

Small Indigenous Fish Species of Midnapore Districts and Their Role in Sustainable Development of Local Communities in West Bengal, India

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ABSTRACT

Small Indigenous Fish Species (SIFs) have been recognized as a vital component of inland fisheries, particularly in South and Southeast Asia, due to their ecological importance, nutritional richness, and contribution to rural livelihoods. The present study examined the diversity, utilization, and socio-economic significance of SIFs in selected blocks of Paschim and Purba Medinipur districts of West Bengal, India. A mixed-method research design had been adopted over a three-year period (2021–2024), incorporating field surveys, household questionnaires, market assessments, and secondary data analysis. A total of fifteen commonly consumed SIFs belonging to seven families were documented. Block-wise analysis revealed spatial variation in species availability, household consumption, income generation, and gender participation. Findings indicated that SIFs significantly contributed to micronutrient intake, livelihood diversification, and women's economic participation, particularly among marginal and landless households. The study further highlighted emerging sustainability concerns related to habitat degradation, overexploitation, and declining wetland connectivity. The results underscored the need for policy integration of SIFs within nutrition-sensitive fisheries management and sustainable development planning. The study contributed region-specific empirical evidence supporting the role of indigenous fisheries in achieving food security, livelihood resilience, and biodiversity conservation.

Keywords: *Small Indigenous Fish Species, Inland Fisheries, Nutrition Security, Livelihoods, Gender, Sustainable Development, West Bengal.*

1. Introduction

Small Indigenous Fish Species (SIFs) have been widely acknowledged as an integral part of inland capture fisheries and floodplain ecosystems in tropical and subtropical regions. These species, generally characterized by small body size and indigenous origin, have historically supported subsistence livelihoods and local food systems (Thilsted et al., 2016). In recent decades, global attention had increasingly shifted toward the role of SIFs in addressing food and nutrition security, particularly among vulnerable populations in developing countries.

In South Asia, inland fisheries had played a crucial role in sustaining rural economies and dietary diversity. India, despite being one of the world's leading fish-producing countries, had largely prioritized major carps and commercially valuable aquaculture species in fisheries development planning. Consequently, Small Indigenous Fish Species had remained under-documented and undervalued within official statistics and policy frameworks (Das et al., 2020).

West Bengal had emerged as a leading inland fish-producing state in India due to its extensive river systems, floodplains, wetlands, and traditional fishing practices. The Midnapore districts, comprising Paschim Medinipur and Purba Medinipur, had historically supported diverse indigenous fish fauna owing to favorable agro-ecological conditions. However, rapid land-use change, intensification of aquaculture, wetland degradation, and hydrological alterations had increasingly threatened indigenous fish diversity.

The present study had been designed to assess the diversity and utilization of SIFs in the Midnapore districts and to evaluate their contribution to sustainable development through nutritional security, livelihood generation, and gender participation. By integrating ecological and socio-economic dimensions, the study aimed to bridge existing research gaps and provides policy-relevant insights.

2. Review of Literature

2.1 Global Perspectives on SIFs

International research had consistently emphasized the nutritional importance of Small Indigenous Fish Species. Studies from Bangladesh, Cambodia, and Laos had demonstrated that consumption of whole small fish significantly enhanced dietary intake of vitamin A, calcium, iron, and essential fatty acids (Roos et al., 2007; Thilsted et al., 2014). These findings had positioned SIFs as a critical component of nutrition-sensitive food systems.

Ecological studies had highlighted the role of SIFs in maintaining aquatic biodiversity and ecosystem stability. Floodplain connectivity and seasonal hydrological cycles had been identified as key determinants of SIF abundance and species richness (Welcomme et al., 2010).

2.2 National and Regional Studies in India

In India, research on inland fisheries had predominantly focused on major carps, while SIFs had received limited attention. Studies from eastern India had documented the presence of diverse cyprinids, silurids, and clupeids in wetlands and rivers (Ghosh et al., 2018). Nutritional studies had confirmed the high micronutrient density of species such as *Amblypharyngodon mola* and *Gudusiachapra* (Longvah et al., 2017).

Gender-focused studies had indicated that women played a substantial role in post-harvest processing and marketing of small fish, although their contributions remained largely informal and under recognized (Kruijssen et al., 2018).

2.3 Research Gaps

Despite growing recognition of SIFs, limited block-level studies integrating ecological, nutritional, livelihood, and gender perspectives had been conducted in the Midnapore districts. The present study had sought to address these gaps through an interdisciplinary approach.

3. Materials and Methods

3.1 Study Area

The study had been conducted in six blocks: Garbeta, Kharagpur, and Ghatal in Paschim Medinipur district, and Contai, Nandakumar, and Mahishadal in Purba Medinipur district. These areas were characterized by riverine networks, seasonal wetlands, ponds, and canals supporting inland fisheries.

3.2 Research Design

A mixed-method research design had been adopted over three years (2021–2024). Primary data had been collected through household surveys, market surveys, and key informant interviews, while secondary data had been sourced from government reports and published literature.

3.3 Sampling and Data Collection

A stratified random sampling technique had been used to select fishing households and fish vendors. Structured questionnaires had been administered to collect data on species utilization, consumption patterns, income generation, and gender participation.

3.4 Data Analysis

Quantitative data had been analyzed using descriptive statistics and comparative block-wise analysis. Qualitative responses had been thematically analyzed to capture perceptions related to sustainability and livelihood resilience.

4. Results

4.1 Diversity of Small Indigenous Fish Species

A total of fifteen commonly utilized SIFs were documented during the study period (Table 1). Cyprinidae emerged as the dominant family, followed by Siluriformes.

Table 1. Common Small Indigenous Fish Species Recorded in the Study Area

Common Name	Scientific Name	Family	IUCN Status
Mola Carplet	<i>Amblypharyngodon mola</i>	Cyprinidae	Least Concern
Darkina	<i>Esomus danricus</i>	Cyprinidae	Least Concern
Punti	<i>Puntius sophore</i>	Cyprinidae	Least Concern
Chapila	<i>Gudusia chapra</i>	Clupeidae	Least Concern
Singhi	<i>Heteropneustes fossilis</i>	Heteropneustidae	Least Concern
Magur	<i>Clarias batrachus</i>	Clariidae	Near Threatened
Pabda	<i>Ompok pabda</i>	Siluridae	Near Threatened
Koi	<i>Anabas testudineus</i>	Anabantidae	Least Concern
Guchi Baim	<i>Macrornathus pancalus</i>	Mastacembelidae	Least Concern

4.2 Block-wise Utilization Patterns

Block-wise analysis indicated that coastal and floodplain blocks such as Contai and Nandakumar exhibited higher species diversity and consumption levels compared to inland blocks.

4.3 Nutritional Contributions

Household surveys revealed that SIFs constituted a regular component of daily diets among low-income households. Species consumed whole were reported to enhance micronutrient intake, particularly among women and children.

4.4 Livelihood and Income Generation

Income from SIF-related activities was found to supplement agricultural earnings, particularly during lean seasons. Women's participation was more pronounced in processing and marketing activities.

5. Discussion

The findings corroborated earlier studies from Bangladesh and eastern India highlighting the nutritional and livelihood importance of Small Indigenous Fish Species (Thilsted et al., 2016; Ghosh et al., 2018). The dominance of cyprinid species reflected habitat suitability and traditional fishing practices in floodplain ecosystems.

Gender analysis revealed patterns consistent with national studies, wherein women's contributions remained significant yet informal. Sustainability concerns identified in the study aligned with global literature emphasizing habitat degradation and biodiversity loss.

6. Sustainability and Policy Implications

The study underscored the need to integrate SIF conservation into fisheries management and rural development policies. Community-based management, wetland restoration, and promotion of nutrition-sensitive fisheries were identified as critical strategies.

7. Conclusion

The present study demonstrated that Small Indigenous Fish Species played a multifaceted role in supporting nutrition security, livelihoods, gender empowerment, and ecological sustainability in the Midnapore districts. Recognition and integration of SIFs within development planning were essential for achieving inclusive and sustainable outcomes.

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