

Studies on Zooplankton Diversity of River Temar District Jabalpur, Madhya Pradesh, India

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Abstract: Zooplanktons are heterotrophic Planktonic animals floating in water. They serve as good indicators of changes in water quality. The present papers deals with study of monthly variations in the Zooplankton population during October 2013 to September 2014. The diversity and population dynamics of Zooplankton is under the control of numerous physico-chemical factors, population influence, etc. A study revealed that 34 species of Zooplankton belonging to 5 major groups were observed. Among these, 6 species belongs to Protozoa, 11 species belongs to Rotifera, 9 species belongs to Cladocera, 6 species belongs to Copepoda and 2 species belongs to Ostracoda. The Rotifera group is dominant followed by Cladocera and Copepoda. Highest Zooplankton populations were recorded in November and December.

Keywords: Zooplankton, Diversity, Environment, Physico-Chemical Properties, Temar River, Jabalpur, Madhya Pradesh.

I. INTRODUCTION

The aquatic ecosystem covers a vast area and the organisms occurring in this area are under the influence of its physico-chemical properties [1], [2], [3]. Its interaction occurs between living and non-living components. The occurrence and abundance of zooplankton depends on its productivity, which in turn is influenced by abiotic factors and the level of nutrients in the water [4]. Zooplankton forms the microscopic animals that play an important role in an aquatic food chain as they are largely consumed by fishes and other higher organisms in food chain. Equally, results of several studies have shown that physico-chemical properties of aquatic ecosystems determine the occurrence, diversity and density of both flora and fauna in any given habitat, which may change with season of the year [5]; [6]. The present study was undertaken to investigate the zooplankton diversity in river Temar through different months and season during the period October 2013 to September 2014 in order to assess the species composition, population density and seasonal fluctuation of this faunal group.

II. MATERIALS & METHODS

Jabalpur is the largest city of the Madhya Pradesh state. Today the city becomes the smart city of the M.P. It has its own indefinable charm, combining many traditional elements and the latest international blend. Location of the Jabalpur in India is 23°10' North latitude and 79°56' East longitude. The Temar River is one of the most important river of Jabalpur and Seoni District of Madhya Pradesh. Temar River originates from Palatwara village near Ghansore, district Seoni M.P. It joins Narmada River near Saliwara village, Bargi, district Jabalpur M.P. The river is the lifeline of the people resides in nearby villages, mostly for the various domestic activities. For the study of zooplanktons, samples were collected on monthly basis for a period of one year from October 2013 to September 2014. For qualitative and quantitative studies of zooplankton 100 lits. of surface water was passed through the plankton net number 120 μ . The collected samples were

preserved in 4% formalin solution. These samples were observed and identified under microscope using keys and monographs of [7], [8], [9], [10] and [11]. Zooplanktons were counted with the help of Sedgwick Rafter Cell method. The concentrated remaining specific volumes (10ml) used for the identification of different groups of zooplankton like Rotifers [12] Copepods [13], Cladocerans [14] and Ostracods [15]. For their numerical estimation, the organisms were observed under light microscope using "Sedgwick Rafter Cell" as per procedure given in standard methods [16]. Average 5 to 10 counts for each sample were taken and results were expressed in number of organisms/litre

III. OBSERVATIONS

Month wise and Season wise data of population density (no./lit) of different zooplankton groups (October 2013 to September 2014) in Tamar River, Jabalpur is presented in Table I and II, respectively . Annual seasonal variation of different zooplankton groups in Tamar River, Jabalpur (October 2013 to September 2014) is presented in Fig. 1

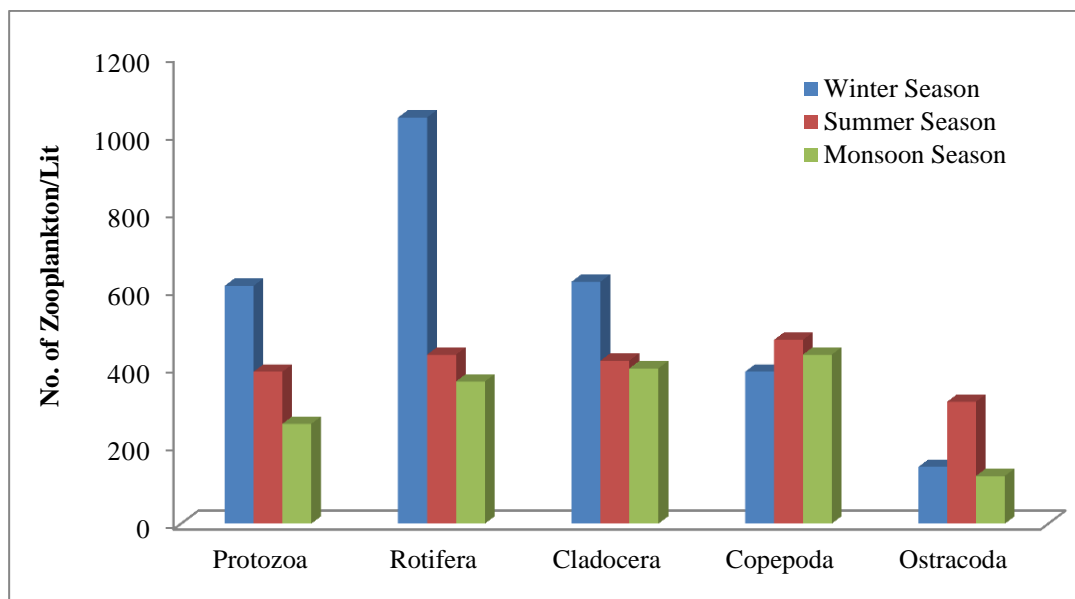


FIG.1. ANNUAL SEASONAL VARIATION OF DIFFERENT ZOOPLANKTON GROUPS IN TEMAR RIVER, JABALPUR (OCTOBER 2013 TO SEPTEMBER 2014)

TABLE I. MONTH WISE POPULATION DENSITY (NO/LIT) OF DIFFERENT ZOOPLANKTON GROUPS (OCT. 2013 TO SEP. 2014) IN TEMAR RIVER, JABALPUR

Sr. No	Zooplankton Groups	Winter Season				Summer Season				Monsoon Season				Annual Total Zooplankton
		Oct. 2013	Nov. 2013	Dec. 2013	Jan. 2014	Feb. 2014	Mar 2014	Apr. 2014	May. 2014	Jun. 2014	Jul. 2014	Aug 2014	Sep. 2014	
1	Protozoa	153	150	164	145	119	101	97	74	31	44	56	126	1260
2	Rotifera	253	265	277	249	122	118	108	87	53	63	57	193	1845
3	Cladocera	123	163	179	158	135	114	95	76	57	105	116	122	1443
4	Copepoda	88	95	111	97	103	122	130	118	105	103	121	106	1299
5	Ostracoda	47	43	16	40	77	86	84	67	21	10	50	42	583
6	Total Zooplankton	664	716	747	689	556	541	514	422	267	325	400	589	6430

TABLE II. SEASON WISE POPULATION DENSITY (NO/LIT) OF DIFFERENT ZOOPLANKTON GROUPS (OCT. 2013 TO SEP. 2014) IN TEMAR RIVER, JABALPUR

Sr. No	Zooplankton Groups	Winter Season (Oct. 2013 to Jan. 2014)	Summer Season (Feb. 2014 to May. 2014)	Monsoon Season (Jun. 2014 to Sep. 2014)	Annual Total Zooplankton
1	Protozoa	612	391	257	1260
2	Rotifera	1044	435	366	1845
3	Cladocera	623	420	400	1443
4	Copepoda	391	473	435	1299
5	Ostracoda	146	314	123	583
6	Total Zooplankton	2816	2033	1581	6430

IV. RESULT & DISCUSSION

In the present study, total 34 species of zooplanktons were recorded. 6 species of Protozoa were found as follows; *Amoeba* species, *Arcella* species, *Colpidium* species, *Diffflugia* species, *Paramecium* species, *Vorticella* species. Belonging to Rotifera 11 species *Asplanchna* species, *Brachionus* species, *Filinia longiseta*, *Keratella cochlearis*, *Keratella tropica*, *Monostyla* species, *Notholca* species, *Platylas patulus*, *Polyartha vulgaris*, *Tricocerca* species, *Trichotria* species were recorded. 9 species of Cladocera were recorded as *Bosmina* species, *Ceriodaphnia* species, *Daphnia* species, *Diaphanosoma* species, *Macrothrix* species, *Monia micrura*, *Simocephalus* species, *Alona* species, *Alonella* species. 6 species of Copepods were recorded as *Cyclops* species, *Diaptomus* species, *Macrosyclops* species, *Mesocyclops* species, *Nauplius* larvae, *Eucyclops* species. Belonging to Ostracods 2 species *Cypris* species and *Stenocypris* species were recorded. The monthly and seasonal variations of zooplankton are illustrated in Table – I and II, respectively. Species richness was high in the winter season and it was minimum during monsoon season.

Protozoa: As components of the micro and macro fauna protozoa are an important food source for micro invertebrates. Thus, the ecological role of protozoa in the transfer of bacterial and algal production to successive trophic levels is important. As predators, they prey upon unicellular or filamentous algae, bacteria and micro fungi. Protozoa are both herbivores and consumers in the decomposer link of the food chain. They also control bacteria populations and biomass to some extent [17]. All the 6 species had been reported from the river Temar where density was maximum in winter, i.e. 164/lit in December, while it was minimum in monsoon, i.e. 31/lit in June.

Rotifers: The rotifers are being considered as the most important soft bodied invertebrates [18]. They play a significant role in aquatic food chain and thereby constitute an important food item to fishes. Taxonomic dominance of rotifers was reported in several water bodies. This pattern is common in tropical and sub tropical freshwater, whether in lakes, ponds, reservoirs, rivers or streams [19] and [20]. In the present study population density of rotifers was maximum in winter, 277/lit in December and minimum in monsoon, 53/lit in June [21].

Cladocera: They are popularly called as "water flea" prefers to live in deep water and constitute a major item of food for fish. Thus they hold key role in food chain and energy transformation [22]. During the present study 9 species out of 110 species recorded in India [23], were recorded. The Cladoceran population showed minimum in monsoon, i.e. in June 57/lit and maximum in winter, i.e. in December 179/lit. The maximum population of cladoceran in summer and winter may be due to favourable temperature and availability of food, while in monsoon the factors like temperature, turbidity, and transparency play an important role in controlling the diversity and density of cladocera [24].

Copepods: Freshwater copepods occur in all types of water bodies. They serve as food to several fishes and play a major role in ecological pyramids. During the present investigation, copepods were found to be maximum during summer, i.e. 130/lit in April and minimum during winter, 88/lit in October. Similar trend was observed in Renuka lake, Himachal Pradesh [25].

Ostracods: They are bivalve and have shape like small seeds. They occur in all kinds of freshwater and marine environments. The abundance of these provides a good food for aquatic organisms. In the present investigation, 2 species of ostracods were recorded. Maximum ostracods population was recorded in summer, 86/lit in March month while minimum in monsoon, i.e. 10/lit in July. Similar observations were also made in Fort lake of Belgaum, Karnataka [26].

V. CONCLUSION

The zooplankton analysis showed that, the annual total zooplankton density is 6430/lit. (Table-I & II). The season wise total Zooplankton density was high in winter season (2816/lit) due to low temperature, favourable for phytoplanktonic growth as an abundance of food and low in monsoon season (1581/lit) given in Table – II. The Rotifera group is dominant (1845/lit) followed by Cladocera (1443/lit) and Copipoda (1299/lit). The month wise highest total Zooplankton population density were recorded in November (716/lit) and December (747/lit). Lowest total Zooplankton population density were recorded in July (325/lit) and June (267/lit) given in Table-I. Zooplankton is the intermediate link between phytoplankton and fish, which are the secondary producers in the aquatic environment. Zooplanktons are good indicators of changes in water quality, because they are strongly affected by environmental conditions and responds quickly to change in environmental quality. Hence, qualitative and quantitative study of zooplanktons is of great importance.

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