

# Highly invasive and ecologically detrimental fish species affecting the livelihoods of small-scale wetland fishers in West Bengal, India



By **Aparna Roy, Priya Chaterjee, B.K Das, A.K Bera, P.R Behera & P.K Parida**  
ICAR-Central Inland Fisheries Research Institute

India is home to 877 native freshwater fish species, out of which 450 are small indigenous fish. Conservation of this rich biodiversity is crucial for the environment and maintaining healthy ecosystem. In the recent years, the rivers, floodplain wetlands, *beels*, creeks, and canals, which are home to various indigenous species, have been subjected to various anthropogenic stressors that affect the aquatic biodiversity of resident flora and fauna. One such stressors is the introduction of invasive fish species in these aquatic ecosystems. Khalsi is a seasonally open oxbow shaped lake located in the Haringhata Block of Nadia district in the state of West Bengal, India, managed by the Khalsi fishers' cooperative society. Stock enhancement of the *beel* is managed through culture-based fisheries intervention. The fish cultured in this wetland are mainly Indian Major Carps (*Labeo catla*, *Labeo rohita*), Silver Carps (*Hypophthalmichthys molitrix*), Grass Carp (*Ctenopharyngodon idella*) etc. There are also numerous small indigenous fish species like Mola (*Amblypharyngodon mola*), Punti (*Puntius* sp.), Tangra (*Mystus* sp.), and Koi (*Anabas testudineus*). Recently, a high abundance of two invasive species has been noticed in Khalsi wetland: *Pterygoplichthys paradalis* and *Pterygoplichthys disjunctivus*. These non-native species cause ecological imbalance and, eventually, economic harm. Occurrences of these two species in inland open waters have been reported from East Kolkata Wetland (EKW) and several states of India as well as in different South Asian countries. Introduction of these two species in this wetland may have been accidental; according to the wetland dependent community of the Khalsi *beel*, the species might be introduced along with carp seeds as there is no regular quality check in the hatchery produced seeds. Moreover, as Khalsi is a seasonally open wetland, these invasive species may have come from the parent river of the wetland. Frequent reporting of these fish from rivers and open or seasonally open water bodies across the nation is an indication that these species are compatible with the habitat conditions. Immediate attention towards their elimination is needed, otherwise the population will stabilize in the inland open waters of the nation and directly affect the small-scale, inland open-water fishery.

**Photo:** Khalsi Beel source of livelihoods of the fishers, 2022. © Priya Chaterjee

**Location:**  
West Bengal State, India

**Ecosystem type:**  
Freshwater

**Main gear:**  
Cast net, gillnet, harpoon, hook and line, Seine net, surrounding net and traps

**Target species:**  
Catla (*Labeo catla*), Rohu (*Labeo rohita*), Mrigal (*Cirrhinus mrigala*), Tangra (*Mystus* sp.), Snakehead murrel (*Channa striata*) and Mola (*Amblypharyngodon mola*), Punti (*Puntius* sp.)

**Vessel type:**  
Small non-motorized boats

**No. of small-scale fishers:**  
250 (Approx)

## Justice in context

### Types of justice:

- **Distributive**
- **Social**
- **Economic**
- Market
- Infrastructure/wellbeing
- **Regulatory**
- Procedural
- **Environmental**
- COVID-19 related

” ... The first incidence of presence of this species in the wetland was reported about four years back, but they were very few in numbers. In three-six months there was a huge increase in the population, including gravid females. These fish grow at a very high rate.

“

### Ecosystem hazards

Commonly detritivores, these non-native fish compete for the same niche as the bottom dwelling fish that leads to interspecies competition, resulting in degradation of native fish populations. Introduction and dominance of these species is ultimately expected to affect the food web and therefore dislodge ecological balance. They also tend to dig burrow in the mud and form tunnels in the bank wall of water bodies for spawning and nesting, which leads to soil erosion and increases turbidity of water, causing the banks to collapse. They also transfer pathogen to the native fish. All of these factors will eventually affect the small-scale wetland fisheries.

### Hazard to resources

Fish of this genera are known for their rapid growth, high level of fecundity i.e., the ability to produce abundant healthy growth or offspring, and female-biased sex ratios, which is expected to cause explosive population growth upon an introduction. Catching them during harvest compels fishers to spend more time catching the desired fish like IMCs etc., which leads to waste of valuable human resources. They are also causing damage to fishing gears, which adds to the financial burden of the fishers, and may even cause minor injuries to fishers through their handling.

### Health hazard

Due to a lack of proper disposal methods, the fish caught during harvest is discarded in open fields near the wetland. As the regular predators avoid them, the fish carcasses remains there until they are naturally decomposed. Due to their thick body composition, it takes much longer to decompose, which creates unpleasant odour. As these fields are located close to the neighbouring localities, it is causing problems for the local residents. There is also a risk of a vector borne infectious diseases from such open disposal of the fish.

### Threat to livelihood and nutritional security

The majority of the small-scale fishers are economically vulnerable and, consequently, vulnerable to food insecurity and malnutrition. Collection of small indigenous fish is a means of nutritional and livelihood security for the women of the wetland-dependent community. Increase in population of these invasive species will reduce number of small fish and subsequently affect the livelihood and nutritional security of the fishers.

## Definition of small-scale fisheries

In India, the beel/wetland fisheries are considered to be small-scale fisheries, as they are substance-based fisheries with small fishing craft and gears, involving less or no capital, using family labour to harness fish and other aquatic resources for local consumption and to earn livelihoods. Small-scale wetland fisheries in India contribute immensely to food and nutritional security and provide livelihoods for the rural populace.

# Dealing with justice

## Sources:

- Alien fish species pose threat to Manipur's indigenous breeds: Experts. Hindustan Times, Imphal, By Sobhapati Samom, Apr 28, 2020.
- Bijukumar, A., R. Smrithy, U. Sureshkumar & S. George (2015). Invasion of South American suckermouth armoured catfishes *Pterygoplichthys* spp. (Loricariidae) in Kerala, India - a case study. *Journal of Threatened Taxa* 7(3): 6987–6995; <http://dx.doi.org/10.11609/JoTT.o4133.6987-95>
- In Jharkhand's Dhanbad, Fishermen Catch Never Seen Before 'Crocodile Fish'. Local News Desk, News18.com October 26, 2021.
- Cauvery basin fishes face extinction, Deccan Chronicle. Published Dec 5, 2016
- Colin G. Scanes, Chapter 17 - Invasive Species, Editor(s): Colin G. Scanes, Samia R. Toukhsati, Animals and Human Society, Academic Press, 2018, Pages 413-426, ISBN 9780128052471, <https://doi.org/10.1016/B978-0-12-805247-1.00024-1>
- Crowds gather to see Exotic fish Cachar's Kanakpur; "Highly invasive and ecologically detrimental" DFO, Barak Bulletin, 4th July, 2022
- Don't Dump Your Aquarium in the River! The San Antonio River Authority. Nov 12, 2021
- Entrepreneurs hope to sell Mexico's 'devil fish' to Canadians as a sustainable snack. CBC News. Posted: Jul 22, 2018
- Fisherman nets rare 'Amazon Sailfin Catfish' in Khammam. Telengana Today. 2020
- Hossain, M. Y., Vadas Jr, R. L., Ruiz-Carus, R., & Galib, S. M. (2018). Amazon sailfin catfish *Pterygoplichthys pardalis* (Loricariidae) in Bangladesh: a critical review of its invasive threat to native and endemic aquatic species. *Fishes*, 3(1), 14.
- Kovalenko, K. E., Pelicice, F. M., Kats, L. B., Kotta, J., & Thomaz, S. M. (2021). Aquatic invasive species: introduction to the Special Issue and dynamics of public interest. *Hydrobiologia*, 848(9), 1939-1953
- Liang, S. H., Wu, H. P., & Shieh, B. S. (2005). Size structure, reproductive phenology, and sex ratio of an exotic armored catfish (*Liposarcus multiradiatus*) in the Kaoping River of southern Taiwan. *ZOOLOGICAL STUDIES-TAIPEI*, 44(2), 252.

The best way to deal with the current situation seems to be through the removal of these fish by catching them through repeated netting. In addition, identification of locations of the burrows, generally located on the bank of the wetland where the females lay their eggs, and subsequent disposal of the eggs by scooping them manually is an effective way of controlling their population growth. The common predators of the indigenous fish like fishing cats and piscivorous birds do not prefer this fish due to their heavily armored skin and presence of sharp spines on the fins. Hence, management by direct removal seems to be the only way out. Meanwhile, the sensitization of the fishers and the general public about the harmful effects of release of such invasive species on the ecosystem is of utmost importance. Disposal of ornamental fishery units consisting of crocodile fish is one of the potential sources of such species in open waters, hence caution needs to be practiced against such acts. In general, raising awareness among the general public about the threats imposed by invasive plant or animal species is required to prevent similar occurrence in the future. These fish are not used for consumption purpose or as fertilizers due to its high ash content and heavy metal content. However, they might be utilized as fish feed, crab bait etc. due to their high protein and lipid content that needs to be validated through research. In some parts of the Mediterranean, the thick skin of these fish is being utilized for shoe-making. Complete removal of these fish from the open-water ecosystems and ensuring prevention of similar incidents should be among the priorities for sustaining the small-scale wetland fisheries.

Photo: The crocodile fish while putting nets in wetland, 2022. © Priya Chaterjee



## How to cite

Roy, A. et al. (2022). Highly invasive and ecologically detrimental fish species affecting the livelihoods of small-scale wetland fishers in West Bengal, India. In: Kerezi, V. & Chuenpagdee, R. (Eds.) *Blue Justice For Small-Scale Fisheries: A Global Scan, Volume 3*. TBTI Global Publication Series, St. John's, NL, Canada.