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## STUDIES ON SEASONAL VARIATIONS OF BIOLOGICAL PARAMETERS OF TUNGARLY DAM, TUNGARLI, PUNE. (MAHARASHTRA, INDIA)

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### ABSTRACT

*The seasonal studies on Tungarly dam have shown that, Tungarly dam has a Eutrophic nature. The phytoplankton analysis of Tungarly dam showed dominance of Cyanophycean members. Among Cyanophyce an members the genera Scytonema and Microcystis was most dominant. Next to Cyanophycean the Chlorophycean members are found dominant. The zooplankton analysis of Tungarly dam water showed the dominance of group Rotifera. The Cladocera also recorded but their number is less than that of Rotifera and Copepoda. The group Ostracoda represented by single genera. In and around the Tungarly dam the a quatic macrophytes recorded belongs to an giosperms. The study presented here on Tungarly dam was designed to provide baseline data on the biological parameters of Tungarly dam. It is an initial study for Tungarly dam. The biological study of Tungarly dam showed that the dam is a natural ecosystem.*

**KEYWORDS:** Tungarly Dam.

### INTRODUCTION

Clean water is essential to human survival, and we rely most heavily on continental water, including streams, lakes, wetlands and ground water. The global renewable supply of water is about 39,000 Km<sup>3</sup> per year, and humans use about 54% of the runoff that is reasonably accessible. Thus, clean water is one resource that will be limited severely with future growth of the human population and increases the standard of living. Therefore, the study of ecology of inland waters will lead to more sound decisions regarding aquatic habitats as well as provide a solid basis for future research. (Dodds 2002). Tungarly dam is located near Tungarly village under Pune district in the state of Maharashtra, India; The quality and quantity of phytoplankton is a good indicator of water quality. The aquatic ecosystems are also ideal systems for studying various ecological functions. The study of these systems is not only fascinating but is highly important for human welfare and sustenance. The study includes biological features of Tungarly dam water. The main objective of the study was to know status of the water body, aquatic life and to make findings which would help in the successful management of the dam in future. The dam was constructed during British era 1930s. The study on algae are routinely carried out in ecological studies pertaining to biotic components of the aquatic ecosystems as a part of water pollution investigations and in biological waste water treatment plants. Algae serve as a very good indicator of pollution and have been used extensively for this purpose (Palmer 1969, Trivedy 1986). The freshwater algae mainly belong to the green algae (Chlorophyta), Blue green algae (Cyanophyta), the flagellates (Euglenophyta). The zooplankton in water mainly belongs to five taxonomic groups; the Protozoa, Rotifera, Cladocera They also indicate the trophic status of a water body. (Goel and Trivedy 1987).

**MATERIAL AND METHODS:****Water sample collection and analysis:**

Fortnightly samplings were carried out from Tungarly dam near Pune from February 2015 to January 2016. The sampling stations were chosen to cover the dam study. Water samples were collected at 60 cm depth; the water samples for biological studies were taken in plastic bottles. The water sample for plankton's study was preserved by using 4% formalin solution (Battish 1992) and examine in the laboratory under compound microscope using 10 X ocular and 10 X & 40 X objectives. The phytoplankton and zooplanktons were identified with the help of literature by (Fritsch 1979 and Tonapi 1980). For determination of planktons Lacky's drop method was used.

**Quantitative analysis:**

1. Lacky's (1938) drop method was followed for the quantitative analysis of plankton.
2. For collection of plankton sample the plankton net was used for collection of zooplankton.
3. Although a number of models are available the most common is a conical net with a bottle at the end is used for the present study.

**RESULTS:**

Algal bloom serves as a good indicator of pollution and have been used extensively for this purpose (Palmer 1969, Trivedy 1986). The phytoplankton's observed in Tungarly dam are the members from Cyanophyta, Chlorophyta Euglenophyta and Bacilariophyceae. The phytoplankton's observed are recorded in table no. I. It shows dominance of Cyanophyceae members. Next to Cyanophyceae members the Chlorophyceae members are represented by three genera their number in all the months is noticeable. The dominance of Cyanophycean members was found in the summer months March to May. Among the Cyanophycean members the genera *Scytonema*, *Microcystis* and *Rivularia* are dominant. In the month of September and October their number decrease while in the month of March to May their number found to be increased. Similar results of dominant number of occurrences also recorded in the Euglenophycean members. Among the Euglenophyceae the species *Euglena gracilis* was dominant. The maximum number of *Euglena gracilis* recorded in the month of April and May, and the minimum number recorded in the month of November. Among the Chlorophycean members the tree genera were recorded. The maximum number of Chlorophycean members recorded in the summer months March to May, their number decreased and minimum number were recorded in the month of October and November. The genera *Zygnema* show dominance among Chlorophycean members. The maximum number of *Zygnema* were recorded again in the month of April to May. The genera *Pediastrum* and *Scenedesmus* shows more or less similar pattern of occurrence in all the months of study. But their maximum number recorded again in the summer months of March to May and minimum number was recorded in the month of October. The Bacillariophyceae was represented by presence of two genera *Diatoms* and *Navicula*. Among these two genera the Diatoms shows dominance, the maximum number of diatoms were recorded in the month of December and their number decreased from December to October. The maximum number of *Navicula* species were recorded in the month of April and May and the minimum number were recorded in the month of September and October. The zooplankton in water mainly belongs to four taxonomic groups, the Rotifera, Cladocera, Cyclopid and Copepoda. They were abundant in the shallow areas of the reservoirs but only few species are abundant in open waters. The zooplanktons unlike phytoplankton were patchily distributed horizontally and vertically in an ecosystem. They also undergo diurnal vertical migration. They also indicate the trophic status of water body; their abundance increases in eutrophic waters. They are also sensitive to pollution and many species are recognized indicators of pollution.

The results of zooplankton analysis of Tungarly dam water are recorded in table no. II. The results recorded in table shows that among the five groups of fresh water zooplanktons the group Rotifera shows dominance in the Tungarly dam. The group Rotifera dominated by nine genera. The group Cladocera is the next group after Rotifera shows its dominant in the Tungarly dam water. The group Copepoda represented

by two genera, Ostracoda is represented by single genera. In the group Rotifera the *Filinia longiseta* is the most dominating organism among the Rotifers. The maximum number of Rotifers recorded in the summer month March to May. The group Cladocera represented by two genera *Daphnia* and *Bipertura* and shows more or less similar number of occurrences in all the months of study. Their maximum number also recorded in the summer months March to May. The group Ostracoda represented by single genera shows its occurrence in all the months of study. The group Copepoda represented by two genera Nauplius larvae and Cyclopes, among these Nauplius larvae shows its occurrence in some months as compared to Cyclopes which shows its occurrence in all the months of study of Tungarly dam water.

#### DISCUSSION:

In the present study the seasonal variations in the number of planktons was found to influence the dominance of different groups of phytoplankton, Pingale (1981) observed that the member of Chlorophyceae dominated the summer season. In the present study, the dominance pattern of Chlorophyceae group was observed. The members of Chlorophyceae, Bacillariophyceae, and Euglenophyceae were found to occur in higher percentage in the summer season months March to May. The percentage of different groups of plankton at different sampling stations also indicated the highest number of Cyanophyceae members. This observation does not agree with that of Munwar (1974) who observed similar dominance of Cyanophyceae in winter during his studies of ponds from the city of Hyderabad.

Muhammad Ali et al. (2005) recorded abundant phytoplankton compared to zooplanktons. Among the phytoplanktons, the members of Cyanophyta, Xanthophyta and Chlorophyta were present through out the study period from brackish water fish pond, Pakistan. These findings correlate with present study of Tungarly dam water sample. The zooplankton analysis of Tungarly dam water sample shows four groups of zooplankton community namely Rotifera, Cladocera, Ostracoda and Copepoda. The maximum number of Rotifera genera showed its dominance in Tungarly dam water. Maheshwari and Paulose (2006) worked on zooplankton diversity of Ramgarh lake, Jaipur, Rajasthan showed that zooplankton population was dominated by Copepoda (51%) and Cladocera (41%). In many other Indian waters also, Crustaceans (particularly Copepods) generally dominate (Mitra and Patra 1990; Shayam 1991; Vargese and Nail 1992). The result of present investigation shows more or less similarity with these results. Chowdhary and Mamun (2006) recorded zooplankton diversity and abundance were poor in the months of April and May but Cladocera *Daphnia* sp., *Rotiferon Brachionus* sp. and *Notholca* sp. Show ed highest abundance in these months. Maximum diversity and abundance of zooplanktons were recorded by them in the months of August and September from the fish pond in Khulna, Bangladesh. All the genera of Copepoda except *Cyclopes* sp. were recorded in the months of August, September and October. These findings although in good agreement with Islam et al. (2001) and Naz (1999) but do not agree with the present investigation on monthly zooplankton analysis of Tungarly dam water. Although there is exception many of these investigations show that the relationship between temporal variability of community level and species richness is negative (Loreau et al; 2002; Schimid, Joshi and Schlapfer 2002). This study provides further evidence that diversity may play an important role in maintaining the temporal stability of aggregate community measures. Thus, the present study of Tungarly dam shows that among the phytoplankton's the group Cyanophyta shows its dominant particularly in the month of summer, and among the zooplanktons the group Rotifera shows it's dominant.

**Table No. I- Number of Phytoplankton's per ml in Tungarly Damsamples recorded from February 2015 to January 2016.**

Sr. no.	Phytoplankton	Summer Season February 2017	Monsoon Season	Winter Season January 2018
	<b>Chlrophyceae</b>			
1	<i>Pediastrum simplex</i>	165	120	121
2	<i>Scenedesmus</i>	114	118	112
3	<i>Zygnema indica</i>	158	113	127
	<b>Euglenophyceae</b>			
1	<i>Euglena gracilis</i>	282	241	221
2	<i>Phacusaccuminatus</i>	107	99	119
	<b>Bacilariophyceae</b>			
1	<i>Diatoms sp.</i>	481	275	411
2	<i>Navicula sp.</i>	191	141	172
	<b>Cyanophyceae</b>			
1	<i>Microcystis robusta</i>	403	590	371
2	<i>Oscillatoria chlorine</i>	241	110	205
3	<i>Rivularia sp.</i>	307	105	191
4	<i>Anabaena sp.</i>	362	107	241
5	<i>Calothrix sp.</i>	199	142	151
6	<i>Scytonema crustaceum</i>	501	68	425

**Table No. II- Number of Zooplankton's per ml in Tungarly Dam water samples recorded from February 2015 to January 2016.**

Sr. no.	Zooplanktons	Summer Season February 2017	Monsoon Season	Winter Season January 2018
	<b>Rotifera</b>			
1	<i>Lecanecurvicornis</i>	711	311	511
2	<i>Brachionus sp.</i>	694	428	422
3	<i>Lepadella</i>	684	530	439
4	<i>Testudinella sp.</i>	772	412	552
5	<i>Filinalongiseta</i>	965	695	845
6	<i>Trichocera</i>	701	632	754
7	<i>Keratellacochlearis</i>	178	96	112
8	<i>Keratell sp.</i>	81	68	71
9	<i>Bdelloid sp.</i>	53	65	34
	<b>Cladocera</b>			
1	<i>Biperturaaffinis</i>	219	95	121
2	<i>Daphnia sp.</i>	198	109	139
	<b>Ostracoda</b>			
1	<i>Cypris sp.</i>	18	09	14
	<b>Copepoda</b>			
1	<i>Nauplius larvae</i>	21	31	2
2	<i>Cyclopes bicuspidatus</i>	34	21	10

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