

Ecological Studies of Bhadrakali Lake Water with Reference to Its Physico-Chemical Aspects

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ABSTRACT

Article Info

Volume 8, Issue 1

Page Number : 27-30

Publication Issue :

January-February-2023

Article History

Accepted : 03 Feb 2023

Published : 25 Feb 2023

The present investigation is based on various physico-chemical characteristics of Bhadrakali Lake. The study indicates clearly that the lake is highly polluted. The major source of pollution is Sewage of Warangal City and industrial wastes of surroundings in to the lake.

Keywords: Bhadrakali Lake, Water Pollution, Dissolved Oxygen (D.O), Warangal Municipal Corporation (WMC)

I. INTRODUCTION

Warangal is a Historical City known as city of lakes as a large number of lakes are located in and around Warangal. These lakes are not only the beauty spots and tourists attraction but are also the source of drinking and irrigation water. A huge amount of undesirable elements are constantly being added. Bhadrakali lake is one of the important source of water supply for Warangal Municipal Corporation. The lake is getting polluted by the drainage of Warangal, Hanamkonda which carries the sewage and industrial wastes of Industrial Estate. Deterioration of water quality and interruption in industrial water supply are matters of great concern to the authorities. Purely physico-chemical investigations in lentic and lotic waters in India have been made by several workers such as Purohit & Singh¹, Patil et al.² Patra & Nayak³.

The present investigation was undertaken to study certain physico-chemical characteristics of water in relation to water pollution and nutrient status of Bhadrakali lake.

II. METHODS AND MATERIAL

All the chemicals used are of Analar Grade. The water samples were collected during the morning hours. Investigations are carried out by standard methods (APHA)⁴ and Mackereth⁵ were followed for the evaluation of results.

III. RESULTS AND DISCUSSION

The Data on Physico-chemical characteristics of Bhadrakali lake for the year 2010 and 2011 are presented in Tables 1 and 2 respectively. Temperature is one of the most important factors in an aquatic environment⁶ and no other single factor has so many

profound influence and so many direct and indirect effects.⁷ Hence, it has been investigated by almost all the limnologists. Observations on seasonal fluctuation in water and air temperatures suggest that there exists an intimate relationship between air and water temperatures, since both of them exhibit a similar pattern in regard to their fluctuation.

The lower transparency during summer and rainy seasons and higher transparency during colder seasons have been reported by Pandey & Pandey⁸ indicates very clearly the high level of turbidity of lake water, especially during summer and early monsoon period. pH plays an important role in aquatic systems, especially when some other factors are in an unfavourable range. This single parameter can explain many of the limnological properties. The lake water was sufficiently alkaline both the year, viz. 2010 and 2011. A slight decline in pH in rainy season is due to dilution by rain water.

Limnologist can probably learn more about the nature of a lake from a series of oxygen determination than from any other kind of chemical data.⁹ The higher concentration of DO in winter was probably due to the fact that conditions during winter was probably due to the fact that conditions during winter are more favourable for higher photosynthesis. The lower value of DO during summer explains its quick utilization in the oxidation processes of the lake.

According to Vallentyne¹⁰ dissolved organic matter in water may be considered as a dilute soil extract, consisting largely of humic, non-humic and many other organic compounds of known biological importance. This is in accordance with the observations of Singh¹¹ and Zafar¹² who attributed the higher concentrations during summer to the accelerated rate of bacterial decomposition and during monsoon to the surface runoff. Most probably, the same was true for Bhadrakali.

Carbon dioxide is more soluble in water than oxygen and nitrogen. It forms the compound carbonic acid (H_2CO_3) with water, and this acid ionizes to a small extent. A study of the carbon dioxide content of lake water is, therefore of great importance in understanding the hydrogen ion concentration of water.

High concentration of phosphate in surface like water was observed during the rainy season. This is probably due to the incoming rainwater, which contains all types of sewage and other rubbish matter including agricultural waste which empty into the Bhadrakali lake. The importance of the inflow of phosphate content through the catchment area during the rainy season has been emphasized by Vyas & Kumar¹³ and Verma & Shukla¹⁴, who have also reported high concentration of phosphates during the rainy season.

Studies of Sylvester,¹⁵ the domestic sewage is mainly responsible for greater concentration of nitrates in freshwater bodies. Hem¹⁶ pointed out that the use of soil fertilizers in the agricultural farms around lakes may add large amounts of nitrates to the water. Maximum concentration of nitrate during the rainy season has been proposed by Vyas & Kumar.

The present study reveals that Bhadrakali lake is highly polluted as indicated by a large accumulation of soluble organic matter, and the higher values of nitrates and phosphates during the rainy season.

ACKNOWLEDGEMENT

The author is highly thankful to Mr. Abdhul Hakeem, Babloo Bhaiyya, Mummy Hakeem, Bobby Hakeem and all other family members of Vana Vaibhav Shikshan Mandal, Aheri, Dist. Gadchiroli, Maharashtra State. Author also expresses his deepest gratitude to Dr. R.P.Dhabre, Principal C.V.Raman Science College, Sironcha, Dist. Gadchiroli, Maharashtra State.

ECOLOGICAL STUDIES OF BHADRAKALI LAKE

Table-1: Studies performed during the year 2010.

Sl No	Property	Summer (April-July)	Rainy (Aug.-Oct.)	Winter (Nov.-March)
1	Temperature (°C) (a) Air (b) Water	29.52 27.01	28.05 26.01	20.24 18.82
2	Dissolved Organic matter (mg/L)	13.95	16.99	8.02
3	D.O. (mg/L)	4.01	7.9	10.65
4	Acidity (mg/L)	5.14	4.01	Nil
5	Nitrate (ppm)	0.39	0.68	0.57
6	Transparency (m)	0.35	0.35	0.81
7	pH	8.61	8.01	8.54
8	Free CO ₂ (mg/L)	4.51	3.54	Nil
9	Phosphate (mg/L)	0.40	0.72	0.44

Table-2: Studies performed during the year 2011.

Sl No	Property	Summer (April-July)	Rainy (Aug.-Oct.)	Winter (Nov.-March)
1	Temperature (°C) (a) Air (b) Water	30.02 27.52	28.70 27.11	20.48 19.03
2	Dissolved Organic matter (mg/L)	6.92	6.60	6.58
3	D.O. (mg/L)	4.16	5.50	5.62
4	Acidity (mg/L)	2.08	3.41	0.32
5	Nitrate (ppm)	0.41	0.71	0.56
6	Transparency (m)	0.44	0.45	0.87
7	pH	8.58	7.98	8.52
8	Free CO ₂ (mg/L)	1.80	3.14	0.24
9	Phosphate (mg/L)	0.42	0.81	0.46

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Cite this article as :

Dr. A. V. Kantha Rao, "Ecological Studies of Bhadrakali Lake Water with Reference to Its Physico-Chemical Aspects ", International Journal of Scientific Research in Chemistry (IJSRCH), ISSN : 2456-8457, Volume 8, Issue 1, pp.27-30, January-February.2023
URL : <https://ijsrch.com/IJSRCH22761>