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AN EVALUATION OF ALGAL FLORA AS BIOINDICATOR OF FUTALA LAKE

Rajendra N. Deshmukh
Dept. of Botany Shivaji Science College, Nagpur
Email: rn.deshmukh1964@gmail.com

ABSTRACT:

Algae in aquatic environment are crucial component of biological monitoring programs for analyzing water quality. Microscopic evaluation of water samples collected from lakes, streams and other water bodies determines the diversity and density of algal species and provides useful early signs of devastating conditions. The samples were collected from Futala Lake, of Nagpur city. Some parameters were measured such as: Temperature, pH, dissolve Oxygen and Phosphate. Laboratory microscopic evaluation techniques, which reveals the composition and density of the algal flora present in a water body are important part of monitoring programs and is valuable in identifying diverse trophic conditions. The populations and species diversity of green algae, flagellates and diatoms reflect different trophic conditions and are important indicators for monitoring water quality. All reading before treatment is very high but the readings changed rapidly after treatment. In opposite, oxygen concentration before treatment was low and increased after treatment so much until reaches to the optimal condition for all biological and chemical properties.

Keywords: *Algae; Bio Indicator; Discharge; Futala lake; Nagpur.*

INTRODUCTION:

Water pollution has become one of the most important environmental problems. Polluted water can deteriorate water quality thus restrict the use of water bodies for many purposes. In urban area, water pollution problems always influence the biological imbalance both qualitatively and quantitatively. Bio-indicators are taxa or groups of organisms that show signs that they are affected with environmental pressure because of human activities or the destruction of biotic system. The major groups of organisms that have been used as indicators of environmental pollution include bacteria, fungi, algae, higher plants and aquatic animals. Algae, a vital group of bacteria and plants in aquatic ecosystems and its important components of biological monitoring programs for evaluating water quality. They are appropriate for various water quality assessment processes because of their nutrient needs, fast reproduction rate and short life cycle. Algae are important indicators of ecosystem because they respond quickly both in species composition and densities to a wide range of water conditions due to changes in water composition. For example, increase in water acidity due to acid-forming chemicals that influence Lake PH levels, as well as heavy metals discharged from industrial areas affect the composition of genera that are able to tolerate these conditions. Bio- indicator organisms can be any biological species or agents that define a characteristics of the environment. Algae are known to be good indicators of pollution of many types for the following reasons: (i) Algae have wide temporal and spatial distribution (ii) many algal species are available through the year (iii) response quickly to the charges in the environment due to pollution (iv) Algae are diverse group of organisms found in large quantities (v) esey to detect and sample (vi) algae are correlated with particular type of pollution particularly to organic pollution. Evaluation of algal biomass is very common in many lake studies and may be important in studies that address nutrient enrichment or toxicity. High nutrient concentrations can affect recreational activities when the nutrients produce dense growths of aquatic vegetation, which are aesthetically unwanted .

MATERIALS AND METHODS

An analysis of various aquatic algae and acting as indicator of water pollution was carried out and an account of most pollution tolerant genera and species was included in the results. Phytoplankton samples were collected according to the method given by *Sournia* in by a phytoplankton's net (20 µm pores diameter), put it reversed to the water flow and pulled out finally

collected the contents in a clean sample bottles which used to identify phytoplankton. For preservation, five drops of Lugol's solution were added. Measurements of temperature, pH, and dissolved oxygen were performed in the field, while phosphate was done in a laboratory by using ascorbic acid method. All the parameters were done according to APHA.

Algal species was identified by using a compound microscope. non-diatom were identified by preparing a temporary slides at low magnification, while diatom were identified by preparing a permanent slides at high magnification after clear or remove the organic matters in the cell by using Nitric acid and the identification of species made according to the references. Sedimentation method was used to count phytoplankton cell by using counting chambers.

RESULTS AND DISCUSSION:

Table 1 illustrates the physical and chemical Characteristics of the Sample, where all reading before treatment is very high but the readings lowers rapidly after treatment. In contrast oxygen concentration before treatment are low yet elevated after treatment so much to reach the optimal condition for all biological and chemical properties. This readings (before and after) indicate the efficiencies of treatment process in the effluent.

Many types of Algae are good indicators to assess the water quality and are characterized based on their dominant phytoplankton groups. In this study different species of algae were recorded out of which more than 10 species were reported, the dominant group by the large number of species is Bacillarariophyce (7 species) followed by Cyanophyceae (2 species), Chlorophayceae (2 species), Euglenophyceae (1species) table 2.

Obviously, table (2) indicates the increasing of total number of algae that's return to improving of quality of the waste water and therefore it can support the growth of algae, whereas increasing of the pennals group can prove that's, because this particular group can exist in a clean water, In contrast of Centrales group represented by *Cyclotella sp.* exist in polluted water showed in table (2) revealed that the number of *Centrales* before treatment are higher than after the treatment process.

A list of more than 850 algal groups were published based on the reports of considerable number of authors. According to which, many algal groups have species that grow in water containing a high concentration of organic wastes. Including species recorded in this study like; Green algae *Chlamydomonas, Euglena*, Diatoms, *Navicula, Synedra* and blue-green algae *Oscillatoria* are emphasized to tolerate organic pollution, *Scenedesmus quadricauda* appear in water rich with organic. *Nitzschia* sp.always appear to be dominant in the mild pollution zone *Navicula* is stressed to be a good indicator of organic pollution as the species comfortably grow in the most heavily affected zones in which other species cannot grow.

Euglena viridis (Euglenophyta), *Nitzschi sp.* (Bacillariophyta), *Oscillatoria sp.* (Cyanophyta) (table3) are reported to be present than any other species in organically polluted waters sample.

Form table (2) it is clear that high number of cyanophyta in both site (before and after) with regards to the number after the treatment is lower than before treatment but still the occurrence of this group at any number its conceder an environmental problem, where high densities of this group are an undesirable component of freshwater ecosystems because they can produce hepatotoxins and neurotoxins that are ecological and public health concerns as a result to discharging of this effluents into the lake. Toxic algal blooms can also restrict activities like swimming, fishing and pet-related activities.

CONCLUSION :

In the present paper work, we try to investigate on the biological effect of effluent on Futala lake. The result elucidate that's these effluents have a diverse species of algae. Cyanophyceae and Centrales group dominant in wastes Before Treatment where this two group represent the undesired water condition, in other side Chlorophyeae and Pennales group dominant in wastes after Treatment where this two group represent the desired water condition, all species we find in this research eventually tack place in the water of Futala lake and affect the biodiversity.

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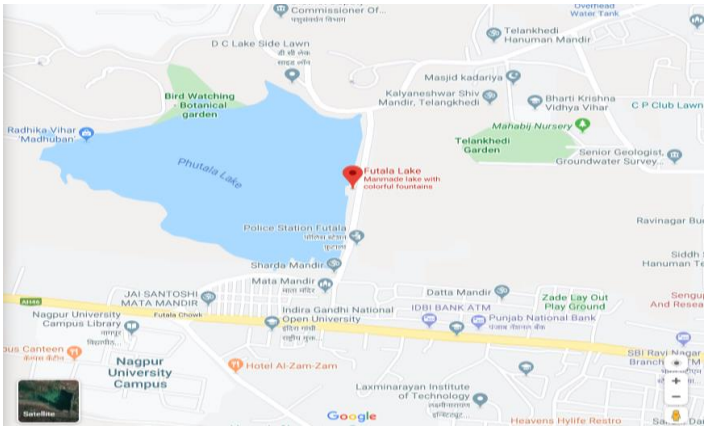

Figure 1: Map of Futala Lake illustrating Study Site

Table 1: physical and chemical Characteristics of the Samples				
PARAMETER				
Samples	Temperature,	pH	Dissolve Oxygen (DO),	PO4
	C°		mg/1	mg/1
Before	20.8	9.6	0.38	3.1
After	19.1	7.8	10.2	0.6

Table 2: Total Number of Cell (Individual/L)		
Phytoplankton	Before Treatment	After Treatment
Cyanophyta	989	749
Chlorophyta	59	221
Euglenophyceae	7	20
Centrales	174	59
Pennales	111	3152
Total Number	1340	4201

Table 3: list of identified algae during the study

Taxa	**before**	**after**
Cyanophyceae		
• *Chroococcus limneticus*	-	+
• *Oscillatoria* sp.	**+**	**+**
Chlorophyeae		
• *Chlamydomonas sp.*	-	+
• *Scenedsmusacuminatus*(Lag.) Chodat	-	**+**
Euglenophyeae		
• *Euglena viridis*	-	+
Bacilariophyceae		
Centrales		
• *Cyclotella sp.*	**+**	-
Pennales		
• *Cymbella* sp.	+	-
• *Fragilaria bicapitata*	-	+
• *Fragilaria sp.*	**+**	-
• *Navicula atoms*	**+**	-
• *Navicula.* sp	**+**	**+**
• *Nitzschia* sp.	-	+