# DIVERSITY OF ROTIFERS IN VALVAN LAKE OF VALVAN MAVAL

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## ABSTRACT

Valvan Lake is a principal fresh water body located in Maval Tahsil, Pune Maharashtra. It is situated at about 260 ml above the mean sea level. A study was undertaken during 2014 to 2015 to assess the types of rotifera present in this water body.

This water body is utilized by local residents for washing clothes and open defecation. Siltation is also responsible for polluting the water. Rotifers are the connecting link between primary producers and consumers in aquatic ecosystems. Rotifers reside in inland water bodies and their diversity indicates a presence variety of species within their community. During the present study 23 species of rotifers were found at all sampling sites of the Lake.

Key words – Valvan Lake, Rotirera, Diversity.

## INTRODUCTION: -

Rotifers are important component of an aquatic ecosystem. They are microscopic soft bodied freshwater invertebrates. They play a significant role in an aquatic food chain. According to Hulyal and Kaliwal (2008) freshwater rotifers play an important role in the conversion of plant origin food to animal food and serve as prey to other smaller predatory fauna.

Rotifers are also called ‘wheeled animals’ and are aquatic organisms that get their name from the corona: a rotating, wheel-like structure that is covered with cilia at their anterior end. They exhibit a wide range of feeding habits, they are filter feeders that eat dead material, planktonic food particles such as algae, bacteria detritus and other microscopic living organisms and therefore are regarded as very important components of aquatic food webs. They are widely distributed in inland water bodies, such as in Lakes, rivers and Lake ponds. Due to their fast-reproductive rates and vast dispersal capabilities they quickly colonize new habitats and are often know of dominating there communities in hung numbers.

## MATERIAL AND METHODS

The water samples were collected from the four sites of Lake such as site A, site B, site C and site D. The samples were collected in the morning hours between 8.30 a.m. to 10.30 a.m. 50 ltr of water sample was filtrated through the plankton net made of bolting silk number 25 with mesh size 64 lime. The collected samples were allowed to settle down by adding Lugol’s iodine. Sedimentation of the sample requires 24 hrs after which supernatant was removed and

the concentrate was reduced to 50 ml depending on the number of plankton and preserved in 5% formalin for further studies.

For the quantitative studies, the concentrated sample was shaken and one drop of sample was taken on a clear micro slide with the help of a standard dropper, the whole drop was carefully covered with the cover glass and observed. Plankton identification up to genera and whenever possible up to species level was classified according to keys given by Edmonson (1959), Adoni (1985) and APHA (1985) and standard analysis was undertaken as per Zar (2005).

Quantitative study of plankton was done by Sedgwick – Rafter Cell method.

**Sedgwick–Rafter Cell method**

The Sedgwick Rafter Cell is a special kind of slide similar to the Hemocytometer. The cell has a 50mm x 20 mm x 10 mm rectangular cavity that holds 1 ml sample. The cell is moved in horizontal directions on the stage of an inverted microscope and planktonic species encountered in the field are enumerated. A number of replicate samples are enumerated to calculate plankton / ltr.

Plankton (Units /ltr.) = n x c /v

Where, n = number of plankton in 1 ml.

c = volume of concentrate.

v = volume of sample in liters.

**DISCUSSION AND RESULT**

According to Sharma (2010) dominance of protozoan and rotiferan communities indicates a deterioration in the water quality and onset of eutrophication at an alarming rate. The presence of rotifer species is very useful for indicating the water quality, particularly in pollution studies. Plankton particularly rotifers have long been identified as indicators of water quality Arora. (1966) observed rotifers are bioindicators of water quality. Rotifers play an important role in the trophic level of freshwater impoundments and serve as a living capsule of nutrition (Suresh Kumar, *et.al.,* 1999). The abundance of rotifers in an aquatic system indicates, the water body is also rich in phytoplankton, debris element and bacteria and few predators. Rotifers, especially *Brachionus*, constitute an important link in the food chain of inland waters. They are considered preferred food for many fish larvae reported by Guerguess (1993).

During the present study rotifera were found as the most dominant group among all the zooplanktons. Taxonomic dominance of rotifers was observed by several researchers like Nogueira (2001), Sampaio, *et.al.,* (2002) and Kudari *et.al.,* (2005). Govind (1969) observed rotifers as a dominant group in his study from Tungabhadra reservoir. Many workers like Moitra and Bhaumik (1968), Chaube (1991), Jayabhaye and Madalapure (2006) and Sharma and Capoor (2010) found that the rotifera were the most abundant species in their studies on different water bodies of India. Similar reports were documented by Gaurvi, *et.al.*, (2003). They observed rotrifers were dominant during the summer season.

Taxonomic dominance of rotifers were observed by researchers, Sampaio, *et.al.*, (2002), Neves, *et.al.*,(2003). Bhagat, *et.al.*, (2010) recorded 29 species belonging to rotifera in Ambadi irrigation dam, Akola. Shashikant R.Sitre and Mahendra G. Thakare (2013) recorded that the most abundant species are represented by rotifer in Balaji Temple Tank of Chimur, Chandrapur District (M.S.), Hemlata Verma, *et.al.*, (2013) observed that rotifers were most abundant throughout the study period in Futera pond, Damoh District (M.P.), Gunwant P. Gadekar (2014) recorded the maximum species density was observed in group rotifera in Pangdi Lake , Gondia, (M.S.) and Gajanan Sontakke and Satish Mokashe (2014) recorded rotifera was dominant with 11 species in Dekhu reservoir ,Aurangabad (M.S.).

In the present investigation there are 23 species that represent rotifers in all the sampling sites of ponds. They showed little species diversity as per sampling sites at the respective ponds. In site A, rotifera were represented by 18 species in 2014-15. In site B, rotifera were represented by 17 species in 2014-15. In site C, rotifera were represented by 20 species in 2014-15. and in site D, rotifera were represented by 19 species in 2014-15.

Isaiarasu, *et.al.,* (1995) collected 11 species of rotifera from Sivakashi,ponds TamilNadu. Kamble and Meshram (2005) observed 5 species of rotifera in Khatijapur tank Achalpur, Amaravati (M.S.), Pawar and Pulle (2005) founded 28 species of rotifera in Petwadaj dam, Nanded (M.S.), Sahoo, S. and Jameson, J.D. (2006) observed 25 species of rotifera in a fish pond in Thothukudi, Tamilnadu. Jayabhaye and Madalapoure (2006) recorded 14 species of rotifera in Parola dam Hingoli (M.S.), Sakhre and Joshi (2006) recorded 8 species of rotifers in Yeldari reservoir. Sharma, *et.al.,* (2007) observed 28 species of rotifera in and around Udaipur city, Rajasthan. Chargan, *et.al.,* (2008) observed 7 species of rotifera in freshwater wetlands in Yeotmal district of (M.S.) Balakrishna, D. *et.al.*, (2013) observed that rotiferan form a significant component of the zooplanktons in Dharmasagars Lake, Dharamsagar Warangal, Andhra Pradesh. M. Jeelani and H. Kaur (2014) recorded 27 species of rotifer in Dal Lake, Kashmir. Shashikant R. Sitre (2014) recorded nine species of rotifera in Naik Lake, Nagpur City (M.S.) and Gajanan Sontakke and Satish Mokashe (2014) recorded 11 species of rotifers in Dekhu reservoir Aurangabad, Maharashtra.

In site A, during 2014-2015, 18 species of rotifera were recorded among which *Branchionus bidentata* (84 no./ltr.) was dominant followed by *Filinia opoliensis* (60 no./ltr.) *Brachionus forticula* (40 no./ltr.), *Testidinella macroneta* (10 no./ltr.) *Horaella brehmi* (38 no./ltr.), *Polyarthra vulgaris* (32 no./ltr.), *Platyias quadricornis* (14 no./ltr.), *Lecane luna* (16 no./ltr.), *Asplanebnopus myrmeleo* (13 no./ltr.), *Brachionus calyciflorous* (36 no./ltr.), *Branchionus quadridentatus* (35 no./ltr.), *Branchionus caudatus* (26 no./ltr.), *Keratella valga* (32 no./ltr.), *Trichocerca tigris* (24 no./ltr.), *Brachionus formadivergens* (26 no./ltr.), *Lepadella ovalis* (15 no./ltr.), , *Esophora anthadis* (14 no./ltr.), *Philodina roseota* (16 no./ltr.), *Asplanchna intermedia* (15 no./ltr.), *Keratella tropica* (09 no./ltr.) and *Trichocerca rattus* (28 no./ltr.)

In site B, during 2014-2015, 17 species of rotifera were recorded among which *Brachionus bidentata* (98 no./ltr.) was dominant followed by *Brachionus furficula* (60 no./ltr.), *Brachionus caudatus* (55 no./ltr.), *Keratella valga* (14 no./ltr.),*Filinia opolensis* (61 no./ltr,

*Polyarrthra vulgaris* (44 no./ltr.), *Asplanehnopus myrmeleo* (21 no./ltr.), *Tripleuchlaris plicata* (16 no./ltr.)*Brachionus quadridentatus* (33 no./ltr.),*Cephalobdella gibba* (32 no./ltr.), *Keratella vulga* (32 no./ltr.), *Brachionus angularis* (38 no./ltr.), *Platyias quadricornis* (39 no./ltr),*Lepadella ovalis* (25 no./ltr.), *Rotaria neptunia* (14no./ltr.), *Monostyla bulla* (18 no./ltr.) and *Brachionus calyciforus* (34 no./ltr.),

In site C, during 2014-2015, 29 species of rotifera were recorded among which *Filenia opliensis* (45 no./ltr.) was dominant followed by *Brachionus bidentatatus* (35 no./ltr.), *Rotaria neptunia* (34 no./ltr.), *Horaella brehmi* (38 no./ltr.), *Lepadella ovalis* (39 no./ltr.), *Brachionus caudatus* (26 no./ltr.), *Brachionus formadivergens* (25 no./ltr.), *Cephalodella gibba* (24 no./ltr.), *Monostyla bulla* (26 no./ltr.), *Philodina roseola* (28 no./ltr.), *Brachionus forficula* (21no./ltr.),*Brachionus falcatus* (27 no./ltr.), *Platyias quadricornis* (20 no./ltr.), *Keratella tropica* (24 no./ltr.), *Testudinella macroneta* (21no./ltr.), *Asplanchna intermedia* (18 no./ltr.), *Brachionus plicatilsi* (22 no./ltr), *Polyarthra vulgaris* (18 no./ltr.), *Asplanehnopus myrmeleo* (11 no./ltr.), and *Trichocera rattus* (9no./ltr.).

In site D, during 2014-2015, 19 species of rotifera were recorded among which *Brachionus bidentata* (68 no./ltr.) was dominant followed by *Brachionus furficula* (56 no./ltr.), , *Tripleuchlaris plicata* (26 no./ltr.), *Brachionus plicatilis* (18 no./ltr.), *Brachionus angularis* (27 no./ltr.), *Cephalodella gibba* (16 no./ltr.), *Brachionus quadridentatus* (23 no./ltr.), *Brachionus calyciforus* (28 no./ltr.), *Cephalobdella gibba* (42 no./ltr.), *Keratella vulga* (39 no./ltr.), *Brachionus angularis* (42 no./ltr.), *Platyias quadricornis* (29 no./ltr),*Lepadella ovalis* (24 no./ltr.), *Rotaria neptunia* (23no./ltr.), *Horaella brehmi* (38 no./ltr.), *Monostyla bulla* (14 no./ltr.) ,*Lepadella ovalis* (30 no./ltr.), *Brachionus forticula* (48no./ltr.) and *Trichocerca tigris* (24 no./ltr.)

Charjan, *et.al.*, (2008) stated that the presence of *Brachionus sp.* is a precise indicator of the eutrophic nature of a lake. Higher diversity of a *Brachionus sp.* in the zooplankton community indicates that most of the ponds are polluted by the organic detrivs, sourced from domestic sewage. Isaiarasu *et.al.,* (1995) and Malathi, *et.al., (*1999) recorded several species of *Brachionus* from highly polluted in Hussainsagar Lake Hyderabad. Ahmad, U. *et.al.*, (2011) recoreded 11 genera belonging to rotifers i.e. *Brachionus calciflourous, Brachionus bidentata, Brachionus angular, Brachionus plicatilis, Asplanchna peridontata, Keratella, Notholca, Monostyla, Rotaria* and *Fillinia longisita.* Gadekar, G.P. (2014) recorded among the rotifera *Brachionus terminalis, Brachionus angularis, Brachionus falcatus, Cephlodella gibba, Keratella tropica, Lecane sp.* were the dominant species in Railway Pond, Gondia. Plankton particularly, rotifers have long been known as indicators of water quality, observed Arora, (1966).

In the present investigation dominance of rotifera as a group as well as *Brachionus sp.* in site A, B, C and D indicates the eutrophic nature of Valvan Lake. During the present investigation, rotifers were maximum during the winter season in site B, C and site D and minimum during the monsoon season in site A of the lake. Rotifers consume nutrients rapidly

to build up their population (Sabboor and Altaf, 1995). Kedar, (2007) observed maximum Rotifera during March and minimum during July. Nirmal Kumar, J.I. *et.al.*, (2011) recorded maximum population of rotifers during the summer and minimum during the monsoon in Varasda wetland system. Goswami A.P.Mankodi,P.C.(2012)recorded apredominance of rotifers in winter in the water reservoir Nyari-II, Rajkot Gujrat. Abdar (2013) reported maximum density of rotifer was recorded during post monsoon months and minimum during rainy season. Jaiswal, D.P. *et.al., (*2014) reported maximum population density of rotifers was observed) during summer season while minimum during monsoon season in a freshwater Rangavali Dam of Navapur ,Nandurbar. Gunwant P. Gadekar (2014) in his study stated that the population density of rotifers was maximum in winter, in the month of December and minimum in monsoon, in the month of June in Pangdi Lake, Gondia, Gondia, (M.S.) and Shashikant R. Sitre (2014) founded Rotifers were minimum in monsoon in Naik Lake Nagpur (M.S.).

To conclude the present investigation, it is observed that maximum rotifera during the winter is probably due to availability of suitable food and favorable temperature, large quantities of domestic sewage and minimum density in monsoon season which could be due to dilution of water resulting in fewer nutrients or could be due to reduction of transparency and dissolved oxygen. Similar observations were also recorded by Goswami, A.P. and Mankodi, P.C. (2012).

**Table No. 1: Seasonal variation of Rotifera in Valvan Lake at Site-A during year 2014-2015**

| S.N. | Parameter | Summer | Monsoon | Winter | Total |
|---|---|---|---|---|---|
| 1 | Rotifera | 15.36 ± 4.62 | 89.44 ± 40.10 | 56.38 ±27.62 | 53.72± 14.69 |

**Table No. 2: Seasonal variation of Rotifera in Valvan Lake at Site-B during year 2014-2015**

| S.N. | Parameter | Summer | Monsoon | Winter | Total |
|---|---|---|---|---|---|
| 1 | Rotifera | 21.89 ± 5.13 | 120.98 ± 43.19 | 61.30 ± 45.64 | 68.05 ± 18.54 |

**Table No. 3: Seasonal variation of Rotifera in Valvan Lake at Site-C during year 2014-2015**

| S.N. | Parameter | Summer | Monsoon | Winter | Total |
|---|---|---|---|---|---|
| 1 | Rotifera | 25.60 ± 4.22 | 102.65 ± 18.36 | 46.38 ±31.62 | 58.21 ± 16.59 |

**Table No. 4: Seasonal variation of Rotifera in Valvan Lake at Site-D during year 2014-2015**

| S.N. | Parameter | Summer | Monsoon | Winter | Total |
|---|---|---|---|---|---|
| 1 | Rotifera | 25.45 ± 5.02 | 136.51 ± 43.24 | 56.38 ±27.61 | 72.78 ± 15.68 |

**Table No. 5: Yearly Statistical data of Rotifera in Valvan Lake during year 2014-2015**

| S.N. | Parameter | A | B | C | D | Total |
|---|---|---|---|---|---|---|
| 1 | Rotifera | 53.72± 14.69 | 68.72 ± 18.54 | 58.21 ±16.59 | 72.78 ±15.68 | 63.35± 1.41 |

Graphical representation of Seasonal variation of Diversity of Rotrifera in Valvan lake at various sites during year 2014-2015 is presented below

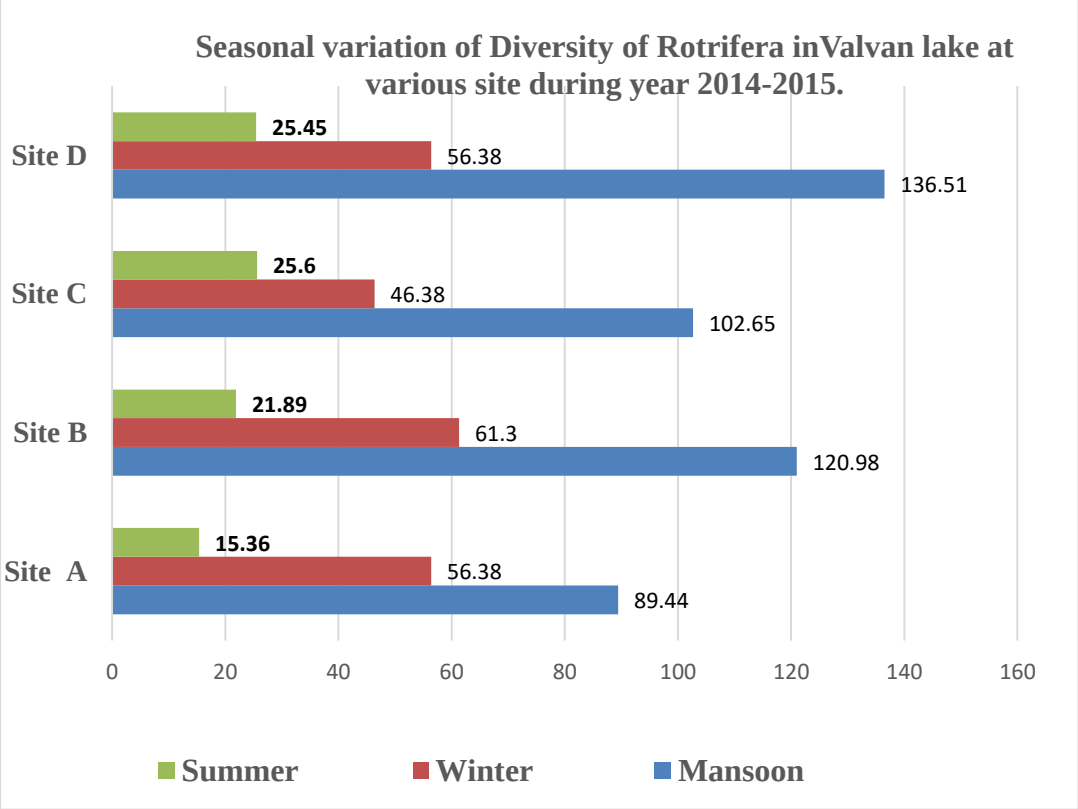


**Figure 1**

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