

Studies on Zooplankton Diversity of River Chandrabhaga, Dhape wada, Dist. Nagpur, Maharashtra

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Abstract:

Water is vital to man's existence. Early human civilizations centred on springs and streams. Many civilizations that flourished after developing reliable water supply collapsed when the supply was exhausted or its quality deteriorated. The aquatic ecosystem covers a vast area and the organisms occurring in this area are under the influence of its physico-chemical properties. 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. 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. The present paper deals with study of monthly variations in the zooplankton population during January 2013 to December 2013. The diversity and population dynamics of zooplankton is under the control of numerous physico-chemical factors, pollution influence, etc. A study revealed that 32 species of zooplanktons belonging to five major groups were observed. Highest zooplankton populations were recorded in November and December.

Keywords: Diversity, Environment, Chandrabhaga, Physico-chemical properties, Zooplankton.

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 Chandrabhaga through different months and season during the period January 2013 to December 2013 in order to assess the species composition, population density and seasonal fluctuation of this faunal group.

Material and Methods:

Chandrabhagariver is in the vicinity of Dhape wada town, located at 21.3858225° North latitude and 78.9201478° East longitude, in Nagpur district of Maharashtra state. For the study of zooplanktons, samples were collected on monthly basis for a period of one year from January 2013 to December 2013. For qualitative and quantitative studies of zooplankton 100 lts. 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 following are the specific volumes 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.

Observations:

As shown in Table 1 For Month wise population density (no./lit) of different zooplankton groups. (Jan.2013 to Dec. 2013).



Results and Discussion:

In the present study, total 32 species of zooplanktons were recorded. 4 species of Protozoa were found as follows; Urocentrum, Vorticella, Coleps and Sarcodina. Belonging to Rotifera 10 species Asplanchna, Brachionusdurgae, B. angularis, B. bidentata, B. falcatus, B. pallas, Filiniabory, F. longiseta, Monostyla spp. and Keratellavulga were recorded. 6 species of Copepods were recorded as Cyclops sternuus, C. viridis, Diaptomusedax, D. minutes, Heliodiaptomusviduus, Mesocyclopsleuckarti. Belonging to Ostracods 5 species Cycloocyprisglobosa, Cyprissubglobosa and Stenocyprisfontinalis and Cypris spp. were recorded. 7 species belonging to Cladocerans were recorded as Alonaintermedia, A. pulchella, Ceriodaphniacomuta, Moniamicrura, M. brachiata, Macrothrixrosea and Moina daphnia. The monthly variations of zooplankton are illustrated in Table 1. Species richness was high in the winter season and it was minimum during monsoon.

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.

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 4 species had been reported from the river Kolar where density was maximum in winter, i.e. 185/lit in December, while it was minimum in monsoon, i.e. 29/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, 288/lit in December and minimum in monsoon, 48/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 7 species out of 110 species recorded in India [23], were recorded. The Cladoceran population showed minimum in monsoon, i.e. in June 56/lit and maximum in winter, i.e. in December 178/lit. The maximum population of cladocera 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. 135 in April and minimum during winter, 80/lit in October. Similar trend was observed in Renukalake, 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 5 species of ostracods were recorded. Maximum ostracods population was recorded in summer, 92/lit in March month while minimum in monsoon, i.e. 16/lit in July. Similar observations were also made in Fort lake of Belgaum, Kamataka [26].



Table 1- Month-wise population density(no./lit) of different zooplankton groups (January to December 2013).

Zooplankton Component	Monsoon Season				Winter Season			Summer Season					Total
	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	
Protozoa	29	45	57	127	154	151	185	146	120	102	98	75	1289
Rotifera	48	64	58	194	254	266	288	250	123	119	109	88	1873
Cladocera	56	106	117	123	124	164	178	114	106	106	67	56	1317
Copepoda	106	104	122	107	80	96	112	98	104	123	135	119	1306
Ostracoda	22	16	51	43	48	44	17	41	78	92	85	68	605
Total Zooplankton	244	366	405	594	677	721	780	619	531	542	494	406	6390

Conclusion:

The zooplankton analysis showed that, the total zooplankton density was more in winter season due to low temperature, favourable for phytoplanktonic growth as an abundance of food.

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