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A STUDY ON FISH DIVERSITY IN THE GANOL RIVER NEAR THE ASSAM–MEGHALAYA–BANGLADESH BORDER REGIONS.

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Abstract

River Ganol (Kalu) a tributary of River Barak is a first order river originating from the eastern side of the Nokrek Biosphere, runs towards the west through Damalgre, Garobadha and Rangapani joining several other tributaries before entering Assam through South Salmara Mankachar District after travelling a distance of 94 km from the origin. The river then enters Bangladesh near Char Aomkhaoa (25^0 31' 45.22" N 89^0 51' 18.02" E) and flows a major distance, which joins the Barak near Munshiganj and ultimately falls in the Bay of Bengal after joining with the Brahmaputra drainage traveling a distance of 655.5 km.

The present study highlights the rich and diverse ichthyofauna of the Ganol River, particularly along the ecologically sensitive border stretches of a 5 km segment in Assam–Meghalaya and Assam–Bangladesh. A total of 50 species were recorded, and classified under 10 orders and 26 families. This species richness reflects the ecological integrity and biological productivity of the riverine ecosystem.

From a conservation perspective, although the majority of species fall under the Least Concern category in the IUCN Red List, the presence of few Vulnerable and Near Threatened species calls for proactive conservation planning. Human-induced pressures such as overfishing, habitat modification, pollution, and cross-border developmental activities pose potential threats to the ecological integrity of the river. Without timely management interventions, these pressures could lead to the decline of sensitive species and overall biodiversity.

Keywords: Brahmaputra, Barak, Ganol, Bangladesh, India, Ichthyofauna, Fish Diversity

Introduction

The Ganol river, also known as the Kalu, is a first-order river originating from the eastern side of the Nokrek Biosphere. It flows westward through Damalgre, Garobadha, and Rangapani, joining several other tributaries before entering Assam through the South Salmara-Mankachar district, after traveling a distance of 94 km from its origin. The river then enters Bangladesh near Char Aomkhaoa (25°31'45.22" N, 89°51'18.02" E) and continues for a considerable distance, eventually joining the Barak River near Munshiganj. Ultimately, it merges with the Brahmaputra drainage system and empties into the Bay of Bengal, covering

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a total distance of 655.5 km. The river originates in hilly terrain, and its reach type ranges from pool-and-riffle to braided. The riverbed is composed mainly of bedrock, boulders, cobbles, and gravel, creating suitable feeding and breeding grounds for hill stream fishes. (Hussain 2012)

As it journeys across these diverse ecological and political regions, the river supports a rich and complex aquatic ecosystem. This transboundary nature of the Ganol River makes it an important site for ecological studies, particularly in understanding how fish diversity is shaped by geographical, climatic, and anthropogenic factors across regions.

Freshwater fishes play a crucial role in maintaining ecological balance and supporting local livelihoods, especially in rural border communities that depend heavily on fishing for sustenance and income. The diversity of fish species in a river reflects the health of its ecosystem. However, freshwater ecosystems in Northeast India, including the Ganol River, are increasingly threatened by human interventions such as overfishing, pollution, habitat fragmentation, and climate variability.These factors, combined with a lack of comprehensive documentation, have left many river systems understudied.

Despite the ecological significance of the Ganol River, there exists a noticeable gap in detailed research on its ichthyofauna, especially in the sensitive and biologically rich border stretch between Assam and Meghalaya, and Assam and Bangladesh. The current study seeks to address this gap by focusing on a 5 km segment of the river—from the junction at Assam (India)-Bangladesh border to Assam-Meghalaya. This region is expected to host a unique blend of fish species due to the confluence of different ecological zones and hydrological conditions.

The primary objectives of this study are to document the diversity of fish species found in this stretch of the Ganol River, analyze the distribution patterns of these species, and assess the ecological conditions influencing them. By generating baseline data, this research aims to contribute to the conservation of freshwater biodiversity in the region and provide valuable insight for future studies, especially those focused on transboundary water resource management and sustainable fisheries.

Study Area

The present study was conducted in the Ganol River, a significant freshwater body that originates in the western part of Meghalaya and flows into Assam near the Assam–Meghalaya border, approaching the India–Bangladesh boundary. However, all fish sampling for this study was strictly carried out within Indian territory. The topographic survey of the

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Ganol River covered a stretch extending from the Bangladesh border near Mankachar (Lat. 25.529793°, Long. 89.865928°) to an upstream point near South West Garo Hills, Meghalaya (Lat. 25.561274°, Long. 89.900626). Geographical coordinates of the sampling sites were recorded using a smartphone equipped with GPS functionality as shown in **Figure 1.**

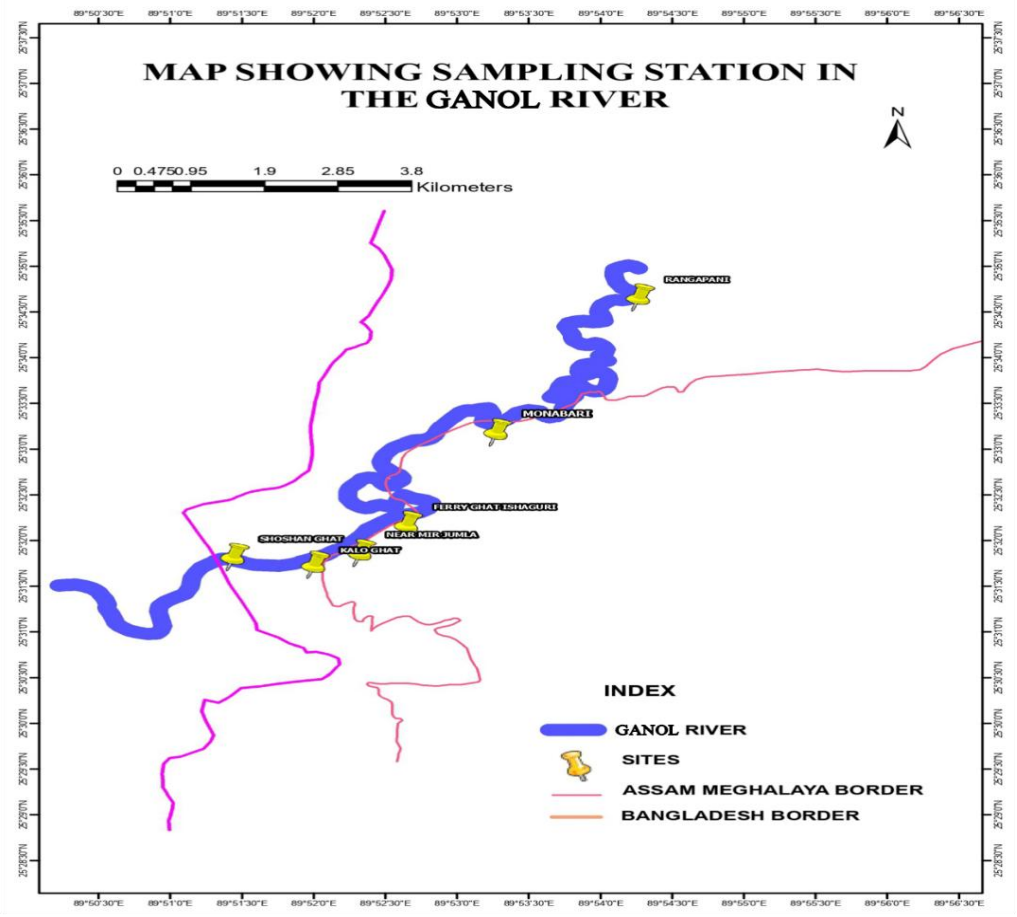

Figure 1: Showing the sampling station in the Ganol river.

Sampling and Methods for Data Collection:

Field surveys were conducted between January 2025 and June 2025, covering both dry and pre-monsoon seasons to account for potential seasonal variation in fish diversity. Fishes were collected from different sites along the main channel as well as adjoining stream sections of the Ganol River. Most of the sampling activities were carried out during the morning hours between 6:00 AM and 11:00 AM. A variety of sampling methods were employed, including the use of cast nets, scoop nets, gill nets of varying mesh sizes, and methods permissible by the concerned district authority. In addition to direct sampling, specimens were also obtained from local fishermen and villagers familiar with the river system.

Immediately after collection, fishes were photographed in live and then all specimens were preserved in 10% formalin to ensure their structural integrity for further laboratory-based

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taxonomic studies. Preliminary identification of the fish species was conducted using standard ichthyological literature, including the works of Jayaram (Jayaram, The Freshwater Fishes of the Indian Region, 1999) (Jayaram, The Fresh Water Fishes of the Indian Region. 2010)and Menon (A.G.K 1999). The conservation status of each recorded species was assessed based on information available from the IUCN Red List of Threatened Species (www.iucnredlist.org). Taxonomic classification and scientific nomenclature were verified and cross-checked using multiple authoritative sources, including FishBase (www.fishbase.org).

Result and Discussion :

The present investigation was carried out in the Ganol River, an important freshwater body that originates in the western part of Meghalaya and flows into Assam near the Assam–Meghalaya border before approaching the India–Bangladesh boundary. For this study, all fish sampling was confined strictly within Indian territory. A total of six sampling sites were selected along the main river channel as well as adjoining stream stretches, namely Shoshan Ghat, Ganol Ghat, Mirjumala Ferry Ghat, Monabari, and Rangapani.

The Ganol River and its adjoining streams exhibit heterogeneity of habitat, including shallow pools, riffles, sluggish stretches, and confluences with minor rivulets. The riverbed consists of boulders, cobbles, pebbles, gravels, sand, and fine silt, along with suspended and dissolved organic matter that enrich the aquatic system. Such substrates provide shelter for fishes, serve as substrata for algal attachment, and create diverse feeding grounds. The riparian zones are characterized by dense vegetation with mixed forest cover, which not only stabilizes the riverbanks but also contributes leaf litter and detritus to the aquatic ecosystem. These microhabitats collectively sustain a variety of fish species by offering spawning and breeding grounds, while also supporting the overall ecological balance of the river.

The study reveals a total of 51 fish species. Among these, 50 species were identified and classified using the IUCN Red List (www.iucnredlist.org), while 1 species remained unidentified, suggesting the possibility of a previously undocumented or new species as shown in **Table 1.**

Table 1: Fishes of different orders and families recorded during the present study

Sl. No.	Order	Family	Scientific Name	IUCN Status
1	Osteoglossiformes	Notopteridae	*Notopterus notopterus*	LC
2	Clupeiformes	Clupeidae	*Gudusia chapra*	LC
3	Clupeiformes	Clupeidae	*Tenualosa ilisha*	LC
4	Clupeiformes	Engraulidae	*Setipinna phasa*	LC
5	Cypriniformes	Cyprinidae	*Puntius chola*	LC

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6	Cypriniformes	Cyprinidae	*Puntius amphibius*	DD
7	Cypriniformes	Cyprinidae	*Labeo gonius*	LC
8	Cypriniformes	Cyprinidae	*Gymnostomus ariza*	LC
9	Cypriniformes	Cyprinidae	*Labeo rohita*	LC
10	Cypriniformes	Cyprinidae	*Labeo bata*	LC
11	Cypriniformes	Cyprinidae	*Labeo calbasu*	LC
12	Cypriniformes	Cyprinidae	*Cirrhinus mrigala*	LC
13	Cypriniformes	Cyprinidae	*Labeo catla*	LC
14	Cypriniformes	Cobitidae	*Pangio pangia*	LC
15	Cypriniformes	Cobitidae	*Lepidocephalichthys guntea*	LC
16	Cypriniformes	Danionidae	*Cabdio morar*	LC
17	Cypriniformes	Danionidae	*Amblypharyngodon mola*	LC
18	Cypriniformes	Danionidae	*Amblypharyngodon melettinus*	LC
19	Cypriniformes	Botiidae	*Botia rostrata*	VU
20	Siluriformes	Bagridae	*Mystus cavasius*	LC
21	Siluriformes	Bagridae	*Sperata aor*	LC
22	Siluriformes	Bagridae	*Mystus vittatus*	LC
23	Siluriformes	Bagridae	*Rita rita*	LC
24	Siluriformes	Siluridae	*Wallago attu*	VU
24	Siluriformes	Siluridae	*Ompok pabo*	NT
26	Siluriformes	Sisoridae	*Gagata gagata*	LC
27	Siluriformes	Sisoridae	*Gagata cenia*	LC
28	Siluriformes	Sisoridae	*Gogangra viridescens*	LC
29	Siluriformes	Clariidae	*Clarias batrachus*	LC
30	Siluriformes	Heteropneustidae	*Heteropneustes fossilis*	LC
31	Siluriformes	Ailiidae	*Ailia coila*	NT
32	Siluriformes	Ailiidae	*Eutropiichthys vacha*	LC
33	Siluriformes	Horabagridae	*Pachypterus atherinoides*	LC
34	Mugiliformes	Mugilidae	*Rhinomugil corsula*	LC
35	Beloniformes	Belonidae	*Xenentodon cancila*	LC
36	Beloniformes	Hemiramphidae	*Hyporhamphus limbatus*	LC
37	Synbranchiformes	Synbranchidae	*Ophichthys cuchia*	LC
38	Synbranchiformes	Mastacembelidae	*Macrognathus pancalus*	LC
39	Synbranchiformes	Mastacembelidae	*Mastacembelus armatus*	LC
40	Perciformes	Channidae	*Channa orientalis*	VU
41	Perciformes	Channidae	*Channa punctata*	LC
42	Perciformes	Channidae	*Channa striata*	LC
43	Perciformes	Ambassidae	*Chanda nama*	LC
44	Perciformes	Ambassidae	*Parambassis baculis*	LC
45	Perciformes	Nandidae	*Nandus nandus*	LC
46	Perciformes	Anabantidae	*Anabas testudineus*	LC
47	Perciformes	Osphronemidae	*Trichogaster labiosa*	LC

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48	Perciformes	Osphronemidae	*Trichogaster fasciata*	LC
49	Gobiiformes	Gobiidae	*Glossogobius giuris*	LC
50	Tetraodontiformes	Tetraodontidae	*Leiodon cutcutia*	LC

(LC=Least Count, NT=Near Threatened, VU= Vulnerable, DD=Data Deficient)

These 50 identified species were distributed across 26 families under 10 distinct orders. Among them, the order Cypriniformes emerged as the most dominant, comprising 15 species that spanned across four families: Cyprinidae, Cobitidae, Danionidae, and Botiidae. The second most represented order was Siluriformes, consisting of 14 species belonging to six families.

The orders Osteoglossiformes, Mugiliformes, Gobiiformes, and Tetraodontiformes were the least represented, with only one species each recorded. In contrast, the orders Perciformes, Synbranchiformes, and Beloniformes had a moderate number of species among the recorded fish as shown in **Figure 2.**

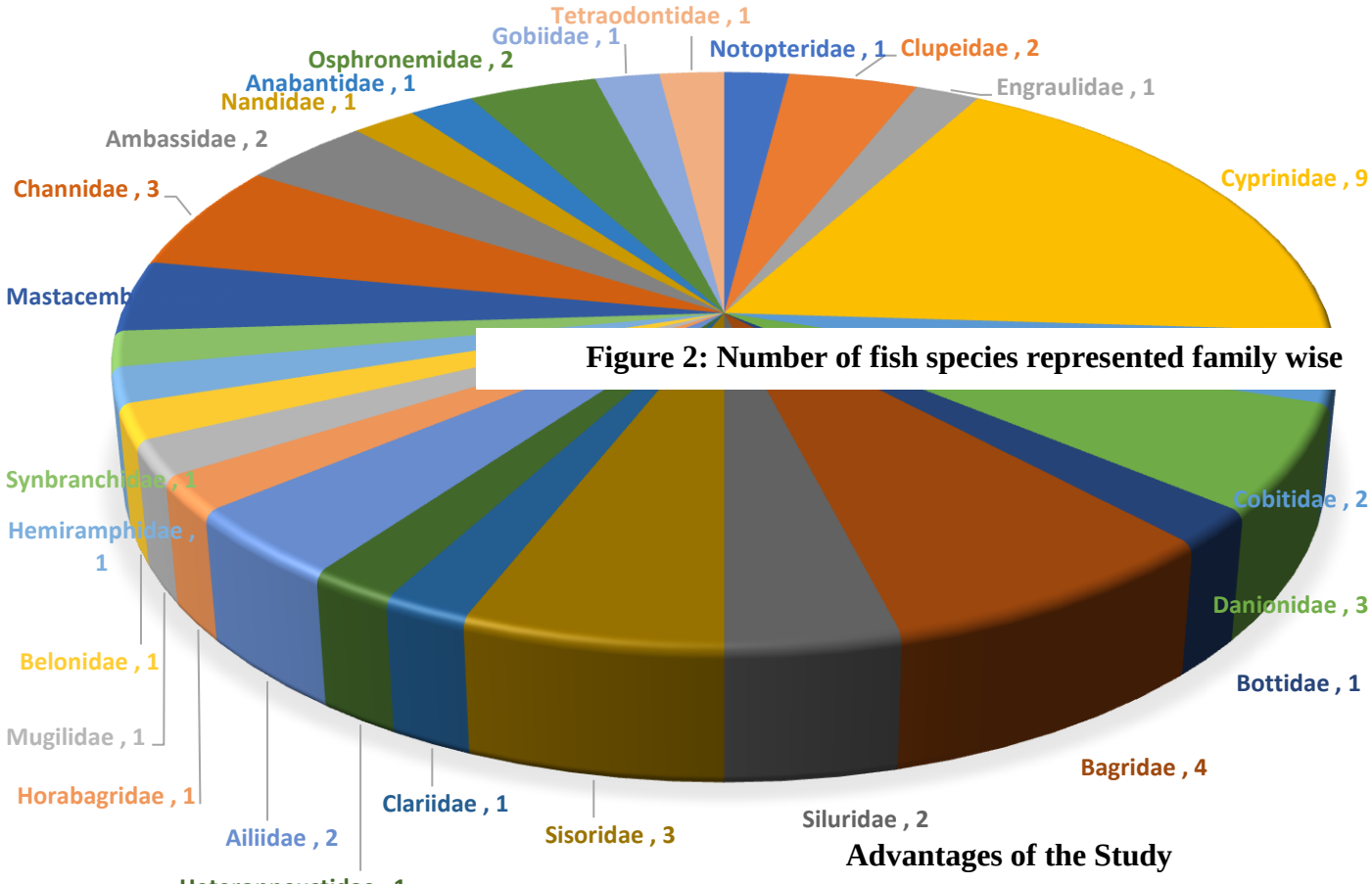

Figure 2: Number of fish species represented family wise

Advantages of the Study

This study on the Ganol River provides one of the first detailed accounts of fish diversity in a transboundary stretch of western Meghalaya and Assam. By documenting species composition and habitat features across multiple sampling sites, it

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generates essential baseline information for ecological assessment of the river system. Seasonal surveys covering both dry and pre-monsoon periods highlight patterns of variation in fish abundance, which can be useful for identifying critical spawning or feeding grounds. The results also have direct relevance for local fisheries, as they underline the ecological services provided by the river to communities that depend on it for livelihood. Beyond biodiversity documentation, the study enhances understanding of riverine habitat heterogeneity and its role in sustaining aquatic life.

Future Prospects

Further research on the Ganol River can focus on long-term ecological monitoring to trace shifts in fish diversity caused by environmental changes and human activities. Advanced methods such as genetic barcoding and population-level studies can be introduced to resolve taxonomic ambiguities and uncover hidden species diversity. Habitat modeling and hydrological assessments could also provide insight into the potential impacts of climate change on river ecosystems. On a broader scale, integrating ecological research with socio-economic studies may help in designing community-based conservation initiatives and sustainable fisheries management plans. The outcomes of such research can serve as valuable guidelines for conservation authorities, policymakers, and cross-border collaborations aimed at protecting aquatic biodiversity in this ecologically sensitive region.

Conclusion

The present study highlights the rich and diverse ichthyofauna of the Ganol River, particularly along the ecologically sensitive border stretches of Assam–Meghalaya and Assam–Bangladesh.

The detection of one unidentified species possibly a new or unrecorded species is a significant observation. The ichthyofauna of the border regions of Northeast India remains understudied, and discoveries of new species have been reported in recent years. This underscores the need for further taxonomic, morphological, and genetic analysis

Regarding conservation status, most recorded species fall under the Least Concern (LC) category according to the IUCN Red List. However, the presence of species listed as Near Threatened (NT) and Vulnerable (VU) (IUCN, 2023) emphasizes the need for active monitoring. Anthropogenic pressures such as overfishing, sand mining, agricultural runoff, and habitat fragmentation—especially in border regions—may gradually impact the fish diversity, as observed in other studies (Goswami et al., 2012; Nath & Dey, 2021).

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In conclusion, the Ganol River supports a biologically rich and ecologically significant ichthyofaunal population. The findings serve as valuable baseline data for future biodiversity assessments, conservation strategies, and taxonomic research in this less-explored transboundary river system.

REFERENCES

1. Hussain, Barbhuiya Anjam. 2012. "Masheer Fishes of River Barak,Jatinga,Dholeswari and Ganol in North East India." *Reaserch Journal of Recent Science* 1(ISC-2011): 7-16.
2. Jayaram, K.C. 2010. "The Fresh Water Fishes of the Indian Region." *Narenda Publishing House(Delhi)* 616.
3. Jayaram, K.C. 1999. "The Freshwater Fishes of the Indian Region,." *Narenda Publishing House* 551
4. A.G.K, Menon. 1999. "Checklist: Fresh Water Fishes of India." XViii + 366.
5. IUCN Red List of Threatened Species. (2023). Retrieved from www.iucnredlist.org
6. Classification https://www.iucnredlist.org/
7. Wikipedia. (2024). *Mekong*. Retrieved from https://en.wikipedia.org/wiki/Mekong
8. https://www.fishbase.se/
9. Identifying characters https://fishbase.mnhn.fr/physiolog
10. Identifying characters https://google.com
11. Goswami, U.C., Basistha, S.K., Bora, D., Shyamkumar, K., Saikia, B., & Changsan, K. (2012). Fish diversity of North East India, inclusive of the Himalayan and Indo-Burma biodiversity hotspots zones: A checklist on their taxonomic status, economic importance, geographical distribution, present status and prevailing threats. *International Journal of Biodiversity and Conservation*, 4(15), 592–613.