



## Conservation of Natural Habitat for Sustaining Indigenous Ornamental Fish Stock: Prime Need of the Hour amidst Development and Industrialization

Banlam J. Marbaniang<sup>1\*</sup>, Venerability Dhar<sup>1</sup>, Supratim Malla<sup>2</sup>, Debojit Dekari<sup>2</sup> and Nayan Chouhan<sup>2</sup>

<sup>1</sup>ICAR-Central Institute of Fisheries Education, Versova, Andheri (W), Mumbai, Maharashtra (400 061), India

<sup>2</sup>College of Fisheries, Central Agricultural University (I), Lembucherra, West Tripura, Tripura (799 210), India



Open Access

### Corresponding Author

Banlam J. Marbaniang

✉: banlamarbaniang@gmail.com

**Conflict of interests:** The author has declared that no conflict of interest exists.

### How to cite this article?

Marbaniang *et al.*, 2023. Conservation of Natural Habitat for Sustaining Indigenous Ornamental Fish Stock: Prime Need of the Hour amidst Development and Industrialization. *Research Biotica* 5(1): 07-10.

**Copyright:** © 2023 Marbaniang *et al.* This is an open access article that permits unrestricted use, distribution and reproduction in any medium after the author(s) and source are credited.

### Abstract

The rapidly increasing developmental activities around the globe are ultimately compromising with the existence of rich biodiversity in the ecosystem. Development at any cost should never affect the flora and fauna of a particular geographical location adversely. Wild fish stocks are getting depleted due to the anthropogenic activities carried out by man which disrupts their natural habitat, feeding and breeding grounds due to the output and waste generated from them which proves to be detrimental to the fish biodiversity. Moreover, 85% of ornamental fish according to studies, are caught from the wild for marketing purposes and if the natural habitat remains the sole source of exploitation, sooner or later the stock may get completely vanished. In order to sustain and maintain a healthy and rich environment, the organisms dwelling in it should not be stressed in any way so that they can normally thrive and enhance its population to conserve the environment because for centuries they have co-existed with that environment through which a positive mutual correlation has been created which is necessary to achieve the goal of a healthy and rich diversity. Therefore, necessary and concrete measures and strategies such as standardization of captive breeding techniques, ranching, regulatory measures *etc.* should be devised and implemented to achieve the said goal.

**Keywords:** Biodiversity, Conservation, Fisheries, Strategies, Sustainability

### Introduction

The presence of indigenous or native fish greatly improves the maintenance of aquatic ecosystems. This is due to the biological behaviour of the species, which has evolved to live in aquatic environments for generations, creating a significant correlation with the environment and maintaining and sustaining a healthy ecosystem. A larger initiative to save the biodiversity of the earth includes the conservation of native fish. Fish services are beneficial to both the ecology and mankind. They contribute to the richness of aquatic environments while also supporting the economy and providing food. Native fish fill a significant niche in the food chain system and are essential contributors to the trophic levels of the environment. They are just as vital as other creatures in maintaining the balance of the food web.

The existence and functioning of life on earth as we know it, as well as human survival and well-being, depend

on biodiversity in its broadest meaning. As a result, it is becoming increasingly clear that the rapid reduction in biodiversity requires urgent worldwide attention (Given and Meurk, 2000). According to Reid (1995), the dominance and superiority of humans in terms of industrialization and development contribute to the extinction of life and Thilsted *et al.* (1997) have specifically mentioned that over-exploitation of fishes and habitat loss and deterioration due to human activities are causing a huge decline in small native fish species. Therefore, Philippart (1995) has stated that in order to conserve rare, threatened, and endangered fish species, the major approach can be the development of captive breeding technologies and the ranching of captive-bred individuals into nature.

### Ornamental Fisheries Status in India

There are 700 marine and 374 freshwater species of ornamental fish native to India; among the marine species

### Article History

RECEIVED on 09<sup>th</sup> November 2022

RECEIVED in revised form 21<sup>st</sup> January 2023

ACCEPTED in final form 28<sup>th</sup> January 2023

150 are contributed by the Andaman & Nicobar Islands and 300 by the Lakshadweep Islands (Pandey and Mandal, 2017). These fish are in high demand in the international export markets. In contrast to the marine biodiversity, which is mostly found in Lakshadweep, Andaman & Nicobar Islands, Gulf of Kutch, Gulf of Mannar, Palk Bay, Kerala coast, etc., freshwater biodiversity is plentiful in NER and the Western Ghats. Approximately 90% of ornamental fish traded comes from the port of Kolkata, with 8% coming from Mumbai and 2% coming from Chennai (Raja et al., 2019). Only the native fish viz., *Sahyadria denisonii* is in demand in both the domestic and international markets. Even though there is a high demand for native ornamental fishes from India on the worldwide markets, Raja et al. (2019) also noted that only a small amount is exported for a variety of reasons. The sustainability issue is the most crucial, and there is also little interest in rearing native species that are not well-liked in the home market. Although the country has scientifically advanced in the breeding methods for a few indigenous ornamental fishes, their large-scale production has not yet started. More indigenous ornamental fishes can be produced to increase exports from the nation if government institutions can build up large-scale facilities and offer breeders specialized training and help.

### Strategies for Conservation of Wild Fish Stock

#### 1. Development of Captive Breeding for Propagation of Indigenous Ornamental Fishes

In order to lessen the strain placed on nature by wild-catch and preserve the natural population of these living treasures, Pandey and Mandal (2017) have stressed the importance of developing captive broodstock for indigenous ornamental fish species. According to Aziz et al. (2021), both climatic and human-caused factors have contributed to the loss of fish variety. According to Swain et al. (2021), the wild populations of *Trichogaster chuna* (Hamilton, 1822) are at risk due to overfishing and habitat destruction, which is gradually reducing the species' natural supply. Furthermore, Mahapatra and Lakra (2014) reported that only 15% of native fish species are raised in captivity, out of the total indigenous ornamental fish trade that takes place in India. If technological advancements in captive breeding are not made, this could ultimately result in over-exploitation, endangerment, and eventually lead to the extinction of native fish species, provided, climatic and anthropogenic factors are already acting upon this to create a synergistic effect.

#### 2. Ranching of Hatchery Bred Individuals into the Wild

When stock enrichment in a population is needed, stocking programmes are done. The method used to produce hatchery fish differs by management technique. While some fish are supplied to boost recruitment, other fish are stocked with no intention of creating a fishery that can support itself. Release of hatchery-raised juveniles has been done for several species and in many nations to rebuild a stock that has collapsed as a viable fishery, to increase a natural population for a "put and take" fishery,

or to bring back a stock that is locally extinct (Travis et al., 1998). In fact, ranching is the best way to conserve marine ornamental fishes and to sustain the coastal tourism strategy and livelihood options for local community. Through captive breeding programs complete dependence on wild for ornamental fish supply can be reduced. Apart from preventing the capture of endangered organisms by law, captive breeding, and sea ranching help in replenishing the wild populations (Rajagopal and Sethnarayanan, 2006).

#### 3. Declaration of Sanctuary

Although India's coastal and marine habitats hold significant ecological and economic importance and are governed by a policy and regulatory framework, they are at risk of degradation (Sivakumar et al., 2012). The country's coastal and marine biodiversity is suffering from a variety of direct and indirect stresses brought on by various forms of economic growth and related activities. One of the most effective conservation techniques for preserving marine environments and their resources is the creation of marine protected areas (MPAs) and sanctuaries (Agardy et al., 2011). It is possible to designate areas as sanctuaries with "sufficient ecological, faunal, floral, geomorphological, natural, or zoological significance" in order to preserve, enhance, or promote species or its environment. Sanctuaries may be established on territory that has been handed to a state government by the central government or by a state government itself. Both the declaring process and the consequences of such a declaration are the same. According to Section 18(1) of the Wildlife Protection Act, the State Government has the authority to declare its intention to establish a protected area, excluding any region within a reserve forest or territorial waters designated as a sanctuary, by issuing a notification.

#### 4. Regulatory Measures as per the Law

As per Article 253 of the Indian Constitution, the Indian Parliament possesses the power to pass laws required for fulfilling any treaty, agreement, or convention with other countries, as well as for implementing decisions made at international conferences, associations, or other bodies, whether applicable to the entire Indian territory or a part of it. In 2003, amendments were made to the Wildlife Protection Act to introduce the concept of conservation reserves and community reserves. Both strive to simultaneously improve the socioeconomic standing of the populace and preserve biodiversity. The 2011 CRZ Notification, which has special requirements for the protection of marine regions, is the result of extensive consideration and consultation. In the territorial seas, fishing and conservation practices are governed by the Marine Fishing Regulatory Acts (MFRAs).

#### 5. Public Awareness

People must be informed in order to successfully include and involve the public in decisions on marine conservation. The public participates in management choices with more traditional stakeholder groups as marine conservationists, resource users, and recreational users (Sonak et al., 2008). Information on conservation, protection, eco-restoration,

education, and awareness should be made available to all public in general so that they are aware about the dire consequences mankind may face if biodiversity is not conserved.

#### 6. Designation of Threatened or Endangered Species

The preservation of natural ecosystems is known as species conservation. Several fish that are threatened are being evaluated and added to the Red List. We must protect clusters of co-occurring native species, with prime importance given to threatened and endangered species (Moyle and Yoshiyama, 1994).

#### 7. Aquatic Diversity Management Areas (ADMAs)

Significant Natural Areas (SNAs) and large watersheds are the two categories into which the ADMAs are arbitrarily separated. SNAs refer to smaller watersheds or watershed segments that harbour exceptional habitats or species, and as a result, they may require more extensive conservation or management measures than an ADMA watershed. Examples of extraordinary features that may be found in SNAs include endangered species, pristine streams, and rare habitat types. SNAs are more akin to reserves or preserves than ADMA watersheds due to their exceptional habitats or species. Two sets of suggested guidelines are provided, one for a strategy that exclusively uses public lands and the other for a strategy that uses entire watersheds (Moyle, 1996). To manage ADMA watersheds, the first step is to reduce or cease any activities on public lands that are contributing to habitat degradation or loss of habitat diversity. Establish a network of watersheds, aquatic areas, and Aquatic Diversity Management Areas (ADMAs) where maintaining aquatic biodiversity is the primary management objective.

#### Conclusion

Conservation in its broadest sense should start from the smallest step and in order to achieve a bigger goal, step by step breakdown of the conservation process should be necessitated. Fishes are one of the major subjects of the aquatic ecosystem which balances it and maintains a healthy environment and therefore, its conservation and protection is a must since its stock depletion and disappearance can alter the ecosystem and eventually impart a negative impact upon it. The implementation of conservation plans that prioritize the protection of aquatic biodiversity is a crucial goal for all watersheds. Conservation and protection for sustaining fish stock in the wild should be made a top priority activity by concerned authorities by implementing the strategies discussed above for achieving the bigger target of saving nature.

#### References

Agardy, T., di Sciara, G.N., Christie, P., 2011. Mind the gap: Addressing the shortcomings of marine protected areas through large scale marine spatial planning. *Marine Policy* 35(2), 226-232. DOI: <https://doi.org/10.1016/j.marpol.2010.10.006>.

Aziz, M.S.B., Hasan, N.A., Mondol, M.M.R., Alam, M.M.,

Haque, M.M., 2021. Decline in fish species diversity due to climatic and anthropogenic factors in Hakaluki Haor, an ecologically critical wetland in northeast Bangladesh. *Heliyon* 7(1), e05861, DOI: <https://doi.org/10.1016/j.heliyon.2020.e05861>.

Given, D., Meurk, C., 2000. Biodiversity of the urban environment: the importance of indigenous species and the role urban environments can play in their preservation. In: *Urban Biodiversity and Ecology as a Basis for Holistic Planning and Design*. (Eds.) Stewart, G.H., Ignatieva, M.E. Lincoln University, Lincoln, New Zealand. pp. 22-33.

Reid, G.M., 1995. Conserving fishes and aquatic invertebrates: Chester Zoo Aquarium and the FAI Taxon Advisory Group. *International Zoo Yearbook* 34(1), 52-59. DOI: <https://doi.org/10.1111/j.1748-1090.1995.tb00657.x>.

Mahapatra, B.K., Lakra, W.S., 2014. Ornamental fishes of East Kolkata wetland, West Bengal, India. *IJSR Zoology* 3(12), 406-408.

Moyle, P.B., Yoshiyama, R.M., 1994. Protection of aquatic biodiversity in California: A five-tiered approach. *Fisheries* 19(2), 6-18. DOI: [https://doi.org/10.1577/1548-8446\(1994\)019<0006:POABIC>2.CO;2](https://doi.org/10.1577/1548-8446(1994)019<0006:POABIC>2.CO;2).

Moyle, P.B., 1996. Potential aquatic diversity management areas. Chapter 57. In: *Sierra Nevada Ecosystem Project: Final Report to Congress*. Vol. II. Assessments and Scientific Basis for Management Options. Davis: University of California, Centers for Water and Wildland Resources. pp. 1493-1502.

Pandey, P.K., Mandal, S.C., 2017. Present status, challenges and scope of ornamental fish trade in India. In: *Conference: Aqua Aquaria India 2017*. Mangalore, India. p. 10.

Philippart, J.C., 1995. Is captive breeding an effective solution for the preservation of endemic species? *Biological Conservation* 72(2), 281-295. DOI: [https://doi.org/10.1016/0006-3207\(94\)00090-D](https://doi.org/10.1016/0006-3207(94)00090-D).

Raja, K., Aanand, P., Padmavathy, S., Sampathkumar, J.S., 2019. Present and future market trends of Indian ornamental fish sector. *International Journal of Fisheries and Aquatic Studies* 7(2), 6-15.

Rajagopal, S., Sethnarayanan, D., 2006. Conservation of marine ornamental fishery resources along Gulf of Mannar through aquaculture. In: *Compilation of Research papers, National Research & Monitoring Moderation Workshop*. Volume 1. (Eds.) Melkani, V.K., Naganathan, V., Maheswarai, R.U. 15-16<sup>th</sup>, Dec 2006, Madurai. pp. 64-71.

Sivakumar, K., Mathur, V.B., Choudhury, B.C., 2012. Marine protected areas network in India: progress in achieving Aichi targets. In: *Abstracts of 16<sup>th</sup> meeting of subsidiary body on scientific, technical and technological advice*. 30<sup>th</sup> April-5<sup>th</sup> May 2012, Montreal, Canada. pp. 78-79.

Sonak, S., Pangam, P., Giriyan, A., 2008. Green reconstruction of the tsunami-affected areas in India using the integrated coastal zone management concept. *Journal of Environmental Management* 89(1), 14-23. DOI:

- <https://doi.org/10.1016/j.jenvman.2007.01.052>.
- Swain, S.K., Ail, S.K.S., Jena, S.K., Bairwa, M.K., Sahoo, S.N., 2021. Preference of breeding substratum, embryonic development and seed production of honey gourami, *Trichogaster chuna* (Hamilton, 1822) - An indigenous ornamental fish in demand. *Aquaculture* 542, 736874. DOI: <https://doi.org/10.1016/j.aquaculture.2021.736874>.
- Thilsted, S.H., Roos, N., Hassan, N., 1997. The role of small indigenous fish species in food and nutrition security in Bangladesh. *Naga, ICLARM Quarterly* 20(3/4), 82-84. URL: <https://hdl.handle.net/20.500.12348/2658>.
- Travis, J., Coleman, F.C., Grimes, C.B., Conover, D., Bert, T.M., Tringali, M., 1998. Critically assessing stock enhancement: an introduction to the Mote Symposium. *Bull. Mar. Sci.* 62(2), 305-311.