

## Fighting against all odds: the struggle for existence among hill stream loaches of northern Western Ghats

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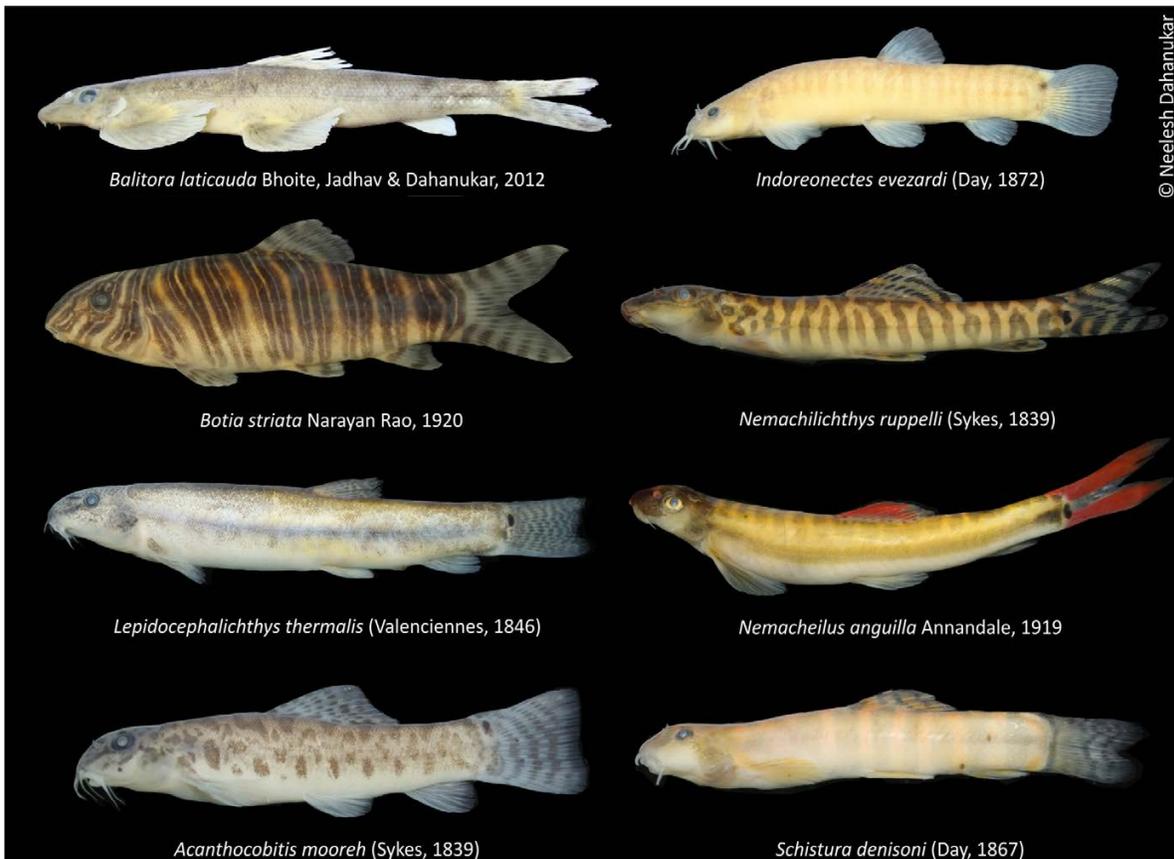
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**Highlights:** Fighting against the water current, the hill stream loaches live their life in the fast lane and occupy niches that only few others can dare to dwell in. With their beautiful color patterns, hill stream loaches are often found in rapidly flowing waters, clinging on to the rocks and plants, swiftly swimming in torrents and suddenly disappearing under the pebbles and gravel. Relatively fewer studies in the northern Western Ghats of India, have rendered the true diversity of loaches from this region to be obscure. Recreational activities on the mountain tops, habitat modifications, siltation and pollution are rapidly degrading the pristine habitats that these loaches are accustomed to live in. These beautiful fishes are also exported through aquarium pet trade in high numbers. Unless we care, it will be just a matter of time before these beautiful jewels disappear from the face of earth.

Image 1. Known species of loaches from Western Ghats of Maharashtra\*.



\* photograph of *Balitora laticauda* is reproduced from Bhoite et al. (2012; *Journal of Threatened Taxa* 4: 3038-3049).

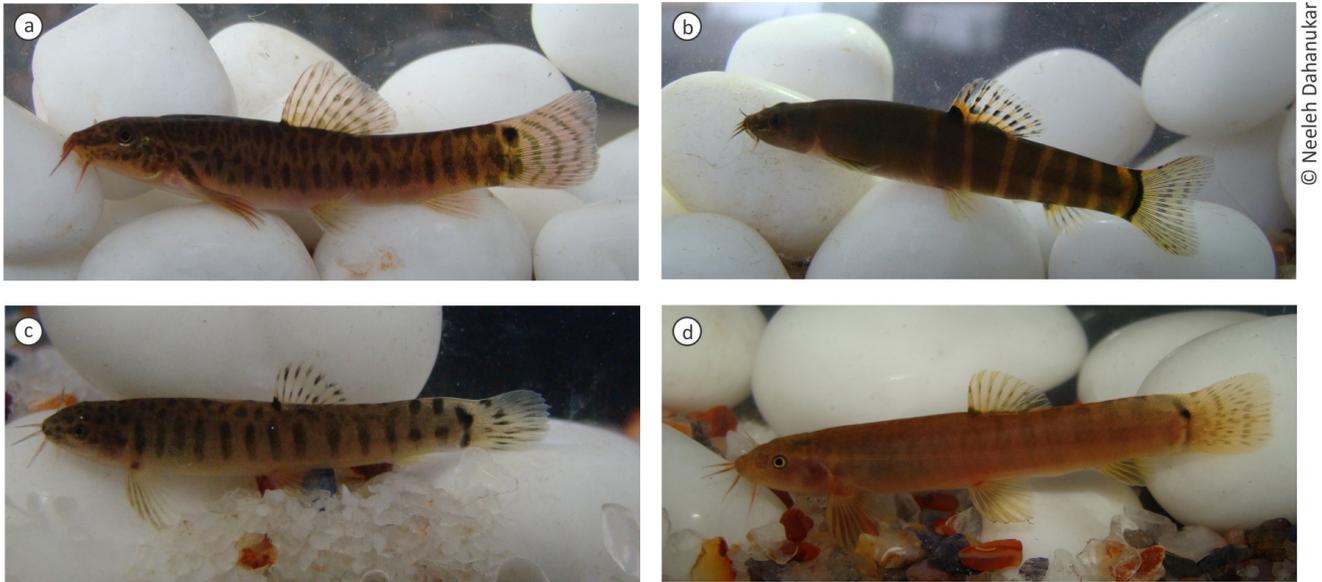


Image 2. Loaches in life. (a) *Acanthocobitis* sp. (b) *Schistura* sp. (c, d) *Indoreonectes* sp.

The hill streams of the northern Western Ghats are alive with the freshwater loaches mesmerizing us with their beautiful colors, their swift movements and a continuous attempt to defy the flow of water against which they swim. Hill stream loaches are freshwater fishes belonging to order Cypriniformes and they come under four families namely Balitoridae, Botiidae, Cobitidae and Nemacheilidae. The Western Ghats of India hosts about 43 species of loaches belonging to 12 genera out of which 39 species are endemic to this zoogeographical region (Dahanukar & Raghavan 2013). The northern parts of the Western Ghats, from Amboli in the south to Saputara in the north, hosts seven known species of loaches (Image 1) namely *Balitora laticauda* Bhoite, Jadhav & Dahanukar, 2012 from Balitoridae; *Botia striata* Narayan Rao, 1920 from Botiidae; *Lepidocephalichthys thermalis* (Valenciennes, 1846) from Cobitidae and *Acanthocobitis mooreh* (Sykes, 1839), *Indoreonectes evezardi* (Day, 1872), *Nemacheilus anguilla* Annandale, 1919, *Nemachilichthys ruppelli* (Sykes, 1839) and *Schistura denisoni* (Day, 1867) from Nemacheilidae. However, several known species of loaches are probably species complexes and there could be several undescribed species of loaches yet unknown to science. Although there are also records of fishes such as *Acanthocobitis botia* (Hamilton, 1822), A.

*sinuatus* (Day, 1870), *Schistura striata* (Day, 1867) and *Lepidocephalichthys guntea* (Hamilton, 1822), all these records (Tonapi & Mulherkar 1963; Wagh & Ghate 2003; Kharat et al. 2001; Chandanshive et al. 2007) need taxonomic validations. In life, loaches have beautiful banding patterns (Image 2), which are often used as identification criteria for loach genera and species. However, these banding patterns could show age, gender and population variations and identification based solely on color patterns could be misleading.

Loaches inhabit fast flowing streams and rivers but can also be found in small ditches in pools within the river or stream flow (Image 3). In large rivers they are normally found associated with the river bank vegetation and submerged roots of trees. A stream with pebble and gravel as the bed are preferred by the loaches. Loaches are also fond of hiding below the rocks and stones submerged in the water and use it as a defence mechanism when there is potential threat in the water. Loaches are mainly substrate feeders and they relish on phytoplankton such as diatoms and desmids and crustaceans such as daphnia and ostracods. Although enough data on their reproductive behaviour is not available, based on the presence of young in July-September indicates that the loaches in northern



Image 3. Habitats of loaches in northern Western Ghats: (a) hill streams of Kundalika Valley, (b) hill stream at Gupta Bhima, the origin of Bhia River, (c) summer time refuge in the ditches of a dried stream of Plus Valley in Mulshi, and (d) stream with pebbles, gravel and stones at Ghod River origin.

Western Ghats breed during the monsoon season. In the case of *Acanthocobitis mooreh*, it has been suggested that the species breeds twice in a year once during August-September and second time during February-March (Kharat et al. 2008).

While most of the loaches in the northern Western Ghats migrate upstream for breeding during the monsoon season perhaps the most notable migrant is *Indoreonectes evezardi*. This species can actually migrates right up to the first order streams in the mountain tops for breeding. This migration is a tedious process because of the

high water flow and rapid currents second only by the steep slops of water falls which are sometimes several feet deep. It a miracle how *Indoreonectes evezardi* copes up with these hindrances and occupy the niches in the first order streams, which hardly any other fish can inhabit. While, some hill stream loaches, like *Balitora laticauda* are known to have padded fin rays in pectoral and pelvic fins, no such structures are known for other species including *Indoreonectes evezardi*. Further studies on the loaches of the northern Western Ghats are essential to understand how they have evolved to cope up with their life in the torrential streams.



Image 4. Some loach fishing methods from Western Ghats of Maharashtra. (a) Water is channeled through a bamboo basket, (b) a false stream bed is made up of bamboo sheet and a bamboo basket is hidden under it, (c) stick with worms tied on its end is held in water for some time till loaches start feeding on the worms and the attached loaches are collected in a strainer, and (d) collected loaches.

Loaches do not form a part of a major fishery but they are either caught by local people during the late monsoon and early winter months for consumption or are collected by Katkari tribe for selling in the local fish markets. Normally, Katkari tribe people catch the loaches with a cloth by using it like a drag nets, however there are other three methods which are also used (Image 4). Because loaches do not form a major part of fisheries, fishing is not a threat to the loaches of the northern Western Ghats. This is also evident from the population dynamics of *Acanthocobitis mooreh*, which has suggested that fishing mortality is low in the species (Kharat & Dahanukar 2013).

Nevertheless, there are other anthropogenic stressors which might be more threatening to the

loaches of the northern Western Ghats. Recreational activities on the mountain tops, especially in the hill stations like Mahabaleshwar, Bhimashankar and Matheran has severely affected the associated biodiversity because of extensive tourism. Such activities lead to organic and inorganic pollution of the streams and rivers. Habitat modifications brought about by deforestation could be even more severe because the loss of riparian vegetation leads to siltation and the habitats such as gravels and pebbles, which forms the breeding grounds for the loaches, might get lost. Several, pristine habitats on the mountain tops near the plateaus at Patan and Chalkewadi are lost because of the erections of windmills. It has also been suggested that the introductions of alien invasive fishes such as Guppies and Gambusia could also have affected

some populations of loaches on the mountain tops, especially from the forts of the northern Western Ghats at Rajgad, Sinhagad and Harishchandra gad (Paingankar & Dahanukar 2013). In addition, because of their beautiful color patterns several species are in the aquarium trade. Raghavan et al. (2013) have reported extensive export of the threatened and endemic loach *Botia striata* raising concern for conservation.

While the loaches have evolved for millions of years to defy the water currents, their current struggle for existence is due to the different threats from the anthropogenic interferences. The populations of loaches have severely declined in several parts of the northern Western Ghats. Urbanization has claimed the extirpation of several populations including the ones in the Pune city and its outskirts and several species such as *Acanthocobitis mooreh*, *Indoreonectes evezardi* and *Nemachilichthys ruppelli*, which were originally described from Pune, are no longer found in this region. Loaches such as *Botia striata* and *Nemachilichthys ruppelli* are regularly caught from the wild in large numbers from Satara, Kolhapur and Sangali districts and are sold to aquarium fish exporters. Unless we care and take appropriate actions on the habitat modifications and unsustainable harvesting of the loaches from this region, it will be only a matter of time before we lose this biological heritage forever.

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