

Studies on Physico-Chemical parameters of Kunigal Tank, Tumkur Dist, India.

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ABSTRACT: Assessment of Physico-Chemical parameters of Kunigal tank, Tumkur district was done during the period of January 2014 to June 2014. Fresh water is a source of drinking water used by the rural and urban population of India. It supports the life of the aquatic organisms. It is getting polluted by dumping of domestic sewage, agricultural wastes, Industrial effluents etc. The water samples were collected on the monthly basis from five sampling sites. The analysis was carried out for the parameters like Temperature, pH, Turbidity, Total Dissolved Solids (TDS), Alkalinity, Biological Oxygen Demand (BOD).

Keywords:

KEYWORDS: Kunigal tank, pollution, domestic sewage, Physico-Chemical parameters, BOD.

I. INTRODUCTION

Water is a natural resource with greater significance to mankind. Since, fresh water bodies are essential for the sustenance of life, there is a need for the conservation of fresh water bodies everywhere in the world [1]. 75% of the globe is covered with water and most of the water is saline in nature. The water found at the caps, glaciers, and ground water is fresh water and constitutes about less than 5%, and the remaining water is found in lakes, streams and soil moisture. Hence, the earth is often called as Blue planet, [2]. It is analysed that the occurrence of third world war may be due to the cause of water and hence the scenario of global water is alarming [3].

Fertilizers and pesticides are the chief pollutants causing water pollution. Natural water is contaminated by the weathering of rocks, leaching of soil, mining processes etc [4]. The chemistry of the water decide the metabolism of ecosystem. The general hydrobiological relationship in the eco system is under the influence of physico chemical parameters [5]. Surface water pollution has become a great problem due to the rapid growth of population, improvement in the field of agriculture, urbanization, industrialization and reduced the availability of drinking water. The problem of scarcity of water is found in many parts of the world. Without treating the waste water, most of the waste waters are directly dumped in to the lakes, rivers and estuaries. Lakes are very important fresh water bodies. Since the lakes are the source of precious water, provide habitats for flora and fauna and moderate the hydrological cycles, lakes are considered as the very important fresh water bodies. They also influence the microclimate and increase the aesthetic beauty of the earth and provide means of recreation to mankind [6].

The main objective of this study is the assessment of Physico-Chemical parameters of Kunigal tank, Tumkur (Dist) India which is a rural area. Kunigal Lake is slightly under anthropogenic stress and gets heavy inputs of domestic waste and sewage. A perusal of the available literature related to this reveals that there is no much scientific investigation on Kunigal tank. Hence, it is right time to formulate methods to monitor the data in order to control the indiscriminate activities of man on this lake by formulating the methods to monitor data and control permissible limits of contamination. With this strong background, an ecological investigation on Kunigal tank has been undertaken [2].

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

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Vol. 7, Issue 2, February 2018

II. RELATED WORK

Depletion of oxygen can result from a number of natural factors but is most a concentration as a result of pollution and eutrophication in which plant nutrient enter water source. Biochemical oxygen demand is the amount of organic compounds in water as measured by the volume of oxygen required by bacteria to metabolize it under aerobic condition. As the organic matter increases, more oxygen is required by bacteria for its oxidation [7].

Fertilizers and pesticides are major contributors to water pollution. Weathering of rocks, leaching of soils and mining processing ect, contaminate natural water [8]. Alkalinity depends on the amount of carbonates and bicarbonates due to the presence of carbonates and bicarbonates of calcium and magnesium from kitchen waste water. Alkalinity may be due to cattle bathing and laundering of clothes [9]. Temperature measurements are very useful in understanding the physical, chemical and biological activities which are under the control of temperature variation [10].

III. STUDY AREA

Kunigal tank is one of the biggest tanks in Tumkur District. It is situated between 13.02° N 77.03° E. It is located in between Kothagere and Kunigal town on Tumkur road as shown in figure 1.



Figure 1. Satellite view of Kunigal Tank and its surroundings

The tank is spread across a vast area of 1030 acres of land with a bund of 2 km long. The catchment area of the tank is 33.914 Th ha. The tank was mainly constructed for the purpose of irrigation. Now a days it is used for various purposes like agriculture, fish culture, drinking and partially for domestic purposes.

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Vol. 7, Issue 2, February 2018

IV. MATERIALS AND METHODS

Surface water samples were collected from the selected sampling sites in the early morning between 7 AM to 9 AM in two liters of polythene cans. Five sampling sites were selected which completely cover the whole area of the tank. The sampling locations are shown in Figure 1. The investigation was carried out to study the physico-chemical parameters of water during January 2014 to June 2014. The temperature was recorded at the spot using Thermometer. In addition to temperature, other physico-chemical parameters such as pH-Electrometric method, Turbidity-Nephelometric method, TDS-Gravimetric method, Alkalinity-Titrimetric method and BOD-Winkler's method were analysed for the collected samples in the laboratory using standard methods [11]. The results were compared with standard permissible limit by BIS [12].

V. RESULTS AND DISCUSSION

Sl. No	Parameters	Range value	BIS standard permissible limit for drinking water
1.	Temperature	26 °C to 29 °C	40 °C
2.	pH	7.4 to 8.2	6.5-8.5
3.	Turbidity	1 to 3 NTU	10
4.	Total Dissolved solids	102 -152 mg/L	500
5.	Total Alkalinity	52 mg/L to 68 mg/L	200
6.	BOD	BDL to 4 mg/L	5

Table. 2 Comparison of Physico-chemical parameters with BIS standards.

Table-2 shows the range of physico-chemical parameters compared with the BIS standards to know the water quality of the tank.

VI. TEMPERATURE

Temperature plays an important role in determining the growth of the aquatic organisms. Temperature is a dominant environmental factor influencing the metabolic rate of Poikilotherms and also affects other factors like pH, growth of planktons which in turn affects fish growth. The water temperature affects the biochemical reactions occur in the body of aquatic animals. The increase in the water temperature reduces the solubility of gases. The atmospheric temperature was found to be in the range of 26 °C to 29 °C and the water temperature was found to be in the range of 24 °C to 27 °C.

VII. TURBIDITY

Turbidity is recognized as one of the limiting factor in the biological productivity of the water bodies [13]. Turbidity is a measure of clarity of water which is a qualitative measure of how much light is scattered by the particles in the water samples. The suspended particles are aggregated to form colloidal solution. The extremely minute particles are settling down at the bottom and other minute particles stay as suspended which forms turbidity. In the present study the turbidity was found in the range between 1 to 3 NTU.

International Journal of Innovative Research in Science, Engineering and Technology

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Visit: www.ijirset.com

Vol. 7, Issue 2, February 2018

VIII. pH

pH is an important parameter which determines the suitability of water for various purposes. Highly acidic or alkaline waters are unsuitable for good fish production. A normal range of pH is best for inland waters. The slight alkaline level increases the growth of phytoplankton and fish. Acidic pH causes changes in the permeability of gills of fishes. pH less than 4 produces sour taste and above 8.5 is alkaline in taste. In the current study the pH was found in the ranging between 7.4 to 8.2.

IX. TOTAL DISSOLVED SOLIDS (TDS)

TDS denotes mainly various kinds of minerals present in salt water. Gas and colloids are not included in TDS. The TDS in the present study was ranged from 102 mg/L to 152 mg/L which is within the permissible limit as per BIS standards.

X. ALKALINITY

Alkalinity depends upon location, season and population of the plankton. Heavy rain fall areas have low alkalinity. The high alkalinity increases the rate of organic decomposition, which leads to plankton blooms which may result in oxygen imbalance affecting the fishes. When the alkalinity exceeds the desirable limit the taste becomes unpleasant. It ranges between 52 mg/L to 68 mg/L.

XI. BOD

The BOD is an indicator of organic enrichment of water bodies. High BOD is associated with high degree of decomposition of organic matter. High level of oxygen consumption for stabilization of organic depletes DO content and becomes a threat for a survival of fish. Hence, BOD of water body is an important parameter to be considered for fish culture. Increase in the BOD decrease the dissolved oxygen content of water and the water becomes unsuitable for fish culture. In the present study BOD ranges between Below Detectable Level to 4 mg/L

XII. CONCLUSION

It is concluded from the present study that pH, turbidity, TDS, alkalinity and BOD are in the permissible limit as recommended by BIS standard (8). Hence, the water can be used for agriculture, and also used for drinking after treatment.

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Vol. 7, Issue 2, February 2018

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