



SEASONAL VARIATIONS OF ZOOPLANKTONS IN THE SELECTED PONDS OF VENGANNOOR GRAMA PANCHAYATH, SOUTHERN WESTERN GHATS

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Abstract

Venganoor panchayat is blessed with different water bodies like natural ponds, temple ponds, lake and pools. The study area is situated in Thiruvananthapuram district of Kerala state. The panchayat lies between 8⁰⁴' N latitude and 77⁰ 33' longitude. The study area is a village embedded with rich vegetation and is stretched about 10 Km² in Thiruvananthapuram taluk of Thiruvananthapuram district. For the study two stations were selected. During the study period a total number of thirty-two zooplankton species were encountered in the seven stations during the period of this study. The diversity of zooplankton is maximum during Pre Monsoon season and minimum in Monsoon season.

Key words: Zooplankton, Seasonal, Venganoor, Variations

Introduction

In freshwater ecosystems, rotifers are more abundant than other zooplankton groups and therefore, they account for a major portion of the food chain (Baloch *et al.*, 2010, Harish and Kiran, 2015, Golmarvi, *et al.*, 2018). The Cladocera is an order of the class Branchiopoda which, along with the classes Ostracoda and Copepoda, comprise the micro *Crustacea* (Fitter and Manuel, 1986). Micro *Crustaceans* are a diverse group of zooplankton which occur in water 80 bodies world-wide and form a key component of the trophic structure of most still water ecosystems (Thorpe and Covich, 1991; Fryer, 1993). About 600 species of freshwater cladocerans have been reported to occur throughout the world (Korovchinsky, 1996) and about 110 species have been recorded in India (Patil and Goudar, 1989). Fernando (1980) observed 61 species of cladocera from India with specific information about the absence of large cladocera. Rane (1983) described twelve new species and one new subspecies

of freshwater cladocerans from Madhya Pradesh State in Central India.

Cladocerans are a crucial group among zooplankton and form the most useful and nutritive group of *Crustaceans* for higher members of fishes in the food chain. These are normally covered by the chitinous covering termed as the carapace. The two large second antennae are responsible for giving them their common name, water fleas and are used for rowing through the water. Cladocerans are filter feeders as they filter the water to trap the organisms in it. Cladocerans are highly sensitive against even low concentrations of pollutants. The food source of this group is smaller zooplankton, bacterioplankton and algae (Murugan *et al.*, 1998). Cladocerans inhabit most types of continental fresh and saline water habitats, occurring more abundantly in both temporary and permanent stagnant waters (Forro *et al.*, 2008). Kotov and Fuentes (2014) reported a new species from Columbia. Tolotti *et al.* (2016) suggested subfossil Cladocera as a powerful tool for paleoecological reconstruction. Vasudha *et al.*, 2018 reported that the

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Cladoceran abundance reflects the eutrophic nature of the pond.

Zooplankton communities of Loktak Lake was studied by Sharma and Sharma (2011) and it showed rich and speciose biocoenosis, high monthly richness and by higher similarities and peak richness during winter and autumn. Impact of Physico-Chemical Parameters of Water on Zooplankton Diversity in Nanjangud Industrial Area was investigated by Hashemzadeh and Venkataramana (2012) and reported that the increase in number of zooplanktons was in accordance with temperature of its habitat. Sharma & Pachuau (2013) studied Zooplankton diversity of a sub-tropical reservoir of Mizoram, India and characterized by moderate species diversity, high evenness and low dominance.

Pradhan (2014) studied Zooplankton diversity in fresh water Wunnalake and found that the quantity of zooplanktons is more during winter season. Najeeb *et al.* (2014) reported that the zooplankton is directly or indirectly influenced by the seasonal variation of complex limnological factors. Jose and Senthil Kumar (2015) studied physicochemical parameters and zooplankton diversity in Anicadu Chira, Kerala, India and reported that zooplankton community constitutes an important component in the faunal composition of the water body. They are sensitive indicators of pollution in comparison with phytoplankton.

Materials and Methods

Description of the study area

Venganoor panchayat is blessed with different water bodies like natural ponds, temple ponds, lake and pools. The study area is situated in Thiruvananthapuram district of Kerala state. The panchayat lies between 8°4' N latitude and 77° 33' longitude. The study area is a village embedded with rich vegetation and is stretched about 10 Km² in Thiruvananthapuram taluk of Thiruvananthapuram district. It is a very ordinary village near the southern end of Kerala, which is situated 13 Km south of Thiruvananthapuram and 55 Km from Nagercoil. The climate of this area is moderately humid and variation in temperature is a little. The study area receives both South west and North east monsoon. (Map1 and 2)

Collection of zooplankton

For the study two ponds were selected, namely Valiya Kulam, Azhakulam and Sarkar Kulam, Muttacaud. Zooplankton samples were collected every month and were analyzed in order to assess the diversity during the study period. The plankton concentrate was obtained by filtering 100 liters of surface water through a standard

zooplankton net. The zooplankton samples that got collected in the test tube fitted at end of the net were transferred carefully to sampling bottles and preserved using Formaldehyde solution.

Preservation of the sample

Zooplankton samples collected were washed into a sample jar with one liter water, filtered again through a 40 µm Nitex and preserved again in the laboratory in 4% formaldehyde solution which is commonly practiced. In the preparation of 4% solution, 10ml of 40% formaldehyde is dissolved in 90ml of filtered distilled water. The preserved zooplankton samples were kept stored at low temperature, below 20°C until analysis (Altaff, 2004).

Identification of zooplankton:

Identification of the zooplankton in the respective samples was done separately with the help of the available standard reference materials (Michael, 1973; Adoni *et al.*, 1985; Murugan *et al.*, 1998; Dhanapathi, 2000; Altaff, 2004)

Result and Discussion

A total number of thirty-two zooplankton species were

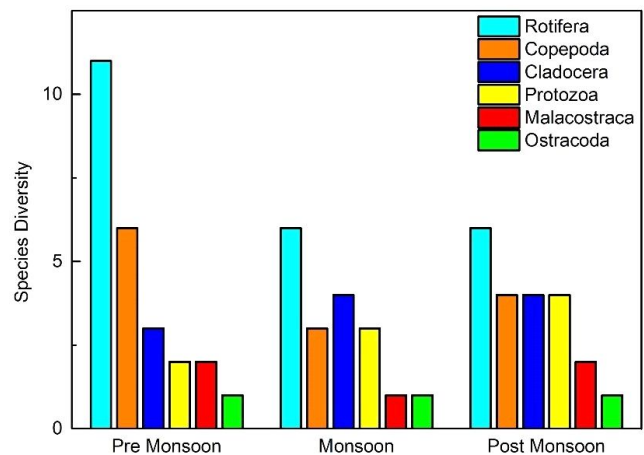


Fig. 1: Seasonal variation of zooplankton diversity in Station 3

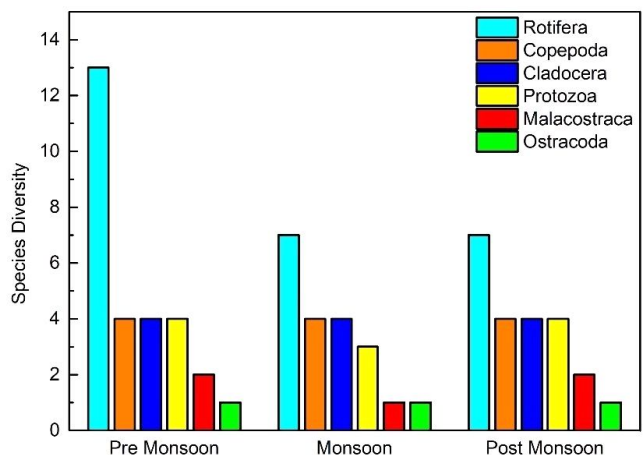


Fig. 2: Seasonal variation of zooplankton diversity in Station

Table 1: Diversity of zooplankton in Station 1

Group	Family	Name	Presence/Absence of the zooplankton		
			Pre Monsoon	Monsoon	Post Monsoon
Rotifera	Brachionidae	<i>Anuraeopsisfissa</i>	+	+	+
		<i>Brachionusbidentatus</i>	+	-	-
		<i>Brachionusfalcatus</i>	+	-	-
		<i>Ketatellacochlearis</i>	-	-	-
	Notommatidae	<i>Cephalodellaforficula</i>	-	-	+
	Lepadellidae	<i>Colurellasulcata</i>	+	+	+
		<i>Colurellauncinata</i>	+	-	+
	Conochilidae	<i>Conochilusunicornis</i>	+	-	+
	Euchlanidae	<i>Dipleuchlanispropatula</i>	+	+	-
		<i>Euchlanisdilatata</i>	+	-	-
		<i>Euchlanis incise</i>	+	+	-
Trochosphaeridae	<i>Filinalongiseta</i>	+	+	+	
Hexarthridae	<i>Hexarthra sp.</i>	+	+	-	
Copepoda	Cyclopidae	<i>Cyclops scutifer</i>	+	-	-
		<i>Mesocyclopssp</i>	+	-	+
		<i>Cyclops viridis</i>	+	+	-
		<i>Paracyclopssp</i>	+	+	+
	Diaptomidae	<i>Neodiaptomus</i>	+	+	+
		<i>Naupliisp</i>	+	-	+
Cladocera	Chydoridae	<i>Alonasp</i>	+	+	+
	Daphniidae	<i>Daphnia sp</i>	-	+	+
	Moinidae	<i>Moinasp</i>	+	+	+
	Bosminidae	<i>Bosminacornuta</i>	+	+	+
	Chydoridae	<i>Pleuroxussp</i>	-	-	-
	Ilyocryptidae	<i>Ilyocryptussp</i>	-	-	-
Protozoa	Euglenaceae	<i>Euglena sp</i>	-	+	+
	Peniculida	<i>Paramecium sp</i>	-	+	+
	Vorticellidae	<i>Vorticella sp</i>	+	-	+
	Amoebidae	<i>Amoeba sp</i>	+	+	+
Malacostraca	Palaemonidae	<i>Macrobrachiumsp</i>	+	-	+
	Gammaridae	<i>Gammaruspulex</i>	+	+	+
Ostracoda	Cyprididae	<i>Cyprissp</i>	+	+	+

(+ means Present and - means Absent)

encountered in the seven stations during the period of this study. The diversity of zooplankton is maximum during Pre Monsoon season and minimum in Monsoon season. All the thirty-two species comes under six groups namely Rotifer, Copepoda, Cladocera, Ostracoda, Malacostraca and Protozoa. Among them Rotifers showed maximum diversity of 13 species altogether in 7 families. Ostracoda is represented by a single species.

In the present study, a total number of Thirty-two zooplankton species were encountered in the Seven stations during the entire period of this study. These zooplankton species belonged to six major groups, such as, Rotifera (13), Cladocera (6), Copepod (6), Protozoa

(4), Malacostraca (2) and Ostracoda (1). They were found to belong to the families Brachionidae (Rotifera), Notommatidae (Rotifera), Lepadellidae (Rotifera), Conochilidae (Rotifera), Euchlanidae (Rotifera), Trochosphaeridae (Rotifera), Hexarthridae (Rotifera), Chydoridae (Cladocera), Daphniidae (Cladocera), Moinidae (Cladocera), Bosminidae (Cladocera), Chydoridae (Cladocera), Ilyocryptidae (Cladocera), Cyclopidae (Copepoda), Diaptomidae (Copepoda), Euglenaceae (Protozoa), Peniculida (Protozoa), Vorticellidae (Protozoa), Amoebidae (Protozoa), Palaemonidae (Malacostraca), Gammaridae (Malacostraca) and Cyprididae (Ostracoda).

Table # Diversity of zooplankton in Station 4

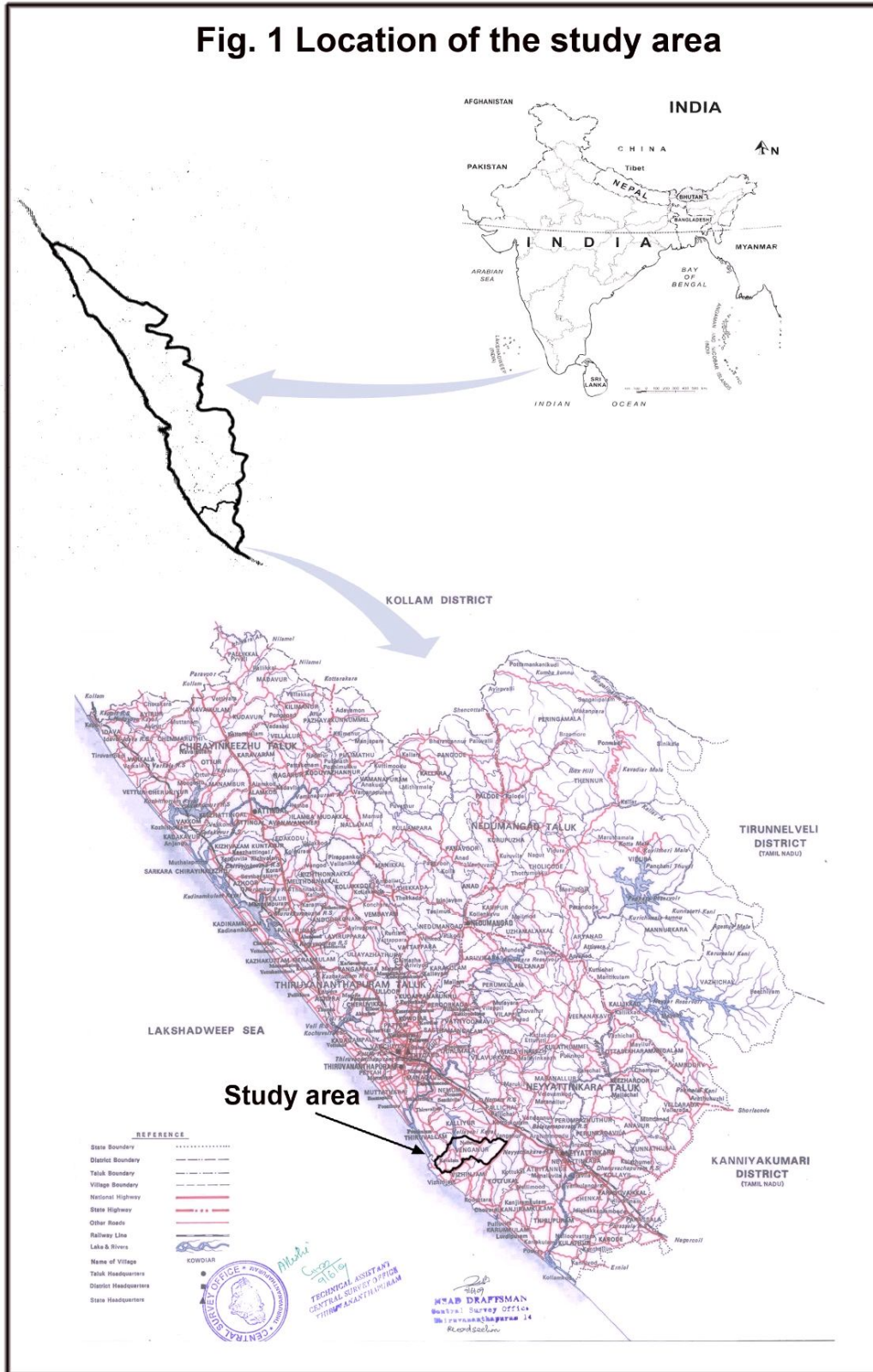
Group	Family	Name	Presence/Absence of the zooplankton		
			Pre Monsoon	Monsoon	Post Monsoon
Rotifera	Brachionidae	<i>Anuraeopsisfissa</i>	+	+	+
		<i>Brachionusbidentatus</i>	+	-	-
		<i>Brachionusfalcatus</i>	+	-	-
		<i>Ketatellacochelearis</i>	+	+	+
	Notommatidae	<i>Cephalodellaforficula</i>	+	-	-
	Lepadellidae	<i>Colurellasulcata</i>	+	+	+
		<i>Colurellauncinata</i>	+	-	+
	Conochilidae	<i>Conochilusunicornis</i>	+	-	+
	Euchlanidae	<i>Dipleuchlanispropatula</i>	+	+	-
		<i>Euchlanisdilatata</i>	+	-	-
		<i>Euchlanis incise</i>	+	+	-
Trochosphaeridae	<i>Filinialongiseta</i>	+	+	+	
Hexarthridae	<i>Hexarthra sp.</i>	+	+	+	
Copepoda	Cyclopidae	<i>Cyclops scutifer</i>	+	+	-
		<i>Mesocyclopssp</i>	+	+	+
		<i>Cyclops viridis</i>	+	+	+
		<i>Paracyclopssp</i>	+	+	+
	Diaptomidae	<i>Neodiaptomus</i>	-	-	+
		<i>Naupliisp</i>	-	-	-
Cladocera	Chydoridae	<i>Alonasp</i>	+	+	+
	Daphniidae	<i>Daphnia sp</i>	+	+	+
	Moinidae	<i>Moinasp</i>	+	+	+
	Bosminidae	<i>Bosminacornuta</i>	+	+	+
	Chydoridae	<i>Pleuroxussp</i>	-	-	-
	Ilyocryptidae	<i>Ilyocryptussp</i>	-	-	+
Protozoa	Euglenaceae	<i>Euglena sp</i>	+	+	+
	Peniculida	<i>Paramecium sp</i>	+	+	+
	Vorticellidae	<i>Vorticella sp</i>	+	-	+
	Amoebidae	<i>Amoeba sp</i>	+	+	+
Malacostraca	Palaemonidae	<i>Macrobrachiumsp</i>	+	+	+
	Gammaridae	<i>Gammaruspulex</i>	+	-	+
Ostracoda	Cyprididae	<i>Cyprissp</i>	+	+	+

(+ means Present and - means Absent)

Bharathidevi and Ramanibai (2012) reported the zooplankton of Muttukadu estuary near Chennai clumped into four major groups as copepods, cladocera, ostracods and rotifers. The total of 46 zooplankton species encountered comprised of copepods (31 species), rotifers (9 species), ostracods (2 species) and cladocerans (4 species). Nimbalkar *et al.*, 2013 reported 15 rotifers, 12 cladocerans and 6 copepods from Ambe Ghosale lake, Thane city of Maharashtra. Manickam *et al.*, 2014 reported 55 species of zooplankton in a perennial reservoir at Dharmapur district, South India. Pawar (2014) reported 66 species of Zooplankton in some freshwater bodies around Satara district of Maharashtra, India. 40 genera

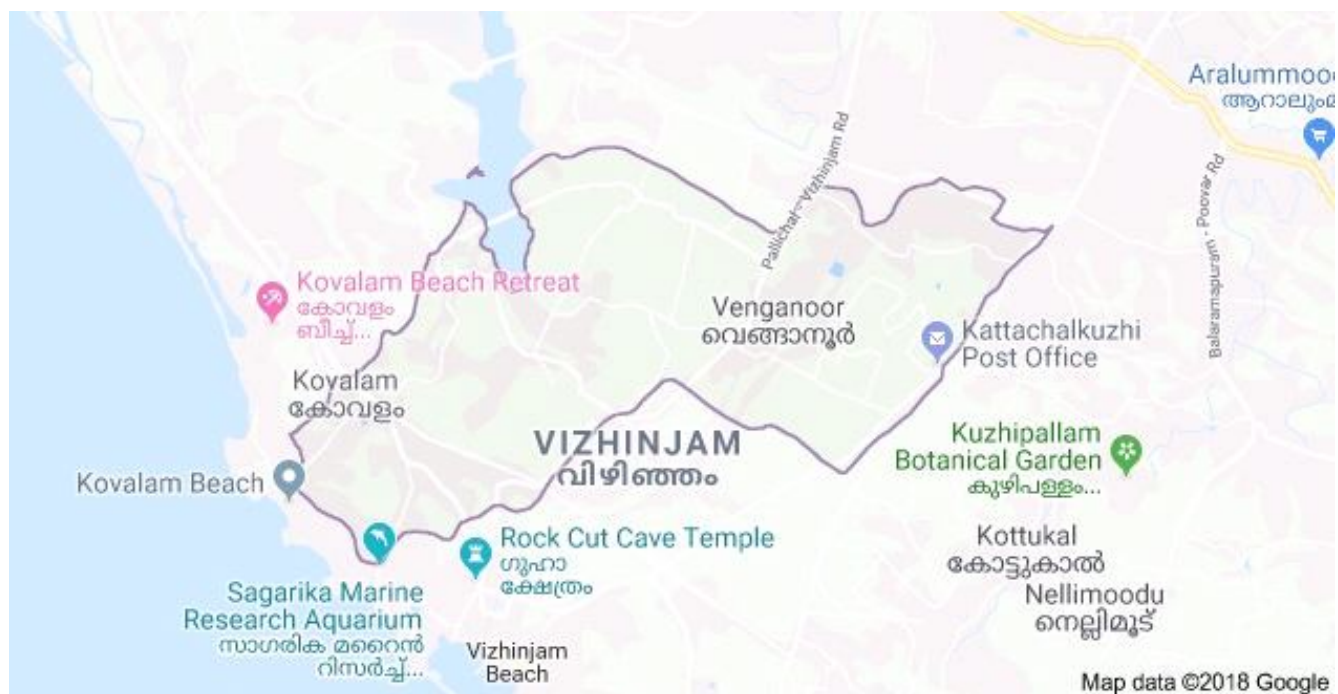
of zooplankton were reported by Kar and Kar, 2016 from a freshwater wetl and of Cachar, Assam. Rotifers occupied a major population in both the studies. The diversity and density of zooplankton in Powai (Mumbai, Maharashtra) reservoir, India was studied by Singh and Talpade (2018) and reported that Cladocerans dominated over Rotifers. Ramesh and Rama (2018) studied Seasonal variation in zooplankton community and environmental variables of sacred Lake Prashar Himachal Pradesh, India and concluded that Rotifers dominated than others.

Most of the cladocera species are primary consumers and feed on microscopic algae and the fine particulate matter in the detritus thus influencing cycling of matter



and energy in benthic food chain of a lake ecosystem. The physico-chemical parameters have been reported to play an important role in controlling the diversity and density of cladocera. Michael (1973) had reported that

among the planktonic genera in and around Madurai, cladocerans, such as, *Moina*, *Diaphanosoma* and *Ceriodaphnia* are very common. Boonsom (1984) found in freshwater pond at Thailand, 16 species out of the 47



species reported in the sampling sites containing a great number of fish species, which are known to be active predators of cladocera and resulted in the low number of cladocera species collected. Pholpunthin (1997) noticed from Thale-noi in South Thailand 17 cladoceran species among which, 7 species were considered new to Thailand. Thakur and Kochar (2018) studied the Diversity and density of cladoceran population in different types of water bodies of Ludhiana, Punjab (India) and reported that out of the recorded nine species of cladocerans, six were found to belong to family Daphnidae, two to family Moinidae and only one to family Chydoridae. The present study states that the Cladocerans belongs to Chydoridae, Daphniidae, Moinidae, Bosminidae, Chydoridae and Ilyocryptidae.

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