



## Research Article

### PRESENT STATUS OF FISH BIODIVERSITY AND FACTOR AFFECTING THE BIODIVERSITY OF BANGALI RIVER IN GAIBANDHA OF BANGLADESH

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#### Abstract

Fish diversity in Bangladesh's major rivers is declining, but the lack of comprehensive research means their current status remains largely undocumented. This study addressed the issue in the Bangali River using a pre-tested questionnaire, direct catch assessments, and interviews with fishers, traders, locals, and the upazila fisheries officer. A total of 49 fish and prawn species were documented, belonging to 10 orders and 17 families. Cypriniformes, Siluriformes, and Perciformes emerged as the most prominent orders, accounting for 40.81%, 22.45%, and 14.28% of the total fish population in the Bangali River, respectively. Among the families, Cyprinidae (38.78%) was identified as the most dominant, followed by Bagridae (10.20%), Cobitidae, and Ambassidae (6.12%). These results demonstrate that the Bangali River is a highly valuable inland open waterbody, potentially serving as a vital fishery and gene bank. Therefore, it is imperative to implement conservation measures to safeguard this invaluable resource. Manmade activities like overfishing, use of pesticides, operation of illegal gear and natural causes such as climate change and drought are accelerating biodiversity degradation in the Bangali River. Furthermore, adopting ecosystem-based fisheries management strategies with active involvement from local communities is strongly recommended to ensure the sustainability of these water bodies.

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#### Introduction

Bangladesh, located in the floodplain delta of the Brahmaputra, Ganges, and Meghna rivers, possesses a highly diverse and productive inland aquatic ecosystem supported by vast water resources and a wide range of fish species. The country is one of the leading fish-producing nations in the world, with a total production of 4.5 million metric tons (MT) during 2019–20, as reported by the Department of Fisheries (DoF, 2022). Bangladesh has approximately 6.7 million hectares of inland water bodies, where fisheries are predominantly open water capture fisheries, accounting for 94% of the total production, while closed water aquaculture contributes the remaining 6%. According to the Food and Agriculture Organization, Bangladesh ranks as the third highest producer of inland open water capture fisheries globally (FAO, 2020). Fish production in the country relies heavily on inland water bodies such as rivers, estuaries, forest

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water resources of the Sundarbans, beels, Kaptai Lake, floodplains, and haors (marshy wetlands). These diverse aquatic habitats support rich fish assemblages, including nearly 260 native freshwater fish species (DoF, 2022).

In recent years, however, fish biodiversity has faced multiple challenges arising from natural and anthropogenic factors (Pramanik et al., 2017). On the positive side, conservation initiatives and habitat restoration efforts have contributed to the recovery of certain fish populations and the protection of critical habitats (Rahman et al., 2009).

Assessing fish biodiversity in river ecosystems is crucial for understanding ecological health, ensuring sustainable fisheries management, and conserving aquatic resources. Rivers function as dynamic ecological corridors that support complex food webs, genetic connectivity among populations, and essential ecosystem services such as nutrient cycling and livelihood support. Biodiversity assessments provide baseline information on species composition, abundance, and conservation status, enabling the detection of population declines, habitat degradation, and emerging threats (Hriody et al., 2021, 2025a). Such studies are particularly important in data-deficient regions like Bangladesh, where many river systems remain poorly documented despite rapid environmental change. Accurate biodiversity information supports evidence-based management, contributes to national conservation planning, and aids in evaluating progress toward biodiversity targets and sustainable development goals. Therefore, documenting the current status of fish diversity in rivers like the Bangali River is essential for informed conservation actions and long-term ecosystem resilience.

Despite these efforts, fish biodiversity continues to face serious threats. Many fish populations are declining due to habitat destruction, pollution, climate change, overfishing, and the introduction of invasive species. The severity of these impacts varies across regions, with some areas experiencing greater biodiversity loss than others (Rahman et al., 2015). Human-driven factors like deforestation, urbanization, and dam construction are destroying and fragmenting habitats, pollution from agricultural runoff, industrial effluents, and improper waste disposal introduces toxic substances and excess nutrients into aquatic systems, degrading water quality and disrupting ecological balance (Saha et al., 2007; Hridoy et al., 2024)). Climate change further intensifies these threats by altering water temperature and chemistry, influencing fish physiology, reproductive cycles, and feeding behavior, and causing shifts in species distribution that may lead to local extinctions and the spread of invasive species (Siddique et al., 2016). Unsustainable fishing practices, including overfishing and destructive methods, reduce fish stocks and disturb trophic relationships, while bycatch leads to the unintended loss of non-target species, further threatening biodiversity (Islam, 2017).

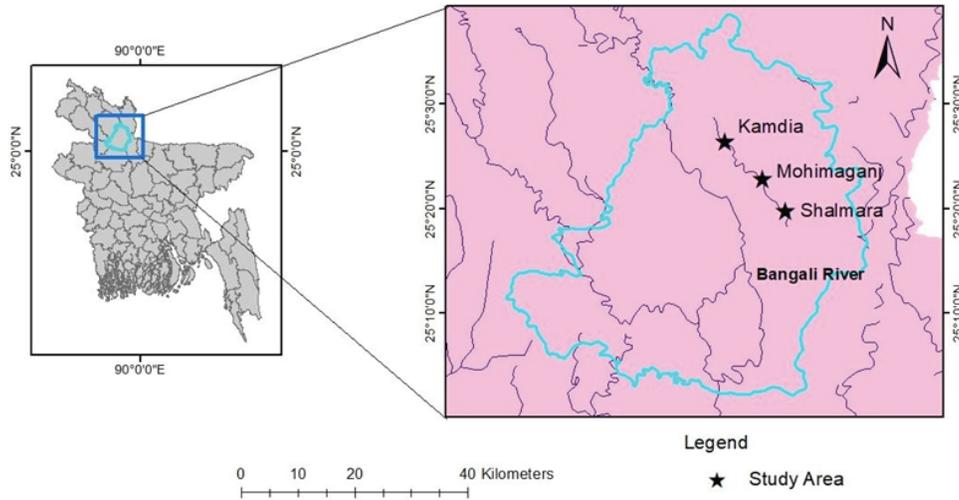
The Bangali River, flowing through the Gaibandha district of Bangladesh, is an important freshwater ecosystem that supports local livelihoods and contributes significantly to regional fish biodiversity. The present status of fish biodiversity in the Bangali River reflects a complex interaction of natural processes and human-induced pressures (Rahman et al., 2012). Historically, the river was known for its rich fish fauna, including economically important groups such as carps (Cyprinidae), catfishes (Siluridae), snakeheads (Channidae), and featherbacks (Notopteridae), which have long served as crucial sources of protein and income for local populations.

Addressing fish biodiversity challenges in the Bangali River requires joint efforts from government agencies, conservation groups, and local communities, along with sustainable fishing practices such as mesh-size regulation, size limits, and seasonal bans. This study evaluates the current status of fish diversity and identifies the key factors affecting biodiversity in this important freshwater ecosystem.

## Materials and Methods

### *Study Area*

The Bangali River is a river in Gaibandha, Bogura and Sirajgonj districts in northwestern Bangladesh, possesses coordinates 25.178689°N and 89.460016°E. It's length 183 km with an average width of 143 m, flows through Gaibandha, Bogura, and Sirajganj districts in northwestern Bangladesh (Figure 1). Originating as a distributary of the Teesta, it follows multiple branching paths- first as the Ghaghot River, then dividing and reconnecting with major rivers such as the Karatoa and Jamuna- while the present study focuses on a 22 km stretch of this dynamic river system.



**Figure 1.** Study area.

### *Identification of target group*

A total of 67 fishermen, 18 fish merchants, 9 distributors, and 6 community leaders, each with substantial knowledge of the Bangali River's biodiversity, were randomly selected for questionnaire interviews, ensuring comprehensive representation of those involved in fishing and related activities within the study area.

### *Preparation of questionnaire*

The questionnaire played a crucial role in meeting the study's objectives and was first developed and pre-tested in the study area to identify additional relevant information. Based on the pretest, it was revised and organized logically to guide fishermen through step-by-step responses, covering topics such as changes in fish biodiversity, commonly available species, seasonal availability, fishing gear used, and factors affecting fish habitats.

### *Collection of data*

The research was conducted for one year at three key fishing and landing sites using both primary and secondary data. Primary data were collected from fishermen and fish traders through 67 questionnaire interviews (QI), 6 focus group discussions (FGD), and 2 key informant interviews (KII), while secondary data were obtained from Upazila Fisheries Offices of Gobindaganj and Saghata and various literature sources.

*Siddque et al. (2025)*

### ***Collection and identification of collected fish samples***

During the fishing survey, samples were collected from landing stations and fishermen using various local gears such as seine nets, gill nets, cast nets, hooks, and traps. Fish were sorted by physical characteristics, and species difficult to identify on-site were preserved in 5–10% buffered formalin and transported to the laboratory of Aquatic Resource Management Department at Sylhet Agricultural University in Sylhet. In the laboratory, the fish specimens were identified by examining their morphometric measurements, meristic features, and coloration, following the guidelines outlined by IUCN Bangladesh (2015).

### ***Questionnaire Based Interview***

Throughout the research period, a combined total of 63 anglers, 8 suppliers, and 16 fish merchants were chosen at random for questionnaire surveys from various villages and five fish markets adjacent to the study region. The questionnaire surveys were conducted in households, while fishing in the river, at the fish landing dock along the river, and at market locations, as per the availability of the fishermen, suppliers, and fish traders.

### ***Focus Group Discussion (FGD)***

FGD refers to purposeful gatherings of small clusters (6-8) of individuals, typically sharing a common occupation or belonging to a similar community segment. In diverse locations, a grand total of 6 FGD sessions were conducted. Each FGD session comprised participants who were individuals engaged in fishing, spanning across various age brackets, encompassing youthful, mature, and elderly individuals.

### ***Cross Checking of Information with Key Informants***

After gathering the data using QI (questionnaire interviews) and FGD (focus group discussion), it is crucial to validate and support the collected information. The validation interviews were led by important individuals such as Upazila Fisheries Officer (UFO) and community leaders. The KIIs with the participants took place in their respective offices during regular working hours.

### ***Key Stakeholders and their Roles in the Study***

A total of 100 participants, including fishermen, traders, local leaders, housewives, and UFO representatives, took part in the study, with fishermen's livelihoods largely dependent on the Bangali River. Five local leaders were selected for FGDs and QIs, while UFO officials, responsible for enforcing fishing regulations and conserving fish biodiversity, were also interviewed to understand their roles in supporting sustainable fish production.

## **Results**

### ***Fish Biodiversity Status***

This investigation documented a total of 49 aquatic organisms present in the Bangali River, encompassing 10 distinct orders and 17 families (Table 1). Due to the absence of prior research on the fish diversity of this river, it is not feasible to draw comparisons with previous studies. Nevertheless, this current examination will establish a fundamental reference point for any forthcoming evaluations of the fish community in this river.

**Table 1.** Biodiversity status of the fish species of the Bangali River

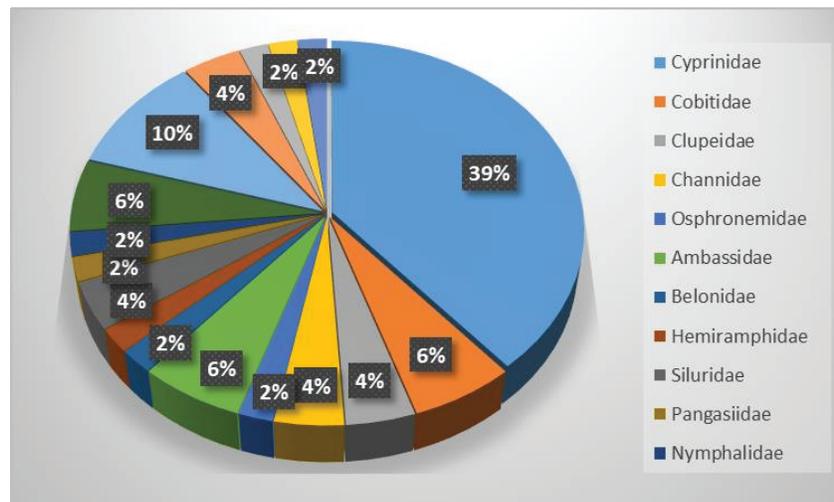
Order	Family	Scientific name	English name	Local name	Present status	Conservation status	
						IUCN	Global BD
Cypriniformes	Cyprinidae	<i>Labeo rohita</i>	Rohu	Rui	CA	LC	LC
Cypriniformes	Cyprinidae	<i>Catla Catla</i>	South asian carp	Catla	LA	LC	NE
Cypriniformes	Cyprinidae	<i>Cirrhinus cirrhosus</i>	Mrigal carp	Mrigel	LA	NT	VU
Cypriniformes	Cyprinidae	<i>Cirrhinus reba</i>	Reba carp	Lachu	LA	NT	LC
Cypriniformes	Cyprinidae	<i>Labeo calbasu</i>	Orange fin labeo	Kalibaus	CA	LC	LC
Cypriniformes	Cyprinidae	<i>Cyprinus carpio</i>	Common carp	Carpio	LA	CR	VU
Cypriniformes	Cyprinidae	<i>Hypophthalmichthys molitrix</i>	Freshwater cyprinid fish	Silver carp	RA	LC	NT
Cypriniformes	Cyprinidae	<i>Ctenopharyngodon idella</i>	Ray-finned fishes	Grass carp	RA	NT	NE
Cypriniformes		<i>Lepidocephalichthys guntea</i>	Guntea loach	Gutum	MA	LC	LC
					MA	VU	LC
Clupeiformes	Clupeidae	<i>Gudusia chapra</i>	Indian river shad	Chapila			
Clupeiformes	Clupeidae	<i>Corica soborna</i>	The Ganges river	Kachki	MA	LC	LC
Perciformes	Channidae	<i>Channa marulius</i>	Giant snakehead	Gozar	RA	EN	LC
Perciformes	Channidae	<i>Channa striatus</i>	Snakehead murrel	Shol	RA	LC	LC
Perciformes	Cobitidae	<i>Botia dario</i>	Bengal loach	Bou Rani	RA	EN	LC
Perciformes	Cobitidae	<i>Botia dayi</i>	Botya loach	Maitta Rani	RA	EN	NE
Anabantiformes	Osphronemidae	<i>Trichogaster fasciata</i>	Banded gourami	Baro kholisha	MA	CR	LC
Perciformes	Ambassidae	<i>Polyura delphis</i>	Ewelled nawab	Chanda	MA	EN	NE
Perciformes	Ambassidae	<i>Chanda nama</i>	glass perchlet	Lamba chanda	MA	LC	LC
Cypriniformes	Cobitidae	<i>Lepidocephalichthys guntea</i>	Guntea loach	Gutum	MA	LC	LC
Clupeiformes	Clupeidae	<i>Gudusia chapra</i>	Indian river shad	Chapila	MA	VU	LC
Clupeiformes	Clupeidae	<i>Corica soborna</i>	The Ganges river sprat	Kachki	MA	LC	LC
Perciformes	Channidae	<i>Channa marulius</i>	Giant snakehead	Gozar	RA	EN	LC
Perciformes	Channidae	<i>Channa striatus</i>	Snakehead murrel	Shol	RA	LC	LC
Perciformes	Cobitidae	<i>Botia dario</i>	Bengal loach	Bou Rani	RA	EN	LC
Perciformes	Cobitidae	<i>Botia dayi</i>	Botya loach	Maitta Rani	RA	EN	NE
Anabantiformes	Osphronemidae	<i>Trichogaster fasciata</i>	Banded gourami	Baro kholisha	MA	CR	LC
Perciformes	Ambassidae	<i>Polyura delphis</i>	Ewelled nawab	Chanda	MA	EN	NE
Perciformes	Ambassidae	<i>Chanda nama</i>	Elongate glass perchlet	Lamba chanda	MA	LC	LC
Perciformes	Ambassidae	<i>Pseudambassis lala</i>	Highfin glassy perched	Lal chanda	MA	LC	LC
Beloniformes	Belonidae	<i>Xenentodon cancila</i>	Freshwater garfish	Kankila	MA	LC	LC
Beloniformes	Hemiramphidae	<i>Hyporhamphus limbatus</i>	Congaturi halfbeak	Ekthutia	RA	LC	LC
Siluriformes	Siluridae	<i>Wallago attu</i>	Freshwater shark	Boal	CA	VU	VU
Siluriformes	Siluridae	<i>Ompok pabo</i>	Pabo catfish	Pabda	RA	CR	NT

Siluriformes	Pangasiidae	<i>Pangasius pangasius</i>	Pungas catfish	Deshi pangus	LA	EN	LC
Lepidoptera	Nymphalidae	<i>Neptis jumbah</i>	Chestnut-streaked sailer	Batashi	MA	LC	NE
Siluriformes	Schilbeidae	<i>Eutropiichthys vacha</i>	Batchwa vacha	Bacha	MA	LC	LC
Siluriformes	Schilbeidae	<i>Ailia coila</i>	Gangetic ailia	Kajuli	MA	LC	NT
Siluriformes	Schilbeidae	<i>Clupisoma garua</i>	Garua bacha	Gaura	RA	EN	NE
Siluriformes	Bagridae	<i>Sperata aor</i>	Long-whiskered catfish	Air	MA	VU	LC
Siluriformes	Bagridae	<i>Sperata seenghala</i>		Baga ayre	RA	CR	NT
Siluriformes	Bagridae	<i>Mystus bleekeri</i>	Bleeker's mystus	Gulsha tengra	MA	LC	LC
Siluriformes	Bagridae	<i>Mystus vittatus</i>	Asian striped catfish	Tengra	MA	LC	LC
Siluriformes	Bagridae	<i>Rita rita</i>	Rita	Rita	MA	EN	LC
Synbranchiformes	Mastacembelidae	<i>Mastacembelus pancalus</i>	Striped spiny eel	Guchi baim	MA	LC	LC
Synbranchiformes	Mastacembelidae	<i>Mastacembelus armatus</i>	Tire-track spinyeel	Baim	MA	EN	NE
Synbranchiformes	Synbranchidae	<i>Monopterusuchia</i>	Gangetic muddee	Kuchia	MA	LC	VU
Osteoglossiformes	Notopteridae	<i>Notopterus notopterus</i>	Bronze featherback	Foli	LA	VU	LC
Tetraodontiformes	Tetraodontidae	<i>Leiodon cutcutia</i>	Ocellated puffer fish	Potka	LA	LC	LC

**Note:** LC – Least concern, NT – Near threatened, NE – Not evaluated, DD – Data deficient, VU – Vulnerable, EN – Endangered, and CR – Critically endangered (IUCN Bangladesh, 2015); AA – Abundantly available, CA – Commonly available, MA – Moderately available, RA – Rarely available

### Fish Species Assemblage

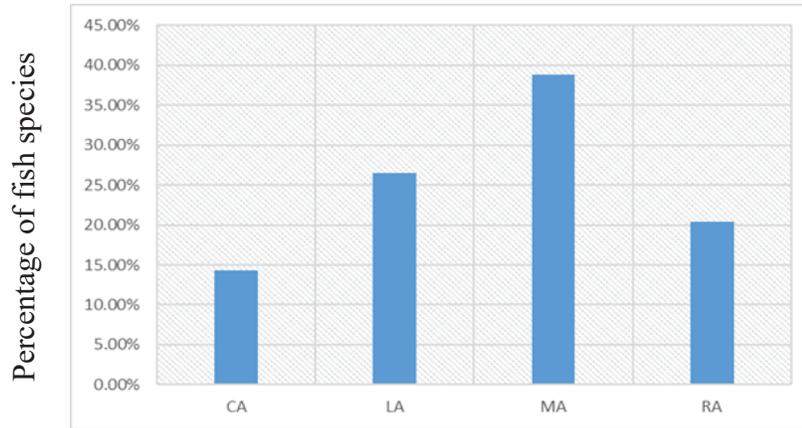
Cypriniformes, Siluriformes, and Perciformes were the dominant orders in the Bangali River, contributing 40.82%, 22.45%, and 14.28% of the fish population, respectively, while the remaining seven orders collectively accounted for a smaller proportion. Overall, 49 fish species from 17 families were recorded over one year, with Cyprinidae being the most dominant family (19 species; 38.78%), followed by Bagridae (5 species; 10.20%); Cobitidae, Ambassidae, and Schilbeidae (each 3 species; 6.12%); Mastacembelidae, Clupeidae, Channidae, and Siluridae (each 2 species; 4.08%); and eight other families represented by a single species each (2.04%) (Figure 2).



**Figure 2.** Composition of fish species available in the Bangali River under different families.

**Availability status**

In the current study, fish species categorized into four distinct tiers based on their availability. Commonly available (CA), comprising 14.28% of the total recorded species followed by less available 26.53%, moderately available 38.78% and rarely available 20.41% (Figure 3).

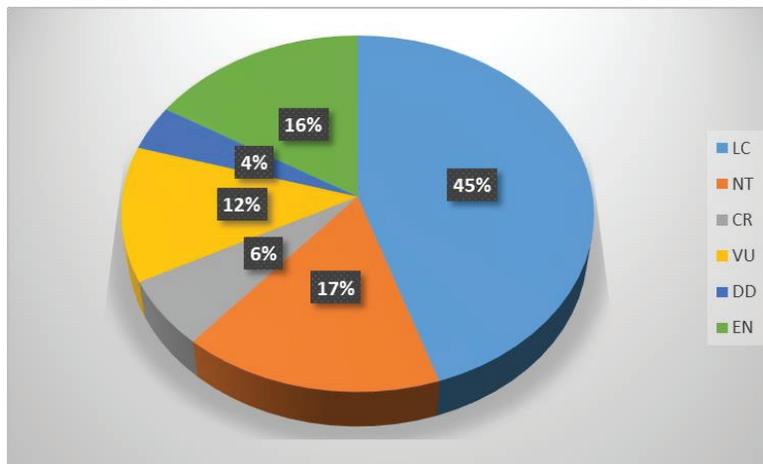


Availability status of fish species

**Figure 3.** Availability status of fish species available in the Bangali River.

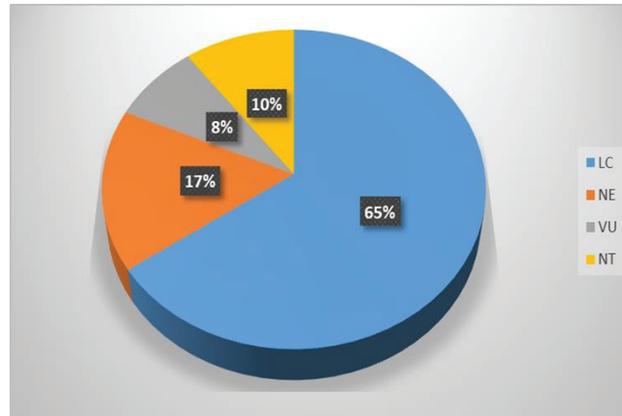
**IUCN Bangladesh Conservation Status**

In terms of percentages, out of the 49 fish species in the Bangali River, 44.90% are LC, 16.33% NT, 16.33% EN, 12.24% VU, 6.12% CR, and 4.08% DD (Figure 4).



**Figure 4.** IUCN Bangladesh conservation status of the recorded fish species (IUCN Bangladesh, 2015).

Among the total of 49 fish species, the largest proportion is accounted for by the category of species with 65.3% are LC, 16.33% NE, 10.2% NT, and 8.16% VU (Figure 5).



**Figure 5.** Global conservation status of the recorded fish species (IUCN Bangladesh, 2015).

### *Fishing Gears Used in the Study Area*

During the study period, the Bangali River supports eight types of fishing gear, classified into three groups, varying in design, length, and mesh size based on season, fish population, and water depth. These fishing gears are:

- Nets
- Traps and
- Hooks and lines.

**Table 2.** Fishing gears categories

Category	Types of gear	Name of gear	Mesh size (cm)	Target species	Period (Month)
Fish net	Push net	Thela jal	0.25-1	Kholisha, punti, taki, guchi baim, boro Baim, veda, bele, tara baim	Year round
	Cast net	Jhaki jal	0.5-1	punti, taki, gulsa tengra, veda, bele, tara baim, boro baim, guchi baim, rita, gutum	February to September
	Gill net	Current jal	0.5-2.5	Punti, tengra, taki, veda, gulsa tengra, guchi baim, boro baim, rui, calibaus	Year round
	Lift net	Dharma jal	0.5-1	Punti, bata, mola, guchi baim, gutum, bele, taki, tengra, kholisha, boal, kakila	August to November
	Drift gill net	Chandi Jal	3.5-4.5	Sorpunti, bata, veda, boro baim, shol, foli	
	Shine net	Ber jal	0.25-1	Boal, air, calibaus, rui, rita, bou rani, gutum, mola, guchi baim, boro baim, kakila, chanda, boro kholisha, potka etc	December
Fish trap	Fish trap	Dhoar	-	Mola, punti, bele, chingri, ghuchi baim	April to August
Hook	-	Ship borshi	-	Boal, air, boro baim, rui, calbaus, rita	August to October

**People’s Perception of Declining Fish Catch and Environmental Change**

Fishermen in the Bangali River face seasonal fish shortages, poorly targeted regulations, and illegal fishing, threatening their livelihoods. They urge leniency for small-scale fishers, stricter enforcement against large-scale illegal fishing, and stronger regulations to protect stocks. Government-established fish sanctuaries, supported by NGOs like World Fish, have boosted fish populations and community governance, with calls for expansion. However, such support remains limited to a few communities, leaving most without crucial assistance.

**Factors affecting biodiversity of the Bangali River**

**Manmade causes:** Survey respondents identified several manmade causes affecting aquatic ecosystems, with overfishing (78%), fishing by dewatering (71.7%), and the use of illegal or destructive gear (69.9%) as major concerns. Other factors included uncontrolled agricultural chemicals (51.6%), water abstraction for irrigation (38.3%), and developmental infrastructure (18.6%), highlighting the broad human impact on fish populations and habitats.

**Table 3. Manmade causes of affecting biodiversity of the Bangali River**

Manmade Causes	Percentage of respondents
Overfishing	78.00%
Fishing by dewatering	71.70%
Use of illegal/destructive fishing gears	69.90%
Uncontrolled use of pesticides, insecticides and chemical fertilizers on agricultural lands	51.60%
Water abstraction for irrigation	38.30%
Construction of developmental infrastructure	18.60%

**Overfishing:** Overfishing, reported by 78% of respondents, has severely depleted fish stocks in the Bangali River, driven by commercial and local fishing pressures, illegal techniques, and weak regulations. This decline threatens biodiversity, disrupts ecosystem balance, and jeopardizes the livelihoods of thousands of fishing communities.

**Fishing by dewatering:** Fishing by dewatering, noted by 71.7% of respondents, involves creating temporary barriers to trap water and catch fish as river levels drop during the dry season. This traditional, skillful method provides sustenance, supports livelihoods, and reflects the local community’s resourcefulness and seasonal connection to the river.

**Use of illegal/destructive fishing gears:** About 69.9% of respondents highlighted that illegal and destructive fishing methods, such as blast fishing, electrofishing, and fine mesh nets—deplete fish stocks, harm aquatic habitats, and threaten livelihoods. Despite regulations, weak enforcement and poverty-driven reliance on these practices exacerbate ecological damage.

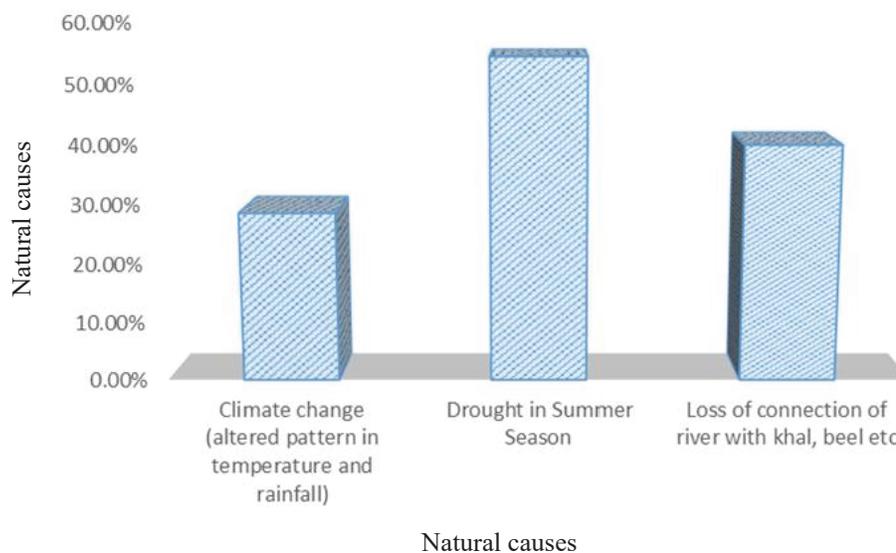
**Uncontrolled use of pesticides, insecticides, and chemical fertilizers on agricultural lands:** Over half of respondents (51.6%) highlighted that uncontrolled use of pesticides, insecticides, and chemical fertilizers threatens fish biodiversity by contaminating waterways, disrupting reproduction, and causing eutrophication. These practices degrade water quality, create oxygen-depleted zones, and harm aquatic ecosystems, underscoring the need for sustainable agriculture and stricter chemical regulations.

**Water abstraction for irrigation:** About 38.3% of respondents noted that water abstraction for irrigation disrupts river flow, reduces water levels, and destroys aquatic habitats, threatening fish and other dependent species (Hridoy et al., 2025b,c). Sustainable water management, regulated abstraction, and habitat protection are essential to preserve biodiversity in the Bangali River.

**Construction of developmental infrastructure:** The acknowledgment by 18.60% of respondents that the construction of developmental infrastructure contributes to environmental challenges suggests recognition of the potential disruption caused by projects such as dams or ports. They noted that developmental infrastructure, such as dams, bridges, and urban projects, disrupts fish biodiversity by fragmenting habitats, altering water flows, and degrading water quality. Mitigation through ecological planning, habitat restoration, fish passages, and stakeholder collaboration is essential to balance development with conservation.

**Natural causes:** A recent survey revealed key environmental concerns: 28.5% noted climate change impacts on temperature and rainfall, 54.3% were worried about summer droughts, and 39.9% highlighted disconnection between rivers and local water bodies like *khal* and *beel* (Figure 6). These findings underscore the urgent need to address climate change, water scarcity, and ecosystem disruptions.

Collectively, these survey findings emphasize the complex challenges posed by climate change, drought, and disruptions to water systems, prompting a call for proactive measures to address these pressing environmental issues.



**Figure 6.** Natural causes of affecting biodiversity of the Bangali River.

**Climate Change:** Approximately 28.50% of respondents identified climate change, characterized by altered patterns in temperature and rainfall, as a significant force shaping their environment. The warming of the planet is altering river ecosystems in various ways, disrupting the delicate balance that sustains aquatic life. One of the most immediate consequences of climate change in rivers is the alteration of water temperature. Moreover, warmer waters can also increase the prevalence of diseases and parasites, further weakening fish populations. Climate change also exacerbates other environmental stressors, such as pollution and habitat destruction, which further degrade fish habitats.

**Drought in Summer Season:** Over 54% of respondents cited summer droughts as a major concern, which lower river levels, reduce flow, and raise water temperatures. These conditions shrink fish habitats, increase stress and disease, lower oxygen levels, and disrupt reproduction, leading to declining fish biodiversity. Water conservation and habitat restoration are essential to protect Bangali River fisheries.

**Loss of Connection of River with Khal, Beel:** A substantial 39.9% of respondents noted the disconnection between rivers and local water bodies like *khal* and *beel*, which serve as crucial fish breeding and migration sites. Urbanization, agriculture, and pollution disrupt these links, altering water flow and quality, leading to declining fish populations and biodiversity loss. Changes in water quality and quantity disrupt the delicate balance of aquatic ecosystems, making survival challenging for many fish species.

## **Discussion**

### ***Fish Biodiversity Status***

The current study documented 49 aquatic organisms in the Bangali River, spanning 10 different orders and 17 families. Arefin et al. (2018) surveyed the Rupsa River and found 62 fish species within 23 groups. Similarly, Islam et al. (2019) examined the Juri River, identifying 75 fish species across 25 families. Sultana et al. (2018) reported 62 fish species from the Banar River, classified into 10 orders and 24 families. Talukder et al. (2021) researched the Shari-Goyain River and documented 66 fish species. Rahman et al. (2019) studied the Basuakhali Beel, discovering 38 fish species, including 34 native and 4 exotic species, within 21 families and 10 orders. Joadder et al. (2015) explored the Padma River, uncovering a diverse array of 71 fish species grouped into 10 orders, 26 families, and 54 genera. Siddique et al. (2016) conducted a thorough assessment, identifying 78 fish species categorized into 10 orders and 26 families. Confirmed 83 fish species across 28 families and 10 orders. Finally, Aziz et al. (2021) investigated the Hakaluki Haor, reporting 63 distinct fish species, consistent with the present findings.

### ***Fish Species Assemblage***

The Cypriniformes, Siluriformes, and Perciformes are the most prevalent orders among the ten recognized ones in the Bangali River, representing 40.82%, 22.45%, and 14.28% of the fish population, respectively. These findings are consistent with multiple studies that have highlighted the dominance of these orders in Bangladesh's freshwater ecosystems (Galib et al., 2015; Hanif et al., 2016; 2020; Akter et al., 2020; Hossain et al., 2016; 2015; Rahman, 2005; Talukder et al., 2021 and Sultana et al. (2019) conducted an extensive analysis of fish and prawn species in Bhawal Beel, noting Cypriniformes (33.93%), Siluriformes (21.43%), and Perciformes (19.65%) as the prominent orders. Similarly, Rahman et al. (2019) observed Cypriniformes (31.58%) as the most dominant order, followed by Perciformes (18.42%), Siluriformes, and Channiformes (10.53%) in Basuakhali Beel, supporting the current findings. Out of the 49 recorded fish species, 19 belong to the Cyprinidae family, making up a significant 38.78% of the total fish population. The Bagridae family, representing 10.20%, emerged as the second most prominent family, hosting five fish species. Joadder et al.

*Siddque et al. (2025)*

(2015); Lima et al., 2025 and Mohsin et al. (2013) consistently observed Cyprinidae as the predominant family in rivers such as the Brahmaputra and Padma Rivers. Rahman (2005) found Cyprinidae to be the most abundant among all freshwater fish families. Sultana et al. (2019) documented Cyprinidae as the dominant family, with 17 species from Bhawal Beel. Islam et al. (2019) reported that Cyprinidae constituted 27% of the entire fish population in the Juri River, closely aligning with the current findings.

### ***IUCN Bangladesh Conservation Status of the Recorded Fish Species***

The distribution of fish species across various threat categories, as defined by the IUCN, indicates that nearly 44.90% are classified as Least Concern (LC), while approximately 16.33% fall under Near Threatened (NT) and an equivalent percentage are classified as Endangered (EN). Vulnerable (VU) species make up around 12.24%, Critically Endangered (CR) species account for approximately 6.12%, and the remaining 4.08% are categorized as Data Deficient (DD). In a study by Islam et al. (2019) focusing on the Juri River, 19 fish species were identified as at risk, with 10 classified as vulnerable, 8 as endangered, and 1 as critically endangered. Similarly, in Hakaluki Haor, Iqbal et al. (2015) documented 41 threatened fish species, including 12 vulnerable, 18 endangered, and 11 critically endangered. Sultana et al. (2019) observed 13 species in a vulnerable state in Bhawal Beel, with 1 considered critically endangered, 5 endangered, and 7 vulnerable. These findings reinforce the urgent need for conservation efforts in these ecosystems.

### ***Factors Affecting Fish Biodiversity of the Bangali River***

Drying the wetlands, torrential downpours, excessive fishing, sedimentation, utilization of destructive equipment, fluctuations in temperature, and the application of urea fertilizer for fish farming all exert a devastating impact on the entire fish population in Hakaluki Haor located in northeastern Bangladesh (Aziz et al., 2021). Rahman et al. (2019) have identified similar factors contributing to the decline in fish biodiversity. The fringes of the wetlands have been transformed into agricultural fields, an ongoing process in the area (Roy et al., 2022). Sediment accumulation in water bodies particularly leads to the loss and degradation of aquatic habitats (Craig et al., 2004). Recent research indicates that climate change has potential ramifications worldwide, resulting in diminished abundance and altered species composition in habitats (Ashley et al., 2007).

### **Conclusion**

The present study represents the first comprehensive exploration of fish species diversity in the Bangali River, aiming to document all indigenous and non-indigenous fish and prawn species inhabiting the system. The observed diversity reflects a biologically healthy and productive fish community that warrants urgent conservation attention. However, both anthropogenic pressures and natural disturbances pose significant threats to this biodiversity, emphasizing the need for immediate and well-coordinated management interventions. Based on the findings, the study highlights the importance of protecting critical habitats such as spawning and breeding grounds, enforcing effective fishing regulations, improving water quality management, and promoting scientifically guided restocking programs. Engaging local communities, promoting sustainable aquaculture, continuous research, and ecosystem-centered, climate-adaptive management are essential to conserve fish biodiversity and sustain the Bangali River.

### **References**

- Akter N, Kunda M, Harun-Al-Rashid A, Mazumder SK, Sultana MA and Pandit D. 2020. Fish biodiversity in the Khiru River of Bangladesh: present status and threats. *International Journal of Natural and Social Science*. 7:30–39.
- Arefin S, Kunda M, Islam MJ, Pandit D and Haque ATU. 2018. Status of fish and shellfish diversity and their decline factors in the Rupsa River of Khulna in Bangladesh. *Archives of Agriculture and Environmental Science*. 3:232–239.

- Ashley DF, Christopher AM and Lara JH. 2007. Potential impacts of global climate change on freshwater fisheries. *Reviews in Fish Biology and Fisheries*. 17:581–613.
- Aziz MSB, Hasan NA, Mondol MMR, Alam MM and Haque MM. 2021. Decline in fish species diversity due to climatic and anthropogenic factors in Hakaluki Haor, an ecologically critical wetland in northeast Bangladesh. *Heliyon* 7:e05861.
- Craig JF, Halls AS, Barr JJF and Bean CW. 2004. The Bangladesh floodplain fisheries. *Fisheries Research*. 66:271–286.
- DoF. 2022. National Fish Week Compendium (in Bengali). Department of Fisheries, Ministry of Fisheries and Livestock, Bangladesh.
- FAO. 2020. The State of World Fisheries and Aquaculture. Food and Agriculture Organization of the United Nations, Rome, Italy.
- Galib D, Mahfuj MSE, Sultana S and Mistri NA. 2015. A preliminary study on fish fauna of the Passur River in Bangladesh. *International Journal of Biodiversity and Conservation*. 7:346–353.
- Hanif MA, Siddik MAB, Nahar A, Chaklader MR, Rumpa RJ. 2016. The Current Status of Small Indigenous Fish Species (SIS) of River Gorai, a Distributary of the River Ganges, Bangladesh. *Journal of Biodivers Endanger Species*. 4:162.
- Hanif MA, Siddik SM, Ali MM. 2020. Length-weight relationships of seven cyprinid fish species from the Kaptai Lake, Bangladesh. *Journal of Applied Ichthyology*. 36(2).
- Hossain FI, Miah MI, Pervin R, Hosen MHA and Haque MR. 2015. Study on the Socio-Economic Condition of Fishermen of the Punorvaba River under Sadar Upazila, Dinajpur. *Journal of Fisheries*. 3(1). <https://doi.org/10.17017/j.fish.98>
- Hossain MY, Nomwine Da, Ouedraogo R, Oueda A. 2016. Length-Weight Relationships of Three Gobiidae Species from the Rupsha River in Southwestern Bangladesh. *Journal of Applied Ichthyology*. 32, 1305-1307. <https://doi.org/10.1111/jai.13183>
- Hridoy MA, Adikari D, Shahriar F and Abu M. 2021. Opportunities and strategies to achieve potential growth of fish farming in North-East Bangladesh. *Journal of Livestock Science*. 15, 125-135.
- Hridoy MAAM, Munny FJ, Shahriar F, Rahman MM, Islam MF, Kazmi A and Kawsar MA. 2025a. Exploring the Potentials of Sajana (*Moringa oleifera* Lam.) as a Plant-Based Feed Ingredient to Sustainable and Good Aquaculture Practices: An Analysis of Growth Performance and Health Benefits. *Aquaculture Research*. 2025(1), 3580123.
- Hridoy MAAM, Shahriar F and Chowdhury S. 2024. A Comparative Study on the Length-Weight Relationships of Two Freshwater Fish Families, Nandidae and Channidae, from Kawadighi Haor in North-eastern Bangladesh.
- Hridoy MD, Paul PB, Rasel MA and Uddin KR. 2025c. Impact of water pollution on physio-chemical properties for fish habitat in the Surma River, Sylhet city, Bangladesh. *Water and Environmental Sustainability*. 5(1), 12-20.
- Hridoy MAAM, Paul PB, Hashar MN, Tabaschum T, Ujjaman R, Khan MS and Shakil MAH. 2025b. Seasonal variations in Water quality and microplastic contamination in the Surma River, Bangladesh: implications for aquatic health and human safety. *Environmental Quality Management*. 34(3), e70055.
- Iqbal DMM, Nasren S, Mamun MAA and Hossain MM. 2015. Fish assemblage including threatened species in Hakaluki haor, Sylhet, Bangladesh. *Journal of Aquaculture In The Tropics*. 30(3-4):233-246.

- Islam MA, Asif AA, Samad MA, Sarker B, Ahmed M, Satter A and Hossain A. 2017. A comparative study on fish biodiversity with conservation measures of the Bhairab River, Jessore, Bangladesh. *Asian Journal of Medical and Biological Research*. 3:357–367.
- Islam MR, Kunda M, Pandit D and Harun-Al-Rashid A. 2019. Assessment of the ichthyofaunal diversity in the Juri River of Sylhet district, Bangladesh. *Archives of Agriculture and Environmental Science*. 4:488–496.
- IUCN Bangladesh. 2015. Red List of Bangladesh. Volume 5: Freshwater Fishes. International Union for Conservation of Nature (IUCN), Bangladesh Country Office, Dhaka. 360 p.
- Joadder MAR, Galib SM, Haque SMM and Chaki N. 2015. Fishes of the river Padma, Bangladesh: current trend and conservation status. *Journal of Fisheries*. 3:259–266.
- Lima MA, Islam MH, Neogi S, Nasrin K, Sen A, Masood A and Al Mamun Hridoy MA. 2025. Recent advances in biochar technology for aquatic pollution control: a critical review of applications, barriers, and future opportunities. *Discover Sustainability*. 6(1), 980.
- Mohsin ABM, Haque SMM, Galib SM, Fahad MFH, Chaki N, Islam MN and Rahman MM. 2013. Seasonal abundance of fin fishes in the Padma River at Rajshahi District, Bangladesh. *World Journal of Fish and Marine Sciences*. 5:680–685.
- Pramanik MMH, Hasan MM, Bisshas S, Hossain ABMA and Biswas TK. 2017. Fish biodiversity and their present conservation status in the Meghna River of Bangladesh. *International Journal of Fisheries and Aquatic Studies*. 5:446–455.
- Rahman AKA. 2005. Freshwater Fishes of Bangladesh. 2nd ed. Zoological Society of Bangladesh, Department of Zoology, University of Dhaka, Dhaka. 263 p.
- Rahman MA, Khamari A, Mandal B, Ullah MR, Hossen MB, Alam MA and Saha N. 2019. Assessment of Fish Biodiversity in Basuakhali Beel under Terokhada Upazilla, Khulna, Bangladesh. *Asian Journal of Research in Biosciences*. 1(2): 55-64.
- Rahman MA, Mandal B, Khamari A, Ullah MR, Sazedul M, Hoque M and Chakma S. 2009. Ichthyofaunal diversity of Basurabad Beel in regards with threat factors and conservation measures, Bangladesh. *Archives of Agriculture and Environmental Science*. 4:478–487.
- Rahman MA, Mondal MN, Hannan MA and Habib KA. 2015. Present status of fish biodiversity in Talma River at northern part of Bangladesh. *International Journal of Fisheries and Aquatic Studies*. 3:341–348.
- Rahman MM, Hossain MY, Ahamed F, Fatematuzzhura, Subba BR, Abdallah EM and Ohtomi J. 2012. Biodiversity in the Padma distributary of the Ganges River, northwestern Bangladesh: recommendations for conservation. *World Journal of Zoology*. 7:328–337.
- Roy D, Dida NB, Sarker S, Khan MAR and Latifa GA. 2022. Appraisal of different attributes of fish community in Andharmanik River of coastal Bangladesh and socio-economic conditions of fishermen. *Heliyon*. 8:e09825.
- Saha JK. 2007. Assessment of Aquatic Biodiversity in Three Beels of Bangladesh and Its Relationship with Environmental Parameters. PhD Thesis. Department of Aquaculture, Bangladesh Agricultural University, Mymensingh. pp. 76–78.
- Siddique MAB, Hussain MA, Flowra FA and Alam MM. 2016. Assessment of fish fauna in relation to biodiversity indices of Chalan Beel, Bangladesh. *International Journal of Aquatic Biology*. 4:345–352.

- Sultana MA, Kunda M and Mazumder SK. 2019. Status and decline causes of fish diversity of Bhawal Beel, Bangladesh. *Malaysian Journal of Medical and Biological Research*. 6:93–100.
- Sultana MA, Mazumder SK and Kunda M. 2018. Diversity of fish fauna and fishing gears used in the River Banar, Mymensingh, Bangladesh. *Bangladesh Journal of Fisheries*. 30:229–240.
- Talukder MR, Hussain MA, Kunda M, Rashid AHA, Pandit D and Sumon TA. 2021. Checklist of fish species in the Shari-Goyain River, Bangladesh: threats and conservation measures. *Indian Journal of Geo-Marine Sciences*. 50:48–155.

