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# DIVERSITY OF FRESHWATER ZOOPLANKTON IN COLLIDAM RIVER NEAR NEELATHANALLUR

## R. MOHANAMBAL<sup>1</sup>, R. RAJASEKARAN<sup>1</sup>, K. SARAVANAN<sup>2\*</sup> AND S. ABARNA UDHAYA<sup>2</sup>

<sup>1</sup>Department of Zoology, Thiru Kolanjiappar Government Arts College, Virudhachalam, India. <sup>2</sup>Department of Zoology, Government Arts College (A), Kumbakonam – 612 002, Tamil Nadu, India.

## **AUTHORS' CONTRIBUTIONS**

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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## ABSTRACT

Zooplankton plays an important role in aquatic ecosystem. They link primary producers, phytoplankton with higher larger tropic level organisms. Many aquatic organism exhibit diurnal rhythms in their activities, although factors such as light, temperature, food, sex and size have been attributed as probable causes for such behavior of planktonic organisms. Zooplankton provides the necessary amount of protein required for the rapid growth and development of organs of fishes. The larvae of most fishes feed mostly on zooplankton. Growth and abundance of zooplankton varies with season and depth and depends upon meteorological and water properties. Temperature plays vital role in the vertical distribution of zooplankton. The work was conducted by the monthly changes in zooplankter recorded in coleroon river, situated near by Neelathanallur (Thanjavur district).

Keywords: Zooplankton; freshwater river; Coleroon River; Annakarai.

## **1. INTRODUCTION**

Zooplankton communities respond to a wide variety of disturbances including nutrient loading and also play a key role in the aquatic food chain. Zooplankton constitutes important food item of many carnivorous and omnivorous fish and the larvae of carps feed mostly on zooplankton. Zooplankton also plays a very important role in the food chain as they are in the second of the tropic level as primary consumers and also as contributions to the next tropic level [1]. Planktons are free floating organisms which cannot move against the water current. Zooplankters are animal plankters having holozoic mode of nutrition. They are grazing on phytoplankters which are autotrophs, plankters are play an important role in aquatic food chain [2]. Both qualitative and quantitative abundance of plankton in a fish pond are of great importance in managing the successful aquaculture operation, as they vary from location to location as pond to pond within the same location even within similar ecological conditions [3]. The production of plank tonic organisms in good nutritional condition to feed fish larvae and finger lings is a basic requirement in fish culture. In a vast majority of fish farm in Brazil, it is a common practice to add organic and chemical fertilizers into hatchery ponds [4]. Although this procedure ensures a quick response in terms of algal biomass increase, both zooplankton composition and nutritional condition change abruptly, causing low fish larvae survival rater, due to the bad quality of food [5,6].

<sup>\*</sup>Corresponding author: Email: prof.ksgac2009@gmail.com;

Among the multi cellular zooplankton, rotifers, Cladocerans and copepods are the most abundant in freshwater ecosystem. The productivity of any aquatic water body depends on the amount of plankton present in the said water body [7], Westlake [8] described plankton as all organisms (plants and animals) which live in water that have limited power of locomotion, largely move by means of flagella or various mechanisms altering their distribution by changes in buoyancy and are more or less passively drifted by waves and water currents.

Zooplankton communities respond to a wide variety of disturbances including nutrient loading and also play a key role in the aquatic food chain [2]. Zooplankton is being influenced strongly by both bottom - up and top-down processes and is often used as models for ecological paradigms. The tropic dynamics concept, the theory of population dynamics and the analysis of predator-prey relationship are examples of successful contribution of plankton research. Owing to this, they have attracted the attention of a large number of researchers throughout the world [9,10,11]. Zooplankter consists mostly of invertebrates and larva of benthic as well as aquatic vertebrates. Zooplankton of fresh water includes copepods Cladocera, Rotifers, Ostracods, Nauplii larvae. Larval forms of molluscs sponges and fishes, copepods, ostracods, cladocera are crustaceans which are commonly seen in plankton community of fresh water. Copepods possess oar shaped appendages for balancing. They also produce feeding current calanoid and cyclopoid copepods are common in fresh water. The majority of workers are in agreement about the complexity of diurnal movement usually involving intricate inter relationship between specific and individual difference of the organisms, physicochemical features of the body of water and the daily cycle of the incident radiation [12,13].

## 2. MATERIALS AND METHODS

#### 2.1 Study Area

The present study report was the monthly changes in zooplankter recorded in coleroon river, situated near by Neelathanallur (Thanjavur district). Neelathanallur is a village panchayat under kumbakonam Taluk in Thanjavur. Tamil Nadu coleroon river is connected with anaikarai. Anaikarai connected two major bridges nearly one kilometer long on both side. It is island in the basin of Cauvery river. Nearly 2000 families live in Neelathanallur with the main occupation of agriculture and fishing it is well known and place for river plankton. Cauvery River commonly called collidam in Anaikarai people.

## 2.2 Methods of Collection and Estimation of Plankton Samples

Plankton samples were collected from the fixed location, at 15 days intervals commencing from 30 days. The collection of plankton was made by a net made of "Bolting Silk" of 0.25 meshes (No.25) with openings between the meshes 0.06 mm square. Since the dimensions of most of the zooplankters are between 0.06 mm ( $60\mu$ ) and 5mm, the bolting silk No.25 was used. Each time plankton sample was collected by filtering about 200 liter of the water through the net Immediately after collection of plankton, samples were preserved in 10% neutral formalin (1 part of formalin diluted with 3 parts of distilled water). The preserved samples were observed under the binocular research microscope and identified based on the keys for the identification of plankton.

#### 2.3 Qualitative Analysis

Qualitative analysis was made in using plankton counting plastic slide (Sedge wick rafter). The capacity of the counting chamber is 1ml. This counting chamber is divided into 100 small squares. First the preserved samples of plankton collected from 200 liters of water were diluted to 100 ml of distilled water. Then from this 1ml was transferred to counting chamber to observe under the microscope. The zooplankton components were counted in all the small squares and calculated the numbers per liter of water filtered. The numbers counted in 1ml of sample are computed for 1000 liter(m<sup>3</sup>).

#### **3. RESULTS AND DISCUSSION**

The Zooplankter observed in the river included Rotifers, copepods cladocerans, ostracods, the Nauplii of copepods. The Zooplankters are showed definite diurnal patterns of decreased day time and increased during night. Among Zooplankton components copepods were funds in abundant measure throughout the day. From the above results it is seen that the zooplankton showed an increased towards night in both the months. Despite the fact light is the most important factor which governs the diurnal changes in the occurrence and abundance of the epipelagic plankters, the role of other ecological and biological factors cannot be ignored. The recorded zooplankton organisms were Rotifers, Copepods, Mysis. Cladocerons and Nauplius larvae, Cypris larvae and Acrocalanus sp. There was marked difference in the density of total zooplankton in the river in December minimum number of zooplankton was (14000) was observed and maximum (19000) in February collection (Table 1 and Plate 1).



**Fig. 1. Map of the study area** 11.1472449,79.4402075,14z Diamond Image\_Grade\_© 2020 1km

In the present study the recorded zooplankton organisms were four genera of copepods; these are *Cyclops* sp., *Mesocyclops* sp., *Merocyclops* sp., and *Diaptomus* sp. In the peak was found (4500) in January and the minimum was found (3500) in December. *Cyclops* sp. was perennial and dominant throughout the study period. Monthly vertical occurrence four genera of copepods were recorded (Table 1). The highest density of Copepods (4500) was recorded in January and lowest (3500) in December. Cyclops sp was dominant among the copepods in the present study it also observed by Ahmad and Singh [14]; Murugan and Angelo Irudayasamy [15].

The high temperature on the surface water acts as an important barrier for the upward migration for the zooplankton during noon. The surface layer of water was rich in copepods because of availability of food in this layer. The present study each type of copepods was always found abundance in bottom layer of water at morning and evening while at noon, they were some time absent at surface laver and found at bottom layer. So it was observed the temperature of the most important for the vertical migration. The copepods were recorded Cyclops sp. and Diaptomus sp., The maximum density of copepod Cyclops (4500) in January month, and minimum (3500) in December. Similar observations are recorded by Ahmad and Singh [14] studied the Zooplankter during diurnal variation in freshwater tank at Dholi.

Rotifers, the tiny wheel animalcules, are considered nature's water purifiers because they perform on important cleanup service in the still or slow-moving waters they inhabit, Sharma 1992) made a detailed account of the systematic and ecology fresh water rotifers of west Bengal, Among Rotifers, Brachionus species was recorded during the day time. The maximum density of zooplankton Rotifers (2000) in January and minimum (1000) in December. Similar

observation are recorded by Nandini, et al. [16] Seasonal variation in the species diversity of planktonic rotifers in lake xochinilco. Mexico. Daphnis (Cladocerans) was observed during night hours. Nauplius of Barnacle was recorded throughout the night and day time. The maximum density of Nauplius Larva of Barnacle (4000) in February month and minimum (1500) in January. Similar observations were made by Ramirez, et al., [17] Seasonal variations of Zooplankton abundance in the freshwater. Ostracods (Cypris sp.,) were identified mainly in the night hour collection. The cypris Larva were found in throughout the monthly collection. The maximum density of cypris larva of Barnacle (1500) in January and minimum (500) in December and also February. Similar observations are recorded by Islam et al. [18] seasonal abundance of some Zooplankton in pond. Among Mysis were collected throughout the day and night time.

The maximum density of Mysis (3000/m<sup>3</sup>) in December and minimum (1000) in January. Similar observation was made by Bhuiyan et al. [19] studied the quantitative of zooplankton in Fresh water river reservoir valle de Bravo. Acrocalanus species was recorded from the abundant measure throughout the month. The maximum density of Acrocalanus species (3000) in February and minimum (1500) in December. Similar observations was made by Yacovino [20], studied the distribution and abundance of plankton in fresh water.

Acartia sp., was recorded during the day time. The maximum density of Acratia (2500) in February, and minimum (500) in January. Similar observations were recorded by Temiyavanich [21]. Studied and the distribution and abundance zooplankton in the fresh water. Oithonoa rigida was recorded during the decreased the level in throughout the month. The maximum density of Oithonoa rigida (1000) in December and minimum (0) in January.

Name of the species	December numbers/	January numbers/	February numbers/
	Lit (m) sample 1	Lit (m) sample 2	Lit (m) sample 3
Copepod- Cyclops	3500	4500	4000
Acartia	1000	500	2500
Nauplii of barnacle	2000	1500	4000
Cypris larva of barnacle	500	1500	500
Acrocalanus sp.;	1500	2500	3000
Mysis	3000	1000	2500
Rotifer	1000	2000	1500
Oithona rigida	1000	0	500
Euphasid	500	1000	0
Microsetella sp.;	1500	500	500

 Table 1. Showing the monthly variations of fresh water zooplankton



Copepod sp.



Copepod sp.



Copepod sp.







Brachinous sp.



#### Acrocalanus sp.

## Plate 1. Showing the planktons in Collidam River

Similar observations recorded by Verma [22], Diurnal variation in fish pond. Euphausid were collected the day time at 6 am. The man made activities can also mask potential effects of lake on species richness, Indirectly however, these lakes may serve as source populations affect plankton that can disperse.

The maximum density Euphausid (1000) in January and minimum (0) in February. These results can indicate the diversity of the planktons, they were much lower in abundance, Information on the frequency and abundance distribution of the zooplankton species from reservoir showed that many species were rare. Similar observations were recorded by Elias et al. [23] Diversity of fresh water Zooplankton in the neotropics. Microsetalla species were found in all months. The maximum density of Microsetalla sp. (1500/m<sup>3</sup>) in December and minimum in (500/m<sup>3</sup>) in January and also February. Similar observation are recorded by Houde [24] variability in Ichthyoplankton and Micro zooplankton abundance in the fresh water.

#### 4. CONCLUSION

The maximum density of zooplanktons abundance on February month and minimum in January month. The zooplanktons are having high density and it indicate the high production of the aquatic organisms. The plankton study was very useful to calculate the higher production of aquatic animals. So the amount of planktons are present in a medium it directly propionate to the present of higher number of fishes.

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## **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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