



Physico-chemical characteristics of Queen Lake in Arasikere, Karnataka, India

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Abstract

The present study deals with the physico-chemical parameters of queen's lake of Arasikere taluk, Hassan district, Karnataka, India during the period of 2010 (October) to 2011 (November). The parameter studied comprised temperature, pH, total hardness, total dissolved solid, phosphate, chloride, free carbon dioxide, COD, BOD, total alkalinity, DO.

Key-Words: Queen's lake, Physico-chemical, Arasikere

Introduction

Water is indispensable natural resources on earth. All life including human being depends on water. We have enormous resources on the earth amounting to about 13, 481, 96000 Km³ of water. Due to its unique properties water is of multiple uses for living organisms. In India 77% of water is used in agricultural sector¹. Human being depends on water for almost every developmental activity. Water is used for drinking water, irrigation, washing, and industrial purposes. Although water is very abundant on this earth, yet it is very precious. Out of the total water reserves of the world, about 97% is salty water and only 3% is fresh water. Even this small fraction of fresh water is not available to us as most of it locked up in polar ice caps and just 0.003% is readily available to us in the form of ground water². The fresh water resources now a day as consequences of population explosion coupled with industrialization, urbanization, and green revolution. In order to benefit from our reservoirs, lakes, ponda dam lakes and rivers, we have to know the characteristics of these water and the algae which are the first link of the food chain with regards to ecology and taxonomy³.

The present investigation attempts to find out the variation in the physico-chemical parameters of queen's lake in Arasikere taluk karnataka. Arasikere is located at 13.31°N 76.26°E. It has an average elevation of 807 metres (2647 feet).

Material and Methods

Monthly collection of water samples were carried out at two different sampling stations for four months (from October 2010-November 2011). All the sample collection and field observations were conducted between 8.00 a.m to 1.00 p.m. throughout the study period. The water samples collected from the lake in polythene bottles were brought to the laboratory for analysis as per the standard methods described⁴⁻⁵.

Results and Discussion

The results of the physico-chemical properties of Queen Lake water during October 2010-November 2011 are shown in table 1. Temperature of water was found to be in the range 29.74°C to 22.52°C. The temperature was maximum (29.74°C) in summer and minimum (22.52°C) in winter in queen lake under study. The result clearly showed that, water temperature remained lesser than air temperature throughout the study period. Similar observation were made by Ade and Vankhede (2001)¹. During the investigation, pH value ranged from 8.1 to 7.6 in queen lake maximum (8.1) in summer and minimum in (7.6) in winter under investigation. The high pH value in summer may be due to photosynthetic activity of micro and macro vegetation resulting in high production of free carbon dioxide shifting the equilibrium towards alkaline⁶ factors like temperature influences the pH of water. Dhembare⁷ has observed a direct relationship between water temperature and pH. The study of total hardness 329.12mg/l in summer and 323.32mg/l in winter under the study⁸ observed maximum hardness in summer and minimum in winter due to variation in rainfall. According to Kannan⁹ the water is classified as very hard if the value exceeds 180ppm. The total

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dissolved solid ranged from 386.56mg/l to 397.05mg/l in Lake Queen. Maximum 397.05mg/l and minimum 38.58mg/l were observed in summer and monsoon. Phosphates are essential for growth of organism and nutrient that limit primary productivity of water body. In the present investigation phosphate ranges from 0.084mg/l to 0.42mg/l in summer and monsoon respectively. The low content of phosphate in summer season may be due to utilization of phosphate by phytoplankton¹⁰. Higher concentration of chloride in the water may be due to discharge of domestic sewage and also excess of chlorine in water. In present study chloride content ranges from 98mg/l to 76mg/l. Maximum (98mg/l) in monsoon and minimum (76mg/l) in summer. The higher value of chloride attributed due to increase of organic matter¹¹. The concentration of carbon dioxide in lake ranges from 41mg/l to 52mg/l. Maximum in winter (52mg/l) and minimum (41mg/l) in summer. The behaviour of carbon dioxide with pH and stated that increase in carbon dioxide concentration in water results decrease of its pH due to the formation of carbonic acid¹². In the present study COD values in Queen Lake varied from minimum (29.38mg/l) in summer and (25.17mg/l) in winter. The five day BOD indicates the amount of organic load in water sample¹³. The study showed that BOD ranged from 14.18 mg/l to 17.87mg/l i.e., minimum (14.18mg/l) in monsoon and maximum in (17.87mg/l) in summer. In summer higher BOD values attributed to the enhanced biological activity at higher temperature¹⁴. Alkalinity value ranged from 218.44mg/l to 238.78mg/l. Maximum (238.78mg/l) and minimum (218.44mg/l) were seen in the summer and monsoon respectively. It was found that alkalinity values varied between 90mg/l to 265 mg/l in sewage fed fish culture pond at Nambur and were of opinion that alkalinity increases in the summer seasons¹⁵. According to Hutchinson¹⁶ a skillful Limnologist can probably learn more about the lake from a series of oxygen determination than from any other kind of chemical rate. In the present study DO varied from 7.93mg/l to 8.69mg/l in lake under study. Minimum DO was found in summer (7.93mg/l) and maximum was observed in (8.48mg/l) in winter respectively. Low DO in summer might be due to high organic content which leads to oxygen depletion¹⁷. During monsoon and winter the level of DO was quite satisfactory, perhaps good aeration caused by rain water as reported earlier¹⁸⁻¹⁹. Blooming has a direct correlation with pH, temperature, DO and other nutrients contributed by sewage and sedimentary cycle²⁰. The water quality of water bodies has to be maintained for the sake of human health. Because a

large number of people use this source of water for drinking and domestic purposes. From now public awareness has to be created to develop a safe guard against any type of contamination and pollution of these water bodies. To achieve the above mentioned goals the foremost prerequisite is to study the water bodies' limnologically. Thus it requires a continuous monitoring and study of large existing waters of various quality in order to determine what controls, what changes or what uses can be instituted for benefit of man and for the conservation of water and desirable aquatic life.

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Table 1: Physico-Chemical Properties of Queen Lake during October 2010 to November 2011

Properties	Summer	Monsoon	Winter
Temperature (°c)	29.74±1.43	28.36±1.23	22.52±1.29
pH	8.1±0.16	7.7±0.89	7.6±0.33
Total hardness(mg/l)	329.76±2.97	326.12±2.64	323.32±1.48
Total dissolvedsolid(mg/l)	397.05±1.09	386.56±1.74	393.94±1.37
Phosphate(mg/l)	0.084±0.012	0.42±0.055	0.38±0.034
Chloride(mg/l)	76±0.43	98±0.19	87±0.53
Free carbon dioxide(mg/l)	41±1.67	48±0.71	52±1.39
COD (mg/l)	29.38±0.89	26.41±1.65	25.17±1.12
BOD (mg/l)	17.87±1.53	14.18±0.68	16.13±1.31
Total alkalinity (mg/l)	238.78±3.89	218.44±5.23	229.69±3.41
DO (mg/l)	7.93±0.83	8.19±0.54	8.69±1.22