Composition and monthly variation in Zooplakton diversity at Laxmiwadi reservoir from Kolhapur District, Maharashtra (India)

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ABSTRACT

The present study was made to reveal the composition and monthly variation in zooplankton diversity at Laxmiwadi reservoir from Kolhapur district of Maharashtra, India. The study revealed that 16 species of zooplankton were noticed, belonging to 6 groups namely, rotifers, cladocers, copepodes protozoa and ostracods. Compositionwise copepode were noted dominant while based on monthly variation, rotifers and copepod,both occupy top place showing dominancy. All four groups have shown monthly variation during both the years and noted lower during monsoon season while higher during winter as well as summer season. Cladoceran group was an only exhibited its presence throughout the study period. Based on the present investigation it can be concluded that the water from the reservoir is tending towards pollution as polutant tolerant copepode and pollutant succeptible rotifer group were dominant.

Keywords: *Zooplankton, Composition, monthly variation, diversity, pollution status, Laxmiwadi reservoir*

Introduction:

Zooplankton plays a principle role within the water bodies as a source of food for fishes, since they occupy the second trophic level as primary consumer. Jeje and Fernando (1986) emphasize that the distribution of zooplankton is influenced. Zooplankton are an important biotic entity which are directly affected by anthropogenic activities. Hence, preliminary assessment of zooplankton diversity and composition provide baseline data to manage the wetlands on strategic level. Zooplankton communities are responsive to nutrient levels, temperature and pollution and can be used to determine the health of an ecosystem. These are typically tiny animals found near the surface of the aquatic environments (Patil *et al.,* 2015). Like phytoplankton, zooplankton are usually poor swimmers, drifting along with the water currents and being the key components of fresh water ecosystem from the base of most freshwater food webs.

Materials and Methods:

Study Area:

Laxmiwadi tank was constructed in the year 1977-78 by Zilla Parishad. It is situated in the vicinity of Hatkanangle Tahsil of Kolhapur district. It is about 7 km away from Hatkanangle, towards west side. It covers an area of about 102 ha with an average water spread area, of about 10.6 ha. It is basically used as a source of drinking water and for domestic purpose, it exhibit fluctuating trend in its water level. Laxmiwadi tank was characterized by absence of littoral and submerged vegetation. The water level declines and characterized by anthropogenic activities and absence of molluscan fauna. For fishery purpose, it was auctioned on lease for the period of three years to the local fishermen community (Manjare, 2015).

Zooplankton Analysis:

The present study was carried out from January 2011 to December 2012. The water samples were collected by filtering 100 liters of water monthly through plankton net made up of bolting silk with pore size of 50 µ for the analysis of plankton and brought to laboratory and 4% formalin was added. Qualitative and quantitative analysis of

zooplankton was carried out in the laboratory by using Sedgwick- Rafter cell counting chamber as suggested by Adoni *et al.* (1985) and Trivedy and Goel (1984). Identification of plankton were carried out by using keys by Needham and Needham (1962), Adoni *et al.* (1985), Michael (1984) and Tonapi (1980).

Results and Discussion:

During the period of present investigation 16 species of zooplankton were noted. These species are belonging to 5 major groups i.e. Rotifera, Copepoda, Cladocera Protozoa and Ostracoda. Among all the four major groups 5 species of Rotifers (*Brachionus calciflorus, Brachionus forficula, Brachionus quadrientata, Keretella tropica* and *Keretella quadrata*), 5 species of copepods (*Encyclop sprinophorus, Mesocyclops luckart, Mesocyclop sp., Nauplius sp.* and *Paracyclops sp.*), 3 species of Cladocers (*Daphnia carinata, Monia brachiate* and *Cyprissub globusa*), 2 species of Protozoa (*Paramoecium quadatum and Arcella discoldes*) and 1 species of Ostracodes (*Cypris sp.*) were identified during the tenure of study. The total numbers of zooplankton were ranged between 202 org/l and 3132 Org/l during 2011 and 221 Org/l to 3537 Org/l during 2012 (Figure 1). The percent composition of zooplankton indicated 38.92% of copepods, 28.99% of rotifers, 19.28% of cladocers and 12.79% of ostracodes during 2011 (Figure 2). However, the percent composition of zooplankton during 2012 (Figure 3) was rotifers with 29.29%, cladocers with 19.98%, copepods with 38.02% and ostracodes with 12.69%. During initial analysis two species of protozoan were observed but later on during the monthly analysis, protozoan group was totally absent. Based on percent composition copepods were noted dominant during both the years.

During the year 2011 (Figure 4), the number of rotifers fluctuated from 0 org/l to 992org/l. However, year 2012 (Figure 5) exhibited the rotiferan organisms from 0 org/l to 1143 org/l. The number of rotifers was noted lower in the month of August and September during both the years while these were higher in the month of November during both the years. Probably, the number of rotifers decreased during monsoon months and increased during winter months directly inter-relate with light penetration and consequently phytoplanktonic growth. Rotiferans are considered as a significant component of the zooplanktons and exhibit a very wide range of morphological variations and adaptations. Among the zooplankton rotifers respond more quickly to the environmental changes and used as a change in water quality (Gannon and Stemberger 1978). Rotifers are regarded as Bio-indicators of water quality. The present study exhibited monthly variation in the number of rotiferan organisms.

The number of copepods were varied from 0 org/l (July) to 1260 org/l (March) during 2011 (Figure 4). The number of copepods were varied from 0 org/l (July) to 1312 org/l (December) during 2012 (Figure 5). Copepods are considered as important food item for various kinds of fish, play a key role in the energy transformation at different trophic levels. As a nature of copepod they prefer Eutrophication environment to grow in high number. The species diversity and dominance among Copepoda have been reported by several investigators, Gouder and Joseph, (1961) and Rajashekar *et al.* (2010). Khan *et al.* (1986) observed the seasonal change of the copepods in sewage fed ponds of Aligarh. Patil *et al.* (2015) have also noted copepods as a dominant group at Ningudage freshwater body and furthermore emphasized that the copepods are pollution tolerant. According to Dahlia and Vyas (1992), Cyclops is pollution tolerant, found abundantly in nutrient rich environments and thus can be considered eutrophication indicators.

The year 2011 (Figure 4) exhibited cladocers as 0 org/l (minimum) in the month of August and 632 org/l in the month of February (maximum). However, year 2012 (Figure 5) exhibited the cladoceron organisms from 0 org/l to 724 org/l. The number of cladocers were noted lower in the month of August and higher in the month of December during 2012. From the ecological point of view Cladocerans considered to be most important components of zooplankton community. As the Cladocers are prefer to live in clear waters, the diversity revels that the lake water is good environmental condition and less anthropogenic activity Similar results found by Ndebele (2012).

The number of ostracods ranged between 0 org/l to 453 org/l during 2011 (Figure 4) and 0 org/l and 483 org/l during 2012 (Figure 5). The minimum number of ostracodes were noted in the months of June and July during both the years while maximum in the month November during both 2011 and 2012. The Ostracods are the entomostracans crustaceans having the bivalve carapace enclosing the laterally compressed body. They inhabit all kinds of fresh and marine water.

Conclusion:

The present study concludes that qualitatively rotifers as well as copepods were dominant during both the years and occupies top position among other groups of zooplankton. However, Copepodes were dominant by the means of quantity. Based on the present investigation it can be concluded that the water from the reservoir is tending towards pollution as polutant tolerant copepode and pollutant succeptible rotifer group were dominant.

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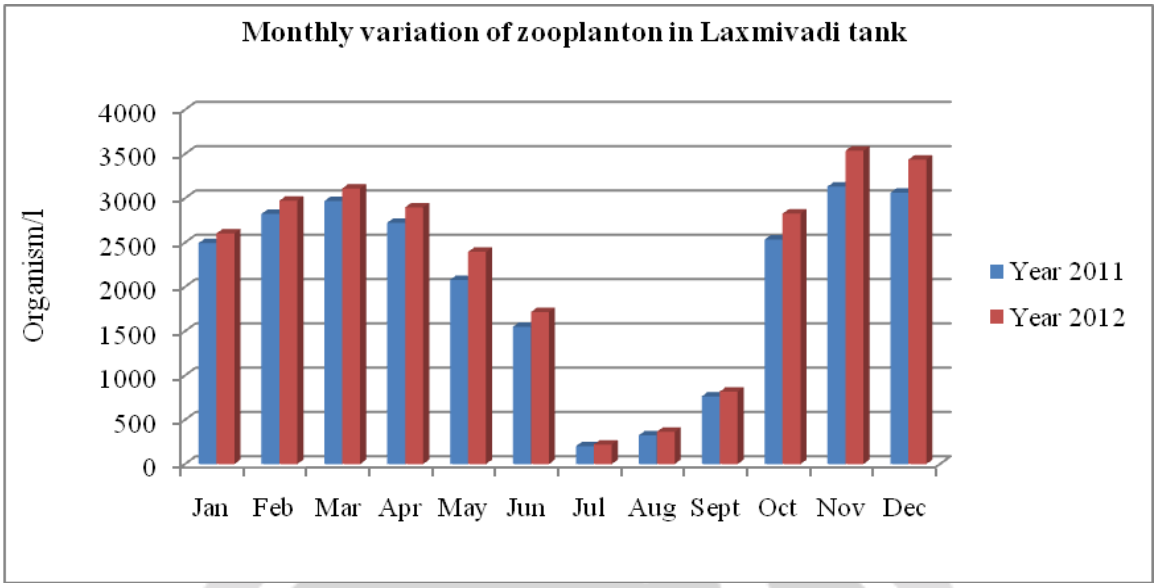

Figure 1: Mothly variation of zooplankton in Vadagaon tank during 2011 and 2012

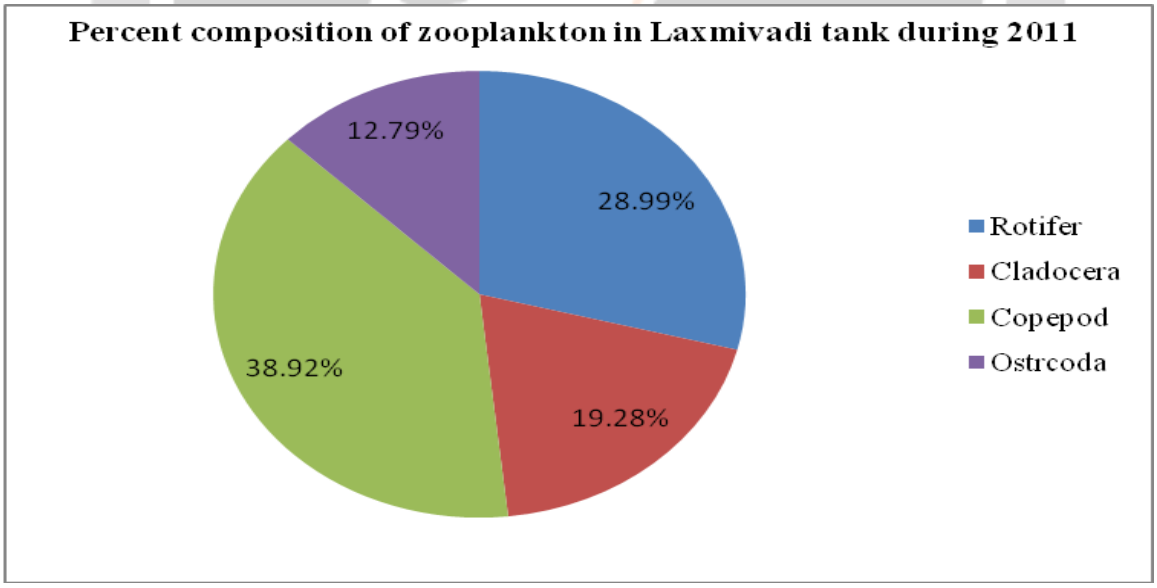

Figure 2: Percent composition of zooplankton in Laxmiwadi tank during 2011.

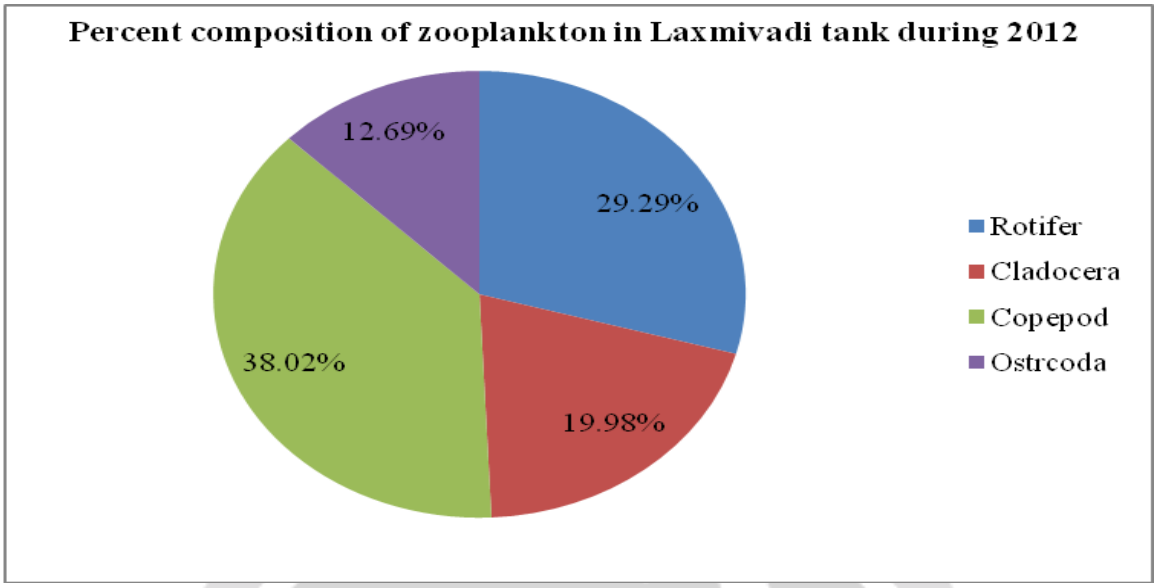

Figure 3: Percent composition of zooplankton in Laxmiwadi tank during 2012.

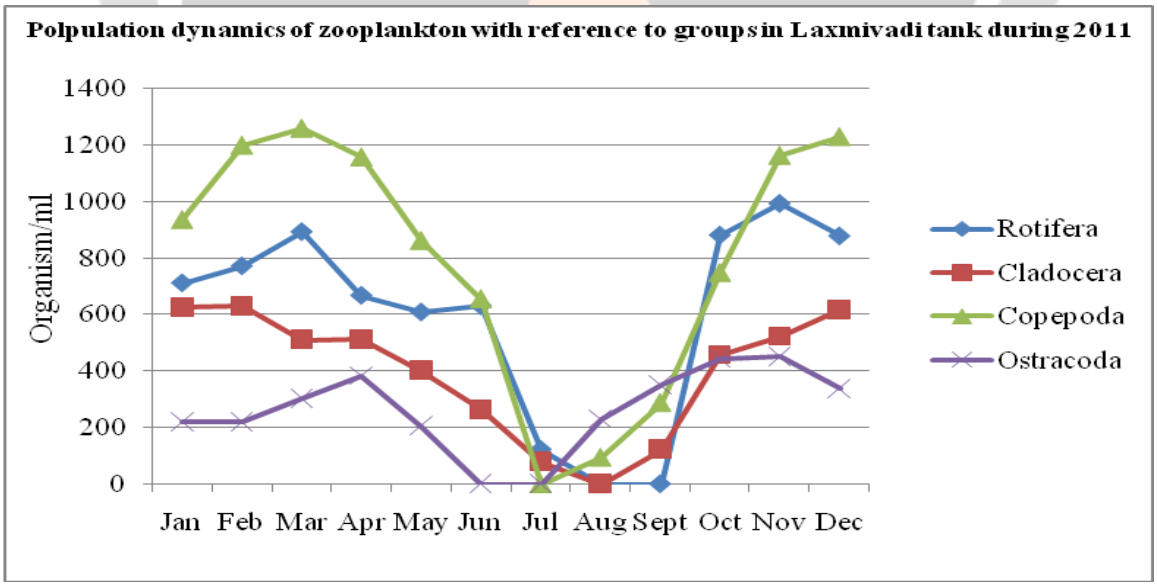

Figure 4: Density of zooplanktons with reference to groups during 2011.

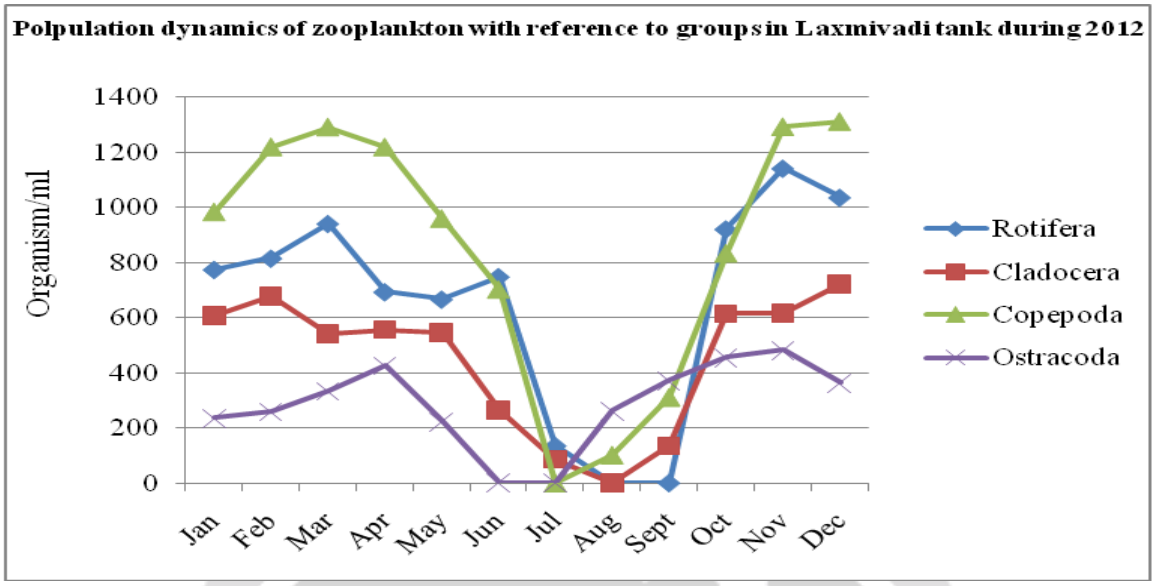

Figure 5: Density of zooplanktons with reference to groups during 2012.