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A STUDY ON ASSESMENT OF PHYSICO-CHEMICAL PARAMETERS OF SAKHI LAKE OF HYDERABAD, TELANGANA, INDIA

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ABSTRACT:

The present study is carried from sakhi Lake of Hyderabad to assess the environmental impact of disposal of industrial waste, domestic waste into the lake. The study was carried from January 2021-february-2022 to assess the water quality analyzed for the various physico-chemical factors by following standard methods, the samples are collected in three different seasons (pre monsoon , monsoon , post monsoon) from three different zones of lake , samples are named as S₁,S₂,S₃, to assess the physical(PH, Temp, Turbidity) , chemical (Do ,Bod ,Cod ,TDS, Hardness ,Alkalinity, Calcium, Magnesium, Ammonia, Nitrite, Nitrate, Iron, Sodium) the parameters considered for the calculation of Water quality index. The aim of physico-chemical analysis of water is to estimate the presence of nutrient .water contains various dissolved and suspended particles component in varying proportions it has different physico-chemical properties including with biological variation. The water quality can be affected by different ways. Eutrophication can produce problems such as bad tastes and Oduors as well as green scum algae. Also, the growth of rooted plants increases, Poor water quality shows adverse biological effects on fish health and damages fish organs it may lead to reduced growth, poor fertility by consuming these fishes it may cause effects on consumer health.

Keywords: Physico-Chemical, Industrial Waste, Water Quality, Biological Effects.

1. INTRODUCTION

The quality of water bodies is influenced by various factors, such as the physico-chemical environment, topographical features, and geological aspects. In lentic waters, the physical and chemical parameters fluctuate due to the cycling of water, involving evaporation and subsequent rain. These changes, along with human activities, also impact the biological environment. Analyzing the physico-chemical properties of water helps determine its nutrient status since it contains dissolved and suspended substances with different physical, chemical, and biological characteristics. Pollution can adversely affect water quality in multiple ways. Eutrophication, for instance, can result in unpleasant tastes, odors, green algae growth, and increased rooted plant growth. This leads to lower oxygen levels in the lake's deeper waters and can harm various forms of aquatic life. Aquatic ecosystems are increasingly facing pressure from human-induced pollutants like industrial effluents, organic waste disposal, metal processing residues, and other sources that introduce toxic elements into water bodies. Aquatic ecosystem is progressively coming under the permanent pressure of anthropogenic pollutants. The water constitutes the “trouble spot” of all ecosystems (Brandy and Weil 1999)..Ensuring a clean water supply remains a significant challenge ,The supply of quality water remains a major challenge for humanity in the 21th century. (Schwarzenbach et al. 2010)The study focuses on Sakhi Lake (Fig 1) in Patancheruvu village near Hyderabad, covering an area of 124 km² at 17.53°N latitude and 78.27°E longitude. Being an industrial area on the Hyderabad-Solapur highway in Sanga Reddy district of Telangana state, it is located 32 km from the city center and 18 km from HITEC City. Researchers discovered high levels of 21 synthetic drugs in Patancheruvu water in 2009 due to waste discharge from local drug factories into the ponds. This contamination poses a direct or indirect threat to aquatic life by introducing heavy metals into the water ecosystem.

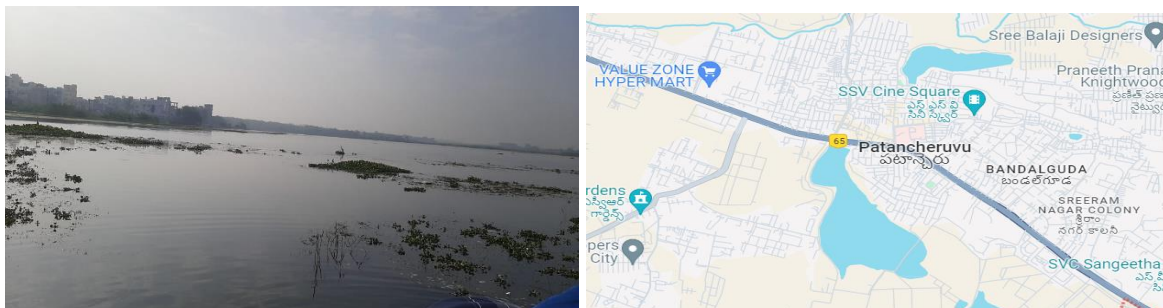


Fig 1: view of Sakhi Lake

2. MATERIALS AND METHODS

Samples Are Collected In Three Different Seasons (Pre-Monsoon, Monsoon, and Post-Monsoon) From the Three Different Zones Of Sakhi Lake Samples Are Collected By Rutners Water Sampler And The Samples Are Transferred To Bod Bottles

Sampling areas three sampling areas were selected from the lake and are characterized as follows. S₁ sample area is located at the right side of the lake. S₂ sample area is situated at the left side of the lake. S₃ is located ~50 meters after S₂.

Collection of water samples the water samples are collected from three different zones of sakhi lake from January 2021-february-2022. Samples are collected before 9:00am, Water samples were collected in BOD bottles (Fig 2) of 250 ml to estimate the dissolved oxygen.

Samples are carried to laboratory. The samples were analyzed on the same day for different physico-chemical factors following the standard methods (APHA, 1995).

Methods

- Ph – electrometric method (fig 3) ,alkalinity-titration method, calcium, magnesium ,total hardness – EDTA method (fig 5).
- TDS-TDS meter ,chlorides-Mohr method, bod, cod-open reflux method, bod test method
- Physico-chemical parameter of lake by APHA method is 3025;IS;10500-2012
- Analysis of heavy metals by AAS(atomic absorption spectrometric methods) (Fig 4)



Fig 2 : water samples



fig 3: pH meter



Fig 4: AAS

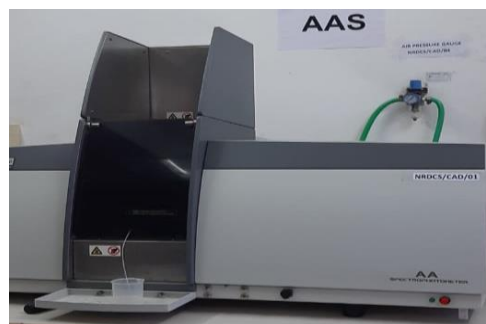


fig 5: EDTA titrants

3. RESULT & DISCUSSIONS

In the present study the physico-chemical parameters such as Temperature, pH, turbidity, Dissolved oxygen, biological oxygen demand, Chemical oxygen demand, Total hardness, Calcium, Magnesium, Nitrates, Nitrites, Total dissolved solids, of water samples taken from sakhi lake. These parameters were taken at seasonal intervals from 3 different locations of the lake.

Table No-1: Representing the parameters seasonal variation one-year average data

s.no	Parameter	Unit	Pre-monsoon	monsoon	Post-monsoon
1.	PH	ph	6.9-7.7	6.5-7.5	7.5-8.5
2.	TEMP	°C	28-32	17.3-19	20-22
3.	TURBIDITY	Cms	18.5-20.3	16-19 cms	22-25 cms
4.	DO	Mg/l	2.9-3.2	3.1-3.5	3.5-3.8
5.	BOD	Mg/l	2.5-3.3	2.0-3	2.5-3.5
6.	COD	Mg/l	3.1-3.9	2.5-3.2	3.1-3.5
7.	SALINITY	Mg/l	0.04	0.03-0.06	0.02-0.05
8.	TOTAL DISSOLVED	Mg/l	180-200	230-260	200-250

	SOLIDS				
9.	TOTAL HARDNESS	Mg/l	230-290	285-310	290.5-300
10.	ALKALINITY	Mg/l	76-83.5	80-95.3	98.3-110
11.	CALCIUM	Mg/l	105-110.3	118.3-125	110.2-120
12.	MAGNESIUM	Mg/l	80-91	92-100	90.2-109.2
13.	AMMONIA	Mg/l	0.03-0.06	0.02-0.04	0.03-0.05
14.	NITRITE	Mg/l	0.98	0.97	0.83
15.	NITRATE	Mg/l	0.04	0.03	0.09
16.	IRON (FE)	Mg/l	0.5-1	0.7-0.9	0.5-0.8
17.	SODIUM	Mg/l	93.6-110	110-125.3	105-114.2

Temperature: The measurement of temperature is one of the most primary factors, which plays an important role in the metabolic activities of the organism. The temperature was ranging from 17.3-32 C, average values in monsoon 17.3-19 C, post monsoon 20-22 C, pre monsoon 28-32 C during the period from Jan 2021 to feb 2022. The maximum temperature was recorded in the summer season month of May and lowest in winter season December month. Water temperature influenced aquatic weeds and algal blooms [Zafar 1968]

pH: pH of water is an important environmental factor which effects the biology and the life cycle of the biotic life. It is recorded in the range of 6.5-8.5 recorded in monsoon 6.5-7.5 , post monsoon 7.5-8.5, pre monsoon 6.9-7.7, pH is ranged 5 to 8.5 is best for plankton growth (Tiwari, 2005)

Dissolved Oxygen: Dissolve oxygen is an important parameter in water quality assessment as it regulates many metabolic and physiological processes of biotic components. It indicates the pollution in water bodies. Lower DO indicate organic pollution in lake as DO levels in water drop below 5.0 mg/l, many life forms are put under pressure. (Bowman e al., 2008)[9]. monsoon 3.1-3.5, post monsoon 3.5-3.8, pre monsoon 2.9-3.2.

Biological Oxygen Demand: The highest concentration of BOD 3.5 mg/l recorded in post monsoon, lowest value 2.0 mg/L recorded during monsoon season and 3.2 in pre monsoon season average values were noted. High amount of waste along with rain water from the surrounding and addition of organic waste in lake. High biological oxygen in was by several microbes in water accelerated their metabolic activities (Solanki H.A 2007)

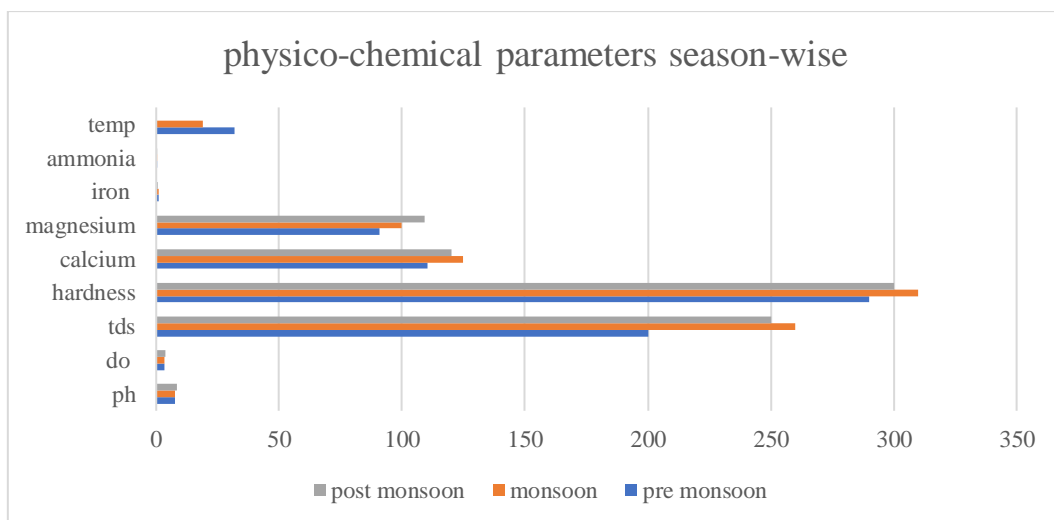
Chemical Oxygen Demand: The highest value 3.9 mg/L lowest values 2.5 mg /l were recorded. Highest values observed in pre monsoon and lowest values were recorded during monsoon season. High COD value may be due to addition of organic matter with waste discharge into lake. The estimation of COD along with BOD is helpful in indicating toxic conditions and the presence of non-biodegradable substances in the water. (Sawyer. et al.,2002) The high COD values indicates non-biodegradable oxygen demanding pollutants were present in the water.

Total Hardness: The average values 230-310 mg/L is recorded. Lowe values 230-290 mg/L were recorded during pre-monsoon season and 290.5-300 recorded in post monsoon. High range organic components, detergents, chlorides, high temperature are influence to decrease in water volume and they increase the hardness.

Calcium: Calcium is an important nutrient for aquatic organism. Sewage waste might also be responsible for the increase in amount of calcium. (Udhaya kumar, et al., 2006)[12]. The average values of calcium 105-120mg/l were noticed.

Nitrates: The estimated average amount of nitrates in rainy month of July 0.97 mg/l, 0.83 mg/l in winter season and 0.98mg/l summer season were recorded.. Nitrogen is component in nitrate, nitrite, ammonia, urea, and dissolved organic compounds in an aquatic environment. The highest amount of nitrate concentration was known to support the formation of blooms. (Udama, A.U 2014)

Nitrites: Nitrites are increase with nitrogen rich flood water into the Lake. The average value 0.03 mg/l recorded in monsoon, post monsoon seasons and the 0.09 mg/l were recorded in summer season. The lowest amount nitrite was due to the utilization by eutrophication. (Abdar. M.R., 2013)



Bar graph: 1 – showing maximum recorded parameters in three different seasons in mg/l

4. CONCLUSION

I hereby conclude that the present study assessment of sakhi lake water physico-chemical parameters in different locations seasonal and month wise to understand the effluents status and its effect on aquatic life in three different seasons Ph , Do is low in pre monsoon season , and less bod is observed during our study , large amount of waste along with rain water is drowned into the lake which results in rich nutrients and contamination of lake because of heavy metals at final it may lead to increase the aquatic weeds population which is the major problem to aquatic life because it restricts the penetration of the light and less the dissolved oxygen , fishes may suffocate due to this and those weeds provide shelter for predators also . some industrial wastes are allowing directly into lake it will show directly impact on aquatic life. by restricting the allowing of the waste into lake can results in the better culture practices and lesser the threat to the aquatic life .

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