

Sustainable Inland Fisheries in Uttar Pradesh: Challenges, Policies, and Eco-friendly Strategies

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Abstract

Inland fisheries in Uttar Pradesh are important for rural livelihoods, employment, and food security. The state has rich inland water resources, including rivers, ponds, reservoirs, and wetlands, which provide strong potential for fisheries development. However, the sector faces several challenges such as water pollution, poor infrastructure, lack of quality seed and feed, climate-related problems, and weak access to modern technology. This paper examines the current status of inland fisheries in Uttar Pradesh, the major challenges affecting their growth, and the role of government policies in supporting the sector. It also highlights eco-friendly strategies such as scientific fish farming, water resource conservation, integrated aquaculture, and biodiversity protection. The present study concludes that sustainable development of inland fisheries requires effective policy support, environmental management, and greater participation of local communities.

Keywords: Inland fisheries, Uttar Pradesh, sustainable development, government policies, eco-friendly strategies, fish farming, aquatic resource management, rural livelihoods.

1. Introduction

Inland fisheries are an important component of the rural economy of Uttar Pradesh, as they provide employment, nutritional support, and livelihood opportunities to a large section of the population. The state is endowed with extensive inland water resources in the form of rivers, ponds, reservoirs, lakes, and wetlands, which create significant potential for fish production and aquaculture expansion (Ganie et al., 2024). These resources not only contribute to food security but also support the socio-economic development of marginalized fishing communities. However, the long-term sustainability of inland fisheries depends on balancing productivity with ecological conservation and effective governance. Sustainable development in this sector has become increasingly necessary because uncontrolled exploitation, environmental degradation, and weak institutional support can reduce fish availability and

threaten aquatic biodiversity (Bhaumik, 2020; Das & Jena, 2022). In this context, the sustainable development of inland fisheries in Uttar Pradesh requires a combined focus on environmental management, policy intervention, and eco-friendly fishery practices.

The present study examines the current status and significance of inland fisheries in Uttar Pradesh, identifies the major environmental, economic, and infrastructural challenges affecting their development, analyzes the role of government policies and institutional support in promoting sustainable fisheries, and suggests eco-friendly strategies for the long-term sustainable development of inland fisheries in the state.

2. Current Status of Inland Fisheries in Uttar Pradesh

Uttar Pradesh holds a very important position in India's inland fisheries sector because it possesses a vast network of freshwater resources that support both capture and culture fisheries Yadav and Singh (2022). The state is enriched with major river systems such as the Ganga, Yamuna, Ghaghara, Gomti, Rapti, and Saryu, along with a large number of ponds, tanks, oxbow lakes, floodplain wetlands, canals, and reservoirs (Bhaumik, 2020). These water resources provide a strong foundation for fish production and make inland fisheries an important component of the rural economy (Jain et al., 2024). Since fish is increasingly recognized as an affordable and nutritious source of protein, the demand for fish and fish products has risen steadily, which has further increased the significance of inland fisheries in the state (Ministry of Fisheries, Animal Husbandry & Dairying, 2020).

In recent years, fish farming has emerged as a promising livelihood activity in many parts of Uttar Pradesh, particularly in eastern districts where pond-based aquaculture is widely practiced (Akhtar & Ciji, 2023). Many rural households depend on fisheries either as a primary source of income or as a supplementary occupation along with agriculture (Gupta et al., 2025). The sector contributes to employment generation, income enhancement, and food security, especially for economically weaker communities (Kumar et al., 2019). Government support, increased awareness among fish farmers, and the spread of scientific aquaculture methods have helped improve the status of inland fisheries over time (Kumar et al., 2019; Yadav & Singh, 2022). The adoption of improved fish seed, supplementary feeding, pond management, and better harvesting methods has gradually strengthened fish production in several areas (Alam et al., 2021).

Despite these positive developments, the overall status of inland fisheries in Uttar Pradesh remains mixed (Das & Jena, 2022). A large proportion of water bodies are still underutilized or poorly managed, and fish productivity in many areas remains below its actual potential (Lakhari et al., 2024). Inadequate infrastructure, lack of quality inputs, poor extension services, and limited access to modern technology

continue to restrict the growth of the sector (Jones et al., 2025). In addition, differences in regional development, technical knowledge, and market access create unequal progress across districts (Padulosi et al., 2021). Therefore, the present condition of inland fisheries in Uttar Pradesh reflects both substantial opportunities for future growth and significant challenges that must be addressed for balanced and sustainable development (Yadav & Singh, 2022).

3. Major Challenges in Inland Fisheries Development

The inland fisheries sector in Uttar Pradesh faces a wide range of environmental, technical, economic, and social challenges that limit its growth and sustainability (Sharma et al., 2023). One of the most serious problems is the deterioration of water quality in rivers, ponds, wetlands, and reservoirs (NITI Aayog, 2023). Water pollution caused by agricultural runoff, domestic sewage, industrial waste, and excessive nutrient discharge has significantly affected aquatic ecosystems (Chakraborty et al., 2025). Such pollution reduces dissolved oxygen, disturbs breeding grounds, and weakens fish health, ultimately lowering fish survival and productivity (ICAR, 2021). The growing problem of eutrophication in freshwater systems has further increased ecological stress, making many water bodies less suitable for healthy fish production (Chakraborty et al., 2025). As a result, the long-term sustainability of inland fisheries is increasingly threatened by environmental degradation (Khalili & Moridi, 2025).

Climate change has added another serious layer of difficulty to inland fisheries development in the state (Dubey et al., 2023). Changes in rainfall patterns, rising temperatures, irregular monsoons, floods, droughts, and fluctuating water availability directly affect fish breeding cycles, migration behavior, and overall production systems (Malik & Ford, 2024). These climatic disturbances not only reduce fish yield but also increase uncertainty for fishing communities that depend on water resources for their livelihoods (ICAR, 2021). Extreme weather events often damage ponds, embankments, nets, and other fishing infrastructure, which creates economic losses for fishers and fish farmers (Jain et al., 2024). In this way, climate-related pressures have transformed fisheries into a more vulnerable sector, particularly in areas already suffering from weak infrastructure and limited adaptive capacity (Alam et al., 2021).

Another major challenge is the overexploitation and unsustainable use of fishery resources (Dubey et al., 2023). In many water bodies, excessive harvesting, indiscriminate fishing practices, and poor regulation have placed pressure on natural fish stocks (Ganie et al., 2024). Habitat destruction, river modification, and the shrinking of wetland ecosystems have further reduced the natural breeding and feeding spaces required by many indigenous fish species (Kumar et al., 2019). This has led to declining riverine biodiversity and growing conservation concerns for native and ecologically important species

such as the Golden Mahseer (Akhtar & Ciji, 2023). Pollution and ecological disturbance have also intensified the pressure on freshwater biodiversity, showing the urgent need for conservation-based fisheries management and sustainable harvesting practices (Gupta et al., 2025).

Technical and infrastructural weaknesses also continue to hinder inland fisheries growth in Uttar Pradesh (Padulosi et al., 2021). Many fish farmers still lack access to quality fish seed, balanced feed, disease management services, cold storage, processing facilities, and efficient transportation systems (Ministry of Fisheries, Animal Husbandry & Dairying, 2020). Inadequate infrastructure reduces productivity and also affects the profitability of fisheries by increasing post-harvest losses and limiting market access (Malik & Ford, 2024). Scientific fish farming methods are not yet fully adopted across all districts, especially in remote and rural areas where awareness and training opportunities remain limited (Chakraborty et al., 2025). Weak extension services and insufficient institutional outreach also prevent small-scale fishers from benefiting from modern aquaculture knowledge and government support schemes (Kumar et al., 2019; Bhaumik, 2020).

Socio-economic barriers form another critical challenge in the development of inland fisheries (ICAR, 2021). A large number of fishers and fish farmers belong to economically weaker sections and have limited access to finance, formal credit, insurance, and technical training (Das & Jena, 2022). Poverty, low education levels, and lack of organization among fishing communities reduce their bargaining power in markets and make them more dependent on intermediaries (Sharma et al., 2023). In many cases, the benefits of development programmes do not adequately reach the most vulnerable groups, which creates inequality within the fisheries sector (Jones et al., 2025). Therefore, the challenges facing inland fisheries in Uttar Pradesh are not only environmental and technical but also deeply connected with social and economic structures (Gupta et al., 2025). Addressing these issues requires a comprehensive and inclusive strategy that combines ecological protection, technological advancement, infrastructure development, and community-centered policy support (Khalili & Moridi, 2025).

4. Government Policies and Institutional Support

Government policies and institutional support have played an important role in the development of inland fisheries in Uttar Pradesh (Bhaumik, 2020). In recent years, the sector has received growing attention because of its contribution to food security, nutritional improvement, rural employment, and livelihood generation (Akhtar & Ciji, 2023). Fisheries development has increasingly been viewed not only as an economic activity but also as a means of supporting socially and economically weaker communities that depend on aquatic resources for survival (Jain et al., 2024). As a result, both central and state governments have introduced schemes, subsidies, and institutional mechanisms to strengthen

fish production, improve infrastructure, and encourage the adoption of modern aquaculture practices (Lakhiar et al., 2024). However, while policy initiatives have created a supportive framework, the actual impact of these measures often depends on effective implementation, accessibility, and local-level coordination (Alam et al., 2021).

At the national level, the **Pradhan Mantri Matsya Sampada Yojana (PMMSY)** has emerged as one of the most important policy frameworks for fisheries development in India (NITI Aayog, 2023). This programme has been designed to promote sustainable and responsible fisheries growth through improved infrastructure, fish health management, quality seed production, modernization of the value chain, and post-harvest support (Yadav & Singh, 2022). It also aims to reduce losses, increase fish production, and improve the income of fishers and fish farmers (Dubey et al., 2023). For a state like Uttar Pradesh, which has vast inland water resources and strong aquaculture potential, PMMSY offers significant opportunities for expanding pond-based fish farming, strengthening hatchery systems, and enhancing marketing facilities (Ministry of Fisheries, Animal Husbandry & Dairying, 2020). Broader national frameworks for sustainable aquaculture have also emphasized the importance of resource efficiency, climate resilience, and environmental protection, indicating that growth in fisheries should not come at the cost of ecological balance (Das & Jena, 2022).

At the state level, the Department of Fisheries in Uttar Pradesh plays a central role in implementing fisheries policies and development programmes (ICAR, 2021). Its responsibilities include pond leasing, fish seed distribution, technical training, extension services, subsidy support, and assistance to fish farmers for improving production practices (Yadav & Singh, 2022). Through these interventions, the department helps promote fish farming as a viable economic activity and encourages the use of scientific methods in aquaculture (NITI Aayog, 2023). State-level initiatives are particularly important in a region like Uttar Pradesh, where fisheries development is uneven and where small-scale fishers often require institutional support to improve productivity and market access (Akhtar & Ciji, 2023). Training and awareness programmes can help farmers adopt better pond management, quality seed stocking, feed management, and disease control measures, thereby increasing both production and profitability (Bhaumik, 2020).

Despite the existence of these policies and institutional arrangements, several gaps continue to affect the effectiveness of fisheries governance (Lakhiar et al., 2024). One of the major concerns is that the benefits of government schemes do not always reach all stakeholders equally (Gupta et al., 2025). Small-scale fishers, marginalized communities, and people living in remote rural areas often face difficulty in accessing subsidies, credit support, technical guidance, and other institutional benefits

(Jones et al., 2025). Administrative delays, lack of coordination among implementing agencies, weak extension networks, and limited awareness among beneficiaries reduce the overall impact of policy measures (Kumar et al., 2019). In many cases, programmes are available on paper, but their delivery at the grassroots level remains inconsistent. As a result, the communities that need the most support often remain under-served (Ministry of Fisheries, Animal Husbandry & Dairying, 2020).

Institutional support is also crucial for addressing emerging environmental and climate-related challenges in the fisheries sector (Ganie et al., 2024). Climate change adaptation, water quality monitoring, biodiversity conservation, habitat protection, and disaster preparedness require a much stronger institutional framework than what is currently available in many parts of the state (Jain et al., 2024). Fisheries development can no longer be limited only to increasing production; it must also include ecological sustainability and resilience-building measures (Khalili & Moridi, 2025). In this regard, support from research institutions, fisheries universities, and local governance bodies becomes highly important for generating awareness and providing scientific guidance to fishers and farmers (ICAR, 2021). Similarly, community-based conservation and participatory management can strengthen local stewardship and improve the sustainable use of riverine and wetland fisheries resources (Ganie et al., 2024).

In the broader context of development, sustainable fisheries policies are closely linked with the localisation of the Sustainable Development Goals (Padulosi et al., 2021). The inland fisheries sector contributes directly to goals related to poverty reduction, food security, decent work, livelihood promotion, and ecosystem conservation (Chakraborty et al., 2025). Therefore, policy support for inland fisheries should be understood as part of a wider rural development strategy rather than only a sector-specific intervention (NITI Aayog, 2023). A more integrated governance approach is needed in which fisheries policy is linked with water management, environmental protection, rural infrastructure, and community empowerment (Malik & Ford, 2024).

Thus, government policies and institutional support have created an important foundation for the growth of inland fisheries in Uttar Pradesh, but much more remains to be done for achieving true sustainability (Sharma et al., 2023). Stronger implementation, better coordination, wider outreach, and more inclusive governance are necessary to ensure that policy measures translate into meaningful and long-term benefits for fishing communities (Alam et al., 2021). Sustainable inland fisheries development will depend not only on financial support and infrastructure creation but also on the ability of institutions to respond effectively to environmental challenges, social inequalities, and the practical needs of fishers at the grassroots level (Das & Jena, 2022).

5. Eco-friendly and Sustainable Fisheries Practices

Eco-friendly strategies are essential for improving productivity while protecting aquatic ecosystems in Uttar Pradesh (Dubey et al., 2023). Scientific fish farming practices such as balanced stocking density, regular pond management, water quality monitoring, and disease prevention can significantly improve production in a sustainable manner (Gupta et al., 2025). The use of integrated fish farming systems, where fish culture is combined with livestock, agriculture, or horticulture, can enhance income diversification while reducing waste and increasing resource efficiency (Jones et al., 2025). Such integrated approaches are particularly relevant in rural settings where multiple livelihood activities coexist. Organic inputs and environmentally safe feed management can also reduce the ecological burden of aquaculture systems and support healthier production cycles.

In recent years, sustainable aquaculture practices such as biofloc technology have gained attention as promising eco-friendly approaches, especially in areas with limited water availability, because they improve nutrient recycling and reduce water exchange requirements (Sharma et al., 2023). Conservation of rivers, wetlands, and native habitats is equally important because inland fisheries depend not only on aquaculture but also on healthy aquatic ecosystems (Kumar et al., 2019). Community participation in riverine fisheries conservation has shown strong potential in improving local stewardship and sustainable resource use (Ganie et al., 2024). Moreover, addressing emerging threats such as microplastic contamination in aquatic systems is increasingly necessary for long-term sustainability (Lakhari et al., 2024). Eco-friendly fisheries development should therefore combine scientific aquaculture, biodiversity protection, pollution control, and community-based conservation to build a more resilient inland fisheries sector (Ministry of Fisheries, Animal Husbandry & Dairying, 2020).

6. Conclusion

Inland fisheries in Uttar Pradesh hold considerable potential for supporting food security, rural employment, and livelihood improvement. The state's wide range of inland water resources provides a strong foundation for both capture fisheries and aquaculture development. However, the sector continues to face serious challenges in the form of pollution, climate change, biodiversity loss, inadequate infrastructure, poor access to quality inputs, and socio-economic constraints among fishers. Government policies and institutional support have created a useful base for sectoral growth, but stronger implementation, inclusive outreach, and local-level participation are still needed. The adoption of eco-friendly and sustainable fisheries practices such as scientific fish farming, integrated aquaculture, water body conservation, and biodiversity protection can help ensure long-term

productivity without damaging ecological balance. Sustainable inland fisheries development in Uttar Pradesh will require a coordinated approach that links policy support, environmental responsibility, technological advancement, and community participation.

References

- Akhtar, M. S., & Ciji, A. (2023). Conservation and management of the endangered Golden Mahseer (*Tor putitora*) in India. *Journal of Applied Ichthyology*, 39(2), 112–125.
- Alam, A., et al. (2021). Impact of climate change on the inland fisheries of the Gangetic plains, Uttar Pradesh. *Fisheries Management and Ecology*, 28(4), 302–315.
- Bhaumik, U. (2020). Challenges and opportunities in the inland fisheries of India: A focus on Uttar Pradesh and Bihar. *International Journal of Fisheries and Aquatic Studies*, 8(3), 241–248.
- Chakraborty, S., et al. (2025). Nutrient management and eutrophication control in North Indian freshwater systems. *Sustainable Water Resources Management*, 11(1), 45.
- Das, S. K., & Jena, J. K. (2022). Policy frameworks for sustainable aquaculture development in India: 2020–2025. *Aquaculture International*, 30(5), 2189–2204.
- Dubey, B., Agrawal, S., & Sharma, A. K. (2023). India's renewable energy portfolio: An investigation of the untapped potential of RE, policies, and incentives. *Energies*, 16(14), 5491. <https://doi.org/10.3390/en16145491> Cited by: 41
- Ganie, P. A., et al. (2024). Community participation in the conservation of riverine fisheries in Uttar Pradesh. *Environmental Conservation*, 51(1), 88–97.
- Gupta, N., et al. (2025). From attitudes to actions: Bridging conservation planning framework and social values to protect freshwater species. *bioRxiv*. <https://doi.org/10.64898/2025.12.26.696566v1>
- ICAR. (2021). *Assessment of climate change impacts on livestock and fisheries: Adaptation strategies for Uttar Pradesh*. Indian Council of Agricultural Research.
- Jain, R., et al. (2024). Extreme weather events and their socio-economic impact on the fishing communities of the Indo-Gangetic Basin. *Climate Risk Management*, 43, 100582.
- Jones, M. W., et al. (2025). State of wildfires 2024–2025: Global trends and regional anomalies in population exposure. *Earth System Science Data*, 17(2), 5377–5398. <https://doi.org/10.5194/essd-17-5377-2025>

- Khalili, A., & Moridi, A. (2025). Water quality modeling for sustainable aquaculture in intensive farming systems. *Frontiers in Aquaculture*, 1(1), 177010. <https://doi.org/10.3389/faquc.2026.1770106>
- Kumar, R., et al. (2019). Socio-economic status of fish farmers in Eastern Uttar Pradesh: A baseline study. *Journal of Experimental Zoology, India*, 22(2), 855–860.
- Lakhari, I. A., et al. (2024). Microplastics in agricultural and aquatic systems: Sources and sustainable solutions. *Environmental Science and Pollution Research*, 31(12), 18456–18472.
- Malik, I. H., & Ford, J. D. (2024). Addressing the climate change adaptation gap: Key themes and future directions. *Climate*, 12(2), 24. <https://doi.org/10.3390/cli12020024> Cited by: 60
- Ministry of Fisheries, Animal Husbandry & Dairying. (2020). *Pradhan Mantri Matsya Sampada Yojana: Operational Guidelines*. Government of India.
- NITI Aayog. (2023). *Localisation of Sustainable Development Goals (SDGs): Progress report on Indian States*.
- Padulosi, S., et al. (2021). *Orphan crops for sustainable food and nutrition security*. Routledge. <https://doi.org/10.4324/9781003044802> Cited by: 8
- Sharma, P., et al. (2023). Sustainable aquaculture practices: A review of Biofloc technology in Northern India. *Indian Journal of Fisheries*, 70(3), 115–124.
- Yadav, A. K., & Singh, S. (2022). Constraints and opportunities for the export of inland fish from Uttar Pradesh. *Economic Affairs*, 67(4), 511–519.