

Original Research Article

Study on Zooplankton Composition and Seasonal Variation in Bhima River Near Ramwadi Village, Solapur District (Maharashtra), India

A.N. Dede^{1*} and A.L. Deshmukh²

¹Department of Zoology, Karmaveer Bhaurao Patil Mahavidyalaya, Pandharpur 41304, Solapur District (MS), India

²Department of Zoology, Shankarrao Mohite Patil Mahavidyalaya, Akluj, Taluka Malshiras, Solapur District, India

*Corresponding author

ABSTRACT

Keywords

Zooplankton,
Bhima River,
Karmala,
Density

The paper deals with the zooplankton composition and seasonal variation in Bhima river near Ramwadi village, Solapur District (M.S), during the period Jan 2014 to Dec 2014. A total of 21 species were found in this river. Among these 9 species belongs to rotifera, 5 species belongs to copepoda, 5 species belongs to cladocera and 2 species belongs to ostracoda. Numerically rotifera was dominant group throughout the study period. The study of season wise zooplankton analysis showed an average abundance of species in winter season, lower in monsoon season and maximum occurrence in summer season, due to different environmental condition of water bodies.

Introduction

Aquatic ecosystems are known to support work to range of organism. Among these zooplanktons are the free floating and microscopic animal found in aquatic ecosystem. The zooplanktons are important for fishes as they are used as source of food. The Zooplanktons are classified in various groups viz. Cladocera, Copepoda, Rotifer and Ostracoda. Many workers have studied the zooplanktons of fresh water bodies both in India and abroad. The biodiversity of phytoplankton and zooplankton are also rich in nature (Kangasabapathi and Rajan, 2010). Zooplanktons are playing important role in biomonitoring of water pollution (Tyor *et*

al., 2014). The availability of food is more due to decomposition of organic matter and the density of zooplankton might be high due to fewer predators (Shivashankar *et al.* 2013). The study of zooplankton is necessary to evaluate the fresh water reservoir in respect to their ecological and fishery status (Goswami and Mankodi, 2012).

The Zooplanktons community fluctuates according to physicochemical parameter of the environment, especially Rotifer species change with biotic factors (Karuthapandi *et al.*, 2012). The abundance and assemblage composition of zooplanktons are depends

upon the dominance of water birds, fish, macroinvertebrates and their food preference, (Russell *et al.*, 2006). On the similar line Jafari *et al.* (2011) studied the zooplankton diversity and compositions are correlated to the physicochemical environment of the Haraz River. Zooplanktons are heterotrophic in nature and play important role in food web by link primary producers to higher trophic level. The Zooplankton abundance was declines due to connection with redistribution number of individual in a water body less possibilities to stay in eutrophic zone where photosynthesis occurs (Dhembare, 2011). Zooplanktons are important in nutritive level, temperature, and pollution used to determine the health of an ecosystem (Purushothama *et al.*, 2011). From the earlier work on the zooplanktons, it appears that studies have been done on the seasonal variation and zooplankton diversity in river but negligible work has been carried out on composition and seasonal variation in zooplankton in Bhima River near Ramwadi village. The objective of present study is to determine zooplankton composition and seasonal variation of Bhima River.

Materials and Methods

Study area: The Bhima River runs along the Ramwadi village in Karmala taluka of Solapur district. It is situated in longitude 74° 83' and 73° 96' E and latitude 18° 31' and 72° 76' N.

Collection of samples and biological analysis

The survey of Zooplanktons Bhima River near Ramwadi village was carried out from Jan 2014 to Dec 2014. Water samples were collected monthly between 9 am to 11 am. The data was articulated seasonally as summer, winter, and Monsoon. The

plankton samples were collected through 50 liters of water by standard plankton net made up bolting silk cloth No. 20 and the collected samples were fixed in 4% formalin. Needham and Needham, (1966). The Zooplankton are identified with the help of standard literature up to generic level by using standard keys of Adoni *et al.* (1985), Edmondson (1959), Pennak (1978), Reddy (1994), Dhanapathi (2000), Bhouyain and Asmat (1992). The qualitative and quantitative analysis of the organism is carried out by 'Sedgwick rafter cell' as per the standard methods APHA (1998).

Result and Discussion

The present study reports the zooplankton diversity composition from the Bhima river near Ramwadi Village, Tal. Karmala, District Solapur (M.S.) India. In total, 21 species of zooplanktons belonging to families and 4 classes *viz.* Rotifera, Cladocera, Copepoda and Ostracoda were recorded from the Bhima River near Ramwadi village. The class Rotifera represents 9 species, Cladocera 5 species, Copepoda 5 species and Ostracoda 2 species.

The species recorded during the study with their occurrence in summer monsoon and winter presented in table 1. Purushothama *et al.* (2011) studied the physico chemical profile and zooplankton community composition in Brahmana Kalasi tank, Sagara, Karnataka. Their study reports 18 species of Zooplanktons from the Brahmana Kalasi Tank. Likewise several records on hand about zooplankton diversity, abundance, composition and seasonal variation from the different fresh water bodies (Jayabhaye, 2010; Jadhav *et al.*, 2012; Watkar and Barbate, 2012; Annalakshmi and Amasth, 2012; Singh *et al.*, 2012; Gaike *et al.*, 2012).

Table.1 Species composition of zooplankton at study area during Jan 2014 to Dec 2014

Sr.no	Zooplankton Groups	Family	Name of species	Summer	Winter	Monsoon
1	Rotifera	Brachionidae	<i>Brachionus caudatus</i>	+	+	+
2			<i>Brachionus falcatus</i>	+	+	+
3			<i>Brachionus forficula</i>	+	+	+
4			<i>Brachionus calyciflorus</i>	+	+	+
5			<i>Brachionus diversicornis</i>	+	+	+
6			<i>Keratella chochlearis</i>	+	+	+
7			<i>Keratella tropica</i>	+	+	+
8			<i>Keratella crassa</i>	+	+	+
9		Filinidae	<i>Filinia opoliensis</i>	+	—	—
10	Cladocera	Moinidae	<i>Moina micrura</i>	+	+	+
11			<i>Moina Brachiata</i>	+	+	+
12		Chydoridae	<i>Chydrous sphaericus</i>	+	+	+
13			<i>Bosmina longirostris</i>	+	+	+
14		Sididae	<i>Diaphanosoma sarsi</i>	+	+	+
15	Copepoda	Diaptomidae	<i>Mesocyclops</i>	+	+	+
16			<i>Undinula valgaris</i>	+	+	+
17			<i>Thermocyclops</i>	+	+	+
18			<i>Microcyclops</i>	+	+	+
19			<i>Nauplius</i>	+	+	+
20	Ostracoda					
21		Cyprididae	<i>Stenocypris</i>	+	+	+
22			<i>Heterocypris</i>	+	+	+

Table.2 Seasonal variation of various zooplanktons density from study area

Sr. no	Zooplankton groups	Summer	Winter	Monsoon	Grand Total
1	Rotifera (No/L)	595	390	250	1235
2	Cladocera (No/L)	350	250	150	750
3	Copepoda (No/L)	400	320	200	920
4	Ostracoda (No/L)	150	100	50	300
5	Total. Zooplanktons (No/L)	1495	1060	650	3,205

Plate 1

Zooplankton of Bhima River near Ramwadi Village, Tal- Karmala, Dist: Solapur, (Maharashtra).



Brachionous forficula



Brachionus diversiconis



Brachionus calyciflorus



Brachionous caudatus



Brachionous falcatus



Keratella crassa



Keratella chochlearis



Keratella tropica



Filinia opoliensis



Mesocyclops



Cyclops nauplis



Undinula Valgaris

Plate 2

Zooplankton of Bhima River near Ramwadi Village, Tal- Karmala, Dist: Solapur, (Maharashtra).



Thermocyclops.



Microcyclop



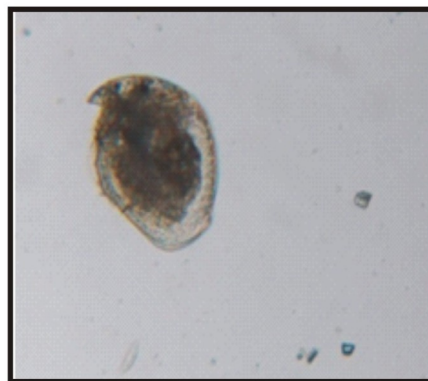
Moina brachiata



Moina micrura



Bosmina longirostris



Chydorus sphaericus



Diaphanosoma sarsi



Stenocypris.

Fig.1 Satellite view of Study area

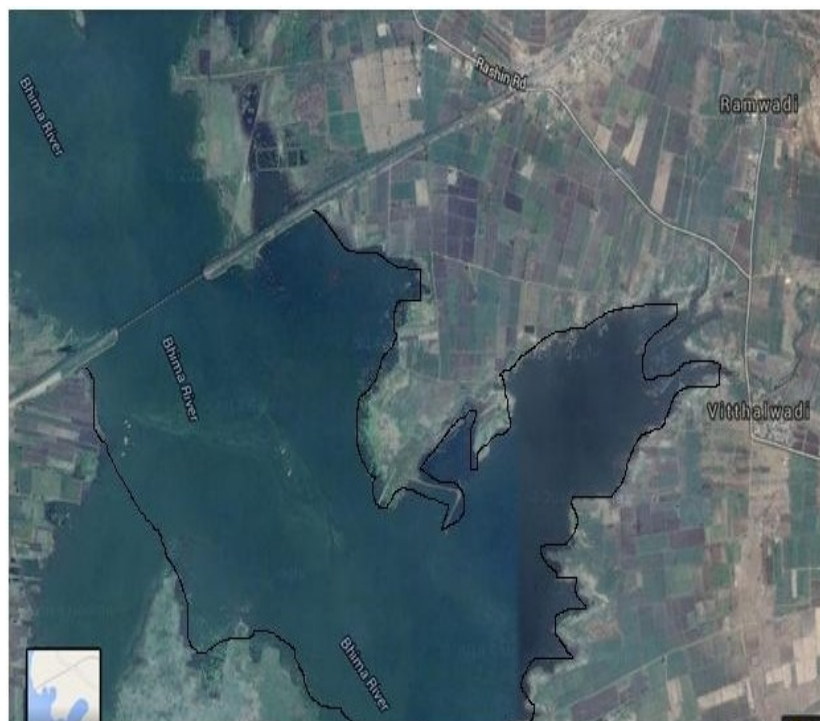


Fig. 2. Annual Seasonal Variation of Zooplankton in Bhima River(Ramwadi) Jan 2014 To Dec-2014

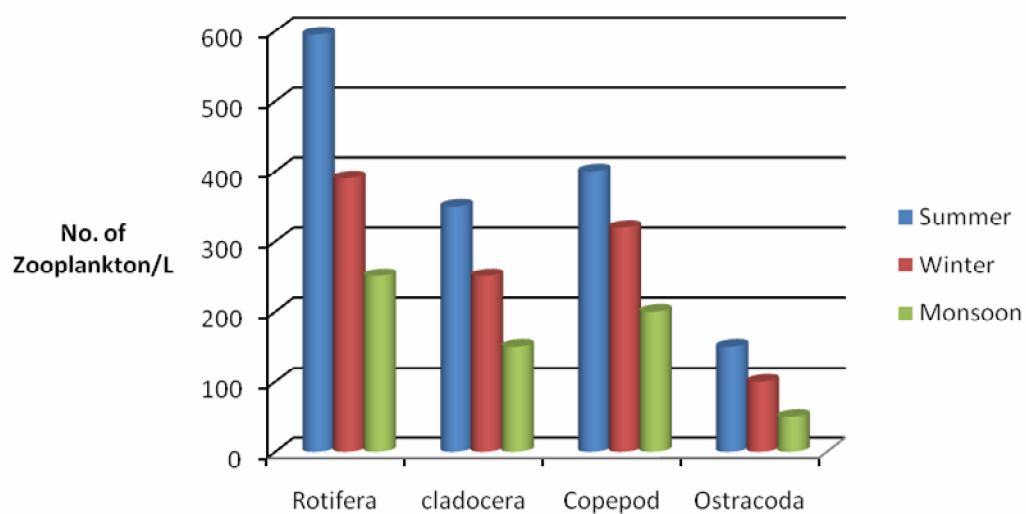


Fig. 3. percent Composition of zooplankton in winter season from study area

■ Rotifera ■ Cladocera ■ Copepoda ■ Ostracoda

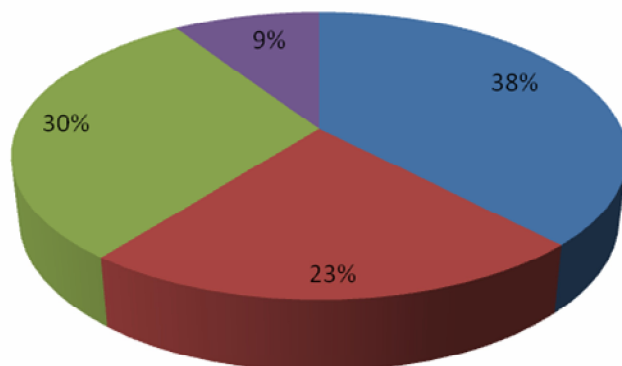
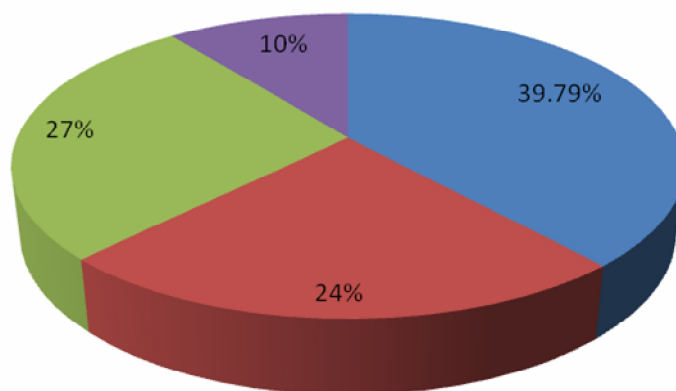
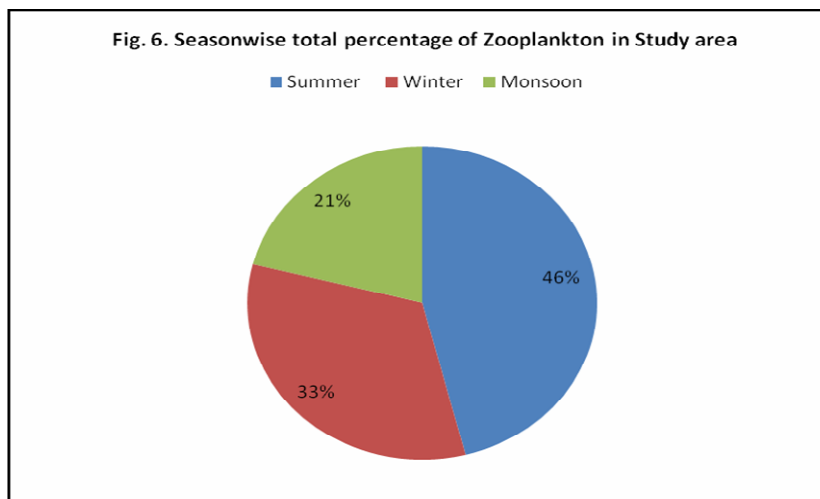
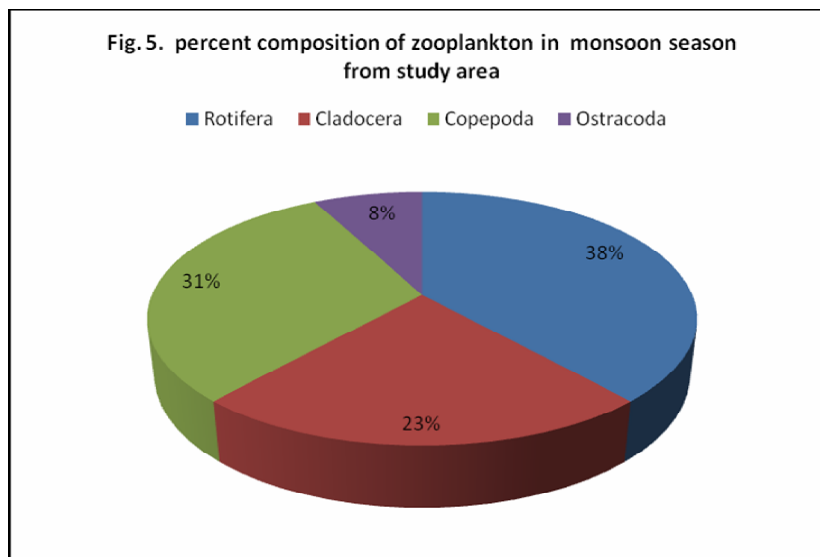


Fig. 4. percent Composition of zooplankton in summer season from study area

■ Rotifera ■ cladocera ■ copepoda ■ ostracoda





Rotifera were the dominant group among the Zooplankton community with 9 species. The *Brachionus*, *Keratella*, and *Filinia* were showed 38.53% population of total zooplankton community. Where as in the Cladocera, the *Moina*, *Chydrous*, *Bosmina*, *Diaphnosoma* represented 23.40% population of total zooplankton community. In the Class Copepoda, the *Mesocyclops* *Microcyclops*, *Undinula*, *Thermocyclops*, *Nauplius* were 28.70% and in the class Ostracoda. *Hetrocypris* and *Stenocypris* were 9.36% out of total population in Zooplankton community. On the similar line, Jose and Sanal Kumar (2012) carried

out a study on seasonal variation in the zooplankton diversity of river Achencovil and reported that in summer, rotifers were dominated (39.36%) followed by copepods (33.53%) and cladocera (27.11%). The cladocera was higher abundance during premonsoon (41.41%) and monsoon (45%) while copepods formed the dominant group during post monsoon season (42.01%).

During the present study, the population density was high in summer (46.64%) followed by winter (33.73%) and monsoon season (20.28%) (Fig.6). The *Filinia* genus was observed only in summer season. The

total zooplankton density was high in summer season followed by winter and Monsoon (Fig.2). In the summer season percent composition was as follows, Cladocera (23.41%), Copepoda (26.75%), Ostracoda (10.03%), Rotifera (39.79%) (Fig.4), the winter percent composition of Rotifera was 36.79%, cladocera (23.58%), copepod (30%) Ostracoda (9.43%), (Fig.3). In monsoon season percent composition of Rotifera was (38.46%), Cladocera (23.07%), copepod (30.76%), Ostracoda (7.69%), (Fig. 5). Similar observations were reported by Ramakrishna (2014) from Yelahanka lake, Manickam *et al.* (2014) from Thoppaiyar reservoir Dharampuri district, South India and Gayathri *et al.* (2014) from Doddavoderhalli lake, Bangalore, Karnataka (Table 2).

The population density, composition and abundance of zooplanktons varies according to the season and type of freshwater body, its physicochemical parameters and biotic components was studied different workers (Thirupathaiah *et al.*, 2011; Patel *et al.*, 2013). The result of present study indicated that zooplankton were maximum in summer season because favourable environmental condition. The present information on the zooplankton composition and seasonal variation from the Bhima River at Ramwadi Village, taluka Karmala, district Solapur (M.S.) India is helpful for further diversity and conservation studies of invertebrates from Bhima River. It will be also useful in the awareness of water pollution and maintenance of such aquatic ecosystem in future.

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