



## COMPARATIVE STUDY OF PROTOZOAN ZOOPLANKTON DIVERSITY IN LENTIC WATERBODIES OF MADDUR, MALAVALLI AND MAREHALLI

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<https://doi.org/10.59436/jsianeV1I4.2583-2093>

### Abstract

A comparative study of Protozoan Zooplankton diversity in lentic waterbodies of Maddur, Malavalli and Marehalli was conducted from June 2020 to May 2021. Sixteen species of protozoans were recorded in Malavalli lake in summer. And least number of protozoans were recorded in Maddur lake during winter season. Malavalli lake was rich in abundance of protozoans. Malavalli lake is more eutrophic in nature compare to Maddur and Marehalli lakes. Water in Malavalli lake is more stagnant and many aquatic weeds abundantly grown which supports the growth of zooplanktons. Whereas in Maddur and Marehalli lakes water is of lotic in nature which is subjected to frequent flow and does not support abundant growth of aquatic weeds and phytoplanktons.

**Keywords:** Zooplankton, lake, protozoan, season

Received 10.10.2021

Revised 09.11.2021

Accepted 22.11.2021

### Introduction

Zooplanktons are free floating microscopic animals and usually do not possess resistance to water currents. They are freely suspended in water bodies. Microscopic protozoans, copepods cladocerans, ostracods and rotifers are the major groups of zooplanktons. Zooplanktons assemblage analysis in water bodies is considered useful in assessing water quality. Mandya district possesses a large number of freshwater ponds and lakes. Considerably there is less work has been done on zooplankton analysis of these lakes. Of the many lakes in Mandya district, Maddur lake, Malavalli lake and Marehalli lakes are three important lakes. All these lakes are situated in plain lands with no hills in the near vicinity. All these three lakes do not receive any industrial effluents. Chemical runoff from the surrounded agricultural fields and domestic waste reaches the lakes. Thus, causes the moderate level eutrophication. The present work was undertaken with the objective of comparative study of Protozoan zooplanktons and their diversity. Hence the seasonal dynamics of these zooplanktons was thoroughly studied from June 2020 to May 2021.

### Description of study area

Geographically Mandya district lies between 12° 25' and 13° 35' North latitude and 74° 04' and 77° 84' East longitude. The altitude of the district varies between 609.60 to 807.72 meters MSL. Physiographically, the Mandya district situated completely in plain land. Only on the South – eastern part of the district, broken patches of Western ghats forests are present.

At about 3.0 kms on the Northwest side of the Maddur town, Maddur lake is located. It is present at 649.83 meters above MSL. It is present across 77° 10' E longitude and 12° 40' N latitude. The total watershed area of the lake is 4220

hectares. The maximum depth of the lake is 7.0 meters with the mean depth of 4.90 meters

Malavalli lake is located on the way to Malavalli town from Maddur side adjacent to town on north side. Lake is situated at a level of 651.20 meters above MSL. Boundaries of the lake lies across 77° 04'E longitude and 12° 38' N latitude. Watershed area of the lake is 3993 hectares and 7.4 meters is the maximum depth of the lake. Mean depth of the lake is 4.35 meters.

Between Malavalli town and Purigali village Marehalli lake is situated. The distance of the lake from Malavalli town is 4 kms. Lake is situated at the height of 650.65 meters above sea level. It lies across 77° 25' E longitude and 12° 21' N latitude. Totally 3484 hectares of watershed area is present. The lake has maximum depth of 5.3 meters and mean depth is 3.4 meters.

### Materials and Methods

Water samples were collected using polyethylene bottles. For detailed description on various types of water sampling Schwoerbel (1970) and Golterman *et al.* (1978) were referred. Every month with an interval of 30 days samples were collected between 10 and 11 AM. Zooplankton nets made up of silk (No. 25, mesh size 55 µm) were used for sample collection. Samples of zooplanktons were collected by towing the plankton net horizontally for about 10 minutes. Preservative 4% formaldehyde was used to store the plankton samples. In the present work, the samples for analysis were collected from surface water at various sampling sites in the Maddur, Malavalli and Marehalli lakes. The sampling sites were selected at inlet points, outlet points and open lake. Sample was collected every month from June 2020 to May 2021. From the preserved samples one drop from each vial was mounted on a slide. Five power fields, one in each corner of the coverslip and one at the center were made and

plankton population was estimated. Zooplanktons were identified using manuals of Edmondson (1959), Victor and Fernando (1979), Sehgal (1983), Michael and Sharma (1988), Battish (1992) and Hosmani (2002).

### Results

Totally 16 protozoans were recorded in Maddur, Malavalli and Marehalli lakes during the investigation period from June 2020 to May 2021. Protozoans species found in all the three lakes during investigation period are shown in Table-1. Maximum number of protozoans were recorded in Malavalli lake while the minimum number of protozoans were recorded in Maddur lake.

Season wise highest number of protozoans were recorded in summer in Malavalli lake (2904 org./L). In Maddur lake lowest number of protozoans were recorded during winter (1790 org. / L) (Table-2). Malavalli lake was rich in abundance of protozoans.

Species like *Actinophrys* sp., *Centropyxis aculeata*, *Cucurbitella mesipiliformis*, *Ceratium* sp., *Diffflugia pyriformis*, *Epalxis mirabilis*, *Euplotes patella*, *Naegleria tachypodia*, *Paramecium caudatum*, *Pelomyxa* sp., *Stentor* sp., *Cochliopodium granulatum*, *Didinium nasutum*, *Oxytricha fallax* and *Vorticella* sp. were found almost throughout the year but abundant during summers (Tables-3).

### Discussion

Protozoans include a variety of microorganisms range from approximately spherical forms to bizarre shapes not readily explained on a functional basis. In recent period many zoologists worked on seasonal dynamics and ecology of

protozoans. Esteban *et al.* (1991) observed that the physico-chemical conditions influence the development of ciliate population and pointed out that variable environmental conditions are very important for the development of each ciliate species and for the whole ciliate population. Pathak and Mudgal (2002) recorded different protozoan species in Khargone reservoir. Prakash *et al.* (2002) recorded various zooplanktons in a freshwater pond and observed maximum density during April and minimum during January. They observed significant correlations between zooplankton density and physico-chemical parameters. Tharavathi and Hosetti (2003) noticed that when high dissolved oxygen is present, protozoans like *Paramecium caudatum*, *Acanthamoeba* sp. are found dominant. In our investigation also highest number of protozoans are recorded during April, May and June. This may be attributed to the favorable factors like water temperature, DO, total solids, calcium, BOD, pH and other factors. Khare (2002) and Manzer *et al.* (2005) also observed that different physico-chemical factors influence the growth of zooplanktons. Prakash *et al.* (2002) and Manzer *et al.* (2005) observed maximum number of protozoans during summer and minimum number of protozoans during winter. Observations in Maddur, Malavalli and Marehalli lakes were in correlation with these findings. Malavalli lake is more eutrophic in nature compare to Maddur and Marehalli lakes. Water in Malavalli lake is more stagnant and many aquatic weeds abundantly grown which supports the growth of zooplanktons. Whereas in Maddur and Marehalli lakes water is of lotic in nature which is subjected to frequent flow and does not support abundant growth of aquatic weeds and phytoplanktons.

**Table 1 :** Protozoan zooplanktons recorded in Maddur, Malavalli and Marehalli lakes from June 2020 to May 2021.

Organisms	Maddur	Malavalli	Marehalli
<i>Actinophrys</i> sp.	++	--	--
<i>Cochliopodium granulatum</i>	++	++	++
<i>Centropyxis aculeate</i>	--	++	--
<i>Cucurbitella mesipiliformis</i>	++	++	++
<i>Diffflugia pyriformis</i>	++	++	++
<i>Pelomyxa</i> sp.	++	++	++
<i>Ceratium</i> sp.	--	++	++
<i>Didinium nasutum</i>	++	++	--
<i>Epalxis mirabilis</i>	--	++	++
<i>Euplotes patella</i>	++	++	++
<i>Oxytricha fallax</i>	--	++	++
<i>Paramecium caudatum</i>	++	++	++
<i>Stentor</i> sp.	++	++	++
<i>Vorticella</i> sp.	++	++	++

**Table 2 :** Seasonal average numbers of Protozoans in Maddur, Malavalli and Marehalli lakes from June 2020 to May 2021 (org. / L).

Season	Maddur	Malavalli	Marehalli
Rainy	2109	2566	2342
Winter	1790	2018	1836
Summer	2810	2904	2864
<b>Total</b>	<b>7187</b>	<b>7488</b>	<b>7042</b>

**Table 3 :** Monthly average number of Protozoans in Maddur, Malavalli and Marehalli lakes from June 2020 to May 2021 (org./L).

Organisms	Abundance of Protozoans in different months											
	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
<i>Actinophrys</i> sp.	30	25	38	40	30	20	28	34	20	36	30	46
<i>Cochliopodium granulatum</i>	52	30	20	32	56	32	30	20	20	30	10	54
<i>Centropyxis aculeata</i>	56	60	52	50	48	10	20	22	30	18	26	62
<i>Cucurbitella mesipiliformis</i>	69	74	40	40	30	44	32	20	25	36	32	70
<i>Diffugia pyriformis</i>	62	58	20	30	36	40	40	52	35	30	48	54
<i>Naegleria tachypodia</i>	24	20	20	28	30	32	30	32	16	20	28	28
<i>Pelomyxa</i> sp.	26	15	20	34	48	40	20	40	46	40	38	20
<i>Ceratium</i> sp.	27	25	22	20	32	16	10	20	20	28	26	20
<i>Coleps hirtus</i>	34	26	20	20	20	10	20	18	20	48	36	24
<i>Didinium nasutum</i>	40	20	36	28	34	10	10	10	22	34	36	30
<i>Epalxis mirabilis</i>	110	134	128	124	100	94	40	60	72	86	96	132
<i>Euplotes patella</i>	126	115	68	45	30	68	70	70	92	60	76	138
<i>Oxytricha fallax</i>	70	30	38	25	18	10	08	20	26	16	24	62
<i>Paramecium caudatum</i>	80	48	36	38	20	10	40	36	40	28	46	78
<i>Stentor</i> sp.	44	22	10	20	16	18	14	10	20	16	20	28
<i>Vorticella</i> sp.	20	42	32	46	52	56	44	48	36	44	38	08
Total organisms / liter	870	746	600	620	600	510	456	512	540	570	610	854

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