



## Loaches from the Kolodyne River drainage in Mizoram, northeastern India, and their current conservation status (Teleostei: Cypriniforms: Cobitidae).

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<b>CC License</b> CC-BY-NC-SA 4.0	<p style="text-align: center;"><b>Abstract</b></p> <p>The study highlights the presence of loaches in the Kolodyne drainage of Mizoram from the year 2021 to 2022, representing six genera: <i>Lepidocephalichthys</i>, <i>Balitora</i>, <i>Hemimyzon</i>, <i>Acanthocobitis</i>, <i>Physoschistura</i>, and <i>Schistura</i>. The genus <i>Schistura</i> exhibited the most diversity, with six species recorded, and followed by <i>Lepidocephalichthys</i> with two species. Each of the other genera—<i>Balitora</i>, <i>Hemimyzon</i>, <i>Acanthocobitis</i>, and <i>Physoschistura</i>—was represented by a single species.</p> <p><b>Key words:</b> Loaches, Kolodyne, Mizoram</p>
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### Introduction

Loaches are freshwater fish belonging to the order *Cobitoidei*, which includes several families such as *Cobitidae* (true loaches), *Botiidae* (botiid loaches), and *Nemacheilidae* (stone loaches) (Kottelat, 2012). Fishes of the suborder *Cobitoidei*, commonly referred to as Loaches are small benthic fishes that generally inhabit rivers and streams in hilly areas, known throughout Eurasia with two named species in Africa (Kottelat, 2012). The suborder *Cobitoidei* derive its name from *Cobitis*, a genus established by Linnaeus (1758) which means 'like the gudgeon'. According to Kottelat (2012) the suborder *Cobitoidei* includes 1043 valid species out of 1499 nominal species belonging to 111 genera out of 185 nominal genera. The general body pattern is oblong, elongate, compressed or cylindrical but not depressed. Snout and lips are fleshy (Kottelat, 2012; Nelson *et al.*, 2016; Sawada *et al.*, 2005). Small, inferior mouth is with thick pendulous barbels. Six to eight, rarely 10 barbels are present. The fishes are usually scaleless; scales when present, small and cycloid (Acharjee & Barat, 2014).

The Kolodyne (Chhimtui) drainage system drains the southern part of Mizoram. The main river, Kolodyne is the biggest river by volume in Mizoram which originates from the western part of Myanmar near Vanum village at an altitude of 2,325 meters and flows in south direction. It enters Mizoram near Sabawngte village from which it takes north direction for some 138 km marking the international boundary and meets Tiau River in the opposite direction. From this point, the flow direction is diverted towards north - west and meets Tuichang River near Hnahthial village and eventually flow southern-wards where tributaries meet confluent to it (Pachau, 2009). The Kolodyne drainage has been hardly explored by researchers in the past with the exception of a few workers such as Karmakar and Das (2007), Kar and Sen (2007). However, recent workers have put forward the rich diversity of fish under the suborder *Cobitoidei* and leads to the description of several new species from the study area.

### Material and Methods

Specimens were collected from the Kolodyne River and six selected tributaries such as Tuisi, Tuichang, Mat, Sala, Ngengpui, and Tiau Rivers, all part of the Kolodyne drainage in Mizoram. Field collections were

conducted from the year 2021 to 2022, four times a year, spaced three months apart, to maximize fish diversity in the samples.

Counts and measurements follow Kottelat (1990) and Talwar & Jhingran (1991). Measurements were made point to point on the left side of the specimen with digital callipers to the nearest 0.1mm. Fin rays were counted using a stereomicroscope. The specimen collected were preserved in 10% formalin solution in the field itself and later transferred to 10% formalin solution in the laboratory for morphometry and meristic counts. Photographs of each specimen were taken on the left side in fresh condition.

## Results & Discussion

Loaches collected from the Kolodyne drainage in Mizoram from the year 2021 to 2022 include six genera: *Lepidocephalichthys*, *Balitora*, *Hemimyzon*, *Acanthocobitis*, *Physoschistura*, and *Schistura*. Among these, the genus *Schistura* comprises the largest number of species, with six identified. *Lepidocephalichthys* contributed two species, while the remaining genera—*Balitora*, *Hemimyzon*, *Acanthocobitis*, and *Physoschistura*—each accounted for one species.

The genus *Schistura* represented the highest proportion, making up 45.45% of the total species collected. The six *Schistura* species identified were *Schistura koladynensis* (Lokeshwor & Vishwanath, 2012), *Schistura porocephala* (Lokeshwor & Vishwanath, 2012), *Schistura nebeshwari* (Lokeshwor & Vishwanath, 2013), *Schistura scyphovecteta* (Lokeshwor & Vishwanath, 2013), and *Schistura andrewi* (Solo *et al.*, 2014). Most *Schistura* species were widely distributed across the study sites, except for *Schistura andrewi*, which was exclusively found in the Mat River within the Kolodyne drainage. All *Schistura* species are newly described, and their IUCN status remains Not Evaluated, highlighting the need for conservation to ensure their diversity for future research.

The genus *Lepidocephalichthys* accounted for 18.18% of the total species collected, with two species identified: *Lepidocephalichthys berdmorei* and *Lepidocephalichthys guntea*. *Lepidocephalichthys berdmorei* was found in the Mat and Sala rivers, whereas *Lepidocephalichthys guntea* was collected from all other sites except Mat and Sala rivers. Both species are classified as "Least Concern" under the IUCN.

The genus *Balitora* was represented by a single species, *Balitora burmanica*, which made up 9.09% of the total. This species has a restricted distribution, found only in the Ngengpui River, and its IUCN status remains 'Not Evaluated', emphasizing the need for conservation efforts.

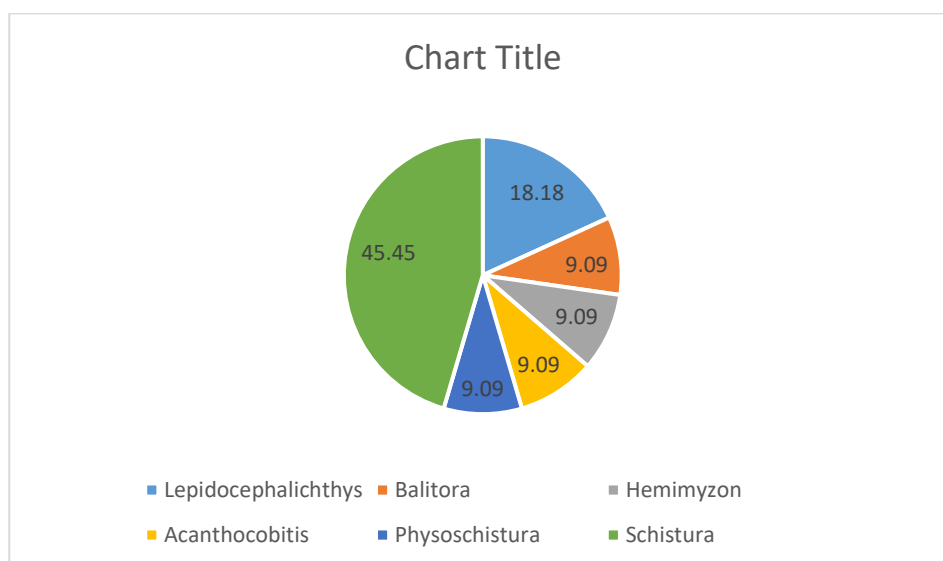
Similarly, *Hemimyzon indicus* (Lalramliana *et al.*, 2018) was the sole representative of the genus *Hemimyzon*, also contributing 9.09% of the total. This species was collected from the Kolodyne River near Lobo village in Saiha District, Mizoram, and is currently only known from this location. As a recently described species, its IUCN status is 'Not Evaluated'.

The genus *Acanthocobitis* included only *Acanthocobitis botia*, which also accounted for 9.09% of the species collected. This species was restricted to the Mat River within the Kolodyne drainage system, despite being classified as "Least Concern" by the IUCN.

The genus *physoschistura* was represented by only a single species, *Physoschistura chhimtuipeiensis* (Lalramliana *et al.*, 2016) which accounted for 9.09% of the total species collection. This species was collected only from Ngenpui River and the species is classified as 'Not Evaluated' which highlighted the need for conservation effort.

Loaches (*Cobitoidei*) play a crucial role in freshwater ecosystems due to their unique adaptations and feeding behaviors. Their ecological significance can be understood in terms of their contributions to nutrient cycling, ecosystem balance, and bioindicator roles. Loaches are benthic (bottom-dwelling) fish that help in the breakdown of organic matter by consuming detritus, algae, and small invertebrates. Their feeding habits contribute to nutrient cycling by Breaking down organic debris and recycling nutrients into the ecosystem and by enhancing sediment aeration by burrowing and stirring up the substrate. They serve as an important food source for larger fish, birds, and amphibians. They regulate populations of small invertebrates, including insect larvae, which helps control aquatic pest species. By foraging on benthic organisms and detritus, loaches help regulate sediment composition and prevent excessive algal growth, which can otherwise lead to eutrophication. Loach species, particularly those sensitive to pollution, are used as bioindicators of freshwater health.

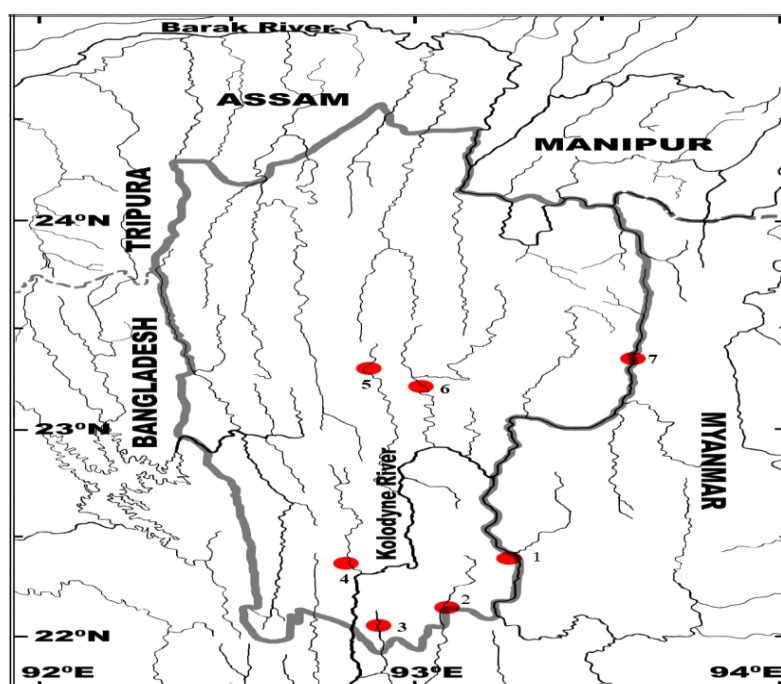
Loaches are vital components of freshwater ecosystems, contributing to ecological balance, nutrient cycling, and water quality assessment. Conservation efforts are essential to protect their habitats and maintain the biodiversity of freshwater ecosystems. Overall, the findings underscore the ecological significance of the Kolodyne drainage and the need for conservation strategies, particularly for species with limited distribution and not evaluated IUCN statuses



**Fig. 1: Genus-wise distribution of loaches from Kolodyne drainage of Mizoram, northeastern India**

**Table 1. List of Nemacheiline loaches from Kolodyne drainage of Mizoram and IUCN (2022) status.**

S.No	Name of species	Genus	IUCN
1.	<i>Lepidocephalichthys berdmorei</i>	<i>Lepidocephalichthys</i>	LC
2.	<i>Lepidocephalichthys guntea</i>	<i>Lepidocephalichthys</i>	LC
3.	<i>Balitora burmanica</i>	<i>Balitora</i>	NE
4.	<i>Hemimyzon indicus</i>	<i>Hemimyzon</i>	NE
5.	<i>Acanthocobitis botia</i>	<i>Acanthocobitis</i>	LC
6.	<i>Physoschistura chhimtuipuiensis</i>	<i>Physoschistura</i>	NE
7.	<i>Schistura koladynensis</i>	<i>Schistura</i>	NE
8.	<i>Schistura porocephala</i>	<i>Schistura</i>	NE
9.	<i>Schistura nebeshwari</i>	<i>Schistura</i>	NE
10.	<i>Schuster scyphovecteta</i>	<i>Schistura</i>	NE
11.	<i>Schistura andrewi</i>	<i>Schistura</i>	NE



**Figure.2: Study areas. 1) Kolodyne; 2) Tuisi; 3) Sala; 4) Ngengpui; 5) Mat; 6) Tuichang; 7) Tiau**

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