Comparative study on variation of plankton of macrophyte infested and non infested lakes from Thane city, Maharashtra.

Nayana S. Raut* and Madhuri K. Pejaver **

* Little Flower High School, Pokhran -2, Thane.

** Department of Zoology, B.N. Bandodkar College of Science, Thane – 400 601, Maharashtra, India.

Abstract : Life on earth is quite vivid. Every living being appears to be different with respect to appearance and mode of life and maintains its own identity. This leads to diversity and known as "Biodiversity". Aquatic macrophytes may contribute considerably to the productivity of lakes and play an important role in regulation of metabolism of aquatic ecosystem (Marshall and Westlake, 1978; Best 1982). Macrophyte infested Lake Ambeghosale (infested mainly with *Pistia stratiotes*) and noninfested lake Upvan were studied. These two lakes showed variation in observations. pH was alkaline in Lake Ambeghosale while Light penetration was more in non-infested lake Upavan, high nutrient values of PO_4-P (0.069-1.0052 mg/L), NO_3-N (0.1359 – 0.4500 mg/L) in Lake Ambeghosale compare to Lake Upavan PO_4 – P (0.0 – 0.196 mg/L), NO_3 – N (0.1070 – 0.2050 mg/L). Similarly difference in number of species of phytoplankton was observed in Lake Upavan and Lake Ambeghosale. Monthly variation of zooplankton showed maximum variation. Cladocera, Ostracoda showed variation in number while phytoplankton and zooplankton showed negative correlation with light penetration. Thus it can be seen that the infestation of Macrophytes bring changes in biodiversity of Lake.

Key words : Macrophyte, Plankton, Pollution.

Introduction

Water is one of the natural resource available in abundant in nature which man has exploited more than any other resources for the sustenance of Life. (Sultana and Sharief, 2004).

The water quality is of paramount importance in the distribution and abundance of organisms present in the water body. The fast deteriorating water quality world over, has put forth a serious problem for the existence of life in and outside water.

Aquatic weeds referred to, as macrophytes constitute an important component of an aquatic ecosystem. Macrophytes though providing a food source and refuge for aquatic animals may also increase diurnal variability of ecologically important physicochemical variables and inhibit mixing process that might improve habitat quality (Wilcock *et.al.*, 1999). According to Abubakar (2012) aquatic macrophytes when present in large abundance have the power of modifying the composition, abundance and distribution of other organisms in water body.

Among the two lakes studied one was infested with macrophytes while other was not. Hence these two lakes were undertaken for study.

Materials and Method

The two lakes namely Ambeghosale which was macrophyte infested and Upavan which was macrophyte non infested lake were selected.

The water samples, from these lakes were collected fortnightly; during the period of one year from October 2000 to September 2003, the data was pooled together and was represented annually. The physicochemical analysis of water samples was performed as per the procedures described in the Standard Methods APHA, (1981) and Trivedi and Goel (1984). The samples for phytoplankton and zooplankton were collected fortnightly and preserved in 4% Lugol's Iodine for further analysis. Macrophytes from Lake Ambeghosale were also collected fortnightly.

Results and Discussion

Aquatic macrophytes may contribute considerably to the productivity of lakes and play an important role in regulation of the metabolism of aquatic ecosystems. (Pieczynska, 1976).

During the present study Air temperature, water temperature, light penetration was more and pH was towards alkaline side in Lake Ambeghosale than Lake Upavan.

According to Wilcock *et.al.*, (1998) the weed chocked streams typically show wide diurnal variation in temperature and pH, extreme values of which can influence habitat suitability. The essential nutrients for algal growth are nitrates and phosphates. The nutrient concentration normally limits the growth and production of phytoplankton. (Bhaskar *et.al.*, 2009).

During the present study nutrients like silicates, phosphates and nitrates also showed variation in these two lakes. Higher range of Phosphates (0.069 – 1.0052 mg/l) and nitrates (0.1359 – 0.4500 mg/l) were recorded in Lake Ambeghosale while in Lake Upavan phosphates (0.0 – 0.196 mg/l) and nitrates (0.1070 – 0.2050 mg/l) were recorded. The presence of high concentration of phosphates in water may lead to pollution as it may accelerate plant growth. However Silicates showed higher range (16.67 – 82.17 mg/l) in Lake

Upavan compared to Lake Ambeghosale.

Productivity of lakes depends on the presence of plankton biomass. Enrichment of nutrients and dissolved matter in the water bodies affects diversity of plankton and also physico-chemical properties of water (Sawant and Telave, 2009). Macrophytes compete with phytoplankton for nutrient requirement and thus the presence of macrophytes may result in change in phytoplankton community.

During the present study macrophytes were reported in Lake Ambeghosale namely *Ipomoea acquatica, Lemna minor, Pistia stratiotes* which were also reported by Manipur and Sitre (2013) in Ghotnimbala Reservoir, Chandrapur.

During the present study 36 species of phytoplankton were identified belonging to 6 classes in Lake Ambeghosale while 32 species of 6 classes were recorded in Lake Upavan. Thus total species of phytoplankton were found more in macrophyte infested Lake Ambeghosale than non infested Lake Upavan. Due to pollution of infested lake is more compared to non infested lake. Plurosigma was observed only in Lake Upavan while Anabena. Euglena, Ulothrix, Zygnema, Amphora, Diatoma and Volvox colony were seen only in Lake Ambeghosale. The presence of phytoplankton in freshwater bodies is a widely accepted indicator of water quality (Sudeep *et.al.*, 2008).

Monthly variation of zooplankton is showing maximum variation. Cladocera was dominant in Lake Upavan while Ostracoda was in Lake Ambeghosale. Ganai *et.al.*, (2010) and Sukhija (2010) also reported presence of Protozoa, Rotifera, Cladocera, Copepoda in Wular Lake, Kashmir and Foy Sagar Lake, Ajmer respectively. Zooplankton showed negative correlation with light penetration in Lake Ambeghosale and with total solids with Lake Upavan. The species composition and abundance of zooplankton group varied from time to time and season and depends on limnological characteristics of the water body (Sukhija, 2010). Which was also observed in present study.

Thus, it can be seen that the phytoplankton and zooplankton vary in the macrophyte infested and non infested lakes.

Table - 1. Nutrients of Macrophyte infested and non infested lakes of Thane City.

		AT(^{0}C)	WT(^{0}C)	Salinity (mg/L)	PO_4-P (mg/L)	No_3-N (mg/L)	SiO_2-Si (mg/L)
Ambeghosale	Annual Average	26.6	24.8	0.054	0.662	0.0400	37.04
	Minimum	22.0	21.5	0.043	0.069	0.1359	7.92
	Maximum	33.5	28.0	0.064	1.005	0.4500	63.53
Upavan	Annual Average	27.6	25.0	0.033	0.058	0.0350	55.23
	Minimum	23.5	19.5	0.019	0.000	0.1070	16.67
	Maximum	33.5	31.5	0.052	0.196	0.2050	82.17

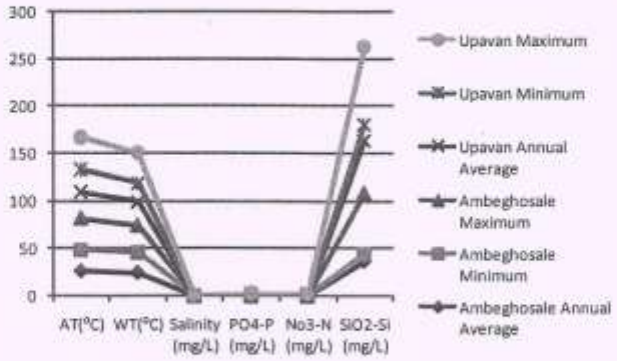

Fig. – 1. Nutrients of Macrophyte infested and non infested lakes of Thane City.

Table - 2. List of Phytoplankton

Class	Genus	Lake Ambeghosale	Lake Upavan
Chlorophyceae	*Chlamydomonas spp.*	P	P
	Chlorella spp.	P	P
	Coelastrum spp.	P	P
	Cosmarium spp.	P	P
	Crucigenia spp.	P	P
	Kirchinenilla spp.	P	P
	Koliella spp.	P	P
	Monoraphidium spp.	P	P
	Pediastrum spp.	P	P
	Scenedesmus spp.	P	P
	Spirogyra spp.	P	P
	Tetraedon spp.	P	P
	Tetrastrum spp.	P	P
	Ulothrix zonata	P	A
	Zygnema spp.	P	A
Cyanophyceae	*Chroococcus spp.*	A	P
	Gleocapside spp.	A	P
	Anabeana spiroides	P	A
	Gomphosypria spp.	P	P
	Merismopedia spp.	P	P
	Microcystis spp	P	P
	Oscillatroia spp.	P	P
Bacillariophyceae	*Amphora holsatrical*	P	A
	Cocconeis spp.	P	P
	Cyclotella spp.	P	P
	Diatoma spp.	P	P
	Fragilaria spp.	P	P
	Melosira spp.	P	P
	Navicula spp.	P	P
	Nitzschia spp.	P	P
	Pinnularia spp.	P	P
	Plurosigma spp.	A	P
	Synedra ulna	P	P
	Thalassiosira spp.	P	P
	Triceratium spp.	P	P
Euglenophyceae	*Euglena viridis*	P	A
	Phacus longicauda	P	P
Cryptophyceae	*Cryptomonas spp.*	P	P
Dinophyceae	*Glenodinium spp.*	P	P
	Volvox Colony	A	P

P = Present , A = Absent

Table -3. List of Zooplankton

Class	Lake Ambeghosale	Lake Upavan
Rotifera	P	P
Copepoda	P	P
Ostracoda	P	P
Caldocera	P	P
Nauplius	P	P
Bivalve	P	P
Eggs	P	P
Eggmass	P	P
Aqu. Insect	P	P
Polychate	P	A

Table – 4. Macrophytes present in Lake Ambeghosale

Plant's name	Habitat	Family
Ipomoea acquatica	Floating	Convolvulanceae
Lemna minor	Floating	Lemnaceae
Pistia stratiotes	Floating	Araceae

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