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Comparative Study of Physico-Chemical Parameters in Saroornagar Lake and Ramanthapur Pedda Cheruvu

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ABSTRACT

The present paper deals with the comparison of physico-chemical parameters in Saroornagar lake and Ramanthapur Pedda Cheruvu. Various physico-chemical parameters Were analyzed in both lakes. Chlorides, Total hardness, biological oxygen demand, chemical oxygen demand and total solids were recorded in high concentration and very low concentration of dissolved oxygen was recorded in both lakes. On the basis of physico-chemical parameters the Saroonagar lake is highly polluted and severe water quality deterioration whereas Ramanthapur Pedda Cheruvu is mildly polluted.

Keywords - Physico-Chemical Parameters, Water Quality, Eutrophication

I. INTRODUCTION

Water is the most valuable blessing to humankind. Life on earth is not conceivable without water. Water the most imperative abiotic segment is one of a kind in numerous regards such as domestic utilities, industrial practices, irrigation and power generation. Water covers 70% of our earth in which 97% is marine water, 3% is freshwater and approximately 1% of which is readily available for mankind in various forms. Lakes, rivers, waterways, streams and wetlands go under classification of surface water. These water bodies get their water supply from precipitation, overflow from snow liquefying and as base spill out of ground water frameworks. Surface water assets have assumed a critical job in the advancement of human development. Lakes have environmental significance as sources of surface and ground water recharge, in maintaining energy exchange, nutrient cycling, watersheds and also support diversified aquatic life. Urbanization, industrialization, population growth, unsustainable water management, exploitation of catchment and command areas have led to impairment of water quality. High organic load, surface runoffs and industrial effluents leads to deterioration of water quality and eutrophication of lakes. The present investigation is a comparison of Saroornagar lake and Ramanthapur Pedda Cheruvu which are the two prominent lakes of Hyderabad. Both the lakes are under the stress. Hence it is important to access physico-chemical parameters of these lakes to counter the water quality impairment.

II. MATERIALS AND METHODS

The water samples were collected monthly intervals for a period of one year (September 2019 to August 2021) in Saroornagar Lake and Ramanthapur Pedda Cheruvu. Water samples were collected from four sampling stations in the Saroornagar lake and three sampling stations from the Ramanthapur Pedda Cheruvu.The samples were analyzed for pH, Temperature, Carbonates, Bicarbonates, Chlorides, Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Organic matter (OM), Chemical oxygen demand (COD), Total hardness, Calcium, Magnesium, Phosphates, Sulphates, Nitrates, Nitrites, Total solids (TS) and Total dissolved solids (TDS) as per the standard procedures of APHA (2005). The average values of the important physico-chemical variables of the water body studied along with the standards stipulated by WHO (1971), ISI (1982) and BIS (1998) standards were compared. To define the interrelationships between two or more variables through The Pearson's correlation matrix was carried out using SPSS 17.0 version.

III. Results and Discussion

Physico-chemical characteristics of Saroornagar Lake and Ramanthapur Pedda Cheruvu:

The samples were collected and analyzed from different sampling stations in Saroornagar Lake and Ramanthapur Pedda Cheruvu on monthly intervals for a period of one year (September 2019 to August 2021). The average, analytic results of each parameter during the period of investigation are summarized in Table 1.

TABLE 1: Average values of Physico-chemical parameters

All vales are expressed in mg/L except pH and Temp (^{o}C)

S.No	Physico - chemical Factors	Saroornagar Lake	Ramanthapur Pedda Cheruvu
1.	Temperature	25.55	24.2
2.	pH	8.36	8.58
3.	Carbonates	21.1	15.8
4.	Bicarbonates	756.7	245.3
5.	Chlorides	764.1	375.2
6.	Dissolved Oxygen	0.47	2.67
7.	Biological Oxygen Demand	218.9	88.0
8.	Organic Matter	83.6	19.3
9.	Chemical Oxygen Demand	231.75	95.1
10.	Total Hardness	617.9	564.3
11.	Calcium	142.5	85.1
12.	Magnesium	55.8	72.0
13.	Phosphates	18.7	5.62
14.	Sulphates	253.5	44.3
15.	Nitrates	18.3	9.2
16.	Nitrites	1.2825	0.32
17.	Total Solids	2772	790.3
18.	Total Dissolved Solids	2615	493.2

It is evident from the Table.1 that the physico-chemical parameters such as chlorides, total hardness, calcium, magnesium, phosphates, sulphates, BOD, total solids and total dissolved solids were higher than permissible limits in Saroornagar lake and Chlorides, total hardness, biological oxygen demand, Chemical oxygen demand, Total solids were recorded higher than prescribed limits in Ramanthapur Pedda Cheruvu. Dissolved oxygen is in very low concentration in both the Lakes.

Temperature is one of the significant factors that affect the aquatic environment (Sedamkar and Angadi, 2003) and can influence on the biological activities and growth. The pH is an important factor for plankton growth (Chisty, 2002) and also influence survival and nourishment of biological life. Saroornagar lake and Ramanthapur Pedda Cheruvu were recorded with pH 8.36 and 8.58 respectively representing alkaline nature of the lakes. Alkaline nature of the lakes in India was reported by John Mohammad (2015), and Ratna V Airsang (2015).

The high values of bicarbonates in saroornagar lake can be attributed to increase in organic decomposition during which CO_2 is released which reacts to form bicarbonates. Similar observation was made by Airsang (2013). The concentration of bicarbonates showed variation between the stations in Ramanthapur Pedda Cheruvu probably due to the fluctuations in the inflow of domestic and industrial wastes. High Chloride values in both lakes indicates the presence of high organic matter. Higher chloride concentration represents high degree of pollution (Ameetha Sinha, 2014 and John Mohammad, 2015) and is considered as very important parameter in determination of the water quality.

The present investigation revealed very low values of dissolved oxygen and very high values of biological oxygen demand (BOD) in Saroornagar lake and Ramanthapur Pedda Cheruvu. A high pollution load may also decrease the DO values considerably (Yeole and Patil, 2005). Higher BOD values indicate the decomposition and mineralization of organic matter, high nutrient loading and organic pollution. Similar observation was made by (Siraj, 2010, Suresh 2015). Chemical oxygen demand (COD) is an important parameter for judging the extent of pollution in water (Amirkolaie, 2008). COD is recorded high in both lakes. High COD values indicate pollution due to oxidizable organic matter (Syeda, 2003). The major sources leading to COD are discharges of domestic wastewater from nearby settlements, surface and the other possible sources could be sewage, dumping of garbage, surface runoff and discharges of slaughter house waste (Purushottam J puri, 2010) and also the presence of carbonaceous matter.

The total hardness (TH) of the Ramanthapur Pedda Cheruvu and Saroornagar lake is higher than permissible limit of BIS (1998). Comparatively Saroornagar lake has recorded with very high total hardness. High hardness may be due to addition of sewage contamination or detergents. In the present investigation Calcium content is more in both lakes. This may be due to inflow of water from surface runoff and watershed (Rachana Bhateria and Disha Jain, 2016). In Ramanthapur Pedda Cheruvu the sulphates, nitrates are within permissible limits and phosphates are slightly more than permissible limits whereas Saroornagar lake exhibited high values of phosphates,sulphates and nitrates.It confirms the lake receiving sewage influx (Langmuir 1971, Sudha Rani 2004 and Amin Hossaini, 2013). High Nitrate concentration is the result of agricultural runoff or contamination with human or animal wastes (Nas and Berktay 2006). It indicates indicates organic pollution which triggers eutrophication (Dinesh K. Uchchariya 2012).

The Physico-chemical parameters exhibited certain interrelationships in Saroornagar Lake and Ramanthapur Pedda Cheurvu. The pH values are positively correlated to carbonates in both the lakes. The present findings clearly indicate negative relationship of dissolved oxygen with organic matter, BOD and COD in both the lakes. Phosphates showed positive correlation with COD, sulphates, nitrates and total solids and they also showed direct relationship with BOD, OM, total hardness and total dissolved solids and exhibited indirect relationship with DO in Saroornagar lake whereas phosphates showed positive correlation with chlorides in Ramanthapur Pedda Cheurvu. Sulphates are directly proportional to BOD,

COD, phosphates and nitrates and also maintained indirectly proportional to DO and nitrites in Saroornagar lake whereas in Ramanthapur Pedda Cheurvu sulphates showed positive correlation with chlorides. Nitrates in the lake showed significant positive correlation with BOD, phosphates, sulphates, total solids and total dissolved solids and showed negative correlation with nitrites in Saroornagar lake whereas nitrates are negatively correlated with Total dissolved solids and exhibited positive correlation with carbonates, bicarbonates and calcium in Ramanthapur Pedda Cheurvu. In both the lakes a positive correlation of COD with BOD, OM, phosphates, sulphates, total solids and total dissolved solids was observed. Total dissolved solids and exhibited positive correlation with carbonates, bicarbonates and calcium and negatively correlated with silicates and nitrites in Saroornagar Lake whereas total dissolved solids are negatively correlated with nitrates in Ramanthapur Pedda Cheruvu.

In Saroornagar lake nitrites are indirectly proportional to BOD, OM, COD, phosphates, sulphates, total solids and total dissolved solids at all stations. Total solids and total dissolved solids both showed positive correlation with BOD, COD, phosphates and nitrates. Total solids exhibited direct relationship with chlorides and showed negative correlation with silicates and nitrites. In Ramanthapur Pedda Cheurvu pH and carbonates are in negative correlation with bicarbonates. Carbonates showed an inverse correlation with Chlorides and total hardness.

The average values of the important physico-chemical variables of the water body studied along with the standards stipulated by WHO (1971), ISI (1982) and BIS (1998) standards were compared. Saroornagar lake and Ramanthapur Pedda Cheurvu both exhibited higher values of chlorides, total hardness, BOD, COD and total solids than permissible limits and very low values of dissolved oxygen were recorded representing polluted status of both the lakes. Comparatively Saroornagar lake is highly polluted than Ramanthapur Pedda Cheurvu.

IV. CONCLUSION

In Saroornagar Lake and and Ramanthapur Pedda Cheurvu chlorides, total hardness, BOD, COD and total solids were higher than permissible limits and dissolved oxygen is in very low concentration compared to the prescribed values by various national and international organizations.Very high average values of physico-chemical parameters and low dissolved oxygen concentration in Saroornagar lake clearly indicates that the lake water quality is severely deteriorated and representing eutrophic condition. Hence, it is unsuitable for drinking purposes, domestic utilities and recreational Purposes. Whereas on the basis of physico-chemical parmeters Ramanthapur Pedda Cheruvu is mildly polluted.

V. REFERENCES

[1]. Airsang R V and Lakshman H C., 2013.Diversity of Chlorophyceae related to physico-chemical parameters in Shetter lake of Navalgund, Dharwad District in Karnataka-India.Science Research Reporter, 3(2):129-134, ISSN: 2249-2321.

[2]. Ameetha Sinha, Baidyanath Kumar, Tanuja Singh. 2014. Water quality assessment of two ponds of Samastipur District (India). International Journal of Environmental Sciences Volume 4, No 4. ISSN 0976 - 4402.

[3]. Amirkolaie A K, 2008.Environmental Impact of Nutrient Discharged by Aquaculture Waste Water on the Haraz River. Journal of Fisheries and Aquatic Science, 3: 275-279.

[4]. Chisty, N., 2002.Studies on Biodiversityof Freshwater Zooplankton in Relationto Toxicity

of selected Heavy Metals.Ph. D. Thesis submitted to M.LSukhadia Univeristy Udaipur.

[5]. John Mohammad, M., Krishna, P.V., Lamma,O.A. and Shabbar Khan, 2015. Analysis of Water Quality using Limnological Studies of Wyra Reservoir, Khammam District, Telangana, India. Int.J.Curr. Microbiol.App.Sci., ISSN: 2319-7706, 4(2): 880-895.

[6]. Purushottam J. Puri, Yenkie, M.K.N., Battalwar D.G., Nilesh V. Gandhare and Dewanand B. Dhanorkar.,2010.Study and Interpretation of Physico-Chemical Characteristic of Lake Water Quality in Nagpur City (India).Rasayan J.Chem. Vol.3, No.4, 800-810. ISSN: 0974-1496 CODEN: RJCABP.

[7]. Ratna V Airsang and Lakshman, H C. 2015.Seasonal Variation and Phytoplankton Diversity in Shetter Lake of Navalgund, Dharwad in Karnataka, India. International Journal of Advanced Research, Volume 3, Issue 5, 1503-1510.ISSN 2320-5407.

[8]. Sedamkar, E and Anagadi, S.D. 2003. Physico-chemical parameters of freshwater bodies of Gulbarga, India, with special reference to phytoplankton, Pollution Research. 22(3) : 411-422 .

[9]. Siraj S, Yousuf A R, Bhat F A, Parveen N.,2010.The ecology of macrozoobenthos in Shallabugh wetland of Kashmir Himalaya,India. Eco Nat Environ 2(5):84–91.

[10]. Suresh B., 2015.Multiplicity of phytoplankton diversity in Tungabhadra River near Harihar, Karnataka (India).International Journal of Current Microbiology and Applied Sciences. ISSN: 2319- 7706. Volume 4 Number 2.pp. 1077-1085.

[11]. Syeda, R. Harakishore K., Msatyakala and Suryanarayanmurty U., 2003.Studies on the physicchemical parameters of Rankala Lake, Kolhapur, Int. J. Env. Protection, 961-963.

[12]. Yeole, S.M and Patil, G.P. 2005. Physico-chemical status of Yedshi lake in relation to water pollution, J.Aqua. Biol., 20(1): 41-44.

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