



Insights into the fish biodiversity and fishing practices in Shanir Haor of Bangladesh

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Abstract. Despite Bangladesh's attempt to safeguard natural water bodies and wetlands, the loss of aquatic biodiversity is becoming an alarming issue. As a key habitat and breeding ground for inland freshwater fish, Shanir Haor in Bangladesh's north-eastern zone harbors a wide variety of fish species. Recent trends in biodiversity loss have emphasized the indispensable need for comprehensive biodiversity research, which is necessary for evaluating the haor ecosystem's present status and assuring its long-term management. The study intends to portray the present scenario of fish biodiversity and fishing practices in the Shanir Haor ecosystem. A total of 78 fish species were found in the study area, with 26 species commonly available, 22 species moderately available, 22 species rarely available, and 8 species very rarely available. The study identified a variety of natural and anthropogenic factors responsible for decline of fish biodiversity. The research will serve as a baseline for future biodiversity conservation and management in Shanir Haor.

Keywords: Shanir Haor, Fish Biodiversity, Haor Ecosystem

Introduction

Bangladesh is endowed with huge and diverse fisheries resources such as rivers, estuaries, *beel*, *haor*, *baor*, floodplains, and a wide ranges of marine water resources (DoF 2018). These diverse water resources support various fish species, allowing the country's total fisheries yield to be accomplished (Shamsuzzaman *et al.* 2017). Bangladesh's inland aquatic ecosystems support a diverse biodiversity, including 258 species of freshwater finfish (IUCN 2016). *Haors* are a swampy wetland habitat in the north-eastern portion of Bangladesh that literally resembles inland seas during monsoon floods. During the monsoon, numerous fish and prawn species come into submerged *haors* from connecting rivers and canals to eat, grow, graze, and spawn. There are 423 large and small *haors* in Bangladesh (Alam *et al.* 2011), covering an area of roughly 8,000 square kilometers and spread across Sylhet division (Sunamganj, Sylhet, Moulvibazar, Habiganj districts), as well as Netrokona and Kishorganj districts. The most significant *haors* are Hakaluki, Tanguar, Dekhar, Shanir, and Hail.

Shanir Haor, situated in Bangladesh's north-eastern zone, is a major ecosystem with a diverse array of fish species and is thought to be a vital breeding and feeding site for inland freshwater fish species. This area also serves as a source of income for small-scale fishermen. During the monsoon season, the whole region floods to around 10,000 ha. During the past century, *haor* wetland habitats have experienced intense human interference, resulting in habitat loss and horrible circumstances of aquatic ecosystems. As a result, several fish species have become critically endangered. Most wild populations in Bangladesh's *haors*, rivers, and streams have drastically reduced as a result of overexploitation exacerbated by numerous environmental changes and loss of natural habitats (Galib *et al.* 2009). The continuing loss of aquatic biodiversity from natural waterbodies is becoming a major issue in Bangladesh (Galib *et al.* 2009 & 2013, Imteazzaman and Galib 2013, Chaki *et al.* 2014, Mohsin *et al.* 2013 & 2014).

Decline of fish biodiversity in inland waterbodies demonstrate the necessity for a thorough survey, which is critical for assessing the current state and ensuring the long-term management of a body of water (Imteazzaman and Galib 2013). Though several studies have been conducted on fish faunal biodiversity in different waterbodies of Bangladesh (Galib *et al.* 2009 & 2013, Imteazzaman and Galib 2013, Ahmed *et al.* 2004, Mohsin *et al.* 2013, Saha and Hossain 2002) to the best of acquaintance of the authors, no research has been conducted on aquatic fish faunal biodiversity of the Shanir Haor, Sunamganj. Shanir Haor is one of the largest *haor* in Sunamganj district and it has great influence on the livelihoods of fishermen and fish diversity. In view of the above facts, the present study was undertaken to analyse the fish diversity in Shanir Haor and the reasons of its decline.

Materials and Methods

Study area: Shanir Haor is located between 25°05'18.9"N -91°07'27.9"E and 25°06'27"N-91°13'33.7"E and 25°04'15.4"N-91°10'51"E. (Fig. 1). The *haor* encompasses 40 villages in three upazilas of Sunamganj district: Tahirpur, Jamalganj, and Bishwamvarpur. The total size of the *haor* is about 8,298 ha. Shanir haor is made up of 20 interconnected small, medium, and big *beels*, canals, rivers, and agriculture areas. Six research locations were chosen from four villages in Tahirpur Upazila, one in Jamalganj Upazila, and one in Bishwamvarpur Upazila. The Shanir Haor has a large number of notable deep and shallow *beel*, which adds to its prominence. These are the names of the 20 *beels*: *Sonatola beel*, *Boro beel*, *Gozaria beel*, *Moranodi*, *Bogiani beel*, *Dhawa beel*, *Koiyar beel*, *Chatarkuna beel*, *Gongania beel*, *Vaitarbondh beel*, *Chatuwarduba beel*, *Sarkarbondher doba*, *Baishar doba*, *Kochma beel*. The *haor* is connected to three rivers: Baulai, Rakti, and Patnai rivers. The *haor* is also linked to various khals. Birnagarer Khal is the most closely linked with it.

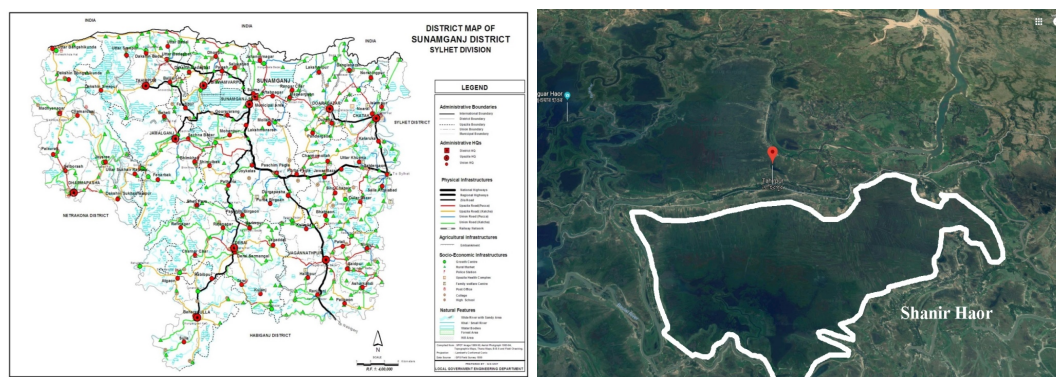


Fig. 1. Map showing the location of the study area (Shanir Haor)

Design and formulation of questionnaire: A semi-structured questionnaire was designed, including questions relating to species availability, critically endangered and endangered fish species abundance seasonal fluctuation, peak harvesting season, and the disappearances of fishes that were largely available in the Shanir Haor in Sunamganj.

Data collection and analysis: Data was gathered during an eight-month period, from May to December 2018. During this period, frequent field trips (twice a month) were performed to gather pertinent data. A total of 128 questionnaire interviews with key stakeholder such as fishermen, aratdars, and merchants were undertaken. At the site of sample collection, the local name, brief notes on the pattern of seasonal availability, location of occurrence, breeding seasons, availability of fishes, fishing equipment used, cause for reduction in biodiversity, and other information were noted. Color, size, and other distinguishing characteristics of the sampled species were also recorded from the fresh fish. Fish species samples were collected and essential information was obtained throughout the research period to document the fish diversity of the Shanir Haor. The fish specimen samples were gathered from fishing spots by fishermen, as well as merchants of fish markets and landing centers. Secondary data such as systematic location, synonyms, fish base name, IUCN Red list status, and so on were also collected. Microsoft Excel was used to tabulate, evaluate, and analyze the acquired data before presenting it graphically (version 2010).

Results and Discussion

Fishers community: About 45% of the families living besides the haor are dependent on the fishing from the Shanir haor for their subsistence. Around 90% are male and 10% are female are involved in fishing in the Shanir Haor. Fishers are divided into three categories according to common practice. They are: i) Professional fishers, who rely on fishing practically year-round for a livelihood; ii) Seasonal fishers, who fish only for a portion of the year as a source of revenue; and iii) Subsistence fishermen, who primarily fish for household consumption.

Fishing seasons: The study region has four distinct seasons for fishing as follows:

- i. Pre-monsoon: This season lasts from April to June. It is the season of the least fish catch. This season's fish catch is at an all-time low.
- ii. Monsoon: It occurs in the months of July, August, and September. Because of the existence of current and high water levels, fishing gear is extensively employed during that season. The season is often referred to as the peak season of fishing.
- iii. Post-monsoon: The season begins in October and lasts until December. Because most fish reproduce in the post-monsoon season, it is a modest peak season for fishing.
- iv. Dry season: This season coincides with the months of January to March. Because the water level is so low during the dry season, fishing performance decreases. Wounding gear is often employed at that time of year.

Status of fish biodiversity: Following the IUCN Red List, the observed fishes were classified as vulnerable (VU), endangered (EN), critically endangered (CR), and near threatened (NO) for the purposes of valuing abundance and biodiversity (IUCN 2016). Based on the fishermen's interviews and recordings, as well as their availability throughout the research period, the fishes

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were further classified and categorized as Commonly Available (CA), Moderately Available (MA), Rarely Available (RA), and Very Rarely Available (VR).

During the study period, a total of 78 fish species were recorded under 27 families, based on the speech of local fishermen as well as direct catch assessment observation and market visits, with 26 species being commonly available, 22 species being moderately available, 22 species being rarely available, and 8 species being found very rarely available in the study area. Table I shows the total number of fishes reported, as well as current status, and IUCN status.

Table I. List of recorded fish species with their status

Sl No	Family	Local name	Common name	Scientific name	Biodiversity Status	IUCN Status
1	Cyprinidae	Tit Punti	Ticto Barb	<i>Puntius ticto</i>	CA	VU
2	Cyprinidae	Teri Punti	One Spot Barb	<i>Puntius terio</i>	CA	NO
3	Cyprinidae	Jat punti	Spot Fin Swamp Barb	<i>Puntius sophore</i>	CA	NO
4	Cyprinidae	Carpio	Common Carp	<i>Cyprinus carpio</i>	CA	EX
5	Cyprinidae	Rohu	Indian major carp	<i>Labeo rohita</i>	CA	NO
6	Cyprinidae	Kalibaush	Black rohu	<i>Labeo calbasu</i>	CA	EN
7	Cyprinidae	Lasso/Lachu	Reba Carp	<i>Cirrhinus reba</i>	MA	VU
8	Cyprinidae	Grass carp	Grass Carp	<i>Ctenopharyngodon idella</i>	MA	EX
9	Cyprinidae	Ghonia	Kuria Labeo	<i>Labeo gonius</i>	MA	EN
10	Cyprinidae	Mrigal	Indian Major Carp	<i>Cirrhinus mrigala</i>	MA	NO
11	Cyprinidae	Darkina	Flaying Barb	<i>Esomus danricus</i>	MA	DD
12	Cyprinidae	Mola	Carplet	<i>Amblypharyngodon mola</i>	MA	NO
13	Cyprinidae	Catla	Indian Major Carp	<i>Catla catla</i>	MA	NO
14	Cyprinidae	Rajpunti	Java barb	<i>Puntius gonionotus</i>	MA	EX
15	Cyprinidae	Bata	Minor Carp	<i>Labeo bata</i>	RA	EN
16	Cyprinidae	Dhela	Cotio	<i>Osteobrama cotio</i>	RA	EN
17	Cyprinidae	Sarpunti	Olive Barb	<i>Puntius sarana</i>	RA	CR
18	Cyprinidae	Chela	Fine scale razor belly minnow	<i>Chela cachius</i>	RA	VU
19	Cyprinidae	Silver Carp	Silver Carp	<i>Hypophthalmichthys molitrix</i>	RA	EX
20	Cyprinidae	Khorsula	Blackline Rasbora	<i>Rasbora daniconius</i>	VR	NO
21	Cyprinidae	Chela punti	Cosuatib Barb	<i>Puntius chola</i>	VR	NO
22	Cyprinidae	Elong	Bengala Barb	<i>Bengala elanga</i>	RA	EN
23	Cyprinidae	Kala bata	Hill-stream Carp Local	<i>Crossocheilus latius</i>	RA	EN
24	Cyprinidae	Fulchela	Finescale Razor belly Minnow	<i>Salmostoma phulo</i>	MA	NO
25	Cyprinidae	Ghora chela	Ghora cela	<i>Securicula gora</i>	CA	NO
26	Siluridae	Modhu Pabda	Butter Catfish	<i>Ompok pabda</i>	CA	EN
27	Siluridae	Kani Pabda	Indian Butter Catfish	<i>Ompok bimaculatus</i>	MA	EN
28	Siluridae	Boal	Freshwater shark	<i>Wallago attu</i>	MA	VU
29	Siluridae	Kalo pabda	Pabo Catfish	<i>Ompok pabo</i>	RA	EN

30	Cobitidae	Gutum	Guntea Loach	<i>Lepidocephalichthys guntea</i>	CA	NO
31	Cobitidae	Rani	Bengal loach	<i>Botio dario</i>	MA	EN
32	Engraulidae	Phasa/ Phaissa	Gangetic Hairfin Anchovy	<i>Setipinna phasa</i>	MA	NO
33	Nandidae	Bheda/ Meni	Mud perch	<i>Nandus nandus</i>	CA	VU
34	Mastacembelidae	Tara baim	Lesser spiny eel	<i>Macrognathus aculeatus</i>	CA	NO
35	Mastacembelidae	Guchi baim	Barred spiny eel	<i>Macrognathus pancalus</i>	CA	NO
36	Mastacembelidae	Baro Baim	Two-track Spiny Eel	<i>Mastacembelus armatus</i>	MA	EN
37	Osphronemidae	Baro khalisha	Striped gourami	<i>Colisa fasciatus</i>	CA	NO
38	Osphronemidae	Choto khalisha	Honey gourami	<i>Colisa chuno</i>	CA	NO
39	Anabantidae	Koi	Climbing perch	<i>Anabas testudineus</i>	CA	NO
40	Ambassidae	Golchand a	Indian glass fish	<i>Parambassis ranga</i>	CA	VU
41	Ambassidae	Lamba Chanda	Elongated Glass Perchlet	<i>Chanda nama</i>	MA	VU
42	Ambassidae	Lal Chanda	Indian Glass Perchlet	<i>Parambassis lala</i>	RA	EN
43	Channidae	Taki	Spotted snakehead	<i>Channa punctatus</i>	CA	NO
44	Channidae	Shol	Snakehead murrel	<i>Channa striatus</i>	CA	NO
45	Channidae	Gozar	Giant snakehead	<i>Channa marulius</i>	MA	EN
46	Channidae	Cheng	Asiatic Snakehead	<i>Channa orientalis</i>	MA	VU
47	Channidae	Pipla Shol	Barca	<i>Channa barca</i>	RA	CR
48	Bagridae	Golsha	Long whiskered catfish	<i>Mystus cavasius</i>	CA	VU
49	Bagridae	Tengra	Striped dwarf catfish	<i>Mystus vittatus</i>	CA	NO
50	Bagridae	Bujuri	Long bled catfish	<i>Mystus tengara</i>	CA	NO
51	Bagridae	Rita	Rita	<i>Rita rita</i>	RA	CR
52	Bagridae	Ayre	Long Whiskered Catfish	<i>Mystus aor</i>	RA	VU
53	Bagridae	Ghagla	Menoda Catfish	<i>Hemibagrus menoda</i>	RA	NO
54	Bagridae	Batasi Tengra	Dwdarf Catfish	<i>Batasio tengana</i>	RA	EN
55	Clariidae	Magur	Walking catfish	<i>Clarias batrachus</i>	CA	NO
56	Heteropneustidae	Shing	Stinging catfish	<i>Heteropneustes fossilis</i>	CA	NO
57	Gobiidae	Bele	Bar eyed goby	<i>Glossogobius giuris</i>	MA	NO
58	Chacidae	Chaikka	Squarehead Catfish	<i>Chaca chaca</i>	RA	EN
59	Notopteriidae	Kanla/Fol i	Bronze Featherback	<i>Notopterus notopterus</i>	MA	VU
60	Notopteriidae	Chital	Indian Featherback	<i>Notopterus chitala</i>	VR	EN
61	Tetraodontidae	Potka	Ocellated Puffer fish	<i>Tetraodon cutcutia</i>	MA	NO
62	Clupeidae	Katchki	Ganges river sprat	<i>Corica soborna</i>	MA	NO
63	Clupeidae	Chapila	Indian River Shad	<i>Gaduasias chapra</i>	RA	NO
64	Clupeidae	Illish	Indian River Shad	<i>Tenulosa ilisha</i>	VR	NO
65	Clupeidae	Khaira/ Chaipla	Indian River Shad	<i>Gudusia chapra</i>	CA	NO
66	Belonidae	Kankila	Fresh water gar fish	<i>Xenentodon cancila</i>	RA	NO

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67	Hemiramphidae	Ekthota	CongaturiHalhbeak	<i>Hyporamphus limbatus</i>	RA	NO
68	Cichlidae	Tilapia	Mozambique Tilapia	<i>Oreochromis mossambicus</i>	RA	EX
69	Schilbeidae	Kajuli/Bashpata	Gangetic Ailia	<i>Alia colia</i>	VR	NO
70	Schilbeidae	Bacha	Batchwa Vacha	<i>Eutropiichthys vacha</i>	VR	CR
71	Schilbeidae	Ghaura	Garua Bacha	<i>Clupisoma garua</i>	VR	CR
72	Sisoridae	Baghair	Dwarf goonch	<i>Bagarius bagarius</i>	RA	CR
73	Sybranchidae	Kuchia	Gangetic Mud Eel	<i>Monopterusuchia</i>	RA	VU
74	Balitoridae	Dari	Scaturigina Loach,	<i>Schistura scaturigina</i>	MA	NO
75	Pangasiidae	Pangus	Pangas	<i>Pangasius pangasius</i>	VR	EX
76	Palaemonidae	Kaloicha	Monsoon river prawn	<i>Macrobrachium malcolmsonii</i>	CA	NO
77	Palaemonidae	Sadaicha	Prawn	<i>Macrobrachium sp.</i>	CA	NO
78	Palaemonidae	Golda	Prawn	<i>Macrobrachium rosenbergii</i>	RA	NO

Commonly Available (CA), Moderately Available (MA), Rarely Available (RA), Very rarely Available (VR)
 CR=Critically endangered, EN=Endangered, VU=Vulnerable, NO=Not threatened, DD=Data deficient and
 EX=Exotic species.

According to the present study, Cyprinidae was the most abundant of the 27 families. Maximum 25 fish species were documented from the Cyprinidae family, which accounts for 32.05% of the total fish population. Bagridae (8.97%) was the second biggest family, with 7 fish species, followed by 5 species of Channidae (6.41%), 4 species of Siluridae (5.13%), 4 species of Clupeidae (5.13%), 3 species of Mastacembelidae (3.85%), 3 species of Ambassidae (3.85%), 3 species of Schilbeidae (3.85%), 3 species of Palaemonidae (3.85%), 2 species of Notopteridae (2.56%), 2 species of Cobidae (2.56%), 2 species of Anabantidae (2.56%) and 1 species of each family were found under Engraulidae, Cichlidae, Sisoridae, Nandidae, Heteropneustidae, Clariidae, Gobiidae, Belonidae, Hemiramphidae, Sybranchidae, Tetraodontidae, Balitoridae, Pangasiidae, Chacidae (Table I). Among the four categories of available fish species, commonly available species account for 34%, moderately available species account for 28% of total reported fish species, rarely available species account for 28%, and very rarely available species account for 10%. (Fig. 2).

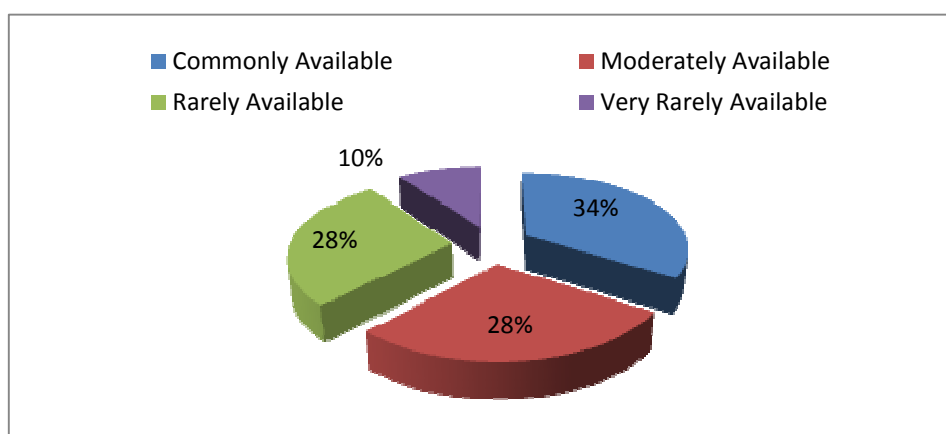


Fig. 2. Percentage of fish biodiversity in the study area.

Rahman *et al.* (2015) discovered a total of 56 fish species from 21 families in the Talma River in northern Bangladesh. Kamrujjaman and Nabi (2015) discovered 48 fish species from 18 families in the Bangshi River in Savar, Bangladesh. Ali *et al.* (2014) discovered a total of 53 fish species in the Chitra River in Bangladesh's southwest. Mohsin *et al.* (2014) found and documented 53 fish species from 28 families in Patuakhali, Bangladesh's Andharmanik River. Galib *et al.* (2013) discovered 63 fish species in the Choto Jamuna river in the Naogaon area. Cyprinidae was discovered to be the top family in the present study, with 25 fish species among the total documented species. Similar Cyprinidae family discoveries have been reported for numerous additional haors in Bangladesh, with varying numbers of species. At the Padma River, Joadder *et al.* (2015) discovered Cyprinidae as the dominant family, with 23 species of fish. Galib (2015) identified the Cyprinidae family as the dominating family on the Brahmaputra River, with 15 species. Chaki *et al.* (2014) identified the Cyprinidae family as the most dominant fish family in Bangladesh's Atrai river, with 18 fish species. Mohsin *et al.* (2013) identified the Cyprinidae family as the most prominent fish family in the Padma river of Bangladesh's Rajshahi district, with 22 species of fish. The major fish species of the Cyprinidae family were clearly distinct in various haors and rivers of Bangladesh owing to geographical variances in those water bodies. According to the analysis of the present fish biodiversity research, a total of 26 fish species were detected and documented as usually available, 22 fish species as moderately available, 22 fish species as rarely available, and 8 fish species as extremely rarely available in the study side. In terms of proportion, commonly available species accounted for 34% of all documented fish species, followed by moderately available species (28%), rarely available species (28%), and extremely rarely available species (8%).

In the Bangshi River, Savar in Bangladesh, Kamrujjaman and Nabi (2015) discovered 29 species (40.42%) of fishes as regionally uncommon, 3 species (6.25%) as extremely common, and 16 species (33.33%) as common. Islam *et al.* (2015b) reported species availability status and found 24 commonly available, 16 moderately available, and 18 rarely obtainable fish species in the wetlands of Bangladesh's Sylhet districts. Islam *et al.* (2015a) identified available (43.86%), less available (29.82 %), less available (18.42 %), and very rare (7.89%) fish species in Bangladesh's Payra River. The quantity and percentage of available fish species discovered in the current study are comparable or somewhat different depending to the geographical location of that water body and the availability of fishes during the study period. Jatpunti was identified as the most abundant fish species among the ten most abundant species in the current assessment of fish biodiversity. Tengra was the second most common species, followed by tit punti, rui, taki, bujuri tengra, kalibas, tarabaim, guchi baim, shol, and sada icha.

Several studies on tiny rivers yielded results that were comparable in several ways. From the Bangshi river in Bangladesh, Kamrujjaman and Nabi (2015) discovered the most dominating species, kalobujuri (*Mystus tengra* and jatputi (*Puntius sophore*). Imteazzaman and Galib (2013) identified jatputi (*Puntius sophore*) as the most prevalent fish species in Bangladesh's Haldi beel. According to Hossain *et al.* (2009), the most abundant fish species in Bangladesh's Chalan beel include jat puti (*Puntius sophore*), tit puti (*Puntius ticto*), chanda (*Chanda nama* and *Parambassis ranga*), chapila (*Gudusia chapra*), and tengra (*Mystus vittatus*). Not Threatened (NO) species account for 47% of available fish species, Endangered (EN) species account for 21%, Vulnerable (VU) species account for 15%, Critically Endangered (CR) species account for 8 %, Exotic (EX) fish species account for 8 %, and Data Deficient (DD) fish species account for 1 % (Fig. 3).

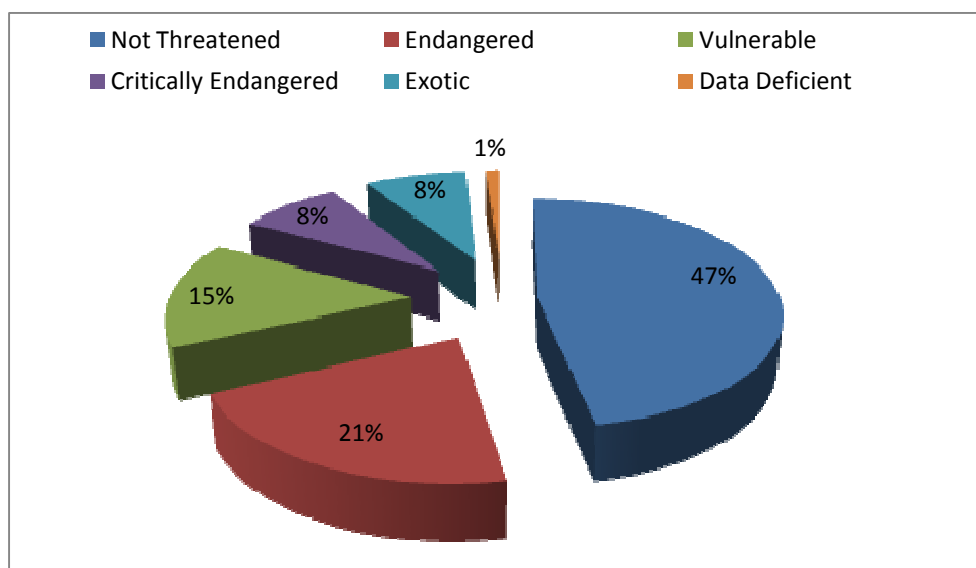


Fig. 3. Percentage of fish according to IUCN status.

During the research period, four species that were available prior to 10 to 20 years ago were documented as extinct (Table II).

Table II. List of extinct fish species of the study area

Sl. No	Family	Local name	English name	Scientific name	Biodiversity status	IUCN status
1.	Cyprinidae	Mohashol, Mohsheer	Tor Mohsheer	<i>Tor tor</i>	ET	CR
2.	Cyprinidae	Ghora Muikha	Pangusia Labeo	<i>Labeo pangusia</i>	ET	EN
3.	Cyprinidae	Nandil	Nandina	<i>Labeo nandina</i>	ET	NT
4.	Anguillidae	Banesshwar, Baneshor	Indian Mottled Eel	<i>Anguilla bengalensis</i>	ET	VU

ET- Extinct, CR=Critically endangered, EN=Endangered, VU=Vulnerable species, NT=Near threatened.

Joadder *et al.* (2015) identified twenty-eight (28) species of fish as threatened by IUCN Bangladesh in the Padma River, categorizing them as vulnerable (13%), endangered (18%), and critically endangered (8%). Kamrujjaman and Nabi (2015) reported 52.08 % threatened species in Bangladesh's Bangshi river, with vulnerable, endangered, and critically endangered species accounting for 20%, 36%, and 44%, respectively. Rahman *et al.* (2015) discovered that 32.14% of fish species were threatened in the Talma River in northern Bangladesh, with 12.5% vulnerable, 16.07% endangered, and 3.57% critically endangered species among the overall threatened fish species. The threatened fish species with their diverse percentages of categories in different small and large rivers of Bangladesh varies somewhat or significantly from the current research owing to a variety of factors.

During the current study's survey with respondents, four fish species— Mohasol (*Tor tor*), Ghora Muikha (*Labeo pangusia*), Baneshor (*Anguilla bengalensis*), and Nandil (*Labeo*

nandina)— were identified and reported as extinct. During 2001-2005, Chakraborty and Mirza (2010) investigated and reported six major commercial aquatic species mohasher (*T. tor*, *T. putitora*), nandil (*L. nandina*), olive barb (*P. sarana*), and reptiles (Bengal roof turtle, Batagur kachuga and Indian eyed turtle, *Morenia petersi*) as extinct species from the Someswari River.

Fishing gears used in the study area: The fishermen in Shanir haor were discovered to be using approximately 12 different kinds of fishing gear (Table III).

Table III. Types of fishing gears used in the Shanir Haor

Sl. No.	Group name	Local name	English name	Material used	Use period	Species caught
1.1	Dragged net	Thela Jal/ Felun	Push net	Net, Nylon rope and bamboo	Before rainy and dry season	Barbs, Indian Glassy Fish, Elongate Glassperhcler, Barred Spiny Eel, Lesser Spiny Eel, etc.
1.2	Dragged net	Tana net	Dragged net	Net, Nylon/Plastic rope and Bamboo	Around the year	Barbs, Large Razorbelly Minnow, Gora-chela, Mola Carplet, Cotio, Indian Glassy Fish, Shrimps, etc.
1.3	Dragged net	Ichar Jal	Dragged net	Nylon net, Nylon rope, Bamboo, 2 pieces of Brikey or Stones and 300 feet long thick rope	Around the year	Mainly Prawn. Other species are Indian Glassy Fish and Elongate Glassperchlet.
2.1	Seine net	Ber Jal	Surrounding net	Nylon or Plastic rope, Nylon net, Floating and Sinkers	Rainy Season	Mola Carplet, Spotted Snakeheads, Tank Goby, Barred Spiny Eel, Rohu, Catla, Mrigal, etc.
2.2	Seine net	Gon Jal	Surrounding net	Nylon net, Nylon rope, Thick rope, Floating, Sinkers (Iron made weight)	July to November	Eels, Loach, Dwarf Gourami, Banded Gourami, Spotted Snakeheads, Stripped Dwarf Catfish, etc.
3.1	Gill net	Current Jal	Current net	Mono-filament synthetic fibre net, Nylon Rope, Floats, Coin shape soil-made Sinkers (weight), Pieces of narrow bamboo poles	Before rainy and dry season	Barb, Kerala Mystus, Stinging Catfish, Climbing Perch, Dwarf Gourami, Banded Gourami, Barred Spiny Eel, Zig-Zag Eel, etc.
3.2	Gill net	Koi Jal/ koiya Jal	Gill net	Mono-filament fibre net, Nylon Rope, Floats, Coin shape soil-made Sinkers (weight), pieces of narrow	Before rainy and dry season	Mostly Climbing Perch. Other species are Dwarf Gourami, Banded Gourami, Pool Barb, Gangetic Leafyfish, Barred Spiny Eel, Zig-zag Eel, Walking Catfish, etc.

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4	Falling net	Koni Jal/ Jhaki Jal	Cast net	Nylon or synthetic rope, Thick Rope, Sinkers (weight)	Around the year	Barb, Kerala Mystus, Mola Carplet, Prawns, Stinging Catfish, Walking Catfish, Dwarf Gourami, Banded Gourami, Barred Spiny Eel, etc
5	Fixed net	Gor Jal	Fixed Set Bag net	Nylon rope, Numbers of Bamboo Pieces, 2 pieces of Bana, Plastic papers and a boat	Around the year	All species which come through the current are caught
6.1	Chip Borshi	Chip Borshi	Hook for Handling	Earthworm, Mussels, Snail, Caterpillar, Spiders, Grasshopper, Bread, Eggs of ants, etc.	July to November	Spotted Snakehead, Barb, Climbing Perch, Kerala Mystus, Snakehead Murrel, Zig-Zag Eel, Orange Fin Labeo, Rohu, Mrigal, etc.
6.2	Daita Borshi	Dati Borshi	Floating Hook	0.4-0.8 inch long	July to November	Spotted Snakehead, Stinging Catfish, Climbing Perch, Snakehead Murrel, Great Snakehead, Walking Catfish.
7	Chai	Chai	One way bamboo trap	Bamboo sticks	November to April	Chingri, Gutum, Tengra, Baim, Puti

Islam *et al.* (2016) performed a study and discovered 11 varieties of fishing nets under 5 primary net groups, with Current jal, Chandi jal under the Gill net group, and Ber jal under the Seine net group being responsible for large-scale catch. Hossain *et al.* (2009) identified and analyzed 11 fishing nets, 9 fish traps, 4 hook and line, 4 wounding gears, and 2 fish aggregating devices from the Chalan beel. The prior recorded research on fishing gears differs more or less or somewhat from the current study due to differences in adoptability, availability of fishing gears, and geographical location of study.

Reasons for decline in fish biodiversity: According to a questionnaire survey and data obtained from fishermen and other individuals living around Shanir Haor, the primary causes for the decline in biodiversity and general availability of fish are:

1. The most indefensible techniques of fishing in Shanir haor had been the harvesting of the last fish, the employment of illegal and damaging gears, and commercial fish yield practice in every year, as well as over-harvesting.
2. Conversely, irresponsible usage and destruction of swamp forests and reeds may have a negative impact on fisheries resources since these ecosystems provide food and shelter to fish and other aquatic species.
3. Water pollution is another concern to faunal variety that might emerge as a result of coal storage and transportation at Tekergat point.
4. Thousands of boats regularly pollute the water during oil spills, hurting the fish population.
5. Biodiversity grade may be compromised after the discontinuation of the active management technique due to a lack of community enthusiasm and structural engagement.

According to the respondents of the survey, blockage of upstream connecting *khals* and *beels* was identified by the maximum respondents (87.5% of the total respondents) as the top most reason of aquatic ecosystem changes of the *haor*. On the other side, use of illegal/destructive fishing gears (chongajal/behundi net) was the second (75.78% of total respondents) most biodiversity degrading factors followed by decreasing water depth, current and increasing siltation (53% of respondents), increasing fisherman and fishing pressure (62.5% of total respondents), catching of juvenile and brood fishes (49% of respondents), use as navigational route resulting fishes were disturbed their breeding and migration purposes (27% respondents), bottom fishing by illegal gears (Ber jal) that damage bottom and surrounding habitat (33% respondents) and high rate of current jal (17% of the total respondents) were recorded from the study area as the factors of fish habitat change.

According to Islam *et al.* (2015a), the negative trend includes overfishing, indiscriminate fishing of larvae and juveniles, siltation, and pollution in the Payra River, Patuakhali. The findings clearly represent falling patterns in fish variety in the study area, forewarning of Bangladesh's steady decline of fish diversity. According to Pandit *et al.* (2015b), the fish variety of the Soma Nadi jalmohal has been steadily reducing owing to both man-made and natural factors such as dewatering, sedimentation, overfishing, use of illegal fishing gear, capture of brood fishes, and so on. Rahman *et al.* (2015) investigated and discovered that the Talma River's fish biodiversity is declining day by day owing to overfishing, natural reasons (such as siltation, floods, drought, and disasters), the installation of barriers to fish movement, and a lack of public awareness. As main risks to the Ichanoi beel of Gaibandha, Bangladesh, Akhtaruzzaman and Alam (2014) highlighted different fish biodiversity diminishing causes—excessive use of fertilizer and pesticides, overfishing, and climate change impacts. According to Rahman *et al.* (2012), major threats to fish biodiversity include habitat destruction and fragmentation, water pollution, indiscriminate harvesting of fry and fingerlings, construction of barrages, construction of embankments, and sedimentation from Bangladesh's Padma distributaries of the Ganges river. The Shanir Haor ecosystem plays a vital role in sustaining the biodiversity of fish fauna and contribute to the economic development of the country through fish production. To overcome these issues, the restoration and improvement of fishery habitats should be prioritized. Existing laws and regulations should be strictly enforced in order to improve biodiversity and fisherman's living conditions.

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