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Ichthyofaunal distribution in Dinara Pond, Shivpuri Madhya Pradesh, India

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Abstract
Ichthyofaunal biodiversity has enormous economic and aesthetic value and is largely responsible for maintaining and supporting overall environmental health. The aim of the study was to explore the fish fauna of Dinara Pond in Shivpuri district Madhya Pradesh. The pond was constructed for irrigation purpose during ancient time. The present investigation on ichthyofauna is carried out on the Dinara Pond from April 2021 to March 2022. The fishes were collected with the help of local fishermen by using various active and passive gears. During the course of study total 26 species belonging to 14 families and 6 orders. This was the first ever systematic survey on the fish distribution of this pond. Cypriniformes were the most dominant group with recorded 10 species followed by Siluriformes with 5 species, Perciformes with 4 species, Osteoglossiformes, Beloniforme and Synbranchiformes each of with 1 species.

Keywords: Dinara Pond, distribution, fishes, ichthyofauna, gears

Introduction
Water is a prime and basic natural resource for all living organism and a precious natural asset. It is essential for sustaining all forms of life, food production and economic development for general well being; hence its use needs appropriate planning, development and management. Of all renewable resources of planet, water has the unique place (Vencatesan, 2007) [11]. Fish and other aquatic organisms live in water, thus it is no surprise that water quality determines to a great extant the presence and abundance of species in a particular aquatic environment (Piper *et al.*, 1982) [9].

Fish constitute more than a half of the total number of all other vertebrates in the world. Out of 64,000 vertebrates, 32,900 species of fish had been described by Froese and Pauly (2014) [3]. India has offered a large variety of water bodies and habitats to aquatic life. Its coastal marine waters, river systems, streams, different wetlands, lakes and ponds of different water quality, at different altitudes have favoured the development of a species-rich fish fauna with a large variety of adaptations. Therefore, India is today a mega diverse in fish fauna and occupies 9th position in terms of fresh water biodiversity. There are about 2,546 species of fishes (about 11% of the world species) found in Indian waters. Central India harbor a wide variety of freshwater fishes in its diverse water resources such as streams, rivers, reservoirs, Dam, lakes and pond (Wani and Gupta, 2015). The present investigation focused on present status of freshwater fish faunal diversity in Dinara Pond a parinial water storage source of Dinara town in Shivpuri district and suggests appropriate conservation and management strategies.

Study area
Dinara pond is situated at the eastern side of Dinara town on Kanpur Mubai Highway 75, 70 km away from Shivpuri district. Geographically it is located at 25°28'15.91"N latitude and 78°19'58.00"E longitudes and 458 m. above mean sea level. Dinara pond is a huge pond with a fill area of 702 hectares. Thousands of acres of agricultural irrigation water are provided from this pond. The pond of Dev Sagar Dinara was built by Maharaja Vir Singh Dev in 1618 AD, under the supervision of his Mandalik Kanhardas. Western side of the pond bank consist valley, eastern side mud wall, northern and southern side agricultural field (Fig. 1).

Material and Methods
During the survey fish species were collected with the help of local people and fishermen by using different types of nets including Drag net (Maha Jaal), gill net (Fasla Jaal), cast net (Ghumaua Jaal), dip net (Pilna) and hook net. The collected fishes were brought to laboratory, fixed in 5% formalin, cleaned with rectified spirit and preserved in 10 % formalin. The fishes were identified by standard keys of Day (1878) [2], Jayram (1981), Talwar and Jhingaran (1991) [10] and Jhingaran (2005). The data on conservation status for all the species collected from Dinara Pond was generated from "The IUCN Red List of Threatened Species" and CAMP status database.

Result
During the study period a total of 26 species of fishes belonging to 13 families and 6 orders were recorded at Dinara Pond (Table 1). On the basis of order by composition of fish species Clupeiformes was most dominant with 8 species followed by Siluriformes with 7 species, Cypriniformes with 6 species, Osteoglossiformes and Synbrachiformes with 2 species of each orders, Beloniformes with 1 species (Fig. 2). Verma (2019) [12] observed during the study period, a total of 12 species of fishes belonging to 4 orders, 7 families and 11 genera were recorded from the Balapur pond. Kumar *et al*, (2011) [6] reported 33 fish species belonging to 6 different orders and 14 families. Similar observation was reported by Ahad and Rao (2019) [1] in the study on assessment of fish diversity of Harsi Reservoir, Madhya Pradesh, India. They recorded a total number of 52 species belonging to seven orders, 17 families and 36 genera. Order Cypriniformes was most

dominant (26 species), followed by Siluriformes (12 species), Perciformes (eight species), Osteoglossiformes and Synbrachiformes (two species each) and Clupeiformes and Beloniformes (one species each).

Family by composition of fish species Clupeidae was most dominant family with 8 species followed by Cyprinidae with 3 species, Notopteridae, Bagridae, Siluridae each of with 2 species, Balitoridae, Heteroopneustidae, clariidae, Channidae, Belonidae, Nandidae, Ambassidae each of with 1 species. Pawar (2009) reported among 7 families, the family Cyprinidae was dominant with 15 species followed by Siluridae with 3, Percidae with 2 and Gobiidae, Rhynchobdellidae, Clupidae and Noto·rJteridae with 1 species each.

In the present study as per IUCN (2021) out of total recorded species, 20 species were in Least Concern (LC) state with a contribution of 77%, two species were Near Threatened (NT) with contribution of 8%, two species are Not Evaluated (NE) and contributed 7%, one species are Data Deficient 4% and one species is Vulnerable with 4% contribution (Fig. 3). Similarly Ahad and Rao (2019) [1] observed out of 52 species at Harsi Reservoir, 40 species are in Least Concern (LC) state with a contribution of 76.92%, five species are Near Threatened (NT) with contribution of 9.62%, four species are Not Evaluated (NE) and contributed 7.69%, two species are Data Deficient (3.85%) and one species is Vulnerable with 1.92% contribution.

As per CAMP (1998) out of recorded fish species found at Dinara Pond, 17 species are Low Risk near threatened (LRnt) with a contribution of 65%, five species are Vulnerable (VU) with 19% contribution, three species were Not Evaluated (NE) with contribution of 12%, and one species are Endangered (EN) with 4% contribution (Fig. 4). Nag et al., (2017) reported out of total recorded species 2 species was vulnerable, 2 species was Data Deficient, 7 species was near threatened, 58 species were least concern, 2 species were not evaluated and 1 species as endangered.

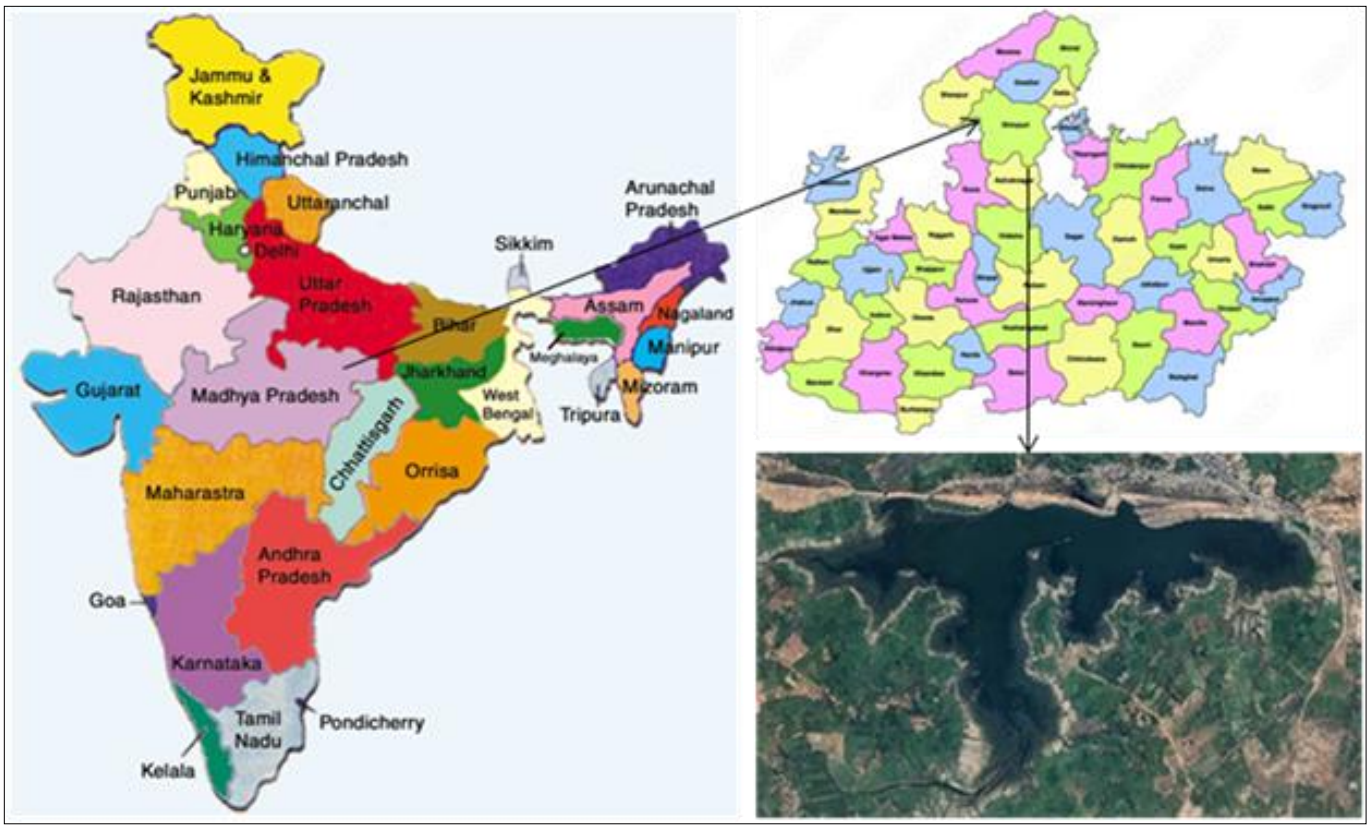

Fig 1: Location of study area (Dinara Pond) in Shivpuri

Table 1: Reported fish species with systematic position and status from Dinara pond

S. No.	Order	Family	Scientific Name	Local Name	IUCN Status	CAMP Status
1	Osteoglossiformes	Notopteridae	*Notopterus notopterus*	Patola	LC	LRnt
2			*Chitala chitala*		LC	LRnt
3	Clupeiformes	Clupeidae	*Catla catla*	Catla	NE	VU
4			Gudusia chapra		LC	LRnt
5			*Cirrhinus mrigala*	Naren	LC	LRnt
6			Cirrhinus reba	Temeri	NE	VU
7			*Cyprinus carpio*	Carp	VU	NE
8			*Labeo rohita*	Rohu	LC	LRnt
9			*Labeo calbasu*	Kirawat	LC	LRnt
10			*Labeo bata*	Bata	LC	LRnt
11	Cypriniformes	Cyprinidae	Puntius conchonius	Putia	LC	LRnt
12			*Puntius sophore*	Putia	LC	LRnt
13			*Puntius ticto*	Putia	LC	LRnt

14			Mystus tengara		LC	NE
15		Bagridae	Rita rita		LC	LRnt
16		Balitoridae	Mystus cavasius	Kituwa	LC	LRnt
17	Siluriformes	Siluridae	*Wallago attu*	Lounch	NT	LRnt
18			Ompok *bimaculatus*	Pabda	NT	EN
19		Heteropneustidae	*Heteropneustes fossilis*	Singhi	LC	VU
20		Clariidae	Clarias batrachus		LC	VU
21		Channidae	*Channa striata*	Darkasol	LC	LRnt
22		Anabantidae	*Channa punctatus*	Soura	LC	LRnt
23			Anabas testudineus		DD	VU
24	Beloniformes	Belonidae	*Xenentodon cancila*	Suja	LC	LRnt
25	Synbrachiformes	Nandidae	*Nandua nundus*	Dhebari	LC	LRnt
26		Ambassidae	Parambassis ranga	Chanda	LC	NE

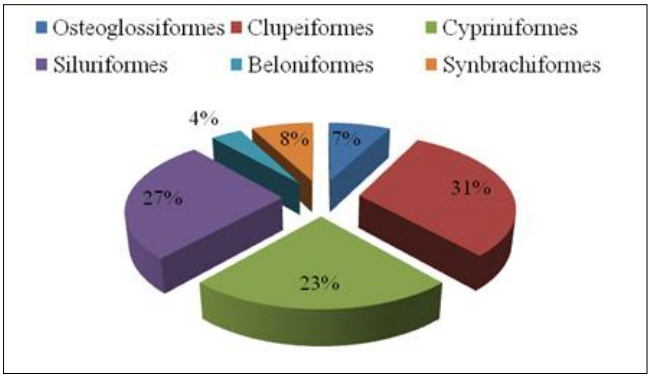

Fig 2: Order wise (%) fish species composition

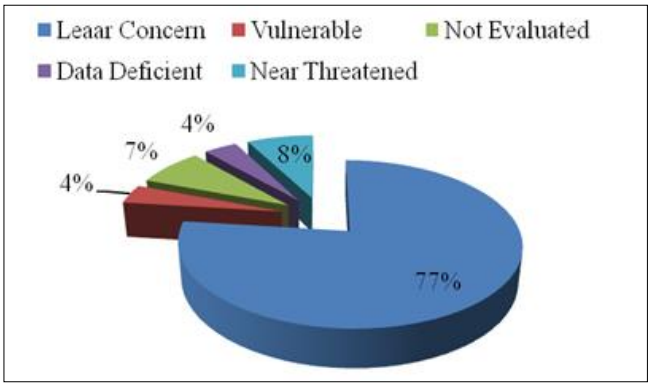

Fig 3: Composition of recorded fish species as per IUCN Status

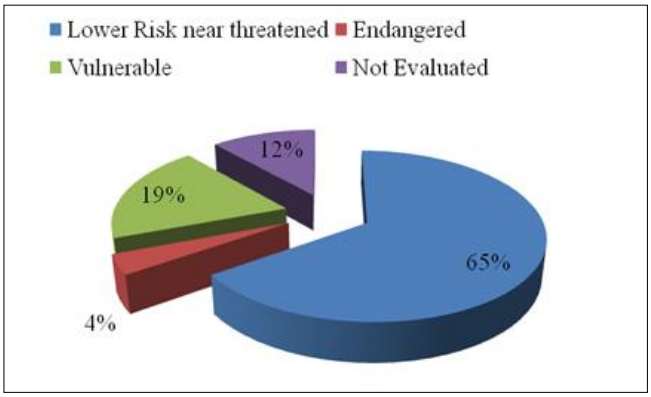

Fig 4: Composition of recorded fish species as per CAMP Status

Conclusion

It can be suggested that appropriate step should be taken to enhance the fish production in a sustainable manner, so that icthyofaunal diversity can be maintain in the ecosystem of pond. It is therefore recommended that special enhancement programmes are required to initiate sustainable use of fisheries resources.

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