E-ISSN: 2347-5129
P-ISSN: 2394-0506
(ICV-Poland) Impact Value: 76.37
(GIF) Impact Factor: 0.549
IJFAS 2025; 13(3): 306-310

www.fisheriesjournal.com
Received: 14-03-2025
Accepted: 17-04-2025

Beihrosa Solo
Department of Zoology,
Government Serchhip College,
Serchhip, Mizoram, India

Corresponding Author:
Beihrosa Solo
Department of Zoology,
Government Serchhip College,
Serchhip, Mizoram, India

Ichthyofaunal diversity, ecological significance and conservation assessment of the Tisi (Tuisi) River, Mizoram, Northeast India

Beihrosa Solo

DOI: https://www.doi.org/10.22271/fish.2025.v13.i3d.3102

Abstract
The Indo-Myanmar region, recognized as a global biodiversity hotspot, hosts a rich diversity of freshwater fish species, many of which are endemic. Situated within this ecologically critical hotspot zone, the Tisi River in Siaha District, Mizoram, plays a vital role in sustaining aquatic biodiversity and supporting local livelihoods. The present study, conducted in 2024, aims to document and assess the fish diversity of the Tisi River, an area previously underexplored in ichthyological surveys. A total of 29 fish species belonging to 19 genera were recorded during seasonal field surveys using cast nets, gill nets, and electrofishing. Species were identified using standard taxonomic references, and their conservation status was evaluated based on the IUCN Red List (2024). The genus *Garra* was found to be the most dominant, with six species including the endemic *Garra khawbungi*. The study found that 34.48% of species were categorized as Least Concern, while others were listed as Vulnerable, Near Threatened, Data Deficient, or Not Evaluated. This distribution highlights the river's ecological complexity and its conservation significance. The findings underscore the need for targeted conservation and further taxonomic assessments to protect the river's unique fish fauna and ecological integrity.

Keywords: Ichthyofauna, Tisi river, Mizoram, biodiversity hotspot, IUCN red list

1. Introduction
The Indo-Myanmar region is recognized globally as one of the richest and most ecologically significant areas for freshwater fish biodiversity [1]. This vital biodiversity hotspot spans a diverse geographical area, including northeastern India, parts of Bangladesh, and a substantial portion of Myanmar [2]. The region's extraordinary aquatic diversity is largely shaped by the presence of several major river systems, most notably the Ganges, Brahmaputra, Irrawaddy, and Salween rivers, along with their extensive networks of tributaries and floodplains [3].
These river systems traverse a wide range of altitudinal and climatic zones from the high-altitude Himalayan foothills to lowland floodplains creating a mosaic of aquatic habitats that support a high degree of species richness and endemism [4]. The dynamic flow regimes, seasonal flooding, and variety of aquatic environments such as hill streams, oxbow lakes, wetlands, and marshes contribute significantly to the ecological complexity and productivity of the region [5].
The convergence of the Indian and Southeast Asian biogeographic zones further enhances the region's biodiversity, making it a unique melting pot of fish fauna [6]. As a result, the Indo-Myanmar region not only harbours hundreds of freshwater fish species, many of which are found nowhere else in the world, but also plays a crucial role in maintaining regional and global aquatic biodiversity [7, 8].
Freshwater ecosystems in the Indo-Burma biodiversity hotspot are renowned for their high levels of species richness and endemism [9]. Few reports of fish diversity are available from Mizoram with respect to fish diversity [10-13]. Situated within this ecologically significant region, the state of Mizoram in Northeast India is home to an intricate network of river systems that play a crucial role in sustaining both biodiversity and human communities [14, 15]. Among these, the Tisi River (also known as the Tuisi River), a tributary that meanders through the region, stands out as a vital freshwater resource.

It not only supports a diverse range of aquatic life but also underpins the livelihoods and cultural practices of local populations who rely on it for fishing, agriculture, and daily water needs.

Despite its ecological and socio-economic significance, the aquatic biodiversity of the Tisi River remains poorly documented, with a particular lack of comprehensive data on its ichthyofauna (fish species). This knowledge gap presents a challenge for conservation planning and resource management in the region. The present study seeks to address this deficiency by conducting an extensive survey of fish species inhabiting the Tisi River. It aims to compile a detailed inventory of these species and assess their conservation status in accordance with the criteria established by the International Union for Conservation of Nature (IUCN). Through this effort, the study contributes to a better understanding of the river's ecological value and provides a foundation for future biodiversity conservation and sustainable management initiatives.

2. Materials and Methods

2.1 Study Area

The Tisi River, also known as Tuisi river, is an important tributary river located in the Siaha District of southern Mizoram, under the administrative region of the Mara Autonomous District Council (MADC). It flows through hilly and forested landscapes, ultimately contributing to the larger Chhimtuipui (Kolodyne) river system which drains southward into Myanmar. The Tisi River basin hosts a rich assemblage of biodiversity, including native freshwater fish, amphibians, and a variety of aquatic insects and plankton.

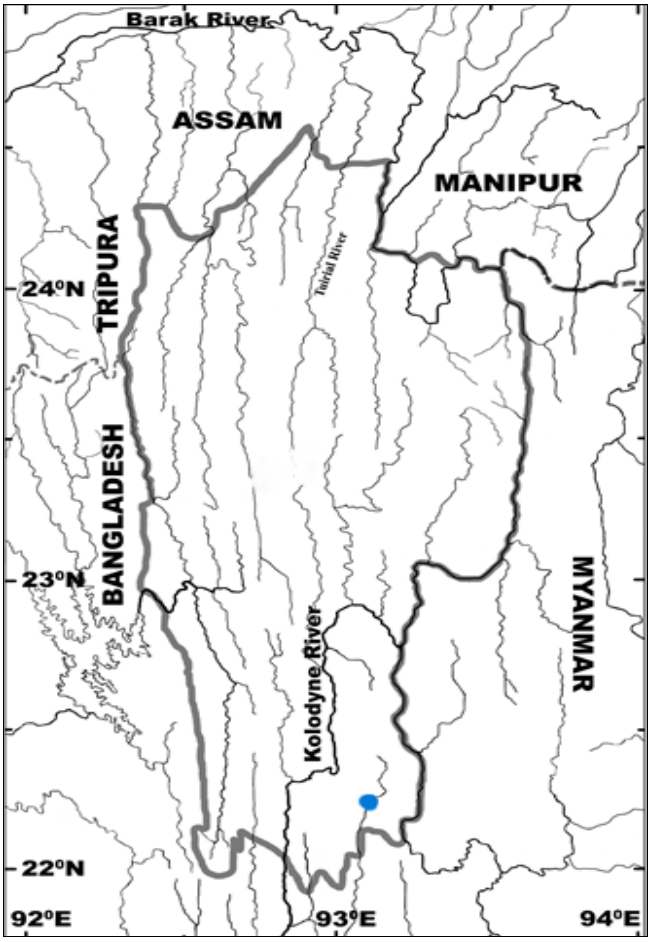

Fig 1: Location of Tisi River on the map of Mizoram

2.2 Specimen Collection

Field surveys were conducted at multiple location along the Tisi River four times throughout the year 2024 to optimize specimen collection. Standardized sampling methods, including cast nets, gill nets, and electrofishing, were employed. The collected specimens were preserved in a 10% formalin solution.

2.3 Identification and conservation assessment

The specimen was identified using following Kottelat (1990), Talwar & Jhingran (1991) and Jayaram (2008) [16-18]. Counts and measurements were taken point-to-point on the left side of each specimen using digital callipers, accurate to 0.1 mm, while fin rays were counted under a stereomicroscope.

The conservation status of each species was verified using the IUCN Red List of Threatened Species 2024. Data were organized taxonomically to determine species richness and conservation concerns.

3. Results

A total of 29 fish species belonging to 19 genera and multiple families including Cyprinidae, Balitoridae, Mastacembelidae, and Siluridae were documented (Table 1) from the Tisi River. These species belong to various taxonomic families, prominently including Cyprinidae, Balitoridae, Mastacembelidae, Siluridae, and others. The genus *Garra* was the most dominant, with six distinct species recorded, indicating the genus's adaptability and ecological relevance in this riverine ecosystem.

Out of the 29 species recorded, 10 (approximately 34.48%)

are categorized as Least Concern (LC) by the IUCN Red List. These species, such as *Puntius sophore*, *Channa gachua*, and *Esomus danrica*, suggest relatively stable populations within the river. However, two species *Garra flavatra* and *Bagarius bagarius* are classified as Vulnerable (VU), implying that they face a high risk of endangerment in the wild due to habitat degradation or overexploitation.

Three species, namely *Garra rakhinica*, *Garra vittatula*, and *Tor tor*, are listed as Near Threatened (NT), which denotes that they are close to qualifying for a threatened category in the near future. One species, *Semiplotus modestus*, is considered Data Deficient (DD), highlighting the need for more comprehensive data on its distribution and population trends.

A significant portion i.e. 12 species (around 41.38%) are categorized as Not Evaluated (NE), including several *Schistura* species and the endemic *Garra khawbungi*. This large number of NE species underlines the existing gaps in taxonomic and ecological assessments in this region and emphasizes the urgent need for further research and evaluation.

Table 1: List of fish species collected from the Tisi River and their conservation status as assessed by the IUCN Red List (2024).

Sl. No	Name of Species	Genus	IUCN
1.	*Badis badis*	*Badis*	LC
2.	*Opsarius profundus*	*Opsarius*	NE
3.	*Devario aequipinnatus*	*Devario*	LC
4.	*Esomus danrica*	*Esomus*	LC
5.	*Garra flavatra*	*Garra*	VU
6.	*Garra gotyla*	*Garra*	LC
7.	*Garra lissorhynchus*	*Garra*	NE
8.	*Garra rakhinica*	*Garra*	NT
9.	*Garra vittatula*	*Garra*	NT
10.	*Garra khawbungi*	*Garra*	NE
11.	*Pethia conchonius*	*Pethia*	LC
12.	*Pethia expletiforis*	*Pethia*	NE
13.	*Puntius sophore*	*Puntius*	LC
14.	*Rasbora daniconius*	*Rasbora*	LC
15.	*Semiplotus modestus*	*Semiplotus*	DD
16.	*Tor tor*	*Tor*	NT
17.	*Psilorhynchus kaladanensis*	*Psilorhynchus*	NE
18.	*Psilorhynchus khopai*	*Psilorhynchus*	NE
19.	*Lepidocephalichthys berdmorei*	*Lepidocephalichthys*	NE
20.	*Balitora* sp.	*Balitora*	NE
21.	*Schistura koladynensis*	*Schistura*	NE
22.	*Schistura porocephala*	*Schistura*	NE
23.	*Schistura nebeshwari*	*Schistura*	NE
24.	*Schistura scyphovecteta*	*Schistura*	NE
25.	*Mastacembelus armatus*	*Mastacembelus*	LC
26.	*Anguilla bengalensis*	*Anguilla*	NT
27.	*Glyptothorax cavia*	*Glyptothorax*	LC
28.	*Channa gachua*	*Channa*	LC
29.	*Bagarius bagarius*	*Bagarius*	VU

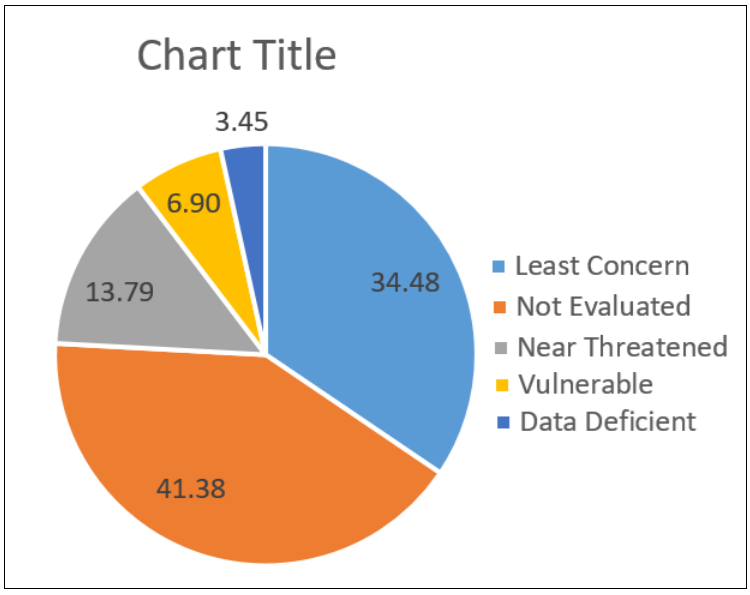

Fig 2: IUCN assessment of fish species from Tisi River in percentage

4. Ecological Significance

The ichthyofaunal diversity observed in the Tisi (Tuisi) River underscores its ecological richness and importance as a freshwater ecosystem within the Indo-Burma biodiversity hotspot. The presence of 29 fish species, spanning 19 genera, reflects a balanced aquatic habitat capable of supporting a wide range of ecological niches and trophic interactions.

4.1. Indicator of Ecosystem Health

The dominance of native species such as *Badis badis*, *Devario aequipinnatus*, and *Channa gachua*, categorized as Least Concern (LC), suggests that the river still maintains relatively unpolluted and structurally diverse habitats. These species typically require specific physicochemical conditions, and their presence can be considered an indicator of good water quality and ecological stability.

4.2. Habitat Heterogeneity and Endemism

The diversity within the genus *Garra* and the presence of endemic or region-specific species such as *Garra khawbungi* and *Psilorhynchus kaladanensis* suggest that the Tisi River hosts varied microhabitats, such as riffles, pools, and runs, which promote niche specialization. The presence of these species highlights the river's role as a refuge for localized biodiversity and evolutionary processes.

4.3. Trophic Complexity

The fish community includes herbivores (*Pethia conchonius*), insectivores (*Schistura* sp.), detritivores (*Garra* sp.), and carnivores (*Bagarius bagarius*, *Channa gachua*), indicating a well-developed food web. This trophic diversity is essential for nutrient cycling, energy transfer, and the overall functioning of the aquatic ecosystem.

4.4. Conservation Value

The presence of species categorized as Vulnerable (*Garra flavatra*, *Bagarius bagarius*) and Near Threatened (*Tor tor*, *Anguilla bengalensis*) signals the ecological sensitivity of the river system. These species often depend on undisturbed habitats and are susceptible to changes such as sedimentation, pollution, and hydrological alterations. The conservation of such species also conserves the broader ecosystem integrity.

4.5. Socio-Economic Linkages

Many of the documented species hold value for local subsistence and artisanal fisheries. For example, species like *Tor tor* and *Bagarius bagarius* are culturally and economically significant to local communities. Sustaining their populations ensures the continuity of traditional fishing practices and food security.

4.6. Potential for New Discoveries

The large proportion of species with an IUCN status of Not Evaluated (NE) or Data Deficient (DD) suggests a potentially high degree of undocumented biodiversity. This opens avenues for further ecological, taxonomic, and genetic studies, and implies that the Tisi River may harbour species new to science.

5. Discussion

The fish fauna of the Tisi River is predominantly composed of species from the family Cyprinidae, with the genus *Garra* being especially well-represented. The majority of species fall under the Least Concern category, suggesting a relatively stable population. However, the presence of species listed as Vulnerable (*Garra flavatra*, *Bagarius bagarius*), Near Threatened (*Garra rakhinica*, *Garra vittatula*, *Tor tor*, *Anguilla bengalensis*), and Data Deficient (*Semiplotus modestus*) raises concerns about the long-term viability of these populations and underscores the need for proactive conservation efforts.

The significant number of species categorized as Not Evaluated (NE) reflects the lack of comprehensive research and assessments in the region. Notably, endemic or regionally restricted species such as *Garra khawbungi* and several members of the genus *Schistura* may be at greater risk due to their limited distributions and specialized habitat requirements.

6. Conclusion

The ichthyofaunal diversity of the Tisi River highlights its ecological and conservation value within the Indo-Myanmar biodiversity hotspot. With 29 documented species, including regionally endemic and threatened taxa, the river represents a critical habitat for sustaining freshwater biodiversity. The dominance of *Garra* species and the presence of several Not Evaluated and Data Deficient species emphasize the ecological uniqueness of the river and the urgent need for focused scientific attention. The study reveals both stable populations and conservation concerns, pointing to the importance of long-term monitoring and habitat protection. Furthermore, the river's role in supporting local fisheries and livelihoods underscores its socio-economic significance. Overall, this research contributes essential baseline data and reinforces the necessity of integrating conservation planning with sustainable resource management in the region.

7. References

1. Dudgeon D. The ecology of tropical Asian rivers and streams in relation to biodiversity conservation. Annu Rev Ecol Syst. 2000;31(1):239–263. https://doi.org/10.1146/annurev.ecolsys.31.1.239
2. Myers N, Mittermeier RA, Mittermeier CG, da Fonseca GAB, Kent J. Biodiversity hotspots for conservation priorities. Nature. 2000;403(6772):853–858. https://doi.org/10.1038/35002501
3. Allen DJ, Smith KG, Darwall WRT. The status and distribution of freshwater biodiversity in the Eastern Himalaya. Gland (Switzerland): IUCN; 2010. Available from: https://portals.iucn.org/library/node/9636
4. Abell R, Thieme ML, Revenga C, Bryer M, Kottelat M, Bogutskaya N, et al. Freshwater ecoregions of the world: A new map of biogeographic units for freshwater biodiversity conservation. BioScience. 2008;58(5):403–414. https://doi.org/10.1641/B580507
5. Dudgeon D. River rehabilitation for conservation of fish biodiversity in monsoonal Asia. Ecol Soc. 2005;10(2):15. https://doi.org/10.5751/ES-01529-100215
6. Kottelat M, Whitten T. Freshwater biodiversity in Asia: With special reference to fish. World Bank Technical Paper No. 343. Washington, DC: The World Bank; 1996. Available from: https://documents.worldbank.org/en/publication/documents-reports/documentdetail/384301468752960288/freshwater-biodiversity-in-asia-with-special-reference-to-fish
7. Dudgeon D. Asian river fishes in the Anthropocene: threats and conservation challenges in an era of rapid

environmental change. J Fish Biol. 2011;79(6):1487–1524. https://doi.org/10.1111/j.1095-8649.2011.03086.x
8. Allen DJ, Smith KG, Darwall WRT. The status and distribution of freshwater biodiversity in Indo-Burma. Gland (Switzerland): IUCN; 2012. Available from: https://portals.iucn.org/library/node/10252
9. Lalramliana, Lalronunga S. Fish diversity of Tuikum River in Mizoram, northeast India. J Threat Taxa. 2015;7(6):7249–7255. https://doi.org/10.11609/JoTT.o4196.7249-55
10. Solo B, Lalnuntluanga. Diversity, distribution and conservation status of fish of the genus *Garra* (Cypriniformes: Cyprinidae) from the Kaladan drainage of Mizoram, northeastern India. Sci Vis. 2018;18(4):125–132. https://doi.org/10.33493/scivis.18.04.0
11. Lalronunga S, Lalnuntluanga, Lalramliana. Diversity of catfish (Teleostei: Siluriformes) in rivers of Barak drainage of Mizoram, Northeastern India. In: Tiwari D, editor. Advances in Environmental Chemistry. New Delhi: Excel India Publishers; 2011. p.297–300.
12. Solo B. Diversity of fishes under the genus *Schistura* McClelland 1838 (Cypriniformes: Nemacheilidae) from Kaladan drainage of Mizoram, northeastern India. J Survey Fish Sci. 2022;9(1):1310–1314.
13. Vishwanath W, Lakra WS, Sarkar UK, Jayasankar P. Fishes of North East India. Lucknow: National Bureau of Fish Genetic Resources (ICAR); 2007.
14. Datta RK, Adhikari S. Fish diversity and habitat ecology of river systems in Mizoram, Northeast India. J Inland Fish Soc India. 2012;44(1):9–15.
15. Kottelat M. Indochinese nemacheilines. A revision of nemacheiline loaches (Pisces: Cypriniformes) of Thailand, Burma, Laos, Cambodia and southern Viet Nam. München: Pfeil; 1990.
16. Talwar PK, Jhingran AG. Inland fishes of India and adjacent countries. Vol. 1 & 2. New Delhi: Oxford & IBH Publishing Co. Pvt. Ltd.; 1991.
17. Jayaram KC. Fundamentals of fish taxonomy. 1st ed. Delhi: Narendra Publishing House; 2008.