IJCSPUB.ORG ISSN : 2250-1770
INTERNATIONAL JOURNAL OF CURRENT SCIENCE (IJCSPUB)
IJCS PUBLICATION (IJCSPUB.ORG) An International Open Access, Peer-reviewed, Refereed Journal

To Study Zooplankton Diversity of Titur-Dongari River From Chalisgaon Region, Jalgaon, Maharashtra

Surekha D. Chate

Department of Zoology, Smt. Godavaribai Ganapatrao Khadse College, Muktainagar, Jalgaon-425 306

ABSTRACT-

The present study was assessed diversity of fresh water zooplankton from Titur-Dongari River. Chalisgaon is a city and a municipal council in Jalgaon district in the state of Maharashtra, India. The town, known for its well planned architecture, is situated on the bank of river Titur and Dongari in the northern part of Maharashtra state, a tributary of the Girna River. The latitude 20.47°N and longitude 75.02°E are the geocoordinate of the Chalisgaon. It has an average elevation of 344 metres. Samples were collected using simple conical tow plankton net (40 µm bolting nylon). During present observations 58 fresh water zooplankton species belonging to 15 families 20 genera were recorded. The present study concluded that the Titur-Dongari River is rich in freshwater zooplankton diversity and the dominance of rotifera and copepoda indicating the eutrophication of present water body.

Keywords: - Zooplankton, Diversity, Titur-Dongari River, Rotifera

INTRODUCTION

Zooplankton are small animals that float freely in the water column of lakes and oceans and whose distribution is primarily determined by water currents and mixing. The zooplankton community of most lakes ranges in size from a few tens of microns (Protozoa) to >2 mm (macrozooplankton). In terms of biomass and productivity, the dominant groups of zooplankton in most lakes are Crustacea and Rotifera and these protocols emphasize those groups. Zooplankton play a pivotal role in aquatic food webs because they are important food for fish and invertebrate predators and they graze heavily on algae, bacteria, protozoa, and other invertebrates. Zooplankton communities are typically diverse (>20 species) and occur in almost all lakes and ponds. Zooplankton are rarely important in rivers and streams because they cannot maintain positive net growth rates in the face of downstream losses.

The relationship between livings and their environment is inevitable, continuous and reciprocal. The study of these interactions under the natural conditions constitutes the science of ecology. The linkages between these wide varieties of diverse habitats and ecosystems are essential for the maintenance of food webs, migration routes and increased productivity. Zooplankton are susceptible to variations in a wide number of environmental factors including water temperature, light, chemistry (particularly pH, oxygen, salinity, toxic contaminants), food availability (algae, bacteria), and predation by fish and invertebrates. It is generally desirable to have as much information on these variables as possible. Clearly, this will frequently be practical. Some variables are relatively easy to measure (e.g. temperature), but others are more difficult (e.g. fish-predation intensity, toxic contaminants). Many environmental factors affect zooplankton only at extreme levels (e.g. toxic contaminants, salinity, oxygen) and will not be important in all lakes. Ideally, most sample collections should be accompanied by measures of water temperature, pH, and algal biomass (chlorophyll-*a* concentration or phytoplankton biomass). Chalisgaon is a Town in Chalisgaon Taluka in Jalgaon District of Maharashtra State, India. It belongs to Khandesh and Northern Maharashtra region. It belongs to Nashik Division. It is located 96 KM towards South from District head quarter Jalgaon. Chalisgaon is located on the Titur and Dongri River, a tributary of the Girna River. The latitude 20.47°N and longitude 75.02°E are the geocoordinate of the Chalisgaon. It has an average elevation of 344 metres.

The zooplankton composition influenced by so many factors and they change according to ecological changes. Tropical aquatic ecosystems are the most productive areas with rich zooplankton population, Robertson *et al.*, (1992) and Saravankumar *et al.*, (2007). Zooplankton is a source of food for many species which themselves serve as a basis for the artisanal fishery well known in Maharashtra state. To understand the secondary and tertiary productivity, it is desirable that the systematic of the zooplankton is known. Although much work has been done all over the India, the fauna of freshwater zooplankton of Titur-Dongari River is not well documented. Consequent upon this, there is a need for information on the dynamics of freshwater zooplankton diversity in the Titur-Donagari River, Chalisgaon.

The present study includes the diversity, species wise distribution and population density of fresh water zooplankton from Titur-Dongari River. During monsoon, large amount of fresh water influx occurs in the reservoir, resulting in considerable fluctuation in physicochemical properties. This River in enriched by nutrients from Girna River. The phyla of zooplankton were encountered during this investigation with the former being more diverse and abundance. As fresh water zooplanktons are quantitatively important group, research on this taxon is particularly significant.

MATERIAL AND METHODS

Selection of sampling sites-

The present study was carried out in five sites so as the water samples represent the entire reservoir. The GPS location of all the sampling sites was noted down. The maps of Titur-Dongari River were digitized using Google 6.0 to show the exact location of sampling sites and other features.

Figure- 1: The Google map showing four sampling sites of Titur-Dongari River.

The sampling sites were selected taking into account the human activities, the outlets, inlets morphometric features and less growth of aquatic vegetation and undisturbed area (APHA, 1992). Depth of the water column was varied. Sampling was done from February 2018 to January 2019. The water sample will be collected monthly intervals.

Zooplankton Collection, Preservation, Identification-

The samples of zooplankton were collected from each selected study site of the dam during 7am to 9am for a period of one year. The nylon net (40µ mesh size) was used for collection of zooplankton. Collection of each sample done by filtering 100 lit of water and concentrate to the 50 ml and transferred to the plastic bottles, it was carefully labeled and preserved immediately onsite using formaldehyde solution (Kharate, *et al.*, 2017, 2018). Later, the collected samples were brought to the laboratory for identification using various monographs, books and other published literature (Altaff, 2004, Edmondson, 1958 and Pennak, 1978).

RESULTS AND DISCUSSION

In the present study 58 species of fresh water zooplankton belonging to 15 families and 20 genera from water samples of Titur-Dongari River were recorded.

Table- 1: Checklist of freshwater zooplankton species of Titur-Dongari River during February 2018 to January 2019.

Group	Name of the Species
Rotifera	*Anuraeopsis fissa* (Gosse, 1851)
	Anuraeopsis navicula (Rousselet, 1892)
	Asplanchna brightwelli (Gosse, 1850)
	Asplanchna priodonta (Gosse, 1850)
	Asplanchna intermedia (Hudson, 1886)
	Brachionus angularis (Gosse, 1851)
	Brachionus bidentata (Jokubsky, 1912)
	Brachionus budapestinesis (Daday, 1885)
	Brachionus calyciflorus (Pallas, 1834)
	Brachionus caudatus (Barrois and Daddy, 1894)
	Brachionus diversicornis (Daday, 1883)
	Brachionus falcatus (Zacharias, 1898)
	Brachionus forficule (Weirzejski, 1891)
	Brachionus quadridentatus (Hermann, 1783)
	Brachionus rubens (Ehrenberg, 1838)
	Keratella cochlearis (Gosse, 1851)
	Keratella tropica (Apstein, 1907)
	Notholca lebis (Gosse, 1887)
	Lecane papuana (Murray, 1913)
	Lecane luna (Muller, 1776)
	Filinia longiseta (Ehrenberg, 1834)
	Filinia terminalis (Plate, 1886)
	Polyarthra major (Burckhardt, 1900)
	Trichotria tetractis (Ehrenberg, 1830)
Copepoda	*Apocyclops dengizicus* (Lepeschkin, 1900)
	Cletocamptus albuquerquensis (Herrick, 1895)
	Eodiaptomus japonicus (Burckhardt, 1913)
	Eucyclops speratus (Lilljeborg, 1901)
	Heliodiaptomus viduus (Gurney, 1916)
	Mesocyclops aspericornis (Daday, 1906)

	Mesocyclops hyalinus (Rehberg, 1880)
	Mesocyclops leuckarti (Claus, 1857)
	Neodiaptomus lindbergi (Brehm, 1951)
	Neodiaptomus schmakeri (Poppe & Richard, 1892)
	Paracyclop fermbrialis (Fischer, 1853)
	Sinodiaptomus indicus (Sewell, 1934)
	Thermocyclops hyalinus (Rehberg, 1880)
	Trpocyclop prasinus (Fischer, 1886)
Cladocera	*Diaphanosoma sarsi* (Richard, 1895)
	Diaphanosoma excisum (Sars, 1865)
	Daphnia carinata (King, 1853)
	Daphnia magna (Straus, 1820)
	Daphnia longirimis (Sars, 1861)
	Ceriodaphnia cornuta (Sars, 1885)
	Ceriodaphnia reticulata (Jurine, 1820)
	Kurzia longirostris (Daday, 1898)
	Moina brachiata (Jurine, 1820)
	Moina flagellate (Hudendroff, 1876)
	Moina micrura (Kurz, 1874)
	Moina macrocopa (Straus, 1820)
	Moinodaphnia macleayi (King, 1853)
	Leydigo acanthocercoids (Fischer, 1854)
Ostracoda	*Cypris protubera* (Muller, 1776)
	Strandesia elongate (Stuhlmann, 1888)
	Cyprinotus nudus (Brady, 1885)
	Cyclocypris globosa (Baird, 1845)
	Heterocypris dentatomarginatus (Baird, 1859)
	Hemicypris anomala (Furtos, 1993)

The freshwater zooplanktons found from four sampling sites, which is shown in table 1 clearly sshows that the zooplankton species like *Anuraeopsis fissa; Anuraeopsis navicula; Asplanchna brightwelli; Asplanchna priodonta; Asplanchna intermedia; Brachionus angularis; Brachionus bidentata; Brachionus budapestinesis; Brachionus calyciflorus; Brachionus caudatus; Brachionus diversicornis; Brachionus falcatus; Brachionus forficule; Brachionus quadridentatus; Brachionus rubens; Keratella cochlearis; Keratella tropica; Notholca lebis; Lecane papuana; Lecane luna; Filinia longiseta; Filinia terminalis; Polyarthra major* and *Trichotria tetractis* were dominated in Titur-Dongari River. Amongst the freshwater zooplankton species, rotifera type of species show highest order-wise species distribution than all other species; as well as least species distribution shows

decapoda type of species. The earlier findings in relation to zooplankton community structure, composition, diversity and dynamics in freshwater ecosystems of India in particular, Andhra Pradesh.

It consistent work done on water pollution along the lakes and rivers points out to the need of systematic and regular monitoring of pollution level for further improvement in the industrial waste water treatment methods. The density and diversity of the zooplankton are controlled by the several physicochemical factors of water. The present study revealed that the species of Rotifera> Copepoda> Cladocera> Ostracoda. The present study concluded that the Titur-Dongari River rich in freshwater zooplankton diversity and the dominance of Rotifera and Copepoda indicating the eutrophication of present water body. The pattern of algal distribution and its density is the main biological factor affecting the density and diversity of the zooplankton. The density and diversity of the zooplankton are controlled by the several physicochemical factors of water, Bais and Agrawal, (1990).

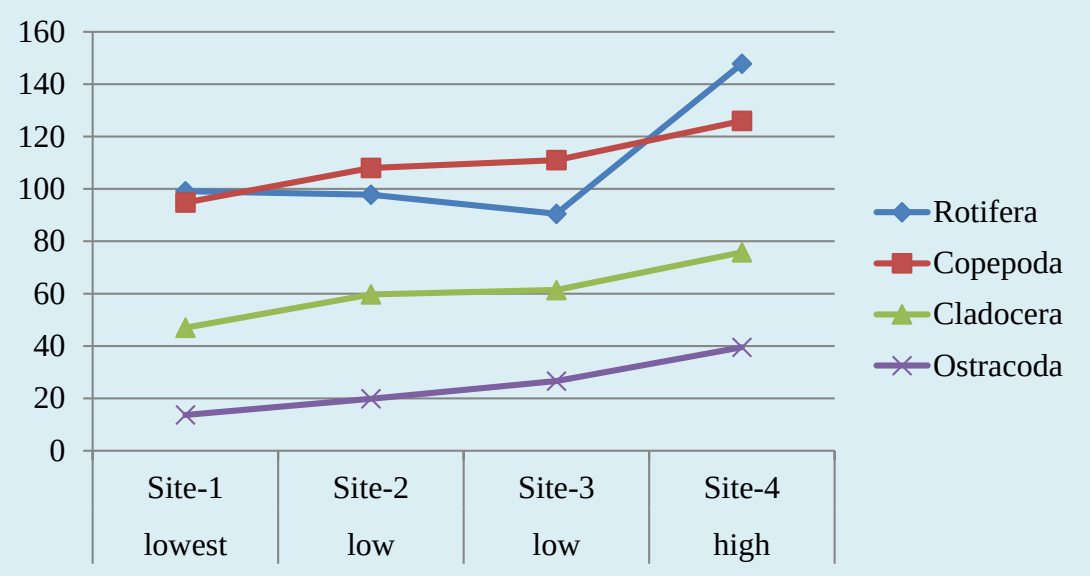

Figure- 2: Showing site-wise species distribution of fresh water zooplankton.

CONCLUSION

The study revealed that decapoda species has low diversity compared with other freshwater zooplnakton species because decapoda might be scarce in sampling sites or high invertebrate predation, as well as because of large abundance of rotifers in the Titur-Dongari River. The study directly addressed the assessment of large seasonal and interannual variability affects metazooplankton abundance. Differences were found between the sampling regions in the proportion of species in the largest taxonomic groups, which could confirm the existence of a biotic threshold which are good for healthy aquaculture practices.

ACKNOWLEDGEMENT

The authors are thankful to, Head, Department of Zoology, Smt. Godavaribai Ganapatrao Khadse College, Muktainagar, Jalgaon-425 306 (M.S.), India for provision of laboratory facilities during experimentation.

REFERENCES

1. Altaff, K. (2004). A manual of Zooplankton, Department of Zoology, The New College, Chennai, pp.19-145.
2. APHA (1992). Standard Methods for the Examination of Water and Wastewater. 18th ed. American Public Health Association (APHA), American Water Works Association (AWWA) and Water Pollution Control Federation (WPCF), Washington, DC.
3. Edmondson, W. T. (1958). Freshwater Biology, Second Ed. John Wiley and Sons Inc. London-Chapman and Hall Limited, New York, USA, 1248.
4. Koli, K. B and D. V. Muley (2012). Study of zooplankton diversity and seasonal variation with special reference to physico-chemical parameters in tulshi reservoir of Kolhapur district (M.S.), India. International scientific Research Journal, Vol. 4(1), pp.67-71.
5. Lackey, R., Nlewadim, A. and Adeyemo, A. (1998). Effect of Inorganic fertilization on zooplankton production in Brackish water (ed.). Selected papers from 9th/10th Annual Conference of the Nigerian Association for Aquatic Sciences. Theme: Sustainable Utilization of Aquatic/Wetland Resources, held at University of Agriculture Abeokuta, Ogun state, Nigeria, pp.75-82.
6. Pennak, R. W. (1953). Fresh Water Invertebrates of the United States.
7. Robertson, A. I. and Blabber, S. J. M. (1992) Plankton, Epibenthos and Fish Communities. Tropical Mangrove Ecosystems, American Geophysical Union, Washington, DC, USA 173-224.
8. Saravanakumar, A., Rajkumar, M., Seshserebiah, J. and Thivakaran, G. A. (2007) Abundance and seasonal variations of zooplankton in the arid zone mangroves of Gulf of Kachchh-Gujarat, West coast of India. Pakistan Journal of Biological Sciences, 10: 3525-3532.
9. Kharate D. S., Lakwal, V. R. and Mokashe, S. S. (2017) The Crustacean Zooplankton Abundance and Population Density in Bhatye Creek, Ratnagiri, Maharashtra, India, International Journal for Research in Applied Science & Engineering Technology (IJRASET), Vol-5, Issue XII, pp. 1386-1392.
10. Kharate D. S., Lakwal, V. R. and Mokashe, S. S. (2018) The Crustacean Zooplankton Diversity from Bhatye Creek of Ratnagiri Coast, Maharashtra State, International Journal for Research in Applied Science & Engineering Technology (IJRASET), Vol-6, Issue-I, pp. 1345-1359.