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Limnological study of Kurala Dam of Washim district, Maharashtra

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Abstract
The present study was carried out to study limnological aspects of Kurala reservoir. Kurala dam is one of the minor reservoirs constructed for the irrigation and drinking purpose. The limnological evaluation was based on the diversity of zooplankton, fishes, aquatic birds and physico-chemical parameters of the reservoir. The present study reveals 26 zooplanktons comprising of 11 rotifers, 8 cladocerans, 6 copepodes and 1 ostracode, 11 species of fishes and 20 species of water birds.

Keywords: Zooplankton, Ichthyofauna, Avian fauna, Physico-chemical properties, Kurala Reservoir

1. Introduction
Limnology is an interdisciplinary science which involves a great deal of detailed field as well as laboratory studies to understand the structural and functional aspects and problems associated with the freshwater environment, from a holistic point of view [1]. Aquatic biodiversity is threatened primarily by human abuse and mismanagement of both living resources and the ecosystems that support them. Most of the ponds are getting polluted due to domestic waste, sewage, industrial and agricultural effluents [2, 3]. The requirement of water in all lives, from micro-organisms to man, is a serious problem today because all water resources have reached to a point of crisis due to unplanned urbanization and industrialization. Water quality assessment generally involves analysis of physico-chemical, biological and microbiological parameters and reflects on abiotic and biotic status of the ecosystem [4, 5].
Aquatic ecosystems are known to support work to range of organisms. Among these zooplanktons are the free floating and microscopic animals found in aquatic ecosystem. The aquatic ecosystems are affected by several health stressors that significantly deplete biodiversity. In the future, the loss of biodiversity and its effects are predicted to be greater for aquatic ecosystems than for terrestrial ecosystems. Zooplankton community fluctuates according to physicochemical parameters of the environment, especially rotifer's species change with biotic factors [6]. The abundance and assemblage composition of zooplanktons are depends up on the dominance of water birds, fish, macroinvertebrates and their food preference [7]. On the similar line Jafari *et al*. [8] studied the zooplankton diversity and composition is correlated to the physicochemical environment of the Haraz river. Tayade and Dabhade [9] recorded 52 taxa (49 species) belonging to 14 families and 1 Indian Streams Research 22 genera are recorded presently. Out of these 14 families Brachionidae consisted of the highest number of species (18) followed by Lecanidae (10), Asplan- chnidae and Notommatidae (3 each), Euchlanidae, Trichocercidae, Synchaeatidae, Filinidae, and Philodinidae (2 each) while families like Epiphinidae, Mytilinidae, Hexarthridae, Testudinellidae and Trochoshaeridae.
Piscine diversity in aquatic ecosystem refers to variety of fish species. Depending on context and scale piscine diversity can refer to alleles or genotypes within a piscine population, to species or genotypes or life forms within a piscine community. According to a workshop estimate hosted out by National Bureau Fish Genetic Resources a total of 227 Indian freshwater fishes are threatened based on the IUCN Red list Categories of 1994.
Tayade [10] investigated a total of 30 species of fish from Morna river with first report of *Ophisternon bengalense*s from Maharashtra.

2. Material and Methods

Kurala dam is minor reservoir constructed for the irrigation and drinking purpose located at $20^0$17'26"N and $77^0$0'55"E. It is earthen dam with canal constructed on the local nalah. This dam is main source of drinking water to Malegaon

Zooplankton samples were collected in early hours from all the sampling stations by towing the plankton collecting net of mesh size 25 µ and preserved in 4% formalin; 2-3 drops of glycerine were added to it.

Fishes were collected by using different nets, hooks and lines with the help of local fishermen. The collected fishes were immediately brought to laboratory. Their colour, fin formula was noted and the specimens were preserved into 30% formalin. The identification of the fish species was carried out by using standard literatures [11, 12].

Birds visiting the dam were sighted and photographed by digital camera. Identification of the bird species was carried out by using a practical guide [13].

Water samples were collected from all the sampling station by using standard methods of APHA [14]**.** Physico chemical parameters like temperature, TDS, hardness, pH, DO, CO_2, carbonate, bicarbonate, chloride and alkalinity were worked out.

2. Results and discussion

2.1 Zooplankton Diversity: Data obtained from the present investigation indicates that a total of 26 zooplankton species were recorded at all the four sites comprising of 11 species of rotifers, 6 copepods, 8 cladocerans and 1 ostracod.

The species recorded during the study were presented in Table 1. Purushothama *et al.* [15] studied the physico chemical profile and zooplankton community composition in Brahmana Kalasi tank, Sagara, Karnataka. Their study reports 18 species of Zooplanktons from the Brahmana Kalasi Tank.

Table 1: Zooplankton composition of Kurala dam.

Sr. No.	Zooplankton
Rotifera	
1.	Brachionus caudatus
2.	Brachionus diversicornis
3.	Brachionus calyciflorus
4.	Brachionus forticula
5.	Brachionus bidentata
6.	Brachionus falcatus
7.	Keratella tropica
8.	Keratella
9.	Filinia longiseta
10	Lecane leontina
11.	Asplanchna brightwelii
Cladocera	
12.	Diaphanosoma sp.
13.	Macrothrix sp.
14	Simocephalus serrulatus
15.	Diaphanosoma brevireme
16.	Diaphanosoma birgei
17.	Chydorus eurynotus
18.	Daphnia ambigua
19.	Diaphanosoma tropicum
Copepoda	
20.	Copepode cyclopes
21.	Microcyclops varicans
22.	Calanus copepod
23.	Macrocyclops
24.	Mesocyclops
25.	Diaptomus
Ostracoda	
26.	Cypris

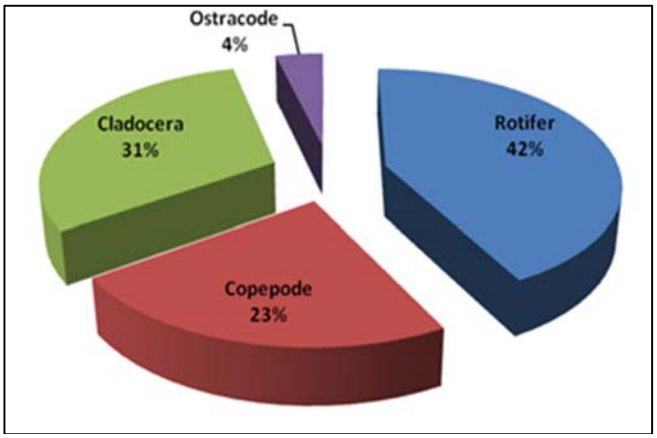

Fig 1: Classwise percentage of zooplankton

2.2 Icthyofaunal diversity: In the present investigation following eleven species of fishes (other than Indian Major carps and exotic carps) were recorded. *Catla catla*, Labeo rohita, Cirrhina mrigala, Ctenopharyngodon idellus and *Hypophthalmichthys* molitrix are the carps common to any reservoir as their seed is being procured. Several exotic species of fishes are now established in the natural water bodies of India. Studies have not been carried out on the impact of the exotic species in Indian waters.

Table 2: Fish fauna of Kurala Dam

Sr. No.	Fish species	Family
1.	*Tilapia mosumbica*	*Cichlidae*
2.	*Puntius chola*	*Cyprinidae*
3.	*Puntius ticto*	
4.	*Rasbora daniconius*	
5.	*Cirrhinus reba*	
6.	*Channa gachua*	*Channidae*
7.	*Nemacheilus mureh*	*Balitoridae*
8.	*Mystus bleekerii*	*Bagaridae*
9.	*Notopterus notopterus*	*Notopteridae*

During the study period a total number of 11 bird species were sighted from the selected sites. The birds observed in the studied area are listed in table 3.

Table 3: Avian fauna visiting the Kurala dam

Sr. No.	Common Name	Scientific Name	Family
1.	Large Egret	*Adrea alba*	Ardeidae
2.	Little Egret	*Egretta garzetta*	
3.	Cattle Egret	*Babulcus ibis*	
4.	Indian Pond Heron	*Ardeola grayii*	
5.	Yellow bittern	*Ixobrychus sinensis*	
6.	Yellow wattle Lapwing	*Vanellus mulbericus*	Charadridae
7.	Red Wattle Lapwing	*Vanellus indicus*	
8.	Little ringed Plover	*Charadricus dubius*	
9.	White breasted Kingfisher	*Halcyon smyrnensis*	Acedinidae
10.	Pied Kingfisher	*Ceryl radius*	
11.	White breasted water hen	*Amauronis phaenicurus pennant*	Rallidae
12.	Purple moorhen	*Porphyrio porphyrio Linn*	
13.	Black winged stilt	*Himantopus himantopus Linn*	Recurvirostridae
14.	Little cormorant	*Phalacrocorax niger*	Phalacrocoracidae
15	Indian Shag	*Phalacrocorax fuscicollis*	
16.	White necked stork	*Ciconia episcopus*	Ciconidae
17.	Black ibis	*Pseudibis papillosa*	Threkiornithidae
18.	River Tern	*Sterna aurantia*	Sternidae
19.	Commom Tern	*Sterna hirundo*	
20.	Little Tern	*Sterna albifrons*	

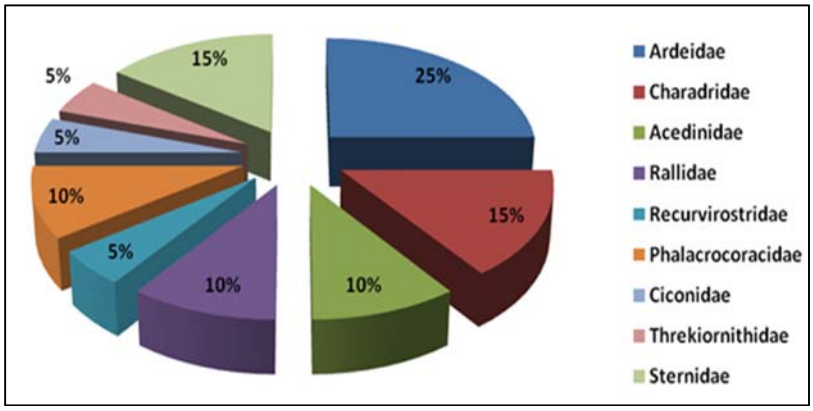

Fig 2: Family wise percent composition of avian fauna sighted at Kurala dam

In the present investigation 20 species of birds belonging to 9 families were sighted. Balkhande *et. al.* [16] enlisted 53 species of birds belonging to 32 families at river Godavari at Dhangar Takli. Abdar [17] observed the assemblage of water bird species in Ramling Island a religious place in Western Maharashtra and reported 47 species of water birds and concluded that there is decrease in water birds in Western Ghats.

2.3 Physico-chemical Parameters

For confirming the good quality of water resources large number of physico-chemical parameter, extent and source of any pollution load must be known for which monitoring of physico-chemical parameter is essential. In all nine physico-chemical parameters of Kurala dam of Washim district, Maharashtra was studied for the period of one year (From June 2015- May 2016). Analytical report of water quality characteristics are presented in table 4.

Table 4: Physico-chemical parameters of Kurala dam

Parameter	June-September (Mean± S.D)	October-January (Mean± S.D)	February-May (Mean± S.D)
Temperature (^{0}C)	23.67 ± 2.73252	22.91 ±1.62532	31 ± 2.36643
Colour	Olive green	Olive green	Dark green
TDS (mg/L)	0.23±0.08165	0.083±0.01966	0.683±0.02066
Hardness	1073.7±93.05119	456.2±133.29036	476.233±67.8191
pH	7.45±0.3184	7.80±0.33146	7.29±0.41889
DO (mg/L)	3.3±0.38987	3.6±1.46969	6.016±1.74633
CO_2 (mg/L)	3.01 ±1.09545	3.04 ±0	Absent
Chlorides (mg/L)	287.78±17.44717	175.675±23.70835	269.788±56.6458
Carbonates (mg/L)	21.766±10.7394	11.466±3.54752	15.433±2.69015
Bicarbonates (mg/L)	36.211±1076304	37.58±9.89516	99.142±44.569

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