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## Integrated fish fauna farming system in north Bihar: Focus on Kosi region

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### Abstract

The Kosi region of North Bihar, with its fertile floodplains, abundant water bodies, and tropical monsoon climate, offers immense potential for integrated fish farming. This sustainable approach combines fish culture with agriculture, horticulture, and livestock rearing to enhance productivity, resource efficiency, and rural income. The study explores ichthyofaunal diversity and the scope of integrated fish farming in the Kosi region, highlighting systems such as fish-cum-paddy, poultry, duck, pig, horticulture, and makhana cultivation. Survey findings reveal that 65% of farmers practice integrated methods, with Rohu, Catla, Grass Carp, and Makhana-fish mixes as dominant species. Despite flood-related challenges affecting 70% of farmers, integrated systems provide natural pest control, improved nutrient recycling, and dual-income opportunities. The paper emphasizes the need for technical support and policy incentives to address challenges and scale sustainable aquaculture. Integrated fish farming in this region demonstrates a viable model for ecological balance, food security, and socioeconomic development in flood-prone areas.

**Keywords:** Ichthyofaunal diversity, integrated farming, Kosi region, flood-prone aquaculture, sustainable livelihoods

### Introduction

With their vast diversity in shape, habitat, and biology, fish species are an essential component of the aquatic environment. The diversity of fish species and their abundance is referred to as ichthyofaunal diversity. There are currently 28,500 known species of fish.

Among these, 2200 fish species are known to exist in India's various aquatic ecosystems. Riverine ecosystems have been under tremendous human strain for the past few decades, which has led to their degradation and the loss of fish habitat. Many fish species are now seriously endangered as a result. The variety of fish species in rivers and Temperature, size and surface area, yearly discharge, depth, flow velocity, topography, substrate type, and climate are some of the biological factors that interact to determine tributary. Fish are a vital component of the aquatic food chain, energy flow, nutrient cycling, and ecological services in addition to being a significant edible food source for humans.

Because of its large floodplains, rich alluvial soil, and profusion of water bodies, the Kosi region of North Bihar is a perfect place for integrated fish fauna farming. To optimize resource use and productivity, integrated fish farming is a sustainable method that blends fish culture with horticulture, livestock, and agriculture. The Kosi region's marshy conditions and frequent flooding present both potential and difficulties for fish farming. The scope, practices, advantages, difficulties, and potential of the integrated fish fauna farming system in the Kosi area in North Bihar are examined in this paper.

### Geographical and Climatic Conditions of Kosi Region

Originating in Nepal, the Kosi River, sometimes known as the "Sorrow of Bihar," flows across North Bihar, impacting districts like Supaul, Saharsa, Madhepura, Araria, and Purnia. The area encounters:

- Seasonal flooding, which creates natural water reservoirs suitable for aquaculture.
- High soil fertility, beneficial for integrated fish-agriculture systems.
- Tropical monsoon climate, with high humidity and abundant rainfall supporting fish farming.

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| Parameter                                         | Survey Findings                           |
|---------------------------------------------------|-------------------------------------------|
| Average farm size                                 | 1.5 hectares                              |
| Percentage of farmers using integrated methods    | 65%                                       |
| Major fish species cultured                       | Rohu, Catla, Grass Carp, Makhana-fish mix |
| Average annual income from fish farming           | ₹2.5 lakhs per farmer                     |
| Percentage of farmers facing flood-related losses | 70%                                       |
| Government scheme beneficiaries                   | 45%                                       |
| Farmers interested in adopting new techniques     | 80%                                       |

### Concept of Integrated Fish Farming

In order to establish a self-sustaining environment, integrated fish farming entails raising fish alongside crops, cattle, or other aquatic species. The main elements consist of:

1. Fish-cum-Paddy Farming
2. Fish-cum-Poultry Farming
3. Fish-cum-Duck Farming
4. Fish-cum-Pig Farming
5. Fish-cum-Horticulture Farming
6. Fish-cum-Makhana Cultivation (specific to Bihar)

### Types of Integrated Fish Farming Systems in Kosi Region: Fish-cum-Paddy Farming

- Practiced in flood-prone areas where rice fields remain submerged for long periods.
- Fish control pests and weeds in paddy fields while enhancing soil aeration.

#### Advantages

- Increased rice yield and additional fish production.
- Natural pest and weed control reduce pesticide use.
- Additional income source for farmers.

### Fish-cum-Poultry Farming

- Poultry sheds are constructed over fish ponds, allowing manure to fertilize pond water.
- Poultry droppings enhance plankton growth, serving as natural fish feed.

#### Advantages

- Reduced feed costs.
- Dual-income from fish and poultry products.
- Improved nutrient recycling.

### Fish-cum-Duck Farming

- Ducks are raised on fish ponds, and their droppings act as organic manure.
- Ducks aerate the water while feeding on insects and weeds.

#### Advantages

- No additional feed cost for fish.
- Sustainable, eco-friendly fish farming method.
- Income from duck eggs and meat.

### Fish-cum-Pig Farming

- Pig pens are located near ponds, allowing pig manure to enrich pond nutrients.

- Common in areas where pig farming is culturally accepted.

#### Advantages

- Organic manure enhances fish growth.
- Lowers cost of fish feed.
- Dual-income source from fish and pigs.

### Fish-cum-Horticulture Farming

- Pond embankments are used for growing banana, papaya, vegetables, and medicinal plants.
- Pond water is utilized for irrigation, reducing the need for chemical fertilizers.

#### Advantages

- Efficient use of pond surroundings.
- Diversified agricultural income.
- Soil fertility is improved.

### Fish-cum-Makhana Cultivation (Specific to North Bihar)

- Makhana (fox nut) is traditionally cultivated in ponds and water bodies in the Kosi region.
- Fish farming is integrated with makhana cultivation to enhance productivity.

#### Advantages

- Sustainable use of water resources.
- Additional income from fish and makhana production.
- Enhances rural employment.

**Table 1:** Economic and Ecological Benefits of Integrated Fish Farming

| Benefit                      | Description                                     |
|------------------------------|-------------------------------------------------|
| Enhanced Productivity        | Increased fish yield due to nutrient recycling. |
| Environmental Sustainability | Organic farming reduces chemical dependency.    |
| Employment Generation        | Provides year-round job opportunities.          |
| Nutritional Security         | Ensures protein-rich food supply.               |
| Water Conservation           | Efficient use of flood-prone lands.             |

### Challenges in Integrated Fish Farming in the Kosi Region

#### Frequent Flooding

- Disrupts fish farming activities.
- Requires flood-resistant pond designs.

#### Lack of Technical Knowledge

Farmers need training in modern integrated fish farming techniques.

#### Infrastructure Deficiency

Poor transportation and storage facilities for fish.

#### Fish Disease Management

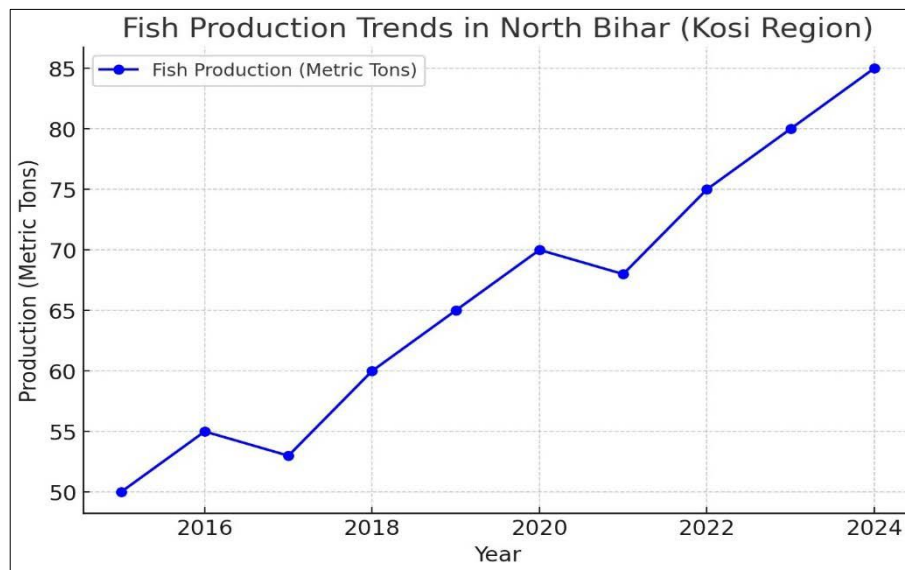
High risk of disease outbreaks due to organic waste accumulation.

#### Market Challenges

Lack of direct market linkages for fish and associated products.

### Government Support and Initiatives

- The Bihar government, along with central agencies, has launched several schemes to support fish farming in the Kosi region:
- Pradhan Mantri Matsya Sampada Yojana (PMMSY): This program provides funding for aquaculture facilities.
- Blue Revolution Scheme: Encourages environmentally friendly methods of fish aquaculture.
- Initiatives of the State Fisheries Department: distribution of fish seeds, subsidies, and technical training.
- One organization that supports integrated fish farming methods is the National Fisheries Development Board (NFDB).



Graph: Fish Production Trends in North Bihar

### Future Prospects and Recommendations

- **Flood-Resistant Aquaculture Systems**  
Promotion of cage culture and deep-water fish farming techniques.
- **Training and Skill Development**  
Establishing fish farming training centers in flood-prone districts.
- **Infrastructure Development**  
Improving cold storage, transportation, and processing facilities.
- **Research and Innovation**  
Developing disease-resistant fish species for better survival in flood-prone areas.
- **Public-Private Partnerships**  
Encouraging private investment in fish farming infrastructure.

### Conclusion

The results of this study showed that a large variety of native species that sustain commercial fisheries can be found in the tributaries of the Kosi River in the Mahepura region of North Bihar. fishing in this area. The main order was Cypriniformes, which includes the Cobitidae, Balitoridae, and Cyprinidae families. Fish diversity was also positively influenced by the orders Siluriformes and Perciformes. The Kosi River's tributaries are the primary source of revenue and livelihood for fishermen and rural residents, but they are also the most severely affected by environmental deterioration. Since fish diversity and availability have decreased more quickly in recent decades, local fisheries must be managed to achieve high productivity. Because of its abundant water supplies and lush floodplains, the Kosi region of North Bihar offers enormous potential for

integrated fish fauna farming. Integrated fish farming provides a viable and lucrative source of income despite obstacles such seasonal flooding and a lack of infrastructure. The government and stakeholders can make the Kosi region a major hub for integrated fish farming, guaranteeing both environmental sustainability and economic development, by putting modern aquaculture methods into place, expanding market access, and offering financial and technical support.

### References

1. Government of Bihar. Fisheries Department Reports. Patna: Govt. of Bihar; [year not specified].
2. National Fisheries Development Board (NFDB). Publications on fisheries and aquaculture. Hyderabad: NFDB; [year not specified].
3. Ministry of Fisheries, Animal Husbandry and Dairying. Pradhan Mantri Matsya Sampada Yojana (PMMSY) Guidelines. New Delhi: Government of India; [year not specified].
4. ICAR-CIFA. Research papers on integrated fish farming. Bhubaneswar: Central Institute of Freshwater Aquaculture; [year not specified].
5. Ministry of Fisheries. Reports from the Blue Revolution Scheme. New Delhi: Government of India; [year not specified].
6. Food and Agriculture Organization (FAO). Reports on sustainable aquaculture practices. Rome: FAO; [year not specified].
7. Various authors. Research articles on integrated fish farming. Int J Fish Aquat Stud. [year not specified].
8. Various authors. Studies on floodplain aquaculture. Indian J Agric Sci. [year not specified].
9. Nelson JS. *Fishes of the World*. 4th ed. New York: John Wiley & Sons; 1994. p. 600.

10. Harris JH. The use of fish in ecological assessments. *Aust J Ecol.* 1995;20:65-80.
11. Sarkar UK, Pathak AK, Lakra WS. Conservation of freshwater fish resources of India: New approaches, assessment and challenges. *Biodivers Conserv.* 2008;17:2495-2511.
12. Gurumayum SD, Kosygin L, Tamang L. Ichthyofaunal diversity of Arunachal Pradesh, India: A part of Himalaya biodiversity hotspot. *Int J Fish Aquat Stud.* 2016;4(2):337-346.
13. Vishwakarma KS, Vyas V. Diversity and composition of freshwater fishes of Dudhi River: A tributary of River Narmada, Central India. *Int J Zool Stud.* 2017;2(6):110-115.
14. Abujam SK, Kumar R, Darshan A, Gogoi B, Das DN. Enumeration of fish and alimentionation of fisherman at Tezu River in Lohit district of Arunachal Pradesh, India. *J Fish Sci.* 2017;11(3):55-63.
15. Mali JD, Chutia P, Biswas SP. Fish diversity and habitat ecology of Jia Bhorelli River: A major tributary of River Brahmaputra. *Int J Zool Stud.* 2017;2(5):229-233.
16. Chandran R, Itagi LK, Jaiswar AK, Raizada S, Mandal S, Mayekar TS, *et al.* Diversity and distribution of fish fauna in the Ib River, a tributary of Mahanadi, India. *Indian J Fish.* 2019;66(1):92-98.