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STUDY OF ZOOPLANKTON IN A HARDIHA POND OF HANUMANA, REWA DISTRICT (M.P.)

Angesh Kumar Tripathi
Guest Lect. Department of Zoology,
Govt. J.S.T. PG College Balaghat (M.P.)

ABSTRACT: Plankton is a word derived from Greek for "drifters". It refers to all the plants and animals that drift with the ocean currents as inhabitants of the open waters of the sea (and also fresh waters; but our concern here is with marine environments). The zooplanktons were represented by the Crustace, Rotifers and Protozoa. The Crustaceans were the most dominating group, followed by Rotifers and then protozoa. Zooplanktons are the smallest, acellular or metazoans in water bodies, ranging in size from about 0.05 to 10 mm. Protozoans, Rotifers, Crustaceans (i.e. Cladocera; Rotifers and ostracoda) and small insects constitution most zooplankton communities. They provide food for many species of fish and are therefore, vital in the food web of ponds; dams are rivers. They are also used as an index of productivity, eutrophication and pollution of the water bodies. Monthly variation in the number of zooplankton with the communities occupying higher trophic levels, were recorded in Hardiha pond, Hanumana, Rewa, M.P. The zooplankton population of Hardiha pond was studied for a period of 12 months from Jan 2012-December 2012.The zooplanktons were represented by five groups of organisms in order Rotifera>Crustacean > Cladocera > Protozoa > Copepoda. Zooplankton were composed of Rotifera (31.81%), Cladocera (18.18%), Copepoda (11.37%), Crustaceans (27.27%) and Protozoa (11.37%). A Total number of 44 genera were observed during the present study. A Total number of 44 genera were observed during the present study. The highest qualitative value of total zooplankton recorded in Hardiha pond was 935.00±22.36org/l in the month of August, while the lowest value of total zooplankton was recorded 446.80±6.46 org/l in the month of January. The fluctuation in the number of zooplankton was discussed in relation to the physico-chemical and other environmental condition of the pond. Dominance of Rotifers and Crustaceans indicate the eutrophic status of pond.

KEYWORDS: - Hardiha pond, Zooplankton, Rotifers, Crustacean, Copepoda, Protozoa.

INTRODUCTION

The zooplanktons were represented by the Crustace, Rotifers and Protozoa. The Crustaceans were the most dominating group, followed by Rotifers and then protozoa. Zooplanktons are the smallest, acellular or metazoans in water bodies, ranging in size from about 0.05 to 10 mm. Protozoans, Rotifers, Crustaceans (i.e. Cladocera; Rotifers and ostracoda) and small insects constitution most zooplankton communities. They provide food for many species of fish and are therefore, vital in the food web of ponds; dams are rivers. They are also used as an index of productivity, eutrophication and pollution of the water bodies.

They are endowed with many remarkable features and are often armored with pines, which hamper their predation by higher organisms. The zooplankton which play a role of converting phytoplankton into food, suitable for fish and aquatic animals have acquired importance in fishery research. The zooplanktons can also play an important role in indicating the presence or absence of certain species of fishes on in determining the population densities. Zooplankton plays major role in the food web of an aquatic ecosystem and forms an intermediate link between primary and tertiary production. Study of plankton diversity and their ecology greatly contribute to an understanding of the basic nature and general economy of an aquatic habitat. Zooplanktons are capable of concentrating large quantities of heavy metals from water bodies. These metals may be passed on and concentrated at higher trophic levels through the food chain. Thus it is necessary to understand whether the mortality is due to biomagnifications of heavy metals or pollutants. The fishery potential is fully related to the presence of zooplankton(Dubey *et.al* 2006). Nutrients mainly nitrogen and phosphorus act as bio-stimulants causing eutrophication or enhancement of the growth of zooplankton and phytoplankton. This can lead to luxuriant growth of unusual plankton blooms, that may or may not be toxic, but which on decay use up oxygen from the water which also cause deoxygenation. Phytoplanktons are representing the microscopic algal communities at primary level, whereas zooplankton at secondary level. They react quickly to limnological

change of aquatic environment. They can be listed and used as pollution indicators (Telkhade et.al. 2008). Uncontrolled domestic wastewater discharge into the pond has resulted in the eutrophication of the pond as evidenced by substantial algal blooms, dissolved oxygen depletion in the subsurface waters, large fish kill and malodour generation. These conditions continued unabated and give rise to monoculture of water hyacinth (*Eichhornia crassipes*) which covered almost the entire pond area.

The present investigation has been undertaken to assess the monthly variations in the occurrence of zooplanktons of Hardiha pond, Hanumana Rewa district (M.P.) during Jan, 2012 to December' 2012, whose banks have been developed into an attractive tourist spot of the city.

STUDY AREA

The present study has been carried out on Hardiha pond of Hanumana, Rewa district in Madhya Pradesh. This pond lies within geographical co-ordinates of 24°18'25"12'' N and 81°2'82.18''E at National Highway No.7. The pond has a maximum depth of 7m and minimum depth 2.5m. The pond receives water through surface run off during monsoon from surrounding upland and has regular inlet of sewage canal while the outlet is blocked on account of its chocking. The pond is regularly used mainly for, agriculture, bathing, washing of clothes and fishing by the local people besides the idol immersion. This pond is also utilized for fish culture as well. Rain is the only source of fresh water for this pond. The pond is anthropogenic and pond water is used for domestic purpose, irrigation, aquaculture etc. The surrounding area of pond is semi urban and semi agricultural. The need to define quality of water has development with the increasing demand of water, which is suitable for specific uses and confirms to desired quality.

MATERIAL AND METHODS

Samples were collected monthly from Five different sampling stations namely A, B, C, D, and E for one year (Jan 2012 to December 2012). The samples were collected at 11 am -1pm during second week of each month. Under qualitative analysis of planktonic communities the identification was done; as for as possible to species level. Sample was collected for planktonic population net in each month. Microphotography, cameralucida diagrams etc. were the main tools for this taxonomy study of the planktonic species.

For the quantitative studies of plankton twenty liter water was filtered through a piece of silk bolting cloth from each station and the collection samples were preserved in 4% formalin. Plankton counting was done with the help of Sedgwick Rafter cell. The average number of planktonic forms per liter was calculated by the following formula:-

$$\text{Organism/liter} = \frac{C \times 1000m3m3}{L \times D \times W \times S}$$

Where, C = Number of planktonic organisms counted in all strips

L= Length of strip
D= Depth of a strip
W= Width of a strip
S= Numbers of strips counted

RESULTS AND DISCUSSION:

The zooplanktons were represented by the Crustace, Rotifers and Protozoa. The Crustaceans were the most dominating group, followed by Rotifers and then protozoa. Zooplanktons are the smallest, acellular or metazoans in water bodies, ranging in size from about 0.05 to 10 mm. Protozoans, Rotifers, Crustaceans (i.e. Cladocera; Rotifers and ostracoda) and small insects constitution most zooplankton communities. They provide food for many species of fish and are therefore, vital in the food web of ponds; dams are rivers. They are also used as an index of productivity, eutrophication and pollution of the water bodies.

A total of 44 genera of zooplanktons have been identified during the research period and are listed in table no. 2. The values of total number of zooplankton have been noted to varied with an increasing trend from January up to August and becoming maximum in the month of August due to rain brings more zooplankton from the water bodies of upper reaches to the sites under investigation. Then a decline is recorded from September onwards up to December.

Zooplankton mainly belong to the groups of Rotifera, Cladocera, Copepoda, Crustaceans, and Protozoa. The species identified in this study and characteristics are as follows:-

Zooplankton were composed of Rotifera (31.81%), Cladocera (18.18%), Copepoda (11.37%), Crustaceans (27.27%) and Protozoa (11.37%). A Total number of 44 genera were observed during the present study (Table no.1).

Quantitative analysis of zooplankton

At the sampling station A:
The monthly quantitative analysis of zooplankton at the sampling station A, revealed that total zooplankton concentration was highest 950 org/l in the month of August 2012 and lowest 445 0rg/l in the month of January 2012.

At the sampling station B:
The monthly quantitative analysis of zooplankton concentration varied from highest concentration 930 org/l in the month of August 2012 and lowest 455 org/l in the month of January 2012.

At the sampling station C:
The zooplankton concentration at the sampling station C, revealed the highest concentration 920 org/l in the month of August 2012 and lowest 440 in the month of January 2012.

At the sampling station D:
The monthly quantitative analysis of zooplankton ranged from 910 org/l in the month of August 2012 to lowest 452 org/l in the month of January 2012.

At the sampling station E
The monthly quantitative analysis of zooplankton concentration at the sampling station E, revealed that highest concentration 965 org/l in the month of August 2011 and lowest 442 org/l was observed in the month of January 2012 (Table no. 3).

The highest value of total zooplankton recorded in Hardiha pond was 965 org/l in the month of August 2012 at the sampling station E, while the lowest value of total zooplankton was recorded 440 org/l in the month of January 2012 at the sampling station C.

Pahwa and Mehrotra (1966) reported rotifer population from Ganga river, where they constituted 61.5 to 94.4% of population. Govind (1969) reported a rotifer peak in February (24.7%) out of the total zooplankton from shallow zone of Tungbhadra reservoir. Gupta (1989) reported a major rotifer peak in August and in February from two ponds near Jodhpur. Sheeba et. al. (2004) Qualitative and quantitative study of zooplankton in Ithikkara river, Kerala. These exhibited a bimodal pattern with a major peak in December and a minor peak in August. The second group of zooplankton, Copepoda, also exhibited two maxima (April & August) and two minima (February, March and September).

Table No. 1 The number of genera belonging to different Groups and their percentage.

S.No.	Group	No. of Genera	Percentage
1.	Rotifera	14	31.81%
2.	Cladocera	08	18.18%
3.	Copepoda	05	11.37%
4.	Crustaceans	12	27.27%
5.	Protozoa	05	11.37%
Total		**44**	**100 %**

Table No. 2 Zooplankton Genera Encountered at different sampling stations of Hardiha pond.

S.No.	ZOOPLANKTON GENERA	Sampling Stations				
		A	B	C	D	E
ROTIFERA						
1.	*Asplanchnopus multiceps*	+	+	+	+	+
2.	*Brachionue angularis*	+	+	+	-	+
3.	*Chromogaster ovalis*	+	+	+	+	+

S.No.	ZOOPLANKTON GENERA	Sampling Stations				
		A	B	C	D	E
4.	*Cyclops bicuspidatus*	+	+	+	+	+
5.	*Filinia longiseta*	+	+	+	+	+
6.	*Keratella cochlearis*	+	-	+	+	+
7.	*Monostyla bulla*	+	-	+	+	+
8.	*Mytilina mucronate*	+	+	-	+	+
9.	*Notholca acuninata*	+	+	+	-	+
10.	*Platyias quandricornis*	+	-	+	+	+
11.	*Polyarthra vulgaris*	+	+	+	+	+
12.	*Synchacta pectinata*	+	-	+	+	+
13.	*Scaridium longicaudum*	+	+	+	+	+
14.	*Trichocerca similes*	+	-	+	+	+
CLADOCERA						
15.	*Alona sps*	+	+	+	+	+
16.	*Ceriodaphnia sps*	+	+	-	+	+
17.	*Daphnia lumholtizi*	+	+	+	+	+
18.	*Diaphanosoma sps.*	+	+	+	+	+
19.	*Leydigia sps*	+	+	-	+	+
20.	*Monia sps*	+	+	+	+	+
21.	*Nauplii larva*	+	+	+	+	+
22.	*Simocephalus*	+	+	-	+	+
COPEPODA						
23.	*Cyclops scutifer*	+	-	+	+	+
24.	*Mesocyclops sps.*	+	+	+	-	+
25.	*Macrocyclops sps.*	+	+	-	+	+
26.	*Microcyclops sps.*	+	+	+	-	+
27.	*Neodiaptomus sps*	+	+	+	+	+
CRUSTACEANS						

S.No.	ZOOPLANKTON GENERA	Sampling Stations				
		A	B	C	D	E
28.	*Bosmia coregoni*	+	+	-	+	+
29.	*Ceriodaphnia reticulate*	+	+	+	-	+
30.	*Cypris sp.*	+	-	+	+	+
31.	*Eubranchipus*	-	-	+	+	+
32.	*Gammarus pulex*	+	+	+	+	+
33.	*Lathonura sp.*	+	+	+	+	+
34.	*Macroblachium*	+	+	+	+	+
35.	*Micrithrix sp.*	+	-	+	+	+
36.	*Moinodaphnia sp.*	+	+	+	+	+
37.	*Neodiaptomus*	+	+	+	+	-
38.	*Pseudosida bidantata*	+	-	+	+	+
39.	*Senecella calanoides*	+	+	+	+	-
PROTOZOA						
40.	*Amoeba proteus*	+	-	+	+	+
41.	*Diffusia sps*	+	+	+	+	+
42.	*Euglena viridis*	-	+	+	+	+
43.	*Pramaecium cardatum*	+	-	+	+	+
44.	*Vorticella nebulifera*	+	+	+	+	+
Total		**42**	**33**	**39**	**41**	**42**

Table No. 3 Monthly variation in Total Zooplankton (Org./l) of various sampling stations in Hardiha pond in January 2012 to December 2012.

S.No.	Months	Sampling Stations					Mean±SD
		A	B	C	D	E	
1.	Jan.	445	455	440	452	442	446.80±6.46
2.	Feb.	520	525	530	540	515	526.00±9.62
3.	March	530	535	540	550	542	539.40±7.54
4.	April	560	555	570	580	560	565.00±10.00

5.	May	660	650	645	655	635	649.00±9.62
6.	June	690	685	692	675	648	678.00±18.01
7.	July	790	795	800	798	780	792.60±7.99
8.	Aug.	950	930	920	910	965	935.00±22.36
9.	Sept.	770	780	760	775	750	767.00±12.04
10.	Oct.	690	658	675	640	675	667.60±19.14
11.	Nov.	570	578	565	560	576	569.80±7.50
12.	Dec.	470	480	478	460	465	470.60±8.47
Range	**Min**	**445**	**455**	**440**	**452**	**442**	
	Max	**950**	**930**	**920**	**910**	**965**	
ANOVA one way test for Zooplankton there is a not significant difference between sampling sites (p=1.0)							

CONCLUSION:-

Therefore it can be concluded through this study that the age old Hardiha pond with social and cultural importance is degrading at an alarming rate and eutrophic status. In the past two decades the pond has shown drastic changes regarding the productivity. The rapid increase of human activities and assemblage of livestock are creating pollution in the pond water and needs immediate measure. At this critical juncture the local representatives, Government and Non-Government bodies, the educated bodies, the village heads and the reputed figures of the society should come forward and formulate conservational model for the sustainability of this beautiful water body.

REFERENCES

1. Gajbhiy, S.N. and B.N. Desai. 1981. Zooplankton variability in polluted and unpolluted waters of Bombay. Mahasagar.Bull. Nat. InstOceangr.,4: 173-182.
2. Ghosh, A. and J.P. George, (1992) Studies on the a biotic factors and zooplankton in a polluted urban reservoir Hussain Sagar, Hyderabad: Impact on water quality and embryonic development in fishes. Indian Journal Environment Health, 31: 49-59.
3. Govind, B. V. 1969. Bottom fauna and macrovegetation in the Tugabhadra reservoir and their role in the food chain of fish communities. Proc. Sem. Ecol. Fish., pp 27-29.
4. Gupta, S 1989.Pollution Ecology of some ponds in urban vicinity of Jodhpur. Ph. D. Thesis University of Jodhpur, p. 234.
5. Kesharwani Sadhna, Mandloi, A. K. and Dube, K. K. 2006. Diversity of zooplankton in Amkhera pond of Jabalpur (M. P.) India. *Natural Journal of Life Sciences*, **3**:359-364.
6. Pahwa, D.V. and S.N. Mehrotra 1966.Observations on fluctuations conditions of river Ganga.Proc. Nat. Acad. Sci. India, 36 (2): 157-189.
7. Sharma R and Capoor A (2010) Seasonal Variations in Physical, Chemical and Biological Parameters of Lake Water of Patna Bird Sanctuary in Relation to Fish Productivity World Applied Sciences Journal 8 (1): 129-132.
8. Sharma, A, Ranga MM and Sharma PC (2010) Water Quality Status of Historical Gundolav Lake at Kishangarh as a Primary Data for Sustainable Management, South Asian Journal of Tourism and Heritage Vol. 3, No. 2
9. Sheeba, S., Ramanujan, N. and Santosh, S. 2004. Qualitative and quantitative study of zooplankton in Ithikkara river, Kerala Ecology, Environment and Conservation 10(3): 249-292.
10. Telkhade, P. M., Dahegaonkar, N. R., Zade, S. B. and Lonkar, A. N. 2008. Quantitative analysis of phytoplankton and zooplankton of Masala Lake, Masala, Distt. Chandrapur, Maharashtra. Environment Conservation Journal, 9:37-40.