A Study of Fish Diversity in Bhandara District (MS) India, With Special Emphasis on Pollution and Human Interference in Aquatic Habitats

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Abstract

Present study deals with the inventorization of fish species in District Bhandara of Maharashtra India. The study area is well known as a district of lakes. About 30 lakes, ponds, reservoir and some river habitats at rural and forests areas, are explored to collect the fish species and studied their habitat conditions. In previous literature about 38 species are reported in the study area of which all are collected and reported in terms of low, moderate and optimum distribution according to their availability in the nearby markets. During study period 23 more species are collected from the rural water bodies. Identification of species is done by the literature of Day and Jairam.

Mostly human interference in the lakes and rivers are mainly responsible for the less distribution of fishes, pollution load and intense hot climatic conditions affects the growth and distribution fishes. Pollution load during the months of summer turns the fish species to develop certain adaptations. The species having more adaptive capabilities showed more in quantities; however some fish fauna is going on the way of scrub down from the study area.

Careless management of some lakes and river and agricultural practices in lakes and river basins pollutes the water which creates hazards for eggs and fries to grow up in the adult fishes. Use of certain manures and insecticides in the lake water harms the fish fauna.

KEYWORDS: Freshwater fishes, Water bodies, Status, Diversity and Inventorization.

INTRODUCTION:

Perusal of past studies showed that fish constitutes almost half of the total number of vertebrates on earth. Out of 39900 species of vertebrates, 21723 fish species have been recorded. Out of which 8411 are fresh water fishes (Jairam 2010). In India there are 2500 species of fishes and in which 930 species resides on fresh water habitats, (Kar 2003). Apart from its economic importance fish forms highest species diversity amongst vertebrates. North eastern region and western ghats region in India is one of the mega-biodiversity hot spot, containing 11.72 % of global fish diversity, (NBGFR 2010). In recent year international community has become sensitive in conservation of natural resources to respond new challenges and development. Govt. of India has legislated the Biodiversity Act 2002 and Biological diversity rules 2004. According to IUCN re data list 16928 species are threatened in the world of which 659 fish species are observed in Indian waters.

No doubt the exploration studies of fishes are essential to know the present status of Icthyo diversity which is necessary for the conservation purposes. But, the exploration linked with the overall conditions of waters and water bodies may provide

better data for conservation strategies. In rural areas of the study area mismanagement of water bodies from concerned authorities is only reaponsible to lower the aquatic biota. However, sustained contamination of lakes, rivers, ponds, and reservoirs is creating threat to fish species. In present urbanization and industrial developments human interference is increased in the surface waters. (Bobdey et al, 2010).

Pollution study on surface waters undertaken by the concerned government agencies is a very insufficient and poor attempt to improve the status of aquatic habitats. Sampling of waters once a month or year cannot get the ideas about the contamination of waters. It, only be achieved by the sampling of sources and innovative ideas to resolve the problems of rural communities. Preparation of borewells and dugwells is not sufficient tool to save lakes and rivers from washerman's and cattle washing activities. Now it is time to think new ideas to overcome the problems.

MATERIAL AND METHODS:

Bhandra district is located in Maharashtra state of central India. Bhandara city is place along the national highway No. 6. Bhandara district has a great religious significance since the dynasty of King Vakatak. Abundance and frequency of fish species in the study area is done from the availability of particular species in fishermans caught and survey from local fish markets. Collected fish species are immediately studied for their morphological characters. Identification of species is performed by the standard literature given by K.C. Jairam (2010) and Francis Day (2007). Photogrphy of habitats and fish species is performed by using Nicon DSLR 3500 camera. Fishes are presereved in 10% formaldehyde solution in glass jars. Sampling of water is done with a Mayer's sampler. Physico chemical parameters such as temperatue, Ph, Conductivity, DO is measured by using Portable water analysis kit. CO_2 and BOD estimation is carried out by the standard methods given by NEERI (1986).

STUDY AREA:

Bhandara district is located in the central provinces of British India and now it is located in Maharashtra state of India. Geographically it is located at 20^0 39' North latitude and 79^0 27' East latitude, in the area of 3716 square kilometers. There are 3648 small lakes and ponds are situated in the Bhandara district. It is transversed by highway No.-6 of India connected to Mumbai and Kolkata. Most of the rural population residing along lakes and rivers depends on the fresh water fishery for their economy. The lakes that located far from the localities have shown the diversity of fish species. However, the stretch of rivers away from the localities contains diversified species of fishes. Most of the habitats of lakes and rivers are seriously contaminated due to human activities.

OBSERVATION:

Table 1.1 Collected and identified fish species in Bhandara District
Table 1.2 Ranges of various parameters during the sampling of surface water bodies in Bhandara District

RESULT AND DISCUSSION:

Many systems have been developed in the world for categorization of fish species on earth. Such as IUCN – world conservation union, (IUCN, 2007), AFSB-Australian society of fisherybiology, AFS- America fishery society etc. According to world conservation Union following five criteria's are developed to assess the global fish diversity. 1) Population reduction, 2) Restricted population, 3) Population

estimates, 4) Restricted distribution & 5) Probability of extinction. In which more importance has been given to the population size, habitat conditions and distribution range. Regional or national assessment guidelines for the assessment of fish diversity have not yet developed. A revised criteria for conservation assessment of fish diversity is developed by the wildlife institute of India, (WII, 2007).

During present exploration 53 species of fishes are reported with 17 families. Perusal of past literature of fish diversity in Bhandara district showed most of the species washed out from the Bhandara region. Three threatened species are observed in the study area are 1) *Puntius sarana (Family - Cyprinidae & Order - Cyprniformes, Division –Cyprini, Suborder - Cyprinoidei), 2) Bagarius bagarius (Family- Sisoridae & Order- Cypriniformes, Division - Siluri, Suborder-Siluroidei)* and 3) *Heteropneustus fossilis (Family- Heteropneustidae & Order- Cypriniformes, Division- Siluri Suborder - Siluroidei)* (NBGFR, 2010). Out of these three Vulnerable species *H. fossilis* showed more abundance in the study area, However, *P. sarana*, is lower in abundance while, *Bagarius bagarius*, *Rita pavimentata* and *Colisa fascinates* are very rare in the fish population of the study area.(Table-1.1). (Day F. 1986), (Talwar &Jhingran, 1991).

More abundance of carps are seen in the district region due to establishment of inland fisheries, but on the other side population of wild species went on decreasing due to deliberated neglegence of communities. Since past decades, the continuous harvesting of high breed species from the lakes and rivers is only the reason of washing off wild forms from study area. Less attention towards the conservation of genetic resources or illiteracy of the localities about fish genetic resources is also one of the reasons. Development of new approaches and criteria's may reduce the threat of endangered fish species. (Sarkar et al, 2008).

Present situation of contamination of surface waters in the region throws light on human interference in the aquatic ecosystems. Almost 98% of lakes and rivers are used by the localities for cloth washing and addition of detergents, Cattle washing activities. However, in the stretch of Wainganga and Chulband river, river basin agriculture is commonly observed during the days of summer(Table-1.2). Use of different manures and pesticides in river basin and inside the lake destruct most of the eggs and fries of wild varieties, (Devendra pandey ,2012), (Bobdey et al, 2005) . All these sustained human activities creates the overburden on the water bodies and ultimately on the fish fauna.

Endangered condition of *Bagarius bagarius* species from the study area is also may be due to its over exploitation. Since decads the locality of Bhandara district demands more for the Bodh (Bagarus) fish. Repeated and unplanned fishing in the lakes and rivers lowers the population of fishes in this region (Kar et al, 2006).

Most of the researchers have defined the pollution of water, which showed the collective approach for contamination of waters. During present condition of increased human population it may be changed. As, the nature has no control to produce the particular season, like this man and his uncontrolled destructive activities have no any control. Hence, it is difficult to say at where, at which time, at which habitat the man contaminates water or land or air. Hence according to my view the water pollution may be defined as, *"uncontrolled activities of man and nature, that adds solid, liquid or gaseous wastes directly or indirectly in water bodies at given date and time."*

CONCLUSION:

Social awareness about the new conservation approaches of biodiversity and genetics resources is necessary in the study area so as to aware the localities, Proper

management of surface waters by concerned rural authorities may reduce the threat of fish diversity. The present status of water bodies in the study area may only be improved by preparation and strict enforcement of proper wildlife legislation for aquatic biota. Separate legislations to conserve lake and river biodiversity and its enforcement is urgently needed. Now a day's some contradiction is seen in the govt. policies, only NGO's and upper strata of societies are only aware of the facts. So, the establishment of forest and wildlife colleges and production of skilled and learned man power in the state may helpful to educate the common peoples about conservation facts.

ACKNOWLEDGEMENT:

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Table 1.1
Collected and identified fish species in Bhandara District

S.No.	Family	Genus	Availability
1	(1) Cyprinidae	*Puntius sarana*	+
2		*Puntius sophore*	+
3		*Rasbora daniconius*	+++
4		*Tor khudree*	+
5		*Catla catla*	+++
6		*Cirrhinus cirrhosa*	+++
7		*Cirrhinus mrigala*	+++
8		*Cirrhinus reba*	+++
9		*Labeo bata*	+++
10		*Labeo boggut*	+++
11		*Labeo calbasu*	++
12		*Labeo dero*	+++
13		*Labeo fimbriata*	++
14		*Labeo gonius*	+
15		*Labeo rohita*	+++
16		*Thynnichthys sandkhol*	++
17		*Gara mullya*	++
18		*Dicognathus modestus*	++
19		*Osteobrama vigorsii*	+++
20		*Cyprinus carpio*	+++
21		*Cyprinus communis*	+++
22		*Salmophasia clupeoides*	+++
23	(2) Notopteridae	*Notopterus chitala*	++
24		*Notopterus notopterus*	++
25	(3) Cobitidae	*Nemachelius botia*	+++
26		*Nemachelius savona*	+++
27	(4) Siluridae	*Wallago attu*	+++
28		*Ompok bimaculatus*	++
29	(5) Claridae	*Clarius batracus*	+++
30		*Clarius garipinus*	+++
31	(6) Sisoridae	*Bagarius bagarius* -	-
32		*Mystus bleekeri*	++
33		*Mystus cavasius*	++
34		*Mystus seenghala*	+++
35		*Mystus vitatus*	+++
36		*Rita pavimentata*	-
37	(7) Anguilidae	*Anguilla bengalensis*	++
38	(8) Belonidae	*Xenentodon cancila*	+

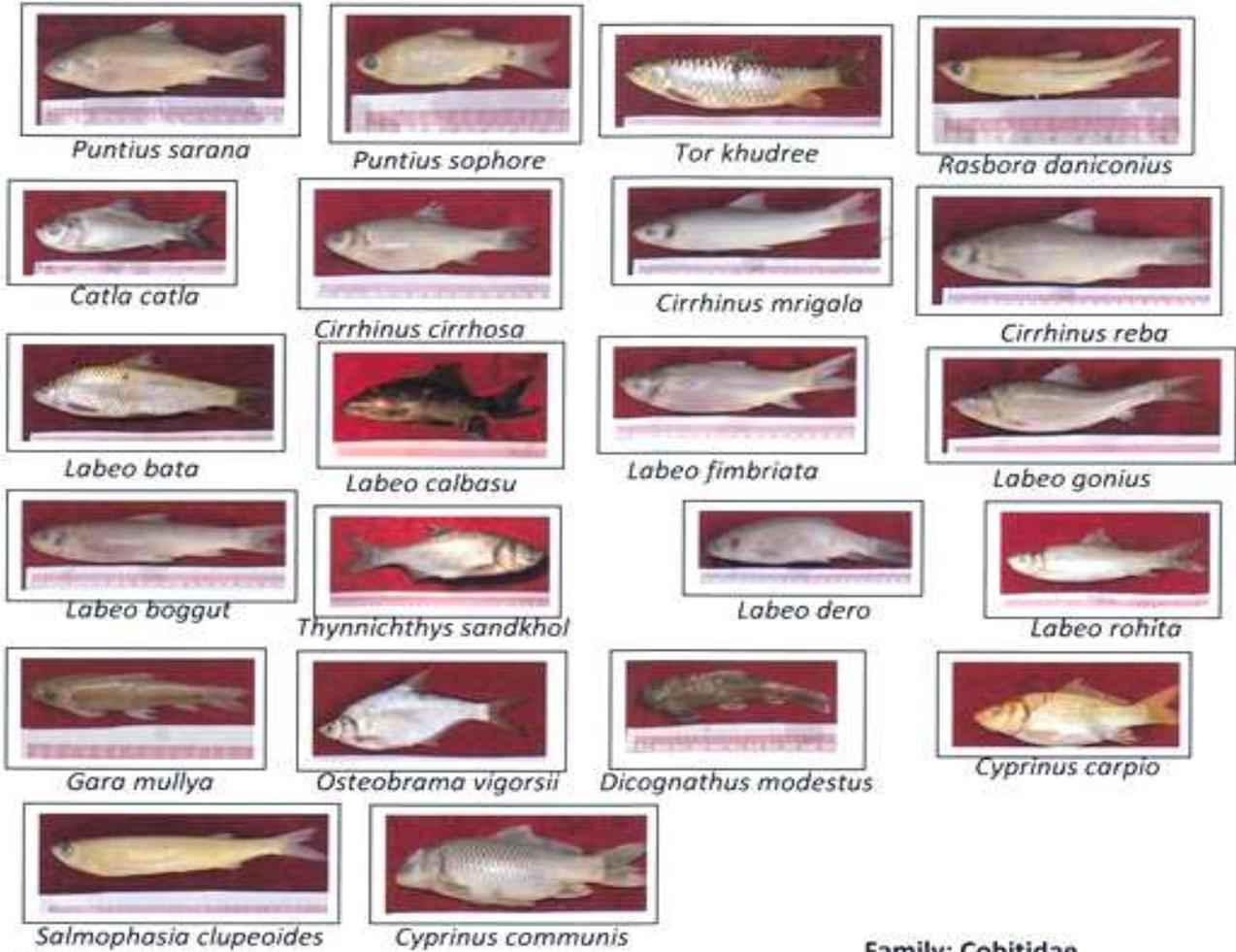| 39 | (9) Ophiocephalidae | *Ophiocephalus gachua* | ++ |
40		*Ophiocephalus marulius*	+++
41		*Ophiocephalus punctatus*	+++
42		*Ophiocephalus striatus*	+++
43	(10) Nandidae	*Nandus nandus*	++
44	(11) Ambassidae	*Ambassis nama*	++
45		*Ambassis ranga*	++
46	(12) Gobidae	*Gobius guris*	++
47	(13) Mastocembelidae	*Mastocembalus aramatus*	++
48		*Macrognathus acculeatus*	++
49		*Mastocembalus pancalus*	+++
50	(14) Heteropneustidae	*Heteropneustus fossilis* -	+++
51	(15) Anabantidae	*Anabas testudineus*	++
52	(16) Belontidae	*Colisa fascinatus*	-
53	(17) Cihlidae	*Oreochromis mosssambicus*	+++

Abundant, ++ Less abundant, + Less population, - Rare population

Table 1.2
Ranges of various parameters during the sampling of surface water bodies in Bhandara District.

S.No.	Parameter	River Wainganga	Kurada lake	Navegaon Lake	Sakoli Lake	Amrai Lake	Gosikhurd dam.	Lakhandur Lake	Chulband river
1	DO (mg/l)	2.6 to10.9	3.7 to 4.9	5.3 to 8.1	4.1 to 6.9	4.4 to 6.6	6.1 to 10.2	3.9 to 6.1	3.6 to 8.2
2	BOD (mg/l)	6.0 to 29.4	15.1 to 63.3	5.1 to 59.9	6.8 to 77.5	15.3 to 63.9	3.1 to 33.1	16.6 to 49.9	14.3 to 69.6
3	CO_2 (ppm)	5.7 to 13.3	4.99 to 9.86	7.77 to 16.2	6.43 to 17.3	4.89 to 15.1	3.52 to 12.1	5.66 to 14.4	6.7 to 16.3
4	pH	7.3 to 8.1	7.3 to 7.9	7.5 to 7.7	7.1 to 8.1	7.2 to 7.8	7.6 to 8.2	7.5 to 8.0	7.4 to 7.8
5	Cond. (Umhos /cm)	359 to 648	1993 to 2114	997 to 2238	1203 to 3183	897 to 2647	388 to 799	983 to 1187	449 to 861
6	TDS (mg/l)	198 to 443	225 to 632	174 to 539	217 to 388	331 to 447	229 to 662	255 to 677	210 to 531

Observed ranges among 24 (Bi-monthly) water samples

Family: Cyprinidae

Puntius sarana

Puntius sophore

Tor khudree

Rasbora daniconius

Catla catla

Cirrhinus cirrhosa

Cirrhinus mrigala

Cirrhinus reba

Labeo bata

Labeo calbasu

Labeo fimbriata

Labeo gonius

Labeo boggut

Thynnichthys sandkhol

Labeo dero

Labeo rohita

Gara mullya

Osteobrama vigorsii

Dicognathus modestus

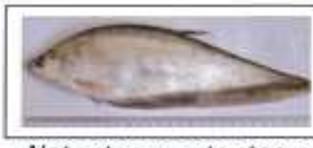Cyprinus carpio

Salmophasia clupeoides

Cyprinus communis

Family: Cobitidae

Family: Notopteridae

Notopterus chitala

Notopterus notopterus

Nemachelius botia

Nemachelius savona

Family: Siluridae

Family: Claridae

Wallago attu

Ompok bimaculatus

Clarius batracus

Clarius garipinus

Family: Sisoridae

Family: Bagaridae

Bagarius bagarius

Mystus bleekeri

Mystus cavasius
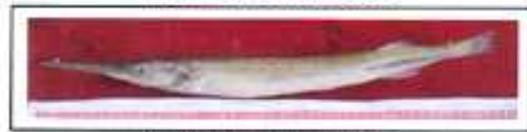

Mystus seenghala

Rita pavimentata

1

Mystus vitatus

Family: Anguilidae

Anguilla bengalensis

Family: Belonidae

Xenentodon cancila

Family: Ophiocephalidae/Chandidae

Ophiocephalus gachua

Ophiocephalus marulius

Ophiocephalus punctatus

Ophiocephalus striatus

Family: Ambassidae

Ambassis nama

Ambassis ranga

Family: Nandidae

Nandus nandus

Family: Gobidae

Gobius guris

Family: Mastocembelidae

Mastocembalus aramatus

Mastocembalus pancalus

Macrognathus acculeatus

Family: Heteropneustidae

Heteropneustus fossilis

Family: Anabantidae

Anabas testudineus

17) Family: Belontidae

Colisa fascinatus

18) Family: Cihlidae

Oreochromis mosssambicus