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Zooplankton Diversity, Abundance and Seasonal Variation of Nagulakunta Water Tank, Vinjapally, Karimnagar Dist, Telangana State, India

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Abstract: ***A Study on zooplankton species abundance and diversity of Nagulakunta water tank, Vinjapally, Karimnagar dist, Telangana, India was conducted to check the status in the area to provide new insights into its ecology. Samples were collected during January 2011to December2011.Total 22 Species were found in the water tank. Among these, Rotifers comprise of 8 species, Cladocera 7,Copepods 5, and Ostracods 1. Zooplankton diversity and abundance refers to variety within the community. Numerically rotifere was dominant group throughout the study period. Some of the dominant zooplanktons present in the month of January. The season wise zooplankton analysis showed an average abundance of species in winter ,lower in July to October and maximum occurrence in November and January months due to the different environmental and inflow characteristics of the water body. The data collected so far, is being processed and discussed in the light of pollution status of the water tank.***

Keywords: Zooplankton, Seasonal variation, diversity, abundance, Nagulakunta water tank

1. Introduction

Zooplanktons are the smallest organisms present in almost all the water bodies and they can be observed only through microscope. They invariably form of an integral component for freshwater communities and contribute significant to biological productivity. Zooplankton acts as main sources of nutrient rich food for many fishes and they play an important role in early detection and monitoring the pollution of water. Zooplankton community distribution depends on some of the complex factors viz, change of physico-chemical parameters of water and vegetation cover.

Zooplanktons are considered as an important compartment of aquatic eco system for its role in the trophic equilibrium. It represents the channel of transmission of energy flux from the primary producers to the top consumers. These studies are assuming greater and greater significance as many of the species are being used as important line food organisms in aquaculture.

The zooplanktons community fluctuates according to physico-chemical parameters of the environment, especially rotifer species change with biotic factors **(Karuthapandi et al 2013).** Many workers have studied the zooplanktons of fresh water bodies both in India and abroad. The biodiversity of plankton and zooplankton are also rich in nature **(Kangasabapathi and Rajan,2010**). On the similar line **Jafari et al (2011)** studied the zooplankton diversity and compositions are correlated to the physico-chemical environment of the Haraz River (Iran). Zooplanktons are heterotrophic in nature and play important role in food web by link primary producers to higher trophic level.

The present study reveals that the different groups of zooplankton have their own peak periods of density, which is also affected by local environmental conditions prevailing at the time. Zooplankton by their hetero tropic activity plays a key role in the cycling of organic materials in an aquatic ecosystem and used as bio indicators.
A number of studies were carried out on the condition of ecology and fresh water bodies in varies different parts of India but in some parts of Telangana ,the ecological studies of fresh water bodies especially zooplankton studies is very scanty. So that the present investigation made an attempt to study the zooplankton species in Nagulakunta Water tank.

2. Material and Methods

Nagulakunta tank is located at Vinjapally village of Karimnagar Dist. Telangana State. The tank area in between longitude 17° 17′ 0″ N, -latitude 78° 38′ 0″ E, some of the benefits getting from the tank storage are irrigation potential of 1.0 hectares fisheries and cattle caring.

Google map of Nagulakunta water tank

Zooplankton sample collection, Preservation, Identification

Water samples were collected randomly in different locations of the tank during an early hours of the day 7.00AM-9.00AM for a period of one year Jan 2011 to Dec 2011 and such samples were pooled together to consider a final sample analysis. The plankton net is made by the bolting nylon silk (mesh size 50nm) is used for collection of zooplankton and which is conical shape and reducing cone with the bottle at its end. For a precise collection of zooplankton, the plankton net is towed horizontally and obliquely (For Quantitative) in surface water of the study area and for Quantitative analysis, 10 liters of water samples were filtered out through the net. After transferring the sample in air tight plastic bottles, it would keep carefully with labeling and preserved immediately using 4% formaldehyde. Later, the collected samples were brought to laboratory and analyzed quantitatively identified by using various authenticated monographs. After an accurate identification of each genus, the density of zooplankton was calculated as per the Lackey drop method.

The density of Zooplankton was expressed as organisms per liter using formula :

N = n* v/V

Where N= Total number of organisms/ Liter of water filtered

n= Number of organisms counted in 1 ml of sample.

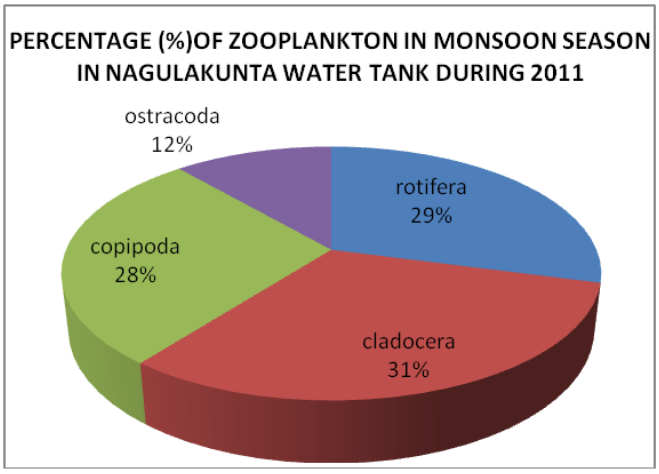
v= Volume of concentrated sample (ml)

V = Volume of total water filtered / Liter (ml)

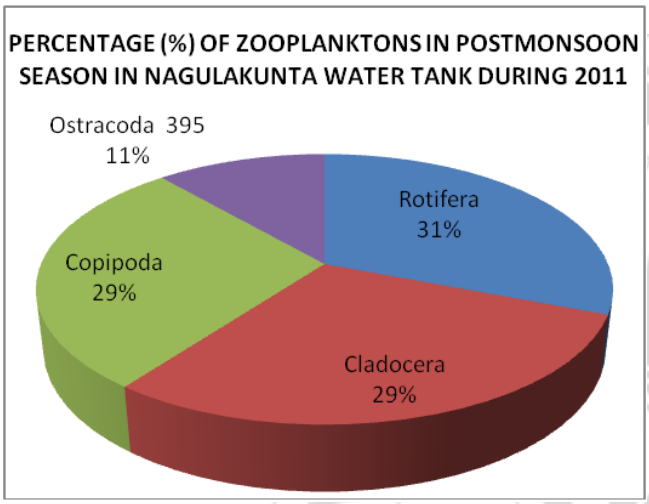
Group	*Name of the Plankton*	*Monsoon*	*Post monsoon*	*Premonsoon*
	Keratella	113	121	133
	Brachionus	225	235	266
	Hexarthra	129	155	163
	Epiphanus	143	168	192
	Rotaria	106	118	133
	Filina	140	120	137
	Cephalodella	85	92	101
Rotifera	***Ceacane***	50	63	61
	Total	**991**	**1072**	**1186**
	Daphniosoma	112	118	139
	Leydiga	134	146	169
	Cereodaphnia	387	325	382
	Alona	125	138	164
	Sida	125	121	129
	Lactona	85	86	105
Cladocera	***Leptodera***	99	83	97
	Total	**1067**	**1017**	**1185**
	Cyclops	329	326	362
	Mesocyclops	374	360	364
	Canthocamptus	112	125	134
	Diaptomus	94	116	128
Copepoda	***Heliodiaptomus***	47	58	71
	Total	**956**	**985**	**1059**
Ostracoda	***Cypris***	387	395	415
Total	***Total***	**387**	**395**	**415**

Season wise total percentage of Zooplankton in the study area

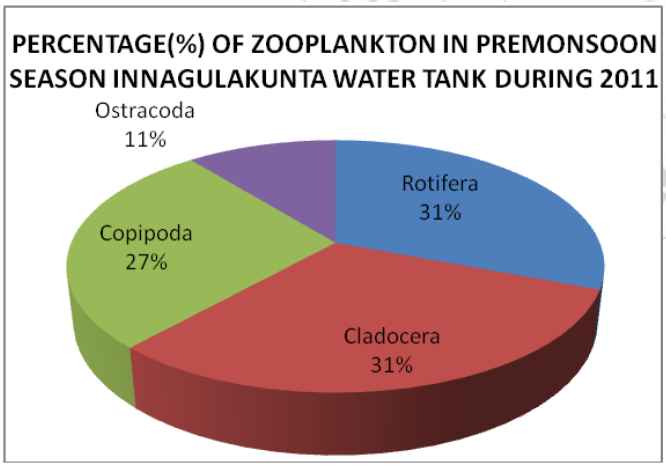
	Rotifera	Cladocera	Copipoda	Ostracoda
Monsoon	31%	29%	29%	11%
Postmonsoon	29%	31%	28%	12%
Premonsoon	31%	31%	27%	11%



Percentage composition of zooplankton in Monsoon from study area



Percentage composition of zooplankton in Postmonsoon from study area



Percentage composition of zooplankton in Premonsoon from study area

3. Results and Discussion

Fresh water bodies constitute an extremely diverse assemblage of organisms represented by nearly by all phyla of Invertebrates. In the present study, the nutrient levels were moderate, relatively high densities of zooplankton were found- in the order Rotifera>Copepoda> Cladocera>Ostracoda. The results indicate that the maximum number of genera occurred during postmosoon season than premonsoon and monsoon. The less number of genera might be attributed to the fewer nutrients in the water tank which consequently results in less productivity. The reduction in the number of species may be due to the predation and variation in the water quality and Physico – chemical factors.

The physical and chemical characteristics of water affect the abundance, species composition, stability and productivity of the indigenous population of aquatic organisms. The presence and dominance of zooplankton species play an important role in the functioning of fresh water ecosystem. The nutrients like, phosphates and nitrates were higher in summer. Rotifer utilizes nutrients more rapidly to build up their population. The comparisons of size structure, fecundity and reproductive strategies of zooplankter's can indicate the nature and extent of pollutant loads **(Sarma 1996, mukhopadhay et al 2000).**

Zooplankton was represented by Rotifera, Cladocera, Copepoda and Ostracoda among zooplankton, rotifer formed an important component in the net plankton of the reservoirs. The shallow basin of these reservoirs with rich littoral macrophyte growth provided many ecological niches for these organisms. According to **Pennak (1966)** the extensive growth of *Potamogeton* was said to inhibit the development of Rotifers. The fresh water zooplankton form an important group as most of them field up on and incorporate the primary producers into their bodies and make themselves available to higher organisms in food chain **(Michael 1973)** .Similarly the planktons particularly rotifers occupied major portion of the vinjapally water tank.

In the present work, the Rotifers occurred more during monsoon months in the reservoir. This indicated that the greater occurrence of lubricate forms was related to the monsoon period with moderate temperature. The similar reports were given by **Kumar *et al* (1978).** Highest diversity as well as maximum number of new records of cladoceran species observed in Santragachi beel was presumably due to important bio-ecological relationship between macrophytes and zooplankton along with possible dispersal of zooplankton by avian agents **(Venkatraman *et al* 2000).**

Free living Copepods are an essential link in the food chain occupying the intermediate trophic level between bacteria and algae on hand and small and large plankton predators on the other. Though they are not as important as Cladocerans in the diet of fish, they are well known as important intermediate hosts for helminthes parasites.

The seasonal fluctuations of zooplankton did not always follow the fluctuations of physico-chemical parameters. It was observed that, the genera appeared only seasonally as aestival vernal or hibernal and a few were of course perennial. **Devi (1997)** and **Piska *et al* (2000)** reported that zooplankton was not always follows the fluctuations of physico-chemical parameters.

Perumal and Santhanam (2002) reported 37 species of zooplanktons in Vedanthangal lake, Tamilnadu. Rotifers

were dominated group in the lake. The order of abundance was Rotifera < Copepoda < Cladocera < Dinoflagellata < Oligohymenophora in the lake. Anjinappa and Kumar (2003) observed the Rotifera (48.46%), Cladocera (27.27%), Copepoda (13.44%) and Ostracoda (10.83%) composition of zooplankton in Bonal reservoir, Karnataka. The abundance of rotifera species was clearly noticed.

4. Conclusion

In the present study, the zooplankton population of Nagulakunta water tank was observed that, the quantity of zooplankton found more during premonsoon. The season. The rotifers were dominated among the population during premonsoon.The Ostracods were comparatively in low profile in annual cycle.

Rotifers are prominent group among the zooplankton of a water body irrespective of its tropic status. Rotifers respond more quickly to the environmental changes and used as a change in water quality. This may be due the less specialized feeding, parthenogenetic reproduction and high fecundity. The abundance of rotifer is more or less governed by the interaction of number of physical, chemical and biological processes and related to the suitable conditions for their survival in the water body.

This study showed that the seasonal variation in zooplankton concentration could largely be due to the Rotifera, which normally constitute major diet items of larger zooplankton. Rotifer species are considered as good indicators of the trophic state of the water tank. Rotifer sp recorded as typical of oligotrophic to mesotrophic systems and that includes Epiphanies sp and Keratella sp. The Crustacean zooplankton community was made up of Cladocerans and Copepods. Zooplankton occurrence is generally high during the dry season because temperature and the availability of food are about the important factors controlling the abundance of zooplankton in the water tank, the high level of food in the water as a result of high primary productivity can be responsible for the high populations. The zooplankton and fish distribution is restricted to aerate upper water layers and littoral regions of the water tank during dry seasons.

To protect water quality, water levels must be maintained by desalting the water tank. The anthropogenic activities, sewage and fertilizer used in agricultural fields appear to be the major causes of the eutrophication in the water tank.

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