

# Diversity of Zooplankton Community of Freshwater Lake Warangal District, Telangana State, India

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**Abstract:** The present investigation deals with the study of seasonal variations of diversity of zooplankton in wardhannapet freshwater lake in Warangal district. The work was carried out for a period of one year from June 2019 to May 2020. The present study contained a total of 23 species of zooplankton belonging to four different groups of zooplanktons were identified in this study which include Rotifera, Cladocera, Copepoda and Ostracoda. 11 species of rotifer, 5 species of cladocera, 4 species of copepod and 3 species of ostracoda. Rotifera group was found to be the most dominant among the other groups. The diversity and density of zooplankton species at wardhannapet freshwater lake during study period are as follows – Rotifera >Cladocera >Copepoda>Ostracoda. The various kinds of diversity indicate the Monthly and seasonal variation of zooplankton community and good quality of Lake Ecosystem. The total zooplankton population of this lake has Rotifera (45%), Cladocera (22%), Copepoda (18%) and Ostracoda (15%). Therefore it can be now concluded that this lake is highly potential to take up commercial fisheries.

**Keywords:** Zooplankton, Wardhannapet Freshwater Lake

## 1. Introduction

Plankton is most essential for many fishes as food. The growth of plankton feeding fishes mostly depends on plankton dynamics of the water body. Zooplanktons are the smallest organisms present in almost all the water bodies and they can be observed only through microscope. Zooplankton community distribution depends on some of the complex factors Viz, change of physico - chemical parameters of water and vegetation cover. In a fresh water system, the zooplankton forms are important group and constitute basic link of the food chain. Planktons are very sensitive to the environment they live in and any alteration in the environment leads to the changes in the plankton communities in terms of tolerance abundance, diversity and dominance in the habitat (Mathivonam, 2007). In ecologically zooplankton is 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 matter (Parkand shin, 2007). The zooplanktons are classified in various groups viz., Rotifera, Cladocera, Copapoda and Ostracoda. Planktons can determine the tropic status and quality of water of lakes and reservoir (Ganapati, 1962). A number of studies were carried out on the condition of ecology and freshwater bodies in varies different parts of India but in some parts of Telangana, the ecological studies of freshwater bodies especially zooplankton studies is very scanty. Present study on Zooplankton diversity abundance and seasonal variation in Wardhannapet fresh water lake of Warangal District, Telangana.

## 2. Materials & Methods

### Study Area

An important fresh water lake in Warangal District has been identified to assess its water quality. This lake is located at Wardhannapet. The objective of the study is to take up fish culture in this lake. Weir and Sluice are present in this lake. This lake shows good diversity of Ichthyofauna along with other fauna.



Figure 1: Location of Wardhannapet

### Zooplankton Sampling

During the study period of investigation monthly samples were collected by a plankton net made of silk bolting cloth silk no.25 (Mesh size 56 µm). Water sample (50 liter) was filtered through the net from littoral and open water zones and carefully transferred to 50 ml bottle and preserved in 4% formalin. Preserved samples were examined under a binocular microscope with different magnification. Quantitative analysis was done on a Sedgwick Rafter Counter cell by taking 1 ml sample. Taxonomic identification was carried out with the help of standard literature by Michael (1986); Kodarkar (1992) and Dhanapathi (2000).

## 3. Results & Discussion

The Zooplankton community in Wardhannapet Lake comprised of Rotifera, Cladocera, Copepoda and Ostracoda. A Total of 23 species of zooplankton were observed during the study which includes 11 species of Rotifers, 5 species of Cladocera, 4 species of Copepods and 3 species of Ostracoda. Monthly variation of the different groups of zooplankton are described in Table - 2 and density of the zooplankton at wardhannapet lake during the study period

are as follows–Rotifer> Cladocera > Copepod> Ostracoda. The higher density of zooplankton in the aquatic environment indicates that the lower parts of the food chain are healthy; we can protect the higher ordered organisms, like fish and other aquatic animals and even humans.

In the present study, Rotifera consists of 11 species. The minimum rotifer population recorded in monsoon season and maximum population recorded in the winter season, shown in Table - 1. Rotifera was found to be the dominant group and has higher diversity among zooplankton community. This group was dominated by *Brachionus falcatus* and *Keratella tropica* *Brachionus sp.* is the indication that the pond is organically polluted reported by Goel 1991. This is also agreed by Ahmed et al., 2012; Dutta and Patra, 2013. The species of *Brachionus calciflorus* considered to be a good indicator of eutrophication, reported by Manickam et. al., 2012. Rotifers are the most responsive to the environmental changes. They appear to be more sensitive indicators of changes in water quality (Gannon and Stremberger., 1978a; Majumder et al., 2015). In the present study, cladocera consists of 5 species. The minimum cladocera population recorded in monsoon season and maximum population recorded in the winter season, shown in Table - 1. The Maximum density of cladoceran was observed in winter due to the favorable condition of abiotic factors and availability of abundant food. Cladocerans are also reported to be the indicators of eutrophic nature of water bodies (Sharma 2001). This group was dominated by *Ceriodaphniacornuata* and *Daphniacarinata*. This group

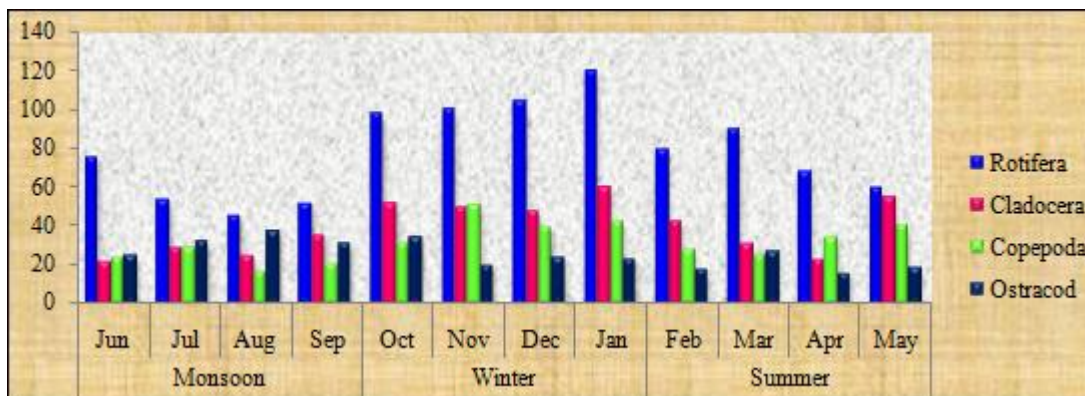
feeds on smaller zooplankton, bacterioplankton and algae; reported by Murugan (1998). Copepods are considered as an important food item for various kinds of fish and play a key role in the energy transformation at different trophic levels (Rajendran, 1973; Goswami and Singbal, 1977). In the present study, copepoda consists of 4 species. The minimum copepoda population recorded in monsoon season and maximum population recorded in the winter season, shown in Table - 1. This group was dominated by *Nauplius larva* and *Mesocyclops leukarti*. Ostracoda comprises of the least abundant group of zooplankton and this group is represented by *Cypris sp.* and *Heterocypris sp.* Ostracods are mainly bottom dwellers of lakes and live on detritus and dead phytoplanktons. These organisms are food of fish and benthic macro - invertebrates (Chakarapani et al., 1996). Ostracods occur in almost all aquatic habitats, the extreme antiquity of the group and the preservation of their valves in a wide variety of depositional environments make them an important tool in both palaeoecological and bio stratigraphic analysis (Armstrong 1980). In the present study, ostracoda consists of 3 species. The minimum ostracoda population recorded in summer season and maximum population recorded in the monsoon season, shown in Table - 1. This group was dominated by *Heterocypris sps.* The total zooplankton population of this lake has Rotifera (45%), Cladocera (22%), Copepoda (18%) and Ostracoda (15%) (Fig no - 3). During the present investigation, the total zooplankton population was dominated by Rotifers in this lake, followed by Cladocerans, Copepodes and ostracods.

**Table 1:** Shows Monthly variation of Zooplankton Population (Org/Lit.) in Wardhannapet Lake during the year from 2019 to 2020

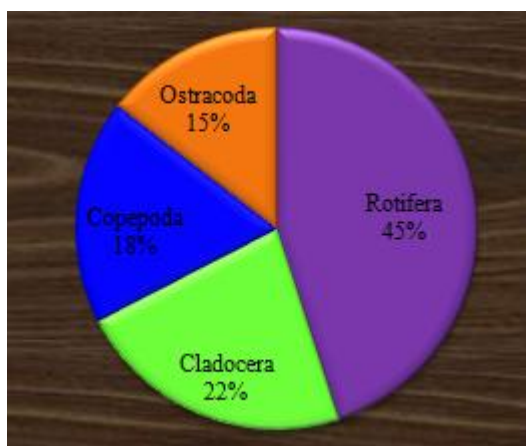
Group	Season Name of the Plankton	Monsoon					Winter					Summer				
		Jun	Jul	Aug	Sep	Tot	Oct	Nov	Dec	Jan	Tot	Feb	Mar	Apr	May	Tot
Rotifera	<i>Brachionuscaudatus</i>	7	4	1	3	15	9	11	8	9	37	8	9	4	7	28
	<i>Brachionusangulifloris</i>	10	8	5	7	30	11	10	9	12	42	8	6	4	7	25
	<i>Brachionuscalciflorus</i>	6	2	4	5	17	5	10	8	9	32	9	8	9	1	27
	<i>Brachionusfalcatus</i>	2	6	7	5	20	17	11	13	16	57	13	18	8	8	47
	<i>Keratella cochlearis</i>	7	2	1	3	13	9	12	10	9	40	7	8	9	8	32
	<i>Keratella tropica</i>	10	3	6	5	24	10	10	12	15	47	8	6	3	5	22
	<i>Filinia longiseta</i>	6	8	14	8	36	10	10	11	13	44	9	7	8	2	26
	<i>Lecane lunaris</i>	5	3	2	4	14	10	7	10	9	36	1	6	1	4	12
	<i>Lepadeili ovalis</i>	8	5	2	3	18	5	4	7	6	22	8	5	8	5	26
	<i>Testudinella patina</i>	8	7	1	3	19	5	6	8	10	29	5	9	5	3	22
<i>Asplanchnabrightwelli</i>	7	6	3	6	22	7	10	9	12	38	4	8	9	10	31	
<b>Total</b>	<b>76</b>	<b>54</b>	<b>46</b>	<b>52</b>	<b>228</b>	<b>98</b>	<b>101</b>	<b>105</b>	<b>120</b>	<b>424</b>	<b>80</b>	<b>90</b>	<b>68</b>	<b>60</b>	<b>298</b>	
Cladocera	<i>Daphnia carinata</i>	3	7	5	8	23	12	10	12	17	51	11	10	6	18	45
	<i>Ceriodaphniacornuata</i>	1	8	6	7	22	13	11	16	14	54	12	8	6	15	41
	<i>Moina Micrura</i>	7	6	4	6	23	9	12	10	15	46	6	5	4	5	20
	<i>Moina Branchiata</i>	5	4	1	8	18	7	10	4	6	27	4	1	1	9	15
	<i>Alona rectangular</i>	6	4	9	6	25	11	7	6	8	32	10	7	6	8	31
<b>Total</b>	<b>22</b>	<b>29</b>	<b>25</b>	<b>35</b>	<b>111</b>	<b>52</b>	<b>50</b>	<b>48</b>	<b>60</b>	<b>210</b>	<b>43</b>	<b>31</b>	<b>23</b>	<b>55</b>	<b>152</b>	
Copepoda	<i>Cyclops viridis</i>	3	2	4	6	15	5	10	9	8	32	5	4	8	8	25
	<i>Mesocyclops leukarti</i>	8	7	5	2	22	8	15	9	9	41	4	7	9	10	30
	<i>Mesocyclops hyalinus</i>	3	9	6	5	23	9	10	9	11	39	7	6	7	11	31
	<i>Nauplius larva</i>	10	11	2	8	31	9	16	12	15	52	12	8	10	11	41
<b>Total</b>	<b>24</b>	<b>29</b>	<b>17</b>	<b>21</b>	<b>91</b>	<b>31</b>	<b>51</b>	<b>39</b>	<b>43</b>	<b>164</b>	<b>28</b>	<b>25</b>	<b>34</b>	<b>40</b>	<b>127</b>	
Ostracoda	<i>Heterocypris sps</i>	9	12	13	12	46	12	7	8	6	33	5	9	7	4	25
	<i>Hemicypris fossucula</i>	10	9	12	9	40	9	6	7	9	31	6	8	5	7	26
	<i>Llycypris gibba</i>	6	11	12	10	39	13	7	9	8	37	7	10	4	8	29
<b>Total</b>	<b>25</b>	<b>32</b>	<b>37</b>	<b>31</b>	<b>125</b>	<b>34</b>	<b>20</b>	<b>24</b>	<b>23</b>	<b>101</b>	<b>18</b>	<b>27</b>	<b>16</b>	<b>19</b>	<b>80</b>	

**Table 2:** Seasonal Variation in the Zooplankton (Group wise) population at Wardhannapet Lake during the year from 2019 to 2020

S. No	Group	Monsoon	Winter	Summer	Total	%
1.	Rotifera	228	424	298	950	45%
2.	Cladocera	111	210	152	473	22%
3.	Copepoda	91	164	127	382	18%
4.	Ostracoda	125	101	80	306	15%
5.	Total	555	899	657	2111	100%



**Figure 2:** Monthly and Seasonal variation in Zooplankton Population at Wardhannapet Lake during the year from 2019 to 2020



**Figure 3:** Group wise distribution of zooplankton population in Wardhannapet Lake during the year from 2019 to 2020

#### 4. Conclusion

The present study on wardhannapet fresh water Lake exhibits rich and diversified Zooplankton which is dominated by Rotifera throughout the study period which reveals that the Lake is very much suitable for aquaculture as Zooplankton particularly rotifer are known to be the best food for the fish larvae for aquaculture.

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