DIVERSITY OF ROTIFERS FROM KORADI DAM MEHKAR, DIST-BULDHANA

O. G. Tanpure
Department of Zoology, Smt. Sindhutai Jadhav Arts and Science College, Mehkar
ogt1811@gmail.com

Dr. S. D. Rathod
P. G. and Research Department of Zoology, R. A. College, Washim

Abstract
Rotifers are microscopic zooplankton primarily inhabiting freshwater ecosystems, where they play a vital role in the aquatic food web. Commonly known as "wheel animals" due to the crown of cilia encircling their mouth, rotifers are an essential component of live supplementary feed for fish and are widely recognized as bioindicators of water quality. Climate change and global warming may contribute to shifts in rotifer diversity. The present study was conducted over a five-month period (August to December 2024) in Mehkar, Buldhana District, Maharashtra, to assess rotifer diversity and their ecological significance. Samples were collected from four distinct sites—S1 (East), S2 (West), S3 (North), and S4 (South). Analysis revealed 18 distinct rotifer species, classified under two orders (Ploima and Flosculariaceae) and six families: Brachionidae, Trochosphaeridae, Tricocercidae, Lepadellidae, Asplanchnidae, and Synchaetidae. Among these, the Brachionidae family was the most dominant, followed by Trochosphaeridae.
Keywords: *diversity, rotifer, Mehkar, Buldhana.*

Introduction:

Plankton refers to a diverse group of organisms inhabiting large water bodies that lack the ability to swim against water currents. They play a crucial role in aquatic ecosystems by serving as a primary food source for many organisms, including fish. Plankton includes algae, bacteria, protozoa, and zooplankton. Among zooplankton, rotifers are a significant group, with approximately 90% of species found in freshwater habitats. These microscopic organisms feed on algae, bacteria, and protists, and typically measure less than 2 mm in length. Rotifers exhibit a variety of shapes broad, flattened, or spherical and show clear sexual dimorphism. Females are larger and fully developed, whereas males are smaller and primarily composed of reproductive organs. They are commonly referred to as “wheel animacules” due to the characteristic crown of cilia, known as the corona, located at the anterior end around the mouth. This corona consists of two concentric ciliary bands an outer and an inner ring which aid in feeding and respiration through coordinated ciliary movement. The rotifer body is divided into three main regions: head, trunk, and foot (or tail). The trunk is either cylindrical or flattened and is enclosed in a transparent, flexible outer covering called the lorica **(Dhanpati, 2000).** At the end of the trunk, one or two dorsal antennae are present, along with a lateral antenna at the posterior end. The mid-dorsal anus is situated at the junction of the trunk and foot. The foot is encircled by cuticular rings and ends in one to four movable toes that contain pedal glands. These glands secrete an adhesive substance that allows rotifers to attach to substrates.

The corona, often referred to as the wheel organ, is one of the most prominent and defining structures of rotifers. It plays a crucial role in both feeding and locomotion. Located centrally within the buccal region, the mouth is encircled by a ciliated area that facilitates the movement of food particles. The corona typically comprises two distinct ciliary bands the *trochus* (anterior) and the *cingulum* (posterior). These bands generate coordinated movements that aid in drawing food towards the mouth and propelling the organism through the water. The structural diversity of the corona among different rotifer species is an important characteristic used in their classification **(Tayade and Dabhade, 2011).**

Maurya (2022) evaluated the water quality of Suraila Taal, identifying concerning levels of several parameters, including pH, total hardness, total dissolved solids, alkalinity, calcium, magnesium, and dissolved oxygen, which exceeded the permissible limits outlined by Indian water quality standards. Although other parameters such as electrical conductivity, chloride, nitrate, and biological oxygen demand were within acceptable limits, the computed Water Quality Index (WQI) classified the water as poor and unsuitable for human consumption or recreational use. The study emphasized the urgent need for the implementation of water purification systems and strict action against the direct discharge of domestic waste into the Taal to prevent ecological degradation and protect public health.

Sharma et al. (2022) studied long-term water quality trends of the Ganga, Sutlej, and Beas from 2012–2016, noting deterioration from untreated wastewater discharge. Despite interventions, desired standards remain unmet. Analysis of temperature, dissolved oxygen, pH, BOD, and fecal coliform revealed rising pollution, particularly in the Ganga, underscoring the urgent need for stronger measures to restore river ecosystems and ensure safe water quality.

Swetha and Aruna (2023) assessed the water quality of Manchippa Lake and concluded that the physicochemical parameters of the lake water were within WHO-recommended limits for drinking water. Seasonal variations in the parameters were observed, indicating changes in the trophic status of the lake. Despite these changes, the water was deemed suitable for drinking, irrigation, and aquaculture activities such as fish farming.

Limnology is the scientific study of inland waters, focusing on the biological productivity and its determining factors, including biological, chemical, physical, and climatic influences **(Tandale et al., 2021).**

The present study, conducted during the years 2012 and 2013, documented a total of 18 rotifer species. In a related investigation, **Dagne et al. (2008)** examined the species composition, spatial distribution, and abundance of rotifer and crustacean zooplankton in Lake Ziway between late April and early July 2004, recording 49 species of rotifers. **Shayestehfar et al. (2008)** explored the influence of physico-chemical parameters on surface water rotifer density, observing an inverse relationship between rotifer population density and water current, as well as between water temperature and population density across all sampling stations throughout the study period. Similarly, **Ekhande et al. (2013)** analyzed seasonal variations in rotifer populations and their correlation with physico-chemical parameters in Yashwant Lake, Toranmal (M.S.), India. Their findings indicated that both rotifer density and species richness peaked in the summer and declined post-monsoon and during winter, respectively. In another study, **Shrivastava et al. (2015)** investigated rotifer diversity in a fly ash discharge pond at Dhanras in Korba district, Chhattisgarh, where **Philodina** species were found to be dominant, while **Prolinopsis** species were the least abundant.

Higher aquatic organisms depend on certain zooplankton as a primary food source; therefore, any harmful or stressful alteration in zooplankton density can directly impact fish populations in a water body. Zooplankton, particularly rotifers, play a vital role in the aquatic ecosystem. They contribute to the natural purification of water and primarily function as primary consumers in the food web. Rotifers, in particular, serve as a crucial natural food source for the larvae of many aquaculture species. In semi-intensive aquaculture systems commonly used in carp production adult fish feed on both zooplankton and zoobenthos, while larvae and fry predominantly rely on zooplankton. Rotifers provide essential nutrients, including proteolytic enzymes, hormones, and growth factors, which aid in the digestive processes of immature larval guts **(Grubisic et al., 2012).**

Assessing rotifer diversity in freshwater bodies of the Washim region provides insights into water quality and suitability for fish culture. Rotifers, with their thin flexible cuticle and adaptability, feed on phytoplankton and in turn serve as prey for fish, forming a vital trophic link in nutrient cycling and energy transfer. As zooplankton, they also act as biological indicators of aquatic ecosystem health **(Pawar et al., 2003).**

Somatkar and Dabhade (2016) conducted a quantitative analysis of zooplankton in the freshwater ecosystems of Washim town, identifying a total of 29 zooplankton species. These included 9 species each of rotifers and cladocerans, 10 species of copepods, and a single species of ostracod. In a related study, **Solanke and Dabhade (2016)** examined the rotifer communities in the Upper Morna Reservoir located in Malegaon taluka, Washim district. **Tayade and Dabhade (2011)** noted that several rotifers possess a hardened structure known as a lorica, which is a localized stiffening of the cuticle and serves as a protective adaptation.

Materials and Methods:

Sites:

For the qualitative analysis of rotifers, four sites within the Koradi Dam located in Mehkar, Buldhana district, were selected for study. The sampling sites were designated as follows: Site S1 (Eastern region), Site S2 (Western region), Site S3 (Northern region), and Site S4 (Southern region).

Satellite View of Sites

Showing Sampling Sites

Photo-plate I: photographs of the locations in Koradi Dam Mehkar, Buldhana District.

Method:

For the qualitative estimation of zooplankton, a standardized and systematic collection method is essential. To ensure accuracy and consistency, standard procedures outlined by **Clesceri et al. (1998, 2006, 2008)** in the *APHA* manual were followed. The collection of zooplankton was carried out primarily through filtration using a plankton net, followed by the transfer of the concentrate into clean sampling bottles. The effectiveness of sampling largely depends on several factors including the choice of sampling gear, mesh size of the net, time of collection, water depth, and overall sampling strategy.

Each study location was subdivided into four directional sites for systematic sampling: Site S1 (East), Site S2 (West), Site S3 (North), and Site S4 (South). However, samples were collected only from those directions where access and collection were practically feasible. Sampling was conducted during morning hours to account for the diel vertical migration behavior exhibited by zooplankton. A plankton net with a mesh size of 25 µm was employed for the collection of samples. The collected samples were preserved immediately using a few drops of 4% formalin, supplemented with a few drops of glycerin and a pinch of detergent to prevent clumping and to aid in long-term preservation. Subsequent microscopic examination and photomicrography of the samples were performed using a Coslab Inverted Microscope.

Result and Discussion:

The present investigation was carried out at four sites in the Koradi Dam, located in Mehkar, Buldhana district of Maharashtra, India. The sites were designated as S1 (East), S2 (West), S3 (North), and S4 (South). Rotifer species diversity was assessed over a period of five months, from August to December 2024. A total of 18 species representing 2 orders and 6 families were recorded. Among these, the family **Brachionidae** was found to be the most dominant, followed by **Trochosphaeridae**. The detailed taxonomic classification of the recorded species is presented in **Table I.** The rotifer species identified in this study belonged to the orders **Ploima** and **Flosculariaceae**. Identification was performed using standard taxonomic keys provided by **Dhanpati (2000), Edmondson (1945, revised edition), Tayade (2011), and Solanke (2015).** The species **Keratella valga tropica** and **Keratella tropicana** were observed to be the most dominant across all sites, while members of the genus **Brachionus** showed consistent dominance at each location.

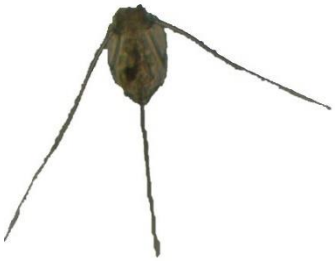
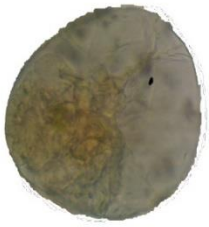
The rotifer species recorded in the present study have also been reported in earlier investigations. **Tayade and Dabhade (2011, 2015)** conducted extensive studies on rotifer diversity in Washim district, Maharashtra. Their survey in 2011 reported a total of 100 taxa (97 species), while a subsequent study in 2015 documented 52 taxa (49 species) belonging to 14 families and 22 genera from ephemeral ponds in the region, thereby providing a comprehensive checklist of rotifers from Washim district.

Further, **Solanke and Dabhade (2016)** examined the rotifer communities of the Upper Morna Reservoir, Medshi, Malegaon taluka, Washim

district, during 2012–2013. Their analysis revealed 18 species of rotifers belonging to 6 genera and 5 families, of which **Brachionus** (11 species) was the most dominant, followed by **Asplanchna** (3 species), **Filinia** (2 species), and **Lecane** (1 species). Similarly, **Kabra et al. (2016)** performed a quantitative analysis of zooplankton from freshwater ecosystems in Washim district and recorded 29 species, including 9 rotifer species. Their findings highlighted the zooplankton diversity pattern as **Rotifera > Cladocera > Copepoda > Ostracoda**.

In another study, **Wanjari (2016)** investigated the limnology of Kurala Dam in Washim district, documenting 26 zooplankton species, of which rotifers (11 species) were the most abundant, followed by cladocerans (8 species), copepods (6 species), and ostracods (1 species). **Mankar et al. (2015)** assessed the seasonal diversity of rotifers in Sonala Dam, Washim, during 2012–2013 and reported 16 species. Their study showed that rotifer abundance peaked in the winter season and was lowest during the monsoon.

Beyond Maharashtra, **Sugumaran and Amsath (2015)** investigated the seasonal diversity of rotifers in the Agniyar Estuary, Thanjavur district, Tamil Nadu, from August 2013 to February 2014. They recorded 24 species belonging to 17 genera, with the family **Brachionidae** being the most dominant. Seasonal variations were evident, with the highest diversity observed during the monsoon season.

 *Polyarthra minor*	 *Filinia terminalis*	 *Filinia opoliensis*
 *Filinia longiseta*	 *Asplanchna priodonta*	 *Lepadella ovalis*
 Keratella cochlearis	 *Keratella tropicana*	 *Trichocerca rousseleti*
 *Keratella valga tropica*	 *Brachionus caudatus*	 *Brachionus diversicornis*

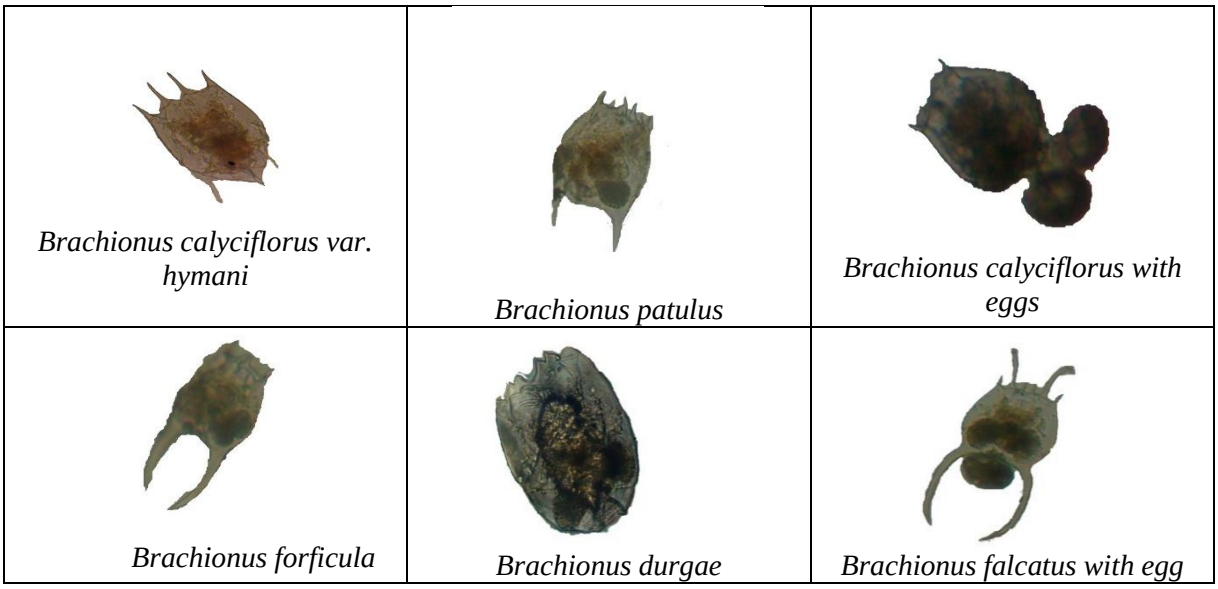


Photo-plate II: Microscopic photography of different Rotifers

Sr.no	Phylum	Class	Order	Family	Genus	Species
1.	Rotifera	Eurotatoria	Ploima	Synchaetidae	Polyarthra	*P. minor*
2.	Rotifera	Eurotatoria	Floscullariaceae	Trochosphaeridae	Filinia	*F. terminalis*
3.	Rotifera	Eurotatoria	Floscullariaceae	Trochosphaeridae	Filinia	*F. opoliensis*
4.	Rotifera	Eurotatoria	Floscullariaceae	Trochosphaeridae	Filinia	*F. longiseta*
5.	Rotifera	Eurotatoria	Ploima	Asplanchnidae	Asplanchna	*A. priodonta*
6.	Rotifera	Eurotatoria	Ploima	Lepadellidae	Lepadella	*L. ovalis*
7.	Rotifera	Eurotatoria	Ploima	Brachionidae	Keratella	*K. cochlearis*
8.	Rotifera	Eurotatoria	Ploima	Brachionidae	Keratella	*K. tropicana*
9.	Rotifera	Eurotatoria	Ploima	Brachionidae	Keratella	*K. valga tropica*
10.	Rotifera	Eurotatoria	Ploima	Tricocercidae	Trichocerca	*T. rousseleti*
11.	Rotifera	Eurotatoria	Ploima	Brachionidae	Brachionus	*B. caudatus*
12.	Rotifera	Eurotatoria	Ploima	Brachionidae	Brachionus	*B. diversicornis*
13.	Rotifera	Eurotatoria	Ploima	Brachionidae	Brachionus	*B. calyciflorus var. hymani*
14.	Rotifera	Eurotatoria	Ploima	Brachionidae	Brachionus	*B. patulus*
15.	Rotifera	Eurotatoria	Ploima	Brachionidae	Brachionus	*B. calyciflorus*
16.	Rotifera	Eurotatoria	Ploima	Brachionidae	Brachionus	*B. forficula*
17.	Rotifera	Eurotatoria	Ploima	Brachionidae	Brachionus	*B. durgae*
18.	Rotifera	Eurotatoria	Ploima	Brachionidae	Brachionus	*B. falcatus*

Table I: Taxonomic summery of rotifers

Conclusion

The present study highlights the diversity and richness of rotifer species in the Koradi Dam, Mehkar, located in Buldhana District. Sampling from four sites recorded a total of 18 rotifer species, with the Brachionidae family being the most dominant, followed by Trochosphaeridae. The abundance of rotifers serves as an indicator of the trophic status of the water body. Owing to their rapid nutrient assimilation and high reproductive potential, rotifers play a significant role in maintaining ecological balance.

Acknowledgement:

The authors express their gratitude to Dr. Balaji Lahorkar, Smt. Sindhutai Jadhao Arts and Science Mahavidyalaya Mehkar Dr. Omprakash B. Zanwar, Principal of R. A. College, Washim, for his valuable support, guidance, and for providing the necessary facilities for the successful completion of the research study.

References

1. Sharma, R. & Kumar, Raghvendra & Sharma, Devendra & Sarkar, Manash & Mishra, Brojo & Puri, Vikram & Priyadarshini, Ishaani & Pham, Thong & Ngo, Phuong & Nhu, Viet-Ha. (2022): Water Pollution Examination Through

Quality Analysis of Different Rivers: A Case Study in India. Environment, Development and Sustainability. Vol.24 10.1007/Pp 10668-021-01777-3.
2. S. Swetha and M. Aruna (2023): Assessment of Physico-Chemical Parameters of Manchippa Lake, Nizamabad District, Telangana *International Journal of Scientific Research in Science and Technology* Volume 10, Issue 3 Pp-696-703.
3. Maurya P. M. (2022): An Analysis of Physico-Chemical Parameters and Water Quality Index of Suraila Taal in Winter Season Issn 2321-1067 Renewable Research Journal Volume 4 Issue 1 Page 223-230.
4. Tandale M. R. And Nagmote S. R. And L. R. Meena (2021): Analysis of Chemical Parameters of Freshwater Bodies of Kajali River Ratnagiri, *India Int. J. Of Life Sciences*, 9 (2):255-259 Issn: 2320-7817(P) | 2320-964.
5. Kabra P.D., J.R. Somatkar and Dabhade D.S. (2016) Zooplanktons of fresh water ecosystem in the Washim district, Maharashtra. International Streams Research Journal Vol. 6 No 5: Pages 1-7
6. Solanke M.R. and Dabhade D.S. (2016) Rotifer communities in Upper Morna Reservoir, Medshi, Washim. International Journal of Applied Research Vol. 2 No.12: Pages 99-102
7. Wanjari H.V. (2016): Limnology of Kurala dam, Washim district. International Journal of Applied Research Vol. 2 No 7: Pages 491-494
8. Mankar U.P., A.D. Bobdev and Bhagat V.B. (2015) Diversity of rotifers in Sonala dam, Sonala, district Washim, Maharashtra. International Journal of Researches in Biosciences, Agriculture and Technology Vol. 2 No 3: Pages 445-447
9. Shrivastava S., A. Singh and Shrivastava L. (2015) Rotifers in Dhanras fly ash discharge water pond. International Journal of Environmental Sciences Vol. 4 No 1: Pages 59-63
10. Sugumaran J. and Amsath A. (2015) Seasonal diversity of rotifers from Agniyar Estuary. International Journal of Pure and Applied Zoology Vol. 3 No 4: Pages 287-292
11. Tayade S.N. and Dabhade D.S. (2015) Rotifer communities in the ephemeral ponds in Washim district of Maharashtra. Indian Streams Research Journal Vol. 5 No 11: Pages 1-8
12. Ekhande A.P., J.V. Patil, R.D. Patil and Padate G.S. (2013) Seasonal variation of rotifer and their correlation with the physiochemical parameters of Yashwant Lake, Toranmal, Maharashtra, India. Archives of Applied Science Research Vol. 5 No 1: Pages 177-181
13. Grubisic R.M., Z.P. Dulic, M.B. Stankovic, I.M. Zivic, K.Z. Bjelanovic, M.M. Spasic and Markovic Z.Z. (2012) The importance of zooplankton as live feed for carp larvae, Conference: Proceedings of 6th Central European Congress on Food-CE Food Congress*:* Pages 1-5
14. Tayade S.N. and Dabhade D.S. (2011) Checklist of rotifers in Washim district, Maharashtra, India. International Journal of Innovations in Bio-Sciences Vol. 1: Pages 27-31
15. Dagne A., A. Herzig, C.D. Jersabek and Tadesse Z. (2008) Abundance, species composition and spatial distribution of Planktonic rotifers and crustaceans in lake Ziway, (Rift Valley, Ethiopia). Internat. Rev. Hydrobiol. Vol. 93 No 2: Pages 210-226
16. Shayestehfar A., M. Soleimani, S.N. Mousavi and Shirazi F. (2008) Ecological study of rotifers from Kor river, Fars, Iran. Journal of Environmental Biology Vol. 29 No 5: Pages 715-720
17. Pawar S.K., V.R. Madhlapure and Pulle J.S. (2003) Zooplanktonic communities of Sirur dam. J. Aqua. Biol Vol.18 No 2: Pages 37-40
18. Dhanpati M.V.S.S.S. (2000) Taxonomic notes on the zooplankton from India (from 1889-2000), Indian Association of Aquatic Biologists (IAAB) Publication
19. Clesceri L.S., A.E. Greenberg and Eaton A.D. (1998, 2006, 2008) Standard Methods for the Examination of Water and Wastewater, 20th Edition.