

Assessment of Ichthyofaunal Diversity in Gavier Lake, Surat, India

ABSTRACT

Fish, with over 36,000 species globally, are the most diverse vertebrates, with nearly half residing in freshwater habitats. This study provides the first comprehensive documentation of the ichthyofauna of Gavier Lake, Surat, Gujarat, identifying 19 species across various families. The Cyprinidae family was the most represented, with five species, Siluridae with three and Channidae with two species. *Wallago attu*, a Near Threatened species according to the IUCN Red List, was also recorded. The lake's diverse ecological features, including rich vegetation and bird habitats, provide vital resources for fish species, supporting an interdependent ecosystem. The structural complexity of submerged roots and aquatic plants enhances fish shelter, breeding, and foraging opportunities. Additionally, otters, apex predators in freshwater systems, indicate a healthy and abundant fish population. Other wildlife, such as snakes and butterflies, further highlights the lake's ecological richness. This study underscores the importance of conserving Gavier Lake as a critical biodiversity hotspot and the need for ongoing conservation efforts to protect its unique aquatic ecosystem.

Keywords: Gavier Lake, ichthyofaunal biodiversity, Cyprinidae

INTRODUCTION

There are many estimates of biodiversity from various sources, and the information obtained indicates that there is much more to explore. Of all vertebrates, fish have the highest species diversity. They constitute almost half of all vertebrate species, with an estimated 36,305 species recognized. Of these, 18,380 are found in freshwater, while the remaining ones are in marine environments (Fricke et al., 2023).

India hosts 3,231 fish species of both marine and freshwater habitats which constitute 9.7% of the global fish species. Of these, marine fish are predominant, representing 7.4% of global fish diversity [8-10]. In India, marine fish form 76% of the ichthyofaunal diversity, of which 2,492 species are spread in 941 genera, 240 families, and 40 orders, respectively (Gopi and Mishra, 2015). The west coast of India is distinctly flooded with different types of coastal ecosystems - bays, river estuaries, muddy and rocky shores, and Kerala's peculiar mudbanks. This region accounts for nearly half of India's ichthyofaunal biodiversity [6,7]. Gujarat alone recorded 426 species, which made up about 15% of the total diversity of fish species in the country (Borichangar et al., 2024)

The state of Gujarat has the longest coastline in India, stretching over 1,600 km with the largest continental shelf of about 1,64,000 km². It comprises about 20% of India's total coastline and 32% of the country's continental shelf [16,17]. The state's coastline is broadly divided into four regions: the Gulf of Kutch, the Saurashtra coast, the Gulf of Khambhat, and the South Gujarat coast [4,5]. According to the Zoological Survey of India, there are approximately 120 species of freshwater fish in Gujarat. In total, the state has documented an impressive 422 species of fish, accounting for 14.95% of India's fish diversity (Parmar et al., 2023).

MATERIALS AND METHOD

Gavier Lake is located in the Surat district of Gujarat (Figure 1). Covering an area of approximately 5.5 hectares, the lake has an average depth of 10 meters. The surrounding area includes Surat International Airport, and the lake is encircled by agricultural lands that frequently draw water from it for irrigation. This freshwater body plays a vital role in the local ecosystem, supporting bird watching, irrigation, and recreational activities. Fish sampling was carried out over a period of 12 months, using gill nets of varying mesh sizes. The collected specimens were identified using standard taxonomic keys and field guides, including *The Fishes of India* (Day, 1889) and *The Fishes of India* (Jayram, 2010). Photographs were taken for documentation, and all specimens were released back into the lake after identification.

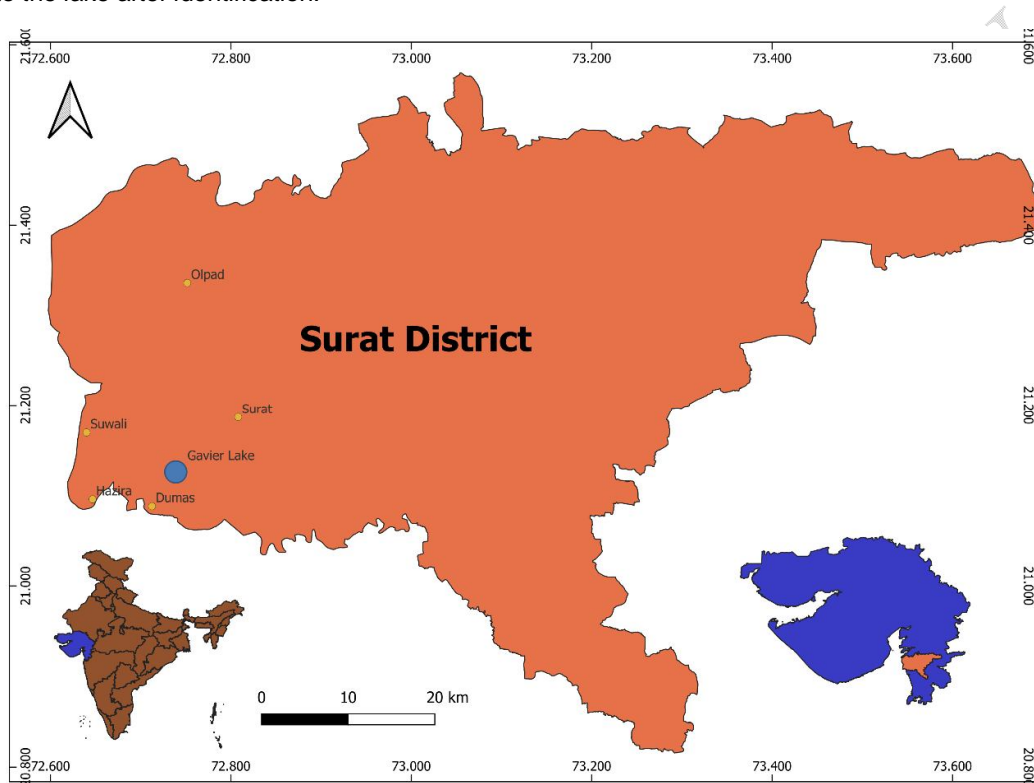


Figure 1: Location of Gavier Lake in Surat District

RESULTS AND DISCUSSION

The ichthyofaunal survey of Gavier Lake documented 19 fish species (Table 1) from various families, all identified at the species level. The family Cyprinidae, a purely freshwater group, accounted for 5 species, making it the most represented family in the survey. Siluridae contributed 3 species, while the family Channidae was represented by 2 species, highlighting its ecological presence in the lake's aquatic habitat.

| Family | Species | Common Name | Feeding habit |
|------------------|------------------------------------|------------------------|---------------|
| Cyprinidae | <i>Labeo rohita</i> | Rohu | Omnivore |
| | <i>Catla catla</i> | Catla | Planktivore |
| | <i>Cirhinus mrigala</i> | Mrigal | Detritivore |
| | <i>Cirhinus reba</i> | Reba carp | Omnivore |
| | <i>Puntius sarana</i> | Olive barb | Omnivore |
| | <i>Labeo calbasu</i> | Orangefin labeo | Omnivore |
| Bagridae | <i>Mystus seenghala</i> | Giant river catfish | Carnivore |
| Siluridae | <i>Ompok bimaculatus</i> | Butter catfish | Carnivore |
| | <i>Ompok pabda</i> | Pabda catfish | Carnivore |
| | <i>Wallago attu</i> | Freshwater shark | Carnivore |
| Pangasiidae | <i>Pangasianodon hypophthalmus</i> | Pangasius | Omnivore |
| Cichlidae | <i>Oreochromis niloticus</i> | Nile tilapia | Omnivore |
| Latidae | <i>Lates calcarifer</i> | Asian seabass | Carnivore |
| Channidae | <i>Channa striata</i> | Striped snakehead | Carnivore |
| | <i>Channa marulius</i> | Giant snakehead | Carnivore |
| Clariidae | <i>Clarias batrachus</i> | Walking catfish | Omnivore |
| Notopteridae | <i>Notopterus notopterus</i> | Bronze featherback | Carnivore |
| Heteropneustidae | <i>Heteropneustes fossilis</i> | Asian stinging catfish | Carnivore |
| Gobiidae | <i>Glossogobius gluri</i> | Tank goby | Carnivore |

Table 1: List of Ichthyofauna collected from Gavier Lake

Other families were represented by a single species each, highlighting the overall diversity and richness of the lake's ichthyofaunal community. Notably, *Wallago attu*, a member of the family Siluridae, was recorded in the study (Figure 2). This species is categorised as Near Threatened in the IUCN Red List, signifying its potential vulnerability due to habitat degradation, overfishing, and other anthropogenic pressures.

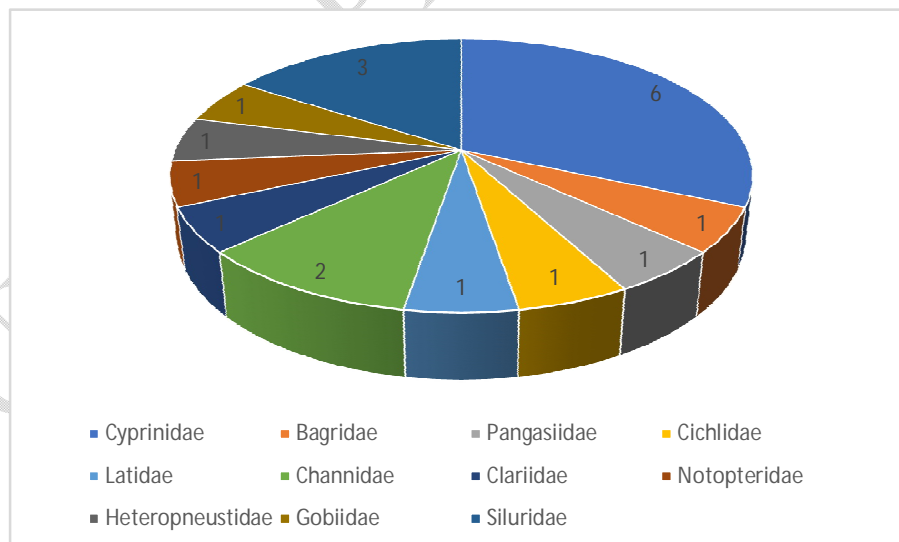


Figure 2: Distribution of Fish Species Across Families Identified in Gavier Lake

The documented ichthyofaunal diversity underscores the ecological significance of Gavier Lake as a vital freshwater ecosystem, supporting both common and conservation-priority species.

Gavier Lake, located in Surat, Gujarat, is a remarkable biodiversity hotspot that supports a wide array of terrestrial, aquatic, and semi-aquatic species. The findings of this study represent the first comprehensive documentation of the ichthyofaunal diversity of Gavier Lake, contributing significantly to the understanding of the lake's ecological role in the region.

The lake's unique ecological setting, with its rich bird habitat and diverse vegetation, including large trees and aquatic plants, provides a conducive environment for sustaining ichthyofaunal diversity. The structural complexity of the habitat, supported by submerged roots, overhanging branches, and aquatic vegetation, plays a critical role in offering shelter, breeding grounds, and foraging opportunities for fish species. This vegetation not only sustains the fish population but also supports a plethora of other organisms, creating a dynamic and interdependent ecosystem.

The presence of otters, which are apex predators in freshwater ecosystems, is a testament to the lake's ecological health. Otters rely heavily on fish as a primary food source, and their presence indicates an abundance of ichthyofaunal diversity. This highlights the significance of conserving the lake's fish population, as it serves as the foundation of the aquatic food web.

In addition to its ichthyofaunal diversity, Gavier Lake is home to a wide variety of other wildlife, including snakes and butterflies, further emphasizing its ecological richness. The co-occurrence of such diverse taxa points to the lake's role as a biodiversity refuge. This interplay between terrestrial and aquatic life forms underscores the importance of Gavier Lake as a critical natural resource.

Conclusion

The ichthyofaunal survey of Gavier Lake has provided a comprehensive record of the lake's fish diversity, documenting 19 species from various families, with Cyprinidae, Siluridae, and Channidae being the most represented. The presence of species such as *Wallago attu*, which is categorized as Near Threatened by the IUCN, underscores the conservation importance of this ecosystem. The diverse fish populations in Gavier Lake reflect its significance as a critical freshwater habitat, enriched by diverse vegetation and wildlife.

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