## UTTAR PRADESH JOURNAL OF ZOOLOGY

43(17): 12-19, 2022 ISSN: 0256-971X (P)



# ASSESSMENT OF ZOOPLANKTON DIVERSITY OF NEW CONSTRUCTED RESERVOIR BISNOOR PACHDHAR RESERVOIR IN DISTRICT, BETUL, MP

### BARSKAR KALPANA <sup>a</sup> AND JAWALKAR MANGLESH KUMAR <sup>a\*</sup>

<sup>a</sup> School of Life Sciences, Madhyanchal Professional University, Bhopal, India.

### **AUTHORS' CONTRIBUTIONS**

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: 10.56557/UPJOZ/2022/v43i173150

<u>Editor(s):</u>

Luis Enrique Ibarra Morales, University of Sonora, Mexico.

<u>Reviewers:</u>

Sivalingam Pothula, Osmania University, India.

Vibhuti Raval, Saurashtra University, India.

Received: 03 July 2022 Accepted: 06 September 2022 Published: 12 September 2022

**Original Research Article** 

### ABSTRACT

The status of healthiness of any freshwater ecosystem is basically depends on the diversity and density of zooplankton inhabiting the freshwater resources. Zooplanktons are considered as fundamental source for primary consumer in any aquatic environment. Which influence greatest scope in decisive the total productivity of freshwater body. The present study is attempted to the qualitative and quantitative distribution of zooplankton in different sites of Bisnoor Pachdhar reservoir. The study was carried out seasonally from July 2020 to June 2021. The whole assessment was divided into four major seasons *viz* monsoon, post monsoon, winter and summer. The compilation of the zooplankton samples and their qualitative and quantitative was through followed the standard procedures of limnological analysis. During the study period sequence of dominant groups Rotifera > Copepoda > Protozoa > Cladocera > Ostracoda was observed at dam site and mid site of all season. On another hand at tail end site major dominant group was Copepoda > Protozoa > Cladocera > Rotifera > Ostracoda noted during monsoon, post monsoon and winter and during summer the order of dominant group Copepoda > Rotifera > Protozoa > Ostracoda > Cladocera was recorded in Bisnoor Pachdhar reservoir.

Keywords: Bisnoor Pachdhar; zooplankton; percentage contribution; seasonal; new constructed reservoir.

### **1. INTRODUCTION**

The study on zooplanktons have been a interesting area under discussion for few decades greatly

perceive to tropical area towards the study of ecological distribution, diversity and density of zooplankton caused by their imperative character in the quickly emerging concepts in aquatic environment

\*Corresponding author: Email: manglesh77@gmail.com, drmangleshkumar@gmail.com;

and bio-monitoring [1]. Zooplankton is a significant part in freshwater, whose major utility is to perform an ecological association in food chain of any water body. The productivity of the any freshwater ecosystem is directly related with the diversity because it continue ecosystem healthy for the reason that each species plays a particular role to allow ecosystem functional a healthy approach [2]. Rotifera, copepoda, cladocera, copepod and ostracoda are regularly the main groups of zooplankton in reservoirs as they have relatively short existence, lasting from few weeks or months, marked alternation in the densities are apparent in short phase of time [3]. Zooplanktons are characterised by underdeveloped life cycles and hasty adaptation to ecological transforms. They are responsive indicators of environmental reactions to diverse interruption related to manmade and natural activity in aquatic environment [4,5]. The origin of manmade reservoirs, sets of abiotic factors, current use and status of water reservoirs, in turn, influence species composition and hydrobiological density while reservoirs serve technological purposes and there are large-amplitude variations in ecological parameters, it is difficult to achieve biological stabilization (Von Sperling and Grandcham, 2010); [5]. Long-term limnological investigations for the most part on physico-chemical and zooplankton facilitate in unbeaten management of freshwater resources, but are regrettably deficiency in tropical countries [6], (Edmondson 1991), [7]. In the present study an attempt has been made to study the occurrence, distribution and species number of zooplankton from seasonally at Bisnoor Pachdhar reservoir.

### 1.1 Study Area

Bisnoor Pachdhar reservoir is one of the most important aquatic resources for irrigation and domestic use of Bhensadehi tehsil in Betul distric, Madhy Pradesh, India. . It covers an area of about 8.31 sq km. It is situated near Pachdhar village which falls under latitude  $21^{\circ}$  -42'- 00" and longitude  $87^{\circ}$ -02'-30". This water body, well known as Bisnoor Pachdhar reservoir constructed for solve the problem of drinking water and irrigation in this area. The sample was collected seasonally from three different sites 1. Dam site area 2. Mid site 3. Tail end site of the reservoir.



### Different sampling sites of Bisnoor Pachdhar reservoir in Madhya Pradesh India

#### Fig. 1.

### 2. MATERIALS AND METHODS

Seasonal zooplanktons samples were collected from three different sites of the reservoir viz dam site, mid site and tail end site. Simultaneously water samples were collected for analysing of selected physical and chemical variables. For zooplankton samples, 40liter of water filtered using 50 µm mesh size plankton net were collected from the water surface (0.5 m) in morning hours (7.00 am). A 200 ml concentrate sample was prepared and 100 ml of sieved residue was shifted to a bottle with preserved by Lugol's solution and 4% formaline for identification using standard keys (Tonapi, 1980), [8,9]. The remaining concentrate (100 ml) was used for estimation of zooplankton density [9].

### **3. RESULTS AND DISCUSSION**

In dam site of Bisnoor Pachdhar reservoir the percentage composition of zooplanktons diversity over the monsoon period, the Rotifera (35%) was the dominant group, then followed by Copepoda (25%), protozoa (21%), Cladocera (15%) and Ostracoda (4%) during monsoon respectively depicted in Fig. 1. While in the post monsoon season percentage of species were recorded, belonging to major taxonomic groups viz. Rotifera (36%), Copepoda (23%), Protozoa (20%), Ostracoda (11%) and Cladocera (10%) shown in Fig. 3. However, during the winter season the percentage of major dominance groups Rotifera (34%) followed by Copepoda (25%), Protozoa (19%), Cladocera (17%) and Ostracoda (5) respectively shown in Fig. 4. On another hand dominant group Rotifera (36%), Copepoda (28%), Protozoa (16%), Cladocera (13%) and Ostracoda (7%) depicted in Fig. 5. In mid site the percentage composition of zooplanktons diversity over the monsoon period, the Rotifera (33%) was the dominant group, then followed by Copepoda (29%), protozoa (18%), Cladocera (17%) and Ostracoda (3%) during monsoon respectively shown in Fig. 6. While in the post monsoon season percentage of species were recorded, belonging to major taxonomic groups viz. Copepoda (32%), Rotifera (29%), Protozoa (20%), Cladocera (17%) and Ostracoda (2%) shown in Fig. 7. However, during the winter season the percentage of major dominance groups Rotifera (26%) followed by Copepoda (25%), Protozoa (19%), Cladocera (16%) and Ostracoda (5%) respectively (Fig. 8). On another hand in the period of summer the dominant group Rotifera (42%), Copepoda (29%), Cladocera (9%), (11%).Protozoa and Ostracoda (9%)respectively (Fig. 9). During the monsoon season at tail end site the percentage composition of Copepoda (37%), Protozoa (23%), Cladocera (20%), Rotifera (18%) and Ostracoda (2%) correspondingly depicted in Fig 10. While in the post monsoon season percentage of species were recorded, belonging to major taxonomic groups viz. Protozoa (27%), Copepoda (26%). Rotifera (24%) and Cladocera (17%) and Ostracoda (6%) shown in Fig. 11. However, during the winter season the percentage of major dominance groups Copepoda (26%) followed by Rotifera (23%), Protozoa (21%), Ostracoda (18%) and Cladocera (12 %) respectively depicted Fig. 12. On another hand dominant group during summer Rotifera (30%), Ostracoda (24%), Copepoda (23%), Protozoa (15%), and Cladocera (8%) shown in Fig. 13. In Bisnoor Pachdhar reservoir Rotifers act in response very speedily to environmental changes than other species. In the bisnoor Pachdhar reservoir the major dominance group Rotifera belongs to Rotifera following species Brachionus calcyciflorus sp., Keratella cochlearis sp., Keratella tropica sp., Brachionus durgae sp., Brachionus Falcatus sp., Brachionus Caudatus sp., Lecane sp., Brachionus Angularis sp. followed by Cladocera Bosmina sp., Leydigia sp., Dephnia, Streblocerus sp., Diaphanosoma sp ; Protozoa belongs to Arcella sp., Coleps sp., Difflusia sp., Paramecium sp; Copepoda belongs to Nauplius Larvae, cyclops sp., Diaptomus and Ostracoda belongs SDto Cypris.species. The rotifers were dominant because of domestic, agriculture runoff from catchment area and human interference while copepods and Cladocera were less abundant. Thus, the rotifers are recognized as pollution indicator group in the aquatic environment (Marneffe, 1996), [10], (Kaur, 2018). It was recommended that the growth in diversity of plankton were sign of the healthy ecological condition on another hand indication of decrease dominance of species maybe due to organic load and environmental stress [11]. The urban sewage influences the nitrogenous compound and phosphorous load in ambient waters which resulted in increased the algal blooms, and phytoplankton composition and zooplankton, [12].





Figs. 2-5. Seasonal percentage contribution of different groups of zooplankton dam site



15



Figs. 6-9. Seasonal percentage contribution of different groups of zooplankton at mid site





Figs. 10-13. Seasonal percentage contribution of different groups of zooplankton at tail end site

**Diversity Indices:** Shannon – Weaver diversity index is an acceptable and useful parameter to determine the seasonal variation of zooplankton in freshwater body [13]. Staub et al. [14] has described Shannon diversity index (H) < 1 shows heavy pollution, H=1-2 means moderate condition of pollution, H = 2-3 light condition of pollution and 3-4.5 slight pollution. The range of Shannon diversity index value in the study area varied from 1.40 to 1.80 (Fig. 14). This indicates moderate pollution of the aquatic body of the study area during the study period.



Fig. 14. Seasonal Shaanon index of zooplankton in different sites of Bisnoor Pachdhar Reservoir

### **4. CONCLUSION**

The current investigation provide quantitative and qualitative data regarding the zooplankton diversity of reservoir and the data can be significant to help out in the fisheries management and inform environmental protection related to diversity. Shannon diversity indices have been indicated that the zooplankton was evenly distributed in all seasons and value of index indicates moderate pollution of the reservoir.

### ACKNOWLEDGEMENT

Author is thankful to Dr. G. F. Ansari Dean faculty of sciences & IT for providing all necessary facilities and encouragement during research work.

### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

### REFERENCES

- 1. Salve B, Hiware C. Zooplankton diversity of Wan reservoir, (Nagpur) (MS), India. Trends research in Science and Technology. 2010; 2(1):39-48.
- Jeelani M, Kaur H, Kumar R. Impact of climate warming on the diversity of ecosystem of Kashmir, Inda. In M. Sengupta and R Dalwani (Eds.) Proceedings of Taal. The 12th world Lake Congress. 2007;1103-1109.
- Hutchinson, GE. A treatise on limnology. 2. Introduction to lake biology and limnoplankton. John Wiley, New York; 1967.
- 4. Ferrari CR, de Azevedo H, Wisniewski MJS, Rodgher S, Roque CV, Nascimento MRL. An overview of an acidic uranium mine pit lake

(Caldas, Brazil): Composition of the zooplankton community and limnochemical aspects. Mine Water Environ. 2015;34:343–351.

- Pociecha A, Bielańska-Grajner I, Szarek-Gwiazda E, Wilk-Woźniak E, Kuciel H, Walusiak E. Rotifer diversity in the acidic pyrite mine pit lakes in the Sudety Mountains (Poland). Mine Water Environ; 2017. DOI: org/10.1007/s10230-017-0492-y
- 6. Herzig A. The analysis of planktonic rotifer populations: A plea for long-term investigations. Hydrobiologia. 1987;147:163-180.
- Van Liere L, Gulati RD. Restoration and recovery of shallow eutrophic lake ecosystems in the Netherlands. Developments in Hydrobiology (reprinted from Hydrobiologia 233). Kluwer Academic Publishers, Dordrecht; 1992.
- 8. Adoni AD, Joshi G, Ghosh K, et al. Work book on Limnology, Department of Botany, Dr. Harisingh Gour Vishwavidyalaya Sagar, India; 1985.
- APHA. Standard Methods for the Examination of Water and Wastewater. American Public Health Association, Washington, DC; 1989.
- Kamble BB, Meshram CB. A preliminary study on Zooplankton diversity at Khatijapur tank, near Achlapur, District Amravati, Maharastra. J Aqua Biol. 2005;20(2):45-47.
- Wilhm JL, Dorris TC. Biological parameters for water quality criteria. Bioscience. 1968; 18(6):477-81.
- 12. Bekliglu M, Ince O, Tuzun I. Restoration of the eutrophic lake Eymir, Turkey by biomanipulation after a major external nutrient control. Hydrobiologia. 2003;489:93-105.

- 13. Sibel Y. Analysis of zooplankton community by the Shannon-Weaver Index in Kesikkopru Dam Lake, Turkey. Tarim Bilimleri Dergisi. 2006;12(2):216–220.
- 14. Staub R, Hofstaler, Hass IJ. The effects of industrial effluents of Memphis and Shelby country on primary plankton production. Biosciences. 1970;20:905-912.

© Copyright MB International Media and Publishing House. All rights reserved.