Online: ISSN 2771-5868
Print: ISSN 2771-585X

Original Research Article

Diversity, Composition and Conservation Status of Ichthyofauna in Dibru River: an Important Habitat for Gangetic Dolphin in Assam

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Received: August1, 2025; revised: December 25, 2025; accepted: December 30, 2025

https://doi.org/10.5281/zenodo.18278720

Published Online: January, 2026

Abstract: The Dibru River, a significant tributary of the Brahmaputra, traverses the Tinsukia and Dibrugarh districts of Assam. It serves as a vital resource for local communities, many of whom rely heavily on fishing for their livelihoods. However, intensive fishing pressure is believed to be a major driver of declining ichthyofaunal diversity in the region. This study aims to assess the diversity, composition, population trends, and economic significance of fish species inhabiting the Dibru River. Data were collected through experimental fishing at three designated sites and supplemented by surveys of fish sold nearby landing stations, including species not captured during field sampling. A total of 76 fish species were documented, representing 51 genera, 25 families, and 9 orders. The family Cyprinidae was the most represented (16 species), followed by Danionidae (12), Bagridae (7) and Channidae (6). According to the IUCN Red List assessment, 87% of the recorded species are classified as Least Concern (LC), 6% as Near Threatened (NT) and 3% each as Vulnerable (VU) and Endangered (EN), with 1% listed as Data Deficient. Of the identified species, 28 are primarily consumed as food, 7 possess exclusive ornamental value, and 41 serve both culinary and decorative purposes. During the study, dolphins were sighted across the years at different sites along the river. This comprehensive documentation of ichthyofaunal diversity is pivotal for guiding future research and conservation efforts, particularly in safeguarding the endangered Gangetic dolphin, which inhabits the same riverine ecosystem.

Keywords: Assam; Dibru River; Fish diversity; Gangetic dolphin

Introduction

Riverine fisheries play a crucial role in the socio-economic development of India, generating employment and alternative income for millions of people and stimulate growth in subsidiary industries (Goswami *et al*., 2012). The growth and productivity of freshwater fishes are determined by the dynamics of their physicochemical environment, as well as the biotic factors present (Wetzel, 1983). A total of 17,292 freshwater fish species have been identified globally, representing over 40% of all known fish species (Granado-Lorencio *et al*., 2021). This diverse landscape provides

extensive water resources that support a rich variety of fish genetic resources. India is recognised as one of the world's mega biodiversity countries and ranks ninth in freshwater biodiversity (Mittermeier and Mitemeir, 1997; Myers et al., 2000), with nearly 2,500 fish species, of which, 930 species are freshwater species (Jayaram, 1999). Freshwater fishes are among the most threatened taxonomic groups of animals due to their sensitivity to the change in aquatic habitats (Darwall and Vie, 2005). The primary drivers include habitat destruction, water use, the introduction of invasive species, pollution and the overarching impacts of global climate change (Mas-Marti *et al.*, 2010; Vass *et al.*, 2011; Das *et al.*, 2012). Therefore, managing fish diversity and their habitats is a significant challenge today (Dudgeon *et al.*, 2006).

Among the Northeast Indian states, Assam stands as a vital region as the habitat for freshwater fishes. It is blessed with 1.02 lakhs hectare of natural lentic water bodies, including swamps connected to the Brahmaputra, Barak, and their tributaries (Chetry *et al.*, 2023; Saha *et al.*, 2024). In recent times, Bailung and Biswas (2014), Deori *et al.* (2015) studied the fish diversity of Dihing River, Sudem (2017) recorded 112 fish species in the lower Brahmaputra region, Borah and Das (2020) studied the ichthyofauna of Jinari River, Goalpara, Assam. Chetry *et al.* (2023) worked on the ichyofaunal diversity of Jia Bharali River. Dohutia *et al.* (2023) investigated the ichthyofaunal assortment in Ranganadi where 76 species were observed from 9 orders and 54 genera.

The Dibru River is an important habitat for a variety of fish species. The river provides essential conditions for the survival of the threatened river dolphin (*Platanista gangetica gangetica*), making it a key area for conservation efforts (Deb *et al.*, 2024; Biswas, 2023). It is crucial to understand the present status and trend of the ichthyofauna of the river and subsequent management activities. Keeping the above in the backdrop, the present study was taken up, that focuses on the fish fauna of the study area, its population trend, economic importance and conservation status.

Materials and methods

Study area

The Dibru River (Figure 1), a tributary of the Brahmaputra, traverses the districts of Tinsukia and Dibrugarh in Assam. It originates in the low-lying hills near Bordumsa village in Arunachal Pradesh and flows westward across the plains, eventually converging with the Doomdooma River (Pamai *et al.*, 2025). The river subsequently drains into Maguri Beel, located in the Tinsukia district, before discharging into the Lohit River south of Dibru-Saikhowa National Park. Its course ultimately culminates in the Brahmaputra River (Sonowal *et al.*, 2022; Pamai *et al.*, 2025). The region is characterized by moderate temperatures accompanied by high humidity levels with annual rainfall ranging between 2,300 mm and 2,800 mm (Wakid and Biswas, 2005).

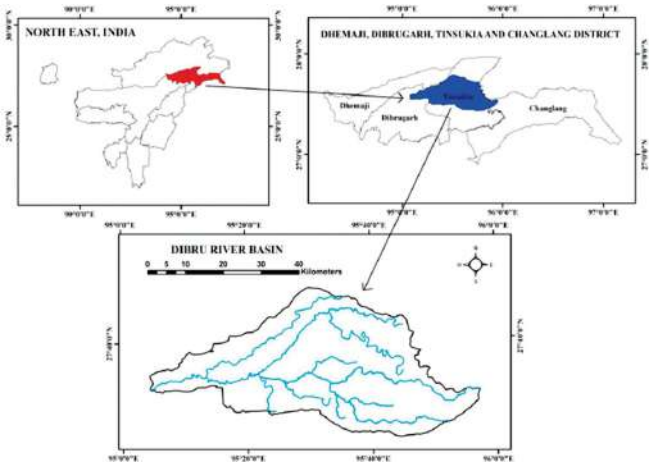


Fig. 1. Map of the study area (adapted from Sonowal *et al.*, 2022)

Data collection

The study was carried out between January 2022 and December 2023. Fish sampling was carried out in close collaboration with experienced local fishermen whose expertise was integral to the process (Bhata, 2003; Lakra *et al.* 2010; Shahnawaz *et al.* 2010; Thampy *et al.* 2021). A variety of gear types was employed including gillnets, cast nets, drag nets, basket traps, and locally adapted methods. These gears featured different mesh sizes to capture a broad

spectrum of fish sizes and minimize bias associated with any single gear type. Additionally, three fish centres on the bank of Dibru River, where capture fishes were sold, were also visited at regular interval to find out fish species which were not found in our experimental fishing. One sample of each fish fauna was collected from the fishermen and preserved them in 6% formalin as a representative samples. Unidentified species were later identified following the guide books in particular Talwar and Jhingran (1991).

Survey for the dolphin was conducted at four sites along the Dibru River, specifically Kathalguri, Memdubi, Koliapani and Digaltarang. Each site was surveyed during the pre-monsoon, monsoon, post-monsoon and winter seasons to document the presence of the species and to examine seasonal patterns in its distribution. All surveys were undertaken from a boat operated at a slow and consistent speed in order to maximise the probability of detecting surfacing individuals. During each survey session, observers performed continuous visual scanning of the water surface for any signs of dolphin activity. All sightings were recorded on videos as well as still photos using a handheld camera.

Global conservation status of the fish species and their population trend in the wild were analyzed from International union for Conservation of Nature and Natural resources (IUCN) Red list latest version of threatened species (2024-2) available in https://www.iucnredlist.org/. The species, which were not listed in the IUCN, their conservation status were not used in the analysis. The occurrence of fish fauna was categorized into common (found over 60% of days of observation), occasional (found between 40% and 60% of days), rare (found below 40% of days based on the percentage of occurrence in 144 days of observation.

Results

This study identified a diverse assemblage of 76 fish species within the Dibru River, distributed across 51 genera, 25 families, and 9 distinct orders (Table 1). The composition of these orders revealed a clear dominance of Cypriniformes,

Table 1. List of Ichthyofaunal species found during the survey in Dibru River, Assam

Order	Family	Scientific name	Local name	IUCN status	Population trend	Economic Importance	Frequency
Osteoglossiformes	Notopteridae	*Notopterus notopterus* (Pallas, 1769)	Kanduli	LC	S	F	R
		Chitala chitala (Hamilton, 1822)	Chital	NT	D	F	R
Clupeiformes	Clupeidae	*Gudusia chapra* (Hamilton, 1822)	Karati	LC	D	F	R
Cypriniformes	Botiidae	*Botiadario* (Hamilton, 1822)	Rani Botia	LC	UN	F, OR	R
	Cobitidae	*Lepidocephalichthyes guntea* (Hamilton, 1822)	Botia	LC	UN	F, OR	C
	Cyprinidae	*Chagunius chagunio* (Hamilton, 1822)		LC	UN	F, OR	O
		Cirrhinus mrigala (Hamilton, 1822)	Mirika	LC	S	F	C
		Cirrrhinus reba (Hamilton, 1822)	Lachim	LC	UN	F	C
		Crossocheilus latius (Hamilton, 1822)		LC	UN	F, OR	C
		Labeo bata (Hamilton, 1822)	Bhangone	LC	UN	F	C
		Labeo calbasu (Hamilton, 1822)	Mali	LC	UN	F	C
		Labeo catla (Hamilton, 1822)	Catla	LC	UN	F	C
		Labeo gonius (Hamilton, 1822)	Kurhi	LC	UN	F	C
		Labeo rohita (Hamilton, 1822)	Rou	LC	UN	F	C
		Tor putitora (Hamilton, 1822)	Pithia	EN	D	F	R
		Osteobramacotio (Hamilton, 1822)	Hafo/Hamto	LC	UN	F	C
		Pethia gelius (Hamilton, 1822)	Puthi	LC	UN	OR	C
		Pethia ticto (Hamilton, 1822)	Puthi	LC	UN	F, OR	C
		Puntius conchonius (Hamilton, 1822)	Puthi	LC	UN	F, OR	C

		Puntius sarana (Hamilton, 1822)	Seniputhi	LC	UN	F	C
		Puntius sophore (Hamilton, 1822)	Puthi	LC	UN	F, OR	C
	Danionidae	*Amblypharyngodon mola* (Hamilton, 1822)	Moa	LC	S	F, OR	C
		Bariliu sbarila (Hamilton, 1822)	Korang	LC	UN	F, OR	O
		Cabdiojaya (Hamilton, 1822)	Boriola	LC	D	F, OR	C
		Cabdio morar (Hamilton, 1822)	Boriola	LC	UN	F, OR	C
		Chela cachius (Hamilton, 1822)		LC	UN	F, OR	O
		Danio rerio (Hamilton, 1822)		LC	D	OR	R
		Devario devario (Hamilton,1822)	Dorikona	LC	UN	OR	O
		Devario aequipinnatus (McClelland, 1839)	Dorikona	LC	UN	OR	O
		Esomusdandrica (Hamilton, 1822)	Dorikona	LC	UN	F, OR	C
		Rasbora daniconius (Hamilton, 1822)	Dorikona	LC	UN	F, OR	C
		Salmophasia bacaila (Hamilton, 1822)	Chelakani	LC	S	F, OR	C
		Raiamas bola (Hamilton, 1822)		LC	UN	F, OR	O
	Nemacheilidae	*Acanthobitis botia* (Hamilton, 1822)	Botia	LC	D	F, OR	O
Siluriformes	Ailiidae	*Ailia coila* (Hamilton,1822)	Kajoli	NT	D	F	O
		Clupisoma garua (Hamilton,1822)	Neria	LC	D	F	C
		Eutropiichthys vacha (Hamilton,1822)	Basa	LC	D	F	O
	Bagridae	*Mystus cavasius* (Hamilton, 1822)	Barsingarah	LC	D	F, OR	O
		Mystus dibrugarensis (Chaudhuri,1913)	Singorah	LC	UN	F, OR	O
		Mystus tengara (Hamilton, 1822)	Singorah	LC	UN	F, OR	C
		Mystus vittatus (Bloch, 1794)	Singorah	LC	D	F, OR	C
		Rita rita (Hamilton,1822)	Litha	LC	D	F	R
		Sperata aor (Hamilton,1822)	Arii	LC	S	F	O
		Sperata seenghala (Sykes, 1839)	Arii	LC	UN	F	O
	Siluridae	*Ompokbimaculatus* (Bloch, 1794)	Pabo	NT	UN	F	O
		Ompokpabo (Hamilton, 1822)	Pabo	NT	D	F	O
		Wallago attu (Bloch and Schneider, 1801)	Borali	VU	D	F	C
	Sisoridae	*Bagarius bagarius* (Hamilton, 1822)	Gorua	VU	D	F	R
		Gagata cenia (Hamilton,1822)	Kyaketta	LC	UN	F, OR	C
		Gagata gagata (Hamilton,1822)	Kyaketta	LC	D	F, OR	O
		Sisor rabdophorus (Hamilton,1822)		LC	UN	OR	R
	Heteropneustidae	*Heteropneustus fossilis* (Bloch, 1794)	Hinghi	LC	UN	F	C
	Clariidae	*Clarias magur* (Linnaeus, 1758)	Magur	EN	D	F	C
	Chacidae	*Chaca chaca* (Hamilton, 1822)	Chega	LC	D	OR	R
Beloniformes	Belonidae	*Xenontodon cancila* (Hamilton, 1822)	Kokila	LC	UN	F, OR	C
Synbranchiformes	Synbranchidae	*Ophichthys cuchia* (Hamilton, 1822)	Cuchia	LC	UN	F	C
	Mastacembelidae	*Macrognathus aral* (Lacepede, 1800)	Tura	LC	S	F	C
		Macrognathus pancalus (Hamilton,1822)	Kaibai	LC	UN	F, OR	C
		Mastacembelus armatus (Bloch and Schneider, 1801)	Bami	LC	S	F, OR	C
Perciformes							
	Ambassidae	*Chanda nama* (Hamilton, 1822)	Chanda	LC	D	F, OR	C
		Parambassis lala (Hamilton, 1822)	Chanda	NT	D	F, OR	C
		Parambassis ranga (Hamilton, 1822)	Chanda	LC	S	F, OR	C
	Anabantidae	*Anabus testudineus* (Bloch, 1792)	Kawai	LC	UN	F, OR	C
	Badidae	*Badis badis* (Hamilton,1822)	Randhoni	LC	UN	F, OR	R
	Osphronemindae	*Trichogaster fasciata* (Bloch and Schneider, 1801)	Kholihona	LC	UN	F, OR	C
		Trichogaster labiosa (Day,1877)	Kholihona	LC	UN	F, OR	O
		Trichogaster lalius (Hamilton,1822)	Kholihona	LC	UN	F, OR	O
	Nandidae	*Nandus nandus* (Hamilton,1822)	Gedgedi	LC	UN	F, OR	C

	Channidae	*Channa aurantimaculata* (Musikasinthorn, 2000)	Noga seng	DD	UN	F, OR	O
		Channa gachua (Hamilton,1822)	Sengeli	LC	UN	F, OR	C
		Channa marulius (Hamilton,1822)	Haal	LC	UN	F, OR	C
		Channa punctata (Bloch, 1793)	Goroi	LC	S	F, OR	C
		Channa stewartii (Playfair, 1867)	Senga	LC	UN	F, OR	O
		Channa striata (Bloch, 1793)	Hol	LC	S	F, OR	O
Gobiiformes	Gobiidae	*Glossogobius giuris* (Hamilton,1822)	Patimutura	LC	UN	F	C
Tetraodontiformes	Tetraodontidae	*Leiodon cutcutia* (Hamilton,1822)	Gangatup	LC	UN	OR	C

Note

IUCN status: LC= Least Concern, NT= Near Threatened, VU= Vulnerable, EN= Endangered, DD= Data Deficient

Frequency: S= Stable, D= Declining, F= Food

Economic Importance: OR= Ornamental, C= Common, O= Occasional, R= Rare.

Population Status: D=Declining, S= Stable, UN: Unknown

which accounted for 41% of the total species richness. This was followed by Siluriformes, representing 26% of the species. The remaining orders exhibited lower representation: Perciformes contributed 20%, Synbranchiformes 5%, Osteoglossiformes 3%, Clupeiformes, Beloniformes, Gobiiformes and Tetraodontiformes 1% each (Figure 2).

In case of families, Cyprinidae emerged as the most species-rich family, encompassing 16 species within 8 genera. Danionidae was the second most diverse family with twelve species, followed by Bagridae with seven species and Channidae with six. Sisoridae comprised four species, while Ailiidae, Siluridae, Schilbeidae, Mastacembelidae, Ambassidae and Osphronemidae each contributed three species. Notopteridae was represented by two species. Single species were recorded for Botiidae, Clupeidae, Nemacheilidae, Heteropneustidae, Clariidae, Chacidae, Belonidae, Synbranchidae, Anabantidae, Badidae, Nandidae, Gobiidae, and Tetraodontidae. This broad spectrum of families underscores the ecological complexity of the Dibru River ecosystem.

The fish fauna of the Dibru River exhibits a wide range of economic values (Table 1, Image 1). A significant proportion, 54% of the identified species possesses both food

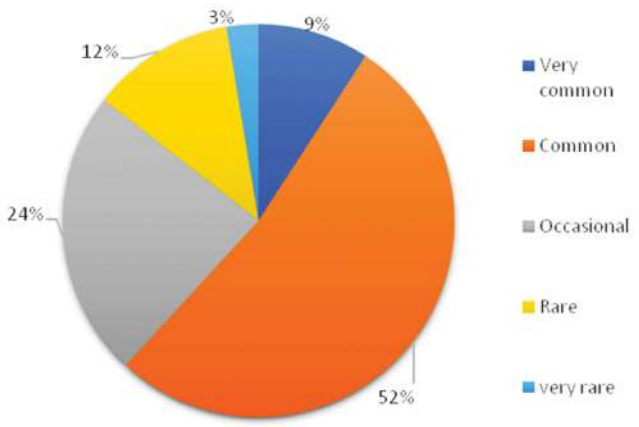


Fig. 2. Status of the itchthyofauna in the Dibru River.

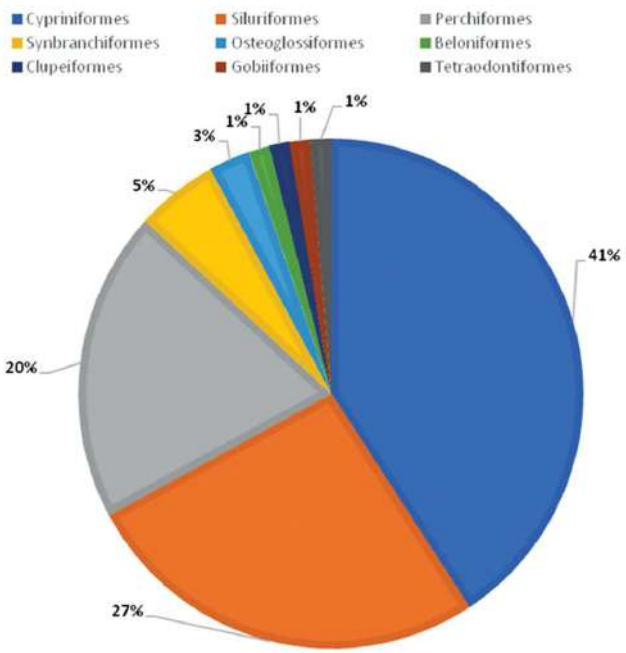


Fig. 3. Percentage of ichthyofauna under various orders.

Fig. 4. (A & B). Gangetic dolphins seen in the Dibru River.

and ornamental value, highlighting their dual importance. Species primarily valued for food accounted for 37% of the total, while those valued solely for their ornamental appeal constituted 9%. Regarding encounter frequency, the study categorized the species into three groups: common (44 species), occasional (21 species) and rare (11 species) (Figure 3). This distribution provides insight into the relative abundance and detectability of different species within the river.

The threat of the fish species was assessed according to the IUCN Red List categories. A majority, 87%, of the 76 species were classified as Least Concern (LC), 6% were under Near Threatened (NT), 3% were Vulnerable (VU) and 3% of the species were Endangered (EN) and remaining 1% were Data Deficient (DD). Further analysis of population trends based on IUCN data revealed that 20 are declining globally and 46 have unknown population trends.

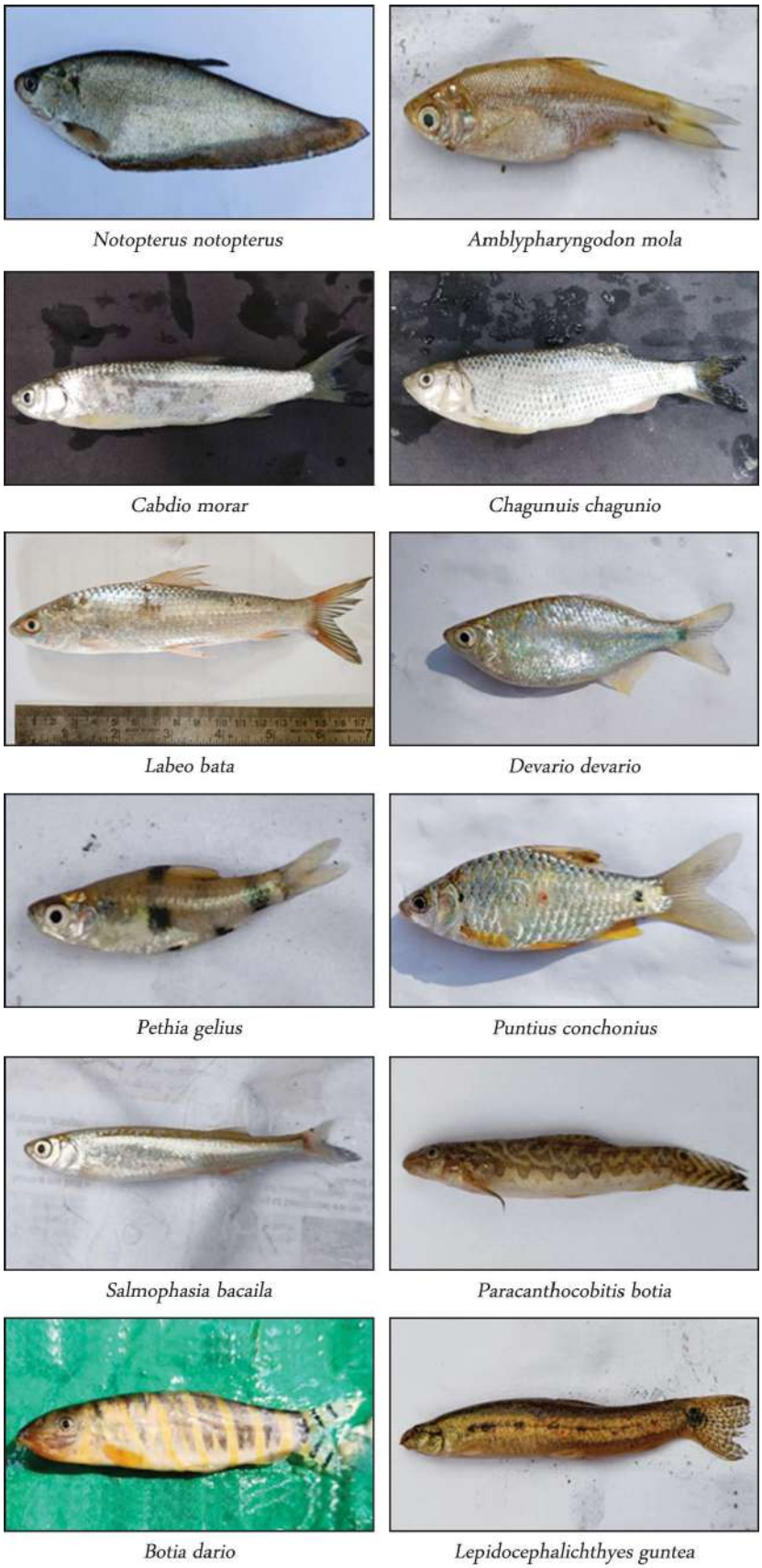
During the study period, dolphins were recorded in all four seasons in the Dibru River. The dolphins were observed in all four seasons at Dighaltarang and Kathalguri. In contrast, dolphins were absent from Memdubi during winter and were recorded only during the monsoon at Koliapani, which had the lowest overall sightings.

Discussion

The presence of 76 fish species in the Dibru River suggests a strong correlation between the river's diverse topographical features and its rich fish biodiversity (Table 1). This finding aligns with studies conducted on other regional rivers, which also highlight the area's significant freshwater fish diversity and its status as an important hotspot, as identified by Kottelat and Whitten (1996). The river's diverse freshwater ecosystems and floodplain characteristics play a crucial role in maintaining this biodiversity. Consistent with our results, Deori *et al.* (2015) reported Cyprinidae as the dominant fish family, comprising 32% of the total species, followed by Bagridae, accounting for 12%. When comparing our study with research on other regional rivers such as the Dihing River (45 species, Bailung and Biswas, 2014; 50 species, Deori *et al.*, 2015), the Jinari River (74 species, Borah and Das, 2020), the Tipkai River (106 species, Ahmed *et al.*, 2023), and the Jia Bharali River (69 species, Chetry *et al.*, 2023), it is evident that the Cyprinidae family consistently dominates the fish fauna in the region. In our study of the Dibru River, Cyprinidae was also found to be the dominant family, representing 36.36% (28 species), while Bagridae accounted for 9% (7 species).

The majority of the species have both food and ornamental values, but the seven species have exclusively ornamental value. Species such as *Chitala chitala, Mystus cavasius, Labeo catla*, and *Labeo rohita* have high market value as food fish. However, species from the Cyprinidae family like *Amblypharyngodon mola, Cabdio jaya, Cabdio morar, Chagunius chagunio, Esomus dandrica, Puntius conchonius, and Puntius sophore*, from the Nemacheilidae family like *Acanthobitis botia*, from the Cobitidae family like *Botia dario* and *Lepidocephalichthyes guntea*, from the Bagridae family like Mystus species, from the Sisoridae family like Gagata species, from the Belonidae family like *Xenentodon cancila*, from the Anabantidae family like *Anabus testudineus*, from the Osphronemindae family like *Trichogaster* species, and from the Channidae family like *Channa* species, have both food and ornamental value. Deb

Image 1. Photographs of important ichthyofauna in Dibru River, Assam.



Notopterus notopterus

Amblypharyngodon mola

Cabdio morar

Chagunuis chagunio

Labeo bata

Devario devario

Pethia gelius

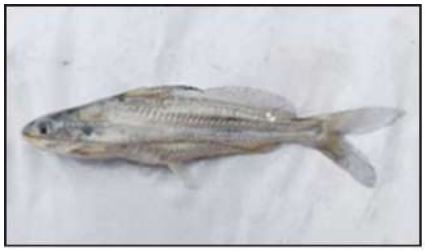
Puntius conchonius

Salmophasia bacaila

Paracanthocobitis botia

Botia dario

Lepidocephalichthyes guntea



Mystus cavasius

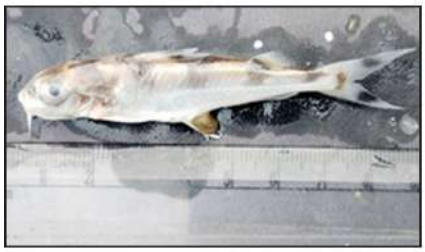
Mystus tengara

Ailia coila

Clupisoma garua

Puntius sophore

Rasbora daniconius



Gagata cenia

Sisor rabdiphorus

Clarias magur

Clarias magur

Chanda nama

Parambassis ranga

Parambassis lala

Puntius sarana

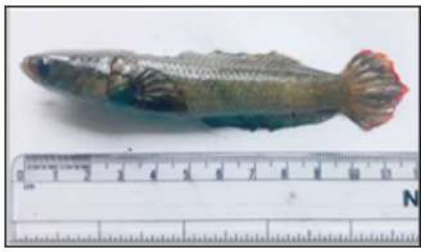
Trichogaster fasciata

Trichogaster lalius

Nandus nandus

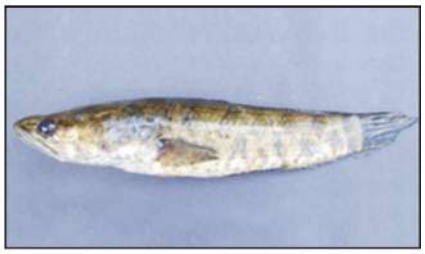
Glossogobius giuris

Channa aurantimaculata



Channa gachua

Channa marulius



Channa punctata

Labeo calbasu

Leiodon cutcutia

et al. (2024) found 46 ornamental fish species in the Dibru River, whereas the present study showed 48 ornamental species from the same river. Although *Channa barca* was observed by Wakid and Biswas (2005) in the Dibru-Saikia National Parks, a part of the same Dibru River but we did not observe the presence of the species throughout the study period. This species has a high market value as ornamental fish, which might lead to overexploitation.

The presence of 6% near threatened and 6% threatened in the river indicate the importance of the river for such species. It also highlights the urgent need for sustainable management strategies to mitigate the effects of over-exploitation and ensure the long-term conservation of the Dibru River's valuable fish biodiversity. Motivating fishermen to participate in conservation efforts and implementing stringent administrative measures are necessary. The frequency of encountering fish species varied significantly. Notably, 15 percent of the fish species are rare or very rare and possess ornamental value, making them vulnerable to exploitation. Conversely, approximately 61 percent of the species are common or very common, indicating their abundance.

The presence of dolphins (Figure 4- A & B) at all sites during at least one season indicates that the Dibru River provides suitable habitat conditions, particularly during the monsoon when elevated water levels enhance habitat availability. However, seasonal hydrological fluctuations strongly influence habitat suitability across sites. Dighaltarang and Kathalguri consistently supported dolphins year-round, highlighting their importance as core habitats. In comparison, Koliapani and Memdubi exhibited seasonal absences associated with declining water levels in winter, with Koliapani showing the most restricted use, as dolphins were detected only during the monsoon. These patterns underscore the sensitivity of dolphin distribution to seasonal changes in water depth and the importance of maintaining adequate flow levels to sustain suitable habitats in the Dibru River.

Interestingly, the Dibru River serves as a vital habitat for a significant population of Gangetic dolphins (*Platanista gangetica gangetica*). The abundance of fish species observed in the river supports the dolphins' existence. Furthermore, species such as *Amblypharyngodon mola, Nandus nandus, Puntius spp., Gagata cenia, Cabdio spp., Botia dario, Mystus* spp., *Labeo gonius, Xenontodon cancila and Mastacembelus* spp., commonly found in this study, were also identified in the gut content of dolphins by Phukan (2016), confirming the availability of food resources crucial for dolphin survival. Previous studies (Biswas and Baruah, 2000; Phukan, 2016) have similarly emphasized the factors contributing to the river's suitability as a dolphin habitat. However, a study by Biswas and Boruah (2001), conducted nearly two decades ago, reported a higher prevalence of species such as *Chaca chaca, Badis badis, Bagarius bagarius, Botia dario, Chitala chitala, Danio rerio, Gudusia chapra, Notopterus notopterus, Rita rita, Sisor rabdophorus,* and *Tor putitora*, which were rarely encountered in the present study. This decline suggests the impact of anthropogenic activities, particularly overfishing, in the river. During this study, the use of fine-meshed nets by fishermen was observed, posing a significant threat to dolphins and requiring immediate monitoring. Controlling fishing with inappropriate gear and preventing overexploitation through awareness campaigns within the fishing community and concerted conservation actions will help regulate fish diversity and, consequently, enhance food availability for this endangered animal.

Acknowledgements

The authors are thankful to the North-East Council Secretariat, Shillong, Meghalaya for the needful funding for the completion of the study. The authors will also be forever indebted to the local fish folks and people, who rendered their help and cooperation during the field visits.

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