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ASSESSMENT OF ZOOPLANKTON DIVERSITY AT PERIYA SADAYAMPALAYAM POND, IN ERODE DISTRICT, TAMILNADU, INDIA

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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 TA read and approved the final manuscript.

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ABSTRACT

Planktons are the basic food source of aquatic ecosystem. The zooplanktons diversity is one of the most important ecological indicators for the assessment of water quality. This study was designed to identify zooplankton diversity of Periyasadayam pond in Erode District, in relation to the diversity of zooplanktons from the period of May to November 2019 and the results were recorded periodically. The populations of zooplanktons were positively correlated. The results revealed that the diversity of Total of 37 species of zooplanktons were identified. Among zooplankton belongs to 5% of Protozoa, 35%, Rotifera 22%, Cladocera 24%, of Copepoda and 14% Ostracoda were recorded. Rotifera was found to be the most dominant group and Protozoa was the least dominant group. The zooplanktons are also very useful as biological indicators of water quality.

Keywords: Zooplankton; water quality; biological indicator.

1. INTRODUCTION

Zooplanktons are the microscopic animal components of the aquatic system which move at the mercy of the water current. They are heterotrophic in nature. Zooplankton distribution in the environment can also be influence by biological factors and other physical factors [1&2]. Freshwater includes different forms as streams, rivers, ponds and lakes. The diversity of ecosystems can vary since some, like ponds, lakes and rivers, can be isolated from other water sources. Planktons are mostly microscopic plants and animals that drift. Planktons respond quickly to environmental changes because of short life cycle. The parameters of zooplankton such as species richness, diversity, size-weight structure, and dominance are sensitive indicators of anthropogenic changes in environmental conditions [3]. 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 [4], which is of great significance for biological conservation. Rare species, which are often either endangered species or species under 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

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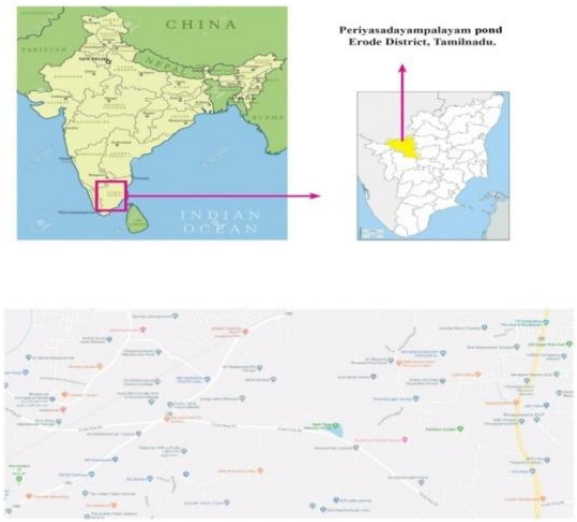


Fig. 1. Satellite map

aquatic body [5]. Hence the present study was aimed to analyse water quality and also associates zooplankton in Periya sadayampalayam (Ps) pond in Erode District, Tamilnadu

2. STUDY AREA

In the present study, the selected area is located at Ps in Erode district, Tamilnadu (India). This pond 103m in length, 50 meters in wide and 5 meters in depth (Fig-1 and Fig-2). The pond water runoff from south to west direction. The pond received water from three main sources. The main sources of water are harvesting rain water from Sathyamangalam dam, agricultural water runoff from the nearby areas at Mullamparappu and Puthur. The pond water is mainly used for agriculture purposes only by the local people.

3. MATERIALS AND METHODS

The zooplankton sampling was carried out for a period of seven months from May to Nov 2019 in Periyasadayampalayam in Erode district, Tamilnadu (India). The collection of water is weekly 5 sampling of zooplankton from the pond during the early hours of the day (4.00 am to 6.00 am) for a period of seven months. The sample of 50 litters of surface water was collected periodically May to November filtered through a standard plankton net size 25 and 50 µm diameter. 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 m^2. Collected samples of zooplankton were transferred to 100 ml plastic bottles and fixed with 4% formalin. A stereoscopic microscope and Olympus FX 100 the microscope was 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 was placed in Sedgwick-Rafter counting chamber and observed under a light microscope required magnification=10×40=400x objective. For enumeration of zooplankton abundance, the modified Sedgwick Rafter method was followed [6]. Sedgwick Rafter counting chamber and observed under Olympus binocular microscope. Photographs of the various zooplankton species were taken using a Canon digital camera (model A 470). Identification of Cladoceran zooplankton group were carried out using the key [7,8].

Fig. 2. Over view of the study pond

4. BIOLOGICAL ANALYSIS

Planktons were studied under a light microscope and identified with the help of standard references [9-10]. Zooplankton species richness, diversity and evenness were carried out using the method [11-12]. The

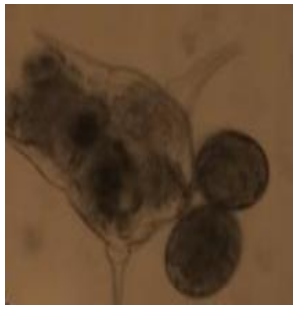
abundance total zooplankton [Org/L] is the total of all four (Protozoa, Rotifers, Cladocera, Copepoda and Ostracoda) zooplankton groups counted.

5. RESULTS AND DISCUSSION

The analysis of zooplankton for each and every month of water samples. The 36 species of zooplanktons were observed. Most species of zooplankton and zooplankton are present every month except few species. When during October most of the species were absent due to dilution by rainfall. Table 1 provide 37 of species zooplankton which include 2 species of Protozoa,13 species of Rotifera,8 species of Cladocera,9 species of Copepoda and 5 species of Ostracoda.

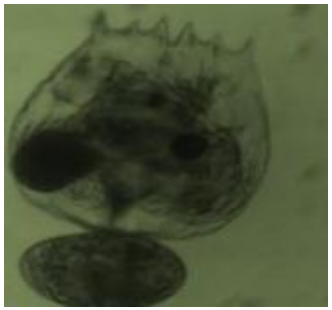
Table 1. List of Zooplankton and their presence

S.NO	Zooplankton	Observation					
1.	***Protozoa***	**May**	**June**	**July**	**Aug**	**Oct**	**Nov**
	Vorticella sp	+	+	+	-	-	+
	Euglypha sp	+	+	+	+	+	+
2.	***Rotifera***						
	Brachionus calyciflorus	+	_	+	+	_	_
	Brachionus rubens	+	_	+	+	+	_
	Euchlanis sp	+	+	_	-	+	+
	Horella brehmi	+	_	+	+	_	_
	Tetrahymena thermophila	+	+	_	-	+	+
	Lepadella triba	+	_	+	+	+	_
	Monostyla quadridentatus	+	+	+	-	_	+
	Brachionus rubens	+	+	_	-	+	+
	Trichocera rattus	+	_	+	+	+	_
	Testudinella patina	+	+	_	-	_	+
	Asplanchna brightwelli	+	_	+	+	+	_
	Lecane lunaris	+	+	_	-	_	+
	K. cochlearis	+	_	+	+	+	_
3.	***Cladophora***						
	Alona quadrngularis	+	_	+	+	_	_
	Daphnia carinata	+	+	+	-	+	+
	Diaphanasoma sarsi	+	+	_	-	_	+
	Diaphnia pulex	+	+	+	+	_	+
	Leydigia sp	+	_	+	-	+	_
	Moina sp	+	+	+	+	_	+
	Moina micrurata	+	+	_	-	+	+
	Illyocryptus spinifer	+	+	+	+	_	+
4.	***Copepoda***						
	Heleodiaptomus viduus	+	+	+	+	_	+
	Diaptomus sp						
	Tropocyclops sp	+	_	+	+	_	_
	Phyllodiaptomous sp	+	+	+	-	_	+
	Spicodiaptomus chilospinus	+	+	_	+	+	_
	Neodieptomous sp	+	+	+	-	_	+
	Calanus finmarchicus	+	_	+	+	_	_
	Cyclops bicuspidatus	+	+	+	-	+	+
	Thermocyclops sp	+	+	_	+	_	+
5.	***Ostrocoda***						_
	Cypretla turgid	+	_	+	+	_	+
	Stenocypris malcolmsoni	+	+	+	-	+	_
	Cyprinus nudus	+	+	_	+	_	+
	Giagantio cypris	+	+	+	-	+	_
	Pseudocypretta maculate	+	_	+	+	_	+



(a. Fig-3)

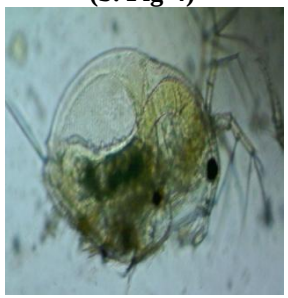
(b. Fig-4)



(c. Fig-5)

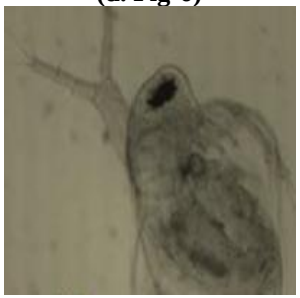
(d. Fig-6)

(e. Fig-7)

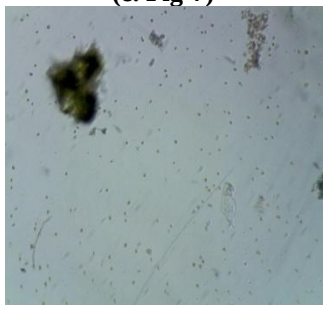


(f. Fig-8)

(g. Fig-9)



(h. Fig-10)



(i. Fig-11)

(j. Fig-12)

(k. Fig-13)

Fig.3 a.Brachionus calyciflorus, Fig.4 b.Tetrahymena thermophila, Fig.5 c.Brachionus rubens, Fig.6 d.Lepadella triba, Fig.7 e.Diaphanosoma sarsi, Fig.8 f.Daphnia pulex, Fig.9 g.Daphnia carinata, Fig.10 h.Moina micrura, Fig.11 i.Clanus finmarchicus, Fig.12 j. Cyclops bicuspidatus, Fig.13 k.Cypretla turgid

Table 2. Diversity index of Zooplankton

Category	# Found	Pi	Pi^2	Piln[Pi]	Measure	Value
Protozoa	2	0.054	0.003	-00.158	5	5
Rotifera	13	00.351	00.123	-00.367	D	00.251
Cladocera	g	00.216	0.047	-00.331	1-D	00.749
Copepoda	9	00.243	0.059	-00.344	L/D	3.984
Ostracoda	5	00.135	0.018	-00.27	H	1.471
| Total	**37**	**1**	|	|	**E**	**00.914**

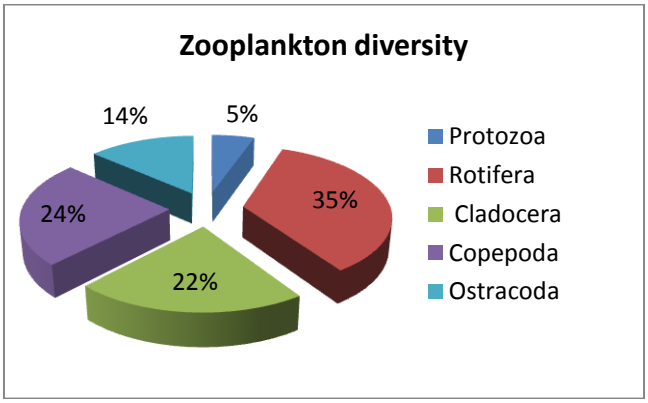


Fig. 14. Diversity composition

The Rotifera sp was observed *Brachionus angularis* during June 2019. The 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 Table 2 provide Copepoda *Diaptomus sp.* observed during 2018 (Table 1 and Fig. 1). The sorted organisms were brought under microscope and identified following Ahlstrom [16]. Depth of water, transparency, pH and predators determine the distribution and abundance of copepods [17,19]. The species composition of the plankton, on the other hand is a great indicator of water quality, because of this quick response to environmental changes [18]. The species composition of the plankton, on the other hand is a great indicator of water quality, because of this quick response to environmental changes [20]. Rotifer species characteristics nature is used as effective indicators of environmental changes, an important role in energy flow and nutrient cycling of zooplankton production in river water [21]. The table 2 provides diversity of the zooplanktons index 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 is recorded as 00.914. The number of individuals observed was 1.471 for each species in the sample plot and two randomly selected individuals in the community belong to the same category as 00.251 and different categories recorded as 00.749. The number of equally common categories tabulated is 3.984.

6. CONCLUSION

The present study provides base line data for the conservation and monitoring of the pond analysis quality of the pond water. Zooplanktons present in the water body reflect the average ecological conditions and may be used as indicators of water quality. In order to know the impact of pollution due to agricultural pesticides, fertilizers and domestic wastewater it was also thought of interest to investigate the physico – chemical parameters of this pond along with the investigation of planktons. These parameters can identify certain conditions for the ecology of living organisms and suggest appropriate conservation and management strategies.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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