Biological Forum – An International Journal **16(7): 285-291(2024)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Ichthyofaunal Diversity in the Rivers of Meghalaya

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(Received: 25 April 2024; Revised: 17 May 2024; Accepted: 18 June 2024; Published: 15 July 2024)
(Published by Research Trend)

ABSTRACT: Three riverine systems—the Wah Umngot, Wah Shella, and Wah Umtrew rivers—located in Meghalaya's West Jaintia Hills, East Khasi Hills, and Ri-Bhoi district were used for the research of fish diversity. In the current study, 52 distinct species of fish belonging to 38 genera, 16 families and 6 orders and have been identified along with their IUCN check list conservation status category. The study was carried out between August 2023 and January 2024. The orders Cypriniformes, Perciformes, Siluriformes, Beloniformes, Tetraodontiformes, and Anabantiformes comprise the fish fauna found in these rivers. Cyprinidae dominated the group with 27 species, followed by Bagridae with 4, Balitoridae and Channidae with 3, Clariidae, Cobitidae, and Sisoridae with 2 each, and the remaining families, which included 1 species each for Badidae, Gobidae, Heteropneustidae, Olyridae, Siluridae, and Tetraodontidae. Attempts have been made to portray fish diversity and economic significance and emphasize the value of conserving biodiversity.

Keywords: Meghalaya, Fish species, Distribution, IUCN status, Economic importance.

INTRODUCTION

The term ‘‘biodiversity’’ was first coined by Lovejoy (1980) and is universally used to designate the number of species (Swingland, 2001). The concept of biodiversity is used to describe the number and variability of species in a given ecosystem. It illustrates the hierarchy of escalating degrees of complexity and structure seen in ecological systems, including those found in DNA, people, populations, species, communities, ecosystems, and biomes. It is essential to study the fish biodiversity of our water ecosystem because maintaining biodiversity is essential for overall environmental quality and for understanding the intrinsic worth of all species on earth (Ehrlich & Wilson 1991). The term Ichthyo-diversity refers to a variety of fish species, and it might also refer to the way alleles and genotypes are distributed within the Pisces population depending on the context and scale (Burton *et al.,* 1992).

Globally, fish make up almost half of all vertebrates. Water bodies are invariably inhabited by fish. In addition to providing food resources, these organisms also provide useful information about the ecological health of the waters they live in (Nel *et al.,* 2008).

Along with supporting natural diversity, economic growth, and wellness, the river is a priceless resource (Chapman, 1996). Indian rivers form a repository of aquatic organisms, which constitute the capture fisheries sector in the country (Madhavi *et al*., 2012). A total of 930 freshwater fish species are found in India, belonging to 326 genera, 99 families, and 20 orders (Das and Sarmah 2014). In the north-eastern region of India, there is a distinct terrain and arrangement of watershed systems that fascinates and lures the ichthyologist for their exploration of what can be established in the field of ichthyology. Three river systems make up the entire Himalayan range: the Ganga, Brahmaputra, and Indus (Unni, 2003). India ranks ninth in the world for fresh water resources and is one of the twelve mega-biodiversity countries. It has two biodiversity hotspots: the Eastern Himalayas and the Western Ghats (Mittermeier and Mittemeier 1997).

As part of the North Eastern region of India, Meghalaya lies between the latitudes 25.1 N' and 26.7' N and the longitudes 89.50' E and 92.48' E. Meghalaya has two drainage systems: Barak in the south and Brahmaputra in the north. In the Brahmaputra drainage, the rivers Umiam, Kopili, Myntang, Jingiram, and Simsang are significant. Barak drainage's Kynshi, Umngot, and Myntdu (Ramanujam *et al.,* 2010). Within the overall resources of North Eastern states, this state, consisting of 12 districts, has the longest river and canal system, spanning approximately 5600 km (Gurumayum and Choudhury 2007). There are 104 different fish species

found in the rivers of Meghalaya, which flow either to the northern side (Brahmaputra) or to the river Barak in the southern part (Sen and Dey 1984). 152 species, categorized into 74 genera, 29 families, and 8 orders, were reported by Sen (1995) from the state. On the other hand, Sen (2000) revised the data and enumerated 165 distinct species of fish found in the state of Meghalaya. In terms of ornamental fish, Meghalaya has a lot of potential. Nearly all types of bodies of water, from huge lakes and rivers to minor streams and reservoirs, are home to 155 species, which provide a broad range of ornamental values to the state. The state's ornamental fish trade, when properly managed, can augment local economies and provide opportunities for self-employment (Mahapatra, 2004). Meghalaya is home to 190 species, divided into 32 families and 11 orders, according to Vaiphei and Gupta (2016).

MATERIALS AND METHODS

A. Study Area

In order to document the diversity of fish species, a six-month survey was conducted between August 2023 and January 2024. Three different rivers were selected during the study as follows: Wah Shella-East Khasi Hills Latitude 25°10′45″N Longitude 91°38′40″E Wah Umtrew, Ri-Bhoi District Latitude 25°54′30″N Longitude 91°52′50″E Wah Umngot-West Jaintia Hills Latitude 25°11′7.33″N Longitude 92°0′53.86″E. Through experimental fishing with a scoop net, cast net, fishing rod, and varieties of locally made traps, fish samples were gathered. Interaction with the local people that live there helped obtain some of the information too.

Fig. 1. Umtrew river.

Fig. 2. Shella river.

Fig. 3. Umngot river.

B. Identification of Fishes

The collected fish were photographed in live condition and preserved in a 10% formaldehyde solution. The following standard reference was utilized for identification: Talwar and Jhingran (1991); Vishwanath *et al*. (2014). In reference to the present validity of the taxonomic names, Fricke *et al*. (2019). While nomenclature was based on www.fishbase.org (Froese & Pauly 2021) and the IUCN Conservation Status of the collected species was checked based on www.iucnredlist.org.in (Version 2022-2). Fish were measured and identified to the species level using morphometric and meristic characteristics, with the aid of conventional keys and literature.

RESULTS AND DISSCUSSION

The study disclosed that Cypriniformes was the most dominant order, representing 32 species with a 61.54% contribution to the total species, with Siluriformes coming in second with 11 species (21.15%). Perciformes by 6 species (11.54%), Beloniformes, Tetraodontiformes, and Anabantiformes, each with one species contributing to 5.77% of all the total species identified throughout the study. There is also a variation in the distribution of fish in these three rivers. The explanation for this was that the rivers are raging during rainy seasons; thus, all discharges will flow off with the river current, maintaining pristine water quality. On the other hand, rivers tend to remain sluggish during dry spells, causing the water's quality to decline and become murky and dirty. This also hides fish habitat areas. Fish were more abundant and diverse during the monsoon season as opposed to the dry season.

Table 1: Variation in fish species across three different districts.

Sr. No.	Order	Family	Genus	Species	EKH	RB	JH
1.	Cypriniformes	Cyprinidae	*Labeo*	*gonius*	+	-	+
2.				*calbasu*	+	-	+
3.				*pangusia*	-	-	+
4.				*rohita*	-	+	+
5.			*Puntius*	*chola*	+	+	+
6.				*shalynius*	-	+	-
7.				*sophore*	-	+	+
8.				*sarana*	-	-	+
9.			*Neolissocheilius*	*hexagonalepis*	-	+	+
10.				*hexastichus*	-	+	-
11.			*Tor*	*tor*	-	+	+
12.				*putitora*	-	+	+
13.			*Danio*	*rerio*	+	+	+
14.				*dangila*	+	-	+
15.			*Devario*	*aequipinnatus*	+	+	+
16.			*Amblyphayngodon*	*mola*	-	-	+
17.			*Cyprinus*	*Carpio*	-	+	-
18.			*Garra*	*gotyla*	+	-	+
19.				*lamta*	-	+	+
20.			*Barilius*	*bendelisis*	+	-	+
21.			*Ctenopharyngodon*	*idella*	+	+	-
22.			*Cirrhinus*	*reha*	+	+	+
23.				*mrigala*	+	-	+
24.			*Salmostoma*	*bacaila*	-	-	+
25.			*Chela*	*laubuca*	-	-	+
26.			*Esomus*	*danricus*	-	+	-
27.			*Hypophthalmicthys*	*molitrix*	-	+	-
28.		Balitoridae	*Balitora*	*brucei*	-	-	+
29.			*Schistura*	*multifasciatus*	-	+	+
30.			*Acanthocobitis*	*botia*	-	-	+
31.		Cobitidae	*Botia*	*dario*	-	-	+
32.			*Lepidocephalus*	*guntea*	-	+	+
33.	Perciformes	Badidae	*Badis*	*badis*	+	+	-
34.		Gobidae	*Glossogobius*	*giuris*	-	+	+
35.		Belontidae	*Colisa*	*fasciatus*	-	-	+
36.		Channidae	*Chana*	*gachua*	-	+	+
37.				*punctatus*	-	+	+
38.				*striatus*	-	-	+
39.	Siluriformes	Heteropneustidae	*Heteroneustes*	*fossilis*	-	+	+
40.		Clariidae	*Clarius*	*Batrachus*	+	-	+
41.				*gariepinus*	-	+	-
42.		Sisoridae	*Gagata*	*cenia*	+	-	+
43.			*Glyptothorax*	*telchitta*	-	-	+
44.		Bagridae	*Mystus*	*cavasius*	+	-	+
45.			*Mystus*	*bleeker*	+	-	-
46.			*Mystus*	*vittatus*	+	+	-
47.			*Batasio*	*batasio*	+	-	+
48.		Siluridae	*Ompak*	*pabo*	-	+	+
49.		Olyridae	*Olyra*	*longicaudata*	+	-	+
50.	Beloniformes	Belonidae	*Xenentodon*	*cancila*	+	-	+
51.	Tetradontiformes	Tetradontidae	*Tetratodon*	*cutcutia*	+	-	+
52.	Anabantiformes	Anabantidae	*Anasbus*	*Testunideus*	-	+	+

Here (+) sign indicates the availability of the species and (-) sign indicates the absence of the Species

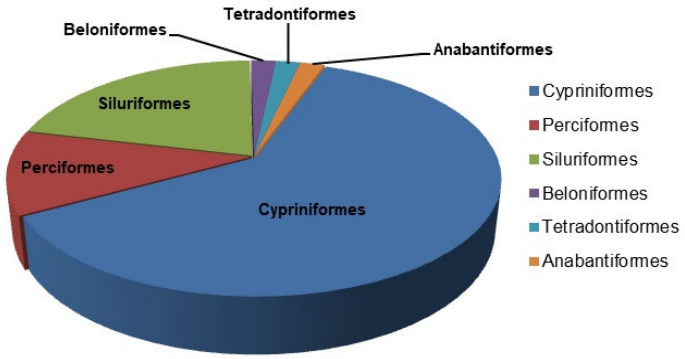
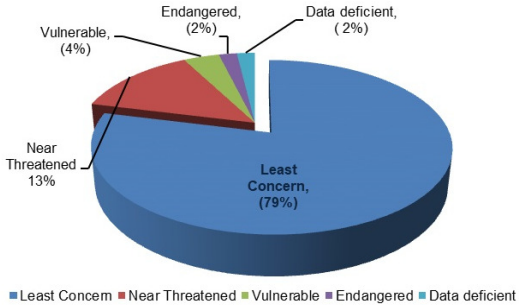


Table 2: Meghalaya's fish fauna: feeding behavior, habitat, economic importance, and IUCN status.

Species	Feeding Behaviour	Habitat	Economic importance	IUCN status
Tor tor (Hamilton,1822)	Omnivorous	R, L Str (BP)	Food	DD
Tor putitora (Hamilton,1822)	Omnivorous	R, L, (BP)	Food	EN
Neolissocheilius hexagonalepis (McClelland,1839)	Omnivorous	R, Str (BP)	Food	NT
Neolissocheilius hexastichus (McClelland,1839)	Omnivorous	Str(BP)	Food	NT
Anabus testunideus (Bloch,1792)	Carnivorous	R, L, P, Swa (D)	Food	LC
Ompok pabo (Hamilton,1822)	Carnivorous	R, P, L(D)	Food	NT
Olyra longicaudata (McClelland, 1842)	Carnivorous	Str, R(D)	Food,Or	LC
Devario aequipinnatus (McClelland,1839)	Carnivorous	R, Str (P)	Food, Or	LC
Danio dangila (Hamilton,1822)	Carnivorous	R, Str(BP)	Food,Or	LC
Cirrhinus reba (Hamilton,1822)	Omnivorous	R, P (BP)	Food.	LC
Cirrhinus mrigala (Hamilton,1822)	Omnivorous	R, P (BP)	Food	LC
Mystus cavasius (Hamilton,1822)	Omnivorous	R, Str, L(D)	Food,Or	LC
Mystus bleekeri (Day,1877)	Carnivorous	R, Str(D)	Food,Or	LC
Mystus vittatus (Bloch,1794)	Carnivorous	R, Str (D)	Food,Or	LC
Batasio batasio (Hamilton,1822)	Carnivorous	R, Str (D)	Food,Or	LC
Tetraodon cutcutia (Hamilton,1822)	Omnivorous	R(D)	Food,Or	LC
Clarius batrachus (Linnaeus,1758)	Carnivorous	R, Str(D)	Food	LC
Clarias gariepinus (Burchell,1822)	Carnivorous	R, Str(BP)	Food	LC
Labeo gonius (Hamilton,1822)	Herbivorous	R, L(BP)	Food	LC
Labeo calbasu(Hamilton,1822)	Herbivorous	R, Str (D)	Food	LC
Labeo pangusia (Hamilton,1822)	Herbivorous	R, L(BP)	Food	NT
Labeo rohita (Hamilton,1822)	Herbivorous	R, P, L(BP)	Food	LC
Gagata cenia (Hamilton,1822)	Carnivorous	R, Str(D)	Or	LC
Glyptothorax telchitta (Hamilton, 1822)	Carnivorous	R, Str(BP)	Or	LC
Salmostoma bacaila (Hamilton,1822)	Carnivore	(BP)	Or,food	LC
Chela laubuca (Hamilton,1822)	Omnivorous	R, Str(P)	Food,Or	NT
Esomus danricus(Hamilton,1822)	Omnivorous	Str (BP)	Or	LC
Amblyphayngodon mola (Hamilton,1822)	Herbivorous	R, Str(BP)	Food,Or	LC
Cyprinus carpio (Linnaeus,1758)	Omnivorous	R, L, P (BP)	Food	VU
Garra gotyla (Gray, 1830)	Herbivorous	R, Str(BP)	Food,Or	LC
Garra lamta (Hamilton, 1822)	Herbivorous	R, Str(BP)	Or	LC
Barilius bendelisis (Hamilton,1807)	Omnivorous	R, Str(BP)	Food, Or	LC
Ctenopharyngodon idella (Valenciennes,1844)	Herbivorous	R, L, P(BP)	Food	LC
Puntius chola (Hamilton, 1822)	Carnivorous	R, Str, L(BP)	Or	LC
Puntius shalynius (Yazdani and Talukdar,1975)	Carnivorous	R, Str (BP)	Or	VU
Puntius sophore (Hamilton,1822)	Omnivorous	R, Str, L (BP)	Or	LC
Puntius sarana (Hamilton,1822)	Carnivorous	R, Str (BP)	Food	LC
Channa gachua (Hamilton,1822	Carnivorous	R, L(BP)	Food	LC
Channa punctatus (Bloch,1793)	Carnivorous	R, L (BP)	Food	LC
Channa striata (Bloch,1793)	Carnivorous	R, L(BP)	Food	LC
Badis badis (Hamilton,1822)	Carnivorous	R, P (BP)	Food,Or	LC
Glossogobius giuris (Hamilton, 1822)	Carnivorous	R (BP)	Or	LC
Colisa fasciatus (Bloch and Schneider, 1801)	Carnivorous	R, P (BP)	Or,	LC
Danio rerio(Hamilton, 1822)	Carnivorous	R, Str(BP)	Or	LC
Xenentodon cancila (Hamilton,1822)	Carnivorous	R, Str(P-N)	Or	LC
Heteropneustes fossilis(Bloch,1794)	Omnivorous	R, L (D)	Food	LC
Botia Dario(Hamilton,1822)	Carnivorous	R, Str(D)	Food,Or	LC
Lepidocephalus guntea (Hamilton,1822)	Carnivorous	R, Str (D)	Or	LC
Balitora brucei (Gray, 1830)	Omnivorous	R, Str (D)	Or	NT
Schistura multifasciatus (Day,1878)	Omnivorous	Str (BP)	Or	LC
Acanthocobitis botia (Hamilton, 1822)	Omnivorous	R,Str(D)	Or	LC
Hypophthalmicthys molitrix (Valenciennes,1844)	Herbivorous	R,Str (BP)	Food	NT

Acronym: LC: Least Concern; NT: Near Threatened; VU: Vulnerable; EN: Endangered; DD: Data Deficient; Ornamental Fish; Str: Stream; P: Pond; R: River; L: Lake; O: Omnivorous; C: Carnivorous; H: Herbivorous; P: Pelagic; BP:: Bentho Pelagic; D: Demersal; and P-N: Pelargic-Neritic.



Hora (1924) initiated the study of the ichthyofauna of Meghalaya. Sen (1995) found 152 species after a thorough investigation of Meghalaya's ichthyofauna diversity. Sen (2003) list states that 167 species can be found in Meghalaya and 176 species altogether, according to Khynriam and Sen (2014) collection. According to Vaiphei and Gupta (2016), Meghalaya is home to 190 species, divided into 32 families and 11 orders.

Over the course of the six-month study period, 52 species from 38 genera, 16 families, and 6 orders were identified from three distinct rivers: Wah Umngot, Wah Shella, and Wah Umtrew. The fish fauna from these rivers belongs to the orders Cypriniformes, Perciformes, Siluriformes, Beloniformes, Tetraodontiformes, and Anabantiformes. According to Kharbani *et al.* (2022), over the course of the study, *Cyprinus carpio*, an invasive species, was also recorded, and *Channa punctatus* had the greatest relative abundance (RA) of native fish in the Umngi River.

The study recorded the presence of 1 endangered species, 1 data deficiency, 2 vulnerable species, 7 near-threatened species, and the remaining 41 species are least concerned according to the IUCN red list assessment (Version 2022-2). There are significant concerns about the biodiversity and ecological stability of freshwater aquatic habitats. Conservation initiatives help to maintain diversity and increase the sustainability of fish output. Additionally, maintaining diversity enhances the likelihood that uncommon and late-successional species will continue to exist in populations that are at least marginally viable. The state of affairs is occasionally linked to the devastation of aquatic ecosystems, where fish diseases are common, habitat loss occurs due to siltation, obstruction of waterways, careless introduction of exotic fish species, irrational harvesting of juveniles, and other factors that could exacerbate the process of genetic loss and species extinction in the future (Kar *et al*., 1996; Kar, 2005). The Nongkhyllem Wildlife Sanctuary and the surrounding areas, according to Khynriam and Sen (2016), offer the ideal habitat for the protection of endangered species, helping the following species: *Pillaia indica, Tor putitora, Schistura sijuensis, and Clarias magur.*

In Meghalaya, a diversified fish fauna of 88.57% has been found to have potential ornamental value, with 155 species belonging to 71 genera under 30 families and 9 orders (Mahapatra, 2004). Out of 155 ornamental fish, about 51.61% are included in the export list and are marketed overseas as Indian aquarium fish. The term "living jewels" refers to decorative fish because of their unique color, shape, behavior, etc. A study by Ghosh and Lipton (1982) listed 172 fish species along with an analysis of their economic significance. In my assessment, for their economic significance, 30 fish species were considered to have ornamental value. A study conducted by Biswas and Kumar (2015) found that 109 fish species in North-East India have the potential to be ornamental species, at least when they are young or in the breeding season.

CONCLUSIONS

All three rivers of Meghalaya—(i) Wah Umngot, (ii) Wah Shella, and (iii) Wah Umtrew—are enriched with remarkable ichthyo diversity, thus alluring attention in terms of consumption, commercial value, and research purposes. The goal of the current study was to assess the fish diversity in these three distinct rivers across the districts of Ri-Bhoi, East Khasi Hills, and East Jaintia Hills. The project was carried out from August 2023 to January 2024, a duration of six months. Gaining proficiency in ichthyo-diversity offers a positive protective trail against uncertainties since it illustrates the pinnacle of water management, which is far different from merely maintaining stable populations of specific species.

Through perusal analysis, it can be concluded that a good number of people are dependent on fishing for their livelihood by employing different traditional traps and boats. However, due to the absence of proper knowledge, fish are deprived of their ornamental value and are susceptible to some major threats, such as the loss of natural habitats through the use of small mesh-sized gears, the use of pesticides and insecticides, as well as domestic waste, etc. Kottelat and Whitten (1996) assert that habitat degradation, overfishing, and other human impacts are to blame for the sharp decline in freshwater fish abundance in the north-eastern region. However, it is also evident that there is a slight decline in the number of fish, possibly due to habitat destruction (for construction activities like building houses and shops by the river sides), pollution (such as dumping of sewage), and the use of toxic chemicals (excessive use of copper sulfate) to catch fish, etc. Thus, the consequences of these innumerable anthropogenic activities seem to be the main cause affecting the diversity and distribution of fish in the water bodies. Practically in the imminent future, an index of declining fish species is expected to be stretched out due to indiscriminate disposal of sewage, unplanned developmental activities leading to degradation of rivers, and habitat destruction. Also, if

you look at the present world, there is a continuous increase in the number of fish that are threatened or endangered and are on the verge of extinction. This clearly indicates that the global environmental crisis caused by various anthropogenic activities should be given proper and urgent attention to standard protocols and resolve the issues associated with the decline of fish species. In order to comprehend and safeguard a variety of fish resources, fishermen and ichthyologists are also essential. This present study is a significant attempt to help people understand what needs to be done to prevent these species from becoming endangered or extinct. Though this study provides some notable information on fish fauna related to the fish species, their feeding behavior, habitat (the places where the fishes are found), economic significance, and their IUCN status, thorough research is still needed to investigate the ecology and breeding behaviors of these fishes in their natural environment so as to develop a conservation strategy. To sum up, careful planning is essential for conservation efforts and management plans in order to protect these natural water resources and ensure that they are respected by the public, policymakers, village administrators, and all the stakeholders to prevent any further demolishing caused to the fish and all other aquatic organisms that are still thriving in these rivers.

FUTURE SCOPE

Overall, the future scope of ichthyofaunal diversity research is broad and dynamic, offering opportunities for significant contributions to:

i) taxonomic analysis and the finding of novel species

ii) ecological knowledge that is locating and safeguarding vital habitats for a variety of fish species

iii) sustainable Management: creating plans for sustainable fishing methods that preserve fish populations and biodiversity.

iv) Biodiversity conservation.

iv) The preservation of genetic resources: maintaining genetic variety both within and between fish species in order to promote flexibility and resilience.

Acknowledgement. I acknowledge the SAGE University Bhopal and Department of Aquaculture, School of Agriculture and the Directorate of Fisheries (Shillong, Meghalaya) for providing me all necessary facilities for this study.

Conflict of Interest. None.

REFERENCES

Biswas, B. C., & Kumar, P. A. (2015). Diversity of Small Indigenous Fishes (SIF) of Nabaganga and Kaliganga rivers of Jhenidah, south western part of Bangladesh. *Research Journal of Recent Sciences, 4*(12), 77-80.

Burton, P. J., Balisky, A. E., Coward, L. P., Cumming, S. G. and Kneeshaw, D. D.(1992). The value of managing for biodiversity. *The Forestry Chronicle, 68*(2), 225-237.

Chapman, D. E. (1996). Water quality assessment: A guide to use the Biota sediments and water in Environmental Monitoring, 2nd edn, Chapman and Hall, London, U K.

Das, M., & Sarmah, J. (2014). A Study on Icthyo-Diversity of Jia Bharali River, Assam, India. *Reviews of Literature, 2*(3).

Ehrlich, P. R. and Wilson, E. O. (1991). Biodiversity studies science and policy. *Sci., 253,* 758-762.

Fricke, Ronald, Eschmeyer, William & Van der Laan, Richard (2019). Eschmeyer's catalog of fishes: Genera, species, references.

Froese, R. and Pauly, D. (Eds.) 2021. Fish Base. World Wide Web electronic publication. www.fishbase.org, version (06/2021).

Gurumayum, S. D. and Choudhury, M. (2007) Fishing methods in the rivers of North-East India. *Indian Journal of Traditional Knowledge, 8* (2), 237-241.

Ghosh, S. K. and Lipton, A. P. (1982). Ichthyofauna of the NEH Region with special reference to their economic importance. *Shillong Special Bulletin 1. ICAR Research Complex for NEH Region*, p. 119-126.

Hora, S. L. (1924). Fishes of the siju cave, Garo hills, Assam. *Rec. Indian Mus., 26*(1), 27-32.

IUCN (2023). The IUCN Red List of Threatened Species. Version 2022-2. Electronic database accessible at <https://www.iucnredlist.org>.

Kar, D., Dey, S. C., Kar, S., Michael, R .G. & Gadgil, M. (1996). Ichthyoecology, Management and Conservation Fish Resources of Lake *Sone in Assam (India). Tiger Paper (FAO, UN), 23*(3), 27-32.

Kar, D. (2005). Fish Fauna of River Barak, of Mizoram and of Tripura with a note on Conservation. *Journal of Freshwater Biology,* 16.

Kharbani, R., Nath, R., & Saxena, S. (2022). Diversity, Distribution and Abundance of Fishes in River Umngi of Meghalaya, India. International of Creative Research Thoughts.

Khynriam, D., & Sen, N. (2016). Taxonomic Studies on the Ichthyofauna of Nongkhyllem Wildlife Sanctuary and its Adjacent Areas, Ri-Bhoi District, Meghalaya. *Records of the Zoological Survey of India, 116*(4), 445–476.

Khynriam, D. and Sen, N. (2014). Taxonomic study on Nemacheiline Loaches of North East India. *Rec.zool. Surv. India, Occ. Paper No.,* 358, 1-37. Published by the Director, Zool. Surv. India, Kolkata.

Kottelat, M. and Whitten, T. (1996). Freshwater Biodiversity in Asia: With Special Reference to Fish. World Bank Technical Paper, 343.

Madhavi, V. K., Reddy V. D. A., & Reddy. V. G. (2012). Conservation of Fish Faunastic Diversity–An Indian Perspective. *European Journal of Zoological Research, 1*(3), 80- 85.

Mahapatra, B. K. (2004). Ornamental fisheries in Northeastern India. ICAR publication, ICAR, NEH region, Meghalaya.

Mittermeier, R. A. & Mittemeier, C. G. (1997). Megadiversity: Earth's Biologically Wealthiest Nation, pp.1-140. In: McAllister, D.E., A.L. Hamilton and B. Harvery (eds.). *Global Freshwater Biodiversity*. Sea Wind, Cemex, Mexico City.

Nel, L. J., J. D., Roux, R., Abell, J. P. Ashton, M. R., Cowling, V. J., Higgins, M., Thieme & Viers, H. J. (2008). Progress and challenges in freshwater conservation planning. Aquatic Conservation: Marine and Freshwater Ecosystem.

Ramanujam, S. N., Manorama, M., & Dey, S. (2010). Icthyodiversity of Meghalaya: India. *Electronic Journal of Ichthyology, 6*(2), 15-26.

Sen, N., & Dey, S. C. (1984). Fish geography of Meghalaya. *Rec. Zool. Surv. India, 81*(3 & 4), 299-314.

Sen, N. (1995). Fauna of Meghalaya, Part 1: 483-606, Zoological Survey of India.

Sen, N. (2000). Occurrence, distribution andstatus of diversified fish fauna of North East India. In: Fish Biodiversity of North East India, (ed. by A. G. Ponniah and U. K. Sarkar), pp: 31-48. National Bureau of Fish Genetic Resources (NBFGR), National Agricultural Technology Project (NATP) Publication, Lucknow, India.

Sen, N. (2003). Fish fauna of Northeast India with special reference to endemic and threatened species. *Records of the Zoological Survey of India, 101*(Part 3-4), 81-99.

Swingland, I. R. (2001). Biodiversity, Definition of *In: Encyclopedia of Biodiversity* Vol. 1. Academic Press, NY, pp 377-379.

Talwar, P. K. and Jhingran, A. G. (1991). *Inland fishes of India and adjacent Countries*, Vol. I & II. Oxford and IBH Publishing Co., Pvt. Ltd. New Dehli, 1158 pp.

Unni, K. S. (2003). Ecology of Indian rivers. *International Book Distributors, Dehradun India*.

Vaiphei, Kh. T., & Gupta, B. B. P. (2016). Fish diversity in Meghalaya. Department of Zoology North-Eastern Hill University, Publications, New Delhi.

Vishwanath, W., Nebeshwar, K., Lokeshwar, Y., Shangningam,B. D. and Rameshori, Y. 2014. *Freshwater fish taxonomy and a manual for identification of fishes of North-east India*. Manipur University, Imphal and ICAR-National Bureau of Fish Genetic Resources, Liucknow, 132 pp.

How to cite this article: Damebantei Mawa, Hameka Papang, Shriparna Saxena and Deepak Kher (2024). Ichthyofaunal Diversity in the Rivers of Meghalaya. *Biological Forum – An International Journal, 16*(7): 285-291.