

## DIVERSITY OF ZOOPLANKTON IN THREE MAJOR LAKES OF HUSNABAD SURROUNDING AREA, TELANGANA STATE, INDIA

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### AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. Author BK designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors VSR and AJ managed the analyses of the study. Author TRR managed the literature searches. All authors read and approved the final manuscript.

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### ABSTRACT

In the present study the three different lentic water bodies were selected for the quantitative estimation of zooplankton in the surrounding area of Husnabad division. The present work carried out for one year from 2019 to 2020. The selected lakes were distanced between 40 to 50 km from Kakatiya University campus. During the study period, 15 genera of zooplankton belonging to four major groups were observed. Among the total zooplankton 7 species belongs to Rotifera, 3 belongs to Copepoda, Cladocera each and 2 belongs to Ostracoda. In all the four major groups the Rotifera group of zooplankton is dominated followed by Copepoda, Cladocera and Ostracoda. In the study period the highest number of zooplankton species observed in the summer season and lowest abundance observed in north east monsoon season in all the three lakes. The zooplankton results indicates that the selected three lakes were not much polluted and supports rich diversity.

**Keywords:** Zooplankton; lake; Rotifera; Brachionus and Copepoda.

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## 1. INTRODUCTION

India by virtue of its geographical position and varied terrain and climatic zones, is blessed with many rivers, which supports a rich diversity of inland and coastal water bodies. India's geographical area of about 329 m.ha is crisscrossed by a large number of small and big rivers (National Informatics Centre) and mountains. There are 12 major rivers, whose total catchment area is 252 million hectare. Of these major rivers, the Ganga - Brahmaputra - Meghana system is the biggest with a catchment area of about 110 m.ha, which is more than 43 percent of the catchment area of all the major rivers in the country.

The most significant threats to water resources are from point sources (sewage, industrial effluents, etc.) and from non-point sources (agriculture, urban etc.) Apart from these, dumping of solid wastes, chemical spills, thermal pollution, acid precipitation, mine drainage, etc. also contribute. Pollution of any form first affects the chemical quality of the water and then systematically destroys the community, disrupting the delicate food web in these aquatic ecosystems.

Less than 1% of all water on Earth is available for human consumption. This precious resource is not only being overexploited, but also is seriously degraded due to anthropogenic activities involving indiscriminate disposal of pollutants in water bodies, which have rendered it unfit for sustenance of life. (According to United Nations Environment Program (UNEP)) According to the United Nations Environment Program (UNEP), close to one quarter of the world's population may soon suffer from chronic water shortages. Most often human interactions with water take place in fresh streams, rivers, and lake waters. We need an abundance of fresh water to live. Globally, there are increasing problems related to the availability of freshwater. Composing more than 70% of the earth's surface, aquatic ecosystems are not only the dominant features of earth but are also very diverse in species and complexity of interaction among their physical, chemical and biological components. Zooplankton comprises of small (often microscopic) aquatic animals, and non-photosynthetic protists suspended or weakly swimming in water. Plankton forms an important component of fish food in aquatic environment and as such, the knowledge of their production and abundance is essential for successful management of fishery [1]. The intent of this section is to review briefly current knowledge of the structure and dynamics of the zooplankton and its ecology. The zooplankton occupies a central position between the

autotrophs and other heterotrophs and or an important link in food web of a freshwater ecosystem [2].

The study of inland water bodies has gained immense importance in recent years because of their multiple uses for human consumption, agriculture and industry. [3] documented a diversity of phyto and zooplankton in the ponds of coalfield areas of Jharkhand [4] studied zooplankton composition in freshwater lake Gulbarga, of north east Karnataka State. The main object of the study is to identify the trophical status of the lake.

## 2. METHODOLOGY

Zooplankton collections were made employing a modified Haron-Trantor net with a square metallic frame of area 0.0625 m<sup>2</sup> area. The filtering cone was made up of nylon bolting silk plankton net (No. 25 mesh size 50μ) was used for collection of zooplankton. Care was taken to avoid trapping of floating debris while towing the net. The net was hauled for a distance of ten meters. Collected samples were transferred to labeled vial bottles containing 4% formalin.

The qualitative estimation of zooplankton communities was carried out in the laboratory. Samples were kept for setting for a period of 48 hours. Three equal aliquots were drawn from the settled samples. Proportionate samples were drawn from above three aliquot and transferred on to Sedgwick-Rafter cell and planktonic organisms numerically counted and identified. The identification of zooplankton species was done by the Zoological Survey of India, Kolkata and the same was confirmed by [5,6,7,8,9].

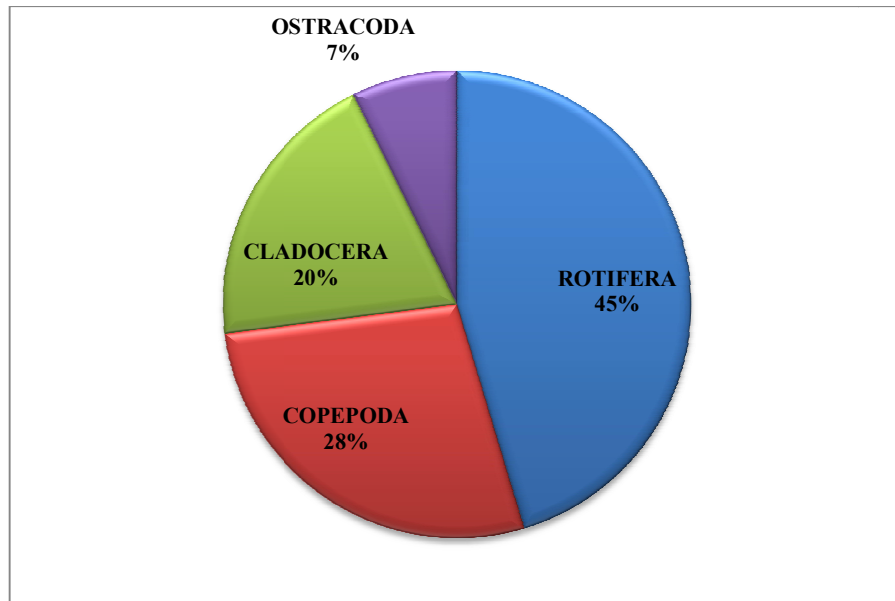
## 3. RESULTS AND DISCUSSION

The abundance order of zooplankton is depicted in Table 1. In the present investigation, 15 genera of zooplankton belongs to 4 major groups viz. Rotifera, Copepoda, Cladocera and Ostracoda were observed in the three different lentic water bodies of Husnabad surroundings mandal. Among the four major groups of zooplankton 7 belongs to Rotifera, 3 belongs to Cladocera, 3 belongs to Copepoda and 2 belongs to Ostracoda respectively. In the three lakes Mulkanoor lake shows high number of zooplankton when compared to other two lakes. The dominance order among the three lakes Mulakanoor lake followed by Husnabad and Bheemdevarapally lakes. [10] reported high diversity of zooplankton in kamareddy town lake.

**Table 1. Zooplankton abundance in three different lakes during the year 2019-20**

| Rotifera                                             | Mulkanoor lake |     |     | Bhemmdevarapally lake |     |     | Husnabad lake |     |     |
|------------------------------------------------------|----------------|-----|-----|-----------------------|-----|-----|---------------|-----|-----|
|                                                      | Summer         | SWM | NEM | Summer                | SWM | NEM | Summer        | SWM | NEM |
| <i>Brachionus angularis</i> (Goose, 1851)            | ++++           | ++  | +   | +++                   | ++  | ++  | +++           | ++  | +   |
| <i>Brachionus caudatus</i> (Barrois and Daday, 1894) | +++            | ++  | +   | +++                   | ++  | +   | ++            | +   | +   |
| <i>Brachionus falcatus</i> (Zacharis, 1898)          | ++             | +   | +   | +                     | +   | +   | ++            | +   | +   |
| <i>Keratella tropica</i> (Apstein, 1907)             | ++             | +   | -   | ++                    | +   | +   | ++            | +   | +   |
| <i>Keratella cochlearis</i> (Goose, 1851)            | +++            | ++  | +   | ++                    | +   | -   | ++            | -   | -   |
| <i>Cephadella gibba</i> (Muller, 1786)               | +              | -   | -   | +                     | +   | -   | +             | +   | -   |
| <i>Lecane luna</i> (Muller, 1786)                    | +              | +   | -   | +                     | -   | -   | +             | -   | -   |
| <b>Copepoda</b>                                      |                |     |     |                       |     |     |               |     |     |
| <i>Paracyclops fimbriatus</i> (Fischer, 1853)        | +++            | ++  | +   | +++                   | +   | +   | +++           | +   | +   |
| <i>Mesocyclops hyalinus</i> (Rehberg, 1880)          | ++             | +   | -   | ++                    | +   | -   | +             | +   | -   |
| <i>Mesocyclops leuckarti</i> (Claus, 1857)           | +              | +   | +   | +                     | +   | -   | +             | +   | -   |
| <b>Cladocera</b>                                     |                |     |     |                       |     |     |               |     |     |
| <i>Ceriodaphnia cornuta</i> (Sars, 1885)             | ++             | +   | +   | ++                    | +   | +   | ++            | +   | -   |
| <i>Moina macrocopa</i> (Straus, 1820)                | +              | -   | -   | +                     | +   | -   | +             | -   | -   |
| <i>Moina brachiata</i> (Jurine, 1820)                | +              | -   | -   | +                     | -   | -   | +             | -   | -   |
| <b>Ostracoda</b>                                     |                |     |     |                       |     |     |               |     |     |
| <i>Cypris</i> sp. (Claus, 1893)                      | +              | +   | -   | +                     | -   | -   | +             | -   | -   |
| <i>Heterocypris</i> (Claus, 1893)                    | -              | +   | -   | -                     | -   | -   | +             | -   | -   |

SWM = South West Monsoon, NEM = North East Monsoon seasons



**Fig. 1. Zooplankton density in all the three lakes during the year 2019-2020**

The observed species belongs to Rotifera is *Brachionus angularis*, *Brachionus caudatus*, *Brachionus falcatus*, *Keratella tropica*, *Keratella cochlearis*, *Cephadella gibba* and *Lecane luna*. Among the Copepoda group *Paracyclops fimbriatus*, *Mesocyclops hyalinus* and *Mesocyclops leukarti*. Among the Cladocera group *Ceriodaphnia coronata*, *Moina macrocopa* and *Moina barnchiata*. Among the Ostracoda group *Cypris sps.* and *Heterocypris*. In the Rotifera group *Brachionus angularis* is the dominant and low abundance species are *Lecane luna*. In the Copepoda group *Paracyclops fimbriatus* the dominant and less abundance species are *Mesocyclops leukarti*. In the Cladocera group *Ceriodaphnia coronata* is the dominant and low abundance species are *Moina barnchiata* and in the Ostracoda group *Cypris sp.* is the dominant and less present species is *Heterocypris*. Similar results were observed by [11] and [12].

During the summer season highest number of species were observed when compared to the south west monsoon season and north east monsoon seasons and the lowest number of species was observed in north east monsoon season in all the three selected lakes similar results were observed by [13]. During the study period there is a distinct seasonal variations of zooplankton with 'productive' (October to May), 'retardation' (June to August) and 'recovery' (September onwards) periods. During the present study Rotifera group of zooplankton were dominated and followed by Copepoda, Cladocera and Ostracoda respectively. Among zooplankton, rotifers are apparently the most sensitive indicators of water properties. Rotifers are the other important

components of zooplankton and are one of the principle links in the food chain. They have been widely used in assessment of aquatic pollution because of their sensitivity to small changes in environment, short generation time, parthenogenic mode of reproduction etc. [14] studied and found the environmental changes in the Rotifera group of zooplankton in Jagtial district lakes.

#### 4. CONCLUSION

Among the three lakes Mulkanoor lake shows rich diversified zooplankton followed by Bheemadevarapally and Husnabad lakes throughout the study period. Among the four major groups of zooplankton Rotifera group of zooplankton is dominated. This clearly indicates that the selected lakes were clearly suitable for aquaculture purposes. Because the Rotifera zooplankton is main food source to the fish larvae. The presence of the cladocers in the selected lakes indicates that the lakes were not much polluted.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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