

Diversity of Freshwater Fishes from Maharashtra, India, with Emphasis on Their Nutritional Importance: A Review

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Abstract-- Maharashtra, one of the largest states in western India, is rich in freshwater resources, including rivers, lakes, reservoirs, and wetlands. These ecosystems harbor a diverse array of freshwater fish species that play a crucial role in regional biodiversity and food security. This review compiles existing knowledge on the diversity of freshwater fishes in Maharashtra, highlighting their ecological significance and nutritional importance. The article discusses the composition of fish fauna across major freshwater systems, the factors influencing species distribution, and the role of native and exotic species. It also underscores the nutritional benefits of commonly consumed fish species, focusing on their protein, fatty acid, and micronutrient content. The review concludes with suggestions for conservation strategies and sustainable management to ensure the protection of aquatic biodiversity and public health benefits.

Keywords-- Freshwater fish, Maharashtra, biodiversity, nutritional value, inland fisheries, conservation, food security

I. INTRODUCTION

India boasts one of the richest freshwater fish faunas in the world, with an estimated 2,500+ species inhabiting its diverse inland aquatic ecosystems. These species contribute profoundly not only to ecological balance—by maintaining food web dynamics and nutrient cycling—but also to the livelihoods and nutrition of millions, particularly in rural and tribal regions. Among the Indian states, Maharashtra stands out due to its expansive network of freshwater systems, including major rivers such as the Godavari, Krishna, Tapi, and Narmada, as well as numerous tributaries, reservoirs, lakes, and wetlands that create a mosaic of habitats supporting diverse ichthyofauna.

The state's topography, climatic variation, and hydrological regimes significantly influence the distribution and diversity of freshwater fishes. From highland streams of the Western Ghats to the floodplains and reservoirs in the central and eastern regions, each habitat supports unique assemblages of species. The freshwater fish communities here include both economically important species like *Labeo rohita*, *Catla catla*, and *Channa striata*, and ecologically significant endemics such as *Tor khudree* and *Glyptothorax spp.*

Beyond biodiversity value, these fishes play a crucial role in ensuring nutritional security, particularly among marginalized and low-income populations. Freshwater fish are a rich source of high-quality, easily digestible animal protein, along with essential nutrients such as omega-3 fatty acids, vitamin D, vitamin B12, and minerals like iron, zinc, and calcium. Their regular consumption has been linked to improved health outcomes, including reduced malnutrition and better cognitive and cardiovascular health.

However, this vital natural resource faces increasing threats from habitat destruction, unregulated fishing practices, pollution from agricultural and industrial runoff, introduction of invasive species, and the impacts of climate change. These stressors not only endanger native fish populations but also jeopardize the food and income security of dependent communities.

Given these concerns, this review endeavors to provide a comprehensive overview of the freshwater fish diversity in Maharashtra, while also exploring their nutritional value and importance in public health and food policy. By synthesizing ecological and nutritional insights, the article aims to support evidence-based strategies for conservation, sustainable fisheries management, and the promotion of fish-based nutrition in the region.

II. MATERIAL AND METHODS

This review is based on secondary data collected from:

- Research articles and books on freshwater fish diversity in Maharashtra.
- Reports from the Central Inland Fisheries Research Institute (CIFRI), National Bureau of Fish Genetic Resources (NBFGR), and Maharashtra State Fisheries Department.
- Nutritional databases and scientific literature evaluating the composition of Indian freshwater fish.
- Online databases like FishBase and IUCN Red List for species status.

The fish species were categorized based on family, habitat, and conservation status. Nutritional information was compiled from peer-reviewed studies and government reports.

III. OBSERVATIONS

- Maharashtra harbors over 180 freshwater fish species, spread across 30+ families.
- Dominant families include Cyprinidae (carps), Siluridae (catfishes), Channidae (snakeheads), and Mastacembelidae (spiny eels).
- Notable rivers like Godavari and Krishna serve as biodiversity hotspots.
- Endemic and endangered species include *Tor khudree* (Deccan Mahseer), *Ompok bimaculatus*, and *Glyptothorax spp.*

IV. NUTRITIONAL PROFILES (EXAMPLES)

- *Rohu (Labeo rohita)*: High in protein (17-20%), Omega-3 fatty acids, Vitamin D, and B-complex.
- *Catla (Catla catla)*: Rich in PUFA, calcium, and phosphorus.
- *Snakehead (Channa striata)*: Known for wound healing properties and medicinal value.
- *Mystus spp.*: High iron content and easily digestible protein.

V. RESULTS

- *Species Richness*: High in undisturbed river stretches; reservoirs have more introduced species like *Oreochromis* and *Pangasius*.
- *Endemism*: The Western Ghats region contributes several endemic species.
- *Threats*: Damming, industrial pollution, and invasive species such as *Clarias gariepinus* have impacted native diversity.
- *Nutritional Value*: Many local species meet or exceed WHO nutritional guidelines, especially in protein quality and fatty acid content.

VI. DISCUSSION

The ichthyofaunal composition of Maharashtra mirrors the broader biogeographic patterns of the Indo-Gangetic and Deccan Plateau regions, both of which are recognized for their ecological richness and species diversity. The state's freshwater ecosystems form a transitional zone between these two biodiversity hotspots, contributing to a unique assemblage of temperate, tropical, and endemic fish species.

The Cyprinidae family, comprising various carps, is particularly dominant across these systems. Their success is attributed to their broad ecological tolerance, rapid growth rates, and economic viability, making them central to both capture fisheries and aquaculture operations in the region.

However, rapid anthropogenic transformations—including large-scale urbanization, agricultural expansion, and hydrological interventions such as damming and canalization—have significantly altered aquatic habitats. These modifications have disrupted the natural flow regimes, degraded water quality, and fragmented critical breeding and feeding grounds, resulting in a shift in species composition. Many native species have been pushed to the margins of their historical range or outcompeted by exotic and invasive species like *Oreochromis mossambicus* (Tilapia) and *Clarias gariepinus* (African Catfish), which have been introduced for aquaculture but have caused ecological imbalance in natural water bodies.

VII. CONCLUSION:

Maharashtra's freshwater ecosystems are rich in fish biodiversity and serve as a vital nutritional resource. Conservation and sustainable exploitation of this diversity is essential, especially in the face of growing anthropogenic pressure. Incorporating nutritionally rich indigenous fish into food systems and policy planning can support health and food security goals in the state. Future research should focus on population dynamics, habitat conservation, and the integration of traditional ecological knowledge with modern fishery practices.

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