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Ecology, distribution and diversity of zooplankton and Ichthyofaunal in Teetha Dam, Tumkur District, Karnataka, India

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Abstract
In the present study, zooplankton belonging to 4 groups consisting of 20 species in the sample scanned throughout the study period (January 2017 to December 2017). Results revealed that, Rotifera was found to be the dominant group of zooplankton (47%) followed by Cladocera (28%), Copepoda (20%) and Ostracoda (5%) and in fish diversity the order cypriniformes found dominant with 07 followed by Percifomes and Siluriformes.

Keywords: zooplankton, Teetha Dam, fish, diversity

Introduction
Zooplankton of small animals that flowed freely in the water: lakes and oceans are whose distribution is primarily determined by water currents and mixing. In terms of Biomass and productivity, the dominant groups of zooplankton in most of the lakes are crustacean and rotifer and protocalls phytoplankton into food, suitable for fish and aquatic animals zooplanktons are an important component in aquatic ecosystems, whose main function is to act as a primary and secondary links in the food chain (Hutchinson 1967) [8]. The temperature, DO and Organic matter have influence and zooplankton community sector.
Ichthyopaunal diversity leads with variety of fish species, depending on context and scale, it could refer to genotypes within fish population to species of life forms within a fish community and to species or life forms across aquaresims (Burton *et al*., 1992) [2]. Biodiversity is essential for stabilization of ecosystem protection overall environmental quality for understanding intrinsic worth of all species on the earth (Ehrlich and Wilson, 1991) [7]. A fresh water perennial tank has got prime importance a source of drinking water and for aquaculture potential in terms of fish.

Materials and Methods
Teetha wetland ecosystem is a perennial fresh water body situated towards north-east 30 kms. from Tumakuru city at 13°25' to 13°30' north side and 77°15' to 77°20' east longitude with an area of 1.32 km^2 constructed in the year 1985-86 across the river Jayamangali, a tributary of Uttarapinakini. The lake is irregular in shape and water in the lake is held by raised east-west earthern bund on either flank with central spill way. Average depth of the lake is 4.5 to 6.5 meters. Lake water is used for agricultural practices, drinking, washing clothes, bathing cattle and other domestic activities. Lake is situated by the side of famous pilgrim Centre Sri Goravanahalli Lakshmi Temple. Water in the lake is also used for anthropogenic activities by large number of devotees visiting the temple. Swimming and fishing are commonly seen during the day hours.
Plankton net (mesh size 25 um) was swept on surface water (Secchi's disc transparency zone) and plankton were collected through the net and easily transferred into separate plastic bottle/container. 100 liters of surface water was sieved through plankton net to obtain planktons. These were fixed and preserved in 4% formalin. The formalin fixed plankton samples were centrifuged at 1500-2000 rpm for 10-12 min. The phytoplankton and zooplankton were settled at bottom, diluted to a desirable concentration in such a way that they could be easily counted individually, under compound binocular microscope and phytoplankton's and zooplanktons were measured and multiplied with the dilution factors. Plankton species identification was done with the help of standard references Phytoplanktons by Smith, (1950) [16] and Dhanpati, (2000) [5] and zooplanktons by IAAB, (1998) [9]; Edmonson, (1963) [6] and Battish, (1992) [1]. The quantitative analysis of plankton organisms were carried out using Sedgwick-Rafter plankton counting cell.
Fishes were collected from Teetha Dam with the help of local fishermen using different type of nets namely; gill nets, cast nets, dragnets and Bhor-jal. Fishes were brought to laboratory and preserved in 4% formalin solution in separate specimen jars according to the size of species. Small fishes were directly placed in the 4% formalin solution. At the same time as large fishes were given an incision in their abdomen and preserved. The meristic and morphometric characters were measured and identified upto the species level, with the help of standard keys (Day, 1994; Talwar and Jhingran, 1991; Jayaram, 1999 and Rahman (2005) [3, 17, 10, 13].

Results and Discussion
Detailed microscopic examination of zooplankton has been carried out under compound microscope reveal that, there were 4 groups consisting of 20 genera of zooplankton in the samples throughout study period (Jan. 2017 to December 2017) (Table 1).

Table 1: Monthly variation in zooplanktons (org / l) at Teetha Dam (Jan-Dec2017)

Class	Zooplankton	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug.	Sep.	Oct.	Nov.	Dec.
Rotifera	*Brachionus calyciflorus*	1	2	7	12	6	1	2	2	3	0	0	0
	Brachionus diversicornis	2	4	3	6	8	1	0	0	0	4	2	1
	Brachionus falcatus	3	6	1	8	12	1	1	0	0	1	0	1
	Brachionus forficula	1	3	5	8	10	1	2	0	0	0	0	0
	Brachionus sp.	7	4	10	13	6	1	1	0	0	8	4	5
	Filina longiseta	1	3	4	4	8	2	2	1	1	0	0	0
	Platyias polyacanthus	6	2	0	1	10	1	0	2	2	2	4	4
Cladocera	*Ceriodaphnia cornuta*	1	3	6	8	5	1	1	0	0	0	1	1
	Ceriodaphnia macrura	1	2	2	3	4	2	2	2	4	0	0	0
	Ceriodaphnia sp.	2	4	6	3	5	1	1	0	1	0	0	1
	Diphanosoma sp.	2	1	0	6	8	0	1	1	2	0	1	1
	Moina brachiata	1	1	0	6	10	2	2	0	0	0	1	2
	Moina sp.	1	1	9	6	5	2	0	2	1	0	1	0
Copepoda	Anostraca sp.	1	3	0	3	7	0	0	1	2	0	0	2
	Calanoid nauplii	1	1	3	8	5	1	0	0	1	2	0	1
	Cyclops sp.	2	1	4	5	4	3	0	1	2	0	2	1
	Mesocyclops hyalinus	2	6	3	3	4	2	0	2	2	1	0	0
	Mesocyclops sp.	1	2	4	2	2	2	1	1	0	0	0	1
Ostracoda	*Cypris* sp.	1	3	1	2	2	2	1	1	0	0	0	1
	Stenocypris sp.	1	1	2	2	1	1	2	2	1	0	0	1

Table 2: Monthly variation in Ichthyofauna of Teetha Dam (Jan-Dec.2017).

Family	Scientific Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cyprinidae	*Catla catla*	2	5	4	5	9	3	1	1	2	4	1	3
	Labeo rohita	1	3	5	5	4	1	2	2	2	1	2	4
	Cyprinus carpio	1	3	3	8	14	2	1	2	2	3	2	5
	Rasbora daniconius	22	28	26	30	27	07	3	07	2	10	14	22
	Puntius ticto	4	10	6	16	10	4	1	0	0	0	6	9
	Puntius stigma	1	1	3	3	5	1	0	0	0	0	0	2
	Chela bacaila	1	3	5	8	6	2	1	0	0	0	4	1
	Garra lamta	1	4	7	2	10	2	0	0	0	0	1	1
Channidae	*Channa punctatus*	2	3	6	13	08	1	0	0	0	1	1	2
Clariidae	*Oreochromis mossambica*	0	0	3	4	2	0	0	0	1	0	0	2
Clariidae	*Clarias batrachus*	0	0	1	2	1	0	0	0	0	0	0	0

The population density of Rotifera was ranged 01 (org/L) to 13 (org/L). The maximum population density of Brachionus sp. recorded 13 (org/L) in April and minimum population density of *Brachionus calyciflorus*, Brachionus diversicornis, *Brachionus falcatus*, *Brachionus forficula*, *Filina longiseta*, Platyias polyacanthus recorded which accounts for 47% of total zooplankton group. The population density of Cladocera was ranged 1 (org/L) to 10 (org/L). The maximum population density of *Moina brachiata* recorded 10 (org/L) in May and minimum population density of *Ceriodaphnia cornuta*, Cerodaphnia macrura, Ceriodaphnia sp., Diphanosoma sp., Moina sp., were recorded which accounts for 28% of total zooplankton group. The population density of Copepoda was ranged 1 (org/L) to 8 (org/L). The maximum population density of *Calanoid nauplii* was recorded 8 (org/L) in April. Minimum population density of *Anostrae* sp., Cyclops sp., *Mesocyclops hyalinus* and *Mesocyclops* sp., were recorded which accounts for 20% of total zooplankton group. The population density of Ostracoda was ranged 1 (org/L) to 3 (org/L). The maximum population density of Cypris sp. recorded 4 (org/L) in February minimum population density of *Stenocypris* sp., was recorded which accounts for 5% of total zooplankton group.

In the present study, Rotifera represented 7 species, the higher concentrations of Rotifers were found during summer and least appearance during monsoon. Similar have been reported by Rajagopal *et al*. (2010) [14]; Smita *et al*. (2009) [15] and Rotifer shows their dominance than other 3 groups.

The maximum density of Copepoda during summer season attributed to water temperature and availability of food. Similar results have been reported by Rajgopal *et al*. (2010) [14] and Smith *et al*., 2009 [16]. The group Cladocera represents 6 species, this group maximum density during summer and minimum winter. Similar results have been reported by Pejaver and Gurav (2008) [12]. Ostracoda represented by only 2 species and higher density of Ostracoda species found in summer and low density in monsoon season. Similar reports have been reported by Rajagopal *et al*. (2010) [14] and Smith *et al*. (2009) [16].

In the studied year the Cyprinidae population density ranged 1 to 30 (Table 2). The maximum population density of Rasbora daniconius recorded 30 in April, minimum population density of *Catla-catla*, *Labeo-rohita*, *Cyprinus carpio*, *Puntius ticto*, *Chela bacaila*, *Garva lamta* and *Thynnichthys sandkhol* recorded very less. Channidae population density ranged 1 to 13. The maximum population density recorded of Channa striatus was 13 in April. Cichlide population density of Oreochromis mossambica ranged 1 to 4 maximum population

density recorded 4 in April. Claridae population density ranged 1 to 2. The maximum population density recorded 2 in April.

The present study reveals the occurrence of 10 fish species belonging 3 orders and 4 families. The order Cypriniformes found dominant with 07 species remaining with one species, seasonally, fishes showed its dominance during summer season followed by winter and monsoon season during summer, the rise temperature enhances the rate of decomposition due to which water becomes nutrient rich similarly due to concentration followed by evaporation in summer season the nutrient concentration increase and abundant food present inform of phytoplanktons, zooplanktons and microorganism to fish that's why high fish population density during summer. Similar, results have been reported by Deshpande and Bhilane (2009); Kamble and Mudkhede (2009) [11].

Conclusion

In the present study basic information of zooplankton and fish distribution and abundance form a useful tool for further ecological assessment and monitoring of ecosystem at Teetha dam.

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