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To study the present status of Wetlands and Rivers and its diversity near Bhopal district, Madhya Pradesh

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Abstract

The present study was conducted to assess the current status of wetlands and riverine fish diversity in and around the Bhopal district of Madhya Pradesh, with specific focus on regions including Bhopal, Sehore, and Berasia. Field surveys were carried out from multiple water bodies such as the Upper and Lower Lakes of Bhopal (Bhoj Wetlands), the Parbati River in Sehore, and various ponds and reservoirs in Berasia including Goretia Talab, Sagoni Kalan, and Semri Kalan. Data were collected through field observations, interaction with local fishers and vendors, and secondary data sources including scientific literature and IUCN assessments. A total of 54 fish species belonging to 12 orders and 23 families were recorded, with Cyprinidae being the most dominant family comprising 20 species, followed by Bagridae and Channidae. The study noted a concerning decline in the population of Small Indigenous Fish species (SIF), attributed to the presence of invasive and predatory species like *Hypophthalmichthys molitrix* and *Clarias gariepinus*, along with anthropogenic pressures such as pollution, habitat degradation, siltation, and unregulated aquaculture. According to the IUCN Red List, the majority of species observed were categorized as Least Concern, while others such as Tor tor were listed as Endangered, *Wallago attu* as Vulnerable, and species like *Ompok bimaculatus* and *Chitala chitala* as Near Threatened or Data Deficient. This study highlights the rich yet threatened fish biodiversity of the Bhopal region and underscores the urgent need for conservation efforts. Recommended strategies include controlling

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invasive species, promoting sustainable aquaculture, preventing overharvesting, and restoring natural wetland habitats. These actions are vital for preserving the ecological integrity of central India's freshwater ecosystems and safeguarding indigenous aquatic biodiversity for future generations.

Keywords: Present Status, Diversity, Wetlands , Rivers

1 Introduction

These aquatic habitats contribute significantly to the socio-economic and ecological well-being of the region, serving as sources of livelihood for local communities and playing crucial roles in nutrient cycling and water purification. However, the current status of fish species in these water bodies is subject to various environmental challenges and anthropogenic pressures.

Understanding the diversity and present status of fish species is essential for effective conservation and management strategies. Factors such as habitat degradation, pollution, overfishing, and the introduction of non-native species pose threats to the delicate balance of these aquatic ecosystems. Conservation efforts are crucial to ensure the sustainability of fish populations and the overall health of these water bodies.

This exploration aims to delve into the richness of fish species inhabiting the rivers, lakes, and wetlands in Bhopal and its rural surroundings. By examining the current state of these aquatic ecosystems, we can better appreciate the importance of their conservation and work towards preserving the delicate harmony between humans and the diverse aquatic life that thrives in these waters.

Wetlands are highly productive, dynamic systems experience frequent changes in abiotic and biotic factors. Being dynamic ecosystems, they offer heterogenous habitats during the year supporting diverse life forms. They are major source of food hence attract many animals. Fish community of wetland resources play a major role in wetland ecosystems by recycling the organic matter and converting it into valuable protein which is used as food by humans apart from other animals also.

2 Materials and Method

Description of Study Area

The present study was conducted in selected sites District Bhopal, Sehore, and Berasia,. As the capital of Madhya Pradesh, Bhopal is often referred to as the "City of Lakes" due to its numerous natural and artificial lakes.

Geographic Coordinates: 23°15′35.6″N, 77°24′45.4″E

Study Areas: Bhoj Wetlands, which include the Upper Lake and Lower Lake.

Sehore: Located in the Sehore district of Madhya Pradesh, this city and municipality lies within central India.

Geographic Coordinates: 23.2°N, 77.08°E

Study Areas: Parbati River and Behrawal Village.

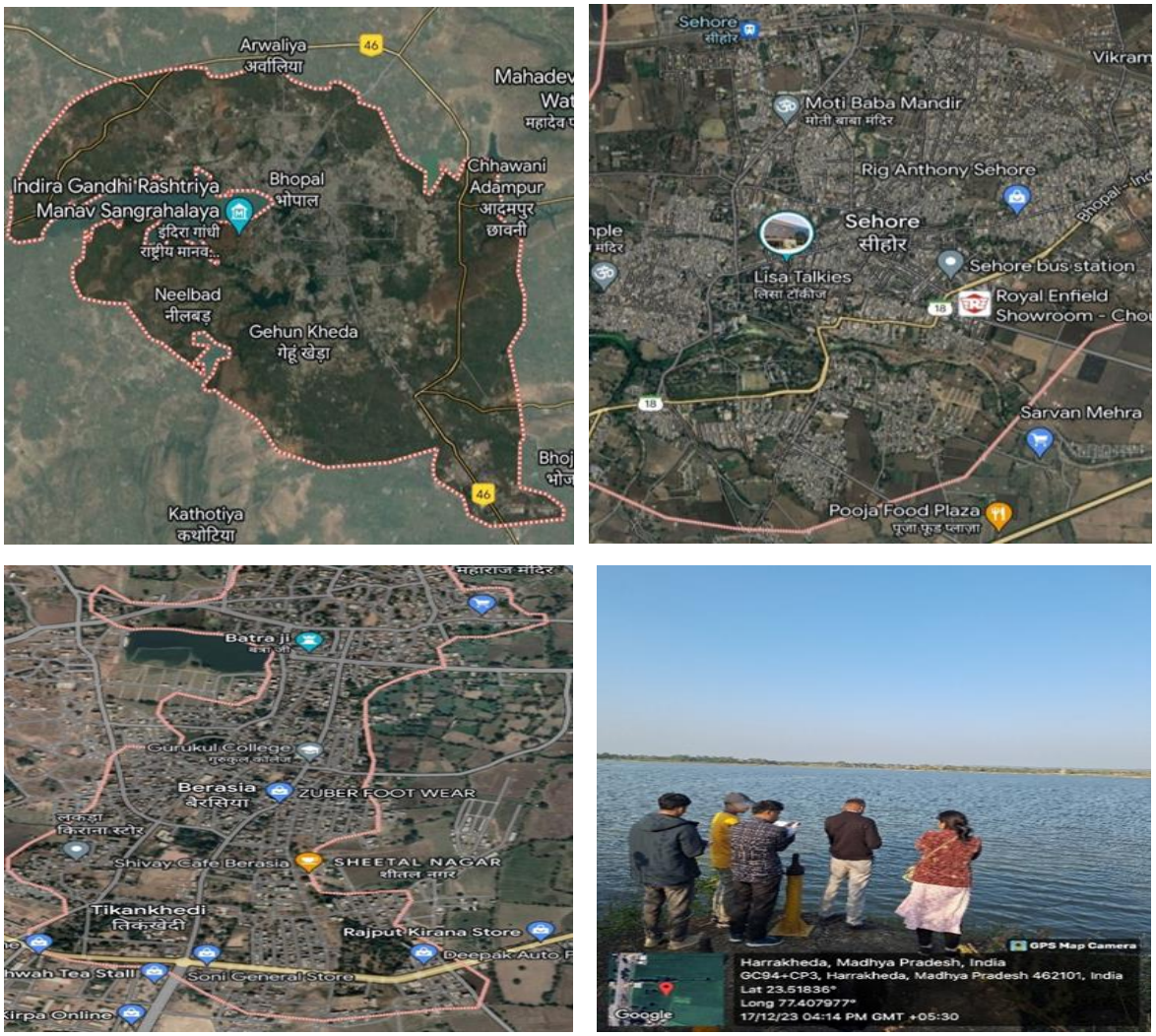
Berasia: A town and municipal council (nagar palika) in Bhopal district, Madhya Pradesh.

Geographic Coordinates: 23.63°N, 77.43°E

Study Areas: Sagoni Kalan, Semri Kalan, Karondiya, Kadhampur, Kothar, and Goretia Talab.

The sites of the study are illustrated in Figure 1. Photographic scenarios of wetlands are highlighted in (Figure 2)

Data collection: Primary data was collected through the use of semi structured questionnaire, picture book administered through the farmers, fishermen's, fish mongers, and Secondary data obtained from research papers. Tables 1 and 2 highlight information regarding the status of Present diversity, threatened, endangered, and extinct species.

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Result and Discussion

Table 1: Berasia

Showing the list of fish indentified during present study area at Berasia block [District Bhopal]

S.No	Species	Garethiya Talab	Manikhedi talab	Kalyanpur talab	Sagoni talab	Semrikalan talab
1	*Notopterus notopterus*	+	+	+	+	+
2	*Gudusia chapra*	+	+	+	+	+
3	*Catla catla*	+	+	+	-	+
4	*Cirrhinus mrigala*	+	+	-	-	-
5	*Cirrhinus reba*	-	-	-	-	-
6	*Cyprinus carpio*	-	-	-	-	-
7	*Labeo rohita*	+	+	+	+	+
8	*Labeo calbasu*	+	+	+	+	+
9	*Labeo gonius*	+	+	+	+	+
11	*Labeo bata*	-	-	-	-	-
12	*Osteobrama cotio*	+	+	+	+	+
13	*Puntius sophore*	+	+	+	+	+
14	*Puntius sarana*	+	+	+	-	-
15	*Puntius chola*	+	+	+	+	+
16	*Puntius ticto*	+	+	+	+	+

17	*Ctenopharyngodon idella*	+	+	+	-	-
18	*Hypopthalmichthys molitrix*	-	-	-	-	-
19	*Amblypharyngodon mola*	+	+	+	+	+
20	*Rasbora daniconius*	+	+	+	+	+
21	*Salmostaoma bacaila*	+	+	+	+	+
22	*Esomus danricus*	+	+	+	+	+
23	*Barilus barila*	+	+	+	+	-
24	*Lepidocephalus guntia*	+	+	+	+	+
25	*Nemachelus botia*	+	+	+	+	+
26	*Mystus bleekeri*	+	+	+	+	+
27	*Mystus cavasius*	+	+	-	+	+
28	*Aorichthys aor*	+	+	+	+	-
29	*Sperata seenghala*	+	+	+	+	+
30	*Ompok bimaculatus*	+	+	-	-	-
31	*Wallao attu*	+	+	+	+	+
32	*Clarias batrachus*	+	+	+	+	+

33	*Heteropnuestus fossilis*	+	+	+	+	+
34	*Xenentodon cancila*	+	+	+	+	+
35	*Mastacembelus armatus*	+	+	+	+	+
36	*Mastacembelus pancalus*	+	+	+	-	-
37	*Nandus nandus*	+	+	+	+	+
38	*Chanda nama*	+	+	+	+	+
39	*Parambassis ranga*	+	+	+	+	+
40	*Glossogobius giuris*	+	+	+	+	+
41	*Anabas testudineus*	+	+	+	+	+
42	*Tricoglaster fasciata*	+	+	+	+	+
43	*Channa marulius*	+	+	+	+	+
44	*Channa striatus*	+	+	+	+	+
45	*Channa punctatus*	+	+	+	+	+
46	*Oreochromis mossabica*	-	-	+	-	-

Showing the status of fishes in terms of family:

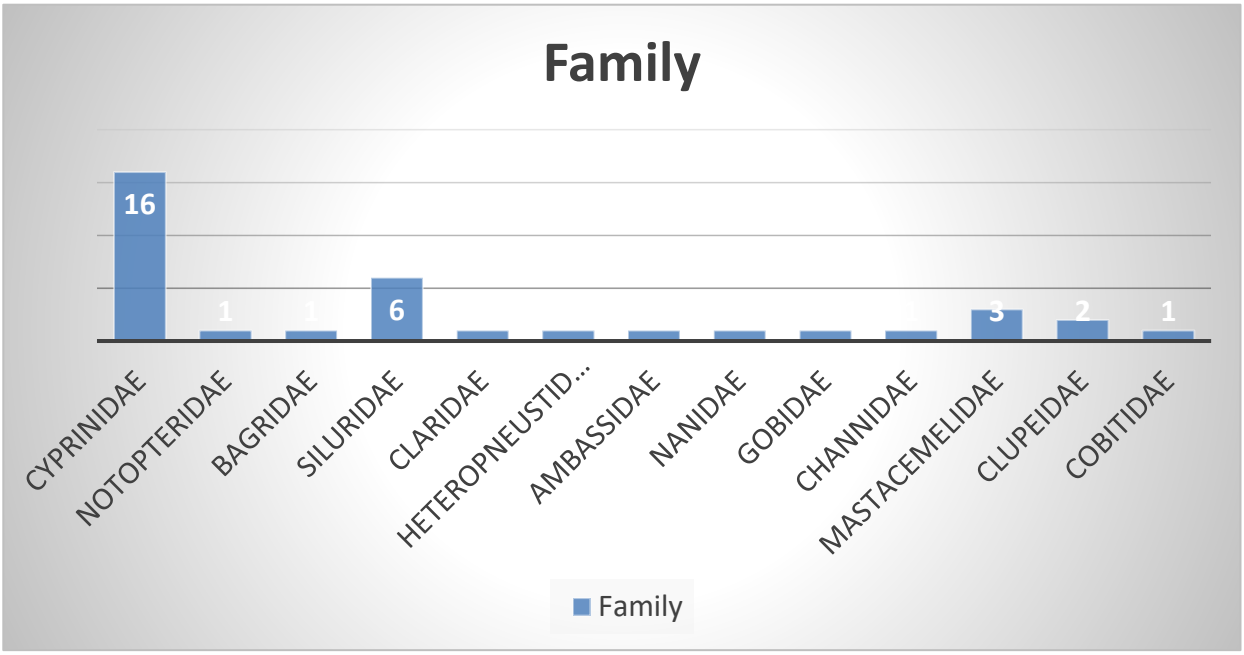


Table 2: Bhopal

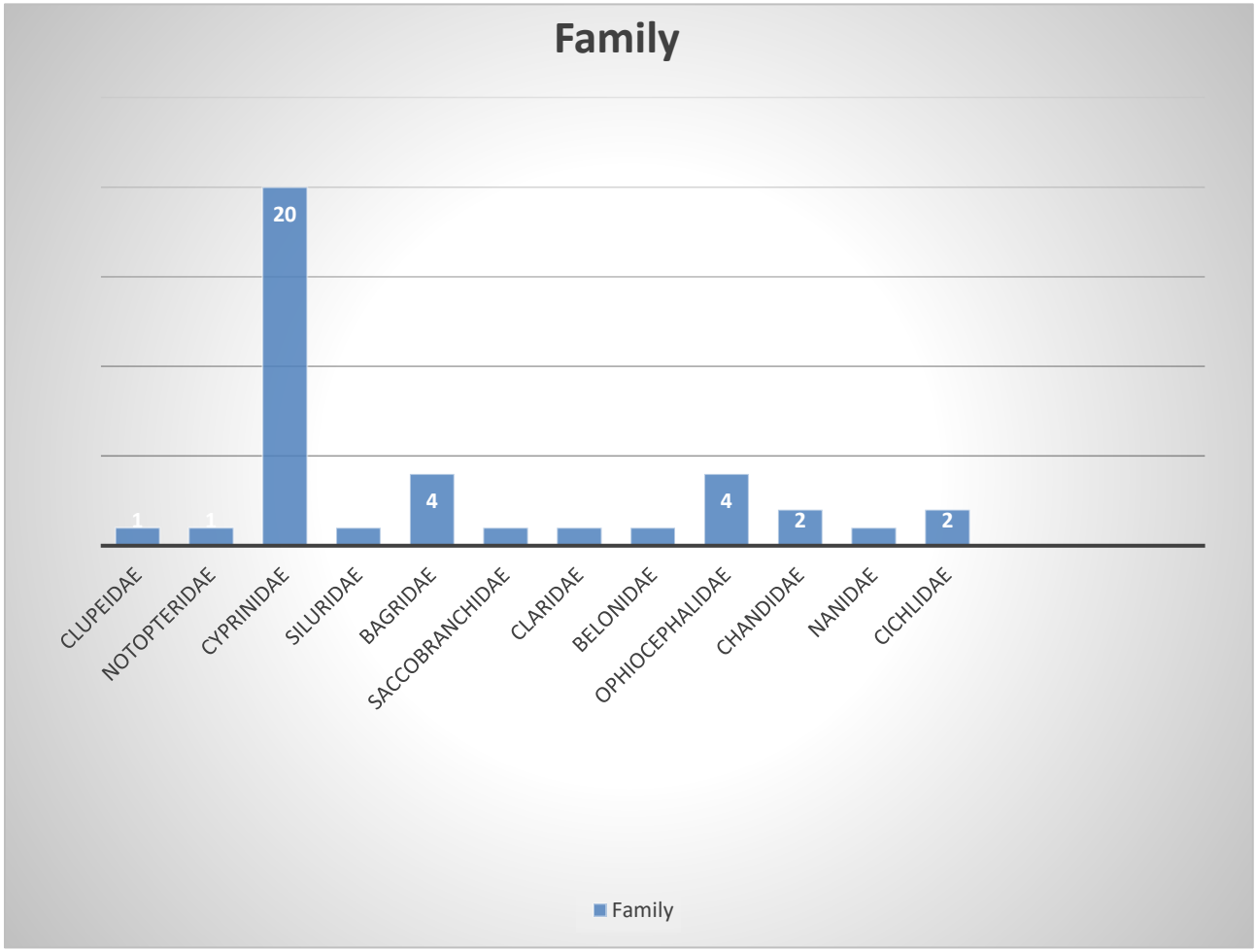
Showing the list of fish identified during present study area at Upper lake and lower lake

S.no	Order	Family	Species
1	Clupeiformes	Clupeidae	*Gudusia chapra*
		Notopteridae	*Notopterus notopterus*
2	Cypriniformes	Cyprinidae	*Labeo catla*
			Barilius bendelisis
			Labeo calbasu
			Labeo rohita
			Labeo gonius *Labeo bata*

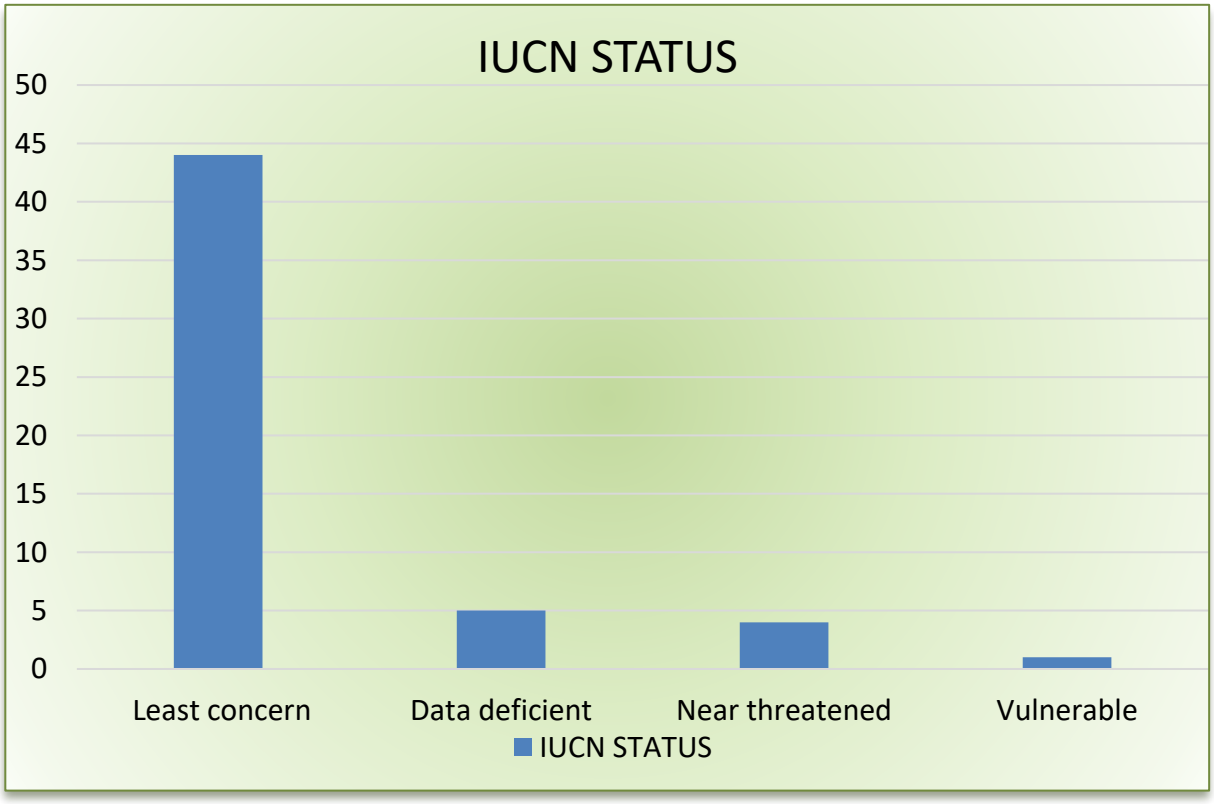
			Labeo dussumeri
			Osteobrama cotio
			Oxygaster bacalia
			Cirrhinus reba *Cirrhinus mrigala*
			Garra gotyla
			Esomus danricus
			Puntius sophore
			Puntius ticto
			Puntius sarana
			Rasbora danoconius
			Cyprinus carpio
		Siluridae	*Ompok bimaculatus*
		Bagridae	*Mystus cavasius*
			Mystus seenghala
			Mystus bleekeri
			Mytus aor
		Saccobranchidae	*Heteropneustus fossilis*
		Clariidae	*Clarias batrachus*
3	Beloniformes	Belonidae	*Xenentodon cancila*
4	Ophiocephaliformes	Ophiocephalidae	*Channa straitus*
			Channa punctatus

			Channa marulius
			Channa gachua
5	Perciformes	Chandidae	*Parambassis ranga*
			Chanda nama
		Nandidae	*Nandus nandus*
6	Cichliformes	Cichlidae	*Oreochromis niloticus*

Showing the status of fishes in terms of Family



IUCN status



According to IUCN redlist.org which gets updated every 2 years 44 species were listed as least concern.Hypopthalmichthys molitrix, Ompok pabda, Ompok bimaculatus, Chitala chitala, were listed as near threatened, Wallago attu listed as vulnerable, and Tor tor was listed as endangered, whereas species such as Mastacembelus armatus, Mastacembelus pancalus were listed as data deficient.

Discussion

A total of 54 fish species was collected from the studied area of which 20 species belonging to the cyprinidae family, followed by bagridae with 6 species, channidae with 3 species, siluridae, ambassidae and nanidae with 2 species each, cichlidae with 2 species followed bynotopteridae, clupeidae, belonidae, gobiidae etc.

The areas from where the specimens were collected are most seasonal.SIF were mostly absent in these ponds, these could be due to the presence of invasive species such as Hypopthalmichthys nobilis and Clarias gariepinus which are voracious feeders.According to the IUCN Redlist.org, 44 species were listed as Least concern, Tor putitora was listed as endangered, *Hypopthalmichthys molitrix*, *Ompok bimaculatus*, *Ompok pabda*, *Chitala chitala* are listed as near threatened, Wallago attu listed as

vulnerable, whereas species such as Tor tor, *Mastacembelus armatus, Mastacembelus pancalus* listed as data deficient.

3 Conclusion

The study indicates a decline in the fish species, especially small indigenous fishes.Factors contributing to this reduction include habitat loss, degradation, water abstraction, drainage of wetlands, dam construction, pollution, and eutrophication. The fish community in water bodies consists of both native and exotic species, with the latter introduced for fish production purposes. Certain species are experiencing a decline in population due to various anthropogenic activities affecting their habitats. The total diversity of fish species in the Bhopal district is still regarded as rich, even though some species have declined. The study highlights the necessity for conservation efforts by pointing out that invasive species are replacing numerous indigenous and native species.

The following are important fish conservation strategies:

1. Halting siltation to protect aquatic habitats.

2. To prevent overexploitation, encourage restricted harvesting.

3. Investigating strategies to limit the spread of invasive species.

4. Carefully consider the cultivation of prohibited species such as *Clarias gariepinus* and *Hypophthalmichthys nobilis*.

In the area under study, exotic species like tilapia are frequently seen. Due to their competition for food, habitat, and shelter, these species which are known to be voracious feeders endanger endemic species. In the area under study, wetlands are mostly utilized for irrigation. Production is poor in aquaculture-practicing areas, maybe as a result of the widespread adoption of intensive farming techniques. The study concludes that in order to preserve the variety of fish species found in the Bhopal district, urgent conservation actions are required. To preserve ecological balance and the region's rich aquatic biodiversity, these policies should include habitat preservation, restricted harvesting, and cautious invasive species management.

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