

A Study on Zooplankton Diversity of Sogal pond in Belagavi District, North Karnataka

Shivshankar S. Abbai*

Professor & Head, Department of Zoology, KLES R. L. Science Institute (Autonomous), Belagavi,
Karnataka, India. *

ABSTRACT: Sogal pond is located at 150 51' 35" North latitude and 740 58' 28" East longitudes having rich diversity of aquatic vegetation though situated among the highly polluted area of the town. Zooplanktons play a significant role as primary consumers. The present investigation was carried out selecting a pond of Belagavi district during June – 2016 to July – 2017. During the study presence of 16 different species belonging to 3 different groups namely 43% Rotifera, 36% Cladocera and 21% Copepoda of total zooplanktons were recorded. Abundance status and population density of the Zooplankton groups were also recorded. Among the 3-zooplankton groups, Rotifera was found to be dominant group constituting 43% of the Zooplankton population. Higher population densities of Zooplankton were recorded during winter season and lower during the summer season.

KEYWORDS: Zooplankton, Diversity, Sogal, Seasonal.

I. INTRODUCTION

Ecologically zooplankton are one of the most vital biotic components influencing all the functional and biological aspects of an aquatic ecosystem such as food chains, food webs, energy flow and cycling of matter [1]. Zooplankton are a group of important organism of key importance in regulating patterns and mechanisms through which matter, energy and pollutants are transferred from the base to the upper levels of an aquatic food webs. It plays a crucial role in aquatic ecosystem as they are cosmopolitan in nature and they inhabit all freshwater habitats of the world [2]. As broad as the taxonomic composition of zooplankton, is their size range. Although they are usually very small, so most of their components are only visible through a microscope or a magnifying glass, usually they are less than one millimetre in length, some gelatinous forms jellyfish and related organisms are in the range size from centimetres to meters [3]. This article briefly describes the importance of zooplanktons in the environment and diversity in Sogal pond.

II. MATERIALS AND METHODS

Study area:

Sogal pond is located at 150 51' 35" North latitude and 740 58' 28" East latitude. Located in Belagavi district of North Karnataka. The surface water run towards south and forms a fall in front of the temple a pilgrim place for devotees. Earlier pond water was used for drinking but due to anthropogenic activities pond is polluted and unfit for drinking.

Zooplankton sampling:

The study was conducted for a period of one year from June – 2016 to July – 2017. The sampling protocol included weekly sampling of Zooplankton from the site following standard literature of Battish (1992) [4].

Zooplankton sample collection:

Water samples were collected monthly by using plankton net made of bolting nylon cloth. (No: 25 and 60 μ in size) by sieving a known volume of water sample. Samples were fixed in 4% formalin and preserved in 50 ml bottles. Numerical estimation of zooplankton was done under microscope using Sedge-Wick Raftar Cell. Average 10 counts were made for each sample and expressed in numbers per liter.

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III. STATISTICAL ANALYSIS

All the experimental data were entered and analyzed using IBM SPSS Statistics software Inc., version 20.0 (Armonk, NY: IBM Corp.).

IV. RESULTS AND DISCUSSION

During the present investigation, 16 different species of zooplankton were recorded from the site belonging to three major groups. Table 1 represents the diversity of zooplanktons present during the months from June 2016 to July 2017. Rotifera formed the dominant group over cladocera and copepod. Density of various zooplankton thus, in the order rotifera>cladocera>copepod. Rotifers represented by six genera namely Brachionus, Keratella, Asplanchna, Trichocerca, Lecane and Filinia. The abundance statuses of Zooplankton groups were also recorded in Figure 1. The distribution of rotifers is not limited to any continent, however rotifers are cosmopolitan and rotifer species depends on their relations to environment and other species of the aquatic community [5]. The composition of rotifer population showed higher population in summer, while lower population observed in monsoon. This may be due to availability of food such as bacteria; organic matter of dead and decaying vegetation, perhaps may be due to the influence of copious quantity of rainwater and turbidity, which is drained into the reservoir [6].

Rotifer were recorded maximum in Feb (334 org/l) and minimum in Sept (87org/l). Seasonally they are abundant in summer and indicate the influence of temperature Figure 2. Similar observations have been recorded. Brachionus species recorded dominated the pond in summer (741 org/l) followed by winter (197 org/l) and 190 org/l in Monsoon indicating temperature dependent factor. Brachionus angularis (20 org/l) has been observed throughout the study period except June, July and August. While B. caudatus found in summer, monsoon and not in winter. B calyciflorus ranged 28 org/l to 10 org/l. B.forficula observed throughout the study period except September. Numerically they were 40 org/l to 12 org/l. Keratella tropica appeared in summer and early monsoon seasons. They were recorded maximum in Feb (40 org/l) and minimum in June (12 org/l).Tricocerca sps were also abundantly observed in summer and winter seasons. Asplanchna sps were observed from April to September. They were maximum in August (32 org/l) and minimum in April (19 org/l). Lecane sps were observed in summer8. Filinia longiseta were observed only in April. Keratella sps, Lecane sps and Filinia sps are abundantly found in the pond indicating the eutrophic status [7].

Table 1: Zooplankton species abundance of Sogal pond.

| ZOOPLANKTON | June | July | Aug | Sep | Oct | Nov | Dec | Jan | Feb | March | April | May |
|--------------------------------|------|------|-----|-----|-----|-----|-----|-----|-----|-------|-------|-----|
| Rotifera | | | | | | | | | | | | |
| <i>Brachionus angularis</i> | - | - | - | + | + | + | + | + | + | + | + | + |
| <i>B. caudatus</i> | + | + | + | + | - | - | - | - | + | + | + | + |
| <i>B. calyciflorus</i> | - | - | - | - | - | - | + | + | + | + | + | + |
| <i>B. forficula</i> | + | + | + | - | + | + | + | + | + | + | + | + |
| <i>Keratella tropica</i> | + | + | - | - | - | - | - | - | + | + | + | + |
| <i>Trichocerca cylindrical</i> | - | - | + | + | + | + | + | - | + | + | + | - |
| <i>Asplanchna priodonta</i> | - | - | - | - | + | + | + | + | + | + | + | - |
| <i>Lecane monostyla</i> | + | + | + | + | - | - | - | - | - | - | + | + |
| <i>Filinia longiseta</i> | + | + | - | - | - | - | - | + | + | + | - | + |
| Cladocera | | | | | | | | | | | | |
| <i>Daphnia carinata</i> | + | + | + | + | + | - | - | - | + | + | + | - |
| <i>Ceriodaphnia cornuta</i> | + | + | + | + | + | - | - | + | + | + | + | - |

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|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| <i>Alona rectangular</i> | - | + | + | + | + | - | - | - | - | + | + | + |
| <i>Moina macrocopa</i> | + | + | + | + | + | + | + | - | - | - | + | - |
| <i>Macrothrix laticarnis</i> | + | + | + | + | + | - | - | - | - | - | - | - |
| <i>Chydorus reticulates</i> | + | + | + | + | + | - | - | - | + | - | - | + |
| Copepoda | | | | | | | | | | | | |
| <i>Rhinodiptomus sps</i> | + | + | + | + | + | + | + | + | + | + | - | + |
| <i>Mesocyclops leukarti</i> | - | - | + | + | + | + | + | + | + | + | + | - |
| <i>Tropocyclops prasinus</i> | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Nauplius larva</i> | - | - | - | - | - | - | - | - | - | - | + | - |

(-) indicates absent; (+) indicates present.

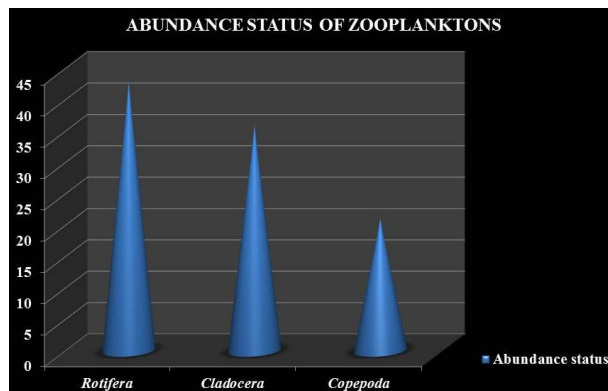


Figure 1. Abundance Status of Zooplanktons.

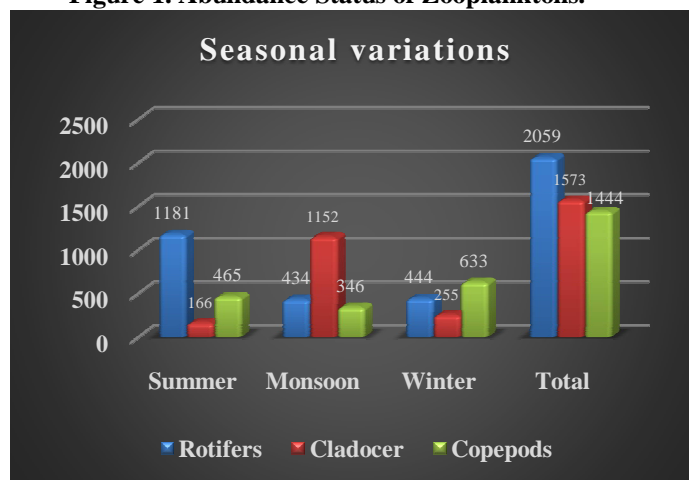


Figure 2. Seasonal variations of Zooplanktons in Sogal pond.

Cladocerans are small crustaceans commonly found in most freshwater habitats, including lakes, ponds, streams and rivers. While there have been a few marine species, cladocerans have definitely not been successful in seawater [8]. Bodies of freshwater that lack an abundance of fish that act as predators provide the most suitable habitats. Many species of cladocerans can be found residing in the open water of lakes, as do plankton. Some other species live either

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on or near vegetation near the bottom of lakes. They together form 31% of the zooplankton. *Daphnia carinata* abundantly found in monsoon. They recorded maximum in June (110 org/l) and minimum in Feb and March (20 org/l). *Ceriodaphnia cornuta* ranged 16org/l to 56 org/l. They appeared maximum in monsoon season. *Alona rectangularis* are recorded from 12 org/l to 42 org/l, seasonally they are abundant in monsoon followed by winter. *Moinanmacrocopa* are recorded from 10 org/l to 52 org/l. *Macrothrix laticornis* fluctuated between 12 org/l (Oct) and 32 org/l (Sept). Seasonally they were plenty in monsoon followed by winter. These are restricted to clean waters, indicated that during July and August anthropogenic activities have been considerably reduced, but as anthropogenic activities increased water body leads to eutropic condition. *Chydorus* sps were recorded minimum in Feb (16 org/l) and maximum in August (98 org/l). They were abundantly observed in monsoon season.

Copepods vary considerably, but can typically be 1 to 2 mm (0.04 to 0.08 in) long, with a teardrop-shaped body and large antennae. Like other crustaceans, they have an armoured exoskeleton, but they are so small that in most species, this thin armour and the entire body is almost totally transparent [9]. Some polar copepods reach 1 cm (0.39 in). Most copepods have a single median compound eye, usually bright red and in the centre of the transparent head; subterranean species may be eyeless. Like other crustaceans, copepods possess two pairs of antennae; the first pair is often long and conspicuous. Copepods were represented by *Rhinodiptomus indicus*, *Mesocyclops leuckartii*, *Tropocyclops prasinus* and Nauplius larvae. Copepods contributing 29% of the total net zooplankton. Similar trends are also observed in fort lake of Belgaum. They are moderately good numbers throughout the study period. Density of *R.indicus* fluctuated between 10 org/l and 48 org/l. *Mesocyclops* sps ranged from 18 org/l (April) to 48 org/l (Jan). *Tropocyclops prasinus* fluctuated between 28 org/l (March) to 68 org/l (August). Seasonally they were abundantly observed in winter season. Nauplius larvae were observed throughout the study period [10]. Copepods are found in clean as well as polluted waters, this is in conformity with the observations made by Patalas. Density of Copepoda were recorded to almost similar throughout the study period except slightly lower in summer season and slightly higher in winter season [11].

V. CONCLUSION

Zooplankton diversity of the Sogal pond revealed during the present study confirm the habitat to be rich for Zooplankton population and suitable for aquaculture, as Zooplankton are known to be the best food for fish larvae in aquaculture. Further, the study indicated that the plankton population of pond is highly influenced by contamination of discharge of domestic waste, floral offerings, washing clothes, cleaning vehicles, bathing and other anthropogenic activities. The shift in the zooplankton community dominance of pollution tolerance forms indicated deterioration of the water quality in the Sogal pond. Public awareness is required to know about the water quality and biodiversity. Although the aquatic habitat of the Pond is being highly disturbed by different anthropogenic disturbances like washing clothes and utensils, direct bathing in the pond, dumping of different kinds of waste materials from the shops and vendors nearby the Pond etc., yet there is diverse presence of the Zooplankton in Sogal pond. Thus, keeping the above in view, steps should be taken for maintenance and conservation of Sogal pond.

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