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Studies on the zooplankton diversity in Kanke dam, Ranchi, Jharkhand.

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Abstract : Kanke dam is one of the large water reservoirs in Ranchi. It is an example of well established pond ecosystem. The collection of zooplanktons in the dam was done during the period of six months (June 2012-November 2012). Total 1239 individuals belonging to 12 species of zooplanktons belonging to five phyla were collected. The collection was made by the help of zooplankton collecting net. The aims and objective of this work was to calculate the diversity of micro zooplanktons and correlate them with the effect of some ecological factors like ambient temperature, water temperature, pH and dissolved oxygen of water and pollution. The results indicated that the growth of larvae of *Culex* and *Anopheles* mosquitoes were very high due to the pollution and optimum ecological conditions.

Key words : Kanke dam, Ranchi, Zooplanktons, Ambient temperature, *Culex*, *Anopheles*

INTRODUCTION

Aquatic ecosystem is the most diverse ecosystem in the world. The first life was originated in the water. Limnology has come a long way since the time (Forel F. A. and Lemana, 1892)⁷ in understanding the dynamics of lentic water bodies. Limnology encompasses studies with reference to the organism especially plankton (Altaff, 2003¹; Battish, 1992³; Edmondson, 1959⁶; Fritsch, 1907⁸). Zooplanktons are therefore responsive to change in the environment. They act as a good biological indicator of water pollution (Altaff, 2003¹; Battish, 1992³).

The present work was done in the Kanke Dam located in the Kanke area of Ranchi. Dam was constructed in year 1954 Rajkumar (2008)¹⁴ It is located in exactly 23°26'0" N latitude & 85°19'0" E longitude. It has an average elevation of 611 meters. The collection of zooplanktons in the dam was done during the period of six months (June 2012-November 2012). Total 1239

individuals belonging to 12 species of zooplanktons belonging from five phyla were collected. The aims and objective of this study was to calculate the diversity of micro zooplanktons. The effect of water pollution was considered to estimate the diversity in the quadrat of collections. The collected samples were preserved properly in the laboratory of S. S. Memorial College, Kanke Road, Ranchi.

MATERIALS AND METHODS

Following materials were used during this project work:

Zooplankton Collection Net

10 litres bucket, 250 ml Glass jar and Conical flask

- Camera
- pH metre
- 70% Alcohol
- Slides , cover slip
- Xylene and Canada balsam
- Titration method (Na-thiosulphate, K-dichromate, Mg-sulphate, Alkaline iodide)
- Starch solution and Sulphuric acid
- Marker pen
- Brush of different size(00,01,02 Round)

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- Slide box of 50/100 slides
- Paper , Pencil, Eraser, Sharpener

Six samples were collected on monthly basis within the period of work (June, 2012- November, 2012). The bucket of 10 liter was used to collect water from the bank of dam. The plankton net was attached to the conical flask and the taken water was filtered to collect zooplanktons. These samples were taken separately into the beaker having preservative (70% alcohol). These samples were brought to the college laboratory and then identified under the compound microscope. The slides were prepared and marked by the permanent marker and placed properly in slide-box under the supervision of laboratory instructor of college.

The water samples of dam were kept in the laboratory of college and then their pH-value, temperature and dissolved oxygen were taken by the use of pH-meter, thermo-hygrometer and titration method respectively. Calculated data is in table I.

RESULTS AND DISCUSSION

From the water sample of 1239 individuals of 12 species is listed properly in the Table I date wise and month wise. It includes the name of indentified organisms, their codes and numbers of individual site wise. It also includes the percentage of collection site wise and date wise. In this table P indicates Protozoa, D indicates Diptera, C indicates Crustacea, I indicate Insecta and L indicate Larva of insects. Table 2 indicates ambient temperature, water temperature, pH and dissolved oxygen of the selected sites of the Knake Dam date wise during June, 2012 to November, 2012. This table indicates the standard deviation and mean value of the taken parameters. Figure 1 indicates the graphical representation of ecological parameters ambient temperature, water temperature, pH and dissolved oxygen of the selected sites.

The results shown in the tables and figures clearly indicate the zooplanktons diversity in the selected area of Knake Dam in Ranchi. The identification of collected samples was done by Sedgwick refter by Elton S. R. (1947-48)¹⁶, Edelstein K. (1993)⁵; and Kellogg L. and Loren (1994)¹².

The data of table I indicate that maximum collection of samples were taken from the site 1 of Knake Dam in

the month of June 2012 when the ambient temperature and water temperature were 22.1° and 20.9 ° C, pH was alkaline (8.45) and dissolved oxygen was 3.01 mg/ltr. Table 2 shows that temperature range and pH values were almost same in all three sites in the month of June 2012. MacGregor (1928)¹³ summed up all work on pH factor in early 1928 and made careful laboratory experiments and concluded that if pH of the normal habitat is changed the development of the larva is adversely affected. The range of dissolved oxygen was variable in the way that site 1 bears lowest value of dissolved oxygen. In year 1938, Wigglesworth¹⁸ worked on the *Culex* larva and found that when the larva is deprived of oxygen, muscular activity causes a rise in the osmotic pressure of the blood increases and this change is associated with extraction of fluid from the tracheoles. Simultaneously the minimum collection was observed in the site 3 in the same month of June 2012 where the value of dissolved oxygen was maximum (3.98 mg/ltr.). Gjullin *et al.*, (1941)⁹ reported that a low oxygen concentration is essential for mosquito eggs to hatch. It was observed that the value of dissolved oxygen was minimum (2.2 mg/ltr) in all collections in the site 2 in the month of July 2012 and the number of individuals was also very low.

The larvae of *Culex* mosquito and *Vorticella* species were the maximum and minimum collections from Kanke Dam respectively. *Culex* lives in stagnant and dirty water. The collection sites were the bank of Dam and were polluted by the discharge of household garbage and other non-traditional pollutants like colourful plastics etc. Awolola *et al.*, (2007)² reported that polluted water bodies in urban area were responsible for the survival of mosquitoes and their larvae. Such kind of aquatic larvae essentially needs oxygen for further growth to adults. Certainly it promotes the population of insects. It is also observed that the second most abundant species was the larvae of *Anopheles* mosquito. The larvae of both *Culex* and *Anopheles* mosquitoes were abundant during the rainy season which is supposed to be the high time for their reproduction and development.

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Table 1: Collection of organisms from the three sites of Kanke Dam, Ranchi during June 2012 to November 2012.

Sl. No.	Code	Organism identified	12.06.2012			12.07.2012			12.08.2012			12.09.2012			12.10.2012			12.11.2012			
			Site 1	Site 2	Site 3	Site 1	Site 2	Site 3	Site 1	Site 2	Site 3	Site 1	Site 2	Site 3	Site 1	Site 2	Site 3	Site 1	Site 2	Site 3	TOTAL
1	P ₁	<i>Amoeba</i>	8	4	6	2	3	4	12	4	4	5	5	9	3	2	2	2	5	3	83
2	P ₂	<i>Balamitidium</i>	11	9	7	3	7	2	3	3	2	5	7	9	3	6	9	2	5	7	100
3	P ₃	<i>Yorticella</i>	2	3	4	4	0	2	8	0	1	5	7	1	6	8	4	0	0	0	55
4	D ₂	<i>Melosira</i>	0	2	4	8	5	3	7	0	1	3	3	3	6	1	8	5	9	4	72
5	D ₃	<i>Cyclotella</i>	9	2	5	5	0	4	3	0	4	5	2	5	5	5	7	9	3	2	75
6	C ₁	<i>Daphnia ceriodaphnia</i>	5	2	1	3	4	7	4	7	5	10	8	5	2	4	3	3	6	8	87
7	C ₂	<i>Daphnia cyclomorpha</i>	11	5	1	2	3	8	8	1	9	9	8	9	7	10	3	9	9	6	118
8	C ₃	<i>Canthocamptus</i>	4	2	0	9	2	4	5	8	5	1	3	4	5	9	9	5	5	7	87
9	I ₂	<i>Nauplius</i> larva	9	1	7	9	2	7	6	6	4	3	5	7	8	4	6	9	2	4	99
10	I ₃	Water Bug	9	7	5	5	8	9	7	9	8	11	11	9	6	8	5	7	5	6	135
11	L ₁	<i>Anopheles</i> larvae	11	8	5	2	9	12	11	14	13	9	8	11	12	8	6	3	4	5	151
12	L ₂	<i>Culex</i> larvae	12	6	0	8	12	11	15	17	10	10	7	8	6	11	21	9	8	6	177
		TOTAL	91	51	45	60	55	73	89	69	66	76	74	80	69	76	83	63	61	58	1239
		%base	7.34	4.12	3.63	4.84	4.44	5.89	7.18	5.56	5.33	6.13	5.97	6.457	5.57	6.134	6.699	5.085	4.92	4.68	

Table 2: Demonstrates parameters like ambient temperature, water temperature, pH and, Dissolved Oxygen in water at site 1, Site 2 and Site 3 in Kanke Dam, Ranchi during the period of June 2012-Nov. 2012.

S.N.	Date	Site 1			Site 2			Site 3					
		Ambient temp (°C)	Water temp (°C)	pH	Dissolved oxygen (mg/ltr)	Ambient temp (°C)	Water temp (°C)	pH	Dissolved oxygen (mg/ltr)	Ambient temp (°C)	Water temp (°C)	pH	Dissolved oxygen (mg/ltr)
1	12.06.2012	22.1	20.9	8.45	3.01	22.1	20.9	8.45	3.11	22.1	20.9	8.45	3.98
2	12.07.2012	21.9	18.5	8.01	2.9	21.9	18.5	8.01	2.2	21.9	18.5	8.01	3.01
3	12.08.2012	22.5	18.6	7.95	3.24	22.5	18.6	7.95	3.01	22.5	18.7	7.95	3.24
4	12.09.2012	21.6	18.3	8.23	4.01	21.6	18.3	8.23	3.91	21.6	18.3	8.23	4.23
5	12.10.2012	20.4	16.9	8.64	3.29	20.4	16.8	8.64	3.01	20.4	16.9	8.64	3.02
6	12.11.2012	16.6	14.8	8.67	3.12	16.6	14.6	8.67	3.12	16.6	14.9	8.67	3.01
	S.D.	2.200	2.027	0.31	0.393	2.20	2.102	0.31	0.542	2.200	2.003	0.31	0.547
	Mean Value	20.85	18	8.33	3.261	20.85	17.95	8.33	3.06	20.85	18.03	8.33	3.415

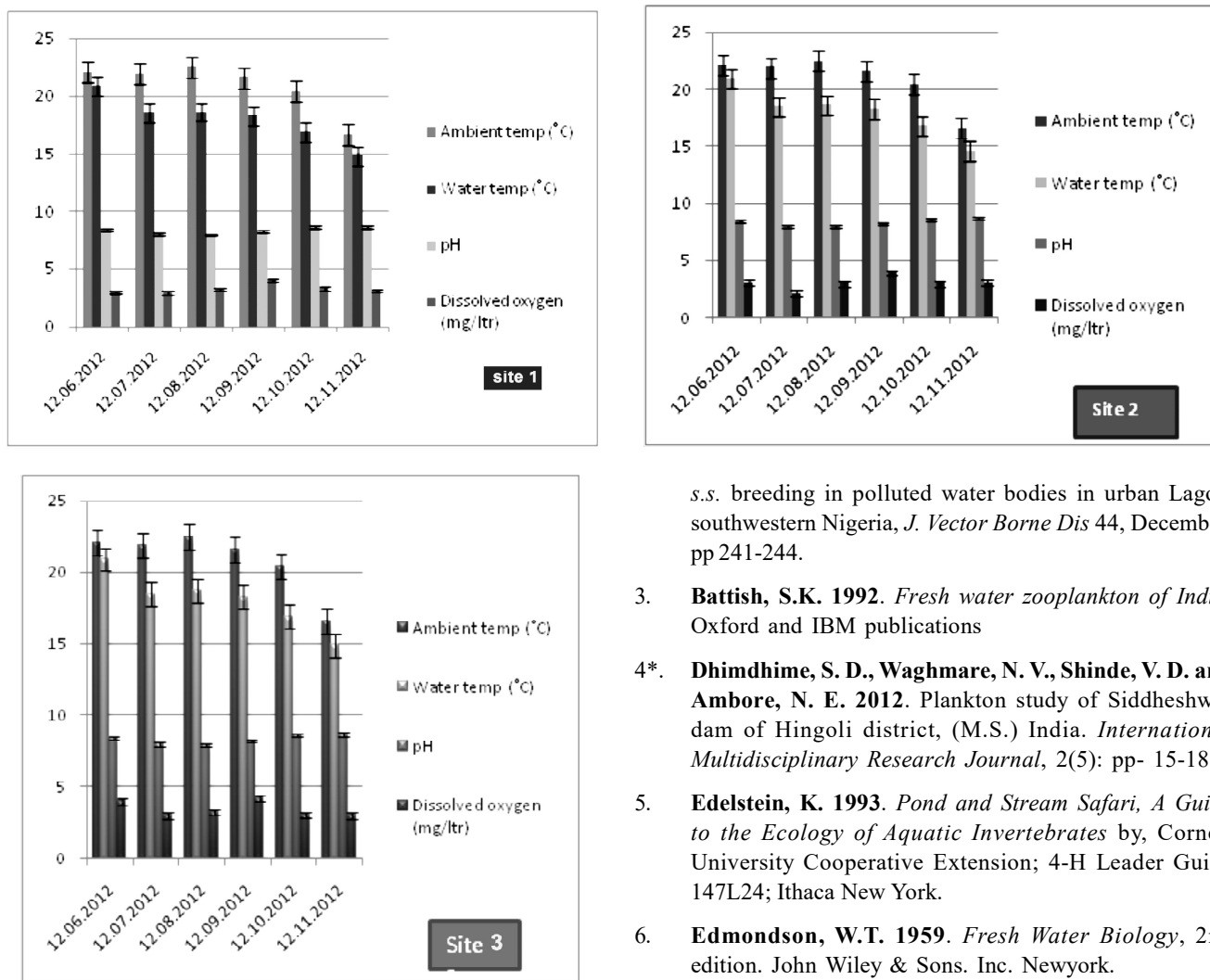


Fig. 1: Demonstrates the ambient temperature, water temperature, pH and, Dissolved Oxygen in water at site 1, Site 2 and Site 3 in Kanke Dam, Ranchi during the period of June 2012-Nov. 2012.

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