

Study of Zooplankton Population Density of Pardi Lake Gadchiroli, MS, India

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Abstract

Zooplankton are diverse groups in nature and they are found in almost all water bodies. The present investigation work was carried out on the zooplankton population density of Pardi lake, Gadchiroli (M.S.) during Feb.2016- Jan.2018. Water quality parameters were analyzed by using standard methods of APHA, whereas zooplankton were collected through plankton net of standard bolting silk cloth no. 25 (mesh size -0.003-0.004 m), and the total number was counted by using the drop count method. Pardi lake, Gadchiroli is situated in the area between a longitude 20°09'45" N and latitude 79°55'39" E. It is 9 km. away from District Gadchiroli headquarter. Observed Zooplankton consisted 26 genera which divided into 04 major groups, viz, Rotifera (11) > Cladocera (07) > Copepoda (05) > Ostracoda (03) and (42.30%) Rotifera, (26.92%) Cladocera, (19.23%) Copepoda and (11.53%) Ostracoda respectively. Rotifer is a dominant group in present investigation which indicates the mesoeutrophic nature of the lake. Zooplankton analysis revealed seasonal variations with high numbers in summer and fall during winter and monsoon. Rainwater is main source to the lake but it is perennial lake. Lake water was mainly used for domestic, fishing and agricultural purpose. Zooplankton population density is recorded in an appreciable number, rotifer is dominant among the group of zooplankton hence there is hope for its utilization for pisciculture, prawn, crab, and pearl culture if it is properly managed.

Keywords: Zooplankton, rotifer diversity, Pardi lake, Gadchiroli.

1. Introduction

Physicochemical parameters are the limiting factors for the survival of aquatic organisms (flora and fauna) as they provide a way to understand the changes in the abundance and distribution of flora and fauna along with time. Biochemically, a diverse group i.e. Zooplankton are of heterotrophic in nature, planktonic organism ranging (20-200 microns) in size from microscopic organisms to large creatures. Zooplankton are a good indicator of the quality of water and consume phytoplankton, restore nutrients through their metabolism, and transfer their energy to the next higher trophic levels [1-3]. Zooplankton is important link in the transfer of energy from producers to consumers [4Error! Reference source not found.]. These are the primary natural food sources for fish, as many of them eat bacteria and algae, which in turn eat a variety of invertebrates, fish, and birds [5-6]. Studies of zooplankton in a waterbody, both qualitative and quantitative, are crucial for managing effective aquaculture operations [2,7,8]. The main aim of the present study to investigate the zooplankton diversity and their seasonal variations in relation to selected water quality parameters to analyze the studied water body.

Zooplankton population in water body regulated by physico-chemical variables. Zooplankton are divided into four major groups viz. Rotifers, Copepods, Cladocerans and Ostracoda. Zooplankton which are act as bio-indicators of water pollution. Zooplankton are microscopic water organism that are crucial components of the food chain and the connection between primary producers and high tropical levels. Many secondary consumers, including commercially significant groups of many crab and fish species, ingest various zooplankton species. Fish are said to be a great source of food

and nourishment, and today, fish is a significant and popular food for people. Fish also produce byproducts like fish oil, which has significant nutritional value as a dietary supplement.

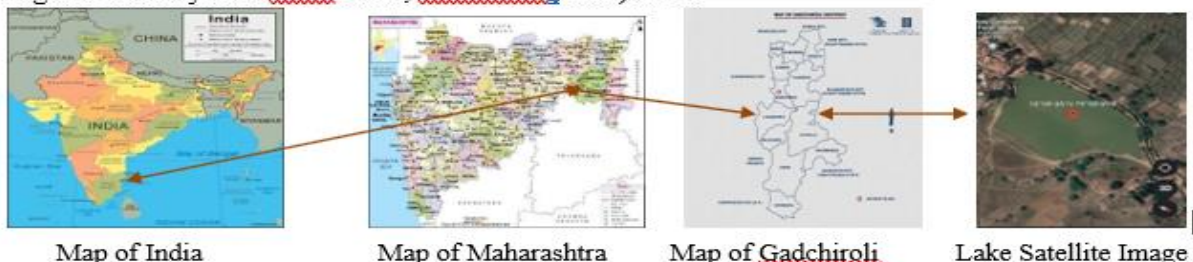
The study of zooplankton has been an interesting subject for a long time. In the last two decades much attention has been paid in tropical countries toward the study of biology, ecology and toxicology of zooplankton because of their importance in various emerging concepts in environmental management. Aquatic animals are an essential for the conservation of diversity so it is required to keep notify knowledge of every aquatic bio-diversity. In present days, because of pollution and human activities the lake biodiversity is found in danger. Various researchers like [9-12] carried out effort to study the diversity of zooplanktons. Zooplankton species played a very important role in the functioning of freshwater system when presence and dominance of. Therefore, present study work was supported out on Zooplankton diversity of Pardi lake, Gadchiroli District of Maharashtra, India during february 2016- January 2018 with following aims and objectives to study rotifer diversity of Pardi lake, Gadchiroli.

2. Materials and Method

Study area:

Pardi lake Gadchiroli located in between longitude 20°09'45" N and latitude 79°55'39" E. It is about 9 km from the District Gadchiroli headquarter. For the present study water samples were collected from the four sampling site of lake at monthly interval mostly during morning hours (8:00 am to 9:00 am) for a period of two year (February 2016 to January 2018).

Fig no. 1. Study area Pardi Lake, Gadchiroli(M.S.) India



Data Collection:

Field sampling was conducted monthly from February 2016 to January 2018 for 24 months. Data were taken on monthly basis and interpreted seasonally, like summer (Feb to May), Monsoon (June to September) and winter (Oct to January). 200 litres of water samples were passed through a plankton net for collection of planktons. (35 µm mesh size) of bolting silk cloth (mesh size 0.003 to 0.004 micron) [13,14] through a Wisconsin conical plankton Samples were transferred into 120 ml screw cap plastic container, then fixed in Lugol's solution and kept in cool and dark place and preserved with 4% formalin and adding glycerin before transported to the laboratory without disturbances following standard methods of Battish [15]. A little amount of detergent powder was also added to prevent the mass of zooplankton. Three sample replicates were collected for each site to increase accuracy of the result. Sampling site 4 dried out during the sampling occasion so it presents fewer samples compared to the other sites. All of the data has been compiled into Microsoft Excel spreadsheet based on sampling sites and sampling months.

Zooplankton sampling:

For qualitative and quantitative study in respects to zooplankton diversity, tested in a Sedgwick-Rafter tally chamber and viewed below a light microscope at the necessary magnification (first 10X, then 40X) and samples known according to the normal literature of [13-18]. Separately planktonic repeat recognized under the microscope with its standard identification up to

generic level and its books as well as explanations which were suggested by [20-23] systematic key by Edmondson [16], Dhanpathi [24].

Results and Discussion

In the present investigation included of Rotifera (11 genera), Cladocera (07 genera), Copepoda (05 genera) and Ostracoda (03genera) where Rotifera is the most dominating group contributing (42.30%) Rotifera, (26.92%) Cladocera, (19.23%) Copepoda and (11.53%) Ostracoda to the total Zooplankton. Zooplankton analysis revealed seasonal variations with high numbers in summer and fall during winter and monsoon. Rainwater is main source to the lake but it is perennial lake. Zooplankton population density is recorded in an appreciable number, rotifer is dominant among the group of zooplankton hence there is hope for its utilization for Pisciculture, Prawn culture, crab culture, and pearl culture if it is properly managed. During the favorable condition diversity of zooplankton showed their richness. Rotifer (11) species, Cladocera (07sp), Copepods (05sp) and Ostracod (03sp.) observed zooplankton species which is depicted in table no. (1). A similar observation was made by many researchers across the country [25-26] also reported 26 zooplankton species from Cachari okbow lake, Assam; [27] considered zooplankton range in shallow Lake Gurgaon, Haryana. This is in conformity with results of [1,11, 18, 19, 25, 27-31].

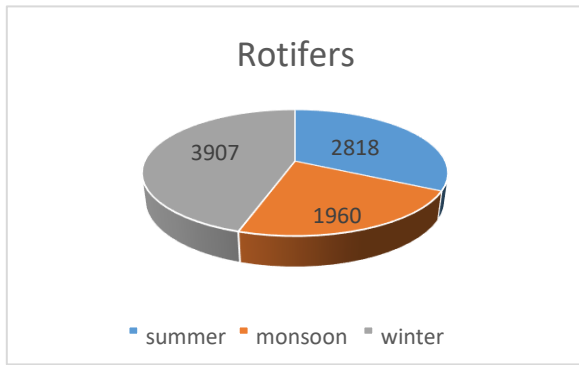
Table 1: showing zooplankton population density (org/10lit.) of Pardi lake, Gadchiroli (MS)

Sr.No.	Zooplankton population density (org/10lit.)	Population Density
A.	Rotifera	
1	<i>Lecane luna</i> (Müller, 1776),	457
2	<i>Keratella quadrata quadrata</i> Müller, 1786,	385
3	<i>Monostyla sp.</i>	345
4	<i>Keratella valga</i> (Ehrenberg, 1834),	120
5	<i>Keratella tropica</i> (Apstein, 1907),	98
6	<i>Brachionus rubens</i> (Ehrenberg, 1838),	267
7	<i>Asplanchna brightwelli</i> (Gosse, 1850),	25
8	<i>Brachionus calyciflorus</i> (Pallas, 1766),	102

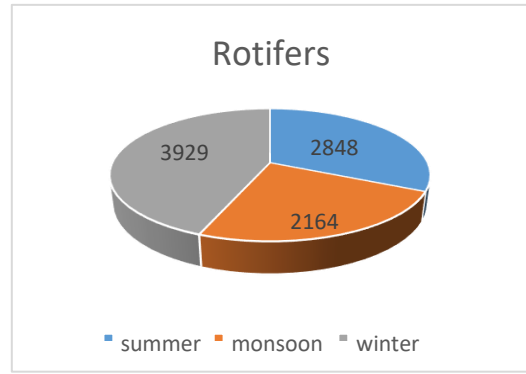
9	<i>Filinia longiseta</i> (Ehrenberg, 1834),	128
10	<i>Brachionus falcatus</i> (Zacharias, 1898),	80
11	<i>Brachionus diversicornis diversicornis</i> (Daday, 1883),	95
B. Cladocera (07sp)-		
1	<i>Moina brachiata</i> (Jurine, 1820),	190
2	<i>Daphnia</i> (<i>Ctenodaphnia</i>) <i>carinata</i> (King, 1853),	171
3	<i>Ceriodaphnia cornuta</i> (G.O. Sars, 1885),	153
4	<i>Diaphanosoma sarsi</i> Richard 1894.,	138
5	<i>Simocephalus vetulus</i> (O.F. Müller, 1776),	46
6	<i>Bosmina</i> (<i>Bosmina</i>) <i>longirostris</i> (O.F. Müller, 1785),	499
7	<i>Chydorus sphaericus</i> (O.F. Müller, 1776),	121
C. Copepods (05sp). -		
1	<i>Nauplius</i> ,	270
2	<i>Tropocyclops prasinus</i> (Fischer, 1860),	90
3	<i>Mesocyclops</i> (Sars G.O., 1914),	192
4	<i>Diaptomus</i> sp.	425
5	<i>Leptodiaptomus minutus</i> (Lilljeborg in Guerne & Richard, 1889),	280
D. Ostracod (03sp).-		
1	<i>Eucypris bispinosa</i> (Victor & Michael, 1975);	205
2	<i>Cypris protubera</i> (Victor & Fernando, 1978)	67
3	<i>Stenocypris</i> sp	244

Table2: Showing data of Zoolplankton population density (org/10lit.) of Pardi Lake, Gadchiroli of Maharashtra state, India during investigation year (February 2016- January 2018)

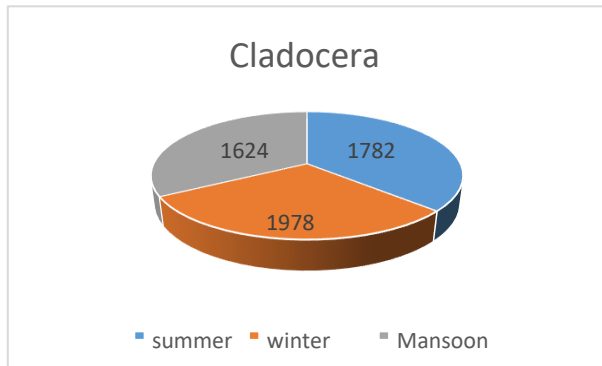
Site	Year	Group	Seasons				Seasonal Abundance		
			Winter	Summer	Monsoon	Total	Winter	Summer	Monsoon
A,B,C and D	2016- 2017	Rotifers	2818	3907	1960	8685	+++	+++++	+
		Cladocera	1978	1782	1624	5384	+++++	+++	+
		Copepoda	1659	1720	1632	5011	+++	+++++	+
		Ostracoda	1180	421	791	2392	+++++	+	+++
		Total	7635	7830	6007	21472	+++	+++++	+
	2017- 2018	Rotifers	2848	3929	2164	8941	+++	+++++	+
		Cladocera	1970	1818	1713	5501	+++++	+++	+
		Copepoda	1709	1803	1496	5008	+++	+++++	+
		Ostracoda	971	452	828	2251	+++++	+	+++
		Total	7498	8002	6201	21701	+++	+++++	+
(Zooplankton population: Highest = +++++, Moderate = +++ & Lowest = +)									



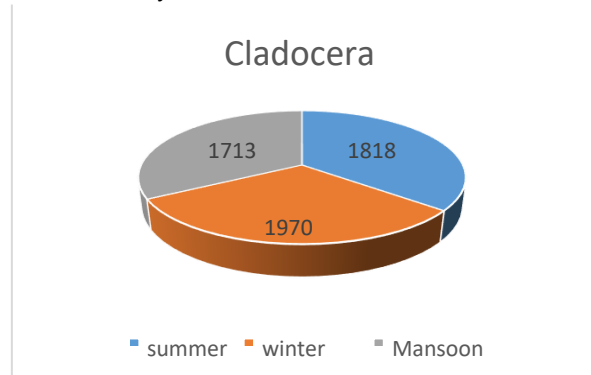
Rotifer Density of Pardi lake 2016-17



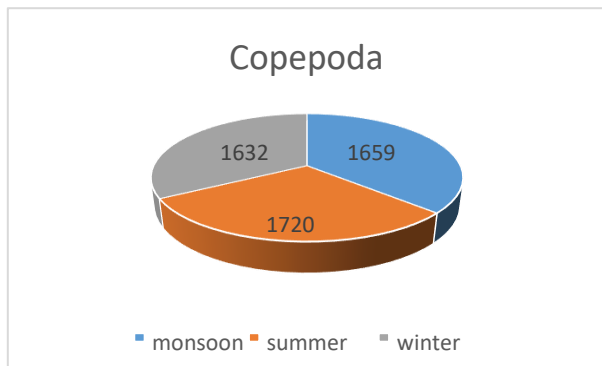
Rotifer Density of Pardi lake 2017-18



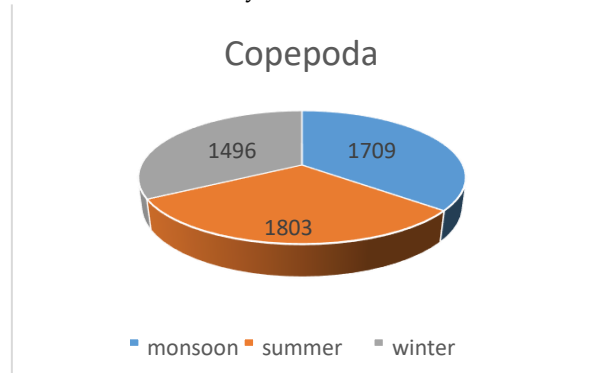
Cladocera Density of Pardi lake 2016-17



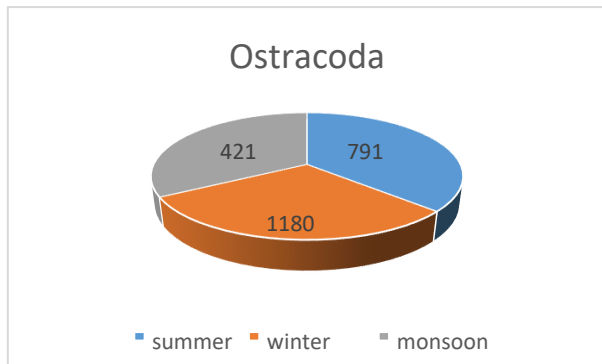
Cladocera Density of Pardi lake 2017-18



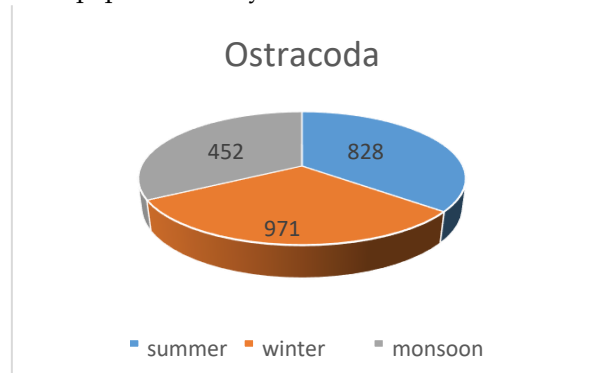
Copepoda Density of Pardi lake 2016-17



Copepoda Density of Pardi lake 2017-18



Ostracoda Density of Pardi lake 2016-17



Ostracoda Density of Pardi lake 2017-18

During present investigation we identified zooplankton consisted total 26 genera which divided into 04 major groups, viz, Rotifera (11) > Cladocera (07) > Copepoda (05) > Ostracoda (03) and (42.30%) Rotifera, (26.92%) Cladocera, (19.23%) Copepoda and (11.53%) Ostracoda respectively. Rotifer is a dominant group in present investigation which indicates the mesoeutrophic nature of the lake. Similar observation was made by many researchers by [32-37]. The functioning of any aquatic system depends to a great extent on the physico-chemical characteristics of its water [38]. The quality of water in any ecosystem provides significant information about the available resources for supporting life in that ecosystem [39-40] and it also helps in determining the health of the water body [41].

3. Conclusion

In the above investigation the Rotifers diversity are dominant on throughout the investigation period which discloses that the wetland is very much right for aquaculture. Keeping in view the importance of the investigation, zooplankton are important sources of the food of local important fishes as well as growth in production of local fishery sector. Present lake is tending toward eutrophication. So, for the conservation and maintenance of the freshwater lake steps should be taken because protection of biodiversity is important so it is required to keep inform knowledge of every aquatic species diversity.

Conflicts of interest: The author stated that no conflicts of interest.

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