Volume : 2 | Issue : 6 | June 2013 • ISSN No 2277 - 8160

Research Paper Science

Plankton Diversity and Density in Ghuma Lake, Rural Area of Ahmedabad

Nikesh G. Kotadiya Research scholar JJT. Uni. Rajasthan

ABSTRACT

The present study was carried out on Ghuma lake of Ghuma village. Ghuma village is situated in Daskroi taluka of Ahmadabad district, Gujarat State. Ghuma is 16.4 km far from its district place Ahmadabad. Nearest town is Sanand and is 12.8 k.m. far from Ghuma village. Current population of Ghuma village is about 15000. Ghuma lake is situated on western side of the village.

The plankton were collected, counted and were identified by using the method suggested by APHA (1995) Prescott (1970) and FRESH WATER BIOLOGY (W. T. Edmondson-1959). The plankton were counted by using Sedgwick Rafter counting cell. Different class such as cyanophyceae, chlorophyceae, bacillariophyceae, euglenophyceae, cilliata, cledocera, copepod and specimens from phylum rotifera were identified during the study. Among all these classes the listed phytoplankton such as Oscillatoria Sp., Tetraedron Sp., Navicula sp., Nitzschia sp, Euglena Sp. and zooplankton such as Ceriodaphnia sp., Cyclops sp., Tropocyclops sp., Brachionus sp. and Platyias sp. were recorded as a dominant genera in Ghuma lake. The study was carried out monthly but was tabulated seasonally by using statistical method.

KEYWORDS: Ghuma Lake, Phytoplankton and Zooplankton

INTRODUCTION:

Ahmedabad is the largest city of the Gujarat state and is the 7th largest city of India. Today the city becomes the commercial capital of the Gujarat state. It has its own indefinable charm, combining many traditional elements and the latest international blend. The present city is divided by the river Sabarmati into two parts, eastern and western Ahmedabad. The Ghuma Lake of Ghuma village is located in the outskirts of the western part of Ahmedabad city. The Ghuma Lake is a natural lake and is located on the western part of Ghuma village. The sewage waste of Ghuma village is directly discharge into this Lake. The People of village also use this Lake to wash their cloths, take bath, sanitation, etc. The cattle of the villagers also take bath in this Lake. The Lake covers an area of 84479 m^2. Peripheral area of the lake is 466.22 m. and depth is 21 feet. Its exact geographical location is 23^0 01′ 57.32″ N Latitude and 72^0 26′ 56.15″ E Longitude.

MATERIALS AND METHODS:

The standard method suggested in APHA used for assessing water quality includes collection, counting and identification of phytoplankton and zooplankton. Plankton net number 25 of mesh size 20 µm was used for collecting samples. 50 liters of water was measured in a graduated bucket and filtered through the net and concentrated in a 100 ml bottle. Samples were collected as close to the water surface as possible in the morning hours. The samples were labeled with the date, time, and study area i.e. name of Lake and the volume measured and pasted on the containers. Plankton is preserved by using 4% formalin. The sample was allowed to settle for 24-48 hours and was further concentrated to approximately 30 ml by decanting. Sedgwick Rafter counting cell is used to count the plankton. Sedgwick Rafter cell is approximately 50 mm long, 20 mm wide and 1 mm deep. The total volume of the cell is 1 ml. A binocular compound microscope is used to count the plankton with different eyepieces such as 10X and 40X. The microscope is calibrated using an ocular micrometer. Formula to convert unit/ml of plankton into unit/liter is

$$n = \frac{(a \times 1000)\, c}{l}$$

Where,
n = Number of plankton / liter of water.
a = Average no. of plankton in one small counting chamber of S-R cell.
c = ml of plankton concentrate.
l = Volume of original water filtered in liter.

RESULTS AND DISCUSSION:

Plankton has long been used as indicator of water quality. Because of their short life spans, plankton responds quickly to environmental changes. They flourish both in highly eutrophic waters while a few others are very sensitive to organic and/or chemical wastes. Some species have also been associated with noxious blooms sometimes creating offensive tastes and odours or toxic conditions. Because of their short life cycles plankton respond quickly to environmental changes, and hence the standing crop and species composition indicate the quality of the water mass in which they are found.

In the present study 4 different genera of cyanophyceae class were recorded from the Lake. The blue green algae recorded in Ghuma Lakes are *Merismopedia sp., Nostoc sp., Oscillatoria sp., and Spirulina sp.* the minimum algal units were recorded during summer season where as maximu was recorded during winter season.

In Ghuma Lake 7 different genera of chlorophyceae class were recorded . In Ghuma Lake the algae recorded are *Closterium sp.,Closteriopsis sp., Coelastrum sp., Mugeotia sp., Spirogyra sp., Tetraedron sp., Scendesmus sp.,* the minimum value was recorded during summer season whereas maximum was recorded during monsoon season.

From the Ghuma Lake 7 different genera of bacillariophycea were recorded. In Ghuma Lake the diatom for bacillariophycea class recorded are *Cyclotella sp., Cymbella sp., Gomphonema sp., Gyrosigma sp., Navicula sp., and Nitzschia sp.,* The minimum unit of diatom were recorded during winter season whereas maximum unit of diatoms were recorded during summer season.

In the Lake 2 genera of euglenoids were recorded. The euglenoid recorded in the lake are *Euglena sp.* and *Phacus sp.* In Ghuma Lake the minimum units of euglenoids were recorded during summer season and maximum unit of euglenoids were recorded during summer season.

In Ghuma lake 2 genera of class ciliata were recorded. The ciliate recorded in the lake are *Pleuronema sp.* and *Strombidium sp.* and 2 genera of cladocera are Alona sp. and Ceriodaphnia sp. In Ghuma lake 5 genera of copepod, *Cyclops sp., Diacyclops sp., Diaptomus sp., Eucyclops sp.,* and *Tropocyclops sp.* were recorded. The minimum number of copepods were recorded during summer season whereas maximum unit of copepods were recorded during winter season.

In the lake 2 genera of phylum rotifer *Brachionus sp.* and *Platyas sp.* were recorded. The minimum number of rotifera were recorded during summer season whereas maximum unit of rotifer were recorded during monsoon season. Density of phytoplankton and zooplankton were mention in table -1 and 2. Season wise phytoplankton and zooplankton count were mention in fig. 1 and 2.

CONCLUSIONS:

Therefore from the above study it is concluded that the total phytoplankton count/ml. is more in summer season and basillariophyceae is dominant while total zooplankton count/ml. is more in winter season. Rotifer is dominant in Ghuma Lake. The total plankton count/ml. is minimum in monsoon season **256/ml** and maximum in summer season **360/ml**. (Table-1). This was proved by the above result as the

amounts of cyanophyceae algae and rotifera were found in Ghuma lake, which are indicator of pollution.

TABLE 1: SEASONAL VARIATION OF PHYTOPLANKTON IN GHUMA LAKE

PHYTOPLANKTON		SAMPLING SEASON		
CLASS	**GENERA**	**MONSOON MEAN**	**WINTER MEAN**	**SUMMER MEAN**
CHLOROPHY-CEAE				
	Closteriopsis Sp.	10	0	0
	Coelastrum Sp.	8	0	0
	Mugeotia sp.	0	14	8
	Pandorina Sp.	4	0	0
	Scenedesmus Sp.	0	0	2
	Spirogyra sp.	0	12	0
	Tetraedron Sp.	6	0	8
Total		**28**	**26**	**18**
CYANOPHY-CEAE				
	Merismopedia Sp.	4	0	0
	Nostoc Sp.	0	4	0
	Oscillatoria Sp.	14	24	0
	Spirulina Sp.	6	0	0
Total		**24**	**28**	**00**
BACILLARIO-PHYCEAE				
	Amphiplrura sp.	2	0	0
	Cyclotella sp.	2	0	2
	Cymbella Sp.	4	0	4
	Gomphonema Sp.	0	8	4
	Gyrosigma sp.	0	0	24
	Navicula Sp.	58	16	96
	Nitzschia sp.	22	20	78
Total		**88**	**44**	**208**
EUGLENOPHY-CEAE				
	Euglena acus	4	2	2
	Euglena gracilis	0	10	2
	Euglena Sp.	12	42	66
	Phacus sp.	2	2	00
Total		**18**	**56**	**70**
TOTAL PHYTOPLANKTON COUNT/ ML		**158**	**154**	**296**
TOTAL PHYTOPLANKTON COUNT/ L		**94800**	**92400**	**177600**

TABLE 2: SEASONAL VARIATION OF ZOOPLANKTON IN GHUMA LAKE

ZOOPLANKTON		SAMPLING SEASON		
GROUP	**GENERA**	**MONSOON MEAN**	**WINTER MEAN**	**SUMMER MEAN**
CILIATA				
	Pleuronema sp.	2	6	0
	Strombidium Sp.	2	0	0
Total		**04**	**06**	**00**
CLADOCERA				
	Alona sp.	0	0	6
	Ceriodaphnia sp.	16	28	32
Total		**16**	**28**	**38**
COPEPODA				
	Cyclops sp.	10	10	2
	Dicyclops sp.	0	10	0
	Diaptomus sp.	2	12	0
	Eucyclops sp.	4	8	0
	Tropocyclops sp.	4	12	6
Total		**20**	**52**	**08**
ROTIFERA				
	Brachionus sp.	56	4	14
	Platyias sp.	2	18	4
Total		**58**	**22**	**18**
TOTAL ZOOPLANKTON COUNT / ML		**98**	**108**	**64**
TOTAL ZOOPLANKTON COUNT / L		**58800**	**648000**	**38400**
TOTAL PLANKTON COUNT / ML		**256**	**262**	**360**
TOTAL PLANKTON COUNT / L		**153600**	**157200**	**216000**

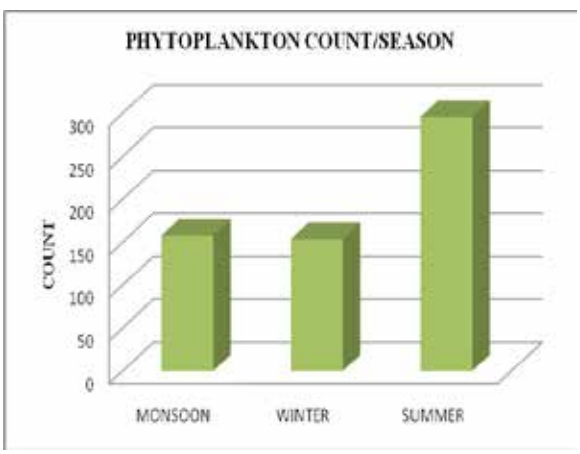

Fig. No.1 Season wise phytoplankton count

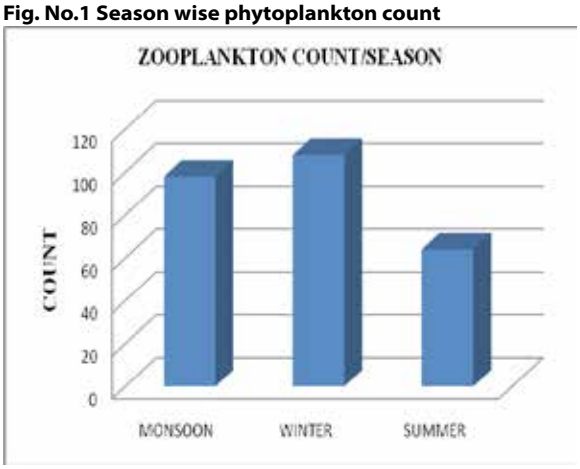

Fig. No2 Season wise zooplankton count

REFERENCES

1. APHA 1995. Standard methods for the examination of water and waste water. 19th Edition, American Public Health Association, American Water Work Association and Water Pollut. Contl. Federation, Washington, D.C., NewYork. | 2. A.K. Koorosh, Sadanand and K. Altaff 2008. Abudance Of Zooplankton in Thre Contrasating Lakes Of Mysor City Karnataka State. | 3. Battish S. K. Fresh water zooplankton of India. Oxford and IBH Pub. Co. New Delhi 1992. | 4. Chakrabarty R.D., Roy P. and Singh S.B. 1959. A quantitative study of plankton and physicochemical condition of river jamuna at Allahabad in 1945 to 1959. Indian Journal of Fisheries. 6(10): 186-203. De Lange E. 1994, Manual for Simple Water Quality Analysis. International Water Tribunal (IWT) Foundation : Amsterdam. | 5. Descy J.P., Servais P., Smitz J.S. , Billen G. and Everbecq E. 1987. Phytoplankton Biomass and production in the river Meeuse (Belgium) Wat. Res. 21, 12pp: 1557-1566. | 6. Dhakar M.L. 1979. Studies in some aspects of the hydrobiology of Indrasagar tank (South Rajasthan) Ph.D thesis, Uni. Of Udaipur, Udaipur. | 7. Edmondson, W. T. 1959. Fresh Water Biology. 2nd ed.Jhon wiley and sons. New York. New York 1248pp. | 8. Gawas A.D., Lokhande P.B. and Meijawas H.A. (2006): Study of Physico-Chemical Parameters of surface water in the Mahad Industrial Area. Poll Res. 25(1):109-114. | 9. Henry R., Tundisi J.G. and Curi P.R. (1984). Effect of phoisphorus and nitrogen enrichment on the phytoplankton in tropical reservoir, Hydrobiologia, 118 (2): 177-186. | 10. Jones F.H. and Barrington R.I. 1985. A study of the suspended algae in the river derwent. Derbyshire. U.K. Hydrobiologia, 128: 255-264. | 11. Kumar A. (1996). Comparitive study on diel variation of abiotic factor in lentic and lotic freshwaterecosystems of Santal Paragana (Bihar). J. Environ. Pollut. 3: 83-89. | 12. Lannineer J., Lea K. and Yrgana E.R. 1982. The role of nitrogen as a growth limiting factor in eutropic Lake Vesijavi. Souther finland, Hydrobiology, 87: 81-85. | 13. Munawar M. 1972. Ecological studies of eugleneae in certain polluted and unpolluted environments. Hydrobiologia. 39: 307-320. | 14. Munawar M. 1970. A limnological studies of fresh water ponds of Hyderabad, India -1. Journal of the Biotype Hydrobiologia, 35, pp. 127-162. | 15. Oemke D.V. and Burtan T.M. 1986. Diatom colonization dynamics in a lotic system. Hydrobiologia. 139: 153-166. | 16. Orhideja Tasevaka, Dafina Guseska 2010 Rotifer based Assessment Of The Lake Dojarn Water Quality. Hydrobiological Institute Ohrid, Macedonia. | 17. Paramsivam M. and Sreenivasan A. 1981. Changes in algal flora due to pollution in Cauvery river. Indian J. Environ. Hlth. 23(3) : 222-238. | 18. Plafkin J. L., M. T. Barbour, K. D. Porter, S. K. Gross, R.M. Hughes. 1989. Rapid Assessment Protocols for | 19. Use in Streams and Rivers : Benthic Macroinvertebrates and Fish. EPA: | 20. Prescott G.W. 1970. Algae of the western great Lakes areas. Pub Cranbrook Institute of science Bulletin. 33: 1-496. | 21. Rafter, G.W. 1900. The microscopical examination of potable waters. Van. Norstrand Co. | 22. Saad M. A. and Abbas M. H. 1985. Limnological investigations on the rosetta branch of the Nile II Phytoplankton, Freshwater Biol. 15: 661-669. | 23. Sarles W.B. 1961. Madisons Lake must Urbanisation destroy their beauty and productivity. Algae and Metropolitan wastes- Tr. Of the 1960 Seminar U.S. Dept. of Health Edu. and Welf: pp: 10-18. | 24. Sengar R.M.S. and Sharma K.D. 1982. Algal flora of Yamuna river at Agra: Chlorococcales Phykos 21: 164-165. | 25. Sharma N. 1983. Investigations on limnology of tank ecosystem near Allahabad with particular reference to the abundance and seasonal distribution pf plankton and benthos, Ph.D thesis, Sagar University, Sagar. | 26. Singh, S.R. and Swarup, K. 1979. Limnologicla studies of Saraha Lake (Ballia). II. The periodicity of phytoplankton. J. Ind. Bot.Soc. 58: 319-329 | 27. Subrahmanyam N. S. and A.V.S. Sambamurty. (2004): "Ecology" Narosa Publication | 28. Trivedy, R.K. 1993. Biomonitoring of water pollution in R.k. Trivedy edited, Encyclopedia of Envronmental pollution and Control Vol 1 and 2. Environ Media, Karad, India. | 29. Vyas L.N. 1968. Studies on phytoplankton ecology of picchola Lake. Udaipur proc. Symp. Recent Adv. Trop. Ecol.: 334-347.