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DISCOVERY
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Report on the present status of ichthyofaunal diversity in and around Brahmapuri, Central India

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ABSTRACT

The variety of fish found in Maharashtra's freshwater bodies, including lakes, rivers, irrigation canals, and dams, is abundant. The size of Maharashtra's fish and fisheries is of great interest from an economic standpoint. In addition to contributing to our world's wealth, this diversity has some significant effects on fishing. In an ecosystem, the lack of Ichthyofaunal knowledge is a major barrier to the popularization of unknown fish species. Brahmapuri is a developing city located in the northern part of Chandrapur district in Maharashtra, Central India, harbors various natural water bodies, maji-malgujari (past landowner's) tanks, reservoirs, ponds and significant river Wainganga and its tributaries. Reported the variety of fish observed in the 227 water bodies that are accessible in and around the tahsil of Brahmapuri. 68 fish reported from the period of January 2022 to September 2024. In the present extensive survey and investigation, observed 68 species of fish from the 11 orders belonging to 24 families. In the present paper the base line data of fish diversity is provided from the peninsular Central India, for the further policy making in conservation actions of Ichthyofauna.

Keywords: Fish Diversity, Present status, Lakes, Wainganga River, Exotic species, Brahmapuri

1. INTRODUCTION

Fish significantly influences the socioeconomic structure of South Asian countries, which is also a valuable source of protein. India's rich biological legacy has earned it a place among the world's twelve most varied nations. The 2,546 fish species found in the inland water bodies of the Indian subcontinent have been the subject of research over the past century, with 930 of those species being freshwater fish (Kar, 2003). Twenty orders, one hundred families and three hundred genera make up these 930 freshwater species. Regarding freshwater megadiversity, India ranks ninth globally and is one of the countries with the highest levels of biodiversity (Mittermeier and Mittermeier, 1997). The potential of fish culture in India has not yet completely realized.

In essence, the diversity and number of fish in a reservoir are represented by its fish biodiversity, commonly known as Ichthyofaunal diversity or Ichthyodiversity. According to Burton et al., (1992) Ichthyodiversity refers to variety of fish species depending on context and scale. It could refer to alleles or genotypes within piscian population and to species of life forms within a fish community and species or life forms across aquaregimes. Many of fish species are conserved in lakes, supporting commercial fisheries. A critical component of the sustainable and cost-effective management of freshwater reservoirs is the knowledge of fish faunal diversity (Battul et al., 2007). The wide diversity of fish species found in Indian lakes contributes to the commercial exploitation of the country's fisheries potential (Krishna and Piska, 2006).

Properly using of a given water body's fishing resources requires a complete understanding of those resources' availability and distribution (Pawar et al., 2006). The fishes of the inland waterways of the Indian subcontinent have been the subject of investigation for a century. The freshwater fishes of India have been the subject of numerous studies, including those by Hamilton, (1822), Shaw and Shebbeare, (1937), Hora, (1951), Hora, (1953), Misra, (1959), Dey, (1973), Jayaram, (1999), Talwar and Jhingran, (1991), Nath and Dey, (1997), Nath and Dey, (2000) have all contributed freshwater fish to India. The Vidarbha region, a northeastern part of Maharashtra state, is famous for its Maji-Malguzari (past landowners) tanks, constructed water harvesting systems with community support centuries ago.

Bhandara, Gondia, Chandrapur, Nagpur, and Gadchiroli districts (formerly Central Provinces) have 6862 clay bund-built irrigation tanks. The poor management of water bodies by relevant authorities is to blame for the decline in aquatic life in rural areas therefore fish species are in danger due to persistent contamination of lakes, rivers, ponds, and reservoirs. Human intervention with surface watercourses has risen due to current industrialization and urbanization. The fisheries industry has a lot of space for development. Still, scanty knowledge about the Ichthyofauna in lotic and lentic habitats of the eastern Vidarbha region. For this reason, an effort has made to document the fish fauna that is currently available with the goal of scientifically using it for both fisheries activities and agricultural irrigation. Basic scientific knowledge of biodiversity is essential for both long-term exploitation and associated conservation of fisheries resources.

Numerous researchers, including Khanna, (1993), Suresh, (2003), Jayaram, (1999), Paliwal et al., (2013) and Price, (1978) have examined Indian fishes concerning pollution, indicator of water quality and sustainable development. Many fish species have become highly endangered due to the severe human interference that has destroyed and degraded lentic and lotic ecosystems over the past century, especially in rivers where freshwater resources widely used. Therefore, it is essential to survey the fish species in different freshwater environments to develop plans for their production and effective management. Comprehensive research and documenting of fish diversity is therefore urgently needed to build a 'freshwater fish diversity information system' that incorporates 'bioinformatics' and 'geo-referenced databases' of fish and fish habitat.

Study area

In the central Indian state of Maharashtra, in the northern section of the Chandrapur District, is the emerging city of Brahmapuri. Located along the Wainganga River, which not only runs the Brahmapuri but also forms natural border between Brahmapuri Tahsil and the borders of Bhandara and Gadchiroli districts. Bramhapuri Tahsil (Figure 1) runs by the Wainganga River for roughly 63 km. At Awalgaon Ghat, the Triveni River is a tributary of the Wainganga River. The Brahmapuri tehsil spreads in 516 square kilometres, having 226 water bodies therein.

Due to the high demand of fish in Brahmapuri tehsil as well as no studies on fish diversity in the region, the current study on fish diversity from many of lotic and lentic water bodies conducted. All of the fish species in the area, including those in Bhandara, Chandrapur, and Gadchiroli District, were identified. The main fishing grounds include Arher, Dighori, Sondri, Bodegaon, Awalgaon, Bodadha, and Mudza Ghats. In Brahmapuri tehsil, major water bodies for fishing include Adyal, Chandgaon, Rampuri, Tukum, Padmapur, and Bhuj.

2. MATERIALS AND METHODS

The present investigation conducted between January 2022 and September 2024. In the present study, the survey conducted in a fundamental manner. Fish samples collected in the morning and evening from various locations at the time of fishing employed. Fish identification and taxonomic classification with the help of following the standard literature of (Day, 1986; Talwar and Jhingran, 1991; Jayaram, 1999; Qureshi and Qureshi, 1983; Vishwanath et al., 2014). Fish collected with the help of fishermen from the different

freshwater bodies in and around the Brahmapuri. The research aimed to assess the local fish diversity to understand the local as well as IUCN status. The abundance of fish has been estimated based on the density of fisherman catching them.

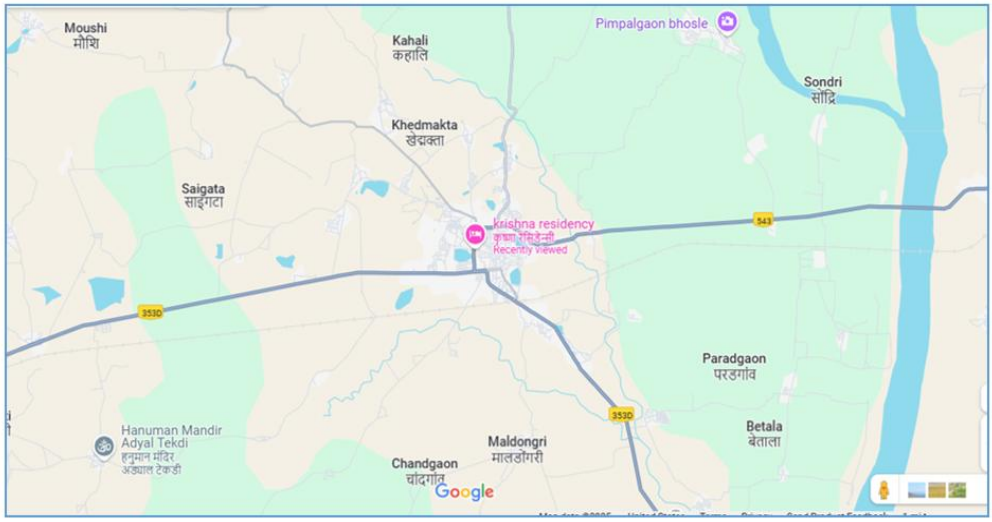

Figure 1 Map of Brahmapuri Taluka showing water bodies.

3. RESULT

Table 1 Fish diversity in and around Brahmapuri region.

SR.	FAMILY	SCIENTIFIC NAME	*HABITAT	ABU	*IUCN
	Order: Anabantiformes				
1	Anabantidae	*Anabas testudineus* (Bloch, 1792)	Lakes, River	A	LC
2	Anabantidae	*Channa orientalis* (Bloch & Schneider, 1801)	Lakes, River	C	VU
3	Anabantidae	*Channa marulius* (F. Hamilton, 1822)	Lakes, River	C	LC
4	Anabantidae	*Channa gachua* (F. Hamilton, 1822)	Lakes, River	R	LC
5	Channidae	*Channa punctatus* (Bloch, 1793)	Lakes, River	M	LC
6	Channidae	*Channa Striata* (Bloch, 1793)	Lakes, River	M	LC
7	Nandidae	*Nandus nandus* (Hamilton, 1822)	River	M	LC
	Order:Anguilliformes				
8	Anguillidae	*Anguilla b. bengalensis* (J. E. Gray, 1831)	Lakes, River	M	NT
	Order:Beloniformes				
9	Belonidae	*Xenentodon cancila* (F. Hamilton, 1822)	River	VR	LC
	Order:Cichliformes				
10	Chichlidae	*Oreochromis mossambicus* (Peters, 1852)	Lakes, River	C	VU
11	Chichlidae	*Oreochromis niloticus* (Linnaeus, 1758)	Lakes, River	R	LC
12	Chichlidae	*Oreochromis Zilli*	River	R	LC
13	Cobitidae	*Lepidocephalchthys guntea* (F. Hamilton, 1822)	Rivers	R	LC
	Order:Cypriniformes				
14	Cyprinidae	*Catla catla* (F. Hamilton, 1822)	Lakes, River	A	LC
15	Cyprinidae	*Cirhhinnus mrigala* (F. Hamilton, 1822)	Lakes, River	A	LC
16	Cyprinidae	*Cirhhinus rebe* (F. Hamilton, 1822)	Lakes, River	A	LC
17	Cyprinidae	*Cyprinus carpio* (Linnaeus, 1758)	Lakes, River	A	LC
18	Cyprinidae	*Labeo bata* (F. Hamilton, 1822)	Lakes, River	C	LC
19	Cyprinidae	*Labeo boga* (F. Hamilton, 1822)	Lakes, River	C	LC

20	Cyprinidae	*Labeo calbasu* (F. Hamilton, 1822)	Lakes, River	C	LC
21	Cyprinidae	*Labeo gonius* (F. Hamilton, 1822)	Lakes, River	C	LC
22	Cyprinidae	*Labeo rohita* (F. Hamilton, 1822)	Lakes, River	A	LC
23	Cyprinidae	*Osteobrama cotio* (F. Hamilton, 1822)	River	C	LC
24	Cyprinidae	*Puntius chola* (F. Hamilton, 1822)	Lakes, River	C	LC
25	Cyprinidae	*Puntius conconius* (F. Hamilton, 1822)	River	C	LC
26	Cyprinidae	*Puntius sarana* (F. Hamilton, 1822)	River	C	LC
27	Cyprinidae	*Puntius sophore* (F. Hamilton, 1822)	River	M	LC
28	Cyprinidae	*Puntius ticto* (F. Hamilton, 1822)	River	M	LC
29	Cyprinidae	*Garra mullya* (Sykes, 1839)	River	R	LC
30	Cyprinidae	*Labeo boggut* (Sykes, 1839)	River	C	LC
31	Cyprinidae	*Labeo fimbriatus* (Bloch 1795)	Lakes, River	R	LC
32	Cyprinidae	*Laubuka laubuca* (F. Hamilton, 1822)	River	R	LC
33	Cyprinidae	*Amblypharyngodon mola* (Sykes, 1839)	River	R	LC
34	Cyprinidae	*Rasbora daniconius* (F. Hamilton, 1822)	River	C	LC
35	Cyprinidae	*Salmophasia boopis* (F. Day 1874)	River	A	LC
36	Cyprinidae	*Esomus danrica* (F. Hamilton, 1822)	River	C	LC
37	Danionidae	*Salmostoma balookee* (Sykes, 1839)	River	R	LC
38	Danionidae	*Devario aequipinnatus* (McClelland, 1839)	River	C	LC
39	Danionidae	*Amblypharyngodon mola* (F. Hamilton, 1822)	River	C	LC
40	Nemacheilidae	*Acanthocobitis mooreh* (Sykes, 1839)	River	R	LC
41	Xenocyprididae	*Ctenopharyngodon idella* (Valenciennes in Cuvier & Valenciennes, 1844)	Lakes, River	M	LC
	Order: Gobiformes				
42	Gobiidae	*Glossogobius giuris* (F. Hamilton, 1822)	Lakes, River	R	LC
	Order:Mugiliformes				
43	Ambassidae	*Chanda nama* (F. Hamilton, 1822)	River	C	LC
44	Ambassidae	*Parambassis ranga* (F. Hamilton, 1822)	River	R	NT
	Order:Osteoglossiformes				
45	Notopteridae	*Notopterus notopterus* (Pallas, 1769)	River	R	LC
46	Notopteridae	*Notopterus chitala* (F. Hamilton, 1822)	River	R	LC
	Order:Perciformes				
47	Osphronemidae	*Trichogaster fasciata* (Bloch & Schneider, 1801)	River	VR	LC
	Order: Siliuriformes				
48	Bagridae	*Mystus cavasius* (F. Hamilton, 1822)	Lakes, River	A	LC
49	Bagridae	*Mystus vittatus* (Bloch, 1794)	Lakes, River	A	LC
50	Bagridae	*Mystus aor* (F. Hamilton, 1822)	Lakes, River	M	LC
51	Bagridae	*Sperata seenghala* (Sykes, 1839)	Lakes, River	M	LC
52	Bagridae	*Mystus bleekeri* (Day, 1877)	Lakes, River	M	LC
53	Bagridae	*Mystus tengara* (F. Hamilton, 1822)	Lakes, River	A	LC
54	Bagridae	*Rita gogra* (Sykes, 1839)	Lakes, River	C	LC
55	Bagridae	*Rita kuturnee* (Sykes, 1839)	Lakes, River	R	LC
56	Claridae	*Clarias batrachus* (Linnaeus, 1758)	Lakes, River	R	LC
57	Claridae	*Clarius gariepinus* (Burchell, 1822)	Lakes, River	C	LC
58	Heteropneustidae	*Heteropneustes fossilis* (Bloch, 1794)	Lakes, River	C	LC
59	Loricariidae	*Hypostomus plecostomus* (Linnaeus, 1758)	River	VR	LC

60	Pangasiidae	*Pangasius pangasius* (F. Hamilton, 1822)	River	R	LC
61	Schilbeidae	*Neotropius khavalchor* (Kulkarni, 1952)	Lakes, River	C	LC
62	Schilbeidae	*Eutropiichthys vacha* (F. Hamilton, 1822)	Lakes, River	C	LC
63	Siluridae	*Ompok bimaculatus* (Bloch, 1794)	Lakes River	C	NT
64	Siluridae	*Wallago attu* (Bloch & Schneider, 1801)	Lakes, River	M	VU
	Order: Synbranchiformes				
65	Mastacembelidae	*Mastacembelus armatus* (Lacepède, 1800)	Lakes, River	C	LC
66	Mastacembelidae	*Macrognathus pancalus* (F. Hamilton,1822)	River	M	LC
67	Mastacembelidae	*Macrognathus siamensis* (Günther, 1861)	River	C	LC
68	Tetraodontidae	*Monopterus cuchia* (Lacepède, 1800)	Lakes, River	R	LC

*Abundance: - C- Common, R- Rare, VR- Very rare, M- Moderate, A- Abundant;

*Threat Status: - LC- Least Concern, VU- Vulnerable, NT- Near Threatened

Table 2 No. of fish in Categories

Status	Category	No. of Fish
Abundance	Rare	18
	Abundant	10
	Common	25
	Moderate	12
	Very rare	03
IUCN	Near Threatened	03
	Vulnerable	03
	Least Concern	62

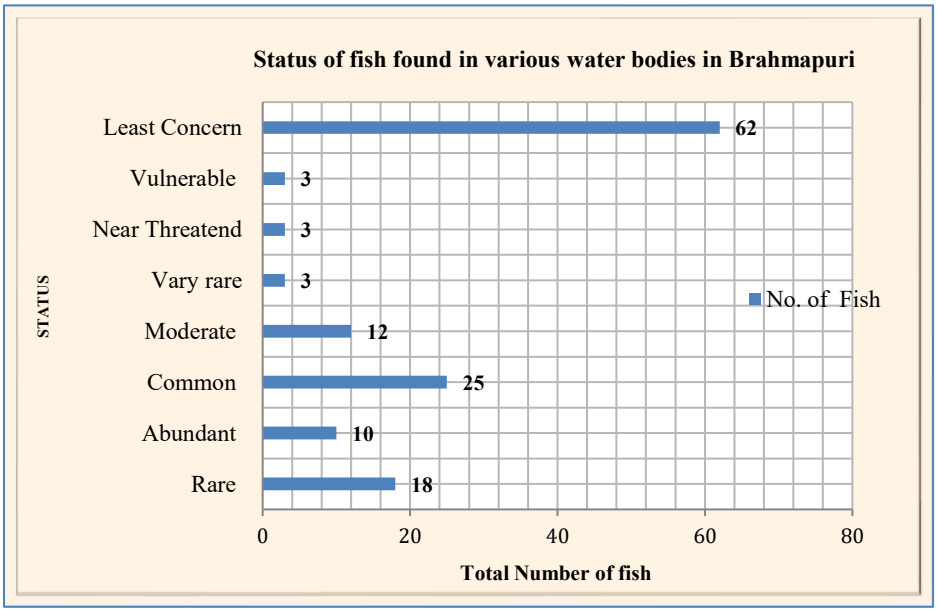

Figure 2 Chart showing status of fish in Brahmapuri

4. DISCUSSION

The details of fish species recorded from the given study area from the Brahmapuri region in (Tables 1 & 2, Figures 2 & 3). A total of 68 fish species from 24 families across 11 orders noted during the current thorough survey and research. There are seven species in the order Anabantiformes, including four from the Anabantidae family, two from Channidae, and one from Nandidae. *Channa gachua*, a

rare (R) member of the Nandidae family is well-considered while *Channa orientalis* from family Anabantidae is categorized as a vulnerable (VU). The Anguilliformes order has only one species, *Anguilla bengalensis bengalensis*, which is classified as Near Threatened (NT) and found relatively in the Anguillidae family. Only one species *Xenentodon cancila* as very rare and one family make up the order Beloniformes.

The order Cichiliformes has two families and the family Chichlidae has three species, of which *Oreochromis nilaticus* and *O. zilli* is deemed rare (R) while *Oreochromis mossambicus* categorized as vulnerable (VU). In contrast, the family Cobitidae has just one species, *Lepidocephalchthys guntea*, which is also deemed rare (R). The Cyprinidae family, which includes 23 fish species, is one of the biggest of the four families that make up the Order Cypriniformes. Of these, four species *Garra mullya*, *Labeo fimbriatus*, *Laubuka laubuca*, and Amblypharyngodon mola were assessed to be rare (R). Of the three species in the Donionidae family, *Salmostoma balookee* is a rare species (R). With just one species, *Acanthocobitis mooreh*, the family Nemacheilidae is classified as rare (R). The Xenocyprididae family has just one species.

There is just one species in the family Gobiidae, *Glossogobius giuris*, which is rare (R) in the other order Gobiformes. *Parambassis ranga* is classified as rare (R) and near threatened (NT) among the two species in the family Ambassidae of the order Mugiliformes. *Notopterus notopterus* and *N. chitala*, two species in the order Osteglossiformes, are both designated as rare (R) in abundance. *Trichogaster fasciata*, the sole species in the order Perciformes is very rare (VR) in abundance. With seven families, the order Silluriformes is the biggest group. *Rita Kutuonee* is rare (R) in eight species in the Bogridae family, while *Clarius batrachus* is rare (R) in abundance in two species in the Claridae family. There is just one species in the Heteropneustidae family. There are one species in the fourth family, Loricariidae and *Hypostomus plecostomus* is very rare (VR).

With just one species, *Pangasius pangasius*, the family Pangasiidae is designated as Rare (R). There are just two species in the Schilbeidae family. There are two species of the seventh family of the order Silluriformes, Siluridae of which *Ompack bimaculatus* is categorized as Near Threatened (NT) while *Wallago attu* as vulnerable (VU). There are two families in the order Synbranchiformes, three fish species in the family Mastacemelidae, and only one, the rare *Monopterus cuchia* (R) in the Tetraodontidae family. Fish reported from the various water bodies in the Brahmapuri region are classified according to the IUCN of Red Data Books, in which 18 species are classified as rare (R), 02 are very rare (VR) in abundance, and 03 are near threatened (NT) and 03 are vulnerable (VU).

According to the most recent IUCN data available, three near threatened and three vulnerable fish species are identified in the current survey (Figure 2 & Tables 1 & 2). It is observed that many of the water bodies are infested with exotic fish, Tilapia (Oreochromis). The local fisherman introduced the Tilapia in the year 2016 in the Lendhari Lake, and in present the said lake is invaded 95% of fish species of Tilapia, similar findings also seen in Khandala village Pond. An introduction of Tilapia fish was utilized in several countries to promote foods with high in protein (Canonico et al., 2005). Nevertheless, evidence of their negative impacts on native species and ecosystems is few (Gu et al., 2014; Shuai et al., 2019).

Because tilapia has biological characteristics that allow them to infiltrate rivers outside of their native range successfully, their possible effects on native fish species are concerning (Greiner and Gregg, 2008). A small number of *Clarius gariepinus*, an African catfish, are also observed in the current study. This species is considered as detrimental to aquatic ecosystems if it is introduced to non-native environments, it is an aggressive and highly adaptive predator that may outcompete local fish species and affect the local biodiversity. Likewise, the Sucker mouth catfish (*Hypostomus plecostomus*) from the Wainganga River's Chichgaon Ghat waters also has similar effect on biodiversity. Invasive species compete with native organisms, change ecosystems, and disturb food webs, all of which have a substantial direct and indirect impact on native biodiversity (Fischer, 2020).

Invasive species pose a major threat to ecosystems, biodiversity and economies on a global scale. Strong laws, rules, and international cooperation are needed to address this issue. Numerous studies emphasize how crucial it is to work together across borders and at all levels to manage invasive species effectively (Sesay et al., 2024). It highlights the critical need for conservation efforts to preserve the water bodies and the faunal richness that goes along with them. The conservation of indigenous fish is crucial for preserving the lotic and lentic ecosystems; however, most fish species are observed to be of least concern due to their low relative abundance. The region's surface waters are currently contaminated, which highlighting human interaction with aquatic ecosystems.

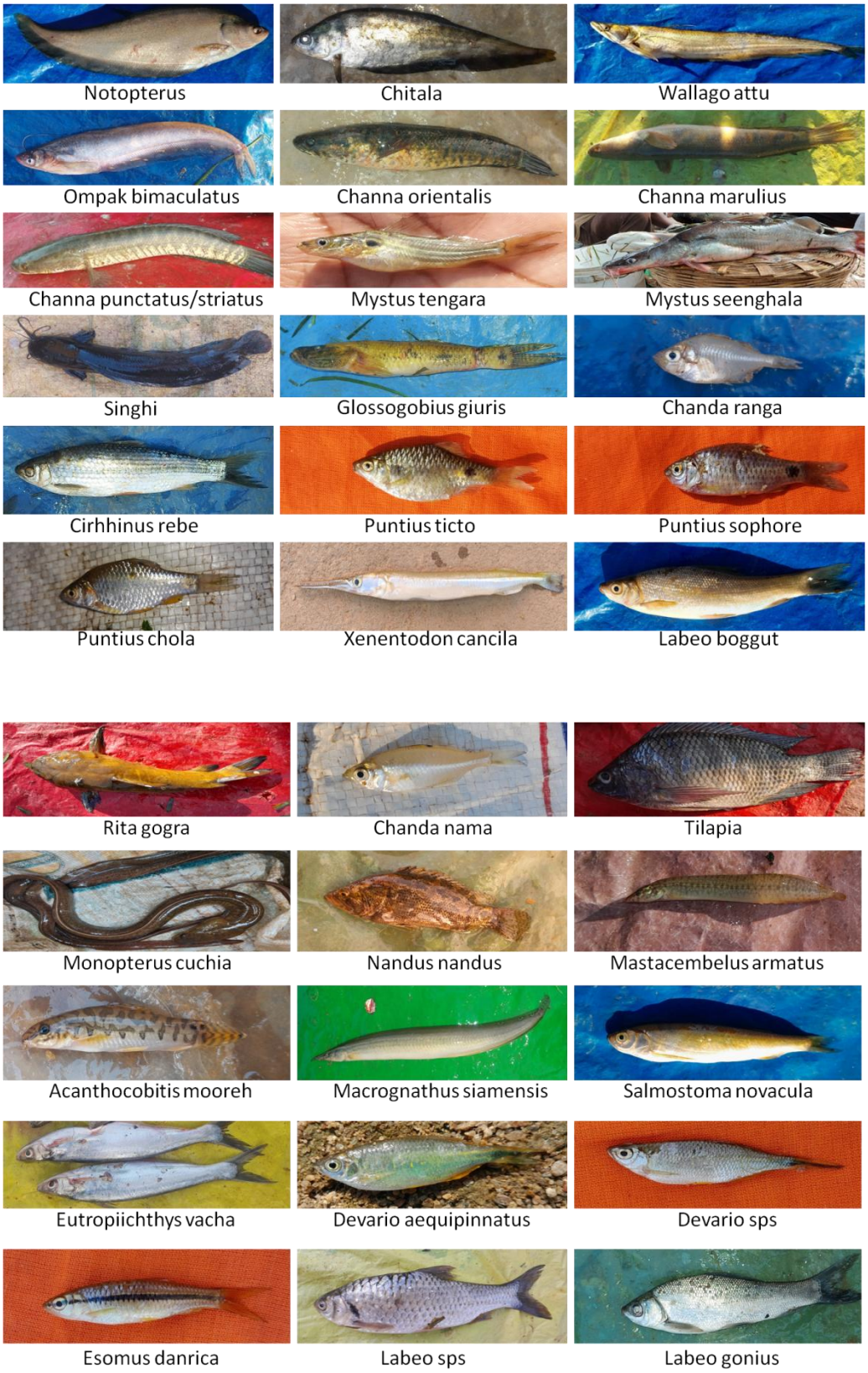

Figure 3 Ichthyofaunal diversity of Brahmapuri region

Communities use nearly all of the lakes and rivers in the area for activities such as washing clothes, applying detergents, and cleaning cattle. Agriculture practices are frequently seen along the river basin in Wainganga and its tributaries. According to Pandey, (2012) the egg and fry of most wild species destroyed by the use of fertilizers and pesticides in river basins as well as inside the lakes. Ongoing anthropogenic activities are responsible for degrading the water bodies, which ultimately affect the fish biodiversity. Wetland health and related ecosystems can be better understood by conducting more research on the connection between human activity and fish species abundance.

The preservation of specific ecosystem practices is necessary to preserve the current native fish population (Paliwal and Bhandarkar, 2014). With the active involvement of local communities, Hoque and Sharma, (2020) proposed that government restoration strategies and programs would be more advantageous. Avoid of introduction of exotic species, prohibited the capture of brood fishes during breeding season, avoid capturing of fry and fingerlings, to prevent the water pollution banned the industrial waste directly disposed of into water bodies and awareness in local fishermen are need to preserve biodiversity and overall harmony of aquatic ecosystem.

5. CONCLUSION

The Brahmapuri region harbors vast diversity of water bodies with plenty of fish diversity within. Conservation of Fish is essential which are Near-threatened and vulnerable categories. The quality of water bodies also degrading due to anthropogenic activities as well as most of water bodies infested with exotic species of fish which could negatively impact the ecology and decrease or eliminate the native fish populations. Building and implementing conservation plans, creating regulations, educating people about science, and training fish farmers are all necessary to stop human activity.

Ethical approval & declaration

In this article, the animal regulations followed as per the ethical committee guidelines of RTM Nagpur University, Nagpur, Maharashtra, India; the authors reported the present status of ichthyofaunal diversity in and around Brahmapuri, central India. The Animal ethical guidelines are followed in the study for species observation & identification.

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Authors Contribution

Lalit Urkude: Survey, Collection of data.
Sudhir Bhandarkar: Manuscript preparation and literature survey.
Gopal Paliwal: Literature survey, moderation of literature.
Akshay Sonavane: Identification of fish.

Informed consent

Not applicable.

Conflicts of interests:

The authors declare that there are no conflicts of interests.

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Data and materials availability

All data associated with this study are present in the paper.

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