

ICHTHYO-FAUNAL STUDY AND LIMNOLOGY OF A PROTECTED (KERWAN) RESERVOIR, BHOPAL, INDIA

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(Accepted 5 November 201)

ABSTRACT – The Capital city of Madhya Pradesh, “Bhopal” is also known as City of Lakes, in which more than fifteen wetlands are present in and around the city and water quality of these is deteriorated day by day due to multiple anthropogenic factors. Upper Lake (Ramsar site) and Kerwan reservoir (12 km away from the city) are most important wetlands, because drinking water supply of the city is dependent on both the wetlands. Kerwan reservoir is a newly constructed reservoir and primarily used for irrigation and secondary for city water supply. This reservoir is a protected reservoir for conservation and protection of threatened fish *Mahseer(Tor-tor)* because of its topography and also developed for ecotourism activities.

The present paper deals with study of water quality monitoring and fish fauna in reservoir for its conservation and management point of view. On the basis of different physicochemical and biological parameters, the status of reservoir is semi-eutrophic in nature and during period under study 14 fish species, 21 phytoplankton and 27 zooplankton genera have been recorded.

Key words : Fish diversity, water quality monitoring, protected reservoir and ecotourism activities.

INTRODUCTION

Madhya Pradesh is rich with different aquatic ecosystem and has 3.0 lakh hectare water area in the form of reservoir and ponds. Five major river systems namely Ganga, Tapti, Mahi, Godavari and Narmada also pass from the state and have a network of 17,088 kms. All these aquatic ecosystems support diversified flora and fauna. Kerwan reservoir is located at the outskirts of Bhopal nearly 12 km away from the city. The reservoir harnesses the water of Kerwan River, a tributary of Kaliasot River, which in turn joins the Betwa river system.

The Kerwan reservoir passes through a narrow deep gorge, at the dam site, for a distance of nearly 2.5 km. The dam was constructed at the beginning of the gorge, by Water Resources Department. The construction was completed in 1979. Some important factors which are responsible for the eutrophication of the reservoir are garbage thrown by the tourists, inflow of residual chemical fertilizers, pesticides and insecticides from catchment area, tourism activities and siltation from agricultural fields. This reservoir is a protected reservoir for the conservation of fish “*Mahseer*” as it has been declared as restricted reservoir for fishing by M.P. Matsya Mahasangh and no fishing allowed in the reservoir. The reservoir is mainly stocked with *Mahseer(Tor-tor)* and plays a key role in conservation of *Mahseer(Tor-tor)*. The reservoir is rich with aquatic diversity.

Various limnological studies have been carried out in important wetland of the state and most of the wetlands

are polluted due to multiple anthropogenic factors. The work on fish fauna of Madhya Pradesh was initiated with the first survey of fish fauna of rivers of central India by Hora (1941-1949). Thereafter as per available literature, different ichthyologists have made limited efforts related with the fish biodiversity. Patil (1981) worked out the algal flora of Bhopal lakes. Bhatnagar (1984) studied the

Morphometric features

Catchment area	:	64.5 sq.km
Latitude	:	23°-9'-55"
Longitude	:	77°-22'-25"
Riverbed level	:	490.42 m
Water spread area	:	4.82 m. sq.
Type of dam	:	Earthen, homogenous
Length of dam	:	396.5 m
Height of dam	:	22.6 m
Top width of dam	:	4.57 m



S.N.	Parameter	Range recorded
1	pH	7.6-8.2
2	Water Temperature	20.5°C -28.8°C
3	Transparency	28-49.20 cm
4	Dissolved Oxygen	4.5-8.6 mg/ltr
5	Free Carbon Dioxide	5.6-6.0 mg/ltr
6	Alkalinity	140-184 mg/ltr
7	Total Hardness	84-130 mg/ltr
8	Chloride	40-100 mg/ltr
9	B.O.D.	1.4-12.6 mg/ltr
10	Nitrate	0.070-0.096 mg/ltr

different physicochemical and biological parameters of Lower Lake, Bhopal. Oommachan (1988) studied the macrophytes of the Bhopal lakes and categorized four major groups of macrophytes on the basis of their habitat and location. Kulshrestha *et al* (1989) studied different limnological parameters of Bhopal lakes. Tamot and Bhatanagar (1989) studied the raw water quality of Upper Lake and its change during the various states of treatment. Johri (1990) studied the limnological and water quality status of two lakes of Bhopal. Saxena (1990) assessed the limnological and water quality status of Lower Lake of Bhopal,. Shrivastava (2003) studied the limnology of Kerwan for conservation and management of Mahseer fish. Zoological Survey of India (2000) reported 172 fish

Fish diversity of Kerwan reservoir

S	Scientific name	Kerwan reservoir	Feeding habit	Economic importance	Caff 2006
A	F-Cyprinidae				
1	<i>Labeo rohita</i> (Rohu)	++	HF	MFF	LR-lc
2	<i>Labeo Calbasu</i> (Kalot)	++	HF	FF	LR-nt
3	<i>Cirrhinus mrigala</i> (Naren)	++	OF	MFF	LR-nt
4	<i>Catla catla</i> (Catla)	++	NP,WF	MFF	LR-nt
5	<i>Puntius sarana</i> (Kharpate)	++	WF	AF	VU
6	<i>Tor tor</i> (Mahseer)	++	OF	GF,FF	LR-nt
B	F-Cultrinae				
7	<i>Oxygaster;Salmostoma bacaila</i> (Chale)	+	WF	BF	DD
C	F-Mastacembalidae				
8	<i>Mastacembelus armatus</i> (Bam)	+++	PD	LV	VU
D	F-Bagridae				
9	<i>M.bleekeri</i> (Kittu.Kaitiya)	++	PD	FF,AF	VU
E	F- Siluridae				
10	<i>Ompok bimaculatus</i> (Gangerwar)	++	PD	GTF	EN
F	F- Claridae				
11	<i>Clarius batrachus</i> (Mangoora)	++	OF	FF	VU
G	F-Heteropneustidae				
12	<i>Heteropneusts fossilis</i> (Singhan)	++	PD,CF	MV,FF	VU
H	F- Belonidae				
13	<i>Xenentodon cancila</i> (Suje, Suhia)	++	WF	FF	LR-nt
I	F-Chichlidae				
14	<i>Tilapia mossambica</i>	++	PD	MFF	DD

+ = Rare, ++ = Average, +++ = Abundant, HF = Herbivorous Fish, OF = Omnivorous Fish, CF = Carnivorous Fish, PD = Predatory Fish, LV = Larivorous, WF = Weed Fish, MV = Medicinal Value, GF = Game Fish, AF = Aquarium Fish, BF = Bait Fish, GTF = Good Table Fish, FF = Food Fish, MFF = Major Food Fish, NP = Non Predatory, EN = Endangered, VU = Vulnerable, LR-nt = Low Risk Near Threatened, LR-lc = Lower risk least Concern, DD = Data Deficient, CAFF = Conservation Assessment of Freshwater Fish Diversity.

species in Madhya Pradesh. Qureshi (2003) recorded 53 species of fishes from Bhoj Wetland, Bhopal. Some work has been done on game fishes by Menon in year 1988. Tamot and Awasthi (2010) studied biodiversity and conservation of indigenous fish species of Upper Lake.

It is evident from above that the limnology and biodiversity of the small lakes, reservoirs and ponds have been neglected from study point of view and no action regarding the proper management of these wetlands have been taken and the same is the situation with ichthyofauna present within them. However the limnology and fish diversity of this wetland has been subject of interesting studies.

MATERIALS AND METHODS

Samples were collected from April' 2010 to March'2011 and analyzed as per "Standard Methods for Examination of Water and Waste Water" 19th edition, AWWA-APHA-WPCF (1995) and "Laboratory Manual on Water Analysis" NEERI (1986). Fish samples were collected with the help of meshes of different mesh sizes ranging from 10-100 mm and also from fishermen. These fishermen use to catch fishes with the help of caste nets. After collection, preserved in 5% formalin and then identified on the basis of morphometric measurement, fin formula and the classification given by Jayaram, Jhingaran, Francis Day, Shrivastava, Qureshi & Qureshi.

RESULTS AND DISCUSSIONS

During the period under study the following important limnological parameters were analyzed and range of variation in these parameters is as:

On the basis of limnological study, the Kerwan reservoir is semi eutrophic in nature.

Planktonological study

The biota in an aquatic system positively reflects the condition existing in the environment and information can be utilized for biological monitoring of water pollution level. Planktonic study is a very useful tool for the assessment of water quality in any type of water body and also contributes to an understanding of the basic nature and general economy of the lake.

Phytoplankton: 21 genera of phytoplankton belonging to three major groups recorded were:

Cyanophyceae: *Anabaena*, *Anacystis*, *Oscillatoria*, *Rivularia*, *Spirulina*.

Chlorophyceae: *Actinastrum*, *Ankistrodesmus*, *Chlorococcum*, *Closterium*, *Gonatozygon*, *Kirchneriella*, *Microspora*, *Scenedesmus*, *Spirogyra*, *Ulothrix*, *Volvox*.

Bacillariophyceae : *Cyclotella*, *Cymbella*, *Fragilaria*, *Navicula*, *Synedra*.

Zooplankton : 17 genera of zooplankton belonging to three major groups recorded were:

Rotifera : *Asplanchna*, *Brachionus*, *Filina*, *Keratella*, *Notholca*, *Trichocera*.

Crustacea : *Bosmina*, *Ceriodaphnia*, *Cyprinus*, *Daphnia*, *Eubrachiounus*, *Mesocyclops*, *Diaptomus*.

Protozoa : *Ceratium*, *Paramecium*, *Vorticella*, *Diffugia*.

Fish Diversity : These 14 species belonging to 9 families are found in the Kerwan reservoir. Out of these 14 species *Mastacembelus armatus*, *Labeo rohita* found in good quantity.

ACKNOWLEDGEMENT

This study was carried out under the Project sanctioned by Madhya Pradesh Council of Science and Technology, entitled "Conservation, management & documentation of fish diversity W/R to water quality in tropical lakes and reservoirs (Bhopal)". Authors are thankful to the Madhya Pradesh Council of Science & Technology.

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