STUDY OF ROTIFER DIVERSITY IN EPHEMERAL PONDS NEAR WASHIM, MAHARASHTRA

S.V. Idhole
Post Graduate and Research Department of Zoology, R. A. Arts, Shri M. K. Commerce and Shri S. R. Rathi Science Mahavidhyalaya, Washim.
sachinidhole0@gmail.com

P. S.Patil
Post Graduate and Research Department of Zoology, R. A. Arts, Shri M. K. Commerce and Shri S. R. Rathi Science Mahavidhyalaya, Washim.

Abstract
Ephemeral ponds are seasonal water bodies that retain water for only a short duration. The present study was conducted to assess the species composition of rotifers and update the existing species list in the Washim region of Maharashtra. A total of 52 taxa, representing 49 distinct species across 14 families, were identified during the investigation. These findings highlight the rich rotifer diversity present in the ephemeral ponds of the region and contribute valuable data to the understanding of local freshwater biodiversity. A total of 22 genera were recorded in this study. These belong to 14 families, with the family Brachionidae exhibiting the highest species richness, comprising 18 species. This was followed by Lecanidae with 10 species, and both Asplanchnidae and Notommatidae with 3 species each. Families such as Euchlanidae, Trichocercidae, Synchaetidae, Filinidae, and Philodinidae were each represented by 2 species. In contrast, families including Epiphanidae, Mytilinidae, Hexarthridae, Testudinellidae, and Trochosphaeridae were represented by a single species each. Prior to this study, 74 rotifer taxa were recorded in the Washim region. With the addition of the newly documented species, the total now stands at 95 taxa, reflecting a significant update to the region's rotifer biodiversity profile.
***Keywords**: Rotifers, Ephemeral ponds, Washim region, Species diversity, Freshwater zooplankton*

Introduction

Ephemeral, or epimoral, ponds—transient water bodies that often form during rainy seasons—play a vital role in supporting aquatic biodiversity in tropical regions. These ponds are characterized by their periodic drying and refilling, imbuing them with dynamic environmental conditions that foster unique biological communities.

These environments, which are widely distributed, can range in size from just a few square meters to several hundred hectares (**Williams, 1987; Schwartz and Jenkins, 2000**).

The depth of ephemeral ponds varies, typically from a few inches to over 10 feet. Rotifers are capable of rapidly colonizing vacant niches and converting primary production into a form accessible to secondary consumers, contributing up to 50% of the total plankton biomass (**Nogrady et al., 1993**). While rotifers predominantly inhabit freshwater ecosystems, they can also be found in a variety of aquatic and semi-aquatic habitats, including mosses, lichens, aquatic vegetation, rocks, gutters, puddles, and sewage treatment tanks (**Pejler, 1995**).

These organisms feed on microorganisms such as bacteria, algae, and protozoans, and some species are detritivorous. As heterotrophs, they play a crucial role in the cycling of organic matter within aquatic ecosystems. The occurrence and abundance of zooplankton in natural waters have long been a subject of scientific interest, particularly in understanding their composition and ecological significance (**Snell and Winkler, 1984**).

Several studies have focused on the ecological fluctuations of Rotifera, including the works of **Sharma and Srivastava (1986), Shayestehfar (1995), Bezerra et al. (1999), Nevs et al. (2003), and Sharma and Bhattarai (2005)**.

Segers et al. (1994), Sharma (1998), and Arora and Mehra (2003) reported 340 Indian rotifer species out of approximately 2,500 known species worldwide. **Dhanapathi and Sarma (2000)** recorded 91 species from Andhra Pradesh, while **Sharma and Michael (1980)** listed 241 species from across India. In Gujarat, **Wulfert (1966)** documented 87 rotifer species from the Ajwa-Nimeta reservoir in Baroda.

Although many permanent water bodies such as rivers, lakes, and reservoirs have been studied for rotifer diversity, ephemeral ponds—especially in the Washim region—remain largely unexplored. These temporary habitats may support a unique and diverse rotifer fauna. Therefore, the present study was undertaken to investigate the species composition of rotifers in ephemeral ponds of the Washim region in Maharashtra and to update the existing rotifer species list for this area.

Plankton refers to the diverse array of plant and animal organisms that drift with water currents. These organisms are most abundant in surface waters where sunlight and nutrients are readily available. Zooplankton (from the Greek zoon = animal, planktos = drifting) are a heterogeneous

group of floating or weakly swimming animals, most of which are microscopic. They may be unicellular or multicellular, with sizes ranging from a few microns to several millimeters. Beyond size, zooplankton vary widely in morphology and taxonomy.

Zooplankton are crucial components of aquatic ecosystems and play a significant role in assessing faunal biodiversity. They include representatives from almost every animal phylum and are found in the pelagic zone either as fully developed adults (holoplankton) or in their egg and larval stages (meroplankton). Due to their abundance and presence across various depths, zooplankton serve as indicators of energy transfer at the secondary trophic level. Their occurrence and distribution can influence pelagic fishery potentials, as many fish species breed in areas rich in plankton to ensure adequate food supply for their young. A decline in zooplankton diversity can negatively affect ecosystem functioning and stability, potentially causing shifts in species composition and leading to alternate stable states. This, in turn, can impact human populations dependent on aquatic ecosystems for resources such as drinking water (**Ostroumov, 2005; Scheffer et al., 2001**).

Zooplankton form an essential link in the aquatic food chain. Numerous researchers have conducted studies to understand their diversity across various freshwater habitats. For example, **Spoljar et al. (2009)** examined the influence of eutrophication on zooplankton communities in a shallow lake. **Jayabhaye (2010)** investigated the zooplankton diversity of the Kayadhu River near Hingoli, Maharashtra. **Vanjare et al. (2010)** studied zooplankton from the polluted Mula River in Pune, reporting the presence of *Brachionus rubens* (Ehrenberg, 1838) epizoic on *Moina macrocopa* (Straus, 1820), an occurrence associated with lower dissolved oxygen levels.

In Buldhana district, **Joshi (2011)** conducted qualitative and quantitative studies of zooplankton in Rajura Lake over a one-year period. **Tayade and Dabhade (2011)** focused on the rotifer community in the Washim region, creating a checklist of rotifer species. Similarly, **Pawar and Dabhade (2016)** investigated the qualitative diversity of rotifers in the Katepurna Reservoir, Akola district.

Kabra et al. (2016) analyzed zooplankton communities in the freshwater ecosystems of Washim town, highlighting their utility as indicators of water quality.

Compared to phytoplankton, zooplankton are more varied, and their distribution is strongly influenced by factors such as patchiness, diurnal vertical migration, and seasonal changes. Accurate assessment of zooplankton populations requires standardized methodologies, including proper sampling, fixation, preservation, analysis, and data interpretation.

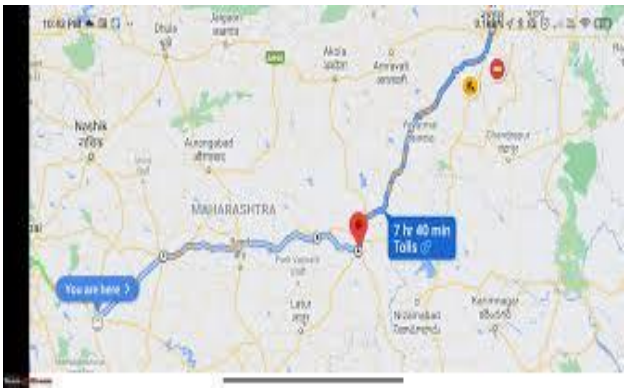
Given the ecological importance of zooplankton and the limited studies on their diversity in this area, the present research aims to investigate the community structure of zooplankton inhabiting various freshwater bodies in the Washim region of Maharashtra.

Rotifers are microscopic, aquatic invertebrates that belong to the phylum Rotifera. They are commonly found in freshwater environments, including ponds, lakes, rivers, temporary pools (ephemeral ponds), and even moist soils. Despite their small size (typically 100–500 micrometers), rotifers play a critical role in aquatic ecosystems.

Materials and Methods

Washim is a district located in the state of Maharashtra, India, lying between 19°36′N to 21°13′N latitude and 76°38′E to 77°13′E longitude. For the present study, 30 ephemeral ponds situated along State highay were selected, spanning from the Washim–Risod border.

These ponds, located alongside the roadside, were monitored during the study period and were sequentially designated as S_1, S_2, S_3, S_4, ..., S_{30} for identification and sampling purposes.



Monthly plankton samples were collected using a Nylon Plankton Net with a mesh size of 25 µm. Sampling was conducted from June 2025 to August 2025. All collections took place in the early morning hours between 8:00 a.m. and 12:00 noon, strictly adhering to the *Standard Methods for the Examination of Water and Wastewater, 20th edition*, edited by **Lenore S. Clesceri, Arnold E. Greenberg, and Andrew D. Eaton (1988)**.

To obtain concentrated samples, the plankton net was towed repeatedly. Large, common organisms such as aquatic insects, crustacean larvae, and tadpole larvae were carefully removed using forceps. Sample concentration was carried out using a bore-cut wide syringe fitted with a fine mesh at the opening. The syringe, without its piston, was immersed in the beaker containing the

sample. Water entering the syringe tube was then expelled by re-inserting the piston, and the filtered water was discarded.

Concentrated samples were transferred to labeled sampling bottles indicating site name, date, and time of collection. Preservation was done using 4% formalin (**Damodare, 2004**). For illoricate forms, an equal volume of hot water was first added to the sample before fixing with formalin. Additionally, a few drops of glycerin were added to enhance preservation and prevent evaporation (**Dabhade, 2006**).

Result and Discussion

The rotifer communities of ephemeral ponds in the Washim region, Maharashtra, revealed a total of 52 taxa (49 species), accounting for more than one-sixth of the 340 species of Indian Rotifera reported so far. Out of the 25 families and 63 genera of Eurotatoria known from India (**Sharma, 1996**), the present study recorded 14 families and 22 genera. Since rotifers are primarily freshwater organisms, their abundance in these ponds reflects the presence of favorable ecological conditions for their survival (**Dhanapathi, 2000**). A systematic list of the identified species is provided separately.

The findings indicate a rich and diverse rotifer assemblage in the ephemeral ponds. The community was largely dominated by Monogononta (95.91%), whereas only two species (4.08%) represented Digononta. Within the three major orders, Ploima was the most abundant, comprising 42 species (85.71%), while Gnesiotrocha and Bdelloida contributed only 5 species (10.20%) and 2 species (4.08%), respectively. The species are as follows.

Phylum: ROTIFERA
Class: Eurotatoria
Subclass 1: Monogononta
Order 1: Ploimida

1.Epiphanes clavulata	14. *Brachionus rubens*
2. *Anuraeopsis fissa*	15. *Plationus patulus* comb.
3. *Brachionus angularis*	16. *Keratella cochlearis*
4. *Brachionus caudatus*	17. *Keratella tropica*
5. *Brachionus diversicornis*	18. *Keratella ticinensis*
6. *Brachionus forticula* f. *typicus-urawensis*	19. *Euchlanis dilatata*
7. *Brachionus calyciflorus*	20. *Pseudoeuchlanis longipedis*
8. *Brachionus bidentata*	21. *Mytilina ventralis*
9. *Brachionus durgae*	22. *Lecane bidentata*
10. *Brachionus falcatus*	23. *Lecane lauterborni*
11. *Brachionus plicatilis*	
12. *Brachionus quadridentatus*	
13. *Brachionus urceolaris*	

Conclusion:

The rotifer communities of ephemeral ponds in the Washim region, Maharashtra, comprised a total of 52 taxa (49 species). The findings of the present study highlight the richness and diversity of rotifer assemblages inhabiting these temporary aquatic habitats. The recorded species were predominantly cosmopolitan in distribution, underscoring the ecological significance of ephemeral ponds as favorable habitats for rotifers. These results emphasize the importance of such ponds as valuable sites for future biodiversity assessments and ecological studies.

Faunistic and zoogeographical studies reveal that even similar aquatic systems often support dissimilar rotifer assemblages, with noticeable variation in species composition. The rotifer communities also exhibited seasonal and spatial fluctuations in both species richness and diversity. In the Washim region, the previously documented record of 74 taxa (Damodare, 2004; Yeole et al., 2008) has now been elevated to 95 taxa, reflecting a significant addition to the regional rotifer diversity.

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