# STUDIES ON ZOOPLANKTON DIVERSITY OF LOWER MANAIR RESERVOIR, KARIMNAGAR, (A.P.), INIDA.

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## *ABSTRACT*

***The study of zooplankton diversity of lower Manair reservoir was carried out from September 2009 to August 2011. During the study period, samples were collected monthly at four different stations. A total of 34 species of zooplankton belonging to 16 species of rotifera, 8 species of cladocera, 6 species of copepoda, 2 species of ostrocoda and 2 species of protozoa were identified. Rotifera was the most diverse zooplankton group in this reservoir. The K. tropica (10±3.00), B. caudatus (4.91±1.21) and B. angularis (4.33±1.48) were dominant than the other species of rotifera, while Alona pulchella (19.23±2.18) and Alona intermedia (12.61±1.87) among Cladocera, and Cyclops sp. (12.5±2.72) and Mesocyclops sp. (6.91±1.25) among Copepoda were the most abundance species.***

***KEY WORDS: - Lower Manair reservoir, zooplankton diversity***

## INTRODUCTION

Zooplankton organisms are identified as important component of aquatic ecosystem (Okogwu, 2010). They are one of the most important biotic components influencing all the functional aspects of an aquatic ecosystem, such as food chains, food webs, energy flow and cycling of mater (Dadhick and Sexena, 1999; Sinha and Islam, 2002). Anene (2003) also reported that they occupies an intermediate position in the food web and thereby, play an important role in the integration of energy budget of the aquatic ecosystem.

Zooplankton diversity and density refers to variety within community (Jalilzadeh *et al.*, 2008) and their diversity is one of the most important ecological parameters, as these are the intermediate link between phytoplankton and fish. They are also useful indicator of future fisheries health because they are a food source of organism at higher tropic levels (Davies *et al.*, 2008). The biomass abundance and species diversity of zooplanktons are used to determine the conditions of aquatic environment (MBO, 2007).

The distribution of Zooplankton community depends on a complex of factors such as change of climatic conditions physical and chemical parameters and vegetation cover (Rocha *et al.*, 1999; Neves et al., 2003). Zooplankton plays an integral role and may serve as bio-indicator and it is well suited food for understanding water pollution status (Beaugrand *et al.*, 2000; Li *et al.*, 2000; Pinto-Coelho *et al.*, 2005; Davies *et al.*, 2008; Contreras *et al.*, 2009,). Zooplankton has been a subject of study in India and several workers [Michael (1968a), Sinha and Islam (2002),

Pulle and Khan (2003), Pandit *et al.* (2007), Lokhande and Shembekar (2009); Thirupathaiah *et al.* (2011); Kehayias *et al.* (2013); Nimbalkar *et al.* (2013); Shah *et al.* (2013); Sharma *et al.* (2013a); Sharma *et al.* (2013b)] worked on it. The main objective of the paper was to determine the studies on zooplankton diversity of lower Manair reservoir water, Karimnagar.

## MATERILAS AND METHODS

The study was undertaken to evaluate zooplankton diversity in lower Manair reservoir, of Karimnagar District, Andhra Pradesh, India. It lies between North Latitude 18º.38' and East Longitude 79º.12'. The total area of the reservoir is about 8,103 hectares and maximum depth is 21.9 m. The climatic condition of the study area was hot summer and cool winter. The present study was conducted at periodic temperature range with a minimum of 29ºC and a maximum of 38ºC. The region got much rainfall from south west monsoon and maximum from June to September during the monsoon. In October and November, the region received rainfall from the north east monsoon. The average rainfall of this study area is 100.9 mm. The water of this reservoir is used for drinking, agriculture and supports fish culture.

Zooplanktons were collected monthly from four different sites of the lower Mannair reservoir during the study period (Sep-2009 to Aug-2011) (Figure 1). Samplings were made between 9.00 am to 11.30 am. Each sample was collected by filtering 20 liters of water through plankton net made up of nylon blotting silk plankton net (No. 25 mesh size 50µ). Filtrate was stored in 20 ml plastic bottles and 5 per cent formalin was added for sample preservation. The concentrated samples, thus, obtained were fixed with 4 per cent neutralized formalin, Lugol's solution (Lugol, 1829) and a few drops of glycerin, allowed to settle for overnight. Finally the quantitative analysis for the presence and dominance was done by using a Sedgwick-rafter cell method (Serfling, 1949). One ml of sample was transferred to Sedgwick-Rafter cell with a pipette; identification and enumeration were done by a Wild-stereo microscope. All the planktons present in cell were counted. The mean of five estimates was then calculated for each component occurring in the total count. The systematic identification of planktons were made by using standard keys of Edmondson (1959), Pennak (1968), Adoni, (1985), Michael and Sharma (1988), Dhanapathi (2000) and Altaff (2004).

## RESULTS AND DISCUSSION

In the present investigation, 34 species of zooplanktons belonging to 25 genera, 15 families and 5 groups were recorded in lower Manair reservoir. Out of 34 species, 16 species were of Rotifera, 8 species of Cladocera, 6 species of Copepoda and 2 species each of Ostracoda and Protozoa (Table 1). The percentage of different groups of zooplanktons presented in Figure 2 indicated that Rotifera, Cladocera, Copepoda, Ostracoda and Protozoa noted 34, 26, 23, 14 and 3 per cent, respectively, during September 2009 to August 2010, whereas it was 36, 28, 25, 10 and 1 per cent during September 2010 to August 2011, in that order (Figure 3).

Monthly abundance of different groups of zooplanktons were recorded during September 2009 to August 2010 are presented in Figure 4. The maximum abundance of Rotifera recorded in January 2010 and minimum represented in August 2010. High abundance of Cladocera recorded in September 2009 and low in May 2010. In case of Copepoda, high abundance recorded in May 2010 and low in October 2009, but not recorded any Copepods in September 2009. High abundance of Ostracoda recorded in June 2010 and minimum December 2009. The maximum abundance of Protozoa recorded in August 2010 and minimum January 2010, but not recorded any Protozoa in July 2010. Similarly, monthly abundance of different groups of zooplanktons were recorded during

September 2010 to August 2011 are presented in Figure 5. The maximum abundance of Rotifera recorded in January 2011 and minimum in August 2011. High abundance of Cladocera recorded in September 2010 and minimum in April 2011. In case of Copepoda, high abundance recorded in April 2011 and minimum in October 2010, but not recorded any Copepods in September 2010. High abundance of Ostracoda recorded in September 2010 and minimum January 2011. Maximum abundance of Protozoa species recorded in June 2011 and minimum in November 2010, but not recorded any Protozoa in July 2011.

The annual mean variations of zooplankton during September 2009 to August 2010 are presented in Table 2. Annual mean variation of Rotifera showed that *K. tropica* had the highest mean value (6.50±1.39) and lowest value was noted in *Synchaeta sp*. (0.66±0.28). Annual variation of cladocera showed that *Alona pulchella* had highest mean value (19.23±2.18) and lowest by *M. brachiata* (2.76±0.31). The results of copepoda showed that *Cyclops sp*. had the highest mean value (12.5±2.72) and lowest by *Nauplius larva* (1.33±0.46). The Ostracoda annual mean variation noted highest in *Stenocypris sp*. (10.66±2.24) followed by *Cypris sp* (8.33±1.42). The protozoa results showed that *Verticella campanula* had highest mean value (2.25±0.42) followed by *Paramecium caudatum* (1.5±0.28).

The annual mean values of different species of zooplankton during September 2010 to August 2011 are presented in Table 2. Annual mean variation of Rotifera was noted highest in K. *tropica* (10±3.00) and lowest by *Synchaeta sp.* (1.25±0.74). Annual variation of cladocera showed that *Alona pulchella* possessed the highest mean value (10.83±2.32), and lowest by *Bosmia sp.* (1.66±0.43). The copepoda results showed that *Cyclops sp*. had the highest mean value (12.33±2.17) and lowest in *Nauplius larva* (1.83±0.51). Annual variation of Ostracoda showed that *Cypris sp*. exhibited the highest mean value (8.91±1.08) followed by *Stenocypris* sp (4.91±1.10). The protozoa annual mean variation was highest in *Paramecium caudatum* (2.00±0.34) followed by *Verticella campanula* (1.50±0.23).

The *Brachionus sp*. and *Keratella sp*. were dominant than the other rotifera and their presence, for most of the times is throughout the study period. Diversity of rotifera was found to be influenced by different water quality and chemical factors (Chandrashekhar, 1996). In the present investigation, the rotifera population was recorded higher in winter and summer months, the similar results were also reported by Sinha, 1992 and Somani and Pejavar, 2003. Singh *et al.* (2002) reported that higher rotifer population occurred during summer months and winter months might be dominant due to hyper tropical condition of the reservoir at high temperature and low level of water. Among cladocera, the most abundance species were *Alona pulchella, Alona intermedia*, and *Daphania carinata (*Jayabhaye, 2010). In the present study, most abundant species of copepoda were *Cyclops sp. and Mesocyclops sp.* Under the present investigation, copepoda were found to be maximum number during summer months and minimum number monsoon months. Similar observation was made by Chauhan (1993). Maximum ostracoda population was recorded in summer months and minimum in monsoon months in the present study. Similar results were reported by Sunkad and Patilis (2004) and Mahor (2011). Protozoa recorded maximum in summer months and winter months and minimum in monsoon months. Similar observation made by Mahor (2011) and Krishnamoorthi and Selvakumar (2012).

## CONCLUSION

Zooplankton community was represented by five groups viz rotifera, cladocera, copepoda, ostrocoda and protozoa. Rotiferas were the most dominant zooplankton

group observed during the study period in lower Manair reservoir. The population of these species was maximum in summer and winter months and minimum in monsoon and therefore, water of this reservoir is suitable source for the supply of water for drinking, irrigation and fish culture. This reservoir water plays a very important role in maintaining the biodiversity of plankton.

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**Table 1: Diversity of zooplankton groups recorded in lower Manair reservoir during study period.**

| Groups | Family | Species |
|---|---|---|
| Rotifera | Brachionidae | *Brachionus angularis* (Gosse,1851) |
| | | *Brachionus calyciflorus* (Pallas, 1766) |
| | | *Brachionus caudatus aculeatus*(Haner, 1937) |
| | | *Brachionus diersicornis*(Daday, 1883) |
| | | *Brachionus quadridentata* (Hermann, 1783) |
| | | *Keratella cochlearis* (Gosse,1851) |
| | | *Keratella tropica* (Apstein, 1907) |
| | Lecanidae | *Lecane lunaris* (Ehrenberg,1982) |
| | | *Lacane monostyla* (Daday, 1897) |
| | Gastropodidae | *Gastropus minor* (Rousselet 1892) |
| | Asplanchnidae | *Ascomorpha ovalis* (Begendal, 1892) |
| | | *Asplanchna* sp |
| | Synchaetidae | *Synchaeta* sp |
| | | *Polyarthra vulgaris* (Carlin, 1943) |
| | Philodinidae | *Philodina citrine* (Ehrenberg, ) |
| | Testudinellidae | *Filinia longiseta* (Ehrenberg) |
| Cladocera | Daphnidae | *Daphania pulex* |
| | | *Daphania carinata* |
| | | *Monia micrua* (Kurz) |
| | | *Monia brachiata* |
| | Bosminidae | *Bosmina.* sp |
| | Chydoridae | *Alona pulchella* (King) |
| | | *Alona intermedia* (Sars) |
| | | *Alonella.* sp |
| Copepoda | Diaptomidae | *Cyclopoid copepodite* |
| | | *Diaptomus pallidus* |
| | | *Neodiaptomus* sp |
| | Cyclopidae | *Cyclops* sp |
| | | *Mesocyclops sp* |
| | | *Nauplius larva* |
| Ostracoda | Cypridídae | *Cypris* sp |
| | | *Stenocypris* sp |
| Protozoa | Parameciidae | *Paramecium caudatum* |
| | Vorticellidae | *Vorticella campanula* |

**Table 2: Annual mean variance of zooplankton species from lower Manair reservoir**

| Species/Group | Year 1 Sep. 2009 to Aug. 2010 (Mean±SE) | Year 2 Sep. 2010 to Aug. 2011 (Mean±SE) |
|---|---|---|
| **Rotifera** | | |
| 1. *Ascomorpha ovalis* | 2.5 ±0.72 | 2.16 ± 0.81 |
| 2. *Asplanchna sp* | 1.91±0.63 | 1.50±0.60 |
| 3. *B. angularis* | 3.25±1.28 | 4.33±1.48 |
| 4. *B. calyciflorus* | 1.66±0.37 | 3.5±0.90 |
| 5. *B. caudatus* | 5.33±1.45 | 4.91±1.21 |
| 6. *B. diersicornis* | 2.83±1.00 | 2.16±0.67 |
| 7. *B. quadridentata* | 3.00±0.79 | 3.5±0.99 |
| 8. *Filinia longiseta* | 2.25±0.60 | 2.25±0.50 |
| 9. *Gastropus minor* | 3.75±1.18 | 2.83±0.93 |
| 10. *K. cochlearis* | 1.83±0.54 | 2.58±0.71 |
| 11. *K. tropica* | 6.50±1.39 | 10±3.00 |
| 12. *L. lunaris* | 1.91 ±0.56 | 2.16±0.64 |
| 13. *L. monostyla* | 2.75±0.93 | 2.58±0.86 |
| 14. *Philodina sp* | 3.16±0.96 | 2.25±0.64 |
| 15. *Polyarthra vulgaris* | 2.66±0.73 | 2.16±0.45 |
| 16. *Synchaeta sp* | 0.66±0.28 | 1.25±0.74 |
| **Cladocera** | | |
| 1. *A. intermedia* | 12.61±1.87 | 5.58±1.69 |
| 2. *Alona pulchella* | 19.23±2.18 | 10.83±2.32 |
| 3. *Alonella* sp | 2.87±0.83 | 2.33±0.60 |
| 4. *Bosmia* sp | 2.92±0.35 | 1.66±0.43 |
| 5. *D. carinata* | 8.46±1.37 | 7.16±1.89 |
| 6. *Daphania puoex* | 9.38±1.24 | 5.66±1.08 |
| 7. *M. brachiata* | 2.76±0.31 | 2.50±0.45 |
| 8. *Monia micrua* | 4.76±1.08 | 3.25±1.14 |
| **Copepoda** | | |
| 1. *Cyclopoid copepodite* | 3.91±0.99 | 4.16±0.95 |
| 2. *Cyclops* sp | 12.5±2.72 | 12.33±2.17 |
| 3. *Diaptomus pallidus* | 3.66±0.84 | 4.91±1.15 |
| 4. *Mesocyclops* sp | 5.83±1.67 | 6.91±1.25 |
| 5. *Nauplius larva* | 1.33±0.46 | 1.83±0.51 |
| 6. *Neodiaptomus* sp | 4.33±1.26 | 3.91±1.00 |
| **Ostrocoda** | | |
| 1. *Cypris sp* | 8.33±1.42 | 8.91±1.08 |
| 2. *Stenocypris* sp | 10.66±2.24 | 4.91±1.10 |
| **Protozoa** | | |
| 1. *Paramecium caudatum* | 1.5±0.28 | 2.00±0.34 |
| 2. *Verticella campanula* | 2.25±0.42 | 1.50±0.23 |


**Fig. 1: Map of the study area showing the different sampling stations**

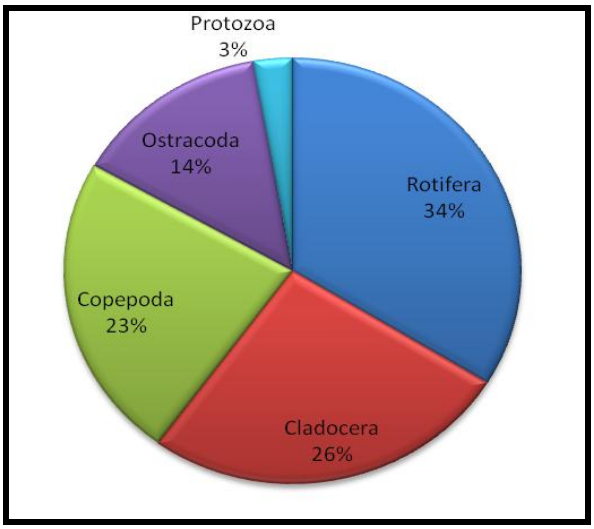


**Fig. 2:Species composition of zooplankton and relative percentage of each group (September 2009 to August 2010)**

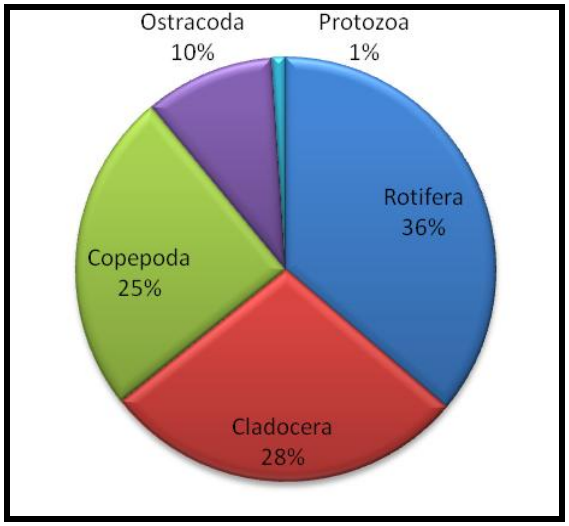


**Fig. 3:Species composition of zooplankton and relative percentage of each group (September 2010 to August 2011)**

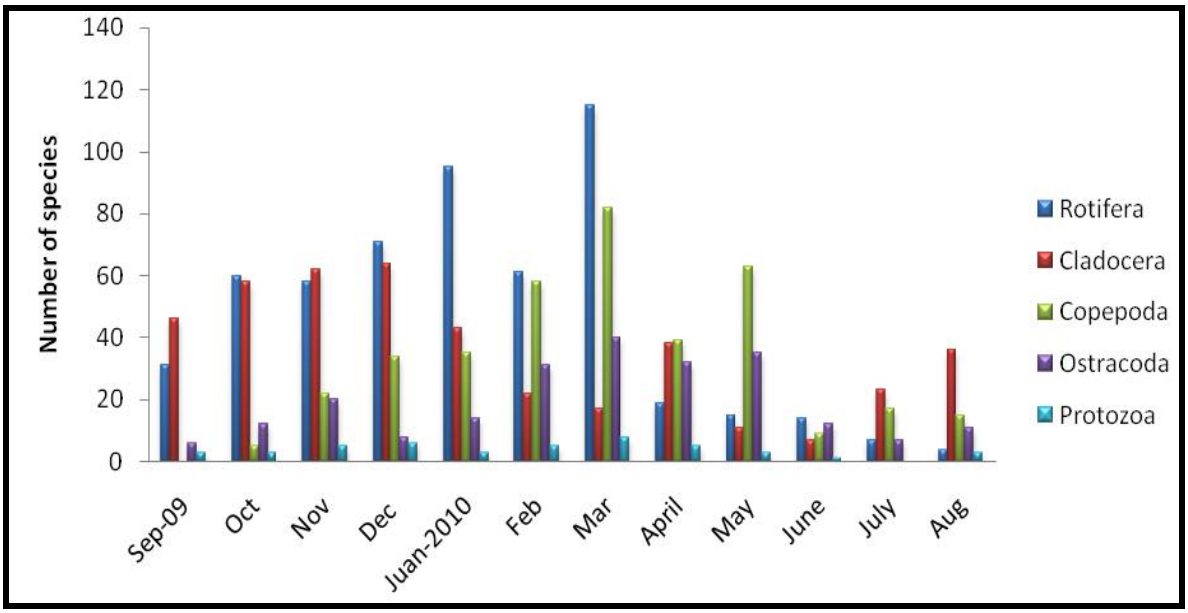


**Fig. 4: Monthly abundance of different groups of zooplankton (September-2009 to August-2010)**

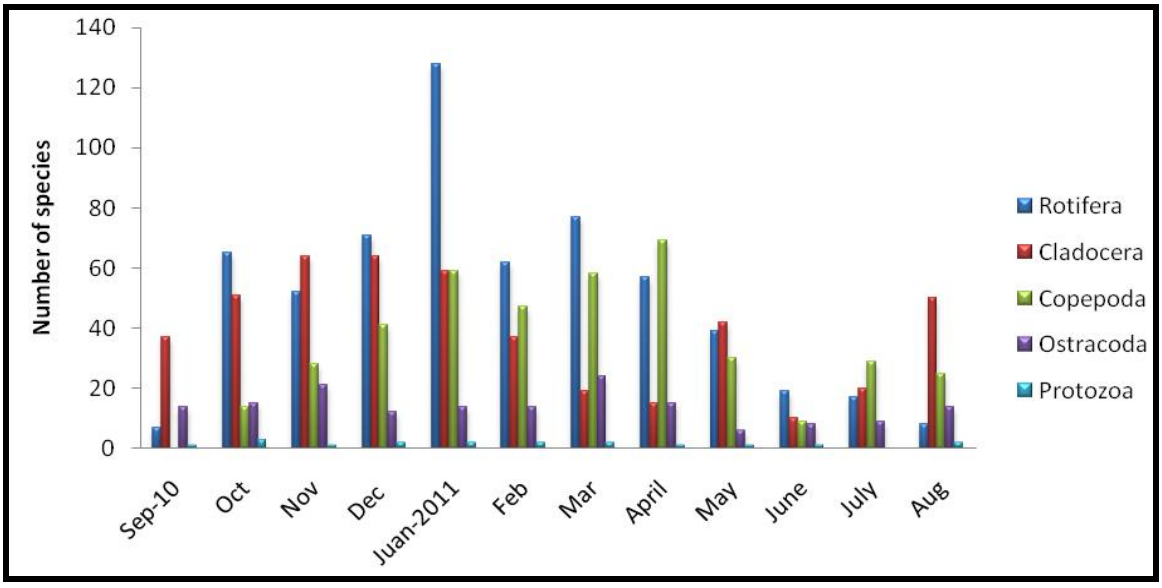


**Fig. 5: Monthly abundance of different groups of zooplankton (September-2010 to August-2011)**

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