



Zooplankton Diversity in Kommaram Bem Lake, Uttoor, Adilabad District, TG, India

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Abstract

The present study reveals diversity of zooplankton. The lake Komaram Bem is situated at Uttoor town of Adilabad district. The investigation period from Sep 2011-Aug 2012. Zooplankton were examined quantitatively with stranded identification methods. Zooplankton species showed variations in their abundance from one month to another month the result showed that a total of 17 genera were recorded of which 9 were Rotifer, copepod 3, Cladoceran 3 and Ostracod 2. The present study revealed percentage wise composition of Rotifer 40.01%, copepod 29.8%, Cladocera 26.14%, Ostracod 3.9%. Shannon –winner index values ranges (2.013-2.167) Simpson index values ranges (0.2379- 0.2207) Dominance index values ranges (0.7391-0.7793) Evenness index values ranges (0.916-0.9864). Maximum population density of Rotifer (102number/lit), copepod (140 number/lit), cladocera (142 number/lit), ostracod (10number/lit), were recorded at winter season and minimum Rotifer (46 number/lit), copepod (31 number/lit), cladocera (15 number/lit), and ostracod (9 number/lit), were recorded at summer season. Avoid the pollution cause substrences into the lake and there of pre-treatment plant should be immediately installed for better management of lake ecosystem.

Keywords: Kommaram Bem Lake, Uttoor, Zooplankton.

Introduction

Water is the important source for all kinds of life activities on this Earth. A fresh water bodies which fulfill a variety of human needs is fill of value only when it is not abused and polluted. Day by day rapid growth of population of population, industrialization, and urbanization are the main cause to water pollution. Planktons are microscopic and free swimming animals, that's play a major role in the nutrition cycling in aquatic ecosystem. Plankton as both as producer and consumer phytoplankton are producers synthesis the organic material with the help of photosynthesis. Zooplanktons are consuming the phytoplankton transfer of energy from one tropic stage to another tropic stage . The zooplankton populations in a small water bodies are subjected to extreme fluctuation are present in

the lake water. Functionally the zooplankton includes herbivores, detrivores, carnivores and organisms. The cause of which was not adequately understood even through exhaustive literature on plankton studies are available. The Indian notable contribution to the knowledge of zooplankton^{1,2}. Zooplankton is also recognized as the biological indicator of water bodies. Zooplankton influence on ionic composition and quality either by removal of material as food or addition of fecal matter and excretory products³⁻⁵.

The main object of this paper to compare and contrast the monthly variations in the zooplanktons such as of Rotifer, Copepod, Cladocera, and Ostracod. To represent the data on biodiversity indices.



Figure-1
Komaram Bem Lake

Materials and Methods

The study was carried out from Sep 2011 - Aug 2012 in Komaram Bem lake, Utnoor, Adilabad. Water samples were collected monthly wise. Early morning hours are suitable environmental condition for collecting of zooplankton species samples. The water samples were filtered through 50µm mesh size plankton collecting net. Collected zooplankton samples were preserving in the 4% formaldehyde solution. The quantitative analysis of zooplankton organisms were counted using with Sedgwick Rafter cell method APHA⁶. Each time take 1 ml sample and observed under binocular microscope and identify, counted the zooplankton species. Zooplankton species diversity indices shows like, Shannon-winner, Simpson indices and dominance indexes were also calculated respectively.

Results and Discussion

After examine the sample main zooplankton species comprises of 4 groups consisting of 17 genera of zooplankton in order of Rotifer (9 genera) Copepod (3 genera) Cladocera (3 genera) and Ostracod (2 genera). The rotiferens are one of the zooplankton group. These are microscopic, psuedocoelomates. It is commonly called as “wheel animalcule” and have shorter life span of <14 days. Rotifer was represent by genera *Branchionus angularis*, *Branchionus caudatus*, *Branchionus falcatus*, *Branchionus rubens*, *Branchionus quadridentatus*, *Keratella tropica*, *Cipodella gibba*, *Lecane luna*, and *Asplancha spee*. Total zooplankton population branchious species are the dominant spp another zooplankton species. It’s indicate to lake approaching towards the utropic nature^{7,8}. *Branchionus rubens* species number high in Sep 2011 another rotifer’s group. Monthly population density of rotifers showed its peak during May 2012, as 171 Org/lit .While least June 2012, 46 Org/lit. During the investigation period monsoon month represented a density and diversity of rotifers which attributed to huge rain water in lake similar observations were also made in tropical pond⁹.

Copepod are second dominant zooplankton group in the lake. Copepod was represent by *Paracyclops frimbriata*, *Mesocyclops lucarte*, *Tropocyclops spec*. Maximum abundance (178Org/lit) of copepods in December and minimum number (31 Org/lit) was recorded in the month of June. Copepod exhibit inverse relationship between rotifer and cladocerans population. Copepod species are sensitivity nature zooplankton they don’t present in polluted water bodies^{10,11}. Copepod population was recorded through the study period and was found abundant in winter season and less during monsoon season^{12,13}. Through the study period copepod population was highest number of organisms in winter season and lowest number of organisms in monsoon season.

Cladoceran represent by 3 species they are *Moina branchiate*, *Moina macrocopa*, *Daphnia spec*. Maximum abundance

(142Org/lit) of copepods in January and minimum number (15Org/lit) was recorded in the month of June. Eight species of Cladoceran were identified in 54 tanks of Haveri district^{14,15}. Cladoceran bereliable indicator of eutrophic nature of water bodies^{16,17}.

Ostracods are one of the important group of zooplankton and are commonly called as “Seed shrimps”. In the present study Ostracod represented by 2 species they are *Cypris spe*, *Steno cypris*. Maximum abundance (15Org/lit) of copepods in January and minimum number (6 Org/lit) organisams recorded in the month of July. The Ostracod density was highest during summer season minimum during rainy season fresh water reservoir Tighra, Gwalior^{18,19}

The densities of zooplankton in the order of Rotifer > Copepod > Cladoceran > Ostracoda. A part from in the investigation period, nauplies larva, also identified in the lake high number of larva’s recorded in the month of January and minimum number of larva’s present in July month.

Composition in the lake during the investigation period zooplankton population was dominated by Rotifer species. Zooplankton Rotifer 41%, Copepod 31%, Cladocera 27%, and Ostracod 1% were respectively (Figure-6).

Conclusion

Total zooplankton density was maximum in winter season and least in the monsoon season, Winter may be due to favorable condition to growth of zooplankton species growth nutrition values are more percentage. In the monsoon season zooplankton number was decrease because decline is due to dilution effect of water bodies. Among all the species of zooplankton rotifers are the dominant species *Branchies species* are dominant genera in the Rotifer it shows exploitation of population of water .Utnoor people they are interacting with lake water for daily activities and sewage water consult to the lake after some years the lake become eutrophic nature. To stop the human intervention to the lake and pollution because material avoid immediately enter into the surrounding of the lake. The percentage composition of zooplankton with repeat to the number of species.

Rotifer >Copepod>Cladocera >Ostracod

Table-2
Biological Index values

	Shannon-Winner index	Simpson index	Dominance index
Rotifer	2.12	0.231	0.766
Copepod	1.061	0.687	0.311
Cladocera	1.027	0.738	0.266
Ostracod	0.666	0.953	0.179

Table-1
Distribution and abundance of zooplankton population (Org/lit) in Komaram Bem lake during September -2011 to August-2012

		Sept	Oct	Nov	Dec	12-Jan	Feb	Mar	AprII	May	Jun	July	Aug	Total	Average	SD
Rotifers	Branchionus angularis	13	10	9	12	14	16	18	24	20	7	17	22	182	15.16	5.28
	Branchionus caudatus	15	11	8	14	18	17	20	18	23	9	16	19	188	15.66	4.51
	Branchionus falcatus	12	9	11	17	16	17	16	19	17	10	19	23	186	15.5	4.18
	Branchionus rubens	10	7	13	11	9	10	14	27	20	6	6	12	145	12.08	6.09
	Branchionus quadridentatus	6	4	12	13	14	17	12	19	21	5	11	14	148	12.3	5.33
	Keratella tropica	11	9	8	6	9	11	14	20	24	2	7	10	131	10.91	6.02
	Cipodella gibba	7	3	3	4	5	7	9	17	23	1	5	8	92	7.66	6.32
	Lecane luna	9	5	7	9	8	9	12	14	13	4	11	15	116	9.66	3.44
	Asplancha spee.	7	4	4	6	9	10	10	9	10	2	9	13	93	7.75	3.19
	Total	90	62	75	92	102	114	125	167	171	46	101	136	1281		
Copepod	Paracyclops frimbriata	12	18	45	63	46	39	35	10	12	11	17	21	329	27.41	17.57
	Mesocyclops lucarte	10	16	58	72	61	57	27	17	14	16	19	24	391	32.5	22.44
	Tropocyclops	16	16	38	43	33	26	16	7	9	4	13	15	236	19.6	58.95
	Total	38	50	141	178	140	122	78	34	35	31	49	60	956		
Cladocera	Moina branhiata	15	27	29	38	39	30	19	9	8	4	7	6	231	19.25	12.86
	Moina macrocopa	14	16	19	29	39	22	11	14	12	3	6	4	189	15.75	10.46
	Daphnia spe.	20	58	61	65	64	49	32	19	15	8	12	14	417	34.75	22.82
	Total	49	101	109	132	142	101	62	42	35	15	25	24	837		
	Ostracod															
	Cypris spe.	6	5	7	8	6	4	5	7	10	7	3	6	74	6.16	1.85
	Steno cypris	8	4	4	5	4	5	3	5	5	2	3	5	53	4.41	1.50
	Total	14	9	11	13	10	9	8	12	15	9	6	11	127		
Others	Nauplius larva	13	14	18	21	24	18	16	9	6	11	11	10	171	14.25	5.29
	Grand total	281	345	354	436	418	364	289	187	153	112	192	241			

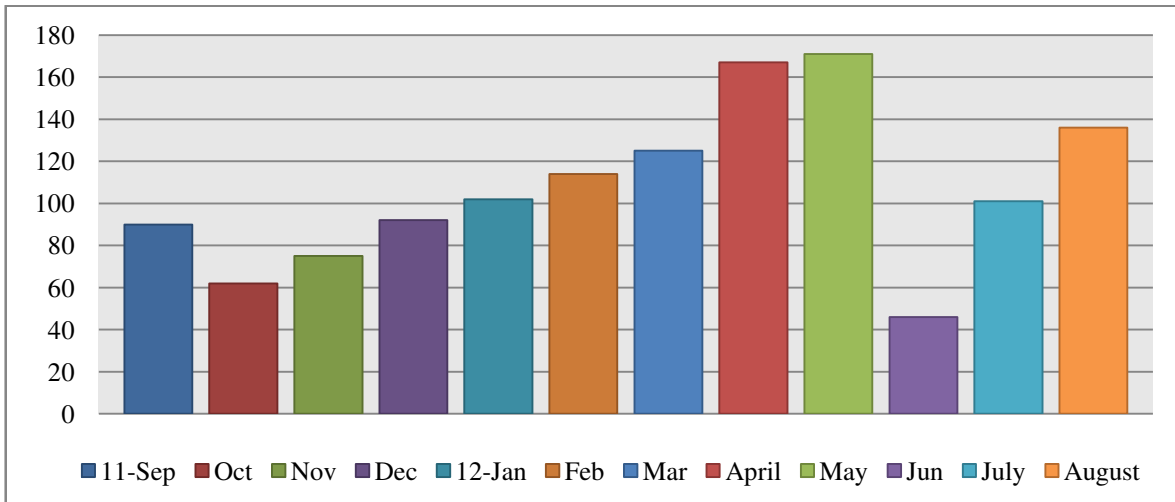


Figure-2
Rotifers

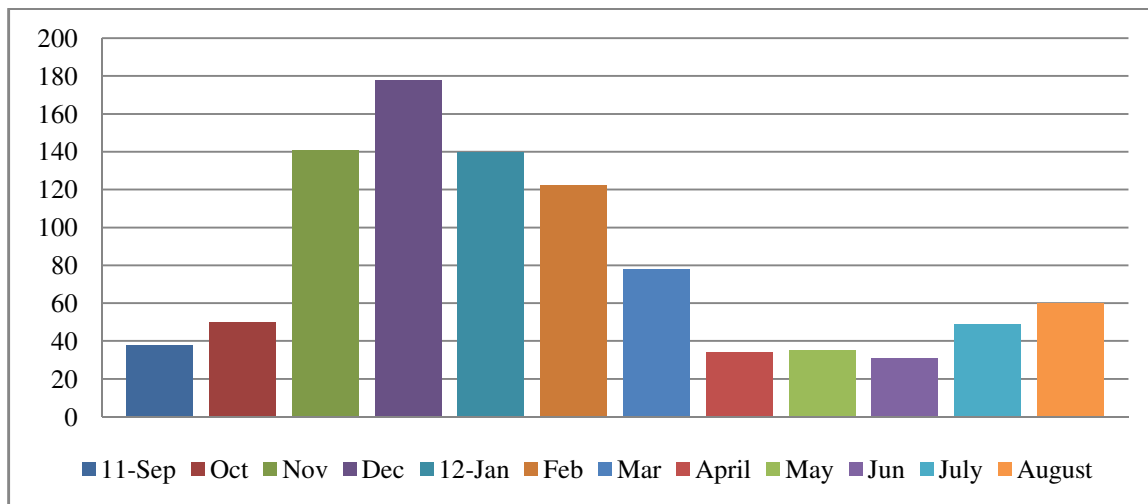


Figure-3
Copepod

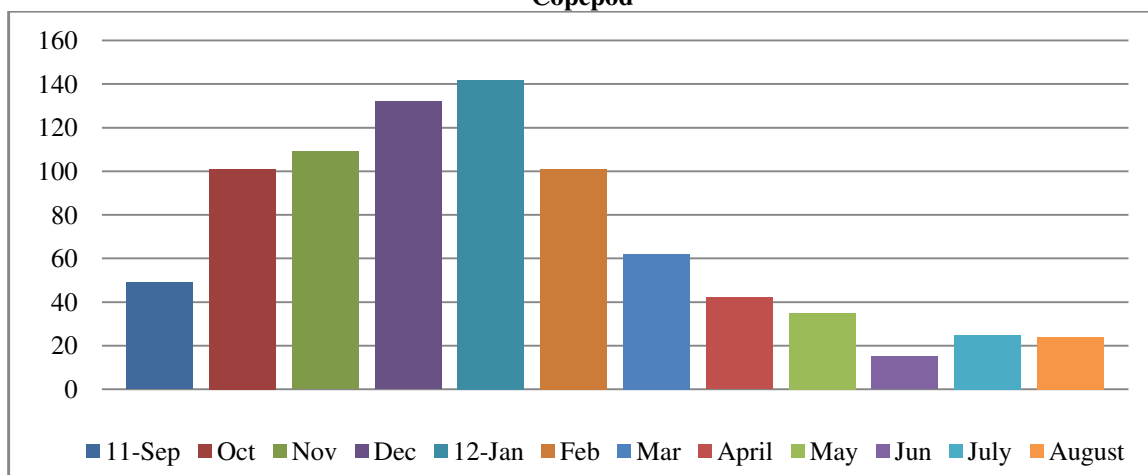


Figure-4
Cladocera

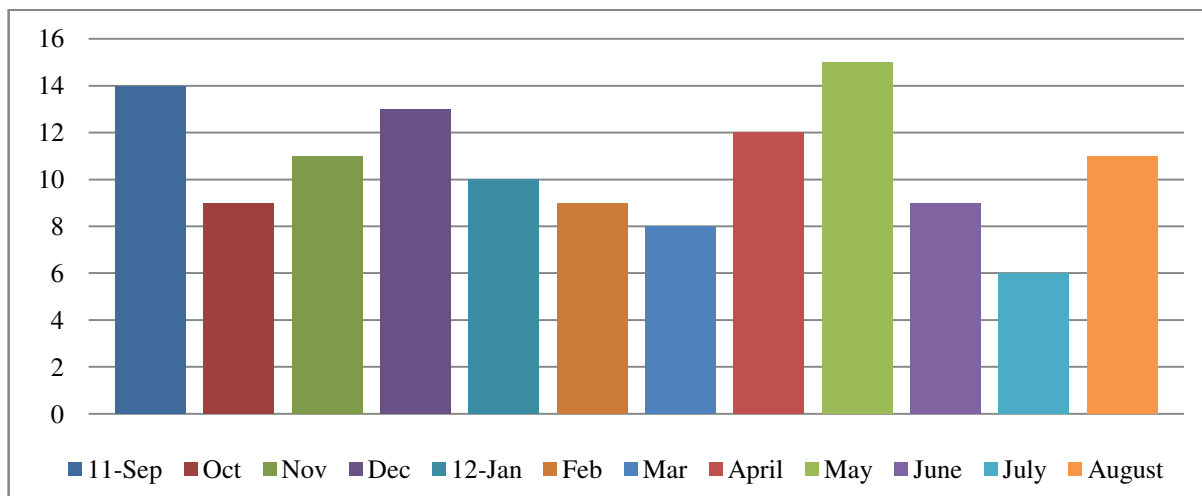


Figure-5
Ostracode

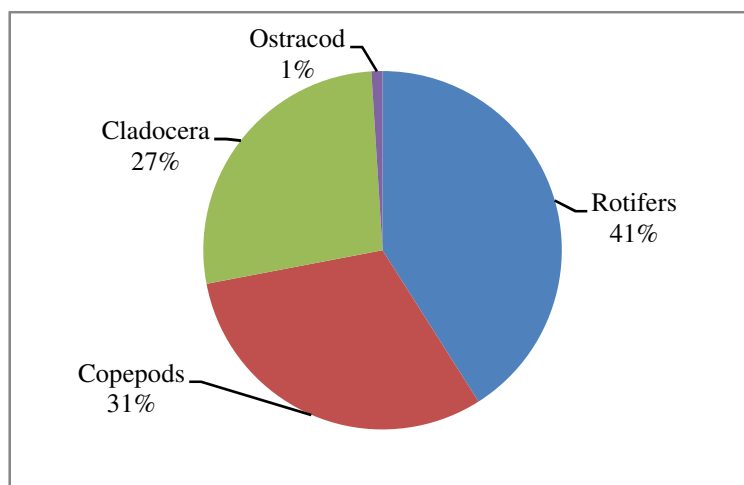


Figure-6
Composition of Zooplankton

References

1. Arora G.L. (1931), Fauna of Lahore, II Entomostracan (water flea) of Lahore, Bull. Dept of zoo. Punjab Univer. I (10), 62-100.
2. Sevell R.B.S. (1934), Fauna of the Chilka lake, Copepod. Men. Ind. Men., 5,771-857.
3. Das SM and Pandey J. (1978). Some physico chemical and biological indicators of pollution of lake Narial, Kumayn (U.P). Int. J. Eco. 5(1), 7-16.
4. Narayana J and Somashekhar RK (2002). Distribution ecology of orotozoea in relation to water quality in river, Caurery, Karnataka. Int. Ecology and ethology of aquatic biota, Arvind kumar (ed) pub. Daya publishing house Delhi, 283-293.
5. Mishra S.R. (2005). Zooplankton and their seasonal variation in sewage collecting at Gwalior, Madhya Pradesh. In Advance in limnology Mishra SR (ed) pub Daya publishing house Delhi, 1-44.
6. APHA (2005). Standard methods for the examination of water and waste water, 21st Edn., Washington, DC. USA.
7. Mola H.R. (2011). Seasonal and spatial distribution of Branchionus (Pallas, 1966: Eurotatoria: Monogonanta: Branchionidae), A bio indicator of eutrophication in lake El- Manzaiah. Egypt. Biology and Medicine, 3, 60-69.
8. Ahmed Uzma, Saltanat Parveen, Hesham R. Abdel Mola, Habeeba A. Kabir, and Altaf H. Ganai. (2012). Zooplankton population in relation to physic-chemical parameters of Lal Diggi pond in Aligarh, India. J. Environ. Biol., 33, 1015-1019.
9. Saboor A. and Altaf K. (1995). Quantitative and qualitative analysis of zooplankton population of a tropical pond during summer and rainy season, J.

- Ecobiol.*, 7(4), 269-279.
10. Kulkarni D.A. and Sarwase S.S. (2013). Studies on occurrence richness and composition of zooplankton in Seena River water at Mohal District Solapur. M.S. India. *Int. Res. Jou. of Sci.*, 2(2), 25-58.
 11. Verma V, Sharma Tyagi A, Rani S., Gupta A.K. and Dalela R.C. (1984). Pollution and saprobic status of Eastern Kalinandi. *Limnologia*. 15, 69-133.
 12. Hulyal S.B. and Kaliwal B.B. (2008). Water quality assessment of Almatti reservoir of Bijapur (Karnataka state, India) with special reference to zooplankton. *Envi. Monit. Assess*, 139-299-306.
 13. Shashikant Majagi and Vijaykumar K (2009). Ecology and abundance of zooplankton in Karanja reservoir. *Env. Monit. Asses*, 152, 451-458.
 14. Uttangi J.C. (2001). Conservation and Management strategy for the water flows of minor irrigation tank habitats and their importance stop over site in the Dharwad district, 179-221, In B. Hosen and M. Venkateshwarlu (Weds). Trends in wild life and management, Daya publishing house, New Delhi, India.
 15. Sinha C and Khani R.A. (1998). Ecology and diversity of cladoceran is some Calcutta wetland. Proceeding of national seminar on Environmental biology on *Biodiversity and Environmental* 154-164.
 16. Sharma B.K. (2001). Biological monitoring of fresh water reference to role of freshwater Rotifer as biomonities, In: water quality Assessment biomonitoring and zooplankton diversity. (ed B.K. Sharma) Ministry of Environmental and forest Government of India New Delhi. 83-97.
 17. Mohar R.K. (2011). Diversity and seasonal fluctuation of zooplankton in fresh water reservoir Tighra, Gwalior (M.P). *Int. Refe. Rese. J.*, II, 19.
 18. Padmanabha B and Belagali S.L. (2008). Ostracods as indicators of pollution in the lakes of Mysore. *J. of Env. Biol.*, 29(3) 415-418.
 19. Fernando C.H. and Weerewardhan S.R. (2002). Srilankha fresh water fauna and fisheries. Third millennium book. Colombo, 17-98.
 20. Gharpure Varsha L. and Bhatkulkar Manisha (2015). Seasonal Variations of Zooplanktons from River Vena Distt. Nagpur, Maharashtra. India, *Int. Res. J. Biological Sci.*, 4(8), 10-13.
 21. Goswami A.P and Mankodi P.C. (2012). Study on zooplankton of freshwater reservoir Nyan-II Rajkot district, Gujarat, India. *ISCA., Jou. of Biol. Scien.*, 1(1), 30-34.
 22. Janakiraman A., Naveed M.S., Muthupriya P., Susumaran J., Asrar M, Sheriff and Altaff K. (2013). Studies on the zooplankton biodiversity and density in Adyar estuary. Chennai. India. *J. Env. Biol* , 34, 273-275.
 23. Mishra S.R. (2005). Zooplankton and their seasonal variation in sewage collecting at Gwalior, Madhya Pradesh. In Advance in limnology Mishra SR (ed) pub Daya publishing house Delhi, 1-44.
 24. Padmanabha B. (2010). Diversity of Rotifer in the lakes of Mysore city wetland. *Biodiversity and climate change*.