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Research Article

ZOOPLANKTON DIVERSITY AND THEIR DENSITY VARIATION IN THE YAMUNA RIVER AT KALPI, (U.P.) INDIA

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ABSTRACT

Present paper deals with the analysis of zooplankton diversity and their seasonal variation of density in the Yamuna river at Kalpi, district Jalaun, U.P.. Samples were collected from four sampling sites for a period of one year (October 2013 to September 2014) in each month of every season. After analysis of collected samples, registered zooplankton were belong to 22 species of 16 genera of different groups like as Protozoa (3 species of 3 genera), Rotifera (12 species of 6 genera), Cladocera (5 species of 5 genera) and Copepoda (2 species of 2 genera). It was noticed that density of zooplankton was maximum in summer, minimum in rainy season and intermediate in winter season.

INTRODUCTION

Zooplanktons are the microscopic animal components of aquatic ecosystem which move at the mercy of the water current. Protozoans, Rotifers, Cladocerans and Copepods constitute the major groups of zooplankton. Zooplanktons constitute an important link between primary producers (mostly Phytoplankton) and higher consumers (mostly fishes) in aquatic food webs. These are heterotrophic planktonic animals and constitute an important food source of many species of aquatic organisms. They occupy in intermediate position in the food web and mediate the transfer of energy from lower to higher trophic level (Water, 1977). Zooplankton diversity is one of the most important ecological parameter in water quality assessment. Because zooplanktons are globally recognized as pollution indicator organisms in the aquatic environment.

Considering the importance of zooplankton diversity and variation in their density, several studies have been made in this field (Battish, 1992; Dhanapathi, 2000; Sampaio *et al*., 2002; Rajshekhar, 2010, Khanna *et al*., 2012; Malhotra, 2014; Mlhotra and Kumar, 2014 and Kumar and Khare, 2015).

Aims and Objectives

Objectives of the study was to analysis of diversity of zooplankton and to analysis of their seasonal variation of density in the Yamuna river at Kalpi stretch.

MATERIAL AND METHODS

Study area The study was carried out at Kalpi stretch of the Yamuna river. Kalpi is a historical city of district Jalaun of Uttar Pradesh. It lies to the south east bank of Yamuna and falls under 26^0 7' 14" N latitude to 79^0 44' 59" E longitude with an average elevation of 112 meters. 5 Km. length of Yamuna at Kalpi from vicinity of Vyas mandir (u/s) to Raid drain opening (d/s) was under study programme (Fig. 1).

Sampling and Analysis Four sampling stations named as S1- Vicinity and in front of Vyas Mandir, S2- Kila Ghat, S3- Peela Ghat and S4- near Raid drain opening were selected for the sampling purpose (fig.-1). The samples were collected monthly till one year (October 2013 to September 2014) from selected sampling stations. Samples were collected between 8.0 AM to 9.30 AM, at every selected sampling stations. Plankton net of bolting silk no. 25 was used for sampling purpose. Samples were taken at mid stream 0.5 to 1m below the surface of water. Collected concentrated plankton samples (10 ml) were fixed and preserved in 5% formalin. Zooplankton samples were examined under high power microscope and identified up to genus and species level with the help of standard books and monographs (Adoni, 1985 and Battish, 1992).

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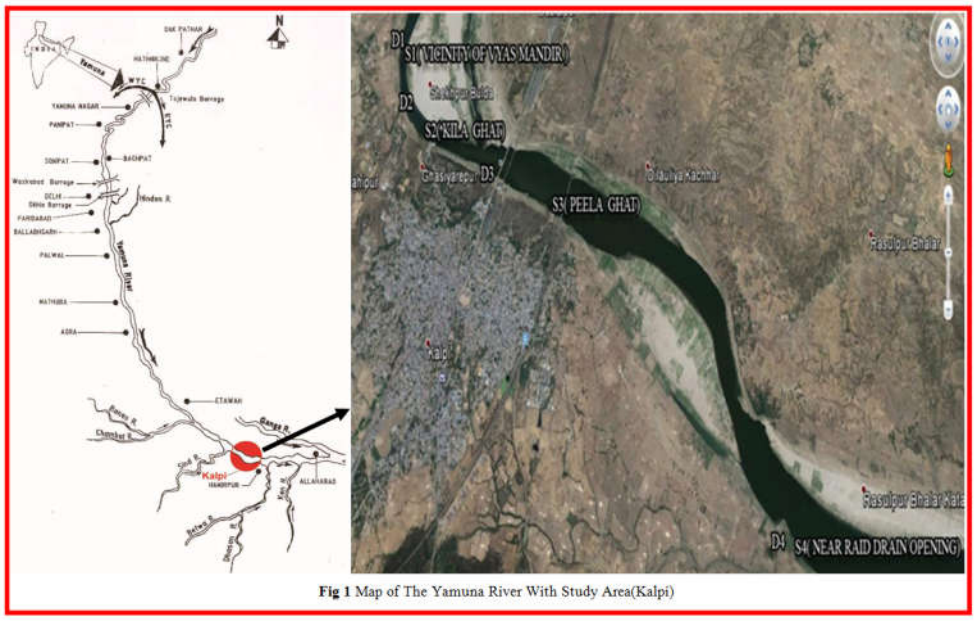

Fig 1 Map of The Yamuna River With Study Area(Kalpi)

RESULT AND DISCUSSION

Registered zooplankton were belong to 22 species of 16 genera of different groups like as Protozoa (3 species of 3 genera), Rotifera (12 species of 6 genera), Cladocera (5 species of 5 genera) and Copepoda (2 species of 2 genera). Alam, 2013 reported 15 species of different group of zooplankton from the Yamuna river at Kalpi stretch. Among recorded zooplankton Rotifer's population was dominant during entire study span (diagram no - 5). Data of collected and identified members of different group of zooplankton has given in table no.- 1.

Table No 1 List of recorded *Zooplankton* in the Yamuna river at study area (Kalpi)

Protozoa		
	Genera	Species
1.	*Arcella*	*dentata*
2.	*Paramecium*	*caudatum*
3.	*Vorticella*	*campanula*

Cladocera		
	Genera	Species
1.	*Alona*	*rectangula*
2.	*Bosmina*	*longirostris*
3.	*Ceriodaphnia*	*reticulata*
4.	*Daphnia*	*carinata*
5.	*Moina*	*brachiata*

Copepoda		
	Genera	Species
1.	*Cyclops*	*bicuspidatus*
2.	*Macrocylops*	*albidus*

Rotifera		
	Genera	Species
1.	*Asplanchna*	*intermedia*
2.	*Brachionus*	*calyciflorus*
	Brachionus	*caudatus*
	Brachionus	*falcatus*
	Brachionus	*plicatilis*
	Brachionus	*quadridentatus*
	Brachionus	*rubens*
3.	*Filinia*	*longiseta*
4.	*Keratella*	*cochlearis*
	Keratella	*tropica*
5.	*Philodina*	*citrina*
6.	*Polyarthra*	sp.

Highest density of Protozoans was noticed in the month of June while lowest density of **Protozoans** was recorded in the month of August (rainy season). Mean value of density of recorded Protozoans was varied from 3 org./L to 31 org./L at different sampling stations. Seasonal fluctuation in the density of Protozoans has given in diagram no. 1. Maximum density of **Rotifers** was recorded in the month of June while their minimum density was recorded in the month of August (rainy season). Mean value of recorded density of Rotiferans was in the range of 8 org./L to 110 org./L. The finding is similar to those observed by Michael, (1964). Seasonal fluctuation in the density of Rotifers has given in diagram no. 2. Highest density of **Cladocerans** was recorded in the month of May (Summer season) and their lowest density was recorded in the month August (rainy season).

Mean value of noticed density of Cladocerans was varied from 4 org./L to 84 org./L during entire study period. Seasonal fluctuation in the density of Cladocera has given in diagram no. 3. Maximum density of **Copepods** was recorded in the month of May (summer) and Lower density of this group was noticed in the month of August (Rainy season).The mean value of recorded density of Copepods during study period was varied from 6 org./L to 42 org./L. Seasonal fluctuation in the density of Copepoda has given in diagram no. 4.

Table No.2 Average value of seasonal density of recorded *Zooplankton* in the Yamuna river at study area (Kalpi)

Period Oct. 2013 to Sept. 2014 Months		Protozoa (org./l)	Rotifera (org./l)	Cladocera (org./l)	Copepoda (org./l)
	Oct.	12	52	30	22
Winter	Nov.	17	51	40	37
Season	Dec.	9	31	26	38
	Jan.	8	28	31	11
Total		46	162	127	108
	Feb.	10	32	44	14
Summer	Mar.	16	41	60	20
Season	Apr.	20	60	74	35
	May	26	100	84	42
Total		72	233	262	111
	Jun.	31	110	74	33
Rainy	Jul.	4	17	6	24
Season	Aug.	3	8	4	6
	Sep.	6	25	10	10
Total		44	160	94	73
Grand Total		162	555	483	292
Percentage (%) contribution		10.86%	37.19%	32.37%	19.57%

It was noticed that density of zooplankton was maximum in summer, intermediate in winter and minimum in rainy season. Data of average value of seasonal density of recorded zooplankton in the Yamuna river at study area (Kalpi) has given in table no.- 2. Plate No 1 to 21 represents prominent zooplankton of the Yamuna river collected and identified during the study period.

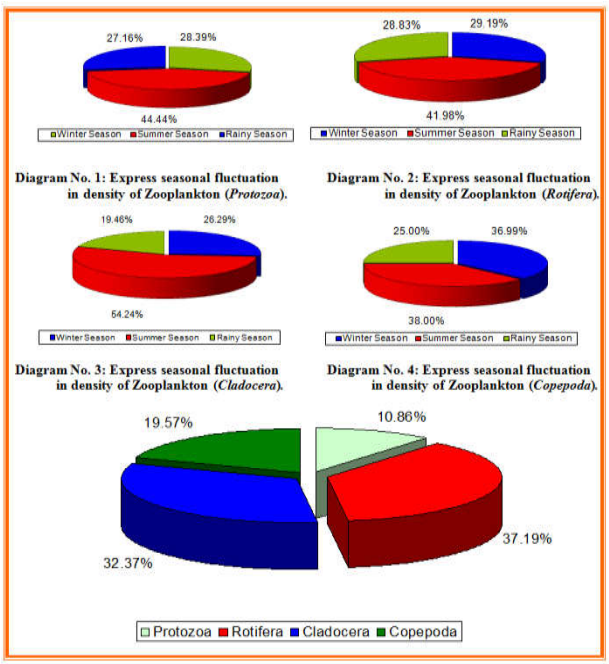

Diagram No.5 Express density relation among different group of *Zooplankton*

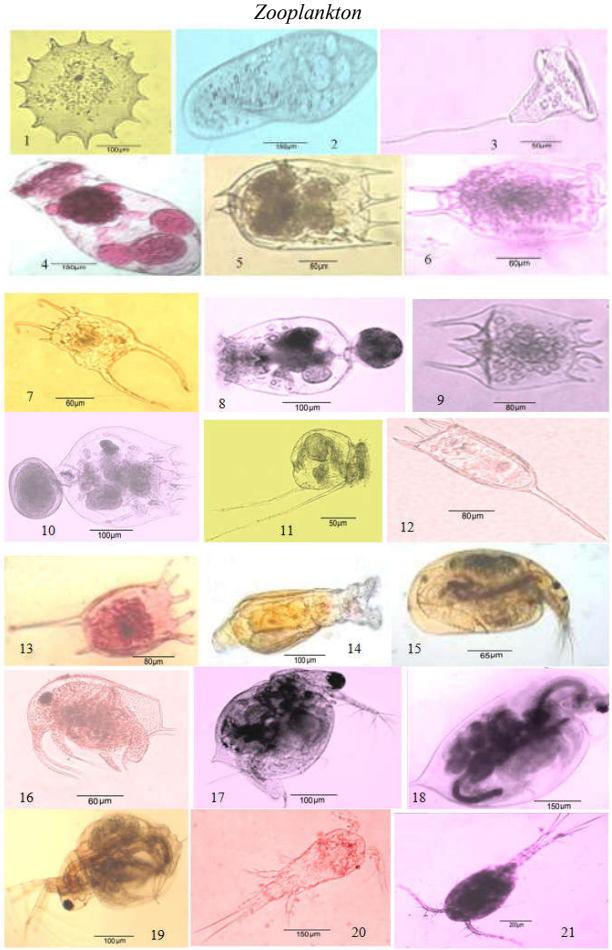

Plate No 1- Arcella dentata, 2- Paramecium caudatum, 3- Vorticella campanula, 4- Asplanchna sps. 5- Brachionus calyciflorus, 6- Brachionus caudatus, 7- Brachionus falcatus, 8- Brachionus plicatilis, 9- Brachionus quadridentatus, 10- Brachionus rubens, 11- Filinia longiseta, 12- Keratella cochlearis, 13- Keratella tropica, 14- Philodina citrina, 15- Alona rectangula, 16- Bosmina longirostris, 17- Ceriodaphnia reticulata, 18- Daphnia carinata, 19- Moina brachiata, 20- Cyclops bicuspidatus and 21- Macrocyclops albidus.

CONCLUSION

Result of study is concluding that Yamuna river was rich in diversity of zooplankton at the study area. Registered zooplankton were belong to 22 species of 16 genera of different groups like as Protozoa (3 species of 3 genera), Rotifera (12 species of 6 genera), Cladocera (5 species of 5 genera) and Copepoda (2 species of 2 genera). Among recorded zooplankton Rotifer's population was dominant during entire study span. It was noticed that density of zooplankton was maximum in summer, minimum in rainy season and intermediate in winter season.

References

Adoni, A.D. (1985). Work book on limnology, *Pratibha Publications*, Sagar (M.P).

Alam, S.K. (2013). Hydrobiological and Physico-chemical analysis of the river Yamuna at Kalpi distt. Jalaun U.P. India, Ph.D. *Thesis (Zoology)* submitted to B.U. Jhansi.

Battish, S.K. (1992). *Fresh water zooplankton of India*, Oxford and IBM publications.

Dhanapathi, M.V.S.S.S. (2000). *Taxonomic notes on the Rotifers, from India*, Indian Associations of Aquatic Biologists (IAAB).

Khanna, D.R., Bhutiani, R., Matta, G., Singh, V. and Bhadauriya, G. (2012). Study of planktonic diversity of river Ganga from Devprayag to Roorkee, Uttarakhand (India), *Env. Cons. Jou.,* 13 (1&2), 211-217.

Kumar, M. and Khare, P.K. (2015). Diversity of Plankton and their Seasonal Variation of Density in the Yamuna River at Kalpi, District Jalaun (U.P.) India, *J. Glo. Bio*., Vol. 4 (7): 2720-2729, ISSN: 2320-1355.

Malhotra, P. (2014). Species Diversity and Distribution of Zooplankton of Western Yamuna Canal in Yamuna nagar (Haryana) India with Special Reference to Industrial Pollution, *Int. Res. J. Environment Sci.* Vol. 3 (8), 61-63. ISSN: 2319-1414.

Malhotra P. and Kumar A. (2014). Comparative Studies on Zooplanktonic Diversity of River Yamuna and Western Yamuna Canal in Relation to Industrial Pollution in Yamunanagar (Haryana), India, International Journal of Science and Research (IJSR), Vol. 3 (9): 1438-1441, ISSN: 2319-7064.

Michael, R.G. (1964). Studies on the Zooplankton of a tropical fish pond, *Hydrobiologia*, 32 (1-2): 47-68.

Rajshekhar, M., Vijaykumar, K. and Parveen, Z. (2010). Seasonal variations of zooplankton community in fresh water reservoir, Gulbarga District, Karnataka, South India, *In. J. of System Biology*, Vol. 2(1): 6-11 ISSN: 0975-2900.

Sampaio, E.V., Rocha, O., Tundisi, T.M. and Tundisi, J.G. (2002). Composition and abundance of Zooplankton in the limnetic zone of seven reservoirs of the Paranapanema river, Brazil. *Brazil Journal Biology* 62 (3): 525-545.

Water, T.P. (1977). Secondary production in Inland Waters, *Adv. in Eco. Res*., 10:11-164.