

Threats and Strategies for Conservation of Indigenous Fish Fauna of Paschim Medinipur: A Review

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Abstract

Present work is a conceptual analysis and assessment of threats to indigenous fish fauna of Midnapur, West Bengal, India and suggestive remedies for protection of live gene bank of indigenous fish species. Development of standard protocol of induce breeding for small indigenous threatened fish species and its incorporation into the composite fish farming (community aquafarming system) will certainly be the sustainable conservation strategies to protect these threatened group of aquareseources. 2.

Keywords: Threatened; Indigenous; Fish; Conservation; Community; Aquafarming

Abbreviations: NBFGR: National Burro of Fish Genetic Resource; SIFFS: Small Indigenous Freshwater Fish Species; HRD: Human Resource Development

Introduction

Biodiversity conservation in general and fish genetic resources in particular have become issues of great concern both globally and nationally. India is one of the 17 mega biodiversity hot spots contributing 60-70% of the world's biological resources. In India, out of 765 native freshwater fish recorded by NBFGR, about 450 may be categorized as small indigenous freshwater fish species (SIFFS) which grow to the size of 25-30 cm in mature or adult stage of their lifecycle. Of the 450 SIF about 23% are highly important as food and local significance and play a significant role in the aquarium trade and in providing local livelihood security. Although rural population depend highly on indigenous species of fish for nutrition in many parts of India, very little attention has been paid on their role in aquaculture enhancement, nutrition, biology, captive propagation and biodiversity conservation research.

They are quite invisible, absent from statistics and indigenous knowledge about the SIFFS and their benefits has been poorly documented. Consequently, many small indigenous fishes have become threatened and endangered due to pollution, over exploitation coupled with habitat destruction, water abstraction, siltation, channel fragmentation, diseases and introduction of exotic varieties. In order to achieve sustainable utilization, appropriate planning for conservation and management strategies are of utmost importance. The greatest challenge is to secure the IPRs related to SIFFS' so that the country is able to maintain its stake on its indigenous resource and their potential benefits. Conservation

of SIFFS is also essential to maintain ecological/nutritional and socio-economic equilibrium.

Species diversity and genetic variability are necessary for the long term maintenance of stable, complex ecosystem and species. The potential areas for future research includes integrated system approach and adopting in-situ and ex-situ measures including conservation aquaculture, live gene banking, tissue banking, valuation, evaluation and registration of the genetic resources, monitoring critical parameters and replacement of natural stocks through ranching, community participation, HRD and capacity building. This paper addresses the challenging issues for sustaining aquatic biodiversity, management of freshwater resources, and highlights the research priorities and needs to develop appropriate conservation strategies for small indigenous freshwater fish species.

Majority of the indigenous freshwater fish of Paschim Medinipur are gradually reducing in number. Very poor survey has been done on the fish fauna of the district [1-3]. There is no record on the conservation status of indigenous freshwater fish fauna of the district. There is a prime requirement of evaluation of conservational status and measures for conservation of the said group of fauna in the south-western Bengal. In this respect the more the delay in adopting the protection and conservation measures, the lesser will be the options left to us to protect and conserve them. This is due to the fact that most of the threatened,

near threatened and endemic freshwater fish species are already in grave danger. It may be mentioned in this context that human activities are responsible in case 99% of the threatened species. Humans are the major cause of extinction and the chief threat to different species at risk of their extinction.

Factors Responsible for Threatening the Fish Resources

Habitat loss and degradation

a. Deforestation: Depletion of forest is caused by both natural causes and human activities. But it is to be kept in mind that it is one of the chief threats contributing to many species for becoming threatened. The destruction of the riparian forests along the course of the rivers and river mouths in the estuarine region should be avoided as deforestation increases the turbidity and temperature of the water bodies which ultimately affects the existence and spawning of the fishes. It has been found that in several locations the original vegetations on either side of the Rivers Subarnarekha and Kansaboti have either been lost or replaced by exotics and cultivates due to human agencies.

b. Damming the river systems: Water diversion due to construction of dams across the rivers has been observed to affect the normal migration of the fishes. Where construction of dams is very much needed for irrigation and hydroelectric purposes, the impact on the aquatic fauna should be assessed properly. It is to be mentioned here that practically all the riverine fishes are migratory in nature moving up and down stream of the river. Dams affect their normal behaviour and movement isolating the feeding and spawning habitats of the fishes. Besides this, construction of dams across the rivers entirely changes the ecosystem of the river and causes irreversible damage to its aquatic organisms, particularly the indigenous fishes. In addition to this, dams themselves create serious consequences leading to siltation on one side and the growth of aquatic weed on the other side. It is, therefore imperative that long-term problems should not be ignored for short-term benefits. It may be referred that where dams are to be constructed their consequential effects are to be considered before construction of the dams. Farakka Barrage in the river Ganga in the Mursidabad district and Kansaboti Dam in Bankura district on the River Kansaboti are two examples where the riverine fishes are obstructed in their normal migratory route.

c. Shrinkage of Wetlands: Since several commercial fishes use the wetlands for breeding purposes, these water bodies should be properly protected and conserved. Therefore, shrinkage of the different wetlands scattered throughout the district should be controlled. This will ultimately protect the fishes and other aquatic animals of the wetland. Besides this, the connections, between the rivers and the wetlands wherever they exist are to be maintained properly otherwise riverine fishes will not migrate to the wetland for their spawning.

d. Urbanisation: It is one of the major threats to the existence of the fish fauna all over our country. Increasing urbanization and industrialization has created pollution both by the activities of the human and discharge of the industrial waste materials in the

different river systems or the water bodies in this district. This has caused an unfavourable condition to many riverine fishes, consequently making their life threatened.

Over-exploitation

Over harvesting or over-exploitation of fish for food is a major factor for threatening the fish communities in general. It is posing a threat to the fish fauna of different natural aquatic bodies due to indiscriminate exploitation of the juvenile as well as the brooders almost throughout the year.

Competition from Exotic species

Wherever aquaculture is practiced, escapes of undesirable species are likely to occur. Further, introduction of exotic species in our Indian waters has been proved to be detrimental to the indigenous fishes of our country in some cases primarily due to the competition with native species. Therefore, proper assessment should be made before introducing any alien species in this district.

The introduction or the escape of a North African catfish (*Clarias gariepinus*) has caused considerable damage to the indigenous fishes of in this district as well as rest of our country. It is a carnivorous fish and is known for faster growth rate. It can attain a weight of 60 kg in eight years and can thrive in extreme environmental condition. Wherever this species has been introduced it has caused serious damage to the indigenous fish species. It may be mentioned here that this species is an example of escapes while importing the exotic species to our district. It is a bottom feeder which sometimes feeds at the surface. It feeds on insects, planktons, invertebrates and other fishes. It is also known to consume young birds, rotting flesh and plants. This species is also noted during intra specific aggressive interactions for generating electric organ discharges. The alarming scenario is that in some of the states of our country it has entered into natural water bodies. Recently another exotic species, *Liposarcus multiradiatus* (Hancock) (Sailfin catfish) has been observed breeding and growing in to an established population along with the native species in an aquaculture pond [4].

It is an aquarium catfish and native of South America and it has no fisheries value. It is a demersal species feeding on algae but also feed on worms, insect larvae and other bottom dwelling aquatic animals. Since its body is strongly built with bony outgrowth, it is likely to be a threat to our native species particularly those residing at the bottom layer like *Cirrhinus mrigala*. It appears that this species is also a case of escape. Silver carp (*Hypophthalmichthys molitrix*) was introduced in our country in 1959. The impacts of the introduction of the Silver carp in different water bodies and reservoirs of this state has been found to reduce the production of Catla (*Catla catla*) (one of our very important commercial fishes) due to competition for common surface feeding habitats.

The introduction of the Common carp (*Cyprinus carpio carpio*) has been observed threatening the existence of some indigenous carp such as *Cirrhinus mrigala* and *Cirrhinus reba* with which Common carp shares the same ecological niche at the bottom.

Tilapia (*Oreochromis mossambicus*) was introduced first into the pond ecosystem of the country in 1952 and was shortly thereafter stocked in reservoirs of South India. Where Tilapia has been introduced it has been found that this fish feeds on the eggs of Rohu (*Labeo rohita* which is one of the very important commercial Indian major carps). The growth rate of Catla, Mrigal (*Cirrhinus mrigala*) and Fringed-lipped peninsula carp (*Labeo fimbriatus*) have been adversely affected due to coexistence of these exotic species.

Suggestions to Safe Guard the Threatened or near Threatened Indigenous Fish Species of Paschim Medinipur

a. Habitat change should be carefully considered

Since habitat destruction or change for industrial development and urbanization, agricultural development or for damming on the course of the river systems alter the growth and production of the fish particularly freshwater fishes, therefore, due consideration should be given to protect and conserve our resident fish populations. Where deforestation is required for the developmental purposes, re-plantation should be done to maintain the stability of the soil, clean water and optimum temperature for survival and breeding of the fishes.

b. Environment Impact assessment of the exotic fish species

Since the impact of the introduction of the alien species are uncertain due to their ecological interactions in new environments, careful environment impact assessment prior to introduction is essential to conserve the biodiversity of the fishes fauna of this district. In this respect it is a good principle to try to use endemic species for aquaculture to protect and conserve the endemic species of our country instead of importing exotic species, which sometimes creates very deleterious effect to our native species. National policies are to be formed considering the diversity of our native fish fauna. Appropriate laws for checking deliberate or accidental introduction of exotic fishes are to be formed. Since introduction of the exotic fish species is a significant threat affecting 30% of all threatened fish species, import of alien species should be very carefully assessed.

c. Development of community aquaculture practice

Our country is now one of the leading fish producing countries having 225 endemic fish species [Fishbase (ver.10/2015)]. We have almost one hundred potential fish species' for aquaculture. Out of them 40 species only are being commercially being cultured [4]. It is suggested for use of endemic and native species for aquaculture i.e., traditional concept of composite fish culture have to shift into a community culture system by incorporating less compatible small indigenous threatened species of fish in the composite fish farming system to protect and conserve our own fish resources. Community fish farming system should be more sustainable aquafarming than traditional composite fish farming practice as because from the ecological point of view species diversity is directly proposonal to the stability of the ecosystem.

d. Monitoring on pollution of the natural water bodies

The industrial waste materials should be treated to remove their toxic effects before discharging their materials in the drainage systems. Pollution due to pesticides and fertilizers in and around the water courses also affect the fish population in general, therefore, the fishermen and the local people should be aware of the detrimental effect of these materials on the fishes through biomagnifications and they should also be instructed to use the biodegradable pesticides only. Some are of the opinion that pollution of the River Subarnarekha has to some extent prevented the migration of the Hilsa (*Tenulosa illisa*) fishes in Paschim Medinipur district. It has been reported by the villagers that Hilsa fish migrates up to Gopiballavepur even in 1980s. Therefore, appropriate steps are to be taken to reduce' the pollution of the water bodies where fishes naturally occur or are cultured.

e. Strict implementation of the laws governing the fishing activities

The existing laws for controlling the fishing operations are to be implemented properly. Monitoring of the water bodies should be done periodically to protect and conserve the fish resources and other aquatic animals. Contradictory laws and policies of the Government and in effective implementation of laws have also affected our resident fish species.

f. Fish sanctuary

The river and its tributaries, which pass through this district contains most of the freshwater fishes of Paschim Medinipur. Certain portions of their courses may be declared as freshwater fish sanctuaries like that of the Wildlife Sanctuaries of our country. It has been found that several scattered isolated pools are formed during the summer months along the courses of its different tributaries. Many important commercial fishes take shelter in these pools until the next onset of the monsoon. During this period fishermen catch these fishes indiscriminately including the brooders, which ultimately destroy the growth and multiplication of the fish population. In view of this fact these pools may also be declared as fish sanctuaries. Fish sanctuaries may also be set up in different isolated perennial ponds and lakes throughout this district [5].

g. Protection and conservation of the endemic species

The endemic species are considered as our National wealth. We have to enact an effective conservation measures so that our National wealth should be save.

h. Public awareness programmes

Since the fishermen particularly those living near the different river systems or water bodies are the real custodians of the fish community, they should be informed the followings facts to protect the fishes through different mass awareness programmes.

I. The traditional fishermen should be aware of the utility and use of proper mesh size of the nets and the effect of indiscriminate fishing since their livelihood is almost completely dependent on the fish catch. During fishing the fishermen should be instructed

not to use very small mesh sized net to avoid capturing juveniles or immature fishes.

II. The traditional fishermen should be taught the easy identification of the threatened and endemic species of our country occurring in this district to protect them from extinction.

III. The impact of over harvesting of fishes in a particular zone should also be intimated to the local fishermen. They should be instructed not to capture matured fishes particularly during the breeding seasons. During breeding seasons netting should be very restricted if not totally stopped. Fishermen may be opted for alternative means of livelihood especially during the breeding season to protect the brooders. In our neighbouring state, Jharkhand and Behar, where people avoid fish eating in the month of "Asar" (June-July) due to religious cause is certainly been a conservation measure for its indigenous fish species (Personal conversation).

Conclusion

The importance of indigenous fish species for nutritional security and livelihood of rural people is an established fact. Therefore, proper conservational strategies are essential for

protection of live gene bank of indigenous fish fauna. Here, author is suggesting three very basic strategies for conservation of such valuable natural resources.

- i) minimization of aqua-pollution
- ii) development of community aquaculture practice among fish farmers
- iii) Extension of induce breeding technology from IMC to different small indigenous threatened ichthyofauna of our country.

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