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Study of seasonal biodiversity of zooplanktons from freshwater Labhansarad Dam Tahsil Warora Dist. Chandrapur (M.S.), India

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Abstract

Global freshwater ecosystem stability is under threat from a number of factors. The largest freshwater dam in Warora Tahsil is the Labhansarad dam. Because zooplanktons are sensitive to outside disturbances, they are valuable indicators of environmental stresses. Additionally, this work offers a valuable resource for managing the health of aquatic ecosystems and conserving aquatic biodiversity. Seasonal variations were seen at each of the five locations where samples were collected annually. Sample examination revealed the presence of zooplankton species, including rotifers, copepods, cladocera, and nauplius larvae.

Key words : *Ecosystem, Labhansarad dam, Zooplanktons.*

Zooplanktons are useful ecological indicators and are occasionally ingested in greater numbers. Understanding and improving the functioning of aquatic ecosystems requires knowledge of zooplankton abundance, distribution, and community composition. Phytoplankton and other zooplankton make up the zooplankton community. They offer a direct conduit between upper tropic levels, such fish, and primary producers. During their larval stages, almost all fish rely on zooplankton as their primary food source, and some fish use it for the entirety of their lives[1]. The diversity index is a metric that is frequently used to quantify the average level of uncertainty surrounding the appearance of a specific species and to indicate how the environmental state should be interpreted. Shannon-Weiner diversity indices were therefore included in the current

investigation. The diversity index (H) of Shannon-Wiener ranges from 0 to 5. In addition to providing information on the total number of species (*i.e.*, accounting for the rarity of some species and the commonality of others), this index is a useful tool that helps scientists measure variety within a community and characterise its numerical structure.

Numerous species, widely dispersed in sizable populations, are found in the most stable communities. A few dominant species are frequently favoured by pollution, which decreases variety. Thus, diversity plays a role in effective conservation management. Therefore, using diversity indices is crucial for quantifying zooplankton diversity. Diversity indices are significant statistical tools that are used to characterise the richness of the species in the community[2]. The assessment of the variety to estimate the diversity indices of zooplankton (rotifera, copepoda, cladocera, and nauplius) from the freshwater Labhansarad Dam can therefore provide insight into the ecological quality of aquatic environments.

The current investigation was conducted from December 2016 to November 2017. The winter, summer, and monsoon seasons were the three main research periods. The process of gathering zooplankton samples at random involved passing 100 lit. of water over a plankton net composed of bolting silk. The zooplankton samples were preserved using a suitable glass container and 4% formalin. Using an Olympus inverted stereoscopic microscope (MLX-B), a thorough observation and investigation of the zooplanktons was conducted. Using counting cell of the Sedgwick Rafter plankton method[2], zooplankton was quantitatively analysed. Zooplankton was identified using the standard literature key[3,4].

The Shannon-Weaver diversity index is a valid and practical metric for assessing the seasonal variations in zooplankton and water quality in aquatic environments[8]. The proportion of each species and species richness are taken into consideration in this measurement. When comparing the diversity of habitat samples, the Shannon Index is employed. While the Shannon Weaver Index (H) has no inherent meaning, it can be a useful tool for comparing two distinct habitats (or communities) or one community at different dates in order to assess changes over time[7].

SDI (Shannon Diversity index) (H)

$= - \Sigma (ni/n) \log (ni /n)$

Where, ni = Total no. of individuals of each group.

n = Total no. of individuals of all the group

The four most significant zooplankton groups identified in the current study are copepoda, rotifera, cladocera, and nauplius larvae. The maximum diversity of rotifera, copepod, and cladocera was observed during the season of winter, followed by season of summer and season monsoon at all stations A, B, C, and D, respectively, but slight exception at station E (given in table-1-5 and figure 1-5). The highest number ever registered at Station E in the summer. The largest diversity of nauplius larvae was recorded during the season of summer, moderately in the monsoon season and the lowest during the winter. Similar results were obtained from Bhiwapur Lake[8]. Throughout the study period, all stations Shannon-Wiener diversity index values (1.131

Table-1. Seasonal biodiversity of zooplankton in Labhansarad Dam at Station- A during 2016-17

Sr. No.	Name of the group/species	Summer	Monsoon	Winter	Annual
1	Rotifera	34.75	18.5	41.5	31.6
2	Cladocera	15.75	9.75	24.5	16.7
3	Copepoda	9.5	8.75	17	11.8
4	Nauplis larvae	4.25	3.25	7.5	5.00
	Total	64.25	40.25	90.5	65
	H index	**1.139**	**1.236**	**1.232**	**1.206**

Table-2. Seasonal biodiversity of zooplankton in Labhansarad Dam at Station- B during 2016-17.

Sr. No.	Name of the group/species	Summer	Monsoon	Winter	Annual
1	Rotifera	45.25	32.25	57.75	45.1
2	Cladocera	21.25	15.5	28.25	21.7
3	Copepoda	15	13	22.25	16.8
4	Nauplis larvae	6.5	5.25	11.25	7.67
	Total	88	66	119.5	91.167
	H index	**1.179**	**1.212**	**1.228**	**1.209**

Table-3. Seasonal biodiversity of zooplankton in Labhansarad Dam at Station- C during 2016-17.

Sr. No.	Name of the group/species	Summer	Monsoon	Winter	Annual
1	Rotifera	35	20.25	43.75	33.0
2	Cladocera	14.25	9.75	25	16.3
3	Copepoda	10.5	9	18.25	12.6
4	Nauplis larvae	4	3.5	8	5.17
	Total	63.75	42.5	95	67.083
	H index	**1.135**	**1.225**	**1.234**	**1.204**

Table-4. Seasonal biodiversity of zooplankton in Labhansarad Dam at Station- D during 2016-17.

Sr. No.	Name of the group/species	Summer	Monsoon	Winter	Annual
1	Rotifera	34.75	18.5	41.5	31.6
2	Cladocera	14	9	21	14.7
3	Copepoda	9	8.5	23.5	13.7
4	Nauplis larvae	4.5	3.5	8.75	5.58
	Total	62.25	39.5	94.75	65.5
	H index	**1.131**	**1.238**	**1.261**	**1.224**

Table-5. Seasonal biodiversity of zooplankton in Labhansarad Dam at Station- E during 2016-17.

Sr. No.	Name of the group/species	Summer	Monsoon	Winter	Annual
1	Rotifera	23.5	15.5	15.5	26.67
2	Cladocera	10.5	6.5	6.5	11.17
3	Copepoda	8	6.5	6.5	9.83
4	Nauplis larvae	3.75	2.75	2.75	4.42
	Total	45.75	31.25	31.25	52.083
	H index	**1.19**	**1.146**	**1.147**	**1.134**

Table-6. Matrix showing physio-chemical parameters (Pearson's Correlation of Co-efficient) of Labhansarad Dam, during Feb 2016-Jan 2017.

Sr. No.	Name of the group/species	Rotifera	Cladocera	Copepoda	Nauplis larvae
1	Rotifera	1			
2	Cladocera	0.95	1		
3	Copepoda	0.94	0.89	1	
4	Nauplis larvae	0.97	0.89	0.97	1

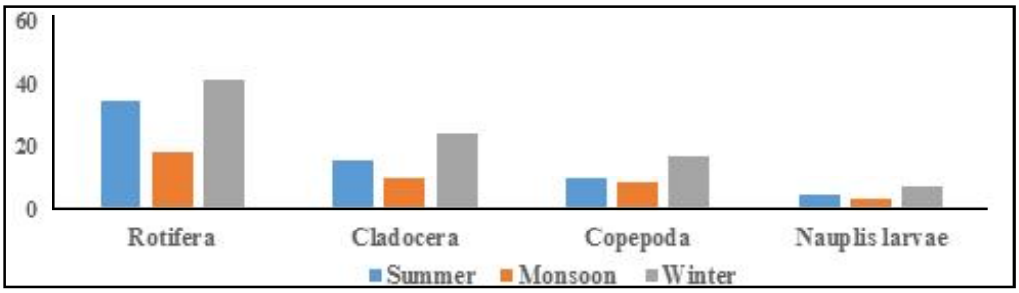

Fig. 1: Graph Showing Seasonal diversity of Zooplankton from Labhansarad Dam, Station-A during Feb 2016-Jan 2017

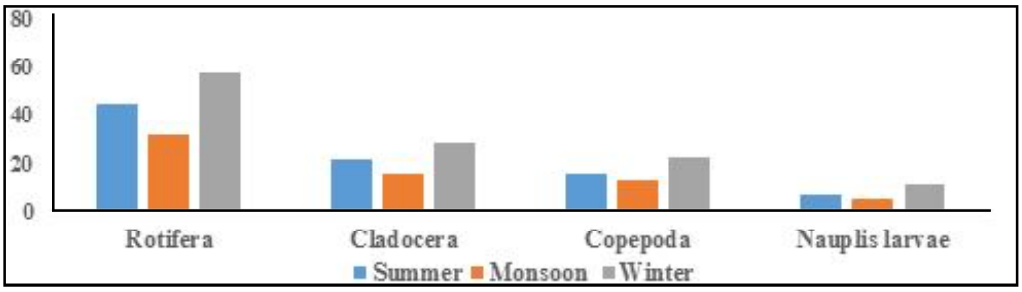

Fig. 2: Graph Showing Seasonal diversity of Zooplankton from Labhansarad Dam, Station-B during Feb 2016-Jan 2017

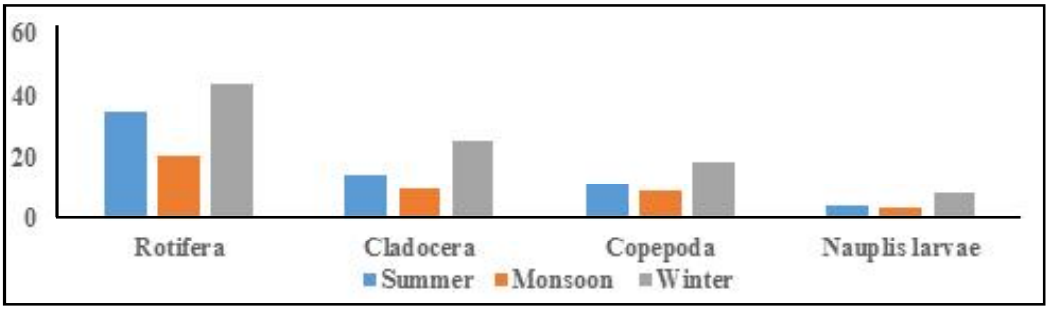

Fig. 3: Graph Showing Seasonal diversity of Zooplankton from Labhansarad Dam, Station-C during Feb 2016-Jan 2017

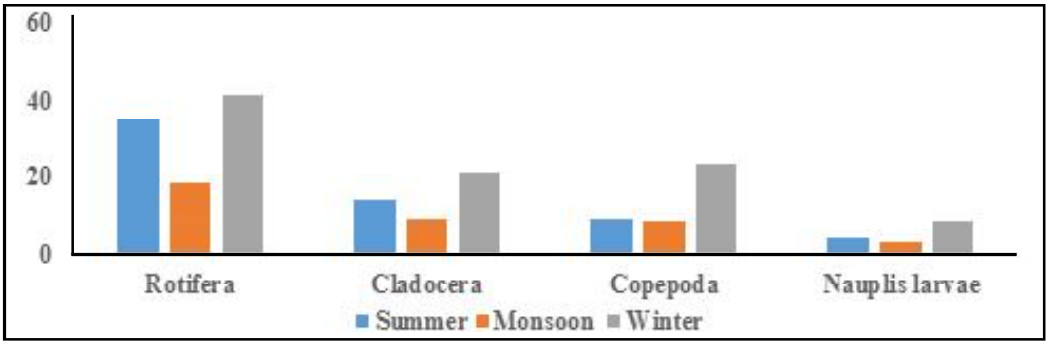

Fig. 4: Graph Showing Seasonal diversity of Zooplankton from Labhansarad Dam, Station-D during Feb 2016-Jan 2017

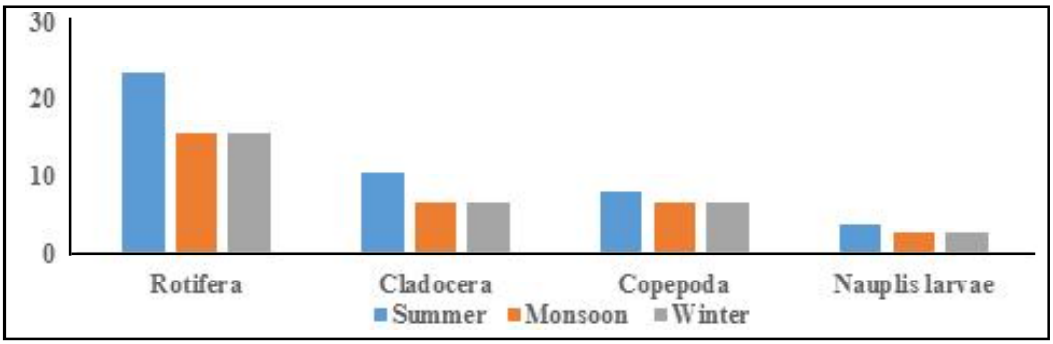

Fig. 5: Graph Showing Seasonal diversity of Zooplankton from Labhansarad Dam, Station-E during Feb 2016-Jan 2017

to 1.261) for the log-transformed means of zooplankton species density in the study area were comparable. Strong positive correlation between all the zooplankton groups mentioned during study.

Conclusion of the study from an ecological and environmental point of view, this activity is crucial. Present investigation proposed that the population mass of rotifers, copepods and cladocerans was highest in the winter and lowest in the summer. Nauplius and copepods are year-round residents. For fish, they are a good source of food. Good fish output should therefore follow from Labhansarad Dam.

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