

“Qualitative Analysis Of Puttanahalli Lake Water”

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Abstract

Groundwater is a characteristic asset for drinking. Populace development, urbanization and industrialization prompt expanded interest of portable water. Providing safe drinking water to urban and sub-urban community will be a challenge to the engineers. Knowing the importance of water for sustenance of life, the need for protection of water bodies particularly the fresh water bodies is being acknowledged worldwide. Global fresh water is the most worthy human resource, frequently earth is designated "Blue Planet" since water covers about 71% of the globe, but most of the water is saline. Less than 5% of water is fresh and quite a bit of this water is in the ice tops and groundwater. This has posed potential risk across the globe.

Water of appropriate quality is not only necessary for drinking and domestic use applications but also for industrial and agricultural purposes In recent years, the water executives of Lakes generally done by the administration agencies witnessed experimentation by the Lake Development Authority with a constrained public–private sector participation in respect of few lakes, which has proved controversial and resulted in almost a reversal of the policy. This paper discusses the outcomes of a research project conducted to characterize the water quality variation in Puttanahalli Lake (JP Nagar, Bangalore, and Karnataka) and the influential parameters such as types of land use. The water quality data for parameters namely pH, Turbidity, Electrical Conductivity (EC), Chloride (Cl⁻), Chemical Oxygen Demand (COD), Dissolved Oxygen (DO), Bio Chemical Oxygen Demand (BOD) etc. were analyzed qualitatively

Keywords: *pH, Turbidity, Electrical Conductivity (EC), Chloride (Cl⁻), Chemical Oxygen Demand (COD), Dissolved Oxygen (DO), Bio Chemical Oxygen Demand (BOD).*

1. Introduction

Water is a substance made out of the chemical components hydrogen and oxygen and existing in vaporous, fluid, and solid states. It is one of the most essential of compounds. A tasteless and

odourless liquid at room temperature, it has the significant capacity to disintegrate numerous different substances. The water particle is made out of two hydrogen atoms, water is a such a substance which doesn't contain taste scent, color and also it is an inorganic and transparent substance water is significant substance of any of the life's But most of the water covered in seas (71%) as saline water and only 1.7% as fresh water in the form of ground water. Owing to the urbanization and industrialization water the available fresh water is at risk and need urgent attention to preserve and replenish.

2. Materials and Methodology

Puttenahalli Lake, is the smallest of the 3 lakes of the JP Nagar 7th phase area in south Bangalore, spreads across an area of 13 acres. It is located at latitude of 12°53'26.37"-N and longitude of 77°35'12.02"- E has a catchment area of 13 acres 25 guntas. The area of water body is 10 acres 1.09 guntas .The perimeter of water body is approximately 920m. The main source of the lake is rainwater and an amount of 6 lakh liter per day is collected from south city apartments which is used only for storage of water.

Samples were collected from different points of Lake. The samples were collected in a clean and sterilized bottles and care was taken such that the sample is not exposed to the solar radiation. The depth of the sample collection was 15 cm below the surface of water and it was brought to the Laboratory to test for its Physical, Chemical and Biological characteristics analysis. The Physio-Chemical parameters selected are: pH value, Turbidity, Total hardness, Calcium hardness, Magnesium hardness, Chloride, DO, BOD, COD etc.



Fig1: Indication Of sample points

Selection of right methodology is a very crucial phase in any project. In the process of collecting samples and conduction of various tests one can understand the nature and need of the project. The study was conducted in Puttenahalli Lake which is a major lake in JP Nagar of South Bangalore which is located at a 12°53'26.37"- N and longitude of 77°35'12.02"- E. The total catchment area of the lake is 13 acres25 guntas. The annual rainfall of 900 mm (3.0 ft.) with three different rainy seasons covering nine months of the year- June to October 2020.

3. Results and discussions:

Physical Parameters

Table 1: Test Results of pH

Parameters	Observed value	Standard value	Reference
P _H	P1-7.6	6.5-8.5	IS2490
	P2-7.5		
	P3-8.1		
	P4-8		

	P5-7.8		
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Table 2: Test Results of EC

Parameters	Observed value	Standard value	Reference
Electrical Conductivity $\mu\text{S/cm}$	P1-20	2.5-10	IS2490
	P2-15		
	P3-17		
	P4-13		
	P5-21		

Table 3: Test Results of Total Hardness

Parameters	Observed value	Standard value	Reference
Total Hardness mg/l	P1-480	200-600	IS2490
	P2-440		
	P3-466		
	P4-520		
	P5-522		

Table 4: Test Results of Calcium Hardness

Parameters	Observed value	Standard value	Reference
Calcium Hardness mg/l	P1-240	75-200	IS2490
	P2-220		
	P3-233		
	P4-260		
	P5-261		

Table 5: Test Results of Magnesium Hardness

Parameters	Observed value	Standard value	Reference
Magnesium Hardness mg/l	P1-145	30-150	IS2490
	P2-155		
	P3-168		
	P4-148		
	P5-160		

Chemical Parameters Results

Table 6: Test Results of COD

Parameters	Observed value	Standard value	Reference
Chemical Oxygen Demand	P1-280	250	IS2490
	P2-320		
	P3-230		

mg/l	P4-160		
	P5-168		

Table 7: Test Results of BOD

Parameters	Observed value	Standard value	Reference
Biological Oxygen Demand mg/l	P1-110.2	30	IS2490
	P2-40.6		
	P3-95.7		
	P4-46.4		
	P5-34.8		

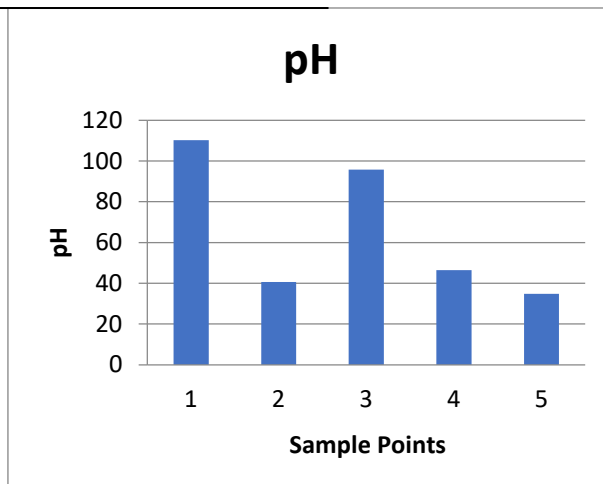


Fig. 2: Graphical representation of pH

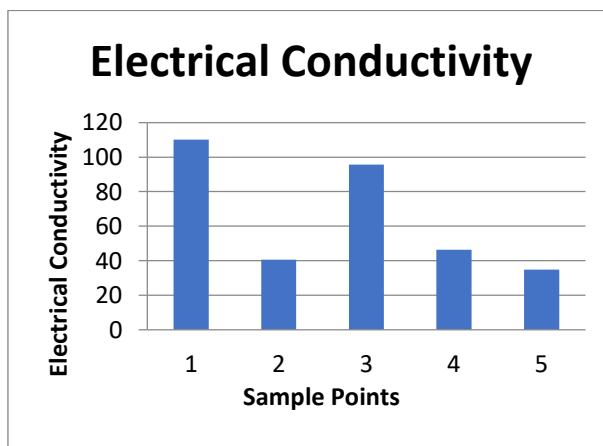


Fig. 3: Graphical representation of EC

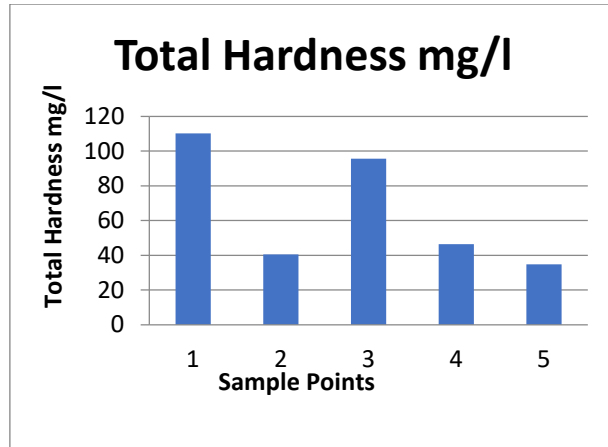


Fig. 4: Graphical representation of Total Hardness

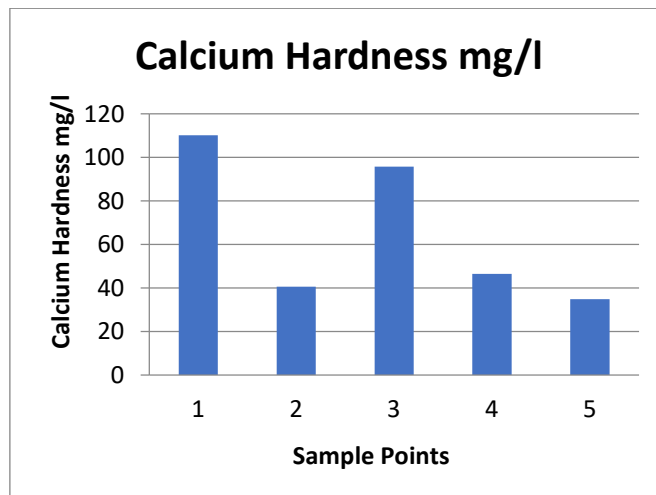


Fig. 5: Graphical representation of Calcium Hardness

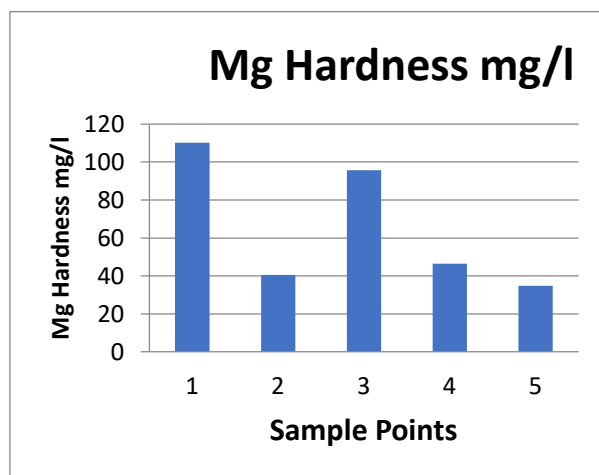


Fig. 6: Graphical representation of Magnesium Hardness

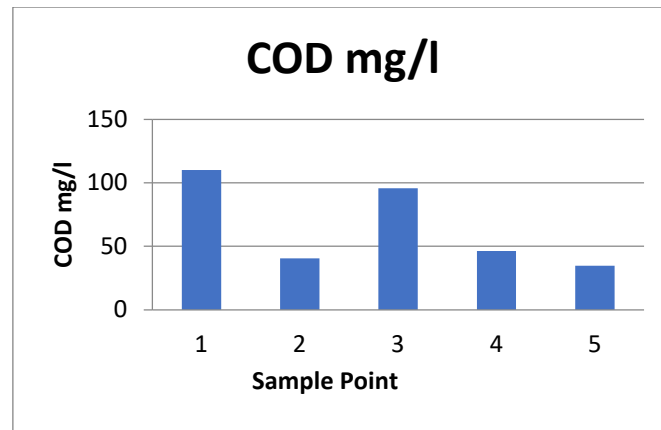


Fig. 7: Graphical representation of COD

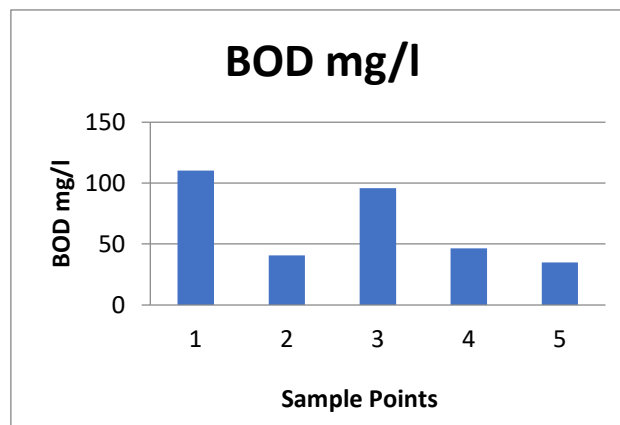


Fig. 8: Graphical representation of BOD

Results

It can be inferred from the analysis that pH ranged from 7.2 – 8.2, the water samples analyzed results were within the prescribed standard limit as per IS2490. Electrical conductivity ranged between 75.20-89.32 μ s/cm, which was exceeding the prescribed limit as per IS24900. Laboratory conductivity measurements are used to establish a degree of mineralization and physiological effects on aquatic biodiversity.

Total hardness (TH) ranged from 416-526 mg/l which is within the permissible limit as per IS2490. Water hardness is basically a measure of the capacity of water precipitate soap. Calcium and magnesium are the principal actions causing hardness. Their value was 208-263 mg/l and 208-261 mg/L range respectively which were exceeding the limit. Other elements such as Iron Aluminum, Manganese strontium and zinc are also responsible in contributing the Hardness of the water. Higher levels of hardness indicate a serious pollution of that water body system by elements other than calcium and magnesium.

Biological Oxygen Demand (BOD) ranged from 17.4-302mg/l. BOD determines the strength of organic waste (sewage, effluents and other pollutants) in water and provides data on the pollution load in all-natural waters. Reason of high values of the BOD may be due to agricultural and domestic discharge in the water.

Chemical Oxygen Demand (COD) ranged from 40 to 440mg/l which is alarmingly high. The increase in COD is mainly attributed to the increase in the air and water temperatures, facilitating the decomposition and oxidation of organic matter and higher the COD is the Indication of increased organic loads due to increased house hold waste water and waste discharges.

Conclusion

Based on the physical and chemical tests undertaken, the following conclusions can be drawn. The pH of the collected sample showed that it ranges from 7.2-8.2, which is within the permissible limit as per IS2490. The electrical conductivity of the collected sample showed that it ranges from 75.20-89.32 μ /sm, which exceeds the permissible limit as per IS2490. The total hardness of the collected sample showed that it ranges from 416-526 mg/l, which is within the permissible limit as per IS2490. The BOD of the collected sample showed that it ranges from 17.4-302 mg/l, which exceeds permissible limit as per IS2490. The COD of the collected sample showed that it ranges from 40-440 mg/l, which exceeds the permissible limit as per IS2490.

The parameters such as pH and total hardness are within the permissible range as prescribed by IS 2490, while others namely electrical conductivity, BOD and COD of the sample investigated exceeds the limits as per the laid down standards and require immediate attention to quantify the ground water potential risk so as to enhance the quality of existing resources.

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