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STUDY OF ZOOPLANKTON POPULATION IN A FRESHWATER, RANGAVALI DAM, NAVAPUR, DIST- NANDURBAR (MS) INDIA

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Abstract

The present study was conducted at two different stations in the Rangavali Dam, from tribal area. Samples were collected from each station between June 2007 and May 2009 on a monthly basis. The samples were evaluated quantitatively and the species identified for collected samples. Total of 20 species of zooplankton were noticed during the study period. They were grouped in Rotifera, Copepoda, Cladocera and Ostracoda. Eight species were reported in Rotifera group. They belong to four families namely Brachionidae, Lacanidae, Euchanidae and Notomatidae. Four species were Copepods all species noticed belonged to Cyclopidae family. Six species were Cladocera. They belonged to three families. Daphnidae, Monidae and Chydoridae. Two specis of Ostracoda were reported distributed in Cypridiidae and Ilyocyprida families.

***Keywords**: Biodiversity of Zooplankton, Freshwater (Rangavali) Dam, Nandurbar(MS).*

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Introduction:

Zooplankton communities are highly sensitive to environmental variation. As a result, changes in their abundance, species diversity or community composition can provide

important indications of environmental changes or disturbance. Zooplankton communities often respond quickly to environmental change because most species have short generation times, (usually days to weeks in length). Zooplankton communities respond to a wide variety of disturbances including nutrient loading (McCauley and Kalff 1981; Pace 1986; Dodson 1992), acidification (Barrett, 1989; Keller and Yan 1991; Marmoreka and Kormann 1993), Contaminants (Yan *et al.*,1996), Fish densities (Carpenter and Kitchell, 1993), and sediment inputs (Cuker 1997). The zooplankton occupies an intermediate position in the food web in the aquatic ecosystem. Similarly, the zoobenthos has significant role in the food chain in the water.

Earliest contributions to zooplankton studies in India came from scientists working in the laboratories either of the zoological survey of India or with the state or central Fisheries Departments. However, the bulk of zooplankton studies in relation to hydrobiology have only during the last fifty years. Universities have contributed significantly during the last fifty years by Das and Pande (1982), Nayer (1968) and Vasist and Sharma (1975).

MATERIALS AND METHOD

This study was conducted at two different stations in the Rangavali Dam, Samples were collected from each station between June 2007 to May 2009 on a monthly basis, using 55 Micron pore size plankton net, with horizontal and vertical hauls. The samples were evaluated quantitatively and the species identified for collected samples. All specimens collected were preserved in 4 % formalin soon after. Collection, Identification of the specimens was performed according to Ward and Whipple (1945). The zooplankton identified to the greatest possible taxonomic level (Genus / Species). Quantitative analysis of zooplankton was performed in Sedgwick rafter cell using the Ward and Whipple (1945) and counts were expressed as number of organisms as follows.

$$N = (A \times 100/L) C$$

Where, N = Number of animals per liter of original water body

A = Average number of organisms from all the counts

C = Volume of concentration in ml

L = Volume of water sieved through the net in liters

Rangavali Dam is known as Rangavali river project in government documents. It is built over Rangavali river near Nagziri village, Tq. Navapur Dist. Nandurbar Maharashtra in year 1972. The catchment area of dam is 99.20 Sq. Km. The gross capacity of the dam is about 15.02 Mcum and capacity of the dead storage 2.13 Mcum. This was first attempt to study zooplankton abundance in Rangavali Dam of Nandurbar district. The crop pattern is nearby dam are mainly cotton, chilies, hybrid jowar, Paddy, Maize, Pulses Crop, ruby Jowar, Wheat and vegetable. The entire area known as tribal area.

RESULT

A total of 20 species of zooplankton were noticed two years of the study period from 2007-2008 to 2008-2009.

Eight species were reported in **Rotifera** group (40 %). They belong to four families namely Brachionidae, Lacanidae, Euchanidae and Notomatidae. In Brachionidae, five species were reported *B.angularies, B. cadatus, B. falcatus, K. tropica, K. cochlearis.* Remaining three families are Lecanidae, Euchlanidae and Notommatidae consisted *L. luna, E. dialatata, C. gibba* respectively.

Four species were **Copepods**(20 %) all species noticed belonged to Cyclopidae family consisted, *T. parasinus, P.fimbriatus, M. leuckarti and M. hyalinus.*

Six species(30%) were **Cladocera(30%)**. They belonged to three families. **Daphnidae** consisted *C. cornuta species.* A **Moinidae** family consisted *M. Branchiata* and *M. macrocopa*. **Chydoridae** family consisted, *A. combouei, P. denticulateus* and *C. reticulates.*

Two specis of **Ostracoda** were distributed in **Cyprididae**, **Ilyocyprida** or **Stenocyprinae** families. *Hemicypris fossulata* and *Ilyocypris gibba* species respectively.

DISCUSSION AND CONCLUSION

The concept of bio-indication of water quality is an emerging area of environmental assessment. Several authors have used zooplankton as an indicator for monitoring water quality, tropic status and pollution levels,(Welch, 1952; Evison and James 1978; Chandrashekhar and Kodharkar 1997; Shebba and Ramanujan 2005). Zooplankton community, thus, plays an important role in the tropho-dynamics, ecological energetic

cycling of materials and productivity. Examination of zooplankton under microscope revealed total four groups i.e. Cladocera, Copepoda, Rotifera and Ostracoda, amongst 20 zooplanktonic species during the period of 2007-08 and 2008-09.

There have been a number of studies on the rotifers fauna in India. The Rotifers of West Bengal have been studied by Andrson (1889), Sewell (1935), Sharma and Vasisht (1976), Sharma (1979) and Tiwari and Sharma (1977). Edmundson and Hutchinson (1934) have reported the rotifers from Kashmir, Nilgiri hills, Oodacmund and Panjab.

Eight species of Rotifers were documented, which accounted 40 % of total zooplankton group. Brachionidae was the largest family. Five species of this family followed by family Lecanidae, Euchlanidae and Notommatidae, representing single species each. Taxonomic dominance of Rotifers were reported by researchers, Cavalli *et al*.,(2001), Sampaio *et al*.,(2002), Neves *et al*.,(2003). Maximum population density of Rotifers was observed during summer season while minimum during monsoon season. Similar reports were document by Gaurvi *et al*.,(2003). They have reported that during summer rotifers are dominant at high temperature.

All four species of Copepods represented Cyclopidae family. Copepods and Cladocerans occur almost throughout the period of study. The predominance of Copepods and Cladocerans has been considered to be very important in terms of density, biomass production and nutrient regeneration (Pace and Orcutt, 1981). The population density of Copepods gave indication of nutrient availability in aquatic ecosystem (Murugan 1990) and influences the entire functions of aquatic ecosystem. Our present knowledge of the Copepod fauna of India is based on the studies from (Gurney, 1934, Sehgal *et al.*,1967, Patil and Gaudar 1982, Uttangi, 2001, and Kudari *et al*., 2005).

The six species of Cladocera are reported. The percentage-wise distribution of Cladocera is 30% Chydoridax is the most frequently represented family with three genera and species followed by Moinidae with only one species. Daphnidae also represented only a single species. During one year study period, a maximum five species of Cladocera were reported during the months of September and October and a minimum of one species was reported during monsoon season during June and July. The maximum, Cladoceran species reported during September and October in Rangavali Dam, may be due to the presence of extensive banks of Macrophytes, which allow a greater heterogenecity of the environment, and results

in the availability of more niches. Similar results were documented by Gauravi *et al*., (2003), Sharma, (2001). Only two species of Ostracoda (10%) were documented during study period. These two species were distributed one in each family of Ostracoda i.e. Cyprididae, Ilyocypridae representing namely *Hemicypris fossulata, and Ilyocypris gibba* respectively. The lowest Ostracods were documented in the month of May during summer while highest Ostracods densilty was recorded in the month of September.

In conclusion Rotifers are dominant group followed by Cladocera, Copepoda and Ostracoda during the zooplankton study. The zooplankton population increases from winter season and reached maximum.. The minimum population has been estimated in summer and pre-monsoon season. Thus, the quality and quantity of zooplankton have fluctuated monthly and seasonally in the Rangavali Dam.

TABLES

Sr No	zooplanktons	Jun		Jul		Aug		Sep		Oct		Nov		Dec		Jan	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	
	Rotifera																
01	*Lecane luna*	10	11	01	13	01	10	21	01	10	09	01	08	01	15	05	0
02	*Keratella tropica*	16	13	01	07	10	09	10	11	12	02	11	00	12	03	12	0
03	*Keratella cochlearis*	11	08	11	01	09	09	17	13	11	09	11	09	04	11	04	0
04	*Euchlanis dilatata*	13	1	10	11	9	1	11	10	9	10	9	9	1	9	10	
05	*Branchionus caudatus*	10	12	12	12	13	11	2	10	9	2	10	9	10	5	1	
06	*Brachionus angularis*	11	8	8	11	11	12	1	9	12	5	8	5	11	1	1	1
07	*Brachionus falcatus*	9	1	13	14	12	11	9	11	8	0	11	5	10	1	10	
08	*Cephalodella gibba*	10	10	12	10	12	7	10	12	8	6	10	3	11	5	13	
	Copepoda																
09	*Paracylops fimbriatus*	12	8	11	9	4	9	4	3	11	3	11	13	1	12	10	
10	*Mesocyclops leckarti*	11	11	12	0	1	3	12	13	8	3	10	10	10	0	10	1
11	*Mesocyclops hyalinus*	10	11	1	12	3	11	19	1	10	9	1	12	9	3	7	1

12	*Tropocyclops parasinus*	12	12	2	1	0	10	1	3	1	3	11	5	10	3	7	
	Cladocera																
13	*Ceriodaphnia cornuta*	12	12	10	10	16	1	13	17	9	11	5	1	10	1	7	1
14	*Alona cambouei*	9	10	1	12	11	11	12	12	11	8	11	6	0	2	9	
15	*Monia brachiata*	10	1	10	11	13	13	1	12	10	4	11	11	14	8	11	1
16	*Monia macrocopa*	20	4	12	1	11	12	11	11	11	10	1	2	10	13	9	
17	*Pleuroxus denticulateus*	11	1	10	10	13	12	1	11	5	9	1	14	2	2	2	
18	*Chydorus reticulates*	10	4	11	12	9	11	14	12	7	2	8	10	5	13	11	1
	Ostracoda																
19	*Hemicypris fossulata*	12	11	13	2	12	1	11	3	8	8	10	10	8	1	2	1
20	*Ilyodypris gibba*	12	12	2	1	11	1	0	13	11	8	6	8	1	7	12	
	Total																

Table 1: The population density of zooplanktons (per Liter) at station A and B during 2007-2008

Table 2: The population density of zooplanktons (per Liter) at station A and B during 2008-2009.

Sr No	zooplanktons	Jun		Jul		Aug		Sep		Oct		Nov		Dec		Ja
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
	Rotifera															
01	*Lecane luna*	10	1	10	11	12	7	2	11	11	5	1	1	6	8	11
02	*Keratella tropica*	11	9	9	9	11	12	0	11	11	5	12	3	0	8	10
03	*Keratella cochlearis*	1	2	1	3	2	11	3	10	4	1	3	0	9	1	4
04	*Euchlanis dilatata*	6	3	3	11	0	10	2	5	9	10	5	4	7	1	2
05	*Branchionus caudatus*	1	3	1	4	10	8	11	5	9	6	8	8	10	3	4
06	*Brachionus angularis*	12	3	10	7	10	9	11	12	10	2	9	5	5	8	10
07	*Brachionus falcatus*	1	1	2	3	10	3	3	11	3	10	4	10	0	2	11
08	*Cephalodella gibba*	9	9	7	11	6	10	8	11	10	2	10	3	1	10	11
	Copepoda															
09	*Paracylops fimbriatus*	10	7	1	11	13	13	9	6	4	5	2	4	7	3	4
10	*Mesocyclops leckarti*	11	10	7	11	12	3	11	5	11	3	2	3	9	8	7
11	*Mesocyclops hyalinus*	10	11	8	8	3	6	10	9	3	2	8	6	6	7	3
12	*Tropocyclops parasinus*	12	2	7	11	2	7	10	1	8	1	11	6	10	0	8
	Cladocera															
13	*Ceriodaphnia cornuta*	12	11	4	12	9	12	8	6	10	6	12	10	9	10	9

14	*Alona cambouei*	11	2	0	6	1	11	5	11	10	5	11	6	5	6	12
15	*Monia brachiata*	9	7	5	11	10	7	6	12	8	8	5	3	1	3	1
16	*Monia macrocopa*	5	10	4	8	11	4	12	10	10	9	5	3	9	1	11
17	*Pleuroxus denticulateus*	10	9	4	6	9	10	9	5	10	4	8	9	11	8	2
18	*Chydorus reticulates*	8	4	13	9	7	12	8	5	1	3	5	9	9	9	7
	Ostracoda															
19	*Hemicypris fossulata*	10	12	1	11	4	9	15	2	4	4	5	9	1	5	5
20	*Ilyodypris gibba*	8	9	10	0	3	4	11	3	8	3	8	0	3	6	3
	Total															

Fig.1: Pie chart image showing group wise Zooplankton diversity of Rangavali Dam during 2007-08.

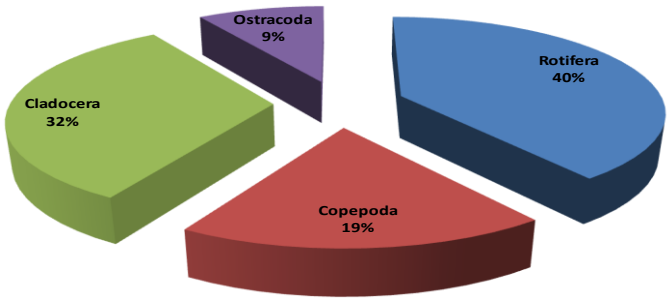


Fig.2: Pie chart image showing Family wise Zooplankton diversity of Rangavali Dam during 2007-08.

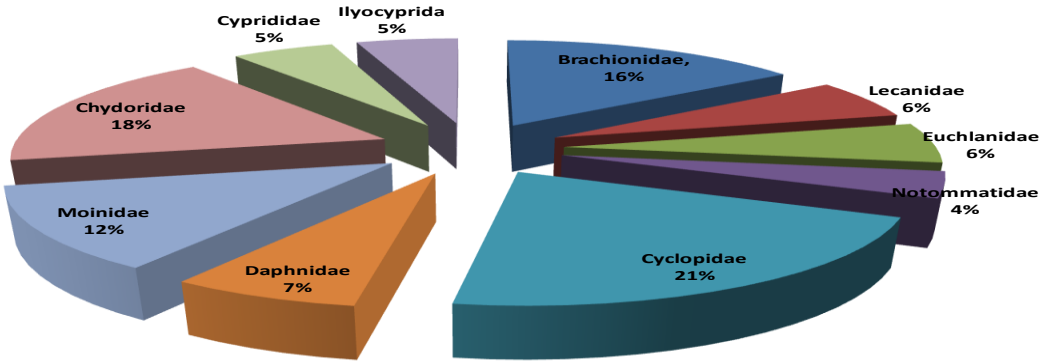


Fig.3: Pie chart image showing group wise Zooplankton diversity of Rangavali Dam during 2008-09.

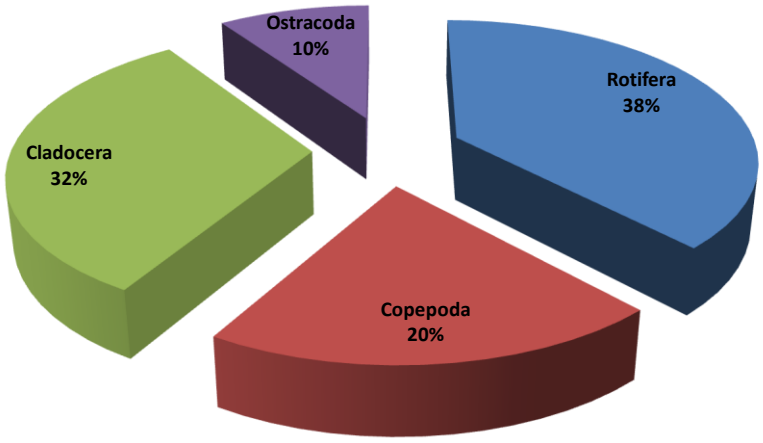
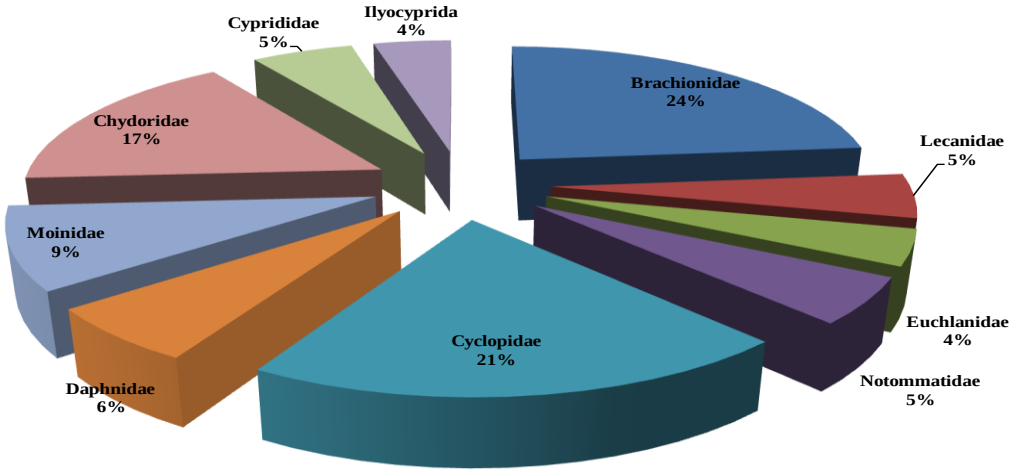


Fig.4: Pie chart image showing Family wise Zooplankton diversity of Rangavali Dam during 2008-09.



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