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Abundance of zooplankton species in West Nimar (Madhya Pradesh) Belt of river Narmada

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Abstract
Zooplanktons are microscopic free swimming heterogeneous animal forms found in aquatic systems, are represented by wide range of taxonomic groups (Protozoa, Rotifera, Cladocera, Crustacea and Copepoda). These are most common and often dominate the entire consumer communities. Study on Zooplankton species were conducted monthly using standard methods in Narmada river between Mar.2016 to Feb.2017.The Zooplankton fauna of the state of Madhya Pardesh, central India, especially in the Nimar basin, is still poorly known. Thus, this paper presents data from samples taken recently from different four sites of Narmada river. A total of 40 species were found in sampling stations. Among these, Copepods comprise of 14 species (37%), Rotifera of 11 species (24%), Cladocera of 8 species (21%) and 7 Protozoan species (18%).

Keywords: zooplankton, copepods, rotifera, cladocera and protozoan

Introduction
Zooplankton study provides way to be expecting the productivity of fresh water aquatic system. The biodiversity and distribution of zooplankton in aquatic ecosystem depend mostly on the physico-chemical parameter of water. Pollution of water bodies by different sources marks in severe change in zooplankton populations, and thus affects the production possible of the ecosystem. Fresh water ecosystems are the divisions of Earths aquatic system. They include ponds, lakes, streams, rivers, springs and wetland. Limnology deals with the natural productivity of inland water and with all its basic influences which determines its causal influences involve physical, chemical, meteorological, geographical and biological factors, which decide the quantity and quality of biological production. A variety of zooplanktonic faunal species were found that were usually adapted for the certain conditions of existence. Different groups of the zooplanktons possess their own peak periods of density which is affected by local environmental condition

Rivers directly or indirectly have an enormous ecological, social, commercial and economical importance. Majority of the water bodies in India are seasonal, shallow or exhibit such large water level changes annually that a large proportion of the basin is exposed to drying. The river Narmada is the largest west-flowing river of the peninsular India. The survival strategies of the zooplankton have been reported by Battish (1992) [1], Zooplankton communities have investigated in numerous water bodies. The dominance of zooplankton in shallow water bodies by rotifers, cladocera or copepods varies according to the lavel of organic pollution. In most of the studies, two or more river of zooplankton densities have been recorded which is generally during the early winter season and the second peak is variable for different groups.

The zooplankton which play an important role of converting phytoplankton into food, suitable for fish, shore birds and aquatic animals have acquired importance in fishery. Zooplanktons can also play an important role in indicating the presence or absence of certain species of fishes on in determining the population densities. Zooplankton plays major role in the food web of an aquatic ecosystem and forms an intermediate link between primary and tertiary production. Zooplankton is good indicator of the changes in water quality because they are strongly affected by environmental conditions and due to their short life cycle, these communities often respond quickly to environmental change and water quality. Hence qualitative and quantitative studies of zooplanktons are of great importance. They are endowed with many markable features and are often armored with pines, which hamper their predation by higher organisms. The zooplankton which play a role of converting phytoplankton into food, suitable for fish and aquatic animals have acquired importance in fishery research. The zooplanktons can also play an important role in indicating the presence or absence of certain species of fishes on in determining the population densities. Zooplankton plays significant role in the food web of an aquatic ecosystem and forms a link between primary and tertiary production.

Methodology
Sampling Station: The study sites include towns or villages situated at the bank of river Narmada. Samples were collected from selected sites of river for one year from between (March. 2016 to February 2017) to calculate diversity of Zooplankton in four sampling sites.

Collection and preservation of plankton was done at the study site while method of identification of plankton was applied in the laboratory. Samples were collected every month during morning hours between 9.00 and 11.00 a.m. The plankton samples were collected by following the guidelines of (Lind, 1979; Welch, 1953) [4, 9], Wetzel (1983) [9], by filtering 20 Liters of water through plankton net having pore size 64 µm. The concentration plankton samples were fixed in 4% formalin and Lugal's solution for zooplankton study. Zooplanktons were identified with the help of keys' provided by Needham and Needham (1962) [5], Tonapi (1962) [7], APHA (2002).

Fig 1: Showing sampling sites from (east to west direction) Jalkoti, Khalghat, Sala, Dharampuri at Narmada river (West Nimar belt).

Result and Discussion

Table 1: Abundent Zooplankton species during study period.

Phyla	SN.	Zooplankton species	Jalkoti	Khalghat	Sala	Dharampuri
Cladocera	1	*Alona sps*	+	+	+	+
	2	*Daphnia lumholtizi*	-	-	-	+
	3	*Daphnia carinata*	+	+	+	+
	4	*Diaphanosoma sps.*	-	+	-	+
	5	*Leydigia sps*	+	-	-	-
	6	*Monia sps*	+	+	+	+
	7	*Nauplii larva*	+	+	-	-
	8	*Macrothrix*	+	+	+	+
Copepoda	1	*Cyclops scutifer*	+	+	+	+
	2	*Mesocyclops sps.*	+	+	+	+
	3	*Macrocyclops sps.*	+	+	+	+
	4	*Microcyclops sps*	+	+	+	-
	5	*Bosmia cornuta*	-	-	+	+
	6	*Bosmia coregoni*	-	+	+	+
	7	*Cypris sp.*	+	+	+	+
	8	*Cyclops viridis*	+	+	+	+
	9	*Gammarus pulex*	-	+	-	+
	10	*Lathonura sp.*	-	+	+	-
	11	*Macroblachium*	+	+	+	+
	12	*Moinodaphnia sp.*	+	-	-	+
	13	*Neodiaptomus*	+	+	+	+
	14	*Pseudosida bidantata*	-	+	+	+
Protozoa	1	*Arcella vulagris*	+	+	+	+
	2	*Amoeba proteus*	+	+	+	-
	3	*Diffusia sps*	+	+	+	+
	4	*Euglena viridis*	+	+	+	+
	5	*Pramaecium cardatum*	+	+	+	+
	6	*Vorticella nebulifera*	+	-	+	-
	7	*Vorticella convallaria*	+	-	+	-
Rotifers	1	*Asplanchna brightwelli*	+	+	+	+
	2	*Brachionue angularis*	+	+	+	-
	3	*Branchinecta ferox*	+	+	+	+
	4	*Chromogaster ovalis*	+	-	-	-
	5	*Keratella cochlearis*	-	+	-	+
	6	*Mytilina mucronate*	-	-	-	+
	7	*Notholca acuninata*	+	-	+	-
	8	*Polyarthra vulgaris*	+	+	+	+
	9	*Synchacta pectinata*	-	-	+	-
	10	*Scaridium longicaudum*	+	+	+	+
	11	*Trichocerca similes*	+	+	+	+

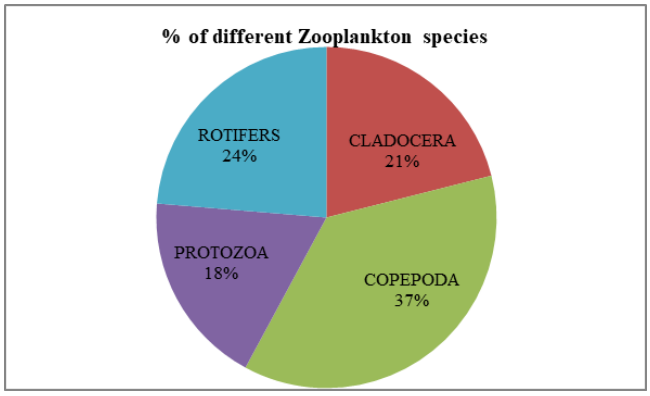

Fig 2: Percentage of different Zooplankton species

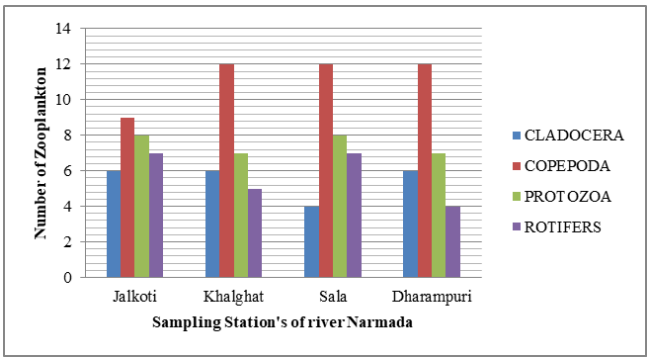

Fig 3: Showing Abundance of Zooplankton species in four sampling sites.

Zooplankton species of river Narmada comprised of 40 belonging to Cladocera 08, Copepoda 14, Protozoa 7 and Rotifera 11 species (table -1). These groups are represented in order of dominance as Copepoda > Cladocera > Rotifera > Protozoa (Fig -2). The relative abundance of plankton species in this river depicted in Fig -3. Similar observation also noted by Jose *et al.* 2012, Pandey *et al.* 2015 and Wasarat *et al*. 2018.

Conclusion

The above study comprises a good ecological indication of the study area. Availability of different zooplankton species represents a good aquatic environment which is essential for a good water quality. Ecologically river plays a major role in fish diversity resource. As we know a healthy aquatic environment boosts the growth for aquatics organisms especially for fishes. Hence we can say that the study site found to be in good environmental condition in all aspects..

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