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ZOOPLANKTON DIVERSITY OF CAUVERY RIVER IN ERODE DISTRICT, TAMILNADU

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. Author SU designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors TC and PS read and approved the final manuscript.

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Short Research Article

ABSTRACT

The river Cauvery is the main water source for many places in Tamilnadu. It is highly polluted in Erode District due to improper management of textile effluents. This study was carried out to analyse the quality of the Cauvery River in Erode. Planktons are the basic food source of an aquatic ecosystem. Zooplankton diversity is one of the most important ecological indicators for the assessment of water quality. This study was designed to analyse the diversity of Zooplankton of the Cauvery River in Erode, relation to from the period of July to Nov 2018, and the results were recorded periodically. The results revealed that the diversity of Zooplanktons are great good indicators for the river ecosystem and influenced by the quality of river water. The Rotifers are the commonly observed and most dominant zooplankton species present in the Cauvery River. The variation in biodiversity of the water body can be related to water quality. Zooplanktons are also very useful as biological indicators of water quality.

Keywords: Zooplankton; Cauvery river; biological indicator; water quality.

1. INTRODUCTION

Zooplankton is an important component of aquatic ecosystems that are involved in the transformation of organic matter and the formation of matter and energy fluxes. Filter-feeding organisms are involved in the natural self-purification of water bodies, which is important under increased anthropogenic loads. In an aquatic ecosystem, zooplanktons from the microscopic animals that an important role in an aquatic food chain as they are largely consumed by fishes and other higher organisms in the food chain. Zooplankton density has also been reported to vary depending on the availability of nutrients and the stability of the water [1]. The parameters of zooplankton species richness, diversity, size-weight structure, and dominance are sensitive indicators of anthropogenic changes in environmental conditions [2]. The primary issue for morphology-based biodiversity monitoring is resolution and efficiency. When gathering information on zooplankton composition and abundance in a traditional way, it relies heavily on taxonomists who identify specimens under a binocular microscope. In addition, morphology-based methods are challenged by rare species detection [3], which is of great significance for biological conservation. Rare species, which are often either endangered species or species under

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severe environmental stresses in polluted ecosystems, should be protected or analyzed in priority. The species diversity and abundance of the community structure of the zooplanktons are necessary to assess the potential fishery resource of an aquatic body [4]. Plankton diversity seems one of the important ecological parameters in water bodies because of its participation in the food chain. But information is lacking on quantitative aspects of zooplankton in relation to physical and chemical parameters and biodiversity studies at Arrah [5,6]. Hence, an attempt has been made to study certain aspects of zooplankton of the Cauvery River, Erode district. The study will provide the basic information of ecology and the present condition of this water body.

2. STUDY AREA

The Cauvery River originated from Guddagumalai and flows through Karnataka and Tamil Nadu. It runs to Mettur, Bhavani, and Pallipalayam, etc., The Cauvery River Pallipalayam is located at Erode district, Tamil Nadu state in India. The present study on the distribution and abundance of the Zooplankton of Cauvery River is located at 11°36’07.6W and 77°74’24.1E at Pallipalayam, Tamil Nadu.

3. MATERIALS AND METHODS

The Zooplankton sampling was carried out for a period of six months from June to Nov 2018 in Cauvery River at Pallipalayam. The collection protocol included a weekly sampling of zooplankton from the site during the early hours of the day (4.00 am to 6.00 am) for a period of six months. The sample of 50 litters of surface water was collected periodically every month filtered through a standard plankton net. Water samples were collected from selected habitats for six months. Zooplankton was collected by horizontal hauls at a depth of about 1.00 m for 5-10 minutes using a bolting silk net with a mouth area of 0.0855 m2 and a mesh size of 0.02 mm. Collected samples of zooplankton were transferred to 100 ml plastic bottles and fixed with 4% formalin. A stereoscopic microscope and Olympus FX 100 microscope were used to observe plankton and standard keys were used for identification. Further for identifying the zooplankton and studying their diversity, a drop of preserved zooplankton sample were placed in Sedgwick-Rafter counting chamber and observed under a light microscope required magnification(× 10 initially, followed by × 40). For enumeration of zooplankton abundance, the modified Sedgwick Rafter method was followed [7]. One ml from the concentrated sample from each sampling site was transferred into a one ml Sedgwick Rafter counting chamber and observed under Olympus binocular microscope. Pictures of the various zooplankton species were taken using a Canon digital camera (model A 470). Identification and abundance of Cladoceran zooplankton group were carried out using the key [8,9]. Various planktonic groups and their species were enumerated by examining 5-10% of the sub-sample and the number of organisms computed per m*3* of water [10,11]. Zooplanktons were identified using the standard works [12].

4. RESULTS AND DISCUSSION

About 42 species of Zooplankton 4 species of protozoa, 21 species of Rotifera, 8 species of Cladocera,7 species of Copepod, and 2 species of Ostracoda are recorded. The diversity indices of zooplankton 9% of Protozoa, 50% of Rotifera, 19% of Cladocera, 17% of Copepod, and 5% of Ostracoda were recorded. The Rotiferasp was observed *Brachionusangularis*during June 2018. Rotifer has an important role in energy flow and nutrient cycling, accounting for more than 50% of zooplankton production in some freshwater systems [13]. The abundance of rotifers and their community characteristics are used as effective indicators of environmental changes, such as acidity, food level, and humidity [14]. Reported that the abundance and diversity of zooplankton vary according to limnological features and the topical state of freshwater bodies [15]. The copepods 17% highly present than Protozoa (9%) and Ostracoda (5%). The copepod *Diaptomus sp.* observed during 2018 (Table 1 and Fig. 1). Depth of water, transparency, pH and predators determine the distribution and abundance of copepods [16,17]. The diversity of the zooplanktons index was tabulated in Table 2. The number of different species found in a particular environment and different organisms. A measure of how similar the abundances of different species are in the community recorded as 00.826 in Table 2. The number of individuals observed was 1.33 for each species in the sample plot and two randomly selected individuals in the community belong to the same category as 00.35 and different categories recorded as 00.675. The number of equally common categories tabulated as 3.077.

Table 1. Showing distribution the Zooplankton of Cauvery River in Erode

Zooplankton:	Observation					
	June	July	Aug	Sep	Oct	Nov
Protozoa						
Euglypha sp.	+	+	+	+	+	+
Difflugia sp.	_	_	+	+	-	_
Prorodon sp.	+	+	_	+	+	_
Vorticella sp.	_	+	+	_	+	+
Rotifera	_	_	+	_	-	+
Ascomorpha sp.						
Brachionus sp.	+	+	+	+	-	_
B. calciflorus	+	+	+	+	+	_
B. angularis	+	+	+	+	+	+
B. rubens	+	+	_	+	-	_
B. caudatus	+	_	+	+	+	+
Cocconeis sp.	+	+	_	+	+	_
Diacranophorus	+	+	_	+	-	+
Horellabrehmi	+	_	+	+	+	+
Keratellatropica	+	+	_	+	-	+
K. cochlearis	+	_	+	+	+	_
Lepadella sp.	+	+	_	+	+	-
Monostylaquadridentatus	+	_	+	+	-	_
Mytilina sp.	+	+	+	+	+	_
Notholca sp.	+	+	_	+	-	+
Philodina sp.	+	_	+	+	+	_
Synchacta sp.	+	+	+	+	-	+
Trichocerarattus	+	_	+	+	-	+
Testudinella patina	+	_	+	+	+	+
Asplanchnabrightwelli	+	+	_	+	_	_
Lecanelunaris	+	_	+	+	-	+
Clodophora						
Bosminalongirostris	+	_	+	+	+	_
Daphnia carinata	+	+	+	+	+	+
D. similes	+	+	+	+	_	_
Diaphanosoma sp.	+	_	+	+	+	_
Leydigia sp.	+	+	_	+	+	+
Moina sp.	+	+	+	+	_	+
Moina daphnia	+	_	+	+	_	_
Sida sp.	-	+	_	+	+	_
Copepoda						
Heleodiaptomusviduus	_	+	+	+	_	_
Cyclopoids sp.	+	_	+	+	+	-
Copepods sp.	+	+	+	+	+	+
Diaptomus sp.	+	+	_	+	_	_
Mesocyclopshyaliners	+	+	+	+	+	+
Oithonabrevicornis	+	+	_	+	+	_
Thermocyclops sp.	+	_	+	+	-	+
Ostracoda						
Cypris sp.	+	_	+	+	+	_
Stenocyprismalcolmsoni	+	+	+	+	+	+

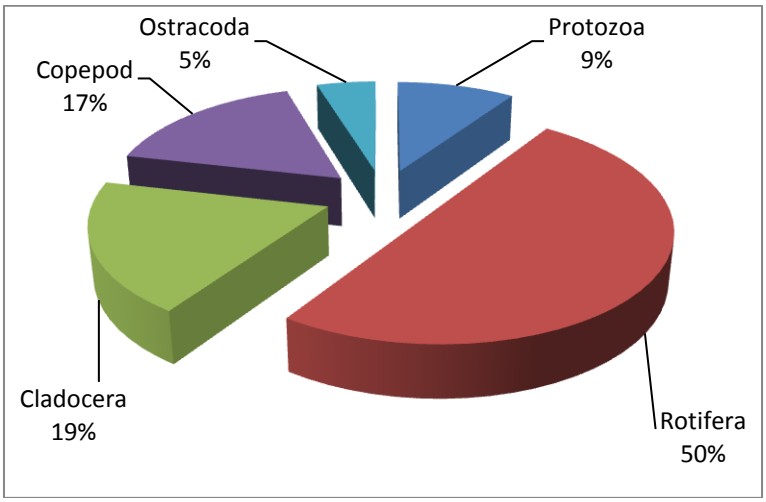

Fig. 1. Zooplankton abundance of Cauvery river in erode

Table 2. Diversity index of Zooplankton

Category	# Found	P_i	P_i^2	$P_i ln[P_i]$	Measure	Value
Protozoa	4	0.095	0.009	-00.224	S	5
Rotifera	21	00.5	00.25	-00.347	D	00.35
Cladocera	8	00.191	0.036	-00.316	1 - D	00.675
Copepoda	7	00.167	0.028	-00.299	1/D	3.077
Ostracoda	2	0.048	0.002	-00.145	H	1.33
Total	**42**	**1**			**E**	**00.826**

S - Species Richness , D - Simpson's Index, 1-D - Index of Similarity, 1/D - Reciprocal Index, H - Shannon-Wiener Index and E- Evenness

5. CONCLUSION

The study also showed that zooplankton species survive in neutral conditions. Thus the status of the River could say to be eutrophic as indicated by the diversity of zooplankton. These conditions of River Cauvery can be changed because of industrial effluents which release into the water. Therefore, conducting further studies in this area is essential to measuring the diversity of zooplankton. The recent years it has been yielding from various problems like urbanization and the growth of various small scale industries nearby leading to its pollution. This work account to give awareness among the people about the quality of water and can help reduce the water pollution through housekeeping and management practice.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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