RESEARCH ARTICLE

Diversity of Zooplankton in some Reserviours in and around Karwar- Uttara Kannada District Karnataka

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ABSTRACT

The present work was carried out from October 2012 to December 2013. The main aim of the study was to analyse the diversity, evenness and richness of zooplankton species in some Reserviours of Karwar. The samples were collected during morning hours and were analyzed monthly for different parameter. Results showed that the larval forms were dominant throughout the study period followed by copepods and protozoa group.

Key words: Zooplankton, Hydrobiology, Karwar, Diversity, Correlation

INTRODUCTION

Zooplankton are the heterotropic component of the plankton community, which range from microscopic to few feet in size. Even though there are many permanent members, much of its composition is made by the juveniles of some animal groups. They form an important link in the aquatic food chain as 'secondary producers' accumulating the carbon for transferring to the other level of food chain, the consumers. Kali River exhibits different type of biotopes such as estuary, backwater, fresh water and mangrove etc. Five reserviours were selected for study. The environmental parameters of aquatic biotope fluctuate periodically dependable on the three conspicuous seasons, pre-monsoon (February-May), southwest monsoon (June-September) and post-monsoon (October-January). The pre monsoon season is identified by high temperature and salinity, the south- west monsoon season is characterized by heavy

rainfall and the post-monsoon season is known for stable environmental conditions and a high biological productivity rate.

MATERIALS AND METHODS

Water samples were collected on monthly basis. Water samples were collected using a clean plastic container for the study of various physic-chemical and biological parameters.

The plankton samples were collected on monthly basis. Plankton samples were collected by filtering 100 litres of water through plankton net made up of bolting silk. The zooplankton samples were preserved in 5 percent formalin. The preserved samples were brought to the laboratory for qualitative and quantitative analysis and the identification was done with the help of methods described by Pennak (1953), Arora (1963), Sehgal (1983), Battish (1992) and Murugan *et al*. (1998).

Community structure analysis: Three indices were used to obtain the estimation of species diversity, species richness and species evenness.

1. Shannon and Weaver (1949) and Simpson (1949) diversity index value was obtained using the following equation:

$D = \sum Pi^2 (\log Pi)$ (Shannon's index)

$i = I$

$D = \sum Pi^2$ (Simpson index)

$i = I$

Where

Pi = is the proportion of the first species. The proportions are given Pi=ni/N

2. Species richness (D or R1 and R2) was obtained using the equation.

$R1 = (S - 1) / \log N$ (Margalef, 1951)

$R2 = S \sqrt{n}$ (Menhinick, 1964)

Where:

R = is the index of species richness

S = total number of species

N = total number of individuals

3. Species equitability or evenness was determined by using the expression of Pielou (1966) and Sheldon (1969).

$$E1 = \frac{N1}{N0}$$ (Pileou's Evenness)

$$E1 = \frac{N1}{N0}$$ (Sheldon evenness)

Where:

N0 = number of species in the sample

N1 = number of abundant species in the sample.

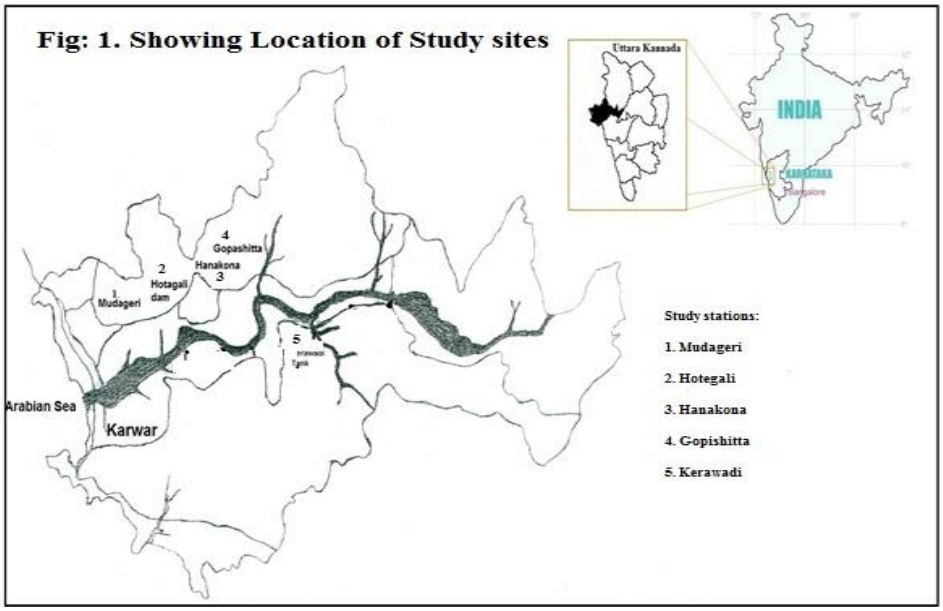

Table: I Study stations with Lat/Long.

Sl.No	Name of the Reservoir	Distance from Karwar	Geographical position
1	Mudageri	13.3km	14⁰-53'-52.27" N latitude/ 74⁰-07'-55.06" E longitude
2	Hotegali	15km	14⁰-54'-13.45" N latitude/ 74⁰-10'-12.08" E longitude
3	Hanakon	17km	14⁰-54'-05.29" N latitude/ 74⁰-11'-28.25" E longitude
4	Gopashitta	19.3km	14⁰-54'-39.24" N latitude/ 74⁰-13'-08.24" E longitude
5	Kerawadi	33km	14⁰-52'-46.32" N latitude/ 74⁰-15'-46.63" E longitude

RESULTS

Table 2: Monthly Variation in Hydrographical Parameters at Station I

Parameters	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Water temp (°c)	28	28	27	26	28.	29	30	32	28	26	28	28	29	27	27
pH	6.9	7.5	7.8	7.6	7.2	7.5	7.5	7.2	7.3	6.6	7.1	6.6	7.4	7.5	7.8
D.O (ml/l)	5.3	6.0	5.5	5.3	5.2	5.1	5.3	5.2	6.1	6.5	5.5	5.8	5.9	5.1	5.4

Table 3: Monthly Variation in Hydrographical Parameters at Station II

Parameters	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Water temp (°c)	29	28	29	29	31	28	30	29	26	28	28	28	28	28	29
pH	6.9	7.1	6.5	6.6	7.6	7.8	7.5	7.7	6.8	6.3	6.7	6.7	7.0	6.8	6.7
D.O (ml/l)	5.7	6.1	5.8	5.5	5.4	5.1	4.9	5.1	6.5	6.4	6.6	5.8	5.5	5.5	5.1

Table 4: Monthly Variation in Hydrographical Parameters at Station III

Parameters	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Water temp (°c)	29	28	28	28	29	30	29	30	29	28	27	29	29	28	29
pH	6.9	6.9	7.0	6.7	7.3	7.5	7.9	8.2	7.2	6.3	6.4	6.9	7.3	7.5	7.2
D.O (ml/l)	5.6	5.9	5.4	5.4	5.5	5.2	5.5	21.2	6	6.36	6.2	5.7	5.8	5.3	5.3

Table 5: Monthly Variation in Hydrographical Parameters at Station IV

Parameters	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Water temp (°c)	27	27	26	26	27	30	30	30	27	26	28	28	29	28	28
pH	7.0	7.3	7.8	7.5	7.3	7.3	7.6	7.7	7.6	6.6	6.9	7.2	7.3	7.5	7.1
D.O (ml/l)	5.3	6.0	5.3	5.6	5.4	5.1	5.0	5.5	6.2	6.3	5.9	5.6	6.2	5.4	5.7

Table 6: Monthly Variation in Hydrographical Parameters at Station V

Parameters	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Water temp (°c)	28	27	28	27	29	30	30	30	27	27	26	28	28	28	28
pH	7.6	7.9	7.9	6.3	7.4	7.6	7.9	8	6	6.4	6.5	7.1	6.8	6.7	6.8
D.O (ml/l)	5.7	5.9	5.5	5.2	5.6	5.4	4.9	4.8	6.1	6.4	6.7	6.3	6.0	5.1	5.2

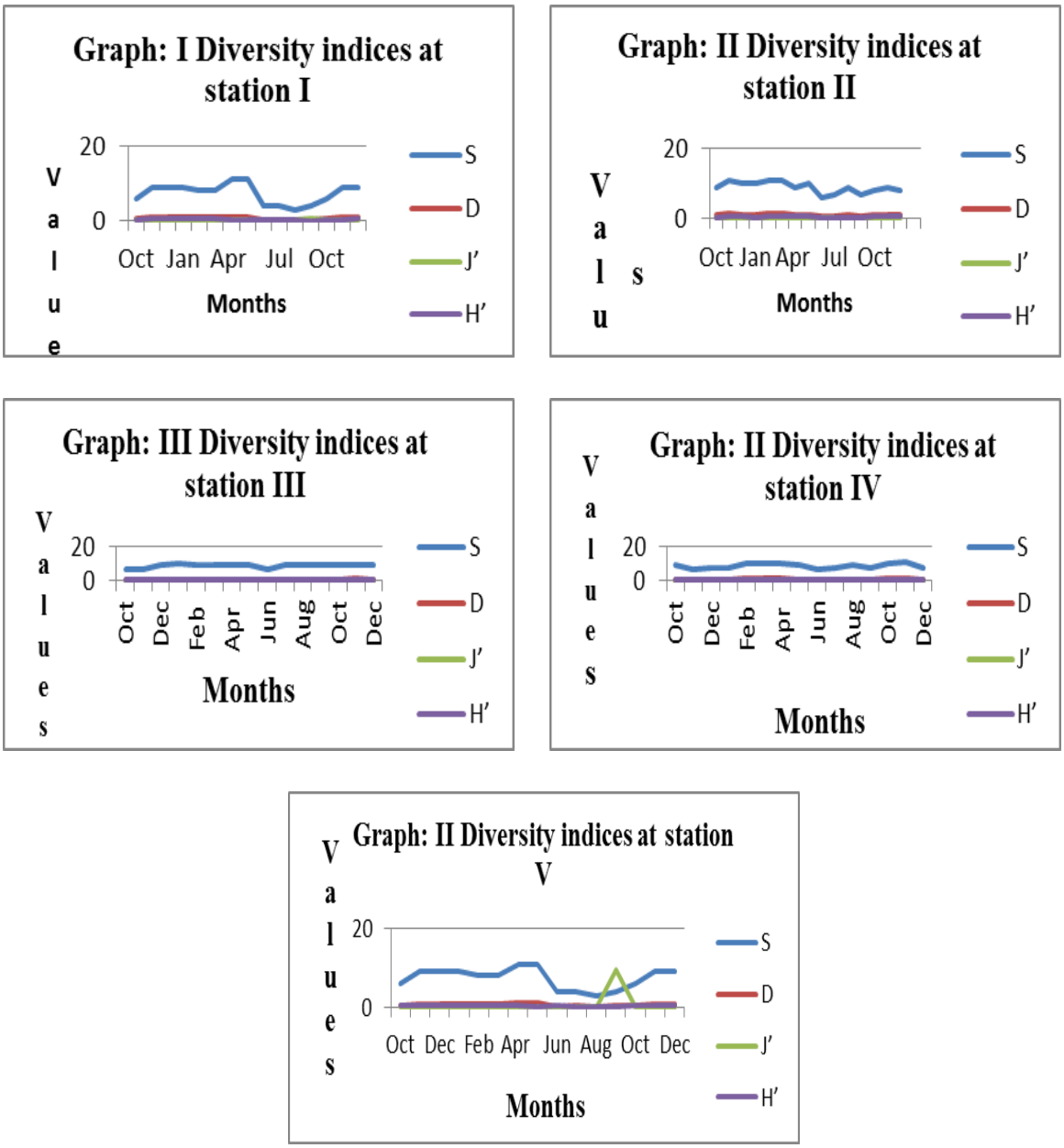

Fig. 1 : Results of Diversity Indices, Species Richness and evenness of zooplankton species

DISCUSSION

Totally 12 groups of zooplankton were identified during the present study. The larval forms ranked 1st (1264-3067/m3) followed by copepods (97-1420/m3) and *protozoa* (41.54/m3). The larval forms constituted about 83-85% of the total species present in all the stations. Copepods constituted 11-13% while *protozoa* constituted only 2-3%.Other groups constituted about 15-17% of the zooplankton diversity. From the study it is clear that the zooplankton population of the study region was found to be dominated by larval forms followed by copepods and protozoans.

Although zooplankton exists under a wide range of environmental conditions, yet many species are limited by DO, temperature and other physico-chemical factors. According to (Magurran 1988) the diversity indices based on 1. Stable

communities have diversity value and unstable ones have low diversity and 2. Stability in diversity is an index of environmental integrity and wellbeing. Species diversity indices of the Zooplankton groups showed Margalef index (d) ranged between 0.4 and 1.68 and Shannon-Weiner (H) ranged between 0.40 and 0.78 and Evenness (J') ranged between 0.20 and 0.32. In all the stations highest numbers of zooplankton species were observed in the month of May and lowest in the month of October. According to Mcdonald (2003) the value of diversity indices ranging between 1.5 and 3.4 represents low diversity and species richness value above 3 indicates high diversity. In the present study, the value of Shannon-Weiner (H) ranged 0.40 and 0.78.

REFERENCES

Arora HC (1963) Studies on Indian Rotifera. Part. II. Some species of the Genus Brachionus from Nagpur. *Journal of Zoological Society India* 15: 112-121.

Battish (1992) Fresh water Zooplankton of India. Oxford and IBH publishing Co. New Delhi, pp; 233.

Magurran A (1988) Ecological diversity and its measurements. Princeton University press.

Margalef R (1951) Diversidad de especies en las comunidales naturales. *Publ. Inst. Biol. Apl*., 9, 5-27

McDonald K (2003) The abundance of herbivorous and predatory fishes in relation to *Diademaantillarum* along the west coast of Dominica. *ITME Research reports*. Pp. 11-21.

Menhinick EP (1964) A Comparison of some species - Individuals diversity indices applied to samples of field insects. *Ecol*., 45, 859-881.

Murugan N, Murugaval P and Koderkar MS (1998) *Indian Association of Aquatic Biologists Organization*. (IAAB), 1- 47pp

Pennak RW (1953) Freshwater invertebrates of the United States. New York: The Ronald Press Company. 769 pp.

Pielou EC (1966) The measurement of diversity in different types of biological collections. *J. Theoret. Biol*., 13, 131-144

Sehgal KL (1983) Planktonic copepods of Freshwater ecosystem. Interprint, new Delhi. 169pp.

Shannon CE and Weaver W (1949) The mathematical theory of communication Urban. *Univ. Illinois Press. Illinois*. p. 125.

Sheldon A (1969) Equitability indices: dependence on the species count. *Ecol*., 50, 466-467

Simpson EH (1949) Measurement of diversity. *Nature*, 163, 688.