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BIO-MONITORING IS THE MOST IMPORTANT TOOL FOR THE ASSESSMENT OF THE POLLUTION IN THE LENTIC WATER SYSTEMS OF KANPUR(DEHAT).

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Abstract-: Bio-monitoring is used to assess environment quality by observations on changes in the biological responses. Bio-monitoring is a valuable assessment technique which is used in water quality monitoring as well as for study of biological populations. In shallow waste water systems, planktons play an important role as primary producers.The present study on planktonic flora and fauna from the shallow waste water systems in Kanpur in relation to changes in chemical picture as it varies in different seasons of a the year. Phytoplanktons are photosynthetic and may contribute as much as 77% of total organic production. Bio-diversity of Phytoplanktons and Zooplanktons can be used to indicate chronic pollution problems. In the present study the diversity and population of planktons depend upon DO and DOM, the higher value of DOM indicated that the phytoplanktonic diversification had decreased and an increasing trend was observed in the population of the existing species.

Key - Words*: Planktons, Shallow waste water system, Biomonitoring, Lentic water system etc.*

INTRODUCTION- In shallow waste water systems, planktons play an important role as primary producers**.** A lot of work has been done in the field of physico - chemical analysis of lentic water systems. Mismanagement of natural resources and ever-increasing population has been responsible for many undesirable modifications to aquatic environments. Most of the freshwater systems are under the stress of urbanisation and industrialisation. The development of new environmental problems as a result of this has given rise to new ideas in the field of monitoring and assessment of aquatic ecosystems. The overall condition or picture of aquatic ecosystems is determined by the interaction of all its physical, chemical and biological components. Information on and understanding of environmental change is necessary to allow for the protection and remediation of ecosystems. Ecological assessment considering all components of the ecosystem helps in arriving at appropriate conservation strategies and restoration methods towards the conservation, management and sustainable use of natural resources.

Bio-monitoring is very useful and important tool in the present days as it is widely used to check the environmental quality of the medium by observations on changes in the biological responses. Bio-monitoring is a valuable assessment technique which is used in water quality monitoring as well as for the biological population.

Collection of water samples from the depth of about 25 cm. was done throughout the year for the analysis of biological & chemical spectrum of the shallow water systems. The present study based on variations in the population of planktons of the lentic water systems (Kanpur Dehat), in relation to changes in chemical picture as it varies with seasons.

With the seasonal variations, fluctuation in the population of Phyto-planktons & Zoo-planktons indicate the changes in water quality parameters. On the basis of the values of pH, magnesium & calcium (Mg, Ca), dissolve oxygen & dissolved oxygen matter (DO, DOM) indicate the pond is moderate polluted. The diversity and population of Planktons depend upon DO and DOM.

MATERIAL AND METHODS

This shallow pond is hypertrophic system situated in the central zone of Kanpur city, received rain waters and domestic waste water discharges. This is a permanent pond. Sunlight reaches all the way to the pond, so photosynthesis and growth of Phyto-planktons occur throughout the water and thus the growth or productivity is higher. For present study, water samples collected from the depth of 25 cm. Regular collection of water samples has been taken for one year. Chemical parameters are related to the solvent capabilities of water, concern in water-quality management. Some of the important physico-chemical parameters (pH, HCO_3, CO_3, Ca, Mg, Cl, DO, DOM), which are estimated in this study are discussed and given in table1.Biological methods used for assessing the water quality include the collection, counting and identification of the aquatic organisms (APHA,1985). Chemical data measure concentration of pollutants, etc. in the water body and the ecosystem imbalances are measured by biological information. Biological and chemical data are essential in understanding the ecosystem (Prasad B.N., Saxena M., 1980, Solanki and Pandit,2006).

Phytoplankton (microscopic algae) usually occur as unicellular, colonial or filamentous forms and is mostly photo synthetic and is grazed upon by the zooplankton occurring in the same environment (Tiseer *et al.*,2008, Shanthala, M., Shnankar P Hosmani and Basaling B Hosetti,2009). Plankton, particularly phytoplankton, has long been used as indicators of water quality. They flourish both in highly eutrophic waters while few others are very sensitive to organic and/or chemical wastes. Some species have also been associated with noxious blooms causing toxic conditions apart from the odor problems. Various steps have been taken for planktonic estimation. Plankton net, concentration technique, preservation of the sample and Counting method were used for observation.

The biological methods used for assessing water quality include collection, counting and identification of aquatic organisms and processing and interpretation of biological data.

Table.1 Monthly fluctuation in the concentration of the parameters of water quality under investigation for one year February,2019 to January,2020.

Months	Ph	HCO3	CO3	Ca	Mg	Cl	DO	DOM
February,2019	8.4	156.0	36.0	21.0	13.6	37.5	8.8	28.8
March,2019	8.5	174.0	22.2	36.0	46.0	28.6	8.0	34.9
April,2019	8.3	152.0	28.6	33.0	42.8	31.4	5.8	51.3
May,2019	8.6	146.0	35.6	23.2	49.6	42.3	4.7	56.0
June,2019	8.4	138.0	37.8	17.6	45.2	48.2	4.2	58.6
July,2019	7.8	188.0	26.4	28.2	22.3	35.6	5.4	48.7
August,2019	8.1	224.0	0	48.9	18.4	30.0	7.8	24.8
September,2019	8.3	208.0	0	46.6	25.0	34.6	6.6	39.6
October,2019	8.5	163.0	22.2	37.8	31.7	38.4	5.3	43.4
November,2019	8.7	156.0	0	0	43.6	25.1	4.1	52.5
December,2019	8.2	192.0	27.2	97.0	47.2	25.0	6.2	43.8
January,2020	8.4	183.0	29.1	30.2	39.1	27.9	4.2	51.2

*All quantities in mg/l except pH

*DOM as mg/l of oxygen equivalent

Table.2 Monthly fluctuation in Phytoplankton densities.

Months	Chlamydomonas intermedia	Euglena acus	Euglena polymorpha
February,2019	0	0	570
March,2019	0	0	1320
April,2019	0	250	2465
May,2019	0	2120	2760
June,2019	0	2580	1480
July,2019	2650	3740	0
August,2019	3200	1200	510
September,2019	5240	320	736
October,2019	280	1700	3550
November,2019	1120	3810	0
December,2019	660	1680	0
January,2020	880	0	0

* Plankton densities as number/millilitre

RESULTS AND DISCUSSION

Water samples collected from Pond was assessed for physico-chemical and biological parameters. Twelve samples were collected during the present study (Sankar, P., Jayaraman, P.R., and Gangadevi, T. 2002). Statistically computed results of chemical analysis have been given in tabular form (Tables 1 & 2).

Analysis of sample, were found to contain *Euglena* species as a dominant unicellular form of plankton population *Euglena acus* was the most dominant and frequent species, which was recorded in nine samples followed by *Euglena polymorpha*, which was found in eight samples. Some other species of *Euglena* were not dominant in nature and occurred in only for one or two months in a year. Another unicellular form like *Chlamydomonas intermedia* was also dominant species and recorded in seven samples.

This hypertrophic small shallow aquatic system received sewage and waste water effluents from domestic establishments. From these sources, continuous domestic discharges reaching to the water bodies. Materials both inorganic and organic mix with the water bodies. With the result of microbial degradation of waste nutrients like inorganic and organic nitrogen, phosphorus and carbon dioxide increase in water, by which rapid growth of several species of planktons as well as organism take place (P.R., and Gangadevi, T., 2002, Bahura C.K. ,2001). It almost invariably growth of certain algae and a raised biological demand (Seenayya and Zafar,1981). If we compare the analysis with studies of other workers at other places, it shows that observed pond under present investigation, represents a relatively moderately polluted system (Das,2002; Dwivedi & Pandey,2001,2002 and Nair, 2000).

On the basis of statistical analysis of chemical parameters and plankton populations, the winter form, *Chlamydomonas intermedia* was found positively co-related with dissolved oxygen content and negative co-relation with dissolved organic matter. Another way, *Euglena acus* and *Euglena polymorpha* were showed positive co-relation with dissolved organic matter and negative co-relation with dissolved oxygen content.

The present analysis, which include a permanent lentic water system and cover a period of one year (February,2019 toJanuary,2020), shows the following features:

PHYTOPLANKTON DENSITIES OF POLLUTED WATER BODY-

1. The pond under observation represents moderate polluted system, in which concentration of some parameters are high but some parameters of water quality are moderate. The fluctuations in plankton population were affected by these concentrations, as these are replenished by inflow of waste water effluent from surrounding areas. Most of the mineral are present in much concentration than are required for the growth of the autotrophic populations.
2. Being shallow water body, this pond has a large surface area as compared to the total volume of water. This results in enough dissolution of oxygen from air while light is available to the sub-surface autotrophs to generate oxygen by photosynthesis.
3. General pattern of fluctuation of plankton diversity are based upon DO and DOM, as both the parameters are negatively co-related (DO ά 1/DOM). As the value of DOM rises population of phytoplanktons goes up, but the diversity decreases.
4. *Chlamydomonas intermedia* form occurs 7 times(months) in a year.
5. *Euglena acus* form occurs 9times(months) in a year.
6. *Euglena polymorpha* form occurs 8times(months) in a year.
7. *Chlamydomonas intermedia* is the form, which usually appear immediately after rains and usually persist throughout the winters.
8. *Euglena acus* and *Euglena polymorpha*, both are the summer forms, which make algal bloom.

REFERENCES

APHA (1985), *Standard methods for the examination of water and waste waters*. 16th edn. New York.

Bahura C.K.(2001), Phytoplanktonic community of a highly eutrophicated temple tank,Bikaner,Rajasthan**.** *J. Aqua. Biol***.16**:1-4.

Das S.K.,(2002), Primary production and zooplankton biodiversity in brackish water shrimp culture pond, *J. Ecobiol*.,**14**(4):267-271.

Dwivedi, B. K. and Pandey G. C., (2001), Seasonal dynamics of cyanobacterial toxin-producing algal species of two water ponds, *Aquacult.*, **2**: 141-146.

Dwivedi, B. K. and Pandey G.

C., (2002), Physico-chemical factors and algal diversity of two ponds (Girija and Maqbara), Faizabad. *Poll. Res.*, **21**: 361-370.

Shanthala, M., Shnankar P Hosmani and Basaling B Hosetti, (2009). *Diversity of phytoplanktons in a waste stabilization pond at Shimoga Town, Karnataka,India.Environmental Monitoring and Assessment* ,151(1),437-443

Nair, M.S., (2000), *J. Eco Biol.*, **12(1)**: 21-27.

Prasad B.N., Saxena M., (1980), Ecological studies the blue-green algae in river Gomati. *Ind. J. Environ. Hlth*., **22**(2):151-168.

P.R., and Gangadevi, T., (2002), *Studies on the Hydrography of a lotic Ecosystem – Killiar at Thiruvananthapuram, Kerala, India. Poll Res.* **21**(2): 113-121.

Sankar, P., Jayaraman, P.R., and Gangadevi, T. (2002), *Studies on the Hydrography of a lotic Ecosystem – Killiar at Thiruvananthapuram, Kerala, India. Poll Res.* **21**(2): 113-121.

Seenayya and Zafar (1981), Algal bloom patterns indicating organic pollution. In: *Biological indicaters of indices of environmental pollution*.Proceedings of the workshops at Osmania University, Hyderabad.

Solanki, H. A. and Pandit, B. R. (2006), *Int. J. of Bioscience Reporter*, **4(1)**: 191-198.

Tiseer, F. A., Tanimu, Y. and Chia, A.M. (2008), *Asian J. Earth Sci.*, **1**: 31-37.


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