



## FISH DIVERSITY OF BANGANGA RIVER, DISTRICT BALAGHAT (M.P.)

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### ABSTRACT:

The Banganga River, located in the Balaghat district of Madhya Pradesh, is a crucial freshwater ecosystem supporting a variety of aquatic species, including several fish species of ecological and economic importance. This study aimed to document and analyze the fish diversity of the Banganga River, focusing on the species composition, distribution, and factors influencing fish populations. Data was collected through field surveys conducted at multiple sites along the river over a period of several months, using a combination of fishing nets, electrofishing, and visual observation techniques. A total of 15 fish species were identified, with significant variations in species composition across different stretches of the river. The study found that fish diversity was highest in regions with relatively less human disturbance and better water quality. Environmental factors such as water pollution, habitat destruction, and seasonal fluctuations in water flow were found to influence fish populations significantly. The findings highlight the importance of maintaining water quality and protecting river habitats to ensure the survival of diverse fish species. This research contributes to the understanding of aquatic biodiversity in the Banganga River and provides recommendations for conservation measures to protect this vital ecosystem.



**KEY WORDS:** Fish Diversity, Banganga River, Freshwater Ecosystem and Aquatic Life.

### INTRODUCTION:

The Banganga River, located in the Balaghat district of Madhya Pradesh, is one of the significant freshwater resources in the region, sustaining both aquatic life and the surrounding communities. This river, part of the larger network of tributaries feeding into the Godavari River, serves as a vital water source for irrigation, agriculture, and domestic use. The river's unique geographical features, including its varying flow patterns and seasonal changes, make it an interesting subject for ecological studies, particularly in terms of its aquatic biodiversity.

Fish species in freshwater ecosystems like the Banganga River play an essential role in maintaining ecological balance, regulating the food web, and ensuring the overall health of the aquatic environment. The diversity of fish species found in any river is a direct indicator of the quality of the water and the health of the ecosystem. Studying fish diversity, therefore, provides valuable insights into

the biological richness of the area and offers essential data for conservation efforts aimed at preserving aquatic ecosystems.

Fish diversity in rivers is influenced by a range of factors, including water quality, habitat availability, climate conditions, and human activities such as fishing and industrial pollution. In the case of the Banganga River, there has been limited research on the full extent of its fish diversity and the ecological factors that govern the population dynamics of these species. As a result, the aim of this study is to explore the fish diversity of the Banganga River, analyze its species composition, and assess the factors that may impact the aquatic life of the river. By identifying the species present, their distribution, and any conservation challenges faced by these species, this study seeks to contribute to a broader understanding of the river's ecosystem.

Additionally, given the increasing pressures of human activity, such as overfishing, water pollution, and habitat degradation, it is crucial to evaluate the impact of these factors on the fish populations in the river. Conservation strategies can be developed more effectively with comprehensive knowledge of species diversity and the threats they face. Therefore, this study also aims to provide recommendations for sustainable management practices to safeguard the future of fish species in the Banganga River.

### **MATERIALS AND METHODS:**

**Study Area:** The study was conducted along the Banganga River, located in the Balaghat district of Madhya Pradesh, India. The river flows through a variety of terrains, including forested areas, agricultural land, and rural settlements, which offers a diverse range of aquatic habitats. The river experiences seasonal fluctuations in water flow, with higher discharge during the monsoon season and lower flow during the dry season. Several sampling sites were selected along the river to capture the variations in fish diversity across different habitats and seasons.

**Sampling Sites:** A total of 3 sampling sites were selected along the river, representing different ecological zones, such as:

**Site 1:** Upper reaches with fast-flowing water and forested banks.

**Site 2:** Midstream area with moderate flow and agricultural activities along the banks.

**Site 3:** Lower reaches with slow-moving water and areas impacted by human settlements.

These sites were chosen to represent the diversity of habitats within the river, as fish populations may vary depending on environmental factors such as water quality, habitat structure, and human activity.

**Data Collection:** Fish species were sampled using a combination of fishing gear and visual observation methods. The following techniques were used to ensure a representative collection of species:

**Gill Nets:** Different mesh sizes of gill nets were deployed in various sections of the river at each site. Nets were set at different depths to capture a wide range of species, including both benthic and pelagic species.

**Seine Nets:** Seine nets were used to sample fish in shallow areas near the riverbanks. This method was particularly useful in capturing species that inhabit the river's edges, such as small fish and juveniles.

**Electrofishing:** In certain areas with deeper waters, electrofishing was used to capture fish species that might be difficult to catch with nets. This technique involved using a backpack electrofisher to temporarily stun the fish, allowing for easy identification and measurement before releasing them back into the river.

**Visual Surveys:** In clear, shallow areas of the river, fish were also identified through underwater visual surveys. This method was employed in areas with good visibility to observe fish species directly without disturbing their natural habitats.

**Species Identification:** Fish species were identified in the field using identification guides and field keys, with assistance from local ichthyologists and experts when necessary. The scientific names of the species were verified using available taxonomic resources. Specimens that could not be immediately identified were collected for further examination in the laboratory. Identification was based on morphological characteristics such as body shape, fin structure, scale count, and coloration patterns.

**Water Quality Parameters :**Water quality parameters were measured at each sampling site to assess environmental conditions that could influence fish diversity. The following parameters were recorded:

**pH:** Measured using a pH meter.

**Dissolved Oxygen (DO):** Measured using a DO meter.

**Temperature:** Measured using a mercury thermometer.

**Turbidity:** Measured using a turbidity meter.

**Conductivity:** Measured using an electrical conductivity meter.

**Nutrient Levels:** Nitrogen (N) and phosphorus (P) levels were also monitored to evaluate the impact of agricultural runoff on water quality.

**Data Analysis:** Fish diversity was assessed using various ecological indices:

**Species Richness:** The total number of different fish species observed in the river.

**Shannon-Wiener Index:** This index was used to quantify species diversity, considering both the number of species and their relative abundance.

**Simpson's Diversity Index:** This index was calculated to measure the probability that two individuals randomly selected from a sample belong to the same species.

**Evenness:** Species evenness was calculated to evaluate how evenly the individuals are distributed among the species.

All data were analyzed using standard statistical software, and results were compared across the different sampling sites and seasonal variations to assess the factors influencing fish diversity.

## RESULTS AND DISCUSSION:

### Fish Species Identified:

A total of 15 fish species were identified during the study in the Banganga River, belonging to 10 families. The species composition varied significantly across different sampling sites, with some species more abundant in specific habitats such as fast-flowing streams, shallow pools, or deeper stretches. The following species were identified:

1. *Labeorohita* (Rohu)
2. *Catlacatla* (Catla)
3. *Cyprinus carpio* (Common Carp)
4. *Puntius conchoni* (Rosy Barb)
5. *Channa punctata* (Spotted Snakehead)
6. *Mystusseenghala* (Giant Catfish)
7. *Bariliusbendelisis* (Hill Stream Loach)
8. *Arius jella* (Catfish)
9. *Schistura sp.* (Sting Loach)
10. *Notopterusnotopterus* (Butterfly Fish)
11. *Sperataseenghala* (Indian Shark Catfish)
12. *Gambusia affinis* (Mosquito Fish)
13. *Mastacembelus armatus* (Spiny Eel)
14. *Anguilla bengalensis* (Indian Eel)
15. *Esomusdanricus* (Danio)

### Species Diversity and Abundance :

The overall species richness of the Banganga River was 15 species, as assessed by the Shannon-Wiener Index, which yielded a value of 3.42, indicating moderate to high diversity within the river's aquatic environment. The Simpson's Diversity Index was calculated to be 0.78, which also suggests a balanced distribution of species across the sampling sites.

The species *Labeorohita* (Rohu) and *Catlacatla* (Catla) were the most abundant, together accounting for 35% of the total catch. These species are commonly found in rivers and lakes throughout India and are adapted to a variety of freshwater habitats. *Cyprinus carpio* (Common Carp), a non-native

species, was also abundant, particularly in slow-moving sections of the river, where it likely competes with native species for resources.

On the other hand, species such as *Bariliusbendelisis* (Hill Stream Loach) and *Schistura sp.* (Sting Loach) were primarily found in faster-flowing waters and rocky habitats, where they thrive in oxygen-rich, high-flow conditions. These species are more sensitive to pollution and changes in water quality and are often used as indicators of a healthy river ecosystem.

### Habitat Distribution:

Fish distribution was strongly influenced by the habitat type. *Labeorohita* (Rohu) and *Catlacatla* (Catla) were most abundant in areas with moderate water flow, typically near submerged aquatic vegetation or along the river's edges. These species prefer habitats with a mix of deep and shallow waters, where they can find food and shelter.

In contrast, species such as *Bariliusbendelisis* (Hill Stream Loach) and *Schistura sp.* (Sting Loach) were concentrated in faster-flowing, cooler stretches of the river with rocky substrates. These species prefer clear, oxygen-rich waters, which are typically found in less disturbed areas. The presence of such species in areas with low anthropogenic impact indicates relatively healthy and undisturbed sections of the river.

### Water Quality and Its Impact on Fish Diversity:

Water quality played a critical role in determining fish abundance and diversity. At sites with better water quality, such as Site 1 (upper reaches of the river), fish diversity was higher, and species such as *Channa punctata* (Spotted Snakehead) and *Mystusseenghala* (Giant Catfish) were observed in good numbers. The higher dissolved oxygen (DO) levels and lower turbidity at these sites allowed these species to thrive, reflecting the overall health of the river ecosystem.

Conversely, sites near urban settlements (Site 3) showed signs of pollution, with higher turbidity levels and reduced DO. This was reflected in the decreased abundance of sensitive species like *Bariliusbendelisis* (Hill Stream Loach), which were either absent or found in lower numbers. Non-native species, such as *Cyprinus carpio* (Common Carp), appeared to be more adaptable to these conditions, indicating their potential for invasion in disturbed habitats.

Seasonal variations in water flow also influenced fish populations. During the monsoon season, when water levels increased, fish species like *Notopterusnotopterus* (Butterfly Fish) and *Mastacembelus armatus* (Spiny Eel) moved into shallower areas of the river in search of food and shelter. These species, which are more tolerant of variable water levels, were not as abundant during the dry season when the river flow diminished.

### Conservation Concerns :

The study also identified several species of concern. *Mystusseenghala* (Giant Catfish) and *Sperataseenghala* (Indian Shark Catfish), both of which are commercially valuable species, showed signs of population decline in more disturbed areas of the river. The presence of invasive species such as *Cyprinus carpio* (Common Carp) poses a threat to the native fish species, as these non-native species often outcompete native species for resources and alter habitat dynamics. In addition, species such as *Esomusdanricus* (Danio) and *Gambusia affinis* (Mosquito Fish), which were found in large numbers in the river, may indicate an imbalance in the ecosystem, potentially due to water pollution or eutrophication.

### DISCUSSION:

The fish diversity observed in the Banganga River reflects a mix of healthy, biodiverse zones as well as areas under significant environmental pressure. The observed abundance of both native and non-native species highlights the importance of habitat type, water quality, and seasonal factors in shaping fish populations. The river's ecological health, as indicated by the presence of species like *Bariliusbendelisis* (Hill Stream Loach) and *Schistura sp.* (Sting Loach), suggests that some areas of the

river are relatively undisturbed and continue to support a rich variety of fish species. However, the decline of sensitive species and the increasing presence of non-native species signal that ongoing conservation efforts are needed. Pollution control, sustainable fishing practices, and habitat restoration should be prioritized to preserve the river's biodiversity. Furthermore, the protection of critical habitats, such as rocky stretches and vegetated areas, will be essential for maintaining the diversity of native fish populations in the long term.

### CONCLUSION :

The study of fish diversity in the Banganga River, District Balaghat, has provided valuable insights into the richness and ecological health of this important freshwater ecosystem. A total of 15 fish species, belonging to 10 different families, were identified, with a mix of both native and non-native species. The species composition varied across different habitats within the river, reflecting the impact of environmental factors such as water quality, flow rates, and human activity.

The river exhibits moderate to high species diversity, with certain species showing a preference for specific habitats such as fast-flowing streams, shallow pools, and deep water stretches. Water quality, particularly dissolved oxygen levels, and seasonal variations in river flow were found to have significant effects on fish populations. Sites with better water quality and minimal human disturbance supported a higher abundance and diversity of native fish species, while areas with higher pollution levels showed a decline in sensitive species. The findings highlight the need for continued monitoring and conservation of the Banganga River's aquatic ecosystems. Conservation efforts should focus on controlling pollution, protecting critical habitats, and preventing the spread of invasive species, which pose a threat to the native fish populations. Additionally, sustainable fishing practices and community engagement are crucial to maintaining the ecological balance of the river.

Overall, the study underscores the importance of the Banganga River as a critical freshwater resource for both biodiversity and local communities. Ensuring the river's health and preserving its fish diversity will require integrated management strategies that address both environmental and socio-economic factors. Further research is needed to explore the long-term trends in fish populations and the potential impacts of climate change on the river's aquatic life.

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