Government of the People's Republic of Bangladesh
Ministry of
Housing and Public Works Urban Development Directorate

FLORA AND FAUNA SURVEY UNDER "PREPARATION OF DEVELOPMENT PLAN FOR MEHERPUR DISTRICT

Report on
Interactive Digital Model on Bio-Diversity and Human Intervention

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1.1. Project Background

Bangladesh is not only the world's fastest-growing populous country, but also a country with immense potential in the near future. As the world's population grows, so does urbanization. Without suitable standards, it is difficult to manage the developing urban areas as a result of urbanization. Urbanization includes the expansion of houses and other infrastructure. Nobody can deny that the housing and infrastructure situation in metropolitan areas is deteriorating day by day. It must be arranged in order to be properly guided. Meanwhile, the honorable Prime Minister issued significant instructions for the country's spatial and sectoral planning at different levels. Bangladesh is one of the world's most densely populated countries, and it has had tremendous population increase over the last century, however the rate of growth has recently slowed to a reasonable level. Over the next decade, the country will see a rapid development of urbanization. According to an estimate, by 2020, nearly every other man, woman and child will live in an urban area (World Bank ed., Bangladesh 2020). Bangladesh's urban population has been growing at a yearly average rate of 6 percent since independence, at a time when the national population growth was 2.2 percent. As a result, urban population has grown six-fold, compared with a 70 percent increase in rural population (World Bank, 2007). As per recent UN data, approximately 25 percent of Bangladesh's current population currently lives in urban areas. Of this urban population, more than half lives in the four largest cities: Dhaka, Chittagong, Khulna and Rajshahi.

Urbanization refers to the increase in the number of people living in urban areas such as towns and cities. In the course of urbanization, urban expansion is unavoidable. People in Bangladesh are increasingly preferring to reside in and around cities and towns in recent years. People in our country primarily migrate from rural to cities in pursuit of a variety of opportunities. Urbanization, on the other hand, is frequently used as an indicator of development. Unplanned urbanization, on the other hand, poses a hazard to developing countries like Bangladesh. Bangladesh's urbanization has recently been complicated by a number of new issues. Such growing difficulties, as well as their impact, can be mitigated with proper planning and actions. Bangladesh would undoubtedly attain its targeted sustainable urban growth goal through planned urbanization. In 2008, humankind has crossed a socio-demographic milestone for the first time in history by having half of its population living within the urban areas (UNFPA, 2007).

In developing countries, urbanization has now become a powerful force. Cities are important drivers of growth and development, providing jobs, infrastructure, and services. With the unplanned expansion, the growing number of people, assets, and economic activities increase the exposure of cities to the impacts of disasters and climate change. However, in low and lower-middle income countries, new urban development is increasingly more likely to occur on hazard-prone land, namely in floodplains and other low-lying areas, along fault lines, and on steep slopes. In addition to settling in hazard-prone areas, much of the building construction that occurs is unregulated and unplanned, placing vulnerable populations, who settle on hazard-prone land, at increased risk. Besides, poor urban governance, declining ecosystems, and vulnerable rural livelihoods are among the main underlying risk drivers, which need to be addressed to build safer cities. Bangladesh has been experiencing a rapid increase in its urban population ever since its independence in 1971.Urban population as a percentage of total population increased from around 8.8% to nearly 23% during the 1974-2011 periods. It is estimated

that by the year 2021 nearly one-third or 33% of the population of Bangladesh will be living in urban areas. More than 60% of the national GDP is derived from non-agricultural sectors that are mainly based in urban areas. This phenomenon indicates the increasing role of urban areas being played in the national economy.

Upazila Parishad is the lowest administrative level of local government in Bangladesh. The majority of Upazila Parishads are still unable to achieve planned rural-urban development, which involves physically and socioeconomically integrating rural and urban areas. Most of the time, land is used haphazardly, resulting in a low level of living for the population. In the present government's policy for administrative reorganization, the upazila is the most important tier of administration. In light of the foregoing, a comprehensive development plan is required to handle the mandatory land use transition in both urban and rural areas, while avoiding unauthorized and unplanned development. A comprehensive development strategy at the Upazila level appears to be necessary.

Urban Development Directorate under the Ministry of Housing and Public Works, has launched a project titled "Preparation of Development Plan for Meherpur Zilla Project". This initiative aims to formulate a development plan for the next 20 years, divided into essential sectors to create a risk-sensitive and sustainable strategy. To understand the socio-economic and demographic profile of the study area is pivotal step for understanding the immediate needs and forecast the future needs for the next 20 years. Existing data and features are instrumental in providing a clear spatial understanding of the project area, accurately reflecting the potentials and problems of the existing scoria economic related conditions, and facilitating the representation within the development plan. Overall, the scope of socio-economic project signifies a comprehensive and forward-looking approach to urban development, emphasizing sustainability and thoughtful planning over the next two decades.

Existing Flora and Fauna survey is one of the important development modules of this project. In this development plan, existing Floral and Faunal information is considered as an important tool for a durable and sustainable urbanization. Land use planning is an important component for a modern urban development. But practicing urban development using a proper land use plan is not developed in Bangladesh. Prior to land use planning it is very essential to access existing Flora and Fauna conditions and the relevant information in and around the site of future urban development. Therefore, a rigorous Flora and Fauna study is needed to carry out for a resilient urban development.

1.2. Description of the Study Area

Meherpur Zilla, located in the southwestern part of Bangladesh, holds a significant place in the country's history and culture. Known for its rich heritage and pivotal role in the liberation war, Meherpur continues to thrive with its diverse economy, agricultural abundance, and growing infrastructure. This proposal aims to highlight the key aspects of Meherpur Zilla, focusing on its socio-economic landscape, cultural heritage, and potential for future development. The district comprises three Upazilas: Meherpur Sadar, Mujibnagar, and Gangni. Meherpur Sadar serves as the administrative and economic hub, with a diverse economy primarily based on agriculture and trade. Mujibnagar, formerly Bhoborpara, is renowned for its historical importance in the Liberation War, attracting many tourists to its memorial complex. Gangni Upazila is notable for its vibrant agricultural activities and emerging industrial potential. Collectively, these Upazilas contribute to the district's cultural richness, economic

diversity, and historical legacy, positioning Meherpur Zilla as a region of significant importance and development potential in Bangladesh.

Meherpur Zilla is bordered by Kushtia to the east, Chuadanga to the south, and the Indian state of West Bengal to the west and north, situated in the Khulna Division. The district's strategic location offers significant advantages for cross-border trade and cultural exchange. The district is predominantly rural, with a diverse population comprising various ethnic and religious communities. The literacy rate is gradually improving, with ongoing efforts to enhance educational facilities and opportunities.

a) Gangni Upazila

Gangni Upazila (Meherpur district) area 363.95 sq km, located in between 23°44' and 23°52' North latitudes and in between 88°34' and 88°47' East longitudes. It is bounded by Daulatpur (Kushtia) upazila on the North, Alamdanga and Meherpur Sadar upazilas on the South, Daulatpur (Kushtia), Mirpur (Kushtia) and' Alamdanga upazilas on the East, Meherpur Sadar upazila and West Bengal state of India on the West.

Population Total 299607; male 148250, female 151357; Muslim 295458, Hindu 2726, Christian 1313 and others 110. Water bodies Main rivers: Bhairab, Ichamati, Mathabhanga and Kazla; Elangi Beel, Nuner Beel and Elalgari Damash Beel are notable. Administration Gangni Thana was formed in 1923 and it was turned into an upazila on 24 February 1984.' Gangni Upazila consist of one Municipality, 9 Unions, 90 Mouzas and 137 Villages.

Mathavanga river, Bamundi Union, Gangni Upazila

b) Meherpur Sadar Upazila

Meherpur Sadar Upazila (Meherpur district) area 276.15 sq km, located in between 23°40' and 23°52' North latitudes and in between 88°34' and 88°47' East longitudes. It is bounded by Gangni upazila and West Bengal state of India on the North, Damurhuda and Mujibnagar upazilas on the South, Gangni and Alamdanga upazilas on the East, West Bengal state of India on the West.

Population Total 256642; male 127300, female 129342; Muslim 252323, Hindu 4199, Buddhist 1, Christian 114 and others 5. Water bodies Main rivers: Bhairab, Kazla; Bhatgari and Chand Beels are

notable. Administration Meherpur Thana was turned into an upazila in 1984. Meherpur Municipality was formed in 1960. Meherpur Sadar consist of one Municipality, 5 Unions, 61 Mouzas and 104 Villages.


Kutubpur beel, Kutubpur Union, Maherpur Sadar Upazila

c) Mujibnagar Upazila

Mujibnagar Upazila (Meherpur district) area 111.51 sq km, located in between 23°36' and 23°45' North latitudes and in between 88°34' and 88°43' East longitudes. It is bounded by Meherpur Sadar upazila on the North, Damurhuda and Meherpur Sadar upazilas on the East, West Bengal of India on the South and on the West.

Population Total 99143; male 49084, female 50059; Muslim 92970, Hindu 945, Buddhist 13, Christian 5200 and others 15. Water bodies Bhairab River, Sarashati Canal and Datpur Beel are notable. Administration Mujibnagar upazila was formed on 24 February 2000. Mujibnagar Upazila consist of 4 Unions, 29 Mouza and 33 Villages.

Dariapur beel, Dariapur Union, Mujibnagar Upazila

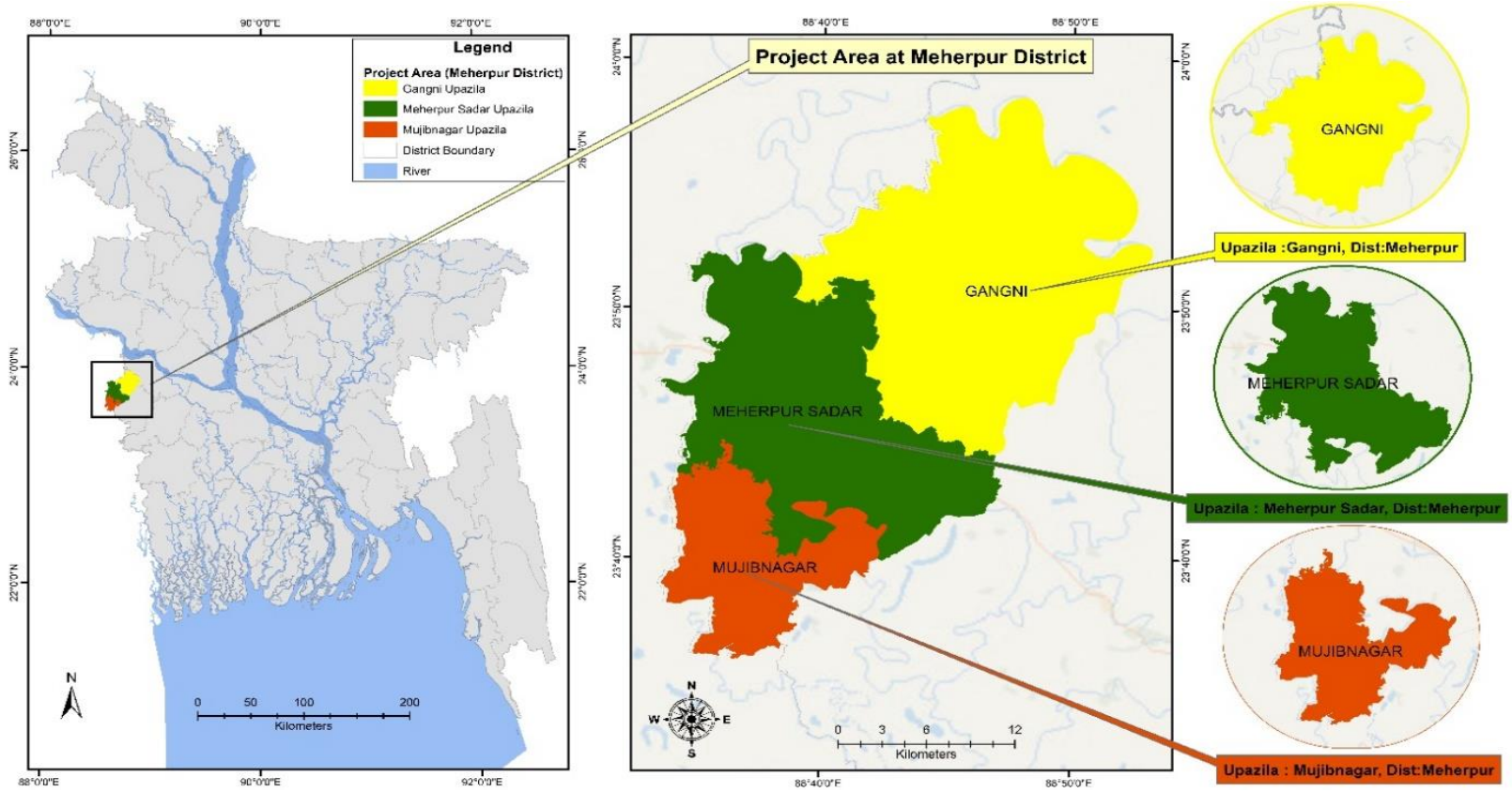

Fig 1: Location map of project area of Meherpur District**.**

1.3. Aims and Objectives

The baseline survey of existing flora and fauna will be conducted in project area of 3 upazilas of Meharpure district; i) Meherpur Sadar upazila, ii) Mujibnagar Upazila, and iii) Gangni Upazila.

Objectives:

Main objectives of the project:

The objective of the project is to optimize resources and activities for sustenance of marginal people. The urban and rural activities and resources are very important to the economy and life of the people of Bangladesh whose living conditions are inextricably linked to the productivity and sustainability of land use. There is no long-term Holistic Development Plan for the rural and urban area but it needs to be integrated with the mainstream of development process of the country. So, an interdisciplinary development planning approach is urgent to optimize livelihood of the project area.

Specific objectives of present study as per scope of work:

Baseline survey of existing flora and fauna in different place of the study area will be conducted to attain the following objectives:

- To develop an understanding of the existing flora and fauna based on available information, data gathering, literature searches, site visits and any baseline studies already carried out;
- To make an inventory of the species that are present on the spatial level of the survey and also the species that are frequent and also which are rare
- To identify the autecological characteristics, they possess and the communities they form
- To identify the characteristics and physical conditions of the sites that form their habitats
- To explore Historical aspects of habitats and biodiversity in the area
- To determine Underlying process of habitats dynamism — char formation, afforestation, forest clearing, settlements, growth centers, dykes, land reclamation, drainage system improvement, etc.
- To determine a threshold for selecting existing flora and fauna, based on their value, using measures;
- To identify those flora and fauna reaching the threshold value which could be affected by the project;
- To identify the spatial arrangements of habitats and the key processes that lead to the decline of endangered species (e.g. Fallowing, eutrophication, disturbance, intensification etc.)
- To determine the species including their habitat that might be threatened due to future development
- To identify the factors affecting the integrity of the existing flora and fauna in the ecosystems and the conservation status of relevant habitats and species;
- To set forth recommendations on preserving the species of the project area and ecology sensitive land use planning to keep the ecological system sustainable.
- To develop an interactive digital model for the ecological system for the project area

Chapter-2: Interactive Digital Model on Biodiversity and Human Intervention (GIS & Thematic Maps)

To support the Preparation of Development Plan for Meherpur District, the flora–fauna baseline information was translated into a GIS database, a set of ecosystem-based thematic maps, and an interactive digital model. The intent is to make biodiversity information directly usable for planning decisions by showing: (i) existing habitats, (ii) declining/degraded habitats, and (iii) priority conservation areas in a spatially explicit way.

This approach helps planners and decision-makers visualize where development pressure overlaps with ecologically important features—particularly wetlands, key wildlife habitats, and colony sites—and provides a platform to incorporate human interventions that are driving habitat loss and species decline.

2.1. Inputs and information base for the GIS model

2.1.1. Field biodiversity datasets and georeferenced features

The survey generated field-based biodiversity information, including critical habitats and key biodiversity features that were plotted on maps using GPS coordinates.

Key georeferenced biodiversity layers used in the model include:

- Important wetlands and aquatic resources (mapped by upazila, supported by a wetland inventory with coordinates).
- Bird breeding colonies mapped at district scale (five colonies identified with locations and coordinates).
- Bat roosting colonies (Flying Fox Bat Pteropus giganteus) mapped at district scale (five colonies with locations and coordinates).

2.1.2. Thematic mapping in ArcGIS and spatial database deliverables

Based on the survey findings, ecosystem-based thematic maps were produced in ArcGIS, and a GIS database was prepared that can be delivered as shapefiles or map outputs at required scales in consultation with the Project Director (PD).

2.1.3. Historical land cover and land-use context

The interactive model incorporates habitat trends by using historical changes of vegetation cover evaluated from imagery for the previous 30 years.

A land-use map was prepared accommodating wildlife habitat, vegetation cover, waterbodies, forests, and other landmarks, which forms the planning "base map" for overlay analysis.

2.2. Thematic map products (core outputs)

The GIS component generates thematic maps that summarize biodiversity significance and support site-level decisions. The report includes the following mapped outputs:

a) Important wetlands and aquatic resources (upazila-level maps) including Meherpur Sadar and Gangni.
b) Bird breeding colony map (district-level).
c) Bat colony map (district-level).

These thematic maps provide the spatial "front-end" of the interactive digital model and can be updated as new biodiversity observations and intervention data are collected.

2.3. Human intervention

The survey identifies multiple human-driven pressures that are directly mappable and suitable for inclusion as "intervention layers".

- Wetland modification and overexploitation
- Agricultural expansion and habitat squeezing
- Disturbance to wildlife and local use patterns

Chapter-3: Important Areas for Flora-Fauna

3.1. Wetlands

There are some wetlands of biodiversity significance have been recorded from Meherpur district. A total of 31 beels were identified those hold water throughout the year and have sensitive ecosystem. These wetlands should be conserved (Table 1) (Fig. 2, 3, 4).

Table 1 List of wetlands of biodiversity significance

Sl	Beel name	Area name		Location	
1	Garagari beel	Buripota	Meherpur sadar	23°46'49.93"N	88°34'0.24"E
2	Horirumpur beel	Buripota	Meherpur sadar	23°46'53.27"N	88°35'6.49"E
3	Jolee beel	Buripota	Meherpur sadar	23°45'29.01"N	88°35'42.56"E
4	Boro jolee beel	Buripota	Meherpur sadar	23°45'7.37"N	88°36'1.79"E
5	Chand beel	Amjhupi	Meherpur sadar	23°44'40.80"N	88°39'56.47"E
6	Katapukur beel	Baradi	Meherpur sadar	23°44'3.29"N	88°45'22.49"E
7	Harder beel	Baradi	Meherpur sadar	23°44'17.96"N	88°46'15.85"E
8	Sholmari beel	Baradi	Meherpur sadar	23°42'22.48"N	88°46'23.82"E
9	Bejon beel/ Terghoria beel	Kutubpur	Meherpur sadar	23°49'59.76"N	88°36'35.16"E
10	Nunar beel	Gangni	Meherpur sadar	23°51'26.54"N	88°48'44.71"E
11	Dubokhola beel	Kutubpur	Meherpur sadar	23°48'52.94"N	88°36'37.88"E
12	Bitkamari beel	Kutubpur	Meherpur sadar	23°48'42.86"N	88°36'27.58"E
13	Kutubpur beel	Kutubpur	Meherpur sadar	23°51'33.46"N	88°38'23.52"E
14	Duntola beel	Kutubpur	Meherpur sadar	23°50'18.12"N	88°35'40.25"E
15	Kakrajoler beel	Kutubpur	Meherpur sadar	23°50'51.01"N	88°37'18.00"E
16	Sholmari beel	Kutubpur	Meherpur sadar	23°51'50.14"N	88°35'20.63"E
17	Isamoti beel	Kathuli	Gangni	23°53'58.97"N	88°43'21.06"E
18	Dholar beel	Kathuli	Gangni	23°53'27.35"N	88°42'24.69"E
19	Shaldah beel	Roypur	Gangni	23°47'51.87"N	88°48'48.59"E
20	Dhomash beel	Kajipur	Gangni	23°56'26.44"N	88°45'43.13"E
21	Moragang river	Motmura	Gangni	23°53'14.49"N	88°49'30.16"E
22	Nougara beel	Dariapur	Mujibnagar	23°43'4.14"N	88°34'22.83"E
23	Chucho khola beel	Dariapur	Mujibnagar	23°42'8.96"N	88°34'4.45"E
24	Poddo beel	Bagoan	Mujibnagar	23°37'29.71"N	88°37'36.78"E
25	Taranagar chulkani beel	Bagoan	Mujibnagar	23°37'40.81"N	88°37'51.06"E
26	Tuplar beel	Bagoan	Mujibnagar	23°38'8.32"N	88°38'13.44"E
27	Nagar beel			23°40'57.58"N	88°34'49.31"E
28	Horirampur beel	Bagoan	Mujibnagar	23°36'49.52"N	88°39'3.24"E
29	Shib nogor bot tola beel	Bagoan	Mujibnagar	23°37'22.60"N	88°39'27.32"E
30	Mirgangi beel		Chuadanga	23°39'52.44"N	88°44'8.21"E
31	Kajla beel/ dolka beel		Chuadanga	23°40'36.95"N	88°45'4.16"E

Moragang beel at Gangni Upazila, Meherpur

Moragang beel at Gangni Upazila, Meherpur

Shaldah beel at Gangni Upazila, Meherpur

Dhomash Beel at Kajibur, Gangni, Meherpur.

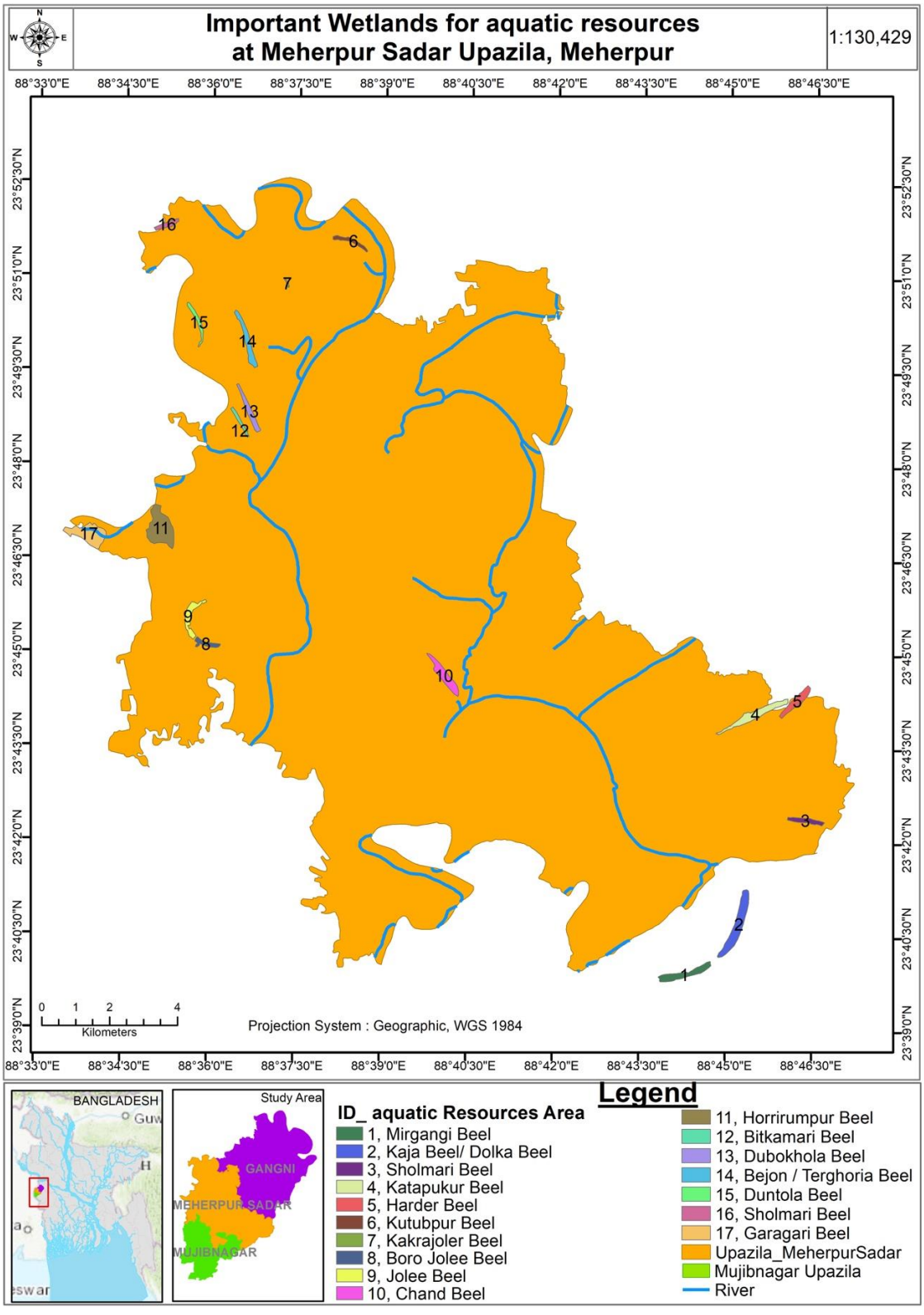

Fig. 2: Map of important wetlands and aquatic resources in Meherpur Sadar upazila.

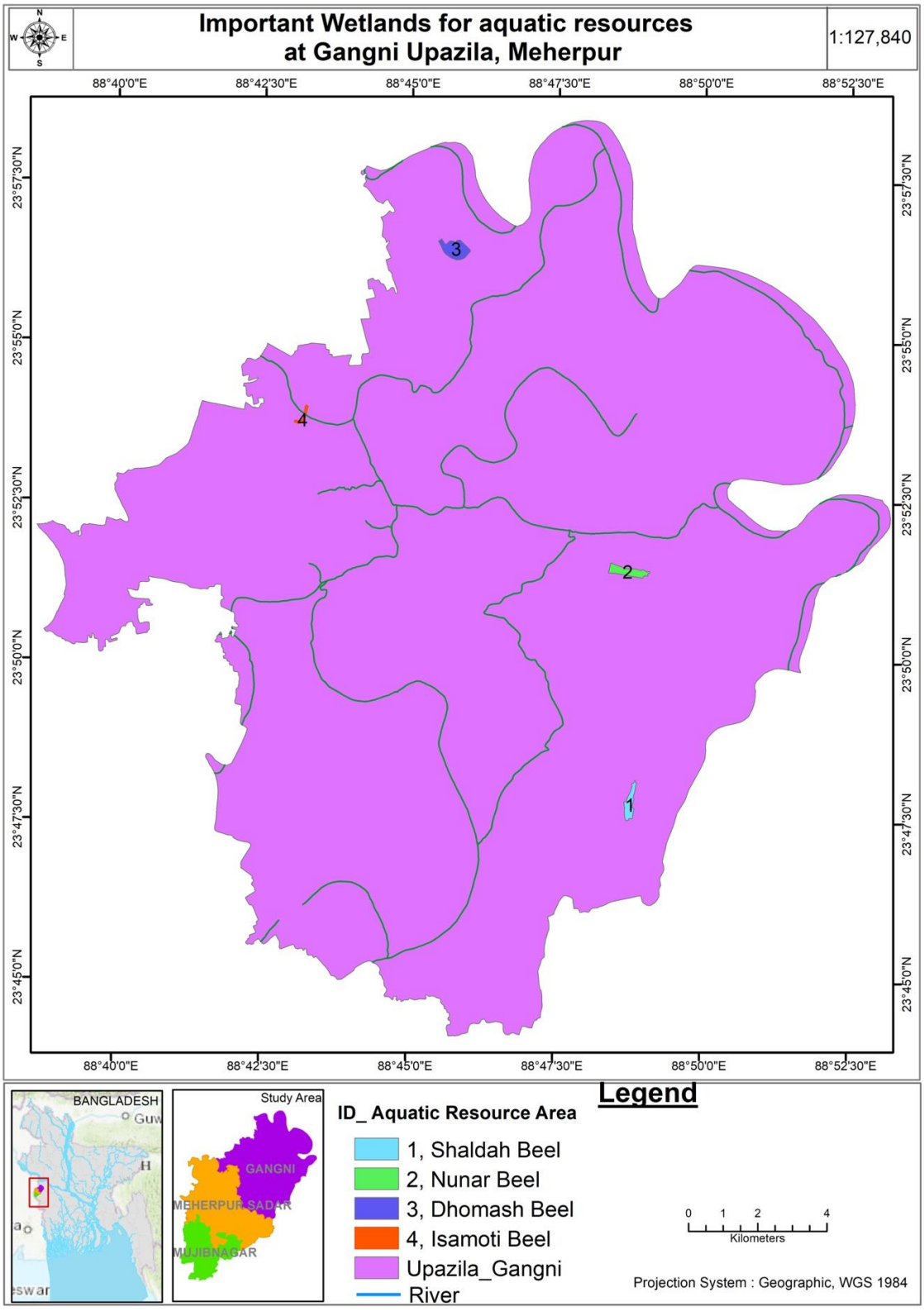

Fig. 3: Map of important wetlands and aquatic resources in Gangni upazila.

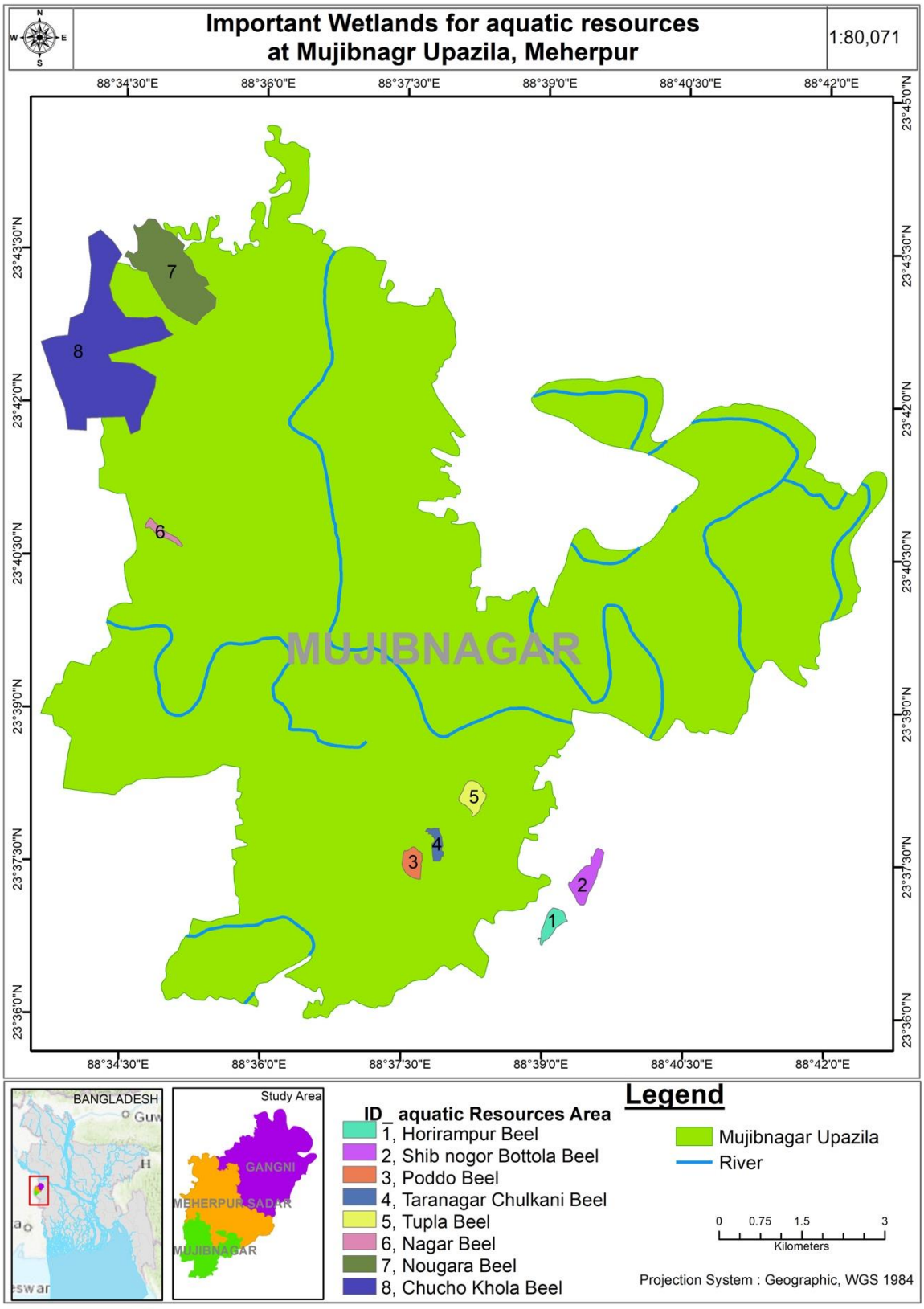

Fig. 4: Map of important wetlands and aquatic resources in Gangni upazila.

3.2. Bird Colony

Five permanent breeding colonies of birds were identified from Meherpur district of which three colonies were situated in Meherpur sadar upazila, one colony each from Gangni and Mujibnagar upazila (Fig. 5, Table 2).

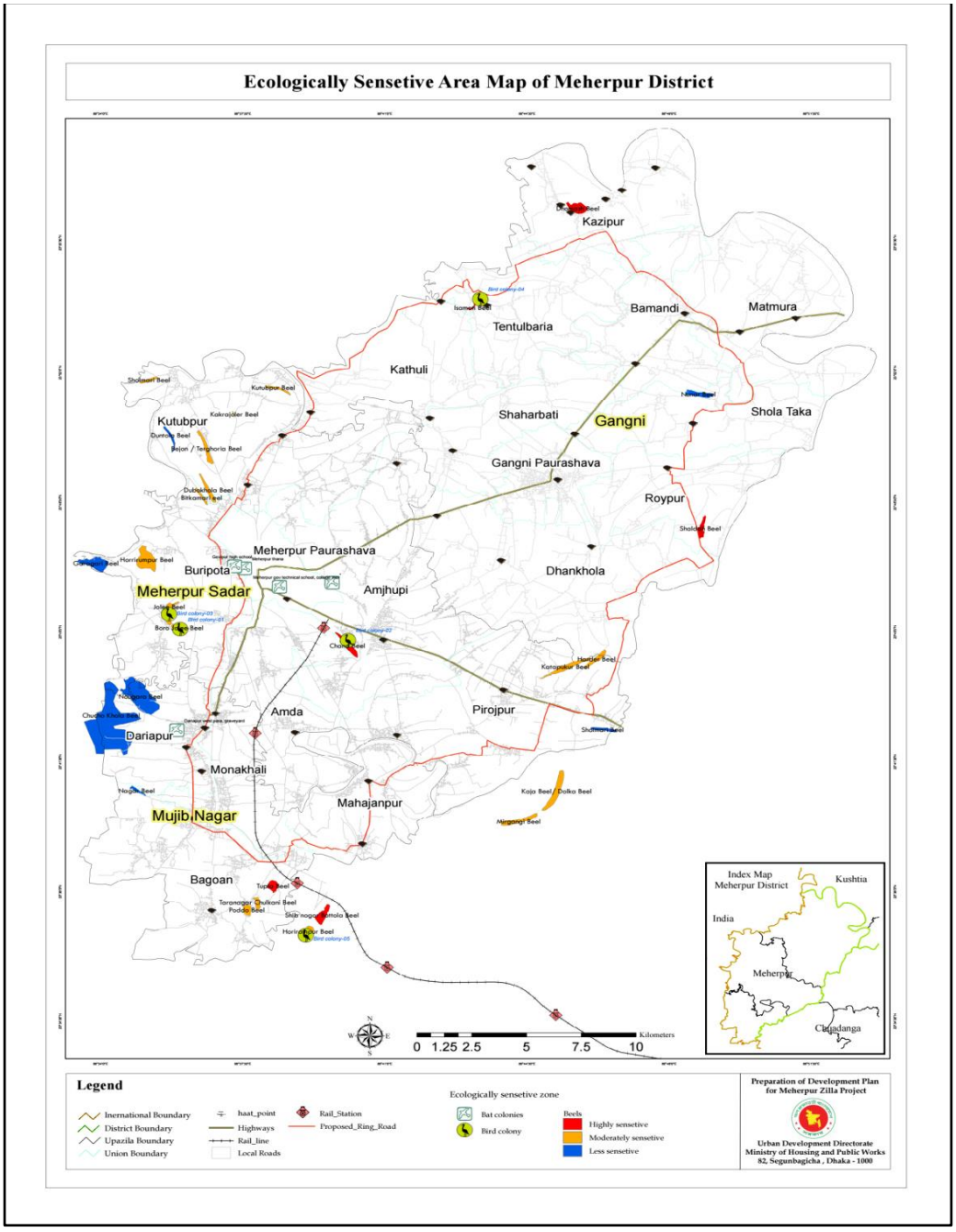

Fig. 5: Map of bird breeding colonies recorded from Meherpur district.

Table 2: Location of bird colonies recorded from Meherpur district

Sl	Bird colony	Species	Location		GPS	
			Place	Upazila	Lat	Long
1	Bird colony-01	Black crowned night heron, Gray heron, Little cormorant, Indian cormorant, Oriental darter	Boro-jolee, Buripota	Meherpur sadar	23.751254°	88.599338°
2	Bird colony-02	Black crowned night heron, Gray heron, Little cormorant, Indian cormorant, Oriental darter,	Chand beel ghat, amjhupi	Meherpur sadar	23.746266°	88.668158°
3	Bird colony-03	Little cormorant, Indian cormorant, Oriental darter, Ducks, Open bills	Buripota	Meherpur sadar	23.758060°	88.594708°
4	Bird colony-04	Indian cormorant, Oriental darter, Ducks, Open bills	Isamoti beel, Kathuli	Gangni	23.899714°	88.722517°
5	Bird colony-05	Little cormorant, Ducks, Open bills	Horirampur beel, Bagoan	Mujibnagar	23.613756°	88.650900°

3.3. Important Bat Colonies

Five roosting colonies of Flying Fox Bat (*Pteropus giganteus*) were recorded from Meherpur district of which four colonies situated in Meherpur sadar upazila and another colony was in Mujibnagar upazila (Fig. 6, Table 3).

Table 3: Location of bat colonies identified from Meherpur district

Sl	Bat colony	Individual	Location		GPS	
			Place	Upazila	Lat	Long
1	Bat colony-01	150+	Meherpur thana	Meherpur sadar	23.778737°	88.625740°
2	Bat colony-02	360+	Govipur high school	Meherpur sadar	23.779586°	88.621684°
3	Bat colony-03	285+	Dariapur west para, graveyard	Mujibnagar	23.705871°	88.597965°
4	Bat colony-04	80+	Meherpur gov technical school, college mor	Meherpur sadar	23.770405°	88.640089°
5	Bat colony-05	110+	-	Meherpur sadar	23.772133°	88.661750°

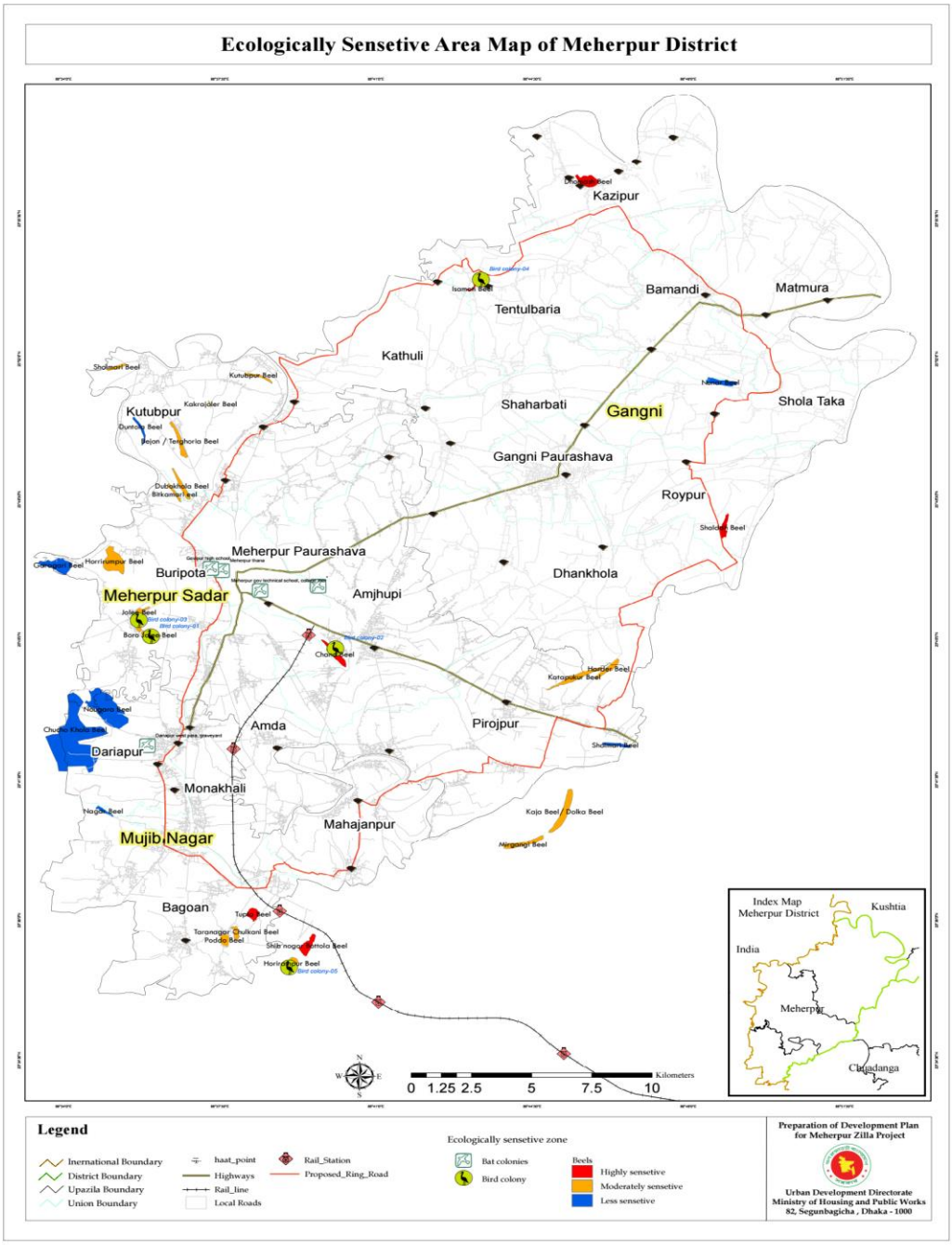

Fig. 6 Bat colonies recorded from Meherpur district.

Chapter-4: Perception of local people about the biodiversity

A total of 100 pre-designed questionnaire was surveyed among the local people of three upazilas of Meherpur district. About 64% people seasonally collect resources form the natural waterbodies. They mostly collect fish (52%) and vegetables (48%). Presence of no professional hunters, hunting birds and other wild animals were found but sometimes people catch migratory birds from the wetlands (beels). About 62% people of the study area do not go to the doctor for generalized sickness and buy medicine by their own from the medicine shop. Only 22% people consult doctor or health workers during sickness. About 9% people goes to the Kabiraj (traditional medicine practicians) and 7% people use traditional medicine (Fig.7). Local people mentioned that they usually see Jackal, Jungle Cat, Civets and Fishing Cat in their area and rarely see Rabbit. They also mentioned that Common Langur frequently visit their area. About 64% people mentioned that biodiversity of their area has been decreasing day by day while 16% has no idea about biodiversity (Fig. 8).

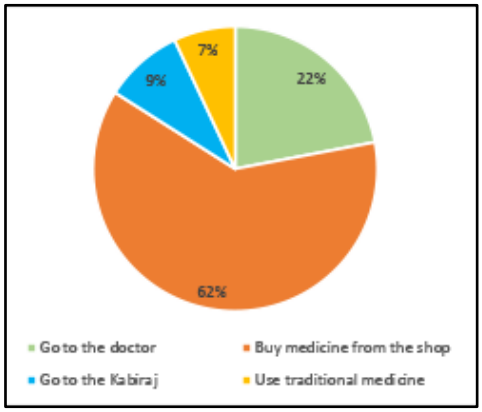

Fig. 7 Treatment status of the people in Meherpur district.

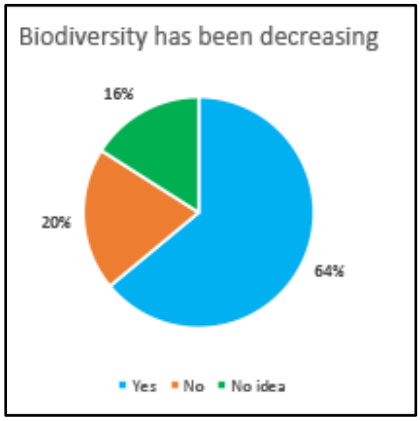

Fig. 8 Concern of local people about the biodiversity of Meherpur.

About 20% people believe that the proposed developmental activities may harm biodiversity of Meherpur while most of the people (54%) has no idea about this (Fig. 9). About 35% people suggested plantation for the conservation of biodiversity of Meherpur while another 35% people have no idea at this point (Fig. 10).

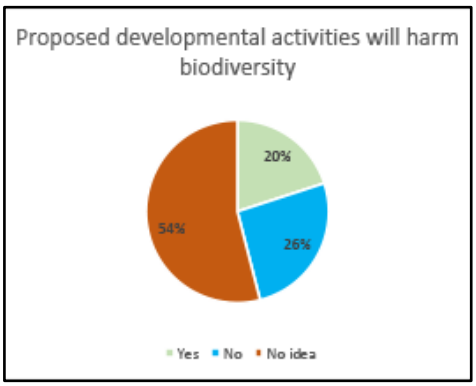

Fig. 9 Concern of local people about the proposed developmental activities in Meherpur.

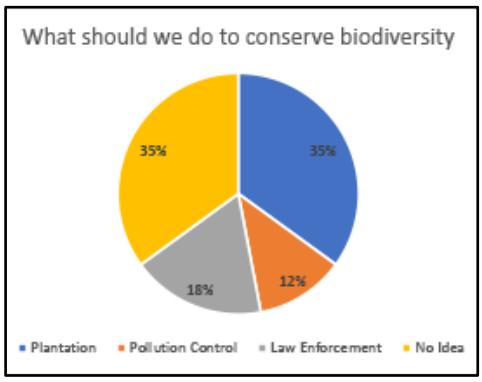

Fig. 10 Suggestions of local people about the biodiversity conservation in Meherpur.

Chapter-5: Legal Framework for Biodiversity Conservation

The policy and institutional framework in Bangladesh continue to expand laws and policies for biodiversity conservation. While Bangladesh has a strong legal and policy framework, the situation on the ground reflects a lack of capacity and coherent implementation by the government agencies (Table 4).

5.1. Government Ministries and Agencies

Ministry of Environment, Forest and Climate Change (MoEFCC)

The principal agency most involved in biodiversity conservation is the MoEFCC, with six different departments but only three of these are concerned directly with forests and biodiversity: Department of Environment (DoE), Bangladesh Forest Department (BFD), Bangladesh National Botanical Garden and Bangladesh National Herbarium (BNH). The Department of Environment (DoE) has been established with a mandate for enforcement of environmental protection laws, management strategies and policies developed by GoB. DoE is responsible for the mamagement and monitor of Ecologically Critical Areas (ECAs).

The Bangladesh Forest Department (BFD)is the primary government agency that deals with forests and forest management and monitoring. BFD manages Protected Areas (PAs), forests and most biodiversity activities in the field and operates through three management plan divisions located at the center of the three main forest types: hill forest, plains forest and mangrove forest. BFD's Wildlife Crime Control Unit (WCCU) was established in 2013 with the support of the World Bank, to combat wildlife trafficking and coordinate efforts with other agencies both national and international.

The Bangladesh National Herbarium conducts botanical surveys and identified, collects and preserves plant species in a facility within the Botanical Garden. Much of their work is conducted by students and academics, and some in collaboration with the National Botanical Garden and NGOs like IUCN. These efforts to document existing flora and fauna have many gaps, and are critical to scientific management and conservation of forests and biodiversity in the country.

Ministry of Fisheries and Livestock (MoFL)

MoFL mainly works to secure the demand of animal protein by enhancing production of fish and livestock products and has two biodiversity related agencies, Department of Livestock (DoL) and the Department of Fisheries (DoF).

Although the Department of Livestock (DoL) is primarily concerned with managing livestock, it is also responsible for the operation of the Bangladesh National Zoo located in Mirpur, Dhaka.

The Department of Fisheries (DoF), under MoFL, is the primary agency for the management of fisheries and fish habitat, as well as the collection of revenue, enforcement of fisheries regulations and research and extension on fisheries and shrimp aquaculture. Although they collect data on the tonnage of fish catches for major species, they have no baseline or monitoring data on the size of fish caught, the range and distribution of these species and other parameters needed to scientifically manage these stocks for long-term sustainability.

Table 4: Major laws in Bangladesh pertaining to Tropical Forests and Biodiversity

Laws	Description	Relevance to Biodiversity Conservation
Forest Act (1927)	Established state ownership of forest areas, rules for use/extraction of forest resources	Legal authority for the Bangladesh Forest Department to gazette forest areas, manage timber and other forest resources
Wildlife (Conservation and Security) Act, 2012 – formerly Wildlife Protection Act, 1974	Provide conservation and safety of wildlife, forests and biodiversity by repealing the existing law relating to conservation and management of wildlife	Ensure protection of wild animals and plants
Brick Burning Control Act, 1989 (Amendment 1995) Preparation of brick and kiln establishment (control) Act, 2013	Prevention of use of wood as fuel for brick kilns and establishment of brick kilns in reserve forests, protected areas, wetlands and agricultural land	These laws were designed to control the exploitation of forests for fuelwood, and development of wetlands and croplands into brick kilns. The 2013 law made stricter regulations and increased penalties, including a provision for trial in regular courts
Environment Conservation Act, 1995 (Revised 2012)	Established legal basis for Environmental Conservation Rules (1997), gives authority to MoEF and DoE to regulate environmental protections	2012 amendment establishes rules for demarcation of wetlands and water bodies, protections for ECAs, hill slopes and mountainous regions
Environment Court Act, 2000 (Amendment 2010)	Established environmental courts, 2010 amendment established courts in each administrative division	Enforcement of protection of ECAs, environmentally important areas like wetlands
Environment Protection Act, 2000 (Amendment 2010)	Deals with environmental pollution, establishes penalties and compensation for pollution, gives individuals/communities rights to file cases in environmental courts	Environmental Clearance Certificates required for industrial development. 2010 amendment increased penalties up to 10 years' imprisonment and increased fines.
Climate Change Trust Act, 2010	Enhances the capability to create climate resilience in the country	Ensure the proper use of climate change trust fund under the MoEF for research and development programme
Biological Diversity Act, 2017	Establishes safeguards for environment and biodiversity	Law has not been passed, still open for public comment

Ministry of Land (MoL)

MoL allocates land and land development rights for various purposes including agriculture, industry and infrastructure development and housing. In many cases, MoL allocates development rights without the appropriate ECC process, thus allowing land in sensitive areas like ECAs to be developed. Officials in BFD, DoF and DoE identified the lack of coordination between MoL and MoEF or other ministries as a significant obstacle to ensuring that the development of land for industry, tourism or agriculture does not harm forests or biodiversity.

5.2. Key National Laws and Policies

Bangladesh has several laws, policies and national strategies that address biodiversity conservation, several of which have been amended over the past decade in an effort to increase enforcement of environmental protections. However, environmental laws and policies are not well enforced on the

ground. The main laws, policies and national strategies that have been developed to address biodiversity protections in Bangladesh are summarized in Table 4 and 5.

Table 5: Key National Policies on Tropical Forests and Biodiversity in Bangladesh

Policies	Description	Relevance to Forest and Biodiversity
Forest Policy, 1994	Establishes participatory management of forests with communities and provides opportunities for cooperation between NGOs and government agencies in social forestry	Target to increase forest cover to 20 percent of the total land area by 2015, to maintain the ecological balance and to attain self-sufficiency in forest produce
Environment Policy, 1992	Protection and improvement of environment and promoting long-term sustainable use of natural resources across 15 sectors	Emphasized the need for sustainable ecological balance on existing forests conservation, expansion and tree plantation and took measures to stop shrinkage and depletion of forest lands and resources
Wetland Policy, 1998	Establishes key principles for wetland sustainability	Maintain existing levels of biodiversity of wetlands and actively promote integration of wetland functions in natural resources management
National Fisheries Policy, 1998	Establishes framework for conservation and management of fisheries and conservation of fish populations	All the water bodies suitable for fisheries production and their fisheries resources conservation, development and management are addressed under this policy.
National Water Policy, 1999	Ensures efficient and equitable management of water resources and institutional capacity building for water resource management.	Promotes afforestation and tree planting for watershed protection
Coastal Zone Policy, 2005	Aims to ensure participatory and integrated approach for management and development of the coastal zone	Encompasses both the terrestrial and aquatic environment

The importance of biodiversity is enshrined in the Bangladesh Constitution. Article 18A safeguards environment protection and sustainable development. As Table 3 indicates, there are laws that protect environmental quality broadly, as well as specific laws for forests, wetlands, fisheries and coastal habitats in Bangladesh. Bangladesh also has a system of environmental courts, established through the Environment Court Act, 2000, but it is unclear whether these courts are able to enforce penalties or prevent environmental laws from being broken. Several national policies (Table 4) also exist to direct the work of government agencies in the management of biodiversity, but in many cases, the purposes of some policies may run counter to others, or to laws that protect forests and biodiversity. The National Agricultural Extension Policy may encourage the development of marginal forests lands for agriculture, or the National Industrial Policy may encourage industrial expansion and pollution at the cost of forests, wetlands or ecologically sensitive areas. The National Shrimp Policy is an effort to reduce the impact of shrimp farming on coastal areas and mangroves, but may not be sufficient to address unsustainable harvesting of wild shrimp for farms or the destruction of mangroves that occurs on the southeast coast.

There are also several national strategies and plans that deal with biodiversity in Bangladesh. The National Biodiversity Strategy and Action Plan (NBSAP) provide a framework for conservation, sustainable use and sharing the benefits of biodiversity, by linking biodiversity conservation with social

and economic development. National Environment Management Action Plan, 1995 (NEMAP) is a 10-year environmental management plan that contains elements of forest and biodiversity conservation. To address the aim of NEMAP, MoEF launched an umbrella program under five thematic areas of environment and forest which is called the Sustainable Environment Management Programme 1998 (SEMP). SEMP developed a strategic plan for the period 2000-2014, but from interviews it was not clear how DoE is following up to implement this plan. Several climate change action plans also contain elements of tropical forest and biodiversity protections. Bangladesh Climate Change Strategy and Action Plan (2009-2018) emphasized biodiversity under the "Research and Knowledge Management" pillar, which will monitor and research the impacts of climate change on ecosystems and biodiversity. The Bangladesh Tiger Action Plan (2018-2027) specifically addresses the conservation of tigers. While several of these plans emphasize the importance of forests and biodiversity, others like the Perspective Plan (2010-2021) prioritize economic growth, and make no mention of biodiversity in the Vision 2021. As with laws and policies, there are conflicts between different plans for economic growth and development in Bangladesh, with a lack of clarity on the status of forests and biodiversity across different government ministries and departments.

5.3. International biodiversity and climate change related conventions

Bangladesh is a party to all the major biodiversity related conventions, including the Convention on Biological Diversity, the Ramsar Convention on Wetlands of International Importance, the United Nations Framework Convention on Climate Change, the Convention on the Conservation of Migratory Species and many others. Bangladesh is up to date on the requirements of these conventions and has recently submitted a 2015 update to for the Ramsar Convention, the Fifth Report to the Convention on Biological Diversity (2015) and an update on major sections of the Red Data Book is near completion.

Chapter-6: Recommendation to mitigate potential impacts on biodiversity

The biodiversity of Meherpur district is high. A total of 18 species of threatened wild animals were identified during the survey period.

Wetlands and Aquatic Resources

Recommendations	Remarks
1. The natural wetlands should be kept in natural condition.	Beels; no development recommended.
2. Human activities like conversion of natural waterbodies to fish culture ponds, other resource collection should be controlled.	Need collaboration with other Gov. agencies
3. Control of illegal fishing gears and poison fishing.	Need active role of department of fisheries and other relevant agencies.
4. Strictly monitor not to catch fish by drying up the wetlands.	Need monitoring from the local Governments.
3. If any intervention needed, assess the critical habitat, choose less critical area and try to minimize its effects on biodiversity.	Need detailed study for the assessment of the quality of habitat and to find out possible alternate habitats.

Bird Colonies

Recommendations	Remarks
1. Bird nesting and roosting colonies should be conserved.	Need compensation policy with the collaboration with FD and local Gov.
2. Roosting trees in public places should be marked from the local Gov. for conservation.	Need collaboration with local Government.
3. Large trees in public places (Graveyard, weekly markets, khas lands) should be conserved.	Need awareness campaign and establishment of bill boards near the colonies.

Bat Colonies

Recommendations	Remarks
1. Bat colonies should be conserved.	Need awareness about the bats among local people.
2. Bat roosting trees need to be kept.	Need negotiation with the owners / authority
3. Large trees in public places (Graveyard, weekly markets, khas lands) should be conserved.	Need collaboration with local Government.

Northern Grey Langur Habitats

Recommendations	Remarks
1. Grey Langur habitats should be kept as undisturbed as possible.	Need awareness among the local people.
2. Preferred food trees should be planted in Government Khash lands and along the road sides.	Need collaboration with the local forest offices.
3. Human-Langur conflicts should be minimized through consultation with the local people.	Need mass awareness along with compensation plan from the Forest Department.
4. Langur population should be monitored	Collaboration with universities and research organizations.

Chapter-7: Conclusion

Meherpur is an important district in terms of its location at northwestern part of Bangladesh and this baseline provides a vital information on the region's floral and faunal diversity. This is the first ever comprehensive baseline study of this district which covers both dry and wet seasons. Scientifically rigorous approaches and field techniques including line transects, quadrats, camera traps, and community questionnaires were appraised to get a clear picture of the whole study area. As an outcome, the study highlights the ecological richness of this region by identifying 354 plant species and 334 animal species, including amphibians, reptiles, birds, mammals, and aquatic species (fishes and shell fishes).

The identification of eighteen nationally and globally threatened species, including the Fishing Cat, Rufous-tailed Hare, Bengal Fox, Large Indian Civet and other species emphasize the urgent need to prioritize the conservation of specific habitats. Additionally, monitoring fish and fish habitat is crucial for sustaining the health of local ecosystems and livelihoods. While no evidence of professional hunting was found, opportunistic bird hunting during winter poses additional threats for local and migratory bird populations. This emphasizes the necessity of raising awareness and involving the community in order to change local perception and attitude towards biodiversity conservation.

This type of baseline survey is critically needed for all districts, where biodiversity data is scarce, and environmental changes are accelerating due to rapid development, agricultural expansion, and climate change. This study not only produces a base for future ecological research but also offers clear information that can help local and national authorities to plan better for managing development in a more sustainable way.