

Diversity and Distribution Pattern of Zooplankton of River Torsa, West Bengal

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Abstract -- A survey was carried out from February 2014 to March 2016. Water samples were collected in a monthly interval. Biodiversity indices like Shannon's diversity index, Pielou's evenness index, Simpson's dominance index and Margalef's species richness index were calculated. A total of 16 zooplankton genera were recorded composed of Protozoa with 4 genera, Rotifer with 5 genera, Cladocera with 4 genera and copepod with 3 genera from the river Torsa. Rotifer was most dominant group (31%) and copepod was least dominant group (19%). Density (org./L), number of organism (S), species diversity index(H') and Margalef's species richness Index (R) of zooplankton were recorded maximum in winter season and minimum in monsoon season at all sites.

I. INTRODUCTION

The river Torsa is a trans boundary river between China, Bhutan, India and Bangladesh. The river Torsa originates from the Chumbi Valley in Tibet, China at an altitude of 7065 M. 358 km is the total length of the river Torsa. The river Torsa is a second largest river of the Dooars region, West Bengal. It's a rain and glacier feed river and continuous flow throughout the year. Zooplanktons is an intermediate part of grazing food chain in aquatic ecosystem (Rao 1993). Zooplankton constitutes an important food source for many aquatic organisms (Guy, 1992). Zooplankton consisting of protozoan, cladocera, copepod, rotifera, and others. Zooplankton also may serve as indicators of water quality (Davies and Otene, 2009). They play a major role in energy transfer from phytoplankton to fish populations, control phytoplankton production, and shape pelagic ecosystems. Zooplankton play critical role as food source for larval fish, so the dynamics of zooplankton populations, reproductive cycles, and growth and survival rates are all important factors influencing production of fish stocks (Harris et. el.2000). They inhabit the ponds, lakes, rivers and reservoirs and are reported to occur more abundantly in ponds and lakes than in rivers (Ried, 1968; Raghunathan, 1983 and

Michel and Sharma, 1991). Zooplankton acts as bio-indicator of water quality as well as quantification of primary energy transfer from producer to primary consumer (Dulicet al., 2006). Kolhe et al. (2013) also observed the zooplankton communities respond more quickly to environment variations. The purpose of this study was to investigate the total zooplankton diversity and their distribution pattern in the river Torsa.

Sampling sites-

Two samplings sites were selected for survey, site-I Gajol doba and site-II Haldi Bari.

II. MATERIALS AND METHODS

A survey was carried out from February 2014 to March 2016. Water samples were collected in a monthly interval by filtering 10 L of water with the help of standard plankton net (75m mesh size) and the water samples then preserved with 4 % neutral formalin. In the laboratory, the water samples were concentrated by centrifugation at 1000-1500 rpm. for 10-15 minutes. One ml of this concentrated sample was then taken on a Sedgwick rafter cell counter and observed under microscope. Identification of zooplankton was done with the help of standard references such as George, 1961; Ward and Whipple, 1966; Pennak, 1978; Battish, 1992; Edmondson, 1992; Perumal et al., 1998 and APHA, 2005. Some bio-diversity indices like Shannon's diversity index, Pielou's evenness index, Simpson's dominance index and Margalef's species richness index were calculated with the help of SPSS 16 software.

III. RESULTS AND DISCUSSION

All together 16 zooplankton were recorded composed of Protozoa (4 genera), Rotifer (5 genera), Cladocera (4 genera) and copepod (3 genera) from the river Torsa (Tab.-1). Rotifer was most dominant group (31%) and

copepod was least dominant group (19%) (Fig.-1). It revealed that 16 genera of zooplankton comprising of protozoa with 4 genera, rotifer with 5 genera, copepod with 4 genera and cladocera with 3 genera were recorded (Table-1) in sites-I of river Torsa. In case of site-II of river Torsa total 15 genera were recorded comprising of protozoa (4 genera), rotifer (4 genera), copepod (4 genera) and cladocera (3 genera (Table-1). The monthly variation of density and number of zooplankton in the river Torsa was ranged from 4 to 27 org./l and 4 to 13 respectively. The monthly variation of Shannon-Wiener Diversity Index (H') of zooplankton was ranged from 1.38 to 2.48. The monthly variation of Margalef's Richness Index of zooplankton was ranged from 2.16 to 3.67. Shannon - Wiener diversity (H') index varied from 3.5 to 4 is an indication of good quality of water (Faure et al., 2001). The monthly variation of Simpson dominance index varied from 0.09 to 0.25. While Evenness Index of zooplankton varied from 0.942 to 1. Density (org./L), number of organism (S), species diversity index (H') and Margalef's species richness Index (R) of zooplankton were recorded maximum in winter season and minimum in monsoon season (Tab.-). Dominance index was maximum in monsoon season and minimum in winter season. Mondal (2013) and Sunkad (2005) were also recorded maximum zooplankton number and density during the winter season. In pre-monsoon and winter season the zooplankton population appeared to have greater stability but in the monsoon season lack of stability (Offem et al., 2011). Fish predation has strong influence on the population dynamics of crustacean zooplankton (Dodson and Frey, 2001; Fernando, 1994). Presence of *Brachionus* indicated a low level organic pollution in river during study period (Basu et al., 2013).

Table 1: Zooplankton diversity in the river Torsa From March 2014 to February 2016.

Srl. No.	Group	Genera	2014-2015		2015-2016	
			Site-I	Site-II	Site-I	Site-II
1.	Protozoa	<i>Amoeba sp.</i>	+	+	+	+
2.		<i>Paramoecium sp.</i>	+	+	+	+
3.		<i>Peridinium sp.</i>	+	+	+	+
4.		<i>Vorticella sp.</i>	+	+	+	+
5.	Rotifera	<i>Asplanchna sp.</i>	+	-	+	+
6.		<i>Brachionus sp.</i>	+	-	+	-
7.		<i>Keratella sp.</i>	+	+	+	+
8.		<i>Polyarthra sp.</i>	+	+	+	+
9.		<i>Philodina sp.</i>	+	+	+	+
10	Cladocera	<i>Bosmina sp.</i>	+	+	+	-
11		<i>Daphnia sp.</i>	+	+	+	+
12		<i>Moina sp.</i>	+	+	+	+
13		<i>Sida sp.</i>	+	+	+	+
14	Copepoda	<i>Cyclopes sp.</i>	+	+	+	+
15		<i>Diaptomus sp.</i>	+	+	+	+
16		<i>Eucyclops sp.</i>	-	+	+	+

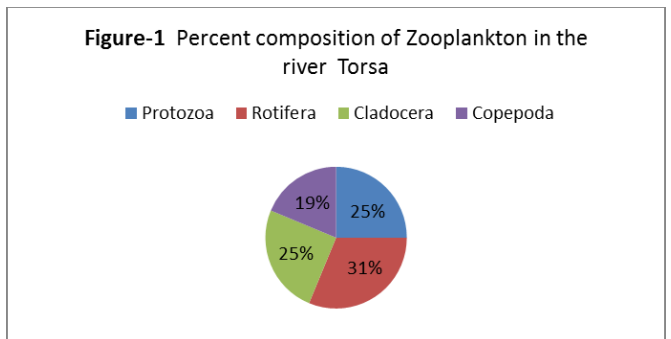


Figure 1: Percent composition of Zooplankton in the river Torsa

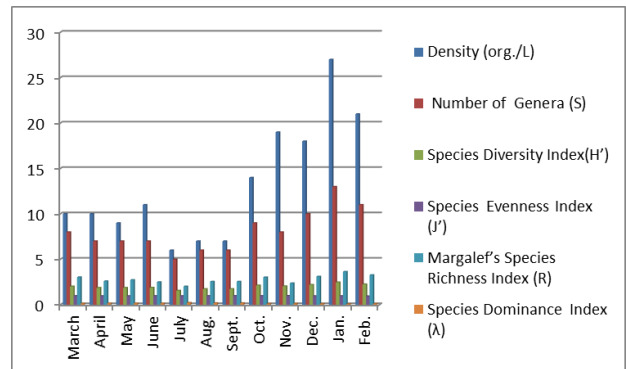


Figure-2. Monthly variation of zooplankton density and diversity index at site-I from March 2014 to February 2015

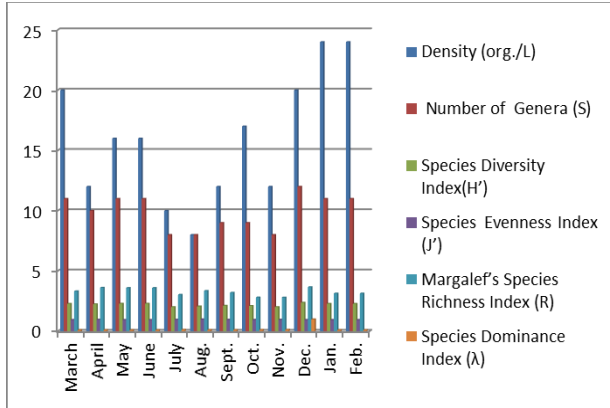


Figure-3. Monthly variation of zooplankton density and diversity indices at site-I from March 2015 to February 2016.

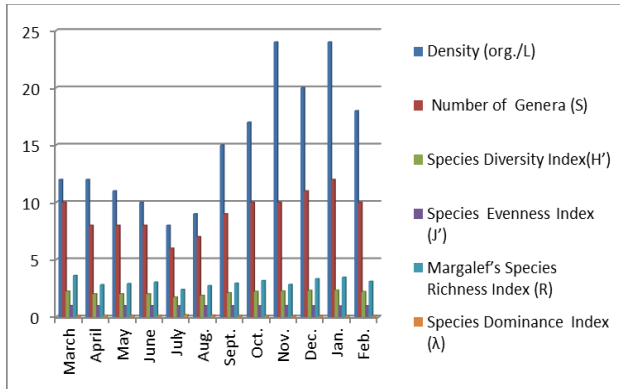


Figure-4. Monthly variation of zooplankton density and diversity indices at site-II from March 2014 to February 2015.

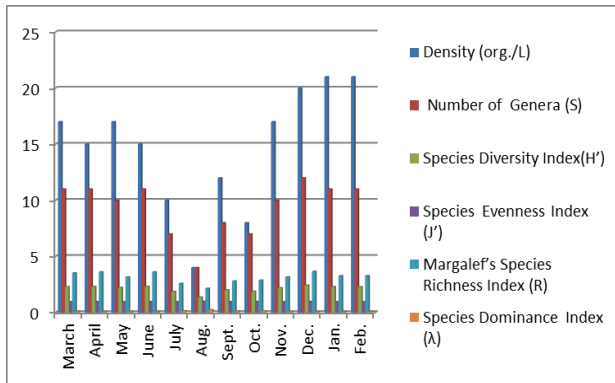


Figure- 5. Monthly variation of zooplankton density and diversity indices at site-II from March 2015 to February 2016.

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