

**STUDIES ON MACROBENTHOS AND SEASONAL VARIATION WITH SPECIAL REFERENCE TO ZOOPLANKTON DIVERSITY OF TITWI DAM (TITWI) DIST- BULDANA (M.S.).**

**Mishra Varsha R.**

Department of Zoology, Jijamata Mahavidyalaya, Buldana, India

**ABSTRACT**

Titwi Dam (Titwi) Maharashtra is freshwater ecosystem. Macrobenthos and Zooplankton survey were carried out on monthly basis for the period of one year from Jan 2012 to Dec 2012 at different spots. The study of benthic fauna is an important component of natural food for freshwater fishes. Zooplankton constitute important food item of many omnivorous and carnivorous fishes. The plankton plays a very important role for maintaining the productivity of the water body. In this study was aimed to assess the zooplankton species richness, diversity, evenness and predict the state of Titwi Dam. Most dominant benthic species encountered were *Bellamyia bengalensis*, *Unio* (Bivalvia), *Baccinum*, Chironomous-Larvae, Crabs, Earthworms, Nematodes, Leeches, Molluscs formed the dominant group in Titwi Dam followed by Diptera, Coeloptera, Plecoptera, Odonata and Hemiptera. 20 Zooplanktonic species belonging to Protozoa, Rotifers, Cladocera, Copepoda, were identified. These groups are represented in order of dominance as Rotifers > Cladocera > Copepoda > Protozoa. The present study deals with the abundance and dominance of Macrobenthos and zooplanktonic groups.

**KEYWORDS:** Macrobenthos, Titwi Dam Zooplanktons.

**INTRODUCTION**

The Macrobenthic fauna forms an important source of food for fish and exhibits a remarkable diversification in their assemblage and life cycles especially in upland waters. It is mainly influenced by the abiotic factor and helps significantly in the estimation of the production potential of aquatic ecosystem. It converts the organic detritus into invertebrate biomass, which provide direct food energy to the fishes though an appreciable amount of literature on benthic fauna is available from freshwater of Indian subcontinent. Singh and Singh (1996), Srivastava and Singh (1996), Singh (1997), Srivastava and Desai (1997), reported that from upland waters of Himachal Pradesh are scattered in nature. Sehgal (1983), Kumar (1987), Dhanze *et al.*, (1998).

The importance of Macro benthic and Zooplankton components in the tropic dynamics of freshwater ecosystems has long been recognized. These Organisms, not only regulate the aquatic productivity by occupying intermediate position in the food chain, but also by indicating environmental status in given time.

The benthic macro invertebrates are the most diverse group of organisms in freshwater ecosystems. They include insects, molluscs, crustaceans, annelids and nematodes. Besides their role in ecosystem function as important links in the food-chains, they are good indicators of health of freshwater ecosystems and water quality (Semwal and Akalkal, 2006). The Macrobenthic population is very sensitive to environmental perturbation and is highly influenced by the physico-chemical characteristics of water, nature of substratum, food, predation and other factors.

The Zooplankton organisms occupy a central position in the food webs of aquatic ecosystem. They are heterotrophic in nature and play a significant role in aquatic system as consumer by linking the primary producers to higher trophic levels. They are capable of affecting the entire aquatic biota. The studies of Zooplanktons have been described by Sharma and Dewan (1989). Zooplankton play a major role in recycling nutrients as well as cycling energy within their respective environments. They play an integral part and may serve as bioindicators and is reliable tool for determining the status of water pollution (Ahmad, 1996). Ganapati and Pathak (1969) observed the primary productivity in the Sayaji Sarovar (a manmade lake) at Baroda.

The aim of the present study was to investigate the species composition, distribution of diversified Zooplankton assemblages in Titwi Dam, Titwi.

**MATERIALS AND METHODS**

Titwi Dam is one of the smallest Dam has built on Painganga river in 2002 at Titwi 09 kms away from Lonar, in Buldana district (M.S.) of height 9.8 meter, Volume 500 km<sup>3</sup> and co-ordinates (19° 58' N 76° 49' E) having 480km<sup>3</sup> water storage capacity. Major aim of this Dam is used to fulfill the water supply of the village and also for irrigation, agriculture and drinking water, fishery etc.

The study were carried out for one complete year from Jan 2012 to Dec 2012. The samples were collected once in month in the morning hours between 9.00A.M. and 11.00A.M. at different spots. The samples of macro benthos were collected with the use of an Ekman dredge and secured in bucket using standard sieve No.40. The whole samples were sieved to obtain the benthos with the help of forceps or brush for preserving the same in 4% formalin. The zooplankton samples were collected from Titwi dam water using net Silk No.25. Collected zooplankton samples were fixed in 5% formalin solution. They were identified with the help of keys, provided by Pennak (1978) Needham and Needham (1962), Tonapi (1980) and APHA (1991). The preserved samples were brought to laboratory for qualitative and quantitative analysis. Quantitative studies were made by using Sedgwick rafter cell. All the zooplanktons present in the cell were counted by moving the cell vertically and horizontally covering the whole area.

## RESULTS

The results are shown in table 1 and 2.

**Table 1. Occurrence and collection of Zooplankton from Titwi Dam, Titwi Dist. Buldana (M.S.), 2012. Titwi Dist. Buldana (M.S.) +: Present, - : Absent**

Name of Group and Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct.	Nov.	Dec
<b>Protozoa.</b>												
<i>Arcella Sp.</i>	-	+	+	+	+	-	-	-	-	-	+	+
<i>Ceratium Sp.</i>	+	+	+	+	+	+	-	-	-	-	+	+
<i>Euglpha Sp.</i>	+	+	+	+	+	+	-	-	-	-	+	+
<i>Diffugia Sp.</i>	-	-	+	+	+	-	-	-	-	-	-	+
<b>Rotifera.</b>												
<i>Branchious diversicornis</i>	+	+	+	+	+	+	-	-	-	-	+	+
<i>Brachious Caudatus</i>	+	+	+	+	+	+	-	-	-	-	+	+
<i>Branchious Forticula</i>	+	+	+	+	+	+	-	-	-	-	+	+
<i>Asplanchna Sp.</i>	+	+	+	+	+	+	-	-	+	+	+	+
<i>Testinella Sp.</i>	+	+	+	+	+	+	-	-	-	-	-	-
<i>Horella Sp.</i>	+	+	+	+	+	+	+	-	-	-	+	+
<i>Filina Sp.</i>	+	+	+	+	+	+	+	-	-	-	+	+
<i>Hexthra Sp.</i>	+	+	+	+	+	+	+	-	-	-	+	+
<i>Conochilus Sp.</i>	+	+	+	+	+	+	-	+	+	+	+	+
<b>Cladocera</b>												
<i>Chydrous Sphaerieus</i>	+	+	+	+	+	+	-	-	-	+	+	+
<i>Bosmina Sp.</i>	+	+	+	+	+	+	-	-	-	-	+	+
<i>Macrothria laticoruis</i>	+	+	+	+	+	+	-	-	-	+	+	+
<i>Dianphenosoma Sp.</i>	+	+	+	+	+	+	+	-	-	+	+	+
<i>Diaphnia Sp.</i>	+	+	+	+	+	+	-	-	-	+	+	+
<b>Ostracoda</b>												
<i>Cypris Sp.</i>	+	+	+	+	+	+	-	-	-	+	+	+
<i>Cyprinotus Sp.</i>	+	+	+	+	+	+	-	-	-	+	+	+
<b>Copepod</b>												
<i>Mesocyclops hyalinst</i>	+	+	+	+	+	+	-	-	-	-	+	+
<i>Mesocyclops Sp.</i>	+	+	+	+	+	+	-	-	-	+	+	+
<i>Phyllodiaptomus Sp.</i>	+	+	+	+	+	+	-	-	-	+	+	+

**Table 2. Groupwise seasonal variation in zooplankton composition in Titwi Dam year 2012.**

Season	Rotifera	Copepoda	Cladocera	Protozoa
Summer	1698.34	968.25	786.25	476.45
Monsoon	1023.47	623.45	642.78	358.12
Winter	842.45	644.24	583.89	625.96

The most dominant benthic species encountered and collected from the Titwi dam were *Bellamya-bengalensis*, *Unio* (Bivalvia), *Baccinum*, Chironomous-larvae. The population of Macro benthic invertebrates in Titwi Dam comprised the larval, nymph and pupal stages of aquatic insects besides leeches, crabs, earthworms, nematodes. The Macro benthic biota was contributed by Ephemeroptera (May flies), Trichoptera (Caddies flies), Diptera (Two winged flies), Coeloptera (water beetles), plecoptera (stone flies), Odonata (Damse), and dragon-flies and hemiptera (water bugs), Molluses (*Unio*, *Bellamya-bengalensis*, *Baccinum* and shell) formed the dominant group in Titwi Dam. Results has been illustrated in table 1-2.

The total Zooplankton comprises of five groups Protozoa, Rotifera, Cladocera, Ostracoda and Copepoda. Out of these groups Rotifera is dominant group and is represented in the order of dominance as Rotifera > Cladocera > Copepoda > Ostracoda > Protozoa. The Rotifers are microscopic soft bodied fresh water Zooplanktons. They indicate tropic status of water body. Rotifer population is abundantly found during March and April, and lowest number in October. Many workers Choubey, (1991), Ganpati and Pathak (1969), reported the rotifer groups in their studies on the different water bodies in India. George, (1966), Micheal, (1968) observed maximum number of rotifers during summer months. The high rotifer densities in summer season may be due to reduced water volume and thereby increased concentration of nutrients.

The Cladocerans are of commonly occurrence in almost all the fresh water bodies. They represent an important link in the aquatic food chain. This group also showed dominant in May and June, and lowest number in September and October. It is moderately present group of Zooplankton in the present study. (Govind, 1967), (Ganpati and Pathak, 1969), abundant from various fresh water bodies. The Copepods are major links in the aquatic ecosystem. The copepod population abundantly present during present study. This group showed dominant in April and May and the lowest in January and December. The Ostracoda also forms a dominant link in the aquatic ecosystem. The Ostracoda population abundantly found in summer and in winter it observed in fewer species during present study. This group showed dominant in summer and lowest in winter. Protozoans are also important members in food chain in an aquatic ecosystem. In the present study the maximum protozoan population was observed during March and April, and minimum in June. Protozoans are rarely found in order of dominance. The study indicates seasonal variations in the distribution of zooplanktons. Rotifera, Cladocera, Copepoda were found in maximum number during summer followed by winter and minimum during monsoon. Thus the present study deals with the abundance and dominant of Zooplanktonic groups, which investigated rotifers as dominant group of Zooplanktons in Titwi Dam of Titwi.

## CONCLUSION

Zooplankton community was represented by four groups' viz., rotifera, cladosera, copepoda and ostracoda. Rotifers were found maximum in summer and minimum in winter season. The cladosera were found maximum in Manson season and minimum winter season. Ostracods were found maximum in summer season and lower in winter season. Whereas Copepods were rarely abundantly found in summer season and rarely found in winter season during one year of this study. The availability of Zooplankton community was correlated with physical and chemical parameters of the dam. Thus the dam plays a very important role in maintaining the biodiversity. The presence of different species *Brachionus* indicates that Dam is approaching towards eutrophication. Further, the present study indicates that the Titwi dam water is suitable source for the supply of water for drinking, irrigation and fish culture.

## REFERENCES

- APHA (1991)**. Standard methods for the examination of water and waste water, 18<sup>th</sup> Ed. NewYork : *American Public Health Association Inc.*
- Choubey V. (1991)**. Studies on physicochemical and biological parameters of Gandhi Sagar Reservoir Ph.D. Thesis Vikram University, Ujjain pp.244.
- Dhanze J.R. and Dhanze R. (1998)**. Post impoundment impact on the biodiversity of western Himalayan River system. A case study. *Proc. Acad. Enviro. Biol.* 7 (1): 11-16.
- Ganapati S.V. and Pathak C.H. (1969)**: Primary productivity in the Sayaji Sarovar (a manmade lake) at Baroda. *Proc. Sem. Eco. And Fish.* Fresh water Reservoir ICAR at CIFRT, Barrackpore 27-29.
- George M.G. (1966)**. Comparative plankton ecology of five tanks in Delhi: *Hydrobiologia.* 27(2): 81-108.
- Govind B.V. (1978)**. Planktonological studies in the Tungabhadra Reservoir and its comparison with other storage reservoirs in India: *Proc. Semi. Eco. And Fish fresh water reservoir*, ICAR at CIFRT, Barrackpore 66-72.
- Kumar K. (1987)**. Observation on seasonal variations of benthic organisms in two trout streams of Kashmir. *Proc. Indian Nat. Acad. Sci.* B53 (3): 227-234.

- Needham J.G. and Needham P.R. (1962):** A guide of the study of freshwater biology, Holden Day Inc., San Francisco P.108.
- Pennak R.W. (1978).** Freshwater invertebrates of the United States, 2<sup>nd</sup> edition, John Wiley and Sons Inc., New York pp.803.
- Sehgal K.L. (1983).** Fishery resources and their management, pp.225-272.
- Semwal N. and Akalkal P. 2006.** Water quality assessment of sacred Himalayan Rivers in Uttarakhand. *Curr. Sci.* 92(4): 486-496.
- Sharma, R. and Diwan A.P. (1989).** Limnological Studies on Yeshwant – nagar reservoir. An assessment of its potential for fish culture. *J. Hydrobiol.* 5(1): 67-69.
- Singh J.P. and Singh V. (1996).** Seasonal variations of macro-zoo-benthos of Rajendra Sarovar, Chapra, Bihar, India. *J. Environ. Biol.* 17(3): 205-209.
- Srivastava K. and Singh S.R. (1996).** On the population dynamics of Chironomids sp. (Chironomidae, Diptera, Insecta) in relation to water quality and soil texture of the River Ganga (Between Buxar and Balia). *Proc. Indian Nat. Acad. Sci. B* 62(4) :259-270.
- Shrivastava N.P. and Desai V.R. (1997).** Studies on the Bottom macrofauna of Rihand reservoir. *J. Environ. Biol.* 18(4): 325-331.
- Singh A.K. (1997).** Abundance of macrobenthic organism in relation to the physicochemical characteristics of River Ganga at Patna (Bihar) India. *J. Environ. Biol.* 18(2): 103-110.
- Tonapi G.T. (1980).** Freshwater animals of India (an ecological approach) Oxford and IBH Publishing co., New Delhi pp.341.