



A Study of Physico-Chemical Parameters of Nyalkal lake, Nizambad, Telangana.

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Abstract: Nyalkal Lake is located in Nyalkal Village of Nizamabad District, Telangana State, India. The present study was carried out for the period of one year from June 2021 to May 2022 to estimate certain physico-chemical parameters in the lake water samples. The study is aimed to check the influence of environmental factors as well as domestic activities in the water quality of the lake. Some of the physico-chemical parameters assessed in one year of the study period are Temperature, PH, Turbidity, Salinity, Total Suspended Solids(TSS), Carbonates, Bicarbonates, Phosphates, Sodium, Chloride, Sulphates, Nitrates, BOD, COD and Dissolved Oxygen.

Keywords: Physico-chemical parameters, Nyalkal lake, Water quality

I. INTRODUCTION

Water, often referred to as the "elixir of life," is a fundamental and indispensable component of our planet Earth. Covering about 71% of the Earth's surface, water plays a pivotal role in shaping our planet's ecosystems, supporting diverse forms of life, and influencing human civilizations. Maintaining water quality is the most important for mankind as it directly influences daily life. Water, the transparent and seemingly simple compound of hydrogen and oxygen, is anything but ordinary. It is the fundamental element that underpins all forms of life and sustains our planet's ecosystems. From nurturing living organisms to driving global processes, water's significance is immeasurable. The importance of water quality cannot be overstated, as it directly impacts ecosystems, human health, and socio-economic development.

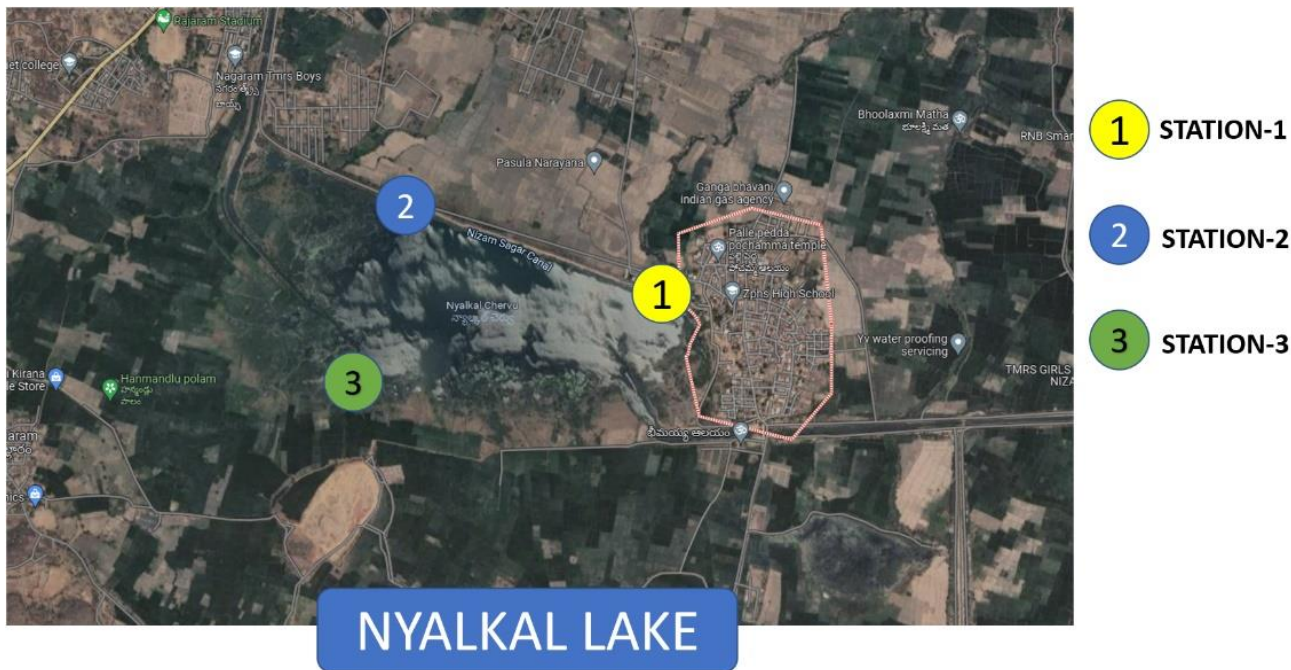
Water quality is a complex concept that encompasses the physical, chemical, biological, and ecological characteristics of water bodies. It is a critical indicator of the health and well-being of aquatic ecosystems and the communities that depend on them. Lakes, being significant reservoirs of freshwater, hold a special place in the discussion of water quality due to their role as ecological hubs and sources of various ecosystem services. Assessing water quality involves the evaluation of multiple parameters, each reflecting different aspects of water health. Lakes are diverse ecosystems that support a wide range of plant and animal life. They serve as habitats for aquatic organisms, migratory birds, and numerous plant species. Lakes contribute to biodiversity, nutrient cycling, and carbon sequestration, playing a pivotal role in maintaining ecological balance. However, their delicate equilibrium can be disrupted by changes in water quality caused by human activities and natural processes.

II. MATERIAL AND METHODS

The Surface water samples from Nyalkal Lake were collected from three sample stations Station-1, Station-2 and Station-3 between 7:30 am and 8:30 am. The samples were collected twice in a month i.e. 5th and 25th of every month from June 2021 to May 2023. From every station, two liters of water samples were collected. Some parameters like temperature and PH were recorded immediately after the collection of the sample. The water samples were brought to the laboratory for the analysis of other parameters. For the estimation of Dissolved Oxygen, BOD bottles were filled with the lake water then, Manganese sulphate, Alkali Iodine Azide reagent and Sulphuric acid were added. The same samples were brought to the laboratory for the estimation of Dissolved Oxygen. Samples from all these three stations were brought for the analysis of Turbidity, Salinity, Total Suspended Solids, Carbonates, Bicarbonates, Phosphates, Sodium, Chloride, Sulphates, Nitrates, BOD, COD and Dissolved Oxygen. (Trivedy and Goel, 1986; Saxena 1990; APHA 1992).

Study Area:

Nizamabad is located at 18°41 `N 78°6 `E surrounded by Nirmal, Kamareddy, Medak and Karimnagar districts. Nyalkal Lake is located in Nyalkal village, Nizamabad Rural mandal, Nizamabad District, Telangana State, India. The lake receives water from Quilla Lake which is about 2km away. The lake has two outlets, one through the canal the water goes out and the other is a sluice where excess water from the lake is sent out when the metal gates are lifted. Nyalkal lake water is mainly used for agriculture, fishery and other activities.



III. RESULTS AND DISCUSSION

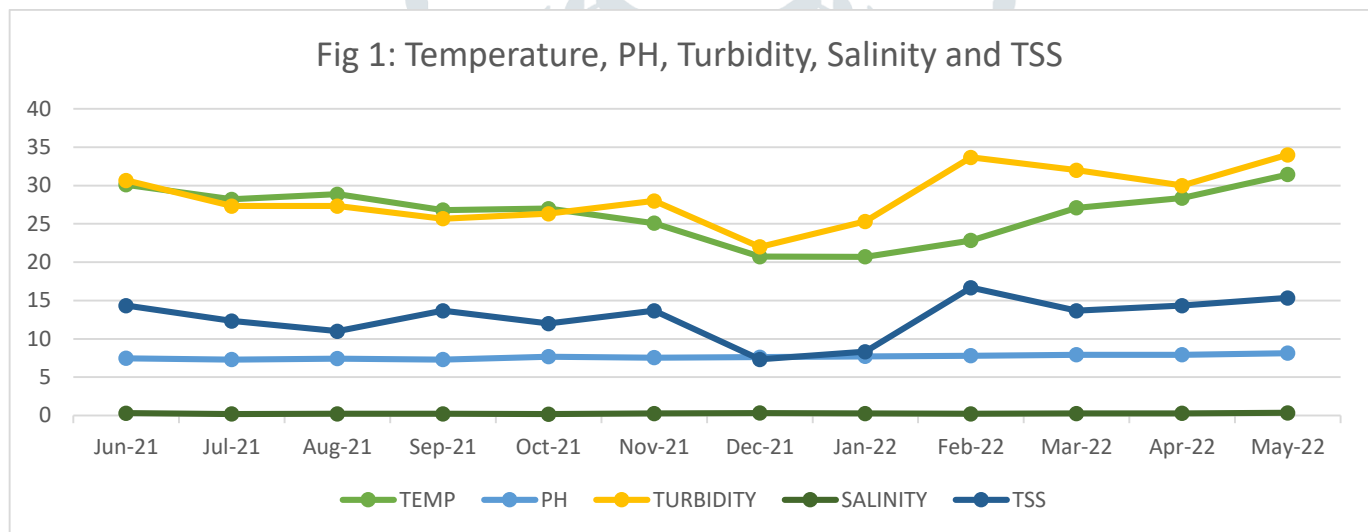
The physico-chemical parameters of the Nyalkal Lake are given in Table-1. After analyzing the physicochemical parameters, the lake is not under the influence of urbanization and eutrophication. The temperature of the atmosphere was recorded between 20 °C to 41 °C. Temperature is one of the important factors in the aquatic environment as it regulates physicochemical and biological activities (Kumar et al., 1996). Site -1 showed the highest average temperature of 26.62°C. The highest temperature recorded was 32.2 °C in the month of May.

Table: 1 Showing the data physicochemical parameters of Nyalkal Lake

Month	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
TEMP	30.1	28.2	28.87	26.8	27	25.1	20.73	20.7	22.83	27.1	28.37	31.43
PH	7.47	7.3	7.43	7.31	7.67	7.55	7.62	7.72	7.8	7.93	7.93	8.13
TURBIDITY	30.67	27.33	27.33	25.67	26.33	28	22	25.33	33.67	32	30	34

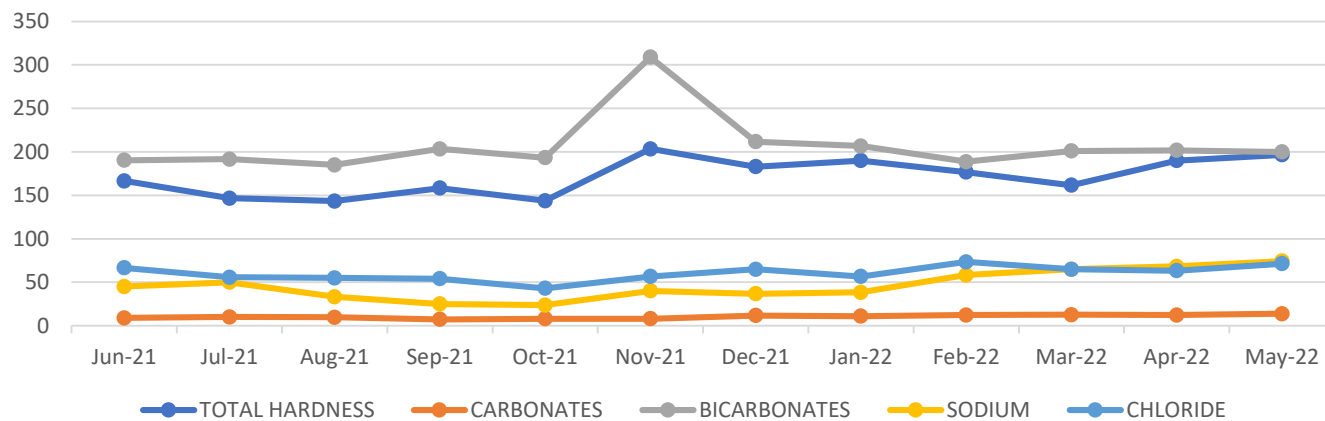
SALINITY	0.3	0.2	0.23	0.23	0.19	0.27	0.32	0.27	0.23	0.27	0.28	0.34
TSS	14.33	12.33	11	13.67	12	13.67	7.33	8.33	16.67	13.67	14.33	15.33
CARBONATES	9	10	9.67	7.33	8	8	11.67	11	12.33	12.67	12.33	13.67
BICARBONATES	190.33	191.67	185	203.33	193.33	309	211.67	206.67	188.67	201	201.67	200
PHOSPHATES	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
SODIUM	45	50	33.33	25	23.67	40	36.67	38.33	58.33	65	68.33	74.33
CHLORIDE	66.67	55.67	55	54	43	56.67	65	56.67	73.33	65	68.33	74.33
SULPHATE	66.67	40	48.33	38.33	17.67	28.33	7	36.67	56.67	85	86.67	88.33
NITRATE	5.67	5.33	4.33	5.67	4.17	5.33	5	6	5.17	6.33	6.33	5.33
BOD	6.33	6	6.33	5.33	5.67	7	6.33	6.67	6	6.33	7	6.67
COD	35.33	34	38.33	38.67	33.33	40.33	36.33	32.33	31	32	37.33	32.67
DO	6.53	6.8	7.27	6.33	6.47	6.77	6.77	7	7.07	7.23	6.33	5.17

Table-1 shows the variation in physico-chemical parameters in the study period of 12 months (June 2021 to May 2022). PH of water has a significant role in the survival of aquatic biota. The PH of the lake water ranged from 8.13 to 7.3 during my study. Turbidity is the value to tell how clear the water is. The turbidity of water ranged between 22 NTU and 34 NTU. Salinity in Nyalkal lake at a maximum of 0.34 mg/l in the month of May and the lowest value in the month of October.



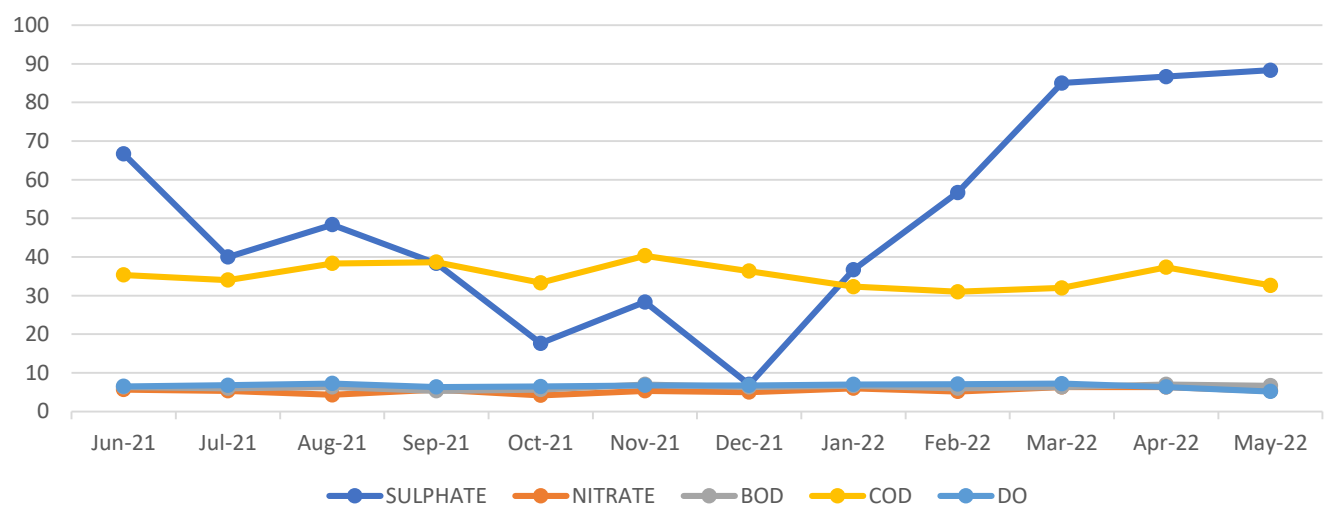
Total Suspended solids(TSS) in the Nyalkal lake were found maximum 16.67 mg/l in the month of February and the lowest 7.33 mg/l in the month of December. Carbonates ranged from 13.67 mg/l to 7.33 mg/l. Bicarbonates were a maximum of 309 mg/l in the month of November and the lowest 185 mg/l in the month of August. In all seasons, Phosphates were found negligible amounts i.e. they were less than 0.1 mg/l in all stations(Values not included in the graphs). Sodium ranged from 74.33 mg/l to 23.67 mg/l. Chlorides were recorded a maximum of 73.33 mg/l in the month of February and the lowest 43 mg/l in the month of October.

Fig 2: Total Hardness, Carbonates, Bicarbonates, Sodium and Chlorides



Much variation was observed in the sulphate values of the lake. The lake contains maximum sulphates of 88.33 mg/l in the month of May and lowest in the month of December. Nitrates are a necessary nutrient for the growth of aquatic plants, including algae. In certain conditions, excessive nitrate levels can lead to eutrophication, a process where nutrient enrichment stimulates excessive plant growth. In Nyalkal lake, Nitrates were found within the tolerant limits. Nitrates ranged between 6.33 mg/l and 4.17 mg/l. BOD values were found maximum of 7.0 PPM in the month of November 2021 and May 2022. Lowest value of BOD was in the month of September. COD Minimum value 31.00 PPM was in the month of February 2022 and the maximum 40.33 PPM in the month of November 2021. Dissolved Oxygen(DO) is the amount of oxygen present in the water. DO is important for the survival of organisms such as zooplankton, fishes and other creatures in the water. Dissolved oxygen in Nyalkal lake ranged between 7.27 PPM and 5.17 PPM. The maximum values were recorded in the month of August and minimum in the month of May.

Fig 3: Sulphates, Nitrates, BOD, COD and Dissolved Oxygen



IV. CONCLUSION

The average values of some important physico-chemical parameters were studied along with the standards stipulated by APHA (2017). After the analysis of the values and graphs, it is concluded that the water in Nyalkal Lake has not undergone Eutrophication and it is not under the impact of urbanization. The water quality is good for a lake and all physico-chemical factors that were studied are within the permissible limit. Hence, the water in the lake is suitable for the Flora and fauna of the lake. This water can be used for agriculture and aquaculture.

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