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*Research Paper*

# STUDY OF ZOOPLANKTON DIVERSITY IN RAJURA DAM AT BULDHANA DISTRICT OF MAHARASHTRA

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**Abstract**

The present study was undertaken to study zooplankton diversity of Rajura dam. The Rajura dam is 7 km away from Jalgaon (Jamod) city, located in the area of village Rasalpur in Buldhana District of Maharashtra. The dam was completed in 1970 and its water was mainly used for drinking and agricultural purpose**.** Rajura Dam is situated in the area between longitude 19º59' and latitude 78º24'. Zooplanktons are one of the important faunas in water body which act as bio-indicators of pollution and play direct role in food chain of fishes. It is rich source of nutrients to fishes. Present investigation was carried out during the year of 2019-2020. Total 09 species of zooplankton were recorded. Among these 06 species belonging to Rotifera, 01 species belonging to Copepoda, 02 species belonging Cladocera were found. Rotifers observed were -1. *Ascomorpha saltans* (Bartsch, 1870), 2. *Brachionus calyciflourus* (Pallas, 1834), 3. *Brachionus bidentata* (Jokubsky, 1912), 4. *Lecane leontina* (Turner, 1892), 5. *Trichotria tetractis* (Ehrenberg, 1830) and 6.*Trichocerca pusilla* (Jennings, 1903). Species of Copepoda observed was 1. *Moina micrura* (Kurz, 1874) and that belonging to Cladocera were -1. *Ceriodaphnia quadrangular* (Müller, 1785) and 2.*Diaphanosoma birgei* (Korineck 1981). Species belonging to Rotifera are dominant among zooplankton which indicates the polluted nature of the lake water.

Key words: Rotifera, Copepoda, Cladocera, Diversity, Zooplankton and Rajura.

## INTRODUCTION

Zooplankton is the important component of aquatic fauna which serves as a major component of aquatic food chain. It also maintains proper equilibrium between biotic and abiotic components of the aquatic ecosystem**.** The freshwater zooplankton is comprised of three major groups of invertebrate animals: Rotifers, Copepods and Cladocerans occurring abundantly in all types of aquatic habitats and plays a vital role in energy transfer in an aquatic ecosystem and act as bio-indicators of pollution. It occupies an intermediate position in food web many of them feed upon bacteria and algae and in turn fed by numerous invertebrates, fishes and birds.

Zooplankton diversity and their ecology greatly contribute to as understanding of the basic nature and general economy of aquatic habitats. Physico-chemical factors also regulate zooplankton population in water body. Various researchers carried out work to study the zooplanktons of different fresh water bodies. Jayabhaye (2010), studied zooplankton diversity of river Kayadhu, near Hingoli city Maharashtra. Tayade and Dabhade (2011) studied the rotifer community around Washim region and prepared a checklist of Rotifers in Washim region. Study of qualitative diversity of rotifer community of freshwater Katepurna reservoir, district Akola, Maharashtra, (India ) was carried out by Pawar and Dabhade (2016).

Zooplankton diversity reflects the water quality and they are the good indicators of changes taking place in the water resources. Kabra *et.al.* (2016), carried out a research work to analyze zooplanktons of Fresh water ecosystem in Washim town, Maharashatra, India. The Biodiversity of aquatic life conservation is an important task because day to day pollution is increasing and their direct effect is on aquatic life. In present days, the biodiversity is in danger due to pollution and human activities. Conservation of biodiversity is essential so it is compulsory to keep update knowledge of every aquatic species diversity. The density of planktons in water body determines stocking rate of fishes because they are the chief sources of the food of commercially important fishes as well as development in production of inland fishery sector. The presence and dominance of zooplankton species played a very significant role in the functioning of freshwater ecosystem.

Therefore, present investigation was undertaken to study zooplankton diversity of Rajura dam freshwater body in Buldhana District of Maharashtra, India with following aims and objectives-

1) Collection and preservation of Zooplankton from Rajura dam freshwater body.

2) Identification of Zooplankton by using standard methodology .

3) Study of diversity of zooplankton in Rajura dam water body.

## MATERIALS AND METHODS

In present investigation water samples were collected from Rajura dam water body in July 2019 to June 2020**.** The water was collected directly from each selected sampling station of Rajura Dam. The samples were transferred to the bottle and brought to the laboratory without disturbances. The water samples were collected by monthly intervals from the sampling stations for a period of one year. The samples were collected during morning hours with the help of net of mesh size 25 micron as well as net numbers 25 bolting silk cloth. Plankton net acts as a filter, it is the most common method for collection of zooplanktons.

The concentrated zooplankton samples were carefully transferred to another container. 5 ml of 4% formalin, 2 to 3 drops of glycerin's were added to it. A pinch of detergent powder was also added to avoid the aggregation of zooplankton. Samples were collected in separate glass phials with label containing name of site, date of sampling, time of sampling, etc. Identification of zooplankton was done with the help of a compound microscope. A dissecting microscope is also used for sorting and counting. Specimens were mounted on glass slides and examined at 25-100X magnification, with its standard identification and its monographs as well as keys which were suggested by APHA (1985); Tonapi (1980); Dodson and Frey (1991) and Williamson (1991) and following the systematic key by Battish (1992) and Altaff (2004).

Main characters considered for identification are lorica, type of trophi for rotifers; antennules, post abdomen, number and arrangement of spines, location of lateral setae and rostrum for cladocera; antennules, antenna, caudal setae, and endopodite for copepoda and antenna, valve shape and setae for ostracods used by Sontakke and Mokashe (2014).

Population density was quantified by Drop count method of Lackey (1938) and was calculated using the following formula of Lackey (1938):

$N = n \times v / V$

Where,

N = Total no. of organisms/ lit of water filtered,

n = Number of zooplankton counted in 1 ml plankton sample,

v = Volume of concentrate plankton sample (ml),

V= Volume of total water filtered through (L)

## RESULTS AND DISCUSSION

During present investigation we found total 09 species of zooplankton. Among which 06 species belonging to Rotifera, 01 species belonging to Copepoda,02 species belonging to Cladocera were identified. Rotifers *identified were -1.Ascomorpha saltans* (Bartsch, 1870),2. *Brachionus calyciflourus* (Pallas, 1834),3. *Brachionus bidentata* (Jokubsky, 1912),4. *Lecane leontina* (Turner, 1892),5. *Trichotria tetractis* (Ehrenberg, 1830) and 6.*Trichocerca pusilla* (Jennings, 1903). 01 species Copepoda, *Moina micrura* (Kurz, 1874) and 02 species belonging to Cladocera,1. *Ceriodaphnia quadrangular* (Müller, 1785) and 2. *Diaphanosoma birgei* (Korineck 1981) were identified from Rajura Dam freshwater reservoir body.

All species are morphologically different. Monthly diversity of zooplankton (Rotifera) population density recorded in summer month was 465 org/10 liter of water and less in July to December was 235 org/10 liters of water. The number of Rotifers increased in summer which may be due to the higher population of bacteria and organic matter of dead and decaying vegetation (Majagi and Vijaykumar, 2009).

Copepoda population recorded in Rajura dam during study period was 10 org/10 liters of water and less recorded in July to December was 06 org/10 liters of water and also Cladocera zooplankton population density recorded in January to April 2020, was 53 org/10 liters of water and less in the month of July to December 2019 was 15org/10liters (Table.1). Various researchers carried out work on biodiversity of zooplankton. Sharma and Srivastava (1986), carried out work on ecological fluctuations of Rotifers. Shayestchfar (1995), studied biodiversity of zooplankton. Jindal and Thakur (2009), studied composition and population dynamics of phytoplankton, zooplankton, nekton and productivity have been correlated with seasonal variations in physico-chemical characteristics of water.

Solanki and Dabhade (2016), studied the Rotifer communities in upper Morna reservoir of Medshi, Washim district and observed 18 species of Rotifera belonging to 6 genera and 5 families among which *Brachionus* species was found in highest number. Dabhade and Chhaba (2019), also studied zooplankton diversity around Washim region of Maharashtra and recorded different 27 zooplankton species from the different sampling sites of Washim region comprising of 11 species of Rotifera, 06 Copepods, 09 Cladocera and 1 Ostracoda. The community structure of zooplankton showed a mixed composition of mesotrophic to eutrophic species.

The distribution of various species depended on the physico-chemical parameters of water (Tonapi G.J.1980) such as temperature, conductivity, pH, chloride, and free CO2 content. During the present study, among all groups of zooplanktons, the Rotifers were found dominant in all groups. Similar results were previously observed by many researchers (Banerjee *et al*. (2008), Abdullah *et al*.(2007),Adeyemi *et al.(*2009), APHA (1989), Balamurugan *et al*. (1999)

**Table: 1 Monthly diversity in Zooplankton of Rajura dam from July 2019 to Dec. 2020**

| **Phylum** | **Genera** | **July.** | **Aug.** | **Sep.** | **Oct.** | **Nov.** | **Dec.** |
|---|---|---|---|---|---|---|---|
| **Rotifera** | *Ascomorpha saltans.*(Bartsch, 1870). | 08 | 10 | 09 | 10 | 09 | 10 |
| | *Brachionus calyciflourus* (Pallas, 1834) | 07 | 10 | 05 | 10 | 10 | 07 |
| | *Brachionus bidentata* (Jokubsky, 1912) | 06 | 08 | 05 | 08 | 04 | 09 |
| | *Lecane leontina* (Turner, 1892) | 05 | 06 | 03 | 04 | 05 | 05 |
| | *Trichotria tetractis* (Ehrenberg,1830) | 04 | 03 | 02 | 02 | 05 | 06 |
| | *Trichocerca pusilla* (Jennings,1903) | 03 | 03 | 05 | 06 | 07 | 10 |
| **Copepoda** | **Genera** | **July** | **Aug.** | **Sep.** | **Oct.** | **Nov.** | **Dec.** |
| | *Moina micrura* (Kurz,1874) | 01 | 01 | 02 | 01 | 02 | 03 |
| **Cladocera** | **Genera** | **July** | **Aug.** | **Sep.** | **Oct.** | **Nov.** | **Dec.** |
| | *Ceriodaphnia quadrangular* (muller,1785) | 01 | 02 | 03 | 02 | 01 | 02 |
| | *Diaphanosoma birgei* (Korineck 1981) | …… | 01 | ……. | 01 | …… | 02 |
| | **Monthly diversity in Zooplankton of Rajura dam from jan.2020 to June.2020** | | | | | | |
| **Rotifera** | **Genera** | **Jan** | **Feb.** | **Mar.** | **Apr.** | **May** | **Jun.** |
| | *Ascomorpha saltans.(*Bartsch, 1870). | 04 | 10 | 19 | 21 | 17 | 10 |
| | *Brachionus calyciflourus* (pallas, 1834) | 05 | 08 | 15 | 23 | 19 | 12 |
| | *Brachionus bidentata* (Jokubsky,1912) | 09 | 06 | 11 | 18 | 11 | 07 |
| | *Lecane leontina* (Turner,1892) | 07 | 06 | 12 | 15 | 14 | 11 |
| | *Trichotria tetractis* (Ehrenberg.1830) | 05 | 04 | 09 | 13 | 15 | 10 |
| | *Trichocerca pusilla* | 02 | 06 | 05 | 23 | 10 | 02 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | (Jennings,1903) | | | | | | |
| **Copepoda** | **Genera** | **Jan.** | **Feb.** | **Mar.** | **Apr.** | **May** | **Jun.** |
| | *Moina micrura* (Kurz,1874) | …… | 01 | …… | 03 | 02 | …. |
| **Cladocera** | **Genera** | **Jan** | **Feb.** | **Mar.** | **Apr.** | **May** | **Jun.** |
| | *Ceriodaphnia quadrangular* (Muller,1785) | 02 | 02 | 04 | 05 | 08 | 07 |
| | *Diaphanosoma birgei* (Korineck 1981) | 01 | 03 | 03 | 06 | 07 | 05 |

**Table 2: Zooplankton Population Density (org/10 lit) in July 2019 to Dec.2020**

| | |
|---|---|
| Rotifera | 235 |
| Copepoda | 10 |
| Cladocera | 15 |
| Zooplankton Population Density (org/10 lit) in July 2019 to Dec.2020 | |
| Rotifera | 465 |
| Copepoda | 06 |
| Cladocera | 53 |

## CONCLUSION

The present investigation reveals that the diversity of zooplankton plays very significant role in the functioning of freshwater ecosystem. We recorded 09 species of zooplankton among which 06 species belonging to Rotifera, 01 species belonging to Copepoda, and 02 species belonging to Cladocera. The Diversity and population of zooplanktons in water provided significant information about the available sources for supporting life for fishery development. In present days, the biodiversity is in danger due to pollution and human activities. So, Conservation of biodiversity is essential so it is compulsory to keep update knowledge of every aquatic species diversity.

The density of planktons in water body determined stocking rate of fishes because they were the chief sources of the food of commercially important fishes as well as development in production of inland fishery sector. The presence and dominance of zooplankton species played a very significant role in the functioning of freshwater ecosystem.

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