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**ORIGINAL ARTICLE** 



#### STUDIES ON MONTHLY VARIATIONS OF BIOLOGICAL PARAMETERS OF GANESH POND, PUNE, MAHARASHTRA

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#### Abstract:

The monthly studies on Ganesh pond have shown that, Ganesh pond has a unique ecosystem and the pond considered as a slightly eutrophic pond. The phytoplankton analysis of Ganesh pond showed dominance of Cyanophycean members. Among Cyanophycean members the genera Microcystis was most dominant. Next to Cyanophycean the Chlorophycean members are found dominant. The zooplankton analysis of Ganesh pond showed the dominance of Rotifera. The Cladocera also recorded but their number is less than that of Rotifera. The group Ostracoda represented by single genera. In and around the Ganesh pond the aquatic macrophytes recorded belongs to angiosperms. The study presented here on Ganesh pond was designed to provide baseline data on the biological parameters of Ganesh pond. It is an initial study for Ganesh pond. The biological study of Ganesh pond showed that the pond is a natural ecosystem.

#### **KEYWORDS:**

Ganesh Pond,

#### **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 Km3 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. (Dodds 2002)

Ganesh Pond is located near Pune behind Akurdi railway station in the state Maharashtra, India; it is twenty five years old which was dug out near Durga Tekadi. 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 Ganesh pond. The main objective of the study was to know status of the pond water, aquatic life and to make findings which would help in the successful management of the pond in future. The area of Ganesh pond is about five acres and its depth is about nine to twelve feet.

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

Title : STUDIES ON MONTHLY VARIATIONS OF BIOLOGICAL PARAMETERS OF GANESH POND, PUNE, MAHARASHTRA Source:Indian Streams Research Journal [2230-7850] PATIL .B.V<sup>1</sup> , PATIL .V.A<sup>2</sup> AND INAMDAR .S. A<sup>3</sup> yr:2013 vol:3 iss:3



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 tropic status of a water body. (Goel and Trivedy 1987).

#### **MATERIALAND METHODS:-**

#### Water sample collection and analysis:

Fortnightly samplings were carried out from Ganesh Pond near Pune from November 2010 to October 2011. The sampling stations were chosen to cover the pond study. Water samples were collected at 60 cm depth; the water samples for biological studies were taken in plastic bottles. The water sample for planktons 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:

Lacky's (1938) drop method was followed for the quantitative analysis of plankton. For collection of plankton sample the plankton net was used for collection of zooplankton. 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:-**

Algae serve as a very good indicator of pollution and have been used extensively for this purpose (Palmer 1969, Trivedy 1986). The phytoplankton's observed in Ganesh pond are the members from Cyanophyta, Chlorophyta and Euglenophyta. The phytoplankton's observed are recorded in table no. I. It shows dominance of Cyanophyceae members. Next to Cyanophyceae members the Chlorophyceaen members are represented by two 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 Rivularia and Microcystis and Scytonema 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 occurrence 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. The frequent occurrence of Phacus accumiantus was observed in all the months of study. Among the Chlorophycean members the four 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 Oedogonium and Zygnema show dominance among Chlorophycean members. The maximum number of Oedogonium and 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's were patchily distributed horizontally and vertically in an ecosystem. They also undergo diurnal vertical migration. They also indicate the tropic 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 Ganesh pond 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

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dominance in the Ganesh pond. The group Rotifera dominated by six genera. The group Cladocera is the next group after Rotifera shows its dominant in the Ganesh pond 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 occurrence in all the months of study. Their maximum number also recorded in the summer months March to May. The group Ostracoda 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 Ganesh pond water.

#### **DISCUSSION:-**

In the present study the seasonal variations in the water temperatures 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 2011.

The percentage of different groups of plankton at different sampling stations also indicated the highest number of Cyanophyceae members. This observation do not agreed 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 phytoplankton's, the members of Cyanophyta, Xanthophyta and Chlorophyta were present throughout the study period from brackish water fish pond, Pakistan. These findings correlate with present study of Ganesh pond water sample.

The zooplankton analysis of Ganesh pond water sample shows four groups of zooplankton community namely Rotifera, Cladocera, Ostracoda and Copepoda. The maximum number of Rotifera genera showed its dominance in Ganesh pond 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 may 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 Cladoceron Daphnia sp., Rotiferon Brachionus sp. and Notholca sp. showed 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 Ganesh pond water.

Muhammad Ali et al. (2005) recorded protozoan in all months of study of brackish water fish pond Pakistan. Cladoceron was present in all months except in December. Rotifers were present only in three months that is July, August and September. The difference in results of present investigation with these results might be due to presence of predators in the pond water.

Thus it is possible that rare zooplankton taxa were missed in some samples, potentially confounding species richness effects with a sample size effect. A handful empirical study has examined the relationship between species diversity and ecosystem stability. Although there are 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 Ganesh pond 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.

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Table No. I- Number of Phytoplankton's per ml in Ganesh pond water sample recorded from November 2010 to October 2011

Sr.		Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.
no.	Phytop lan kton												
	Chlprophyceae												
1	Oedogonium sp.	191	175	181	195	201	221	228	185	171	152	162	182
2	Pediastum simplex	111	118	125	139	151	165	162	145	118	109	118	110
3	Scenedesmus	109	105	110	109	115	117	151	117	121	105	110	98
4	Zygnema indica	120	127	131	145	154	159	162	127	125	115	113	112
	Euglenophyceae												
1	Euglena gracilis	195	205	215	228	271	281	259	252	237	241	225	207
2	Phacus accuminatus	111	117	98	112	91	117	121	123	112	115	98	110
	Bacilariophyceae												
1	Diatoms sp.	301	492	432	402	381	384	387	362	371	273	275	177
2	Navicula sp.	152	167	195	181	175	178	170	171	169	158	141	132
	Cyanophyceae												
1	Microcystis robusta	312	3 50	362	375	402	480	302	334	405	474	432	340
2	Oscillatoria chlorine	109	151	192	205	234	240	51	260	109	110	121	97
3	Rivularia sp.	98	152	198	205	250	307	252	205	152	160	98	105
4	Anabaena sp.	188	210	241	250	267	362	381	202	198	171	102	122
5	Calothrix sp.	155	148	152	168	198	201	198	160	157	152	142	138
6	Scytonema crustace um	402	415	423	447	498	502	512	502	398	205	321	325
7	Gleocapsa sp.	41	57	68	85	100	91	110	105	91	87	62	50

Table No. II- Number of Zooplankton's per ml in Ganesh pond water sample recorded from November 2010 to October 2011

	Zooplankton	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.
	Rotifera												
1	Lecane curvicornis	535	514	511	663	677	765	789	607	512	402	454	552
2	Brachionus sp.	402	422	512	698	694	734	645	717	667	585	590	506
3	Lepadella	539	545	452	551	664	660	784	672	561	630	434	522
4	Testudinella sp.	552	661	542	555	672	786	762	653	649	523	510	545
5	Filinia longiseta	745	710	802	798	865	912	978	845	802	795	720	716
6	Trichocera	754	702	765	810	901	878	798	780	654	732	745	690
	Cladocera												
1	Bipertura affinis	121	139	126	134	198	291	264	251	132	134	142	128
2	Daphnia sp.	123	188	149	151	198	191	172	162	145	149	137	131
	Ostracoda												
1	Cypris sp.	12	10	09	07	15	23	18	16	09	07	02	04
	Copepoda												
1	Nauplius lavae	-	05	09	02	10	16	20	13	08	02	-	03
2	Cyclopes bicuspidatus	16	22	18	13	28	25	23	09	12	16	10	08



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