



INTERNATIONAL JOURNAL OF PHARMACY & LIFE SCIENCES
(Int. J. of Pharm. Life Sci.)

**Fish Biodiversity of District Bhopal at Phanda and Baresia
block (M.P)**

Durga Meena^{1*} and Geeta Saxena²

1, Govt. Science and Commerce College, Benazir, Bhopal, (MP) - India

2, Department of Zoology, Institute for Excellence, Higher Education College, Bhopal, (MP) - India

Abstract

India fresh water resources consist of 195,210 kilometers of rivers and canals, 2.9 million hectares of minor and major reservoirs, 2.4 million hectares of ponds and lakes, and about 0.8 million hectares of flood plain wetlands and water bodies. As of 2010, the marine and freshwater resources offered a combined sustainable catch fishing potential of over 4 million metric tonnes of fish. In addition, India's water and natural resources offer a tenfold growth potential in aquaculture (farm fishing) from 2010 harvest levels of 3.9 million metric tonnes of fish, if India adopts fishing knowledge, regulatory reforms, and sustainability policies adopted by China over the last two decades. The Bhopal district has an area of 2,772 km², and a population 23,68,145 (12,39,378 males and 11,28,767 females) with a sex ratio of 911 females per 1000 males. Population density is 854/km² Total literacy rate is 82.3% (male 87.4% and female 76.6%). 1,836,784 (2011 census). It lies between 23° 15' 0" N latitude and 77° 25' 0" E longitude. Bhopal District is bounded by the districts of Guna to the north, Vidisha to the northeast, Raisen to the east and southeast, Sehore to the southwest and west, and Rajgarh to the northwest. It consists of two tehsil – Huzur and Berasia and block is Phanda and Beresia. It possesses a number of small and large water bodies, which in addition to promoting aquaculture. The present study revealed that a total of 45 fish species belonging to 18 families, 7 orders and 32 genera were recorded from the District Bhopal. Order cypriniformes was dominant (22 species) followed by Perciformes (10 species), Siluriformes (8 species). Synbranchiformes (2 species), Osteoglossiformes, Beloniformes and Clupeiformes (1 species) each.

Key words: District Bhopal, Fish Biodiversity, Madhya Pradesh

Introduction

India is gifted with a river system comprising of more than 20 major rivers with several tributaries. Many of these rivers are perennial and some of these are seasonal. The rivers like Ganges, Brahmaputra and Indus originate from the Himalayas and carry water throughout the year. The snow and ice melt of the Himalayas and the base flow contribute to the flows during the lean season. Apart from the water available in the various rivers of the country, the groundwater is also an important source of water for drinking, irrigation, industrial uses, etc. It accounts for about 80% of domestic water requirement and more than 45% of the total irrigation in the country. (M.Lal, 2001).

The Bhopal district has small and large water bodies, which in addition to promoting aquaculture activities also add to the scenic beauty of the city. However, these water bodies are under great environmental stress due to pollution from various sources. Since last few decades, they have been used for production of fish. Generally the poly culture of Indian major carps and exotic carps is being practiced in them. In spite of fragmentary research work done on the fisheries resources and fish diversity of Madhya Pradesh. There is scope left and some good work needs to be done in this connection. Therefore, the primary research work deals with the study of identification and fish fauna of district Bhopal of Madhya Pradesh.

Material and Methods

Study Area

Bhopal, the capital city of Madhya Pradesh India, is also popularly known as the "City of Lakes". It is a fascinating amalgam of scenic beauty, old historic city

*** Corresponding Author**

Email: meenadurga23@gmail.com

and modern urban planning. It is the 11th century city Bhojpal, founded by Raja Bhoj, but the present city was established by an Afghan soldier, Dost Mohammed (1707-1740). His descendants built Bhopal into a beautiful city. It possesses a number of small and large water bodies, which in addition to promoting aquaculture activities also add to the scenic beauty of the city.

Fisheries resources of Bhopal district consist of village ponds, irrigation tanks, dams and rivers. The present study highlights fish fauna of 18 water bodies in District Bhopal specially at two blocks of Phanda and Berasia. Phanda Block study area:- Upper lake, Lower lake, Shahpura lake, Motia talab, Kaliasot Reservoir, Hathaikheda talab, Chanderi talab, Itkhedi talab, Pura Chhindwara talab, Bakaniya talab and Bagroda talab. Berasia Block study area :- Garethiya talab, Manikhedi talab, Kalyanpur talab, Sagonikala talab, Semrikala talab, Rodiya talab and Khedikala talab.

Methods

Fishes were collected from the different water bodies of district Bhopal with the help of local fishermen by using different types of nets including gill net, cast net etc. Small fish were preserved in 5% formalin solution, while large fishes were gutted for visceral preservation also. Systematic identification of the fishes was done with the help of standard keys prepared. Fishes are classified and arranged based on the work of Jhingran (1991), with slight modification as followed by Day's Fauna (1889), Menon (1999), and Jayaram (1999). A field kit, containing measuring tape, rope, buckets, preservative, enamel trays, digital camera etc. was prepared for regular use. A boat was engaged and the station was visited in the sequence, which was carefully followed throughout the investigation period.

Results and Discussion

In the present investigation total of 45 fish species belonging to 18 families, 7 orders and 32 genera were recorded from the District Bhopal on the basis of percentage composition and species richness. Order cypriniformes was dominant (22 species) followed by Perciformes (10 species), Siluriformes (8 species). Synbranchiformes (2 species), Osteoglossiformes, Beloniformes and Clupeiformes (1 species). The family Cyprinidae is represented by 20 species; *Catla-catla*, *Cirrhinus mrigla*, *Cirrhinus reba*, *Labeo rohita*, *Labeo calbasu*, *Labeo gonius*, *Labeo bata*, *Osteobrama cotio cotio*, *Puntius sarana sarana*, *Puntius sophore*, *Puntius chola*, *Puntius ticto*, *Ctenopharyngodon idella*, *Hypophthalmichthys molitrix*, *Amblypharyngodon mola*, *Rasbora daniconius*, *Salmostoma bacaila*, *Ecomus danricus*, *Barilus barila*. Of these, *Cirrhinus reba* and *Labeo bata* were very rare and *Labeo rohita* and *Labeo*

gonius were most abundant. Percentage wise species composition show that Cypriniformes are the dominant order which constitutes of 48.89%, out of these family Cyprinidae represents 44.44%, Family Balitoridae and Cobitidae both represent 2.22% each, order Perciformes represents 22.22% including family Channidae 6.67%, Ambassidae 4.44%. Nandidae, Gobiidae, Anabantidae, Belontiidae and Cichidae represents 2.22%. Order Siluriformes constitute 17.78%. Including family Bagaridae 8.89%, Siluridae 4.44%, family Heteropneustidae and Clariidae 2.22%. Order Synbranchiformes represents 4.44% by only one family Mastacembelidae with 4.44%, While order Beloniformes, Clupeiformes and Osteoglossiformes both are represented by one family each Belonidae, Clupeidae and Notopteridae respectively contributes 2.22% each. diversity of Ramsagar reservoir. Kantaraj et al., (2011) observed that family Cyprinidae was most dominant in the assemblage composition with 54.55% followed by Bagridae and Siluridae with 9.09%, Channidae with 6.06%, Mastacembelidae, Ambassidae, Cichlidae, Clariidae, Notopteridae, Cobitidae and Heteropneustidae each with 3.03% respectively. (Table-1) Sarkar et al., (2011) reported Cyprinidae was the most dominant family accounted for 49.43% (40 species) of the total number of fish species collected followed by the family Bagridae 8.04% (7 species) and Schilbeidae 5.74% (5 species). It is observed in the present investigation that the four fish species which are rare *Cirrhinus reba*, *Labeo bata*, *Ompok bimaculatus* and *Lapidacephalichthys guntea* show that the conditions of the water bodies are still promoting to the growth of these fish species and conservation measures can be planned in near future. The carps, *Catla catla*, *Labeo rohita*, *Cirrhinus mrigal*, *Cyprinus carpio* and *Ctenopharyngodon idella* have highly commercial and economical importance. While the other minor carps *Puntius sarana*, *Puntius chola*, *Puntius ticto*, *Amblypharyngodon mola*, *Salmostoma bacaila*, *Rasbora daniconius* and *Barilus barila* are less economically important. The biodiversity status of fishes in the 18 water bodies in District Bhopal is evident. Karamchandani et al., (1967) has reported 5 fish species of economic importance. Arya et al., (2001) and Maheshwari (2004) has reported 4 species.

As per (IUCN) red data book out of 45 species of fish, 8 species of fish (*Hypophthalmichthys molitrix*, *Ompok bimaculatus*, *Wallago attu*, *Mastacembelus panculus*, *Parambassis ranga*, *Trichogaster fasciata*, *Channa straitus* and *Channa punctatus*) are Near Threatened (NT) category with 17.78%, 33 species of fish (*Notopterus notopterus*, *Gudusia chapra*, *Catla-catla*, *Cirrhinus reba*, *Cyprinus carpio*, *Labeo rohita*, *Labeo*

calbasu, Labeo gonius, Labeo bata, Osteobrama cotio cotio, Puntius sarana sarana, Puntius sophore, Puntius chola, Puntius ticto, Amblypharyngodon mola, Rasbora daniconius, Salmostoma bacaila, Ecomus danricus, Barilus barila, Lepidocephalichthys guntea, Nemachelius botia, Mystus bleekeri, M.cavasius, Aorichthys aor, A. seenghala, Clarias batrachus, Heteropneustes fossils, Xenentodon cancila, Mastacembelus armatus, Nandas nandus, Chanda nama, Anabas testudineus and Channa marulius) are in Least Concern (LC) category with 73.33%, 1 species of fish (*Cirrhinus mrigala*) is in Vulnerable (VU) category with 2.22%, 2 species of fish (*Glossogobius giuris* and *Oreochromis mossambica*) are in Data Deficient (DD) category with 4.44%, 1 species of fish (*Ctenopharyngodon idella*) is in Not Evaluated (NE) category with 2.22%. (Table-2) Davi Prasad et al., (2009) identified 6 fish species as threatened, and 7 fish species as vulnerable in major wetlands of Mysore. Thirumala et al., (2012) have reported three species as endangered, five species as vulnerable, eleven species as lower risk near threatened, and one species as lower risk least concern in Bhadra reservoir of Karantaka. Paunikar et al., (2012) observed that, nine species are vulnerable, fifteen species are at lower risk (near threatened,) One species lower risk least concern, two species are exotic and four species are not evaluated from Gour river of Jabalpur.

Conclusion

Over all the findings showed that fish fauna of the study area is showing the reduction of fish species. The fish community in water bodies' include the native species and the introduced species for purpose of fish production. The study purpose should open new ways for incoming Ichthyofaunal research. Sustainable fish production by taking appropriate steps for sustaining fish diversity is necessary to conserve different water bodies of District Bhopal. The research shows that the conditions of the water bodies are still conducive to the growth of these fish species and conservation measures can be planned in near future. Population of some of the species is declining due to habitat loss and degradation, water abstraction, drainage of wetlands, dam construction, pollution and eutrophication. The results of the study indicate that Bhopal district is still very rich in terms of fish species diversity. It is also noted that most of the endemic and native species are replaced with some exotic species. So, for conservation of these fish species various strategies are the need of the hour which may be halting of siltation, promoting controlled harvest, exploring checks of the growth of exotic species and control of water pollution. The

domestic sewage, garbage from market, drainage materials from hospital, leaching of fertilizers & pesticides from tea gardens, use of ichthyotoxic substances for fish capture and ashes of cremation directly mix up with the water bodies and are clearly manifested.

References

1. Arya, S. C.; Rao, K. S. and Shrivastava, S. (2001): Biodiversity and Fishery Potential of Narmada Basin Western Zone (M. P. India) with special reference to Fish Conservation. *Environment and Agriculture : Agriculture and Pollution in South Asia*, pp. 108-112.
2. Ayappan and Birdar, (2004). Enhancing Global competition, Survey of Indian Agriculture (The Hindu). pp.98
3. Day F., (1889). The Fauna of British India including Ceylon and Burma. Fishes. 1: 548 and 2: 509. London, Taylor and Francis.
4. Devi prasad et al., (2009). Fish diversity and its conservation in major Wetlands of Mysore. *Journal of Environmental Biology* Vol. 30 (5), pp. 713-718.
5. ICUN, (2010). (International Union for Conservation of Nature and Natural Resources). <http://www.iucnredlist.org>
6. Jayaram, K. C. (1999): The fresh water fishes of India, region. Narendra Publication House. Delhi 110006 (India).
7. Jhingran V.G., (1991). Fish and Fisheries of Indian. 3rd ed. Hindustan Publication Corporation, Delhi, India.
8. Karamchandani, S. J.; Desai, V. R.; Pisolker, M. D. and Bhatnagar, G. K. (1967). Biological investigation on the fish and fisheries of Narmada River (1958-66). *Bull Cent. Inland Fish. Res. Inst., Barrackpore (Mimeo)*, 10: 40.
9. Menon, A.G.K. (1999). Checklist of freshwater fishes of India. Z. S. I. Kolkata.
10. Maheshwari, U. K. (2004). Ichthyobiodiversity, Decline Pattern, Management and Conservation of Natural Seed of Mahseer *Tor tor* in middle stretch of River Narmada, *Nature Conservation*, 8: 111-117.
11. Paunikar et al., (2012). Studies on Ichthyofaunal diversity of Gour River, Jabalpur, Madhya Pradesh, Central India. *World Journal of Fish and Marine Sci.* 4 (4), pp. 356-359.
12. Lal M., (2001). Climate change Implications for India's water resources. *J. India Water Res. Soc.* pp.101-119

13. Sarkar et al., (2011). Biodiversity of the freshwater fishes in the protected forest areas of Uttar Pradesh and its significance in management of riverine fish diversity. National Bureau of Fish Genetic Resources, pp. 36-42.

14. Thirumala et al., (2012). Fish diversity in relation to Physico-Chemical characteristics of Bhadra reservoir of karnataka, India. *Adv. Appl. Sci. Rec.*, 2 (5), pp. 34-47

Table 1: Showing number and percent composition of families, genera and species under various orders (Block – Phanda and Baresia) District – Bhopal

S. No.	Order	Families	Genera	Species	% of families in an order	% of genera in an order	% of species in an order
1.	Cypriniformes	3	15	22	16.67	46.87	48.89
2.	Perciformes	7	7	10	38.89	21.87	22.73
3.	Siluriformes	4	6	8	22.22	18.75	18.18
4.	Beloniformes	1	1	1	5.55	3.12	2.27
5.	Osteoglossiformes	1	1	1	5.55	3.12	2.27
6.	Clupeiformes	1	1	1	5.55	3.12	2.27
7.	Synbranchiformes	1	1	2	5.55	3.12	4.54

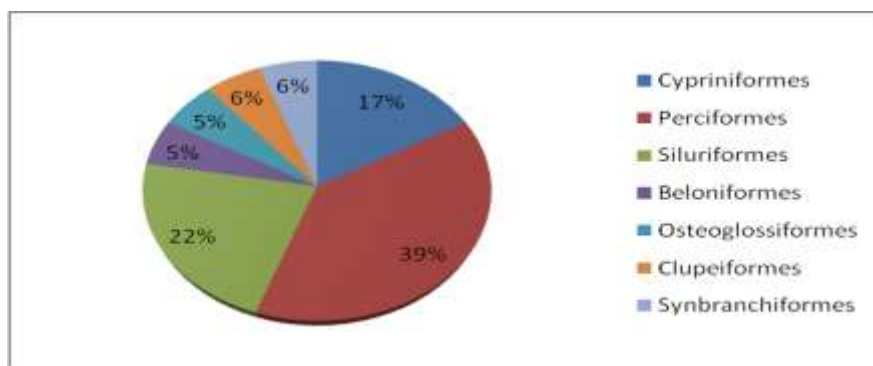


Fig. 1: Showing Percent Contribution of genera to the families, genera and species under orders.

Table 2: Showing number of species and percent composition under various threat category of IUCN.

S.No.	IUCN Category	No. of Species	% of species in an threat
1.	Near Threatened	8	17.78
2.	Least Concern	33	73.33
3.	Vulnerable	1	2.22
4.	Data Deficient	2	4.44
5.	Not Evaluated	1	2.22

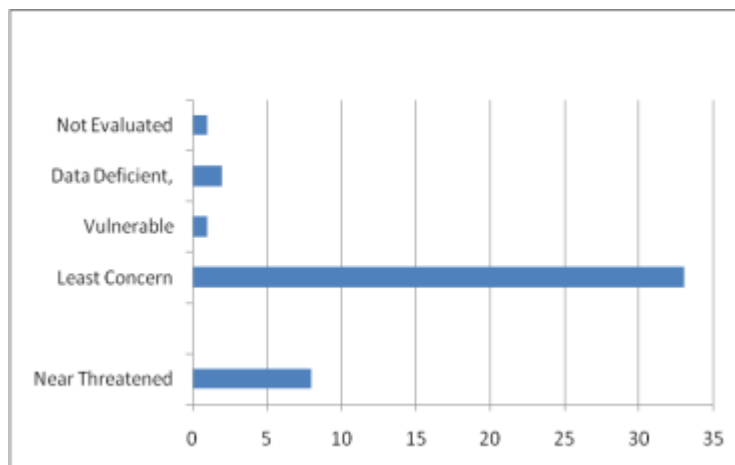


Chart - Showing number of species and percent composition under various threat category of IUCN

Table 3: Showing the list of fish identified during present study area at Phanda block [District Bhopal]

Species	Upper lake	Lower lake	Shahpura lake	Motia talab	Kaliasot reservoir	Hathaik heda talab	Bakaniya talab	Bagroda talab	Purachhin dwara talab	Chan deri talab	Itkhedi talab
<i>Notopterus notopterus</i>	+++	++	-	-	+	++	++	++	++	+	++
<i>Gudusia chapra</i>	++	+	-	-	+	++	+	+	++	++	-
<i>Catla catla</i>	+++	++	++	++	+++	++	++	++	+++	++	+++
<i>Cirrhinus mrigala</i>	+++	+	++	++	+	++	+	+	++	++	+
<i>C.reba</i>	-	-	-	-	-	++	+	-	-	-	-
<i>Cyprinus carpio Linnaeus</i>	+++	++	++	++	++	++	++	++	++	++	++
<i>Labeo rohita</i>	+++	++	++	++	+++	++	++	++	++	++	++
<i>Labeo calbasu</i>	++	+	-	-	+	++	+	+	++	-	+
<i>L.gonius</i>	+	+	-	-	-	+	-	-	+	-	++
<i>L.bata</i>	-	-	-	-	-	-	-	-	-	-	-
<i>Osteobrama cotio cotio</i>	++	+	-	+	++	-	-	++	-	++	-
<i>Puntus sarana sarana</i>	++	++	-	++	+	+	-	++	-	++	+
<i>P.sophore</i>	++	+	-	-	+	-	-	+	-	-	+
<i>P.chola</i>	+	+	-	-	++	+	-	+	++	-	+
<i>P.ticto</i>	++	+	-	+	+	-	-	-	-	-	-
<i>Ctenopharygodon idella</i>	+++	++	-	++	++	+	-	++	-	+	+
<i>Hypophthalmichthys</i>	++	+	+	+	++	++	+	+	++	+	++

Species	Upp er lake	Lo wer lake	Shahp ura lake	Mo tia tala b	Kalia sot reser voir	Hathaik heda talab	Baka niya talab	Bagr oda talab	Purachhin dwara talab	Chan deri talab	Itkh edi tala b
<i>molitrix</i>											
<i>Amblypharyngodon mola</i>	++	-	-	+	+	++	-	-	+	-	-
<i>Rasbora daniconius</i>	++	++	-	+	-	-	++	-	-	-	-
<i>Salmostoma bacaila</i>	+	-	-	+	+	-	-	-	+	-	+
<i>Esomus danricus</i>	+	-	-	-	-	++	-	+	+	+	+
<i>Barilius barila</i>	+	-	-	++	-	-	++	-	-	+	-
<i>Lepidocephalus guntea</i>	+	-	-	-	++	-	-	+	-	-	-
<i>Nemacheilus botia</i>	+	-	-	++	++	-	++	-	+	-	+
<i>Mystus bleekeri</i>	+	+	-	++	-	-	++	+	-	-	++
<i>M.cavasius</i>	-	+	-	-	+	+	-	+	+	-	-
<i>Aorichthys aor</i>	+	+	-	-	-	++	+	-	+	++	-
<i>A.seenghal</i>	++	+	-	+	-	+	++	+	-	++	-
<i>Ompok bimaculatus</i>	++	+	-	+	+	-	-	-	-	-	-
<i>Wallago attu</i>	++	-	-	+	+	+	+	-	-	+	-
<i>Clarias batrachus</i>	-	++	-	+	++	++	-	-	-	+	-
<i>Heteropneustes fossilis</i>	++	-	-	+	++	+	-	++	+	-	+
<i>Xenentodon cancila</i>	+	+	-	+	-	-	-	++	-	++	-
<i>Mastacembelus armatus</i>	+	-	-	+	++	++	-	-	-	+	+
<i>Mastacembelus pancalus</i>	+	+	-	+	-	++	-	+	+	-	+
<i>Nandus nandus</i>	+	+	-	-	-	-	+	-	-	++	+
<i>Chanda nama</i>	+	-	-	-	++	-	+	-	+	-	-
<i>Parambassis ranga</i>	+	-	-	-	++	-	-	+	-	+	-
<i>Glossogobius giuris</i>	-	+	-	-	-	+	-	-	+	-	+
<i>Anabas testudineus</i>	++	-	-	-	-	-	++	-	+	-	-
<i>Trichogaster fasciata</i>	+	-	-	-	-	++	-	+	+	-	-
<i>Channa</i>	++	-	-	-	-	-	++	-	-	-	-

Species	Upper lake	Lower lake	Shahpura lake	Motitalab	Kaliasot reservoir	Hathaik heda talab	Bakaniya talab	Bagroda talab	Purachhindwara talab	Chanderi talab	Itkheditalab
<i>marulius</i>											
<i>C.punctatus</i>	+	-	-	-	-	+	-	-	-	-	-
<i>C.striatus</i>	-	+	-	-	+	-	+	-	-	-	-
<i>Oreocharom is mossabica</i>	-	-	++	-	-	-	+	-	-	-	-

+++=Dominant, ++=Common, +=Rare, -=Absent

Table 4: Showing the list of fish indentified during present study area at Berasia block [District Bhopal]

Species	Garethiya talab	Manikhedi Talab	Kalyanpur talab	Sagoni talab	Semrikala talab	Rodiya talab	Khedikala talab
<i>Notopterus notopterus</i>	++	+	++	++	++	++	+
<i>Gudusia chapra</i>	++	++	++	++	++	++	++
<i>Catla catla</i>	++	+	+	-	+	-	+
<i>Cirrhinus mrigala</i>	+	+	-	-	-	+	+
<i>C.reba</i>	-	-	-	-	-	-	-
<i>Cyprinus carpio Linnaeus</i>	-	-	-	-	-	-	-
<i>Labeo rohita</i>	+++	+++	+++	++	++	++	+
<i>Labeo calbasu</i>	++	++	+++	++	+++	+++	++
<i>L.gonius</i>	+++	+++	+++	++	++	++	++
<i>L.bata</i>	-	-	-	-	-	+++	-
<i>Osteobrama cotio cotio</i>	+	+	+	+	++	+	-
<i>Puntus sarana sarana</i>	++	+	+	-	-	++	+
<i>P.sophore</i>	++	++	++	++	+	++	+++
<i>P. chola</i>	+	++	+	+	+	++	++
<i>P.ticto</i>	++	++	++	++	++	++	++
<i>Ctenopharyngodon idella</i>	+	+	+	-	-	-	+
<i>Hypophthalmichthys molitrix</i>	-	-	-	-	-	-	-
<i>Amblypharyngodon mola</i>	++	+	+	+	++	+	-
<i>Rasbora daniconius</i>	++	++	++	++	++	++	+
<i>Salmostoma bacaila</i>	++	++	++	++	++	++	++
<i>Esomus danricus</i>	++	+	+	+	+	+	-
<i>Barilius barila</i>	++	+	+	+	-	+	+
<i>Lepidocephalus guntea</i>	+	+	+	+	+	+	+
<i>Nemacheilus botia</i>	++	+++	++	++	++	++	++
<i>Mystus bleekeri</i>	++	++	++	++	++	++	++
<i>M.cavasius</i>	++	+	-	++	+	-	+
<i>Aorichthys aor</i>	++	+	++	+	-	+	+
<i>A.seenghal</i>	+++	+++	+++	+++	++	++	+
<i>Ompok bimaculatus</i>	+	++	-	-	-	-	+

Species	Garethiya talab	Manikhedi Talab	Kalyanpur talab	Sagoni talab	Semrikala talab	Rodiya talab	Khedikala talab
<i>Wallago attu</i>	++	++	++	++	++	+++	+
<i>Clarias batrachus</i>	+	+	+	+	+	+	+
<i>Heteropneustes fossils</i>	+	+	+	+	+	+	+
<i>Xenentodon cancila</i>	+	+	+	+	+	-	+
<i>Mastacembelus armatus</i>	+	+	+	+	+	-	-
<i>Mastacembelus pancalus</i>	++	++	++	-	-	-	-
<i>Nandus nandus</i>	+	++	++	++	+	+	++
<i>Chanda nama</i>	++	+	++	++	++	++	++
<i>Parambassis ranga</i>	+++	++	+	+	++	++	++
<i>Glossogobius giuris</i>	++	++	+	+	+	+	+
<i>Anabas testudineus</i>	++	++	++	++	++	++	++
<i>Trichogaster fasciata</i>	+	+	+	+	+	+	-
<i>Channa marulius</i>	++	++	++	++	++	+	+
<i>C.punctatus</i>	++	++	++	++	++	++	++
<i>C.striatus</i>	++	++	++	++	+	+	++
<i>Oreochromis mossabica</i>	-	-	++	-	-	-	-

+++=Dominant, ++=Common, +=Rare, -=Absent

How to cite this article

Meena D. and Saxena G. (2016). Fish Biodiversity of District Bhopal at Phanda and Baresia block (M.P). *Int. J. Pharm. Life Sci.*, 7(12):5388-5399.

Source of Support: Nil; Conflict of Interest: None declared

Received: 10.11.16; Revised: 28.12.16; Accepted: 20.12.16