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Research Article

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ZOOPLANKTON DIVERSITY IN SATHANUR RESERVOIR OF THIRUVANNAMALAI (TAMILNADU), INDIA

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Abstract: The present investigation was an attempt to study the zooplankton community of Sathanur reservoir of Thiruvannamalai, Tamilnadu, India. The zooplankton species composition was studied for a period of one year from October 2018 to September 2019 on monthly interval basis. As a result of study, 24 zooplankton species were identified, out of which 9 were Rotifers, 7 Cladocerans, 5 Copepods and 3 Ostracodans. The overall population density of zooplankton was found maximum during the summer season and mininmum during monsoon. They play a supportive role in fish culture by recycling of nutrients and increase the soil fertility and involve in energy transfer between phytoplankton and fishes.

Keywords: Cladocera, Copepoda, Ostracoda, Rotifera, Sathanur reservoir, Zooplankton.

INTRODUCTION

In aquatic ecosystem diversity, abundance and variation in the plankton is of great importance (Gaikwad *et al*., 2004). The term plankton refers to any small biota living in the water and drifting in water currents. Planktonic plants are called phytoplankton and planktonic animals are called zooplankton. Diversity of zooplankton is essential to keep the ecosystem healthy because each species plays a specific role in recycling of nutrients and maintaining the soil fertility. Some species may allow natural ecosystem to function in a healthy manner (Jeelani *et al*., 2008). Zooplankton establishes linkage within food webs and provides food to higher trophic consumers and also having a major role in energy transfer (Capriulo *et al*., 2002; Turner, 2004; Sotton *et al*., 2014; Zhao *et al*., 2017).

Zooplanktons are microscopic animals which do not possess the power of locomotion and move along the water currents. Their sensitivity and large variations in species composition are often a reflection of significant alteration in ambient condition within an ecosystem. A change in the physico-chemical conditions in aquatic systems brings a corresponding change in the relative composition and abundance of organisms thriving in the water; therefore, they can be used as a tool in monitoring aquatic ecosystems, hence, zooplankton have been considered as ecologically important organisms (Jose *et al*., 2015; Smitha *et al*., 2013). The major groups of Zooplankton are Rotifera, Cladocera, Copepoda and Ostracoda.

The zooplanktons not only serve as a part of aquatic biodiversity but also strengthen the biodiversity and ecosystem of lentic water. The aquatic ecosystem maintains the ecological balance, which is necessary both for widespread biodiversity (Verma, 2017) and human survival (Verma, 2018). The climate change influences the entire composition and biodiversity (Prakash and Srivastava, 2019). The plankton diversity is

Map 1: Showing Sathanur Reservoir, Thiruvannamalai Dist., Tamilnadu, India

associated with limnological properties of a fresh water body. Several workers including Prakash (2001), Prakash *et al.*, (2015a, 2015b), Verma *et al.*, (2016a, 2016b, 2020) and Verma (2020) did a lot on limnological studies and different aspects of planktons.

Study Area:

Sathanur Reservoir (Map 1) is located in Thiruvannamalai district of Tamilnadu, Southern India at the latitude of 12.2064° north on the longitude of 78.8567° east, and is constructed across the south pennai river (also called as Thenpennaiyaru). The reservoir provides habitat for a diversity of life including the edible species of fish, aquatic macrophytes, benthos, nekton and plankton and also used for the utility such as irrigation and fishing. The present attempt was made in Sathanur Reservoir (dam) to study the zooplanktonic community.

MATERIALS AND METHODS

The plankton samples were collected early in the morning between 6.00 and 7.00 a.m, once for a month along the period of one year from October 2018 to September 2019 from Sathanur Reservoir.

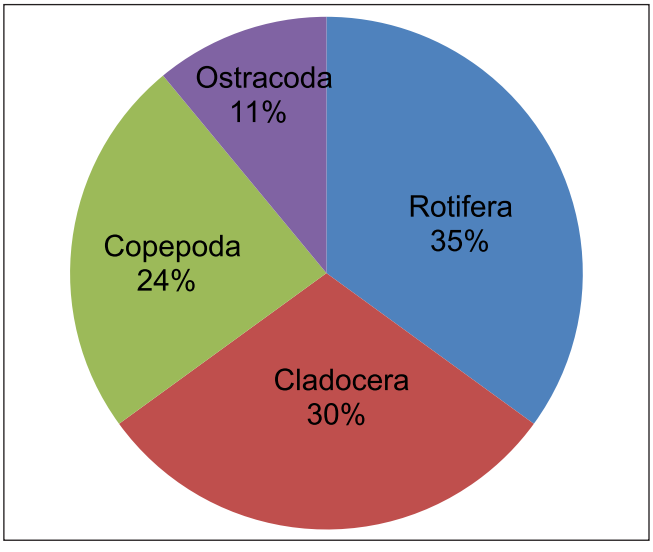

Fig.1: The percentage composition of zooplankton species present in Sathanur resevoir during October, 2018 to September, 2019.

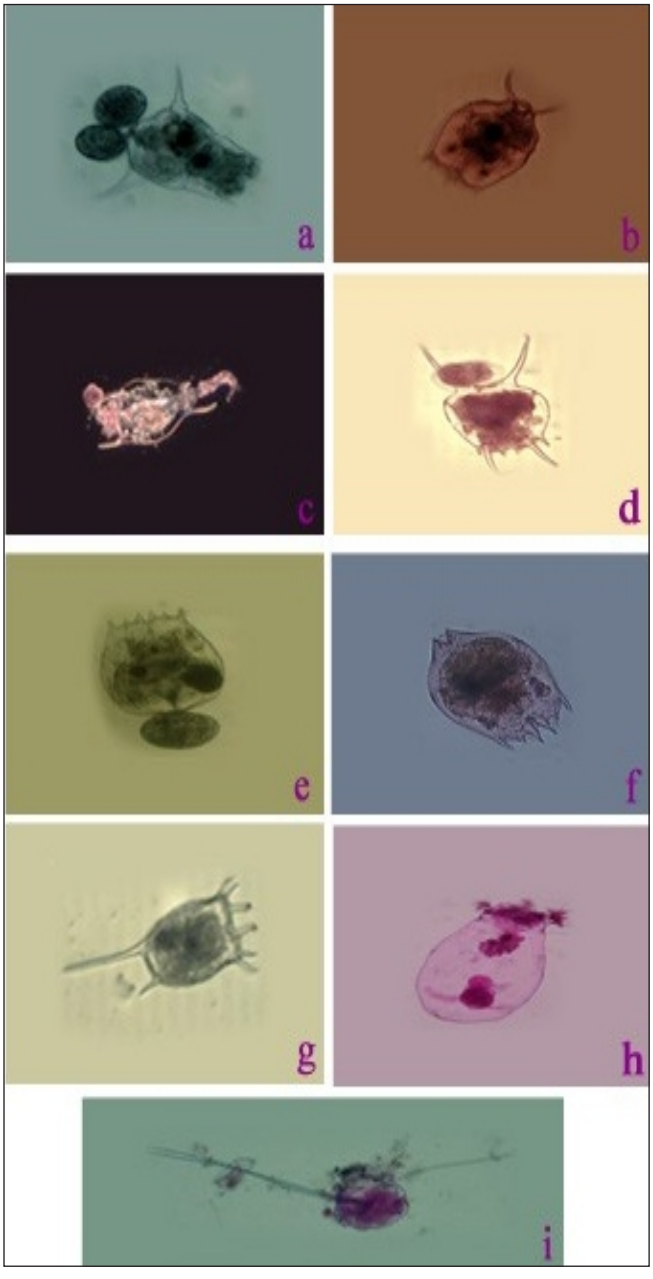

Plate 1: Rotifera species.

a. *Brachionus calyciflorus*
b. *Brachionus caudatus personatus*
c. *Brachionus diversicornis*
d. *Brachionus falcatus*
e. *Brachionus quadridentatus*
f. *Brachionus rubens*
g. *Keratella tropica*
h. *Asplanchna brightwelli*
I. *Filinia longiseta*

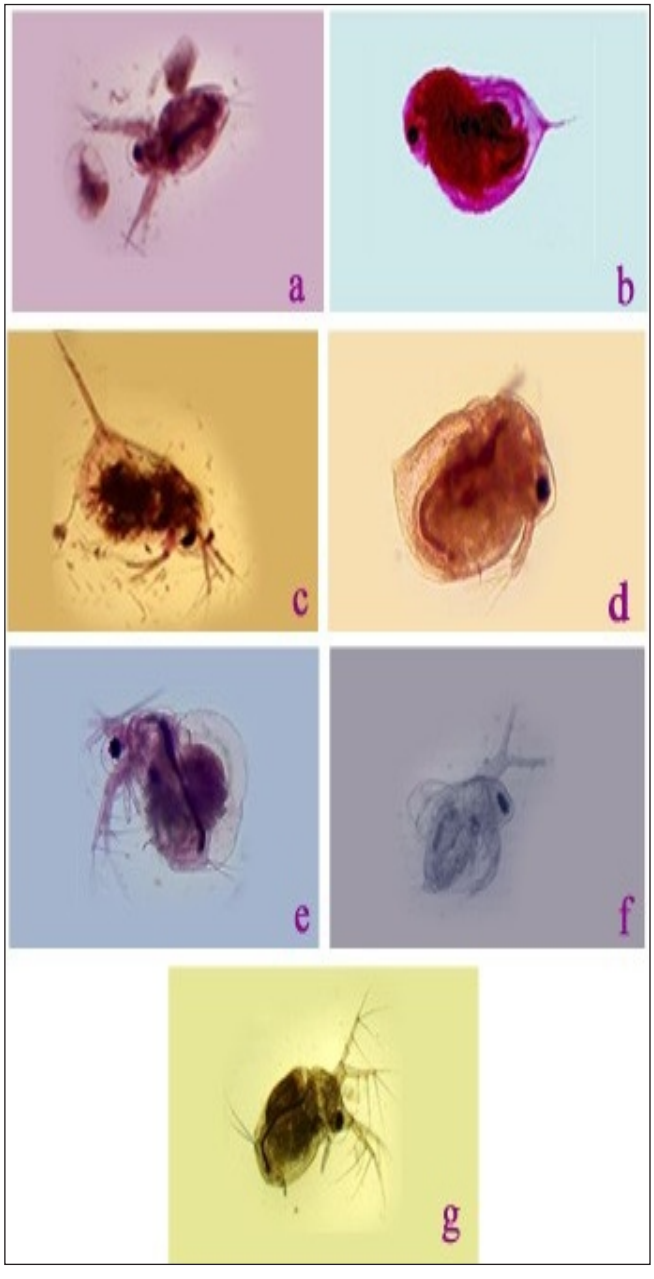

Plate 2: Cladocera species

a. *Diaphanosoma sarsi*
b. *Daphnia carinata*
c . *Daphnia magna*
d. *Ceriodaphnia cornuta*
e. *Moina brachiata*
f. *Moina micrura*
g. *Moinodaphnia macleayi*

Plate 3: Copepoda species

a. Heliodiaptomus viduus

b. Sinodiptomus indicus

c. Mesocyclops hyalinus

d. Thermocyclops hyalinus

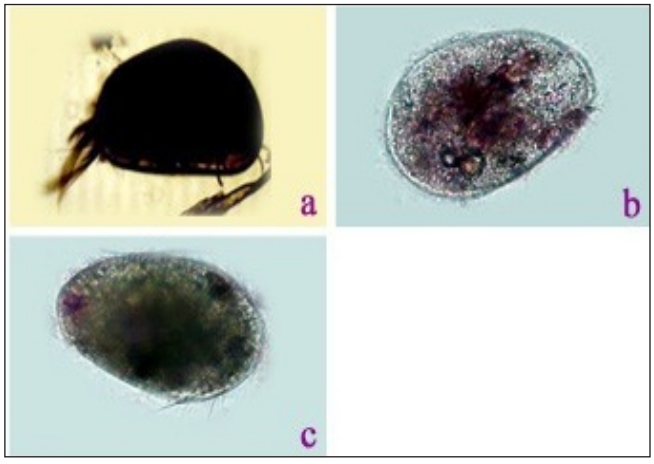

Plate 4: Ostracoda species

a. Cypris protubera

b. Cyprinotus nudus

c. Eucypris bispinosa

The zooplankton samples were collected using Towing-Henson's standard plankton net (150 µm mesh) by towing horizontally at surface for about 10 minutes with uniformly speed of boat. For the quantitative analysis 100 litres of water were filtered through a plankton net made up of bolting silk (No: 10, mesh size: 150 µm) using a 10-litre capacity plastic container. After filtering out the water, the plankton biomass was transferred to specimen bottles containing 5% of neutralized formalin and subjected to microscopic analysis. The zooplanktons were segregated group wise like Rotifera, Cladocera, Copepoda and Ostracoda, under a binocular stereo zoom dissection microscope using a fine needle and brush. Individual species of plankton was mounted on microscopic slides on a drop of 20% glycerin after staining with eosin and rose bengal. One ml of sample was taken with a wide mouthed pipette and poured into the counting cell of the Sedge-wick Rafter counting following Santhanam *et al*., (1989) and counted under light microscope.

The identification of zooplankton was made by referring the standard manuals, text books and monographs (Altaff, 2004; Battish, 1992; Edmondson, 1959; Murugan *et al*., 1998; Sharma and Michael, 1987; Wetzel, 2001) using a compound microscope. The photomicrographs were taken by using, Inverted Biological Microscope (Model Number INVERSO 3000 (TC-100) CETI) attached a camera (Model IS 300).

RESULTS AND DISCUSSION

Zooplankton is considered to be the ecological indicators of water bodies (Manickam et al., 2015). In the present study, a total 24 species belonging to four groups namely rotifera (9 species, 5 genera and 3 families), cladocera (7 species, 5 genera and 3 families), copepoda (5 species, 4 genera, 2 families) and ostracoda (3 species/ genera and 1 family) of zooplankton (Table 1; Plates 1- 4) were recorded in the water samples of Sathanur reservoir. Authors found spatial and temporal distribution of zooplankton in the reserviour studied. It was supported by Manickam *et al*., (2012), Manickam *et al*., (2014) and Bhavan *et al*., (2015).

The Rotifera were found to be predominant with 35% followed by Cladocera (30%), Copepoda (24%) and Ostracoda (11%) (Fig. 1). The present result was similar to earlier observation made by Manickam *et al*., (2014); Bhavan *et al*., (2015) and Manickam *et al*., (2015).

The minimum population and diversity was recorded during the monsoon season (September to November, 2018), while the maximum population during summer season (March to May, 2019) and maximum diversity in post-

Table-1: Zooplankton diversity of Sathanur reservoir during Oct., 2018 - Sep., 2019.

Group	Family	Genus	Species
Rotifera	Brachionidae (Ehrenberg, 1838)	*Brachionus* Pallas, 1776	*Brachionus calyciflorus* Pallas, 1776
			Brachionus caudatus personatus Ahlstrom, 1940
			Brachionus diversicornis Daday, 1883
			Brachionus falcatus Zacharias,1898
			Brachionus quadridentatus Hermann, 1783
			Brachionus rubens Ehrenberg, 1838
		Keratella Bory de St.Vincent, 1822	*Keratella tropica* Apstein, 1907
	Asplanchnidae (Harring & Myers, 1933)	*Asplanchna* Gosse, 1850	*Asplanchna brightwelli* Gosse, 1850
	Filinidae (Bartos, 1959)	*Filinia* Bory and Vincent, 1824	*Filinia longiseta* Ehrenberg, 1834
Cladocera	Sididae (Baird, 1850)	*Diaphanosoma* Fischer, 1850	*Diaphanosoma sarsi* Richard,1894
	Daphnidae (Straus, 1850)	*Daphnia* Muller, 1785	*Daphnia carinata* King, 1853
			Daphnia magna Straus, 1820
		Ceriodaphnia Dana, 1853	*Ceriodaphnia cornuta* Sars, 1862
	Moinidae (Goulden, 1968)	*Moina* Baird, 1850	*Moina brachiata* Jurine, 1820
			Moina micrura Kurz, 1874
		Moinodaphnia Herrick, 1887	*Moinodaphnia macleayi* King, 1853
Copepoda	Diaptomidae (Baird, 1850)	*Heliodiaptomus* Kiefer, 1932	*Heliodiaptomus viduus* Gurney, 1916
		Sinodiaptomus Kiefer, 1937	*Sinodipatomus (Rhinediaptomus) indicus* Sewell, 1934
	Cyclopoidae (Dana, 1853)	*Mesocyclops* Claus, 1893	*Mesocyclops aspericornis* Daday,1906
			Mesocyclops hyalinus Rehberg, 1880
		Thermocyclops Kiefer, 1927	*Thermocyclops hyalinus* Rehberg, 1880
Ostracoda	Cyprididae (Baird, 1845)	*Cypris* Muller, 1776	*Cypris protubera* Muller, 1776
		Cyprinotus Brady, 1886	*Cyprinotus nudus* Brady, 1885
		Eucypris Vavra, 1891	*Eucypris bispinosa* Victor and Michael, 1975

monsoon season (December, 2018 to February, 2019). The species *Brachionus calyciflorous* (rotifer) was found throughout the study period, in all the stations. The greatest species diversity and richness were recorded for the groups rotifera (4 genera/ 9 species) and cladocera (5 genera / 7 species) copepoda (4 genera / 5 species) and ostracoda (3 genera / 3 species). The minimum

species richness was reported in monsoon season (September to November, 2018) and maximum in post-monsoon (December, 2018 to February, 2019). The minimum evenness was recorded during the monsoon season (September to November, 2018), while the maximum during post-monsoon season (December, 2018 to February, 2019).

The distribution and population density of zooplankton depend upon the prevailing physico-chemical parameters of the environment. The rotifers were found to predominant as the indicators of eutrophication. During the present study, the overall population density of zooplankton was found maximum in the summer season. The distribution and population density of zooplankton depends upon the physico-chemical parameters of the lake environment. In the summer season zooplankton population was found to be high, might be attributed to favorable environmental conditions and availability of food (phytoplankton) of lake and reservoir ecosystem (Manickam *et al*., 2015). The rich nutrient loading supported the high phytoplankton production that in turn supported the zooplankton population (Manickam *et al*., 2014; Bhavan *et al*., 2015). In the present study, zooplankton species evenness in the reservoir was high in summer season and found low in monsoon season. Peet (1974) reported that species diversity implies both richness and evenness in the number of species and equatability for the distribution of individuals among the species. Authors strongly recommend the competent authorities and policy makers to make the effective strategies for the conservation and management of such type of biologically important fresh water bodies.

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