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Assessment of water quality in Dharmasamudram lake, Jagtial, Telangana

Padala Thirupathi[1], A Rajani[2], Rajendher[1], A Kavitha[2], T Christopher Reuben[3]
[1] Research Scholar, Department of Botany, Kakatiya University, Warangal, Telangana, India
[2] Assistant Professor, Department of Botany, RBVRR College, Narayanguda, Hyderabad, Telangana, India
[3] Dean, Department of Biotechnology, Faculty of Science, Commerce and Engineering Technology, Chaitanya Deemed to be University, Warangal, Telangana India

Abstract
In the present study to study the Assessment of water quality in Dharmasamudram lake, Jagtial, Telangana. Dharmasamudram lake is located in Jagtial, Telangana. The lake is popular for supply of drinking water to Jagtial town. Jagtial is a city and the district headquarters Jagtial district of Telangana, India. It has an average elevation of 293 meters. In the lake three groups of algae were recorded i.e., Chlorophyceae, Bacillariophyceae and Cyanophyceae. Among the three groups of algae Bacillariophyceae dominated over the other groups of algae, followed by Chlorophyceae. The results of various physico - chemical factors were compared with WHO and ISI Standards. All the physico - chemical parameters are well below the permissible limits.

Keywords: Dharmasamudram lake, physico-chemical parameters and algae

Introduction

A lake is a sizable water body surrounded by land and fed by rivers, springs, or local precipitation. A lake's structure has a significant impact on its biological, chemical, and physical features. Lakes can be classified on the basis of a variety of features, including their formation and their chemical or biological condition, as oligotrophic and eutrophic (Sandhya, 2011). Oligotrophic lakes are characterized by relatively low productivity and are dominated by cold-water bottom fishes such as lake trout (Mishra *et al*, 2007) [6]. Eutrophic lakes, which are relatively shallower, are more productive and are dominated by warm-water fishes such as bass (Deeksha Dave, 2011) [2]. Natural processes of lake formation most commonly include glacial, volcanic, and tectonic forces while human constructed lakes are created by reservoirs or excavation of basins (Kumar and Rai 2005). Water quality refers to the chemical, physical, biological, and radiological characteristics of water (Hosmani, 2002) [3]. It is a measure of the condition of water relative to the requirements of one or more biotic species and or to any human need or purpose.

Material and Methods

Dharmasamudram lake is located in Jagtial, Telangana. The lake is popular for supply of drinking water to Jagtial town. Jagtial is a city and the district headquarters Jagtial district of Telangana, India. It has an average elevation of 293 meters (961 ft). It is located about 190 kilometres (118 mi) north of the state capital Hyderabad. Water samples were collected in separate 250 ml glass bottles (BOD bottles) for the estimation of dissolved oxygen. All the samples were carried to the laboratory. The samples were analyzed on the same day for different physico--chemical factors following the standard methods (APHA, 1995) [1].

Three sampling stations were selected from the lake and are characterized as follows. Station I is located at the right side of the lake. Station II is situated at the left side of the lake and Station III is located 200 meter after station II.

Surface water samples for phytoplankton were collected from the 3 sampling stations for a period of 1 year from June 2019 to May 2020. One liter of the sample was kept in sedimentation columns after adding 4% Formaldehyde solution. The samples were kept in dark undisturbed for about fifteen days for complete settling of the organisms. Finally the sample was concentrated to 100 ml (Pearsall, 1946 and Venkateswarlu, 1969b) [8, 11].

Results and Discussion

The physico- chemical characteristics exhibited certain interrelationships. The pH and carbonates are directly correlated. The pH and carbonates are inversely proportional to bicarbonates. Chlorides showed an inverse correlation with carbonates (Veerandra *et al*, 2006) [10]. Dissolved oxygen shows an inverse correlation with organic matter and biological oxygen demand. The total hardness negatively correlated with carbonates. Sulphates and phosphates showed positive correlation with chlorides (Mahananda *et al*, 2005) [5]. Nitrates showed positive correlation with carbonates, bicarbonates, calcium and negatively correlated with total dissolved solids.

Temperature, organic matter, phosphates and nitrates are influenced the growth of Cyanophyceae. Whereas the Chlorophyceae was influenced by temperature and oxygen. Silicates and oxygen are responsible for the growth of diatoms (Murugesan and Sivasubramanian, 2008) [7]. In Dharmasamudram lake three groups of algae were recorded i.e, Chlorophyceae, Bacillariophyceae and Cyanophyceae.

Among the four groups of algae Bacillariophyceae dominated over the other groups of algae, followed by Chlorophyceae. The

diatoms were represents high in number (Table - 2). In general the Bacillariophyceae constituted the high peaks during winter and Cyanophyceae in summer. Chlorophyceaee dominant in early summer. Bacillariophyceae constituted 79.69% at station-I, 82.07% at station-II and 78.95% at station-III. Chlorophyceae constituted 14.00% at station-I, 12.37% at station-II and 14.38% at station-III and Cyanophyceae constituted 6.31% at station-I, 5.56% at station-II and 6.67% at station-III. Bacillariophyceae is one of the most significant groups. This constitutes *Cyclotella, Navicula and Nitzschia*.

The abundance Chlorophyceae is mainly due to the presence of *Chlorella vulgaries, Coelastrum, Scenedesmus, Eudorina and Pandorina* The Cyanophyceae population has been represented primarily by the species of *Oscillatoria, Merismopedia, Microcystis, Chroococcus and Arthrospira.*

Table 1: Comparison of the present data with Isi and who and standards

Parameters	Station-I	Station-II	Station-III	ISI 1991	WHO 1971
pH	8.25	8.20	8.18	6.5 -8.5	6.5-8.5
CO_3^{2-}	27.30	24.13	22.62	.	.
HCO_3^-	213.14	217.63	216.68	.	.
Cl^-	164.95	115.99	165.72	.	250 mg/L
DO	4.90	5.10	4.95	6 mg/L	3 mg/L
OM	2.2	4.2	2.05	.	.
TH	229.27	230.08	230.94	300 mg/L	300 mg/L
Ca^{2+}	59.15	52.46	62.13	200 mg/L	75 mg/L
Mg^{2+}	47.14	40.78	41.21	75 mg/L	30 mg/L
PO_4^{3-}	0.6	0.8	0.7	.	.
NO_2^-	0.028	0.020	0.025		
NO_3^-	1.80	1.25	1.20	45 mg/L	.
SiO_2	43.00	38.00	33.00	-	-

Table 2: Percentage of Phytoplankton

Groups	Station-I	Station-II	Station-III
Bacillariophyceae	79.69	82.07	78.95
Chlorophyceae	14	12.37	14.38
Cyanophyceae	6.31	5.56	6.67

Conclusions

The water was alkaline in lake. Carbonates and dissolved oxygen were recorded in high concentration. Organic matter, COD, phosphates and nitrates were recorded in low concentration. pH, dissolved oxygen, organic matter, phosphates, nitrates influenced the growth of Cyanophyceae. Bacillariophyceae influenced by silicates and dissolved oxygen. The results of various physico - chemical factors were compared with WHO and ISI Standards (Table - 1). All the physico - chemical parameters are well below the permissible limits. Hence on the basis of both physico-chemical and biological parameters the lake water is clean and unpolluted. From the foregoing account it can be concluded that the lake is oligotrophic and the water is used for the drinking and agricultural purpose.

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