

# ***Labeo pangusia*:** **A potential candidate species for diversification of hill aquaculture**

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*Bhimtal, Upland Central, Himalayan Lake.*

The hill regions of India harbour a diverse array of fisheries resources, including both indigenous and exotic, cultivable and non-cultivable species. Most of the available species are used for food, while few of them are used for sports and ornamental purposes. In the last few decades, the demand for fish has increased drastically, due to population increase and urbanisation in the hills and its adjoining regions. The coming decades are expected to pose newer and greater challenges to coldwater fisheries sector both in the development of aquaculture and conservation practices in the hill regions of the country.

The coldwater fisheries comprise vast and varied aquatic resources with streams and rivers (10,000 km), natural lakes (20,500 ha), reservoirs (50,000 ha) and brackish water lakes (2,500 ha) (Mahanta & Sarma, 2010). The upland fish fauna comprises 258 species, belonging to 21 families and 76 genera. Out of these, the maximum of 255 species have been recorded from North-East Himalaya, 203 from the West and Central Himalaya and 91 from the Deccan Plateau (Vass & Raina, 2002). Among these, mahseer and brown trout are known for their game and sports quality, while a few have ornamental value and most of them are used as food fishes including endemic and exotic species such as snow trout, rainbow trout, loaches and Chinese carps.

The highlands of the north eastern region are the abode of many endemic species and it is believed that many species in the remote mountainous areas are still to be identified and exploited. *Labeo pangusia* is one such prized hill stream carp predominantly found in the deeper pools of upland streams. It shares similar habitats to those of mahseer (Mahanta & Sarma, 2010). *L. pangusia* grows to a fairly large size and is highly preferred by consumers as it is considered to be nutritious and good for the health (Sarma et al., 2014). It is sometimes considered as the 'rohu' of the hilly region perhaps due to its resemblance with *L. pangusia* can thrive well in lakes and fast flowing streams of hilly regions, with a preferred water temperature ranging from 10-20°C. They can also survive in Himalayan tropical waters having a maximum temperature of up to 30°C. Obviously, because of its high demand, the species is rampantly caught and this has led to its drastic depletion over the years. Since aquaculture is one of the fastest growing sectors in the world, this high priced hill stream carp can be considered as a candidate species for diversification in freshwater aquaculture, particularly of hill aquaculture.

Unless an effective conservation strategy is immediately taken, this prized species may be wiped out in the wild before long (Mahanta & Sarma, 2010). One conservation strategy for a threatened species is in-situ conservation through captive





*Sangetser, a high altitude North Eastern Himalayan Lake.*

rearing and breeding. Despite its importance as a food fish, no major attempt has been made to rear the fish in controlled conditions. Therefore, in the present communication, certain aspects of the biology, habitat ecology, rearing and breeding possibilities of *L. pangusia* in captive environment has been discussed.

#### **Identification key of *L. pangusia***

Body elongate and dorsal profile more convex than ventral. Overhanging small mouth with distinct lateral lobes. Eyes small, lips thick and non-fringed. One short maxillary barbels, concealed in labial fold. Dorsal fin inserted to snout tip, pectoral fins do not extend up to pelvic fins and fin deeply forked. Lateral line complete with 40 to 43 moderate scales.



*Labeo pangusia.*





Segregation of female.

Fish body colour varies with water colour. In rivers, the fish exhibits brownish colour above, yellowish and white at sides and below (Vishwanath et al, 2011).

### Biology

*L. pangusia* exhibits seasonal feeding intensity with bimodal peaks: One in March - April and other in September - October (Mahanta & Sarma, 2010). The fish lay eggs in the mid of April to end of July when the water temperature is between 24-28°C in the north eastern region. The species attains

maturity in the second year of life (Mahanta & Sarma, 2010) at a length of 2-30 cm in both males and females. It is a highly fecund fish and the fecundity ranges from 750,000 to 800,000 eggs. The maximum length recorded is 90 cm (Menon, 1999). It is a slow growing species. Although males grow faster than females, the female attains a larger size than the male. Spawning occurs coinciding with monsoonal rain and fingerlings are usually encountered in August-September when the floodwater recedes. *L. pangusia* can breed in the natural environment.



Selection of male.



**Table 1: Water quality parameters recorded during the captive breeding program.**

Water quality parameters	Optimum range
Temperature	28 -30°C
pH	7.5-8.5
Dissolved oxygen	6-7 ppm
Total hardness	250-300 ppm
Total alkalinity	200 - 250 ppm

**Table 2: Weight of injected brooders during the breeding trial.**

Weight of male brooders (kg)	1.5± 0.01 kg
Weight of female brooders (kg)	2.0± 0.06 kg
Ovatide dose (ml/kg)	0.5-1.0 ml/kg



Stripping of eggs.

### Captive rearing and breeding of *L. pangusia*

The IUCN classify *L. pangusia* as 'near threatened' (IUCN, 2014). Therefore, an attempt has been made for captive rearing and breeding of *L. pangusia* at Nameri Eco Camp, ABACA, Nameri National Park in Assam, India. The breeding trial commenced on 11 July 2015 with the selection of male and female broodstock. The broodstock were of 3+ years in age and were reared in a cemented tank of size 200 m<sup>2</sup>. Only broodstock that had fully attained gonadal maturity under pond conditions were selected. The length of the brooders ranged from 35-50 cm and they weighed between 1.0-2.0 kg. The brooders were administered with inducing agent Ovatide @ 0.5ml-1ml/kg body-weight in both male and female brooders (2:1 ratio). The fish were kept in breeding hapas overnight for courtship and mating. Spawning occurred 6-8 hours after hormone injection with 70% fertilisation success. The fertilised eggs were transparent, white and round in shape. A total of 750,000-8 00,000 fertilised eggs were achieved during the breeding trial.

### Significance of *Labeo pangusia* as a potential species for diversification in hill aquaculture

*L. pangusia* is a highly preferred, high-priced species. If the culture protocol of the species is perfected and seed availability in a large scale is assured, it has the potential to fetch higher market demand in the domestic markets of Himalayan states. The cost of fresh fish may increase up to Rs. 500-600 during the festive seasons in the north eastern part of India. The price of the species is reported to be two times higher than the Indian major carps, which may generate more profit to the farmers. The highly coiled intestine and the nature of the gut contents indicate that the species browses in the river bed for periphyton and detritus and therefore, the species is a detritophagus in feeding habit. Since the fish is bottom feeder in nature, it can be considered as an alternative to other bottom feeding fishes in composite fish farming, without compromising the yield and profit. Also, in order to save the germ plasm of *Labeo pangusia* from extinction in nature, it is important to culture them in pond conditions and propagate their seed on a large scale, with due regard for the genetic





*Stripping of milt.*

diversity of hatchery-produced and wild populations, for release into the rivers/streams to increase their population as well as rehabilitation of the fish in the natural eco-systems.

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*Incubation of eggs.*





*Fertilised eggs.*

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*Analysis of water quality parameters.*