



Diversity of Rotifers in a freshwater body, Wadgaon dam, district Nagpur, Maharashtra, India

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ABSTRACT

Zooplankton is an important component play crucial role in aquatic ecosystem. They have a great significance as they produce the food for other aquatic organisms like fishes. They act as bioindicators, on the basis of diversity of zooplankton species pollution status of water body can be assessed. In the present study, total 23 species of rotifer belonging to 6 genera were recorded and station wise study was carried out. At station-1, the population density of rotifer was ranged from 97 to 547 individuals/L in the first year and it was ranged between 99 to 568 individuals/L in the second year; at station-2, the population density of rotifer was ranged from 80 to 575 individuals/L in the first year and in the second year it was ranged between 87 to 500 individuals/L; at station-3, in the first year the population density of rotifer was ranged from 115 to 607 individuals/L, and in the second year it was ranged between 137 to 608 individuals/L; and at station-4, the population density of rotifer was ranged from 93 to 536 individuals/L in the first year and in the second year it was ranged between 96 to 528 individuals/L.

Keywords: Rotifer, diversity, zooplankton, Wadgaon dam

INTRODUCTION

An aquatic ecosystem is a dynamic system of water habitat which includes both components, biotic and abiotic, influencing the properties of each other and both necessary for the maintenance of life. Water supports many lives, which survive in water. They depend on water for their food, shelter, reproduction and all other life activities. Fresh water ecosystems cover only a small portion of earth nearly 0.8%. Freshwater habitats are classified into lotic (flowing) and lentic (standing) habitats, water bodies such as lakes, ponds, pools, bogs and other reservoirs are standing water and known as lentic habitats, whereas lotic habitats represent flowing water bodies such as rivers and streams.

Plankton are comprised of plants and animals that either float passively in the water, or possess such limited powers of swimming that they are carried from

place to place by the currents (Battish, 1968). There are two types of plankton, tiny plants called phytoplankton and weak swimming animals called zooplankton inhabit oceans, seas, lakes, ponds etc. Local abundance arises horizontally, vertically and seasonally. The primary cause of the variability is the availability of light

Zooplankton are heterotrophic plankton. They are the organisms drifting in oceans, seas and fresh water bodies. They float, drift or weakly swim in the water. Freshwater zooplankton are found in the water in wetland areas such as lakes, streams, river and swamps. They are most abundant nearer the surface as they eat phytoplankton which need light for photosynthesis. Most zooplankton are too small to see with the naked eyes, but their varied shapes are revealed under the microscope. Zooplankton are a vital component of freshwater food webs. The smallest zooplankton are eaten by the larger zooplankton which in turn, are eaten by small fish, aquatic insects and so on. Variations in water quality can lead to changes in species, composition and abundance. Rotifers, Copepods and Cladocerans are dominant groups in freshwater habitats than Ostracods. They inhabit the ponds, lakes, rivers and reservoirs and are reported to occur more abundantly in ponds and lakes than in rivers (Sharma and Singh, 2012).

Wadgaon dam of district Nagpur is anthropogenic and perennial water body. Its water is used for domestic purpose, irrigation, aquaculture, etc. The surrounding area of dam is semi-urban and semi-agricultural. The dam is an Earth fill and Masonary dam. The length of dam is 5330 meters (17486.88 ft.), while the height of the dam above lowest foundation is 23.65 meters (77.59 feet). Irrigation project has 21 radial type of spillway gates. Length of the spillway is 307 meters (1007.22 feet). Dam's catchment area is 107.55 thousand hectors. Maximum or gross storage capacity is 152.6 million cubic meter (MCM). Live storage capacity is 136.0 MCM. The present work was carried out to assess the species diversity and population density of zooplankton of Wadgaon dam water, Nagpur, Maharashtra, to evaluate its suitability for fish culture.

MATERIAL AND METHODS:

The present study on diversity of zooplankton was carried out for two years from March-2013 to February-2015 in Wadgaon dam water, district Nagpur (M.S.). To get overall limnological picture of a water body

sampling stations were fixed by taking into consideration a variety of factors like catchment, topography, pollution sources, agricultural and washing activities, inlets and outlets etc. In the present study, water samples were collected from the following four different stations of the dam:

Station-1: Near Generator Room – Water supplies to Butibori.

Station-2: Near Mihan Pump – Centre Point which represent general water quality of the dam.

Station-3: Near Purti Sugar Mill – Place where feeder opens in dam and also overflow occurs.

Station-4: Near Main Gate – Place where mostly human interference occur.

Physico-chemical parameters were determined by following standard methods suggested by APHA, AWWA and WPCF (1989). The physical and chemical characteristics of water affect the abundance, species composition, stability and productivity of the population of aquatic organisms. Analysis of zooplankton includes collection, counting and identification of zooplankton.

For qualitative and quantitative analysis of zooplankton, samples from the selected stations were collected monthly during early morning hours between 7.00 A. M. to 10.00 A.M. Zooplankton samples were collected by filtering 100 litres water through standard plankton net of bolting silk no. 25 (mesh size 64 micrometer). Plastic bottles were used to store the samples. All the filtered content was then transferred to plastic bottles filled with 4% formalin, the aqueous solution of formaldehyde. The samples were diluted up to desirable concentration.

Different groups of zooplankton, rotifera, cladocera, copepoda and ostracoda were segregated and separated under a binocular stereo zoom dissection microscope using a fine needle and brush. Quantification of zooplankton was done by Sedwick Rafter cell (S-R cell) method. Sedwick Rafter cell is about 50 mm long, 20 mm wide and 1 mm deep. The total volume of the cell is 1 ml. Each sample was centrifuged and supernatant was discarded then 1 ml of bottom settled sample was taken with a wide mouthed pipette and poured into the Sedwick Rafter counting cell. After allowing to settle down for few minutes zooplankton were counted. At least 4 such countings were made for each group. The average values were taken into consideration. Total number of zooplankton present in 1 litre of water sample was calculated by using the following formula:

$$N = n \times v / V$$

Where,

N = Total number of plankton per litre of water filtered.

n = Average number of plankton in 1 ml of sample.

v = Volume of plankton concentrated (ml)

V = Volume of total water filtered (L)

Identification of zooplankton was done under microscope using keys and monographs of Edmondson (1959), Battish (1992), Reddy (1994), Murugan *et al.*, (1998), Dhanapathi (2000) and Standard methods of IAAB (1998, 2000).

A binocular compound microscope was used in counting of zooplankton with different objectives such as 10X, 4X and 40X. From the concentrated sample, the temporary slides for the zooplankton were prepared. Then the slides were observed under binocular microscope for zooplankton. Labomed Digi-3 compound microscope attached with C.C.D. camera was used for capturing the images of zooplankton.

RESULTS AND DISCUSSION:

Zooplankton are miniature organisms that have animal like traits. They float, drift or weakly swims in the water. The freshwater zooplankton comprised of four major groups of invertebrate animals: Rotifers, Copepods, Cladocerans and Ostracods. These groups found almost exclusively in freshwater. To study the zooplankton diversity of species of different groups monthly collected samples from four stations were observed during two years study period. The monthly number of zooplankton population (Number of individual/ L) in Wadgaon dam water revealed that the species of mainly four groups, i.e. rotifera, cladocera, copepoda and ostracoda were present.

In the present study, total 23 species of rotifera belonging to 6 genera were recorded and station wise study was carried out. The following rotifers were identified in Wadgaon dam water:

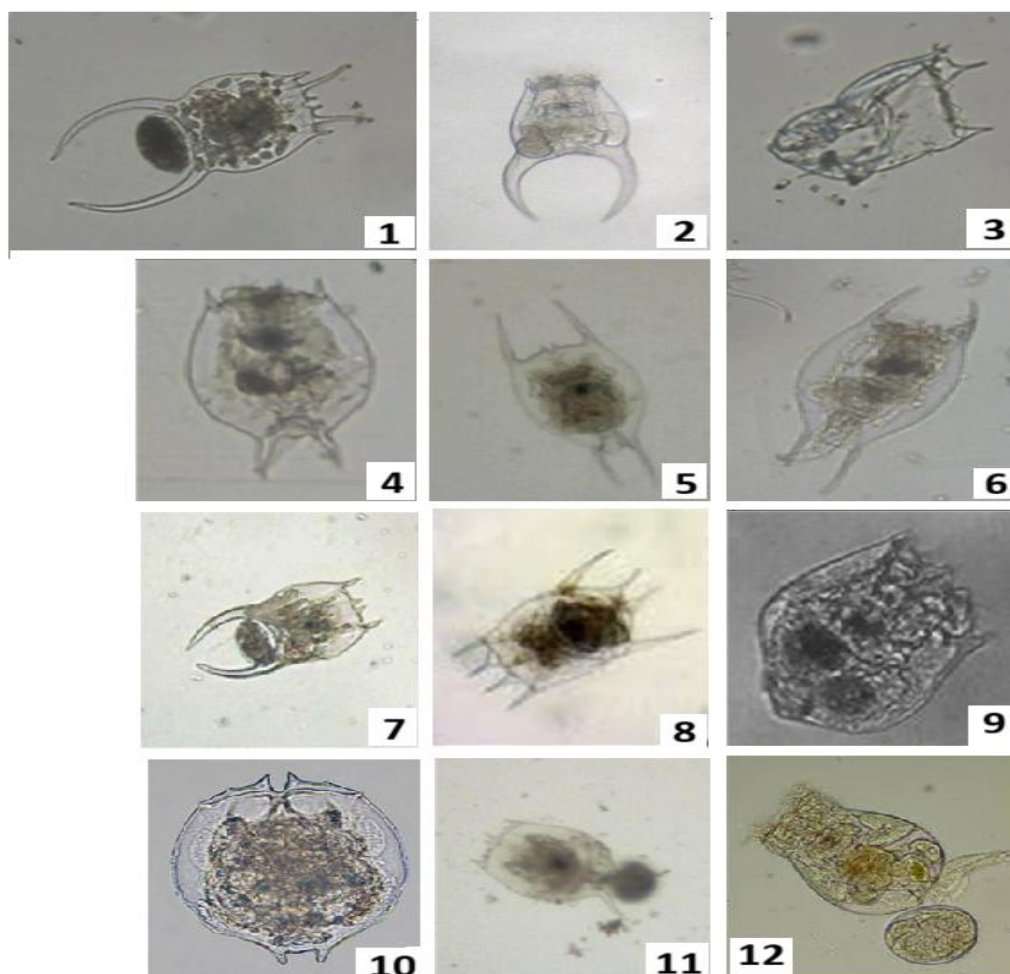


Fig 1. : 1. *B. falcatus*, 2. *B. forficula*, 3. *B. bidentata*, 4. *B. caudatus*, 5. *B. diversicornis*, 6. *B. havanaensis*, 7. *B. caudatus personatus*, 8. *B. calyciflorus*, 9. *B. budapestinensis*, 10. *B. angularis*, 11. *B. quadridentatus*, 12. *B. plicatilis*;

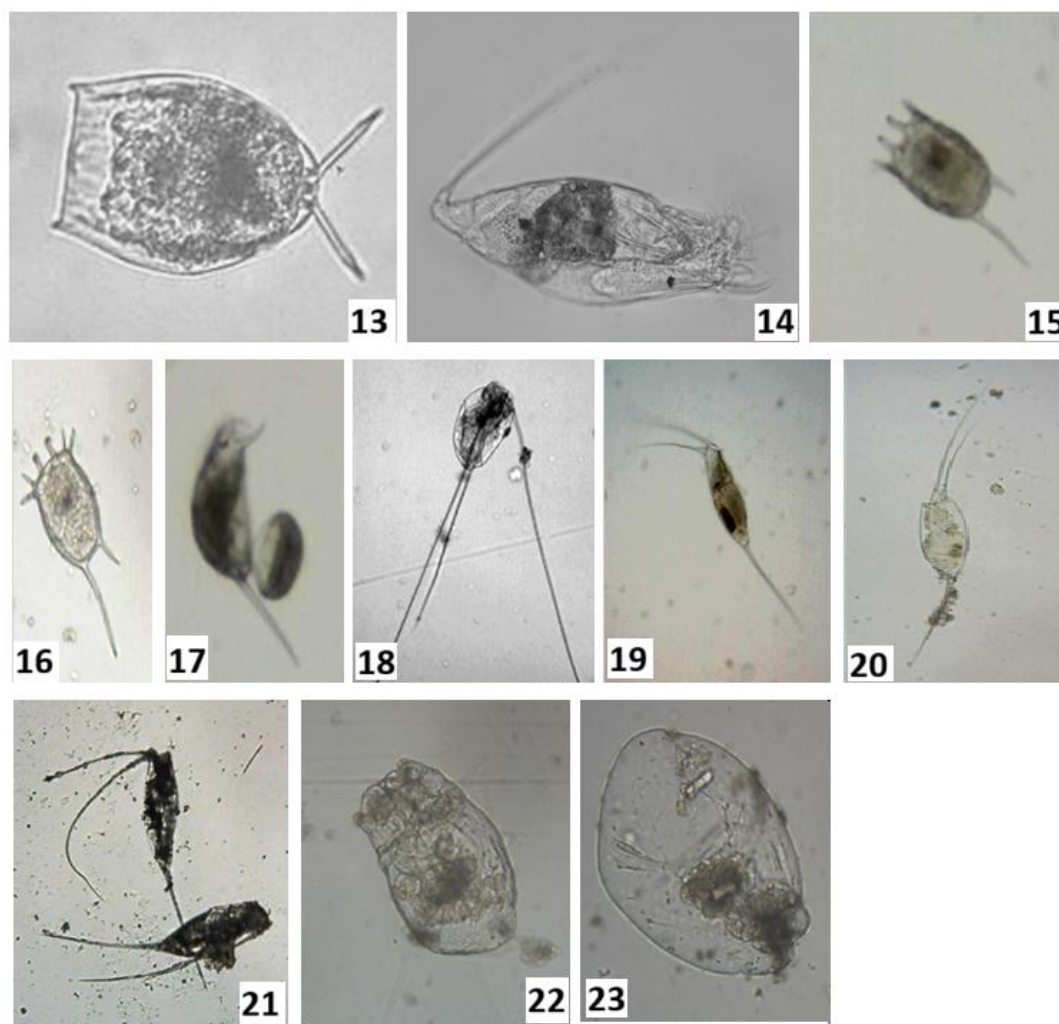


Fig. 2 Rotifera species identified in Wadgaon Dam 13. *Lecane* species; 14. *Trichocerca* species; 15. *K. tropica*, 16. *K. valga*, 17. *K. cochlearis*; 18. *F. longiseta*, 19. *F. opoliensis*, 20. *F. pejeri*, 21. *F. terminalis* and *Asplanchna* species: 22. *A. priodonta*, 23. *A. brightwelli*

Brachionus species: *B. falcatus*, *B. forficula*, *B. bidentata*, *B. caudatus*, *B. diversicornis*, *B. havanaensis*, *B. caudatus personatus*, *B. calyciflorus*, *B. angularis*, *B. quadridentatus*, *B. plicatilis*; **Lecane species;** **Trichocerca species;** **Keratella species:** *K. tropica*, *K. valga*, *K. cochlearis*; **Filinia species:** *F. longiseta*, *F. opoliensis*, *F. pejeri*, *F. terminalis* and **Asplanchna species:** *A. priodonta*, *A. brightwelli* (Fig.1).

Station-1:

In the first year the population density of rotifer was ranged from 97 to 547 individuals/L, and in the second year it was ranged between 99 to 568 individuals/L. Maximum density of rotifer population was noticed in the month of August and minimum density was reported in the month of December during both the years.

Station-2:

In the first year the population density of rotifera was ranged from 80 to 575 individuals/L, and in the second year it was ranged between 87 to 500 individuals/L. Maximum density of rotifer population was noticed in August and minimum density was reported in the month of December in both years.

Station-3:

In the first year the population density of rotifera was ranged from 115 to 607 individuals/L, and in the second year it was ranged between 137 to 608 individuals/L. Maximum density of rotifera population was noticed in August and minimum density was reported in the month of December during both the years.

Station-4:

In the first year the population density of rotifera was ranged from 93 to 536 individuals/L, and in the second year it was ranged between 96 to 528 individuals/L. Maximum density of rotifera population was noticed in August and minimum density was reported in the month of December during both years.

There are several studies carried out by many researchers in relation to biodiversity of zooplankton of freshwater bodies. Sitre (2012) studied on the seasonal variation of zooplankton in Ambazari lake of Nagpur city, Maharashtra and he noticed high number of zooplankton during summer and winter season. Moorthy and Sultana (2011) observed the biodiversity of zooplankton of freshwater pond at Arakkona and Chetpet in Chennai. They also made the qualitative and quantitative study of zooplankton. Present study revealed that the zooplankton study was helpful to determine the seasonal availability of zooplankton with respect to species richness, evenness, dominance and abundance of zooplankton in the dam water.

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Conflict of interest

The author declares that there is no conflict of interest..

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