International Journal of Zoology Studies
ISSN: 2455-7269
Impact Factor: RJIF 5.14
www.zoologyjournals.com
Volume 3; Issue 2; March 2018; Page No. 322-324

Zooplankton population in reference to river water pollution

Vijayan P, Senthilmurgan S, Sasikala P
Department of Zoology, Annamalai University, Annamalai Nagar, Tamil Nadu, India

Abstract
Studies on Zooplankton of river Cauvery water, Mettur, Salem District, Tamil Nadu was made to assess the pollution of water from January 2017 to December 2017. The qualitative and quantitative evaluation of the variation in river water showed high quantity of Zooplankton. The present study revealed that the water of Cauvery River is highly polluted by direct contamination of sewage and other industrial effluents.

Keywords: zooplankton, industrial pollution, Cauvery River, sewage

Introduction
Rivers are important systems of biodiversity and are among the most productive ecosystems on the earth because of the favorable conditions that supports number of flora and fauna. River ecosystem is one of the natural resource which comes into the service of mankind in many parts of the world. They play a vital role in the productivity as they are beset with varieties of flora and fauna including planktons. Urbanization [1], expansion of irrigation and increasing trend of industrialization has contributed towards the demand for water. Surface water is the principal source of irrigation in rural areas. Most of the fresh water bodies all over the world are getting polluted water, thus decreasing the portability of the water [2]. Diatoms constitute a fundamental link between primary (autotrophic) and secondary (heterotrophic) production and form a vital component of aquatic ecosystem [3].

Rivers play a very important role to maintain the biodiversity of the nation. Rivers are the major sources of our water supply to the village, towns and cities. If availability of water is less due to failure of monsoons as it happens in south often, it gives rise to sever scarcity. In the name of development today most of the rivers of world receive millions of liters of sewage, domestic waste, industrial and agricultural effluents containing substances varying in characteristic from simple nutrients to highly toxic substances. Increasing industrialization and consequent urbanizations are the most significant causes of pollution of aquatic ecosystem due to a diverse kind of wastes produced by them. The rapid population, industrialization, urbanization, technological development, injudicious planning without due regard to the sustainable development have induced numerous changes in the environment. Water is a main concern as billions of people worldwide have no access to safe drinking water. Water is basic to life and health of all living organisms. Rivers are dynamic systems that receive minerals and nutrients through sedimentation, rain, surface and ground water and human generated pollution.

Various species diversity indices respond differently to different environmental and behavioral factors of biotic communities and therefore, recent investigations have been directed to species diversity indices. Cauvery River is one of the important River Cauvery at Ammapettai (Near Mettur). The knowledge of river Zooplankton in India is fragmentary, though a number of contributions are available [2, 4, 5]. In a water body there usually occur seasonal qualitative fluctuations in planktonic population in tropical and temperate climates [6, 7]. In the present communication, an attempt was made to study the Zooplankton diversity index in Cauvery River [8, 9]. Zooplankton has short life span and they respond more quickly to environment leads to change in plankton communication in terms of tolerance, abundance, diversity and dominance in the habitat. Therefore Zooplankton communities of numerous reservoirs, lakes and shallow water bodies have been used as indicators for the status of the lake [10, 11]. The variability observed in the distribution of Zooplankton is due to abiotic parameters [12-14].

Hence the present investigation was carried out on the surface zooplankton population in the aquatic ecosystem of Cauvery River The industrial effluents from various industries in and around the Mettur downstream and sewage discharge at area affecting the water quality as a consequence, the zooplankton population of Cauvery River has been affected in terms of abundance and diversity.

Materials and Methods
Monthly surface water samples were collected in two different sites, from January 2017 to December 2017. The reading is recorded for physico-chemical and Biological factors described in [15].

Physico- chemical parameters
Sample was taken from the selected Cauvery River various types of Physico-chemical such as Temperature, pH, DO_2 etc.

Field study
Zooplankton samples were collected for qualitative and quantitative analysis in between 9 am to 10 am. By standard

methods [15] two sampling sites over period of January 2017 to December 2017. The collected samples were fixed in 4% formalin and brought to the laboratory for Zooplankton analysis; counting and identification were done as per, (1992) Species diversity index was obtained by following Shannon were methodology.

The collection and observation of water samples from two different stations were made between 9.00 AM to 10.0 AM hours throughout the study period. A vehicle was used to maintain accuracy in reaching the stations on time from River Cauvery at Ammapettai (Near Mettu).

Physico chemical parameters of water were analyzed from January 2017 to December 2017 collected from both the sites. Temperature and pH were recorded immediately at the sites. Other Physico parameters viz. Nitrite, Nitrate, Phosphate and Silicate analysed in to the laboratory by using standard methods. For Zooplankton analysis, surface Water samples were collected on monthly basis at selected sites. The Zooplankton samples were collected by filtering 50 liters of water through standard plankton net of (200 to 300) mesh size. The samples were concentrated up to 100 ml and preserved with 4% formalin and Lugol's iodine solution. The quantitative and estimation of Zooplankton were carried out by Lackey's drop method.

Result and Discussions

Zooplankton: Zooplankton species encountered their month wise distribution is presented in Table 1 and Fig. 1. A total of 45 species were recorded from this Cauvery River of which 14 species were recorded from this Cauvery River of which 14 species belonged to Rotifera, 13 species to Copepoda, 12 species to protozoa, and 11 species to cladoceran. The total zooplankton population density varied from 40 during March to 60 in September. The annual mean percentage compostion of zooplankton groups showed that Copepoda contributed 26% Rotifera 28% Protozoa 24% and Cladocera 22% (Figure.1).

Table 1: Population composition and monthly fluctuation of Zooplankton from January 2017 to December 2017

Month	Copepoda	Rotifera	Protozoa	Cladocera	Total Zooplankton
January	13	12	12	13	50
February	11	15	10	10	47
March	13	15	10	11	49
April	10	10	12	10	42
May	12	17	11	10	50
June	11	10	12	11	44
July	12	13	19	12	56
August	16	18	12	12	58
September	18	12	10	12	52
October	13	14	11	10	48
November	10	15	12	11	48
December	17	17	11	10	55
Mean	13	14	12	11	50

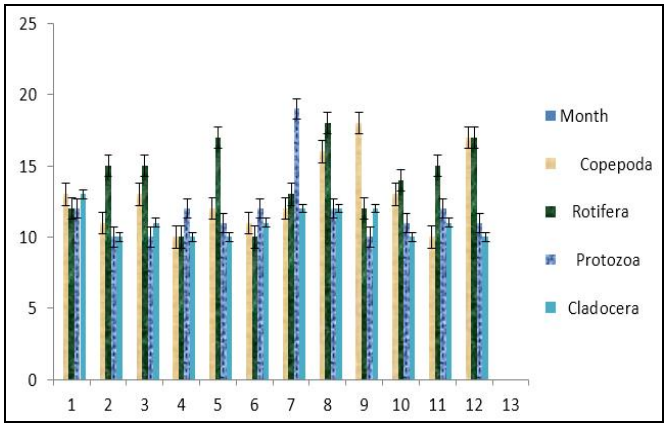

Fig 1: The plankton population in Cauvery, Mettur during Jan. 2017-December 2017. Polluted area

The zooplankton population also flucates monthly [16], productivity was high during August and low during September 2017 in this study area. The rreason might be to heavy rain as evidenced by [17]. The pnedominance of Rotifers and Copepodes over the other groups of Zooplankton observed in the present study has also been reported earlier in various Rivers [18, 19]. Thus the influence of nutrients of water on the Zooplankton has been reduced in Cauvery River. In the present investigation, this observation clearly revealed that Zooplankton represents a sensitive indicator of population.

Conclusion

In the present study it is concluded that is Rotifera dominant (pollute River Cauvery at Ammapettai (Near Mettur). By industrial waste) coming from in and around Mettur areas. So water of this station is organically rich and contaminated. Total plankton count/ml is minimum in monsoon and maximum in post monsoon in Cauvery River. This indicates that though not yet polluted, if the care is not taken may get polluted in future as it is having potential for deterioration and eutrophication under the influence of pollution and anthropogenic activities.

Acknowledgements

The authors are grateful to university authorities and Dr. R. Karuppasamy Professor and Head, Department of Zoology, Annamalai University, for providing necessary facilities for the research.

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