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Short Communication

Diversity and density of zooplanktons of Kolar reservoir of Bhopal, M.P., India

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Abstract

In the present study an attempt has been made to estimate the zooplankton diversity and density in the Kolar reservoir of Bhopal, M.P. Samples were collected from three different sampling stations of the reservoir and density of the planktons were estimated. The prominent group of zooplanktons in the reservoir during the study period 2007-2008 was of three main types. They were Protozoa, Rotifera, Crustacea. The maximum average density was of Crustacea i.e. 950org/l. The highest density was observed in the month of June and lowest density was observed in the month of November.

Keywords: Crustacea, Protozoa, Rotifera, Reservoir, Zooplankton, Density

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1. Introduction

Biologically diversity is a term used to describe the number, variety and variability of organisms. This diversity can be studied at various levels. Mostly it is used as an indication of numbers of species in a particular habitat or ecosystem. Relations between species diversity and various environmental gradients provide a unique challenge to models of community structure. Most groups of invertebrates are representatives of the zooplanktons and are divided into temporary and permanent plankton. Zooplanktons form an important source of fish food, hence the knowledge of abundance and variation in zooplankton is an essential parameter for ecosystem study.

2. Material and methods

2.1. Study area

Kolar dam was constructed on the river Kolar near Birpur 32 km away from Bhopal on Kolar Road at 23° 01' 08" latitude and 77° 20' 30" longitudes (Figure 1). The Kolar is a tributary of river Narmada and has a catchment area of 508 sq.km. The water samples were collected from three sites of the Kolar Reservoir i.e. 1. Starting Point of Dam 2. Near Salikhera Village 3. Jhalpipli village.

2.2. Methodology

25 litres of water was collected and filtered through a plankton net of bolting silk No.20 having 173 meshes per linear inch. The plankton was collected in 150 ml bottle and preserved in 4% formaldehyde and few drops of glycerine was added to it. The sample was allowed to stand for a day and the supernatant plankton free water was reduced with the help of a pipette.

2.3. Quali-quantitative analysis

1 ml sample was taken in a counting chamber and placed on the stage of stereomicroscope and observed. The plankton were identified and counted. They were identified using keys by APHA (1998), Hutchinson (1967) and Workbook on Limnology by Adoni (1985).

3. Results and discussion

In the Kolar reservoir the zooplankton species identified were of three main types (Figure 2). They were *Protozoa* consisting of *Actinophrys, Arcella, Difflugia, Diptinium, Euglena. Rotifera* consisting of *Brachionus, Filinia, Keratella, Polyarthra, Trichura, Crustacesns* consisting of *Bosmina, Cyclops, Daphnia, Eubranchus, Nauplius, Moina* (Table 1). The total number of zooplanktons obtained during the one year study period of

2007-2008 ranged between 400 org/l. in the month of July to 1150 org/l in the month of November as given in (Table 2 and Table 3).

The herbivore communities of tropical lakes are very similar in general composition to those of temperate lakes as studied by Ruttner (1952). There is more endemism among zooplankton particularly for calanoid, copepods as reported by Dermott (1988), than among phytoplankton. A number of important taxa are characteristically tropical e.g. *Keratella tropica*. *Keratella* and *Polyarthra* are common in tropical lakes. Daphnia is seldom present in large quantity in tropical lake and even the species that are present are of small body size as studied by Fernando (1980). Calanoids are among the largest of zooplanktons in temperate lakes and are absent or rare in many tropical lakes as described by Lewis (1978) and Fernando (1980).

According to Shannon-Weaver Index of Diversity the value of the index in Kolar reservoir was 2.355 which was greater than 1 indicating greater diversity. The co-relation table indicates the physico-chemical parameters that are inter-related and these parameters are influenced in variations of phytoplankton and zooplankton (Table 4 Correlation). The presence of the zooplanktons indicates eutrophication in the Kolar Reservoir.

4. Conclusion

Zooplanktons have potential value as assessors of trophic conditions. A correlation study of zooplankton community to environmental variables showed some coherence. The presence of three main types of zooplankton communities and the value of Shannon- Weaver Index of Diversity in itself indicates that the Kolar Reservoir is polluted and that eutrophication has set in.

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Figures and Tables

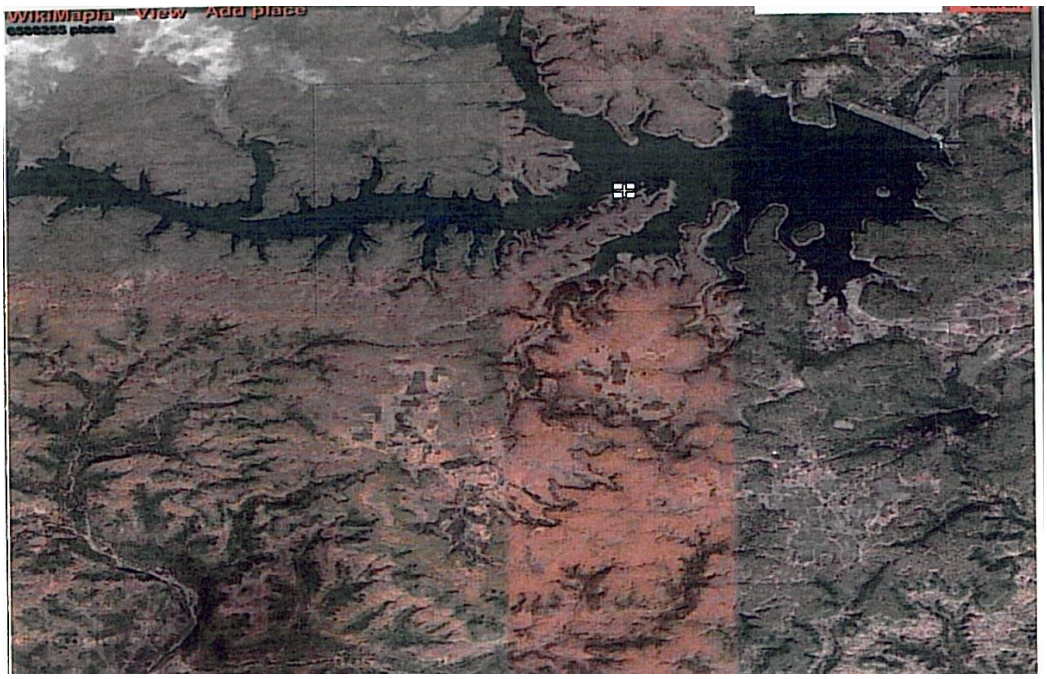


Figure 1. Satellite Imagery of Kolar Reservoir

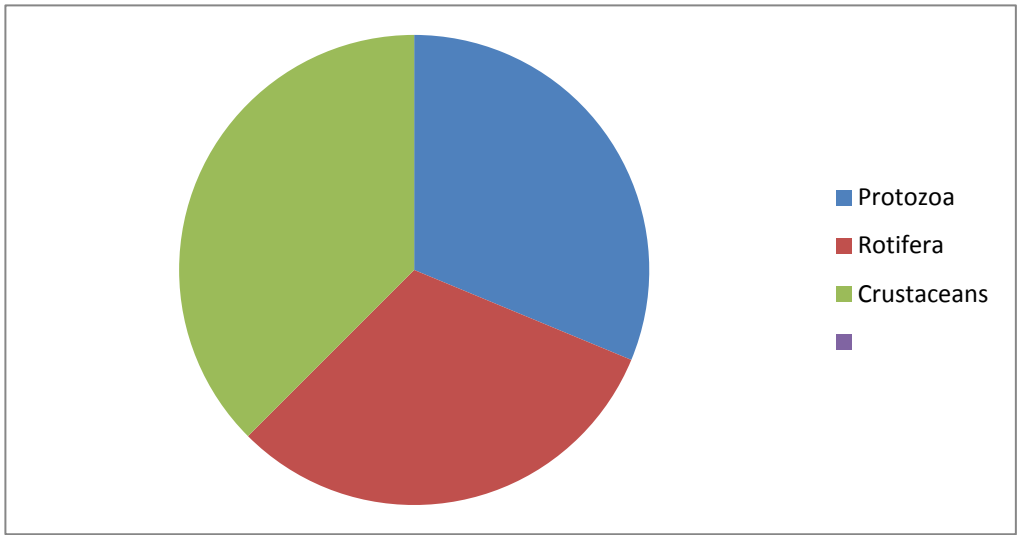


Figure 2. Graph showing composition of zooplankton in Kolar Reservoir

Table 1. Kolar Reservoir Zooplankton Station 1 org/L 2007=08

ZOOPLANKTON	MONTHS											
Protozoa	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**April**	**May**
Actinophys	100	150	250	200	150	200	150	150	150	150	50	100
Arcella	100	50		150	250	50	50	50	50	150	100	150
Difflugia	50	50	50	50	150		50	50	100	100	50	100
Diptinium	50	150		100	100	100	50					150
Euglena	100	100	250	50	50	150		50	50		50	150
TOTAL	**400**	**500**	**550**	**550**	**700**	**500**	**300**	**300**	**350**	**400**	**250**	**650**
Rotifera												
Brachionus	100	100	100	50	150	150	150	50	150	150	50	100
Filinia	150		150			100	50			100	150	100
Keratella	200	100		150	100	150	150	100	150	50	100	150
Polyarthra	100					50	100	50	100	50	50	50
Tricera	100	100	150	100	150	50	50	50	50	50	50	150
TOTAL	**650**	**300**	**400**	**300**	**400**	**500**	**500**	**250**	**450**	**400**	**400**	**550**
Crustacea												
Bosmina	100		100	100	50	50			100	100	50	100
Cyclops	200	100	50	150	50	50	100	100	50	150	50	100
Daphnia	200	50		50	50	50	150	50	50	50	50	100
Eubranchipus	50	150		150	50	50	100	50	100	50	50	50
Nauplius	250		100	50	150		50		50	50	50	100
Moina	150		50	50	50	50	50		100	100	50	50
TOTAL	**950**	**300**	**300**	**550**	**400**	**250**	**450**	**200**	**450**	**500**	**300**	**500**
GRAND TOTAL	**2000**	**1100**	**1250**	**1400**	**1500**	**1250**	**1250**	**750**	**1250**	**1300**	**950**	**1700**

Table 2. Kolar Reservoir Zooplankton Station 2 org/L 2007=08

ZOOPLANKTON	MONTHS											
Protozoa	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**April**	**May**
Actinophys	50		100	150	200	150	50	50	50	50	50	50
Arcella	100	50		50	150	50	50	50	50	50	50	50
Difflugia	50	50	50	50	50			50	50	50	50	50
Diptinium	50			50	150	150	50	100		50	50	50
Euglena	50		250	50		50				150	50	50
TOTAL	**300**	**100**	**400**	**350**	**550**	**400**	**150**	**250**	**150**	**350**	**250**	**250**
Rotifera												
Brachionus	150	50	50		50	150	50	100	50	50	100	50
Filinia	100		50		50	50	50			50	50	50
Keratella	100	50		50	50	100	50	50	50	50	50	50
Polyarthra	50					50	50	50	50	50	50	50
Tricera	150		50	150	200	100	150	100		50	100	100
TOTAL	**550**	**100**	**150**	**200**	**350**	**450**	**350**	**300**	**150**	**250**	**350**	**300**
Crustacea												
Bosmina	50		50	50	100				50	50	100	50
Cyclops	50	50		150	50	50	50	50	50	50		50
Daphnia	50	50		150	50	50	50	50	50	50	50	150
Eubranchipus	50			100		100	50	50	50	50	50	
Nauplius	50		50		50	50			100	100	50	50
Moina	50	100		50		50	50		150	50	50	150
TOTAL	**300**	**200**	**100**	**500**	**250**	**300**	**200**	**150**	**450**	**350**	**300**	**450**
GRAND TOTAL	**1150**	**400**	**650**	**1050**	**1150**	**1150**	**700**	**700**	**750**	**950**	**900**	**1000**

Table 3. Kolar Reservoir Zooplankton Station 3 org/L 2007=08

ZOOPLANKTON	MONTHS											
Protozoa	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**April**	**May**
Actinophys	50		50	150	250	150	150	100	150	50	50	50
Arcella	150	50	50	100	150	50	50	100	50	50	50	50
Difflugia	100	50	50	100	50	50		50	50	50	50	150
Diptinium	100	50		50	50	150	150	150		50	50	150
Euglena	50		100	150	50	150		50	50	50	100	150
TOTAL	**450**	**150**	**250**	**550**	**550**	**550**	**350**	**450**	**900**	**250**	**300**	**550**
Rotifera												
Brachionus	150	50	150		150	150	150	150	150	50	150	150
Filinia	50	50	150	50	50	150	150			100	100	150
Keratella	150	50		250	50	150	150	150	150	100	50	150
Polyarthra	50	50		50		150	50	50	50		50	50
Tricera	150	50	200	200	200	100	150	50	50	50	50	150
TOTAL	**550**	**250**	**500**	**550**	**450**	**700**	**650**	**400**	**400**	**300**	**400**	**650**
Crustacea												
Bosmina	50		150	150	150			50	150	50	150	150
Cyclops	50	150	250	150	50	150	50	150	100	150	100	150
Daphnia	200	150		100	150	50	100	150	100	100	50	150
Eubranchipus	100	50	200	250	50	150	50	150	50	50	100	50
Nauplius	50	50	200	250	50	150	50	150	50	50	100	50
Moina	150	50	50	100		150	50	50	100	150	100	150
TOTAL	**600**	**450**	**850**	**1000**	**450**	**650**	**300**	**700**	**550**	**550**	**600**	**700**
GRAND TOTAL	**1600**	**850**	**1600**	**2100**	**1450**	**1900**	**1300**	**1550**	**1850**	**1100**	**1300**	**1900**

Table 4. Correlation between Physico-chemical Parameters of Kolar Reservoir 2007-2008

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1													
2	0.03	1												
3	6.96	0.639	1											
4	0.552	-0.4	-12.29	1										
5	-0.347	-0.653	-0.41	0.07	1									
6	-0.215	0.26	0.518	0.08	-1.272	1								
7	-0.358	0.07	-0.243	-0.09	-0.176	-0.414	1							
8	-0.398	0.42	0.003	-0.35	-0.118	-0.1	-0.07	1						
9	0.39	0.586	0.724	-0.124	-0.55	0.83	-0.354	-0.07	1					
10	-0.43	0.773	0.559	-0.155	-0.527	0.367	-0.339	0.657	0.558	1				
11	-0.00007	0.0013	-0.00001	0.000001	0.00001	-0.00003	0.000022	-0.00005	0.000043	0.000042	1			
12	0.00001	-0.000002	-0.0000004	0.00001	0.0000003	0.00000004	0.0000001	0.0000004	0.00000001	0.000001	5E-11	1		
13	0.44	0.271	0.425	0.53	-0.39	-0.0023	-0.334	0.35	-0.91	0.495	0.000048	3.9E-15	1	
14	0.38	-0.14	-0.33	-0.186	-0.195	-0.089	8.28	0.15	-0.007	0.08	2.1	-497.5	17.38	1

1. pH 2. Hardness 3. Alkalinity 4. Phosphate 5. Nitrate 6. Total Nitrogen 7. B.O.D 8. C.O.D 9. Electrical Conductivity 10. Turbidity 11. Chlorophyceae 12. Bacillariophyceae 13. Dinophyceae 14. Zooplankton