travel by rail and it is 197 km of rail journey and it takes 4.5 hour from Dhaka to MirsharaiUpazila. 56 km from the Chittagong Divisional headquarters and takes 1.5 hours travel by bus. The Bangladesh Road Transport Corporation introduced a direct bus service from Dhaka to *Mirsharai*via Comilla (Banglapedia,2012)

The Feni is the main river of Mirsharai Upazila; Sandwip Channel is also notable. There are 30 canals present in this area some of those are FeniNadi, Isakhali, Mahamaya, Domkhali, Hinguli, Moliaish, KoilaGovania and MayaniKhal. The hills range on the northern and eastern side of this upazila along the bank of the Feni River extended up to Chittagong and the Chittagong hill tracts.

Map. 1 Project area in Mirsarai Upazila.

1.2 Description of the Project Area

A detailed description of the Project Area is given below:

Table 1 Area, Population and Density of the Project Area:

Municipality	Union	Mouza	Village	Population		Density (persq km)	Literacy Rate (%)
				Urban and Other Urban	Rural		
2	16	103	208	31206	367510	826	55.1

Source: BBS, 2011

Mirsharai sea beach, hilly area, Mohamaya Chara Lake, Khaiya Chara region has the greater potential for tourism development as there are abundant resources to attract tourists. Mirsharai is developing in an unplanned and haphazard manner very rapidly due to the ample opportunity for tourism development, which is acting as pull factor for private sector developers. Hence, this project has been under taken to protect the region from depletion of its natural resources and character and tourism development as well.

1.3 Objectives the baseline survey of existing flora and fauna:

However, some of the specific objectives of the baseline survey of existing flora and fauna are as follows.

- To prepare an inventory on existing flora and fauna of Mirsarai Upazila.
- To identify threatened species of wild plants and animals.
- To identify critical ecosystem and wildlife habitats in this area.
- To prepare habitat map of existing flora and fauna.
- To determine the potentiality of natural resources for ecotourism development.
- To determine potential threats to the wild plants, animals and their critical habitats and also on the critical ecosystems due to the developmental activities.
- To prepare a strategic and management plan to mitigate the potential impacts on the ecosystem or species.

2. Methodology

2.1 An Inventory of the Flora and Fauna

Habitat types will be categorized after the reconnaissance field survey and the survey sites will be selected based on different habitats. Survey points will be selected randomly but ensuring to cover all types of habitats and also covering most of the area of the Upazila. Survey sites will be plotted on the map using GPS coordinates.

2.1.1 Survey areas are broadly divided into 8 Sub-categories.

2.1.1.1 Forest areas

Mirsarai Upazila covers a large area of Korer Hat Forest Range and a part of Baraiyadhala National Park. Regular surveys have been conducting there.

2.1.1.2 Hill streams

Many of the hill streams are active throughout the year. This habitat is suitable for many cryptic species of amphibians and reptiles.

2.1.1.3 Coastal mangroves

Coastal mangroves are good habitat for shore birds and introduced spotted deer.

2.1.1.4 Agricultural land

Agricultural lands provide support to many insectivore and grain eater birds and also to rodents.

2.1.1.5 River banks

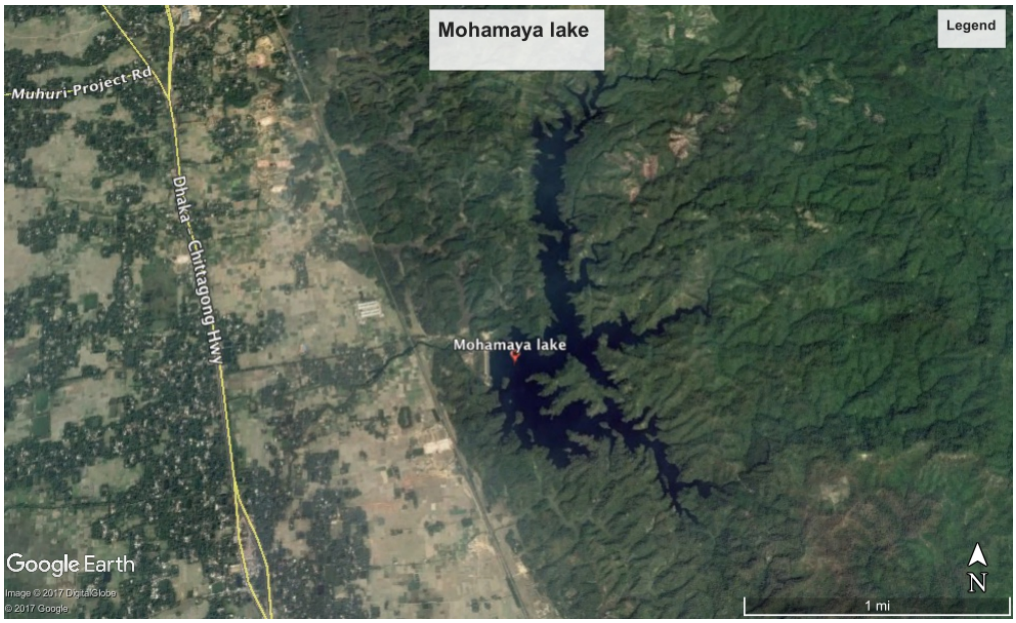
Habitat for many wader birds, freshwater fish and turtles.

2.1.1.6 Homestead vegetation: Habitat for birds as well as hiding places for many nocturnal mammals and birds.

2.1.1.7 Development areas: Developing areas will also be surveyed to know the impact of developing activities on existing wild animals.

Map. 2 Location of economic zone in Mirsarai upazila.

2.1.1.8 Tourist spots: Tourist sports will be surveyed to see the impact of tourists on wildlife habitats and ecosystem.



Map. 3 Mohamaya lake in Mirsarai Upazila.

2.1.2 Survey methods for flora

Plant community will be studied by following different methods. Parameters like frequency, density, abundance, presence, absence and dominance, diversity index will be quantified.

2.1.2.1 Transect survey

Transect survey will be used to explore the existing floristic composition of Mirsharai upazila. Sample of the plant species will be collected to prepare herbarium in order to identify the plant species wherever necessary. The floristic composition includes the occurred species of under trees, shrubs, herbs, climbers, epiphytes, parasites and ferns.

2.1.2.2 Quadrat survey

The quadrat survey will be used for assessing plant community structure, tree species diversity and their regeneration status. The estimate of species contents of a habitat shall be determined by observing the plant species at different sample areas.

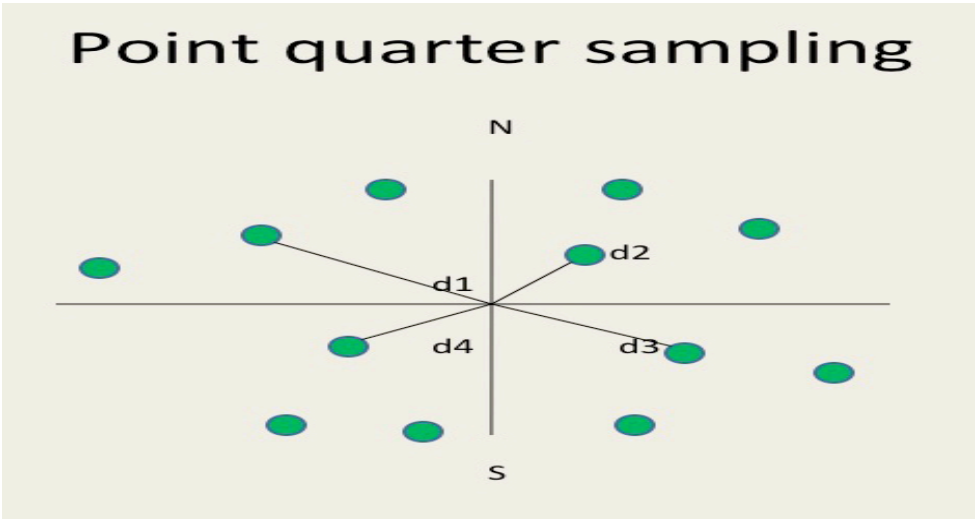
In the quadrates, trees of ≥5cm diameter will be counted. Moreover, total height and diameter of the trees individuals of different species will also be recorded. The parameters that are commonly used to characterize the structure of the plant communities are:

Density, Frequency, Abundance, Vegetation Coverage, Basal area, Dominance, Species richness index, Similarity index, Shannon-Wiener diversity index, Index of similarity etc.

2.1.2.3 Point Quarter Method

The point quarter sampling method is a method that is quick and very useful to field biologist.

The method relies on using a series of randomly determined points that may be distributed along a transect line or throughout a habitat to be described. Each point represents the centre from which four compass directions north, south, east and west) divided the sampling point into four quarters.



In each quarter the distance (d1 to d4) from the point to the centre of the nearest plant with a predefined size (>10 cm dbh) is measured. So the calculation is-

Mean distance from the point d=mean (d1 to d4)

So, density of plants per unit area $=A/d^{2,}$

Where A= total area.

2.1.3 Survey methods for fauna

A combination of different methods will be applied for the project work. Some of the methods are as follows.

2.1.3.1 Line Transect Sampling

Both temporary and permanent transect line will be set randomly covering all types of habitat. Visual encounter survey will be conducted on foot both in day and night. All the wild animals will be recorded from the both side of transect. GPS coordination will be used to calculate the total transect area covered for survey.

During river habitat survey, the river will be considered as a transect line.

2.1.3.2 Quadrate Sampling

Randomly selected quadrates with fixed (10m × 10m) or variable size will be taken in different habitats. Small sized wild animals like amphibians and reptiles will be quantified using quadrat sampling.

2.1.3.3 Use of different types of traps

Pit fall trap, tube trap and box trap will be used to capture cryptic species. All these traps are designed to capture live animals. Appropriate baits will be used wherever necessary.

2.1.3.4 Night survey

Night survey will be conducted with the aid of high power flashlight. Nocturnal wild animals will be encountered during night survey.

2.1.3.5 Camera trapping

Automatic digital camera traps will be used to survey nocturnal and crepuscular animals. These camera traps are operated by motion sensor. The camera will be automatically activated and captured photos if anything moves in front of it.

2.1.3.6 Pellet count

Pellet count method will specifically be used for deer survey. Counting pellet groups (deer defecations) is used to determine population size and distribution. This method is based on the assumption that periodic accumulations of animal defections are related to population density. Quadrat of specific size will be set in deer habitat, counting of pellet will be carried out in the morning and afternoon.

2.1.3.7 Questionnaire survey

A pre-designed questionnaire will be used to know the status of wild animals and plants in this Upazila based on the experience of the local people.

2.1.3.8 FGD

Focal Group Discussion (FGD) will be conducted among the local inhabitants to assess historical status of animals and plants in this area.

2.2 The Comparative Assessment of the Plant and Animal Communities of the Study Area

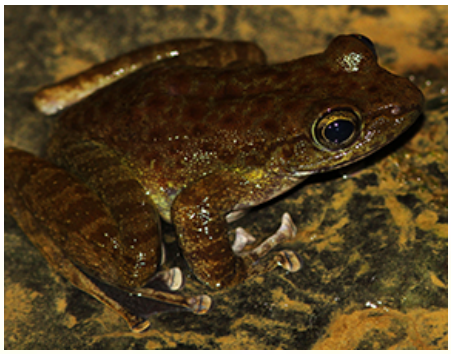
Different types of habitats will be categorized like hilly area, plain lands, wetlands, homestead vegetation, riverbanks, agricultural fields etc. Same survey methods will be repeated in all types of habitats so a comparison would be made. Comparison of plant and animal diversity would be justified using different diversity indices from the data. Critical ecosystem or habitats would be identified by considering the number of species presents there, number of threatened species and the ecosystem services of the ecosystem.

2.3 Indicator species monitoring

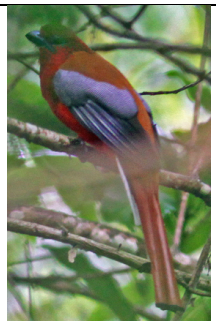
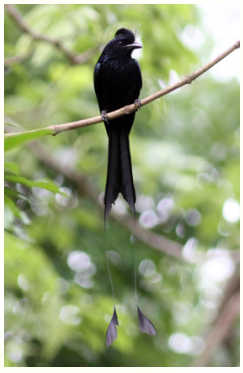
Species, which indicate the health of the environment by their presence, absence or any abnormalities of change in their population, health or behavior. Indicator species are selected from all the groups based on the habitat or target of monitoring. Indicator species from amphibians, reptiles, birds and mammals are selected. Each of the indicator species will be finally selected after the initial field visit. Population status of all the indicator species will be monitored.

From the reconnaissance survey and literature we have selected 13 species from 4 major groups as indicator species for long term monitoring of the project area.

Sl. No.	Name of the species	Role / indication in the ecosystem
Amphibians		
2.3.1	Painted Ballon frog 	Its presence indicates deposition of good leaf litter on forest floor
2.3.2	Cope's Frog	Presence in rainy season indicates capacity of rain water conservation in forest

		
2.3.3	Cascade frog 	Indicates the health of hill stream
Reptiles		
2.3.4	Tokay Gecko 	Its presence on tree indicates the maturation of habitat
2.3.5	Emma Gray's Forest Lizard	It is only found in good quality forest.

		
2.3.6	Ring Lizard 	Indicates the quality of marshy areas in a forest
2.3.7	Spot-tailed Pit viper 	Presence of it indicates the availability of small prey on lower canopy of forest.
Birds		
2.3.8	Red Jungle Fowl 	Indicator of forest floor health
2.3.9	Red-headed Trogon	Only found in good quality dense forest

		
2.3.10	Red-breasted Parakeet 	Indicates the presence of tall trees and breeding habitat of tree-hole nesting birds.
2.3.11	Racket-tailed Drongo 	Indicator of good quality woodland with huge insect production.
Mammals		
2.3.12	Barking deer 	Indicates the presence of dense undergrowth of the forest and also indicates the suitable habitat for other ground dwelling mammals
2.3.13	Fishing cat	Indicates the health of water bodies

2.4 Identification of critical ecosystem and wildlife habitats

Habitats with high species diversity, population density of rare or threatened species will be determined from the field survey. Ecosystem services will also be determined from field observation and also by questionnaire survey and FGD. Critical ecosystem or habitats will be plotted on the maps using GPS coordinates.

2.5 Characterizing Impacts and Mitigation

To illustrate how significant impacts (adverse or beneficial) that might occur due to tourism development and establishment of Mirsharai Economic zone, BISIC industry and salinity of water as well, in the absence of mitigation and compensation measures, shall be quantified and characterized in the following way:

- determine the value of existing flora and fauna affected, through survey and study;
- assess impacts affecting those flora and fauna, which meet or exceed a defined threshold value, with reference to ecological processes and functions as appropriate;
- quantify the extent, magnitude, duration, timing and frequency of the impacts;
- assess impact reversibility;
- explain the level of confidence in these predictions; and
- Identify likely significant impacts in the absence of any mitigation.

2.8 Mapping of the Site

The site of the flora and fauna will be mapped in ARC GIS and present at a scale in consultation with PD.

3. Activities and Work Progress

We have completed three field visits including reconnaissance survey. The summary of the activities are presented in Table 2.

Table 2 Tasks so far done according to the schedule

Report	Activities/Tasks	Duration (in day)	Due Date	Remarks
Signing of Contract & Notification of Order	Task 1: Contract Sign after Notification of Order	1	15.11.2017	Completed
Reconnaissance field visit	To set up methods and observe field situations	1		
Mobilization Report	Task-2: Literature review, finalization of survey protocol, reconnaissance survey	15	01.12.2017	Submitted
Inception Report	Task-3: Inception report for Field Survey	15	17.12.2017	Submitted
Interim Report	Task-4: Field Survey	120		Two field surveys completed. 1st Interim report submitted
	Task-5: Field survey - 1st interim report		17.04.2018	2nd Interim report will be submitted after 3rd field visit
	Task-6: Field survey - 2nd interim report			

Report	Activities/Tasks	Duration (in day)	Due Date	Remarks
Draft Report	Task-7: Data Analysis & Draft report preparation	20	07.05.2018	Will be prepared
Final Report	Task-8: Final report preparation	7	15.05.2018	Will be prepared

3.1 Field visits

Reconnaissance Field visit

Duration: 25 November 2018 1 day trip

Team Composition:

1. Professor Dr. Md. Kamrul Hasan (Team leader)
2. Md. Jamal Uddin (EIA expert)
3. Anik Saha (Research Associate)
4. Local Guide

Study sites covered:

Coastal mangrove
Khoiya chara
Korerhat Forests
Project area

Field visit 1

Duration: 21 January 2018 to 28 January 2018; total 8 days

Team Composition:

1. Professor Dr. Md. Kamrul Hasan (Team leader)
2. Md. Taukir Hasan Hridoy
3. Md. Tarikul Islam
4. Mr. Koushik Aich
5. Local Guide

Study sites covered: Coastal mangrove
Baraiyadhala National Park including Khoiya chara, Napitta chara,
Korerhat Forests.

Field visit 2

Duration: 18 February 2018 to 24 February 2018; total 7 days.

Team Composition:

5. Professor Dr. Md. Kamrul Hasan (Team leader)
6. Md. Taukir Hasan Hridoy (Research Associate)
7. Anik Saha (Research Associate)
8. Local Guide

Study sites covered:

Coastal mangrove
Baraiyadhala National Park including Khoiya chara, Napitta chara,
Korerhat Forests.
Nayatila

3.2 Work Progress (November 2017 to March 2017)

In the last 5 months of the project (Nov'17 to March'18) following activities and tasks have been completed.

1. Contract signing and notification of order has been completed.

2. A detailed work-plan has been constructed.

3. Data sheet has been prepared for questionnaire survey (Annex 1).

4. Resource mobilization for the project has been completed.

5. Requirements of the experts and project staffs have been completed.

6. The expert team made reconnaissance field visit to the survey area.

7. The expert team conducted meeting with the Forest Rangers of Mirsarai Coastal Forest Range and Mirsarai Hill Forest Range and collected basic information from range office.

8. Mobilization report of the project has been submitted.

9. Inception report has also been submitted.

10. Secondary data has been collected through literature review and with the contact of Forest Department.

11. Three field visits including reconnaissance survey have been completed.

12. 1st Interim report has been submitted.

13. Partial data analysis is going on.

14. Data on species composition during winter season has been completed.

15. A partial list of flora and fauna so far observed has been produced.

16. Some critical habitats have been identified.

17. Some of the information have been plotted on the map.

4. Preliminary Findings

4.1 Flora

A total of 87 tree species were recorded from Mirsarai upazila. Many of the tree species are waiting for identification (Table 4.1). The most common tree species of Mirsarai are *Acronychia pedunculata*, *Actinodaphne angustifolia, Albizia chinensis, Albizia odoratissima, Anogeissus acuminata*, *Aphanamixis polystachya, Aporosa wallichii*, *Artocarpus chama, Callicarpa arborea, Dillenia scabrella, Dipterocarpus costatus,Dipterocarpus turbinatus*, *Elaeocarpus varunua, Ficus hispida, Ficus racemosa, Garcinia cowa, Glochidion multiloculare, Grewia nervosa, Holarrhena antidysenterica, Hydnocarpus laurifolius, Lithocarpus acuminata, Macaranga denticulata, Mitragyna diversifolia* etc.

Table 4.1 List of trees found in Mirsarai upazila

Botanical Name	**Family**	**Local Name**
Acacia auriculiformis A. Cunn. *ex* Benth. & Hook.	Mimosaceae	Akashmoni
Acacia mangium Willd.	Mimosaceae	Mangium
Acronychia pedunculata (L.) Miq.	Rutaceae	Jair-gola
Actinodaphne angustifolia Ness.	Lauraceae	Modonmesta, Chagolnadi
Aegle marmelos (L.) Corrx	Rutaceae	Bel
Albizia odoratissima (L. f.) Benth.	Mimosaceae	Tetoya Koroi
Albizia procera (Roxb.) Benth.	Mimosaceae	Sada Koroi
Alstonia scholaris (L.) R.Br.	Apocynaceae	Chatim
Anisoptera scaphula (Roxb.) Pierre	Dipterocarpaceae	Boilam
Anogeissus acuminate (Roxb. *ex* DC.) Guill. & Perr.	Combretaceae	Seori, Chakwa
Antidesma bunius (L.) Spreng.	Euphorbiaceae	Wishwar choa, Banshial Boka
Antidesma velutinum Tulasne	Euphorbiaceae	Pahari Elena
Aphanamixis polystachya (Wall.) R.N. Parker	Meliaceae	Pitraj, Royna
Aporosa wallichii Hook. f.	Euphorbiaceae	Kokra, Castoma
Aquilaria agallocha Roxb.	Thymelaeaceae	Agar
Artocarpus heterophyllus Lamk.	Moraceae	Kanthal
Artocarpus chama Buch.-Ham. *ex* Wall.	Moraceae	Chapalish
Artocarpus lacucha Buch-Ham.	Moraceae	Borta
Baccaurea ramiflora Lour.	Euphorbiaceae	Lotkon
Bombax insigne Wall.	Bombacaceae	Bon shimul, Bon tula
Brassaiopsis glomerulata (Blume) Regel.	Araliaceae	Kurila
Callicarpa arborea Roxb.	Verbenaceae	Bormala, Khoja
Caryota urens L.	Arecaceae	Chau, Sago Palm
Cassia fistula L.	Caesalpiniaceae	Sonalu
Cassia nodosa Buch-Hum. *ex* Roxb.	Caesalpiniaceae	Bon-sonalu, Banderlotya
Ceriscoides campanulata (Roxb.) Tirveng.	Rubiaceae	Boilem
Chukrasia tabularis A. Juss.	Meliaceae	Chickrassi

Botanical Name	Family	Local Name
Chisocheton cumingianus (C. DC.)	Meliaceae	Kalikora, Rata
Cinnamomum iners Reinw. *ex* Blume.	Lauraceae	Tez-bohu
Cocos nucifera L.	Arecaceae	Narikel
Didymosperma gracilis Hook. f.	Arecaceae	Bon Supari
Dillenia indica L.	Dilleniaceae	Chalta
Dillenia scabrella Roxb. *ex* Wall.	Dilleniaceae	Hargeza
Diospyros malabarica (Desr.) Kostel.	Ebenaceae	Deshi gab
Diospyros toposia Buch.-Ham.	Ebenaceae	Katgula, Toposi
Dipterocarpus alatus Roxb. *ex* G. Don	Dipterocarpaceae	Gorjon (Sada)
Dysoxylum excelsum Blume	Meliaceae	Dingori, Koirga Pitraz
Ehretia serrata Roxb.	Borginaceae	Kala-huja
Elaeocarpus tectorius (Lour.) Poir.	Elaeocarpaceae	Jolpai
Elaeocarpus varunua Buch.-Hum *ex* Masters	Elaeocarpaceae	Bon Jalpai, Titpai
Engelhardtia spicata Lesch. *ex* Blume.	Juglandaceae	Jhumka bhadi
Ficus benghalensis L.	Moraceae	Bot
Ficus fistulosa Reinw. *Ex* Blume.	Moraceae	
Ficus hispida L. f.	Moraceae	Dumur
Ficus lamponga Miq.	Moraceae	Jig bot, Katgularia
Ficus nervosa Heyne *ex* Roth	Moraceae	Battrella, Panidumur
Ficus racemosa L.	Moraceae	Dumur, Jagyadumur
Garcinia cowa Roxb. *ex.* DC.	Clusiaceae	Kao
Garcinia morella (Gaertn.) Desr.	Clusiaceae	Moigga Kao, Sunder-Kao
Garcinia xanthochymus Hook. f. *ex* T. Anders.	Clusiaceae	Tamal, Dephal
Gardenia coronaria Buch.-Ham.	Rubiaceae	Bankamal, Painnaphul
Glochidion velutinum Wight	Euphorbiaceae	Matachhar, Painnatora
Gluta elegans (Wall.) Hook. f.	Anacardiaceae	Kabita
Glycosmis pentaphylla (Retz.) A. DC.	Rutaceae	Bonjamir, Jair gola
Gmelina arborea Roxb.	Verbenaceae	Gamar
Grewia tiliifolia Vahl.	Tiliaceae	Pholsa, Dhomoni
Lagerstroemia macrocarpa Wall.	Lythraceae	Bansua Jarul, Mon Jarul
Lagerstroemia speciosa (L.) Pers.	Lythraceae	Painna Jarul
Lannea coromandelica (Houtt.) Merr.	Anacardiaceae	Jial Bhadi
Leea robusta Roxb.	Leeaceae	
Lepisanthes rubiginosa (Roxb.) Leenh.	Sapindaceae	Baraharina
Licuala peltata Roxb.	Arecaceae	Chhata Pat, Kurud
Lithocarpus acuminata (Roxb.) Rehder	Fagaceae	Kali Batna
Lithocarpus elegans var. *elegans* (Blume) Hatus. *ex* Soepad.	Fagaceae	Booro-batna, Tal batna, Ramkota
Mangifera sylvatica Roxb.	Anacardiaceae	Uri-Am
Mallotus tetracoccus (Roxb.) Kurz.	Euphorbiaceae	Kumaribura, Moinbura
Mangifera indica L.	Anacardiaceae	Am
Neolamarckia cadamba (Roxb.) Bosser	Rubiaceae	Kadam
Phoenix sylvestris Roxb.	Arecaceae	Khejur
Phyllanthus emblica L.	Euphorbiacceae	Amloki
Picrasma javanica Blume.	Simaroubaceae	Banposhla, Nilghanta

Botanical Name	Family	Local Name
Pithecellobium angulatum Benth.	Mimosaceae	Jigra, Kurmar, Morogmara
Protium serratum (Wall. *ex* Coelbr.) Engl.	Burseraceae	Gotgutia
Psidium guajaba L.	Myrtaceae	Payara
Walsura robusta Roxb.	Meliaceae	Bon Litchi
Wrightia arborea (Dennst.) Mabb.	Apocynaceae	Dudhi, Dudh kurus
Zanthoxylum rhetsa (Roxb.) DC.	Rutaceae	Bajna, Bazinali
Shorea robusta Roxb. *ex* Gaertn. f.	Dipterocarpaceae	Sal, Gazari
Swintonia floribunda Giff.	Anacardiaceae	Civit
Tamarindus indica L.	Caesalpiniaceae	Tentul
Tarenna campaniflora (Hook. f.) Balakrishnan	Rubiaceae	Harula, Haru Lodi
Tectona grandis L.f.	Verbenaceae	Shegun
Terminalia alata Heyne *ex* Roth	Combretaceae	Asal, Asma, Hasna
Terminalia arjuna (Roxb. *ex* DC.) Wight & Arn.	Combretaceae	Arjun
Terminalia bellirica (Gaertn.) Roxb.	Combretaceae	Bohera
Terminalia chebula Retz.	Combretaceae	Haritaki

4.2 Fauna

The field surveys were confined in winter season, thus the number of herpetofauna detection was very low. This number will be increased after the survey during rainy season.

4.2.1 Amphibians

A total of 7 species of amphibians were recorded during the field visits (Table 3). Among these amphibians, 57% were very common, 29% common and remaining 14% were rare (Fig. 1)

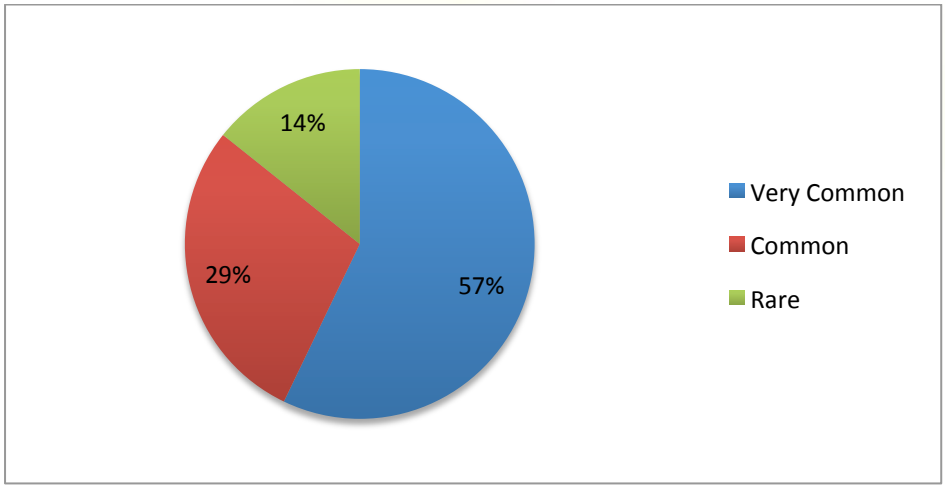


Fig. 1 Status of amphibians in Mirsarai upazila.

Table 3 Status of Amphibians in Mirsarai upazila

Status code: VC- Very Common, C-Common, R-Rare

English Name	Local Name	Scientific Name	Status
Common Toad	Kuno Bang	*Duttaphrynus melanostictus*	VC
Skipper Frog	Kotkoti Bang	*Euphlyctis cyanophlyctis*	VC
Cricket Frog	Jhi-jhi Bang	*Fejervarya asmati*	C
Indian Bull Frog	Sona Bang	*Hoplobatrachus tigerinus*	C
Ornate Microhylid Frog	Laubichi Bang	*Microhyla ornata*	VC
Berdmore's Microhylid Frog	Boro Laubichi Bang	*Microhyla berdmorei*	VC
Smith's Litter Frog	Holde chokha Bang	*Leptobrachium smithi*	R

Metamorph of Smith's Litter frog at Napittachara.

Berdmore's Microhylid frog.

4.2.2 Reptiles

A total of 10 species of reptiles were recorded during the field visits (Table 4). Among these reptiles 50% were very common, 40% common and remaining 10% rare (Fig. 2). Most of the reptiles encountered during the survey period were lizards and only one species of snake (Checkered keekback).

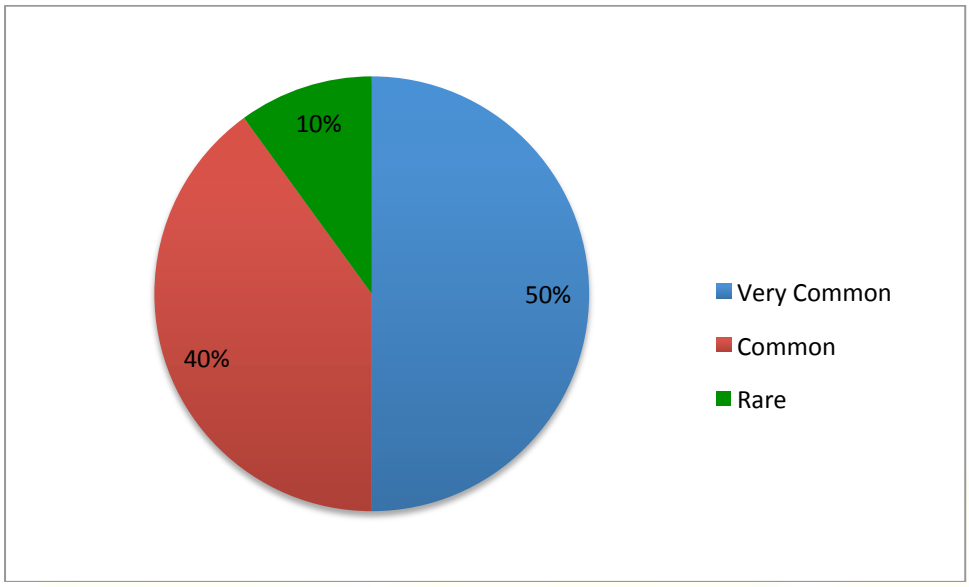


Fig. 2 Status of reptiles in Mirsarai upazila.

Table 4 Status of Reptiles in Mirsarai upazila

Status code: VC- Very Common, C-Common, R-Rare

English Name	Local Name	Scientific Name	Status

Common House Gecko	Tiktiki	*Hemidactylus frenatus*	VC
Bowring's House Gecko	Tiktiki	*Hemidactylus bowringii*	C
Tokay Gecko	Tokkhak	*Gekko gecko*	VC
Common Garden Lizard	Rokto-chusha	*Calotes versicolor*	VC
Bronze Grass Skink	Anjon	*Eutropis macularia*	VC
Keeled Grass Skink	Anjoni	*Eutropis carinata*	C
Many-lined Grass Skink	Anjon	*Mabuya multifasciata*	R
Spotted Litter Skink	Chiti-bon Anjoni	*Sphenomorphus maculatus*	C
Bengal Monitor	Gui Shap	*Varanus bengalensis*	C
Checkered Keelback	Dhora Shap	*Xenochrophis piscator*	VC

4.2.3 Birds

A total of 110 species of birds were recorded from Mirsarai upazila of which 95 species were resident and 15 species were migratory (Table 5 and 6). Among the resident birds 45% were rare, where 41% were common and only 14% were very common (Fig.3). Among the migratory birds 47% were rare while 46% were common and only 7% were very common (Fig 4).

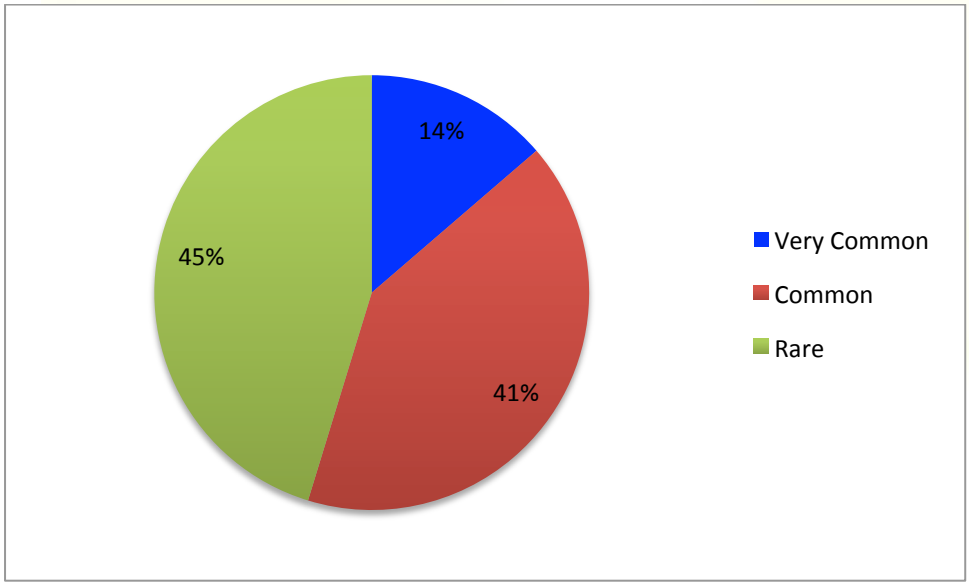


Fig. 3 Status of resident birds in Mirsarai upazila.

Table 5 Status of resident birds in Mirsarai upazila

Status code: VC- Very Common, C-Common, R-Rare

English Name	Local Name	Scientific Name	Status
Red Junglefowl	Bon Morog	*Gallus gallus*	C

Kalij Pheasant	Mothura	*Lophura leucomelanos*	R
Rufous Woodpecker	Lalchey Kaththokra	*Celeus brachyurus*	R
Greater Flameback	Boro Kaththokra	*Chrysocolaptes lucidus*	R
Fulvous-breasted Woodpecker	Pakra Kaththokra	*Dendrocopos macei*	C
Streak-Throated Woodpecker	Kaththokra	*Picus xanthopygaeus*	R
Black-rumped Flameback	Kaththokra	*Dinopium benghalense*	C
Blue-throated Barbet	Basanta Bauri	*Megalaima asiatica*	C
Coppersmith Barbet	Chhoto Basanta Bauri	*Megalaima haemacephala*	C
Lineated Barbet	Beghbou	*Megalaima lineata*	C
Common Hoopoe	Hudhud	*Upupa epops*	C
Indian Roller	Nilkantha	*Coracias benghalensis*	C
Common Kingfisher	Choto Machh-ranga	*Alcedo atthis*	C
White-throated Kingfisher	Machh-ranga	*Halcyon smyrnensis*	C
Pied Kingfisher	Pakra Machh-ranga	*Ceryle rudis*	R
Chestnut-headed Bee-eater	Khoirematha Shuichora	*Merops leschenaulti*	C
Green Bee-eater	Suichora	*Merops orientalis*	C
Greater Coucal	Kanakua	*Centropus sinensis*	C
Indian Cuckoo	Bau-kotha-kou	*Cuculus micropterus*	R
Asian Koel	Kokil	*Eudynamys scolopacea*	C
Common Hawk Cuckoo	Chokhgelo Pakhi	*Hierococcyx varius*	C
Green-billed Malkoha	Sabuj Kokil	*Phaenicophaeus tristis*	C
Red-breasted Parakeet	Tuta	*Psittacula alexandri*	C
Rose-ringed Parakeet	Tia	*Psittacula krameri*	R
House Swift	Ababil	*Apus affinis*	C
Asian Palm Swift	Nakkati	*Cypsiurus balasiensis*	C
Spotted Owlet	Khuruley Pencha	*Athene brama*	C
Asian Barred Owlet	Eshio Dagipencha	*Glaucidium cuculoides*	R
Tawny Fish Owl	Tamatey Mechopencha	*Ketupa flavipes*	R
Brown Fish Owl	Bhutum Pencha	*Ketupa zeylonensis*	R
Large-tailed Nightjar	Lenja Ratchara	*Caprimulgus macrurus*	R
Emerald Dove	Sabuj Ghughu	*Chalcophaps indica*	R

Rock Pigeon	Jalali Kobutar	*Columba livia*	C
Spotted Dove	Tila Ghughu	*Streptopelia chinensis*	VC
Eurasian Collared Dove	Raj Ghughu	*Streptopelia decaocto*	R
Red Collared Dove	Lal Ghughu	*Streptopelia tranquebarica*	C
Yellow-footed Green Pigeon	Horial	*Treron phoenicoptera*	R
White-breasted Waterhen	Dahuk	*Amaurornis phoenicurus*	C
Red-wattled Lapwing	Lal-lotika Hot-ti-ti	*Vanellus indicus*	C
Shikra	Toorkey Baj	*Accipiter badius*	R
Crested Goshawk	Jhutial Godashikrey	*Accipiter trivirgatus*	R
Black-shouldered Kite	Sada Chil	*Elanus caeruleus*	R
Brahminy Kite	Shankho Cheel	*Haliastur 31ordi*	C
Black Kite	Bhubon Cheel	*Milvus migrans*	R
Crested Serpent Eagle	Tila Baj	*Spilornis cheela*	C
Little Cormorant	Paan-kowri	*Phalacrocorax niger*	C
Grey Heron	Dhushor Bok	*Ardea cinerea*	R
Indian Pond Heron	Kani Bok	*Ardeola grayii*	VC
Cattle Egret	Go-Bok	*Bubulcus ibis*	VC
Little Heron	Sabuj Bok	*Butorides striata*	R
Little Egret	Chhoto Bok	*Egretta garzetta*	VC
Cinnamon Bittern	Lal Bok	*Ixobrychus cinnamomeus*	R
Intermediate Egret	Maijhla Bok	*Mesophoyx intermedia*	C
Asian Openbill	Shamuk-bhanga	*Anastomus oscitans*	R
Golden-fronted Leaf Bird	Pata Bulbuli	*Chloropsis aurifrons*	C
Blue-winged Leafbird	Sabuj Bulbuli	*Chloropsis cochinchinensis*	R
Long-tailed Shrike	Bagha Tiki	*Lanius schach*	VC
Bar-winged Flycatcher-Shrike	DorapakhaChotolatora	*Hemipus picatus*	R
Jungle Crow	Dar Kak	*Corvus macrorhynchos*	C
House Crow	Panti Kak	*Corvus splendens*	C
Rufous Treepie	Harichacha	*Dendrocitta vagabunda*	C
Common Iora	Fatikjal	*Aegithina tiphia*	C
Black-hooded Oriole	Holdey Pakhi	*Oriolus xanthornus*	C

Bronzed Drongo	Choto Fingey	*Dicrurus aeneus*	C
Spangled Drongo	Keshraj	*Dicrurus hottentottus*	C
Black Drongo	Fingey	*Dicrurus macrocercus*	VC
Greater Racket-tailed Drongo	Bhimraj	*Dicrurus paradiseus*	R
Lesser Racket-tailed Drongo	Choto Bhimraj	*Dicrurus remifer*	R
Ashy Woodswallow	Latora	*Artamus fuscus*	C
Black-headed Cuckooshrike	Kalomatha Kabashi	*Coracina melanoptera*	R
Small Minivet	Sat Saili	*Pericrocotus cinnamomeus*	C
Scarlet Minivet	Lal Satsaili	*Pericrocotus flammeus*	C
Common Woodshrike	Choto Bonlatora	*Tephrodornis pondicerianus*	R
Black-naped Monarch	Kaloghar Rajon	*Hypothymis azurea*	R
White-throated Fantail	Lejnachani	*Rhipidura albicollis*	C
Asian Paradise-flycatcher	Sada Sipahi	*Terpsiphone paradisi*	R
White-rumped Shama	Shama	*Copsychus malabaricus*	R
Oriental Magpie Robin	Doel	*Copsychus saularis*	VC
Grey-headed Canary Flycatcher	Footfuti	*Culicicapa ceylonensis*	C
Pale-chinned Flycatcher	Shadagola Chotok	*Cyornis poliogenys*	R
Black-backed Forktail	Kalopith Cheralej	*Enicurus immaculatus*	R
Orange-headed Thrush	Komla Dama	*Zoothera 32itrine*	C
Jungle Myna	Jhuti Shalik	*Acridotheres fuscus*	VC
Common Myna	Bhat Shalik	*Acridotheres tristis*	VC
Hill Myna	Moyna	*Gracula religiosa*	C
Asian Pied Starling	Gobrey Shalik	*Sturnus contra*	VC
Chestnut-tailed Starling	Kath Shalik	*Sturnus malabaricus*	C
Great Tit	Tit Pakhi	*Parus major*	C
White-throated Bulbul	Shadagola Bulbuli	*Alophoixus flaveolus*	R
Olive Bulbul	Jolpaironga Bulbuli	*Iole virescens*	R
Black-headed Bulbul	Kalo Bulbuli	*Pycnonotus atriceps*	C
Red-vented Bulbul	Bulbuli	*Pycnonotus cafer*	VC
Red-whiskered Bulbul	Sipahi Bulbuli	*Pycnonotus jocosus*	C
Black-crested Bulbul	Kalojhuti Bulbuli	*Pycnonotus melanicterus*	C
Plain Prinia	Nirol Prinia	*Prinia inornata*	C

Oriental White-eye	Shet-ankhi	*Zosterops palpebrosus*	C
Lesser Necklaced Laughingthrush	Choto Panga	*Garrulax monileger*	C
Abbott's Babbler	Aboter Satarey	*Malacocincla abbotti*	R
Puff-throated Babbler	Golafola Satarey	*Pellorneum ruficeps*	R
Jungle Babbler	Satbhaila	*Turdoides striatus*	C
Striated Babbler	Dora Satbhaila	*Turdoides earlei*	R
Bengal Bushlark	Bharat Pakhi	*Mirafra assamica*	C
Pied Bushchat	Pakra Jharfidda	*Saxicoa caprata*	R
Little Pied Flycatcher	Choto PakraChotok	*Ficedula westermanni*	R
Common Tailorbird	Tuntuni	*Orthotomus sutorius*	VC
Crimson Sunbird	Shidurey Moutushi	*Aethopyga siparaja*	C
Ruby-cheeked Sunbird	Chunimukhi Moutushi	*Anthreptes singalensis*	C
Purple Sunbird	Niltuni	*Cinnyris asiaticus*	C
Purple-throated Sunbird	Begunigola Moutushi	*Leptocoma sperata*	C
Thick-billed Flowerpecker	Thotmota Fuljhuri	*Dicaeum agile*	R
Pale-billed Flowerpecker	Fuljhuri	*Dicaeum erythrorhynchos*	R
Scaly-breasted Munia	Tila Munia	*Lonchura punctulata*	C
White-rumped Munia	Shadakomor Munia	*Lonchura striata*	R
House Sparrow	Charui	*Passer domesticus*	VC
Baya Weaver	Babui	*Ploceus philippinus*	C
White-browed Wagtail	Pakra Khonjan	*Motacilla maderaspatensis*	C

Red Jungle Fowl in Baraiyadhala National Park

Critical habitats for threatened birds of the country.

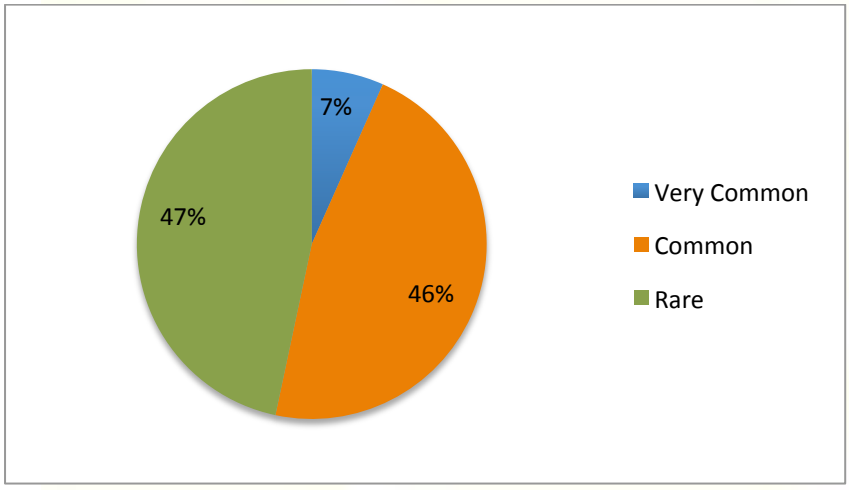


Fig. 4 Status of migratory birds in Mirsarai upazila.

Table 6 Status of migratory birds in Mirsarai upazila

English Name	**Local Name**	**Scientific Name**	**Status**
Common Sandpiper	Pati Batan	*Actitis hypoleucos*	C
Common Snipe	Kada-khucha/Chaga	*Gallinago gallinago*	C
Little Ringed Plover	Choto Nothjiria	*Charadrius dubius*	C
Black-naped Oriole	Kajolchokh Benebou	*Oriolus chinensis*	R

Verditer Flycatcher	Nil Katkatia	*Eumyias thalassina*	R
Brown Shrike	Badami Koshai Pakhi	*Lanius cristatus*	VC
Grey-backed Shrike	Metepith Latora	*Lanius tephronotus*	C
Dusky Warbler	Kalchey Fotok	*Phylloscopus fuscatus*	C
Olive-backed Pipit	Jolpaipith Tulika	*Anthus hodgsoni*	C
Paddyfield Pipit	Dhani Tulika	*Anthus rufulus*	C
Forest Wagtail	Ban Khonjan	***Dendronanthus indicus***	R
White Wagtail	Khanjana	*Motacilla alba*	R
Citrine Wagtail	Holdeymatha Khonjan	*Motacilla citreola*	R
Grey-headed Lapwing	Metematha Titi	*Vanellus cinereus*	R
Black-headed Ibis	Kalomatha Kastechara	*Threskiornis melanocephalus*	R

Tidal mud-flats are important habitats for migratory birds.

4.2.4 Mammals

A total of 23 species of mammals were recorded from Mirsarai upazila (Table 7). Among these mammals, most of them (65%) were rare while 22% were common and 13% were very common.

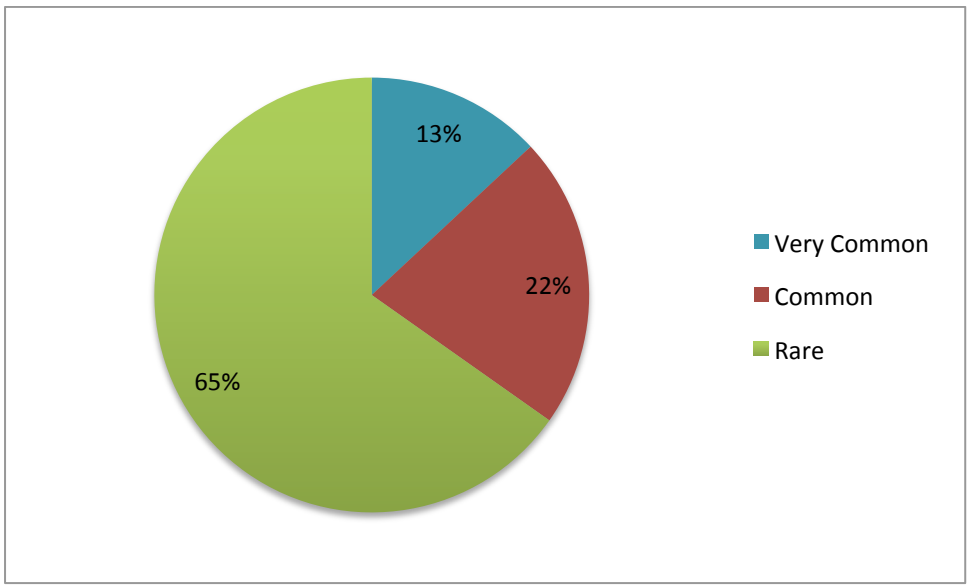


Fig. 5 Status of mammals in Mirsarai upazila.

Table 7 Status of mammals in Mirsarai upazila

Status code: VC- Very Common, C-Common, R-Rare

English Name	Local Name	Scientific Name	Status
House Shrew	Chika	*Suncus murinus*	R
Short-nosed Fruit Bat	Bocha Kola Badur	*Cynopterus sphinx*	R
Indian Flying Fox	Badur	*Pteropus giganteus*	C
Greater False Vampire	Daini Badur	*Megaderma lyra*	R
Lesser Asiatic Yellow Bat	Choto Rongila Chamchika	*Scotophilus kuhlii*	R
Rhesus Macaque	Banor	*Macaca mulatta*	VC
Phayre's Langur	Chosmapora Hanuman	*Trachypithecus phayrei*	VC
Golden Jackal	Pati Shial	*Canis aureus*	C
Jungle Cat	Ban Biral	*Felis chaus*	R
Fishing Cat	Mechho Bagh	*Felis viverrina*	R
Small Indian Mongoose	Benji	*Herpestes auropunctatus*	R
Smooth-coated Otter	Bhodor	*Lutra perspicillata*	R
Common Palm Civet	Gandho Gokul	*Paradoxurus hermaphroditus*	R
Large Indian Civet	Bagdash	*Viverra zibetha*	C
Barking Deer	Maya Harin	*Muntiacus muntjak*	R
Spotted Deer	Chitra Harin	*Axix axis*	C
Mainland Serow	Bon chagal	*Capricornis rubidus*	R

Hoary-bellied Himalayan Squirrel	Badami Kathbirali	*Callosciurus pygerythrus*	VC
Pallas's Squirrel	Lalche-buk Kathbirali	*Callosciurus erythraeus*	R
Lesser Bandicoot Rat	Indur	*Bandicota bengalensis*	C
Large Bandicoot Rat	Dhari Indur	*Bandicota indica*	C
House Mouse	Nengti Indur	*Mus musculus*	R

4.3 Critical Habitats

Two habitats have been categorized as critical habitats for wild animals in this area. One is coastal mangrove and another is hill forests of Baraiyadhala National Park.

4.3.1 Coastal mangrove

The major plants of coastal mangrove are Gewa, Keora, Goran, Bain and Hargoja. Some patches of Golpata also found. This mangrove is the habitat for around 5000 Spotted deer. Due to the developmental activities, habitat of the spotted deer has already been scquized. Deer moved from the north-western part of the forest to the south-eastern part. No fresh track and deer pellet were found between Ischakhali canal and Bamansundar canal. Movement of the deer was recorded only in the eastern part of the Bamansundar canal. If the developmental process continues in coastal mangroves, deer will be forced to come out from the mangroves and poaching rate will be increased.

Old pellet of spotted deer in west side of Bamansundar canal

If the BEPZA cut down all the mangrove patches, spotted deer will loss their habitat and will be wiped out from this region. A special program is needed to conserve the deer.

Map 4. Spotted deer habitat in coastal mangrove.

Fresh pellet of spotted deer in the east side of Bamansundar canal.

Captured fawn of spotted deer at the village near the coastal mangrove.

Construction of road in coastal mangroves.

Freshwater ditch within the coastal mangrove, which has been serving the purpose of drinking water for spotted deer and other mammals.

Coastal trees are market to cut down for developmental activities.

Golpata in coastal mangroves.

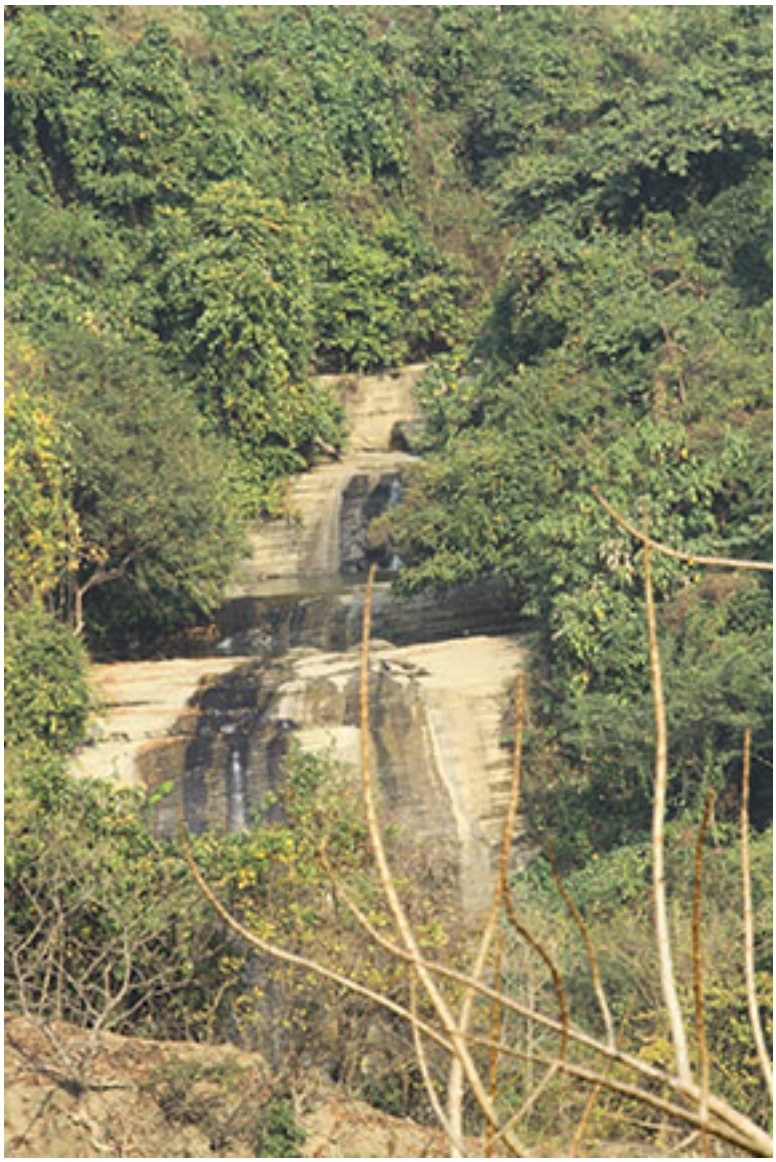
4.3.2 Hill Forests

Hill forests in Baraiyadhala National is very diverse. The water falls in this forest is the life line for many rare wild animals. Some of the notable animals are Mainland Serow, Barking Deer, Black Bear, Phayre's langur, many rare species of birds, amphibians and reptiles. The streams of this forest also serves as breeding ground for many threatened amphibians.

Map 5. Ecologically critical hill forests in Baraiyadhala National Park.

Tadpoles in the pocket of hill streams at Baraiyadhala national park.

Pellet of Mainland Shrew (Wild Goat) at Baraiyadhala National Park.



Hill stream Khoiyachara, at Mirsarai upazila.

Conclusion of Interim Report

During the winter season, data were collected on winter assemblage of species including migratory species. A total of 87 species of trees, 7 species of amphibians, 10 species of reptiles, 110 species of birds and 23 species of mammals were recorded from Mirsarai upazila. Two ecologically critical habitats were identified; coastal mangroves and hill forests of Baraiyadhala National park. Coastal mangroves are specifically important for spotted deer whereas hill forests are important for many threatened mammalian species.

The study will be continued to cover rainy season to see the assemblage of flora and fauna in wet seasons.

Field Activities

On the way to Khoiyachara

At economic zone

At the creek of Khoiyachara.

Entering the mangrove through the newly constructed road.

Measuring tree diameter.

Quadrat to measure tree density.

Setting up camera trap in mangrove.

Resource harvesting by the local people.

Field activities in Baraiyadhala National park.

Questionnaire survey

Annex 1

Questionnaire

Baseline Survey of Existing Flora and Fauna-Package-06 of "Preparation of Development Plan for Mirsharai Upazila, Chittagong District: Risk Sensitive Land use Plan" Project under Urban Development Directorate (UDD).

Location: Date & Time:

Respondent Name: Address:

Age: Sex: Religion/Cast: Education:

Livelihood status

1. How long have you been staying in this village / area?
2. Do you collect any resource (like fish, shell etc.) from the project area?
3. If yes then how frequent?
4. Do you or your family member go for hunting? Y / N
5. If yes, what are the species that you usually hunt for?
6. How frequent do you go for hunting? Daily / weekly / monthly / seasonally / yearly / ……..
7. Does any one in your village destroy bird nest / disturb / catch animals? If yes what kind of animals?
8. What do you do when you/ family members got sick? Use traditional medicine / go to K*abiraj or Boidda* / Buy medicine from shop / go to doctor.
9. Do you see following animals in your village / surrounding areas (show the color plate). If yes, how often you see or when did you see last time?

   Jungle cat…… Fishing Cat …….. Civets ……

   Jackal …… …… Hog Badger…….. Porcupine ……

Monkey …… …. Deer …….. Others ……

10. Do you think biodiversity (forest, plants, animals) in your area decreasing? Y / N. if yes why?

11. Do you think proposed economic zone may harm biodiversity in your area? If yes how?

12. What should do to conserve biodiversity in your area?

13. Do you know about Wildlife Act / other law? Y / N.

14. Miscellaneous Information (if any):

Name and signature of the Interviewer: