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SEASONAL VARIATIONS IN PHYSICO-CHEMICAL CHARACTERISTICS OF KUTLUQ LAKE AT DAULTABAD, DISTRICT AURANGABAD

Shaikh Yasmeen*
* Dr. Rafiq Zakaria College for Women, Navkhanda Jubilee Park Aurangabad (M.S) India

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KEYWORDS: Physico-Chemical Parameters, Seasonal Variations, Kutluq Lake.

ABSTRACT

The present study deals with the assessment of water quality of the Kutluq Lake at District Aurangabad. The physico-chemical characteristics were studied and analyzed during the year 2019-2020. Seasonal variations at three different sampling sites of the Kutluq Lake were observed Conductivity, pH, Total Dissolved Solids (TDS), Total Alkalinity, Total Hardness, Chlorinity, Calcium, magnesium and Dissolved Oxygen were studied at these studies. The results revealed that the condition of this lake in different seasons showed fluctuations in physico-chemical parameters.

INTRODUCTION

Water is the most natural resource that exists on our planet and is essential for survival and the development of modern technology. Thus, rapid industrialization is one of the main causes for aquatic pollution. Discharged wastewater has been used in different regions of the world for fish raising (Wong, C. K., Wong, P. P. K. and Chu, L. M. 2001; Ashraf, W., 2005; Gad, N. S., 2009). The occurrence and concentrations of various contaminants have increased in the environment along with increasing anthropogenic activities in the industrial, agricultural and other sectors (Manoj, K. and Padhy, P. K., 2013). Water is a valuable resource and plays a vital role in supporting all forms of life (Rajiv, P., *et. al*., 2012). Water pollution is, therefore, of universal concern. Among the various contaminants, environmental concentrations of heavy metals have been increasing in aquatic environments in recent years. Cadmium and copper are highly toxic to aquatic animals (Jezierska, B. and Witeska, M., 2001; Mendez-Armenta, M., and Rios, C., 2007).

The life is linked with the quality of environment, hence the biological components of freshwater depends solely on physicochemical conditions. Analysis of physico-chemical parameters of water is essential. The changes in the physico-chemical characteristics adversely affect the living things in an environment. These water bodies pose different problems, pollution being the main and it has been rendered unfit for use and toxic for flora and fauna of the lake. Water bodies situated in the urban areas are under the pressure of various human activities such as cloth washing, bathing, and dying of cloths.

The quality of surface water including lakes and rivers depends on it's their physical, chemical and biological properties. The physiochemical properties give limited picture of water quality at particular point of view, while the living organisms act as continuous monitors of water quality over a period of time. Water quality analysis is important to preserve and protect the natural ecosystem. Analysis of physico-chemical parameters of water is essential, to assess the quality of water for the best usage like irrigation, drinking, bathing, fishing, industrial processing and so on. Water quality deals with the physical, chemical and biological characteristics in relation to all other hydrological properties. (Shinde et al, 2010).

Keeping this view in mind present study has been undertaken to assess seasonal mean values and seasonal standard deviation of different parameters in Kutluq Lake Dam.

In India some hydrobiological work on historic water bodies have been done (Dhere and Gaikwad, 2006; Sharma et al, 2007; Pejaver and Gurav, 2008; Ingole et al, 2009; and Shinde et al, 2010). This essential resource is increasingly scarce in many parts of the world due to severe impairment of water quality. The increasing anthropogenic influences in recent years in and around aquatic systems and their catchments areas have contributed to a large extent to deterioration of water quality and declining of water bodies leading to their accelerated eutrophication.

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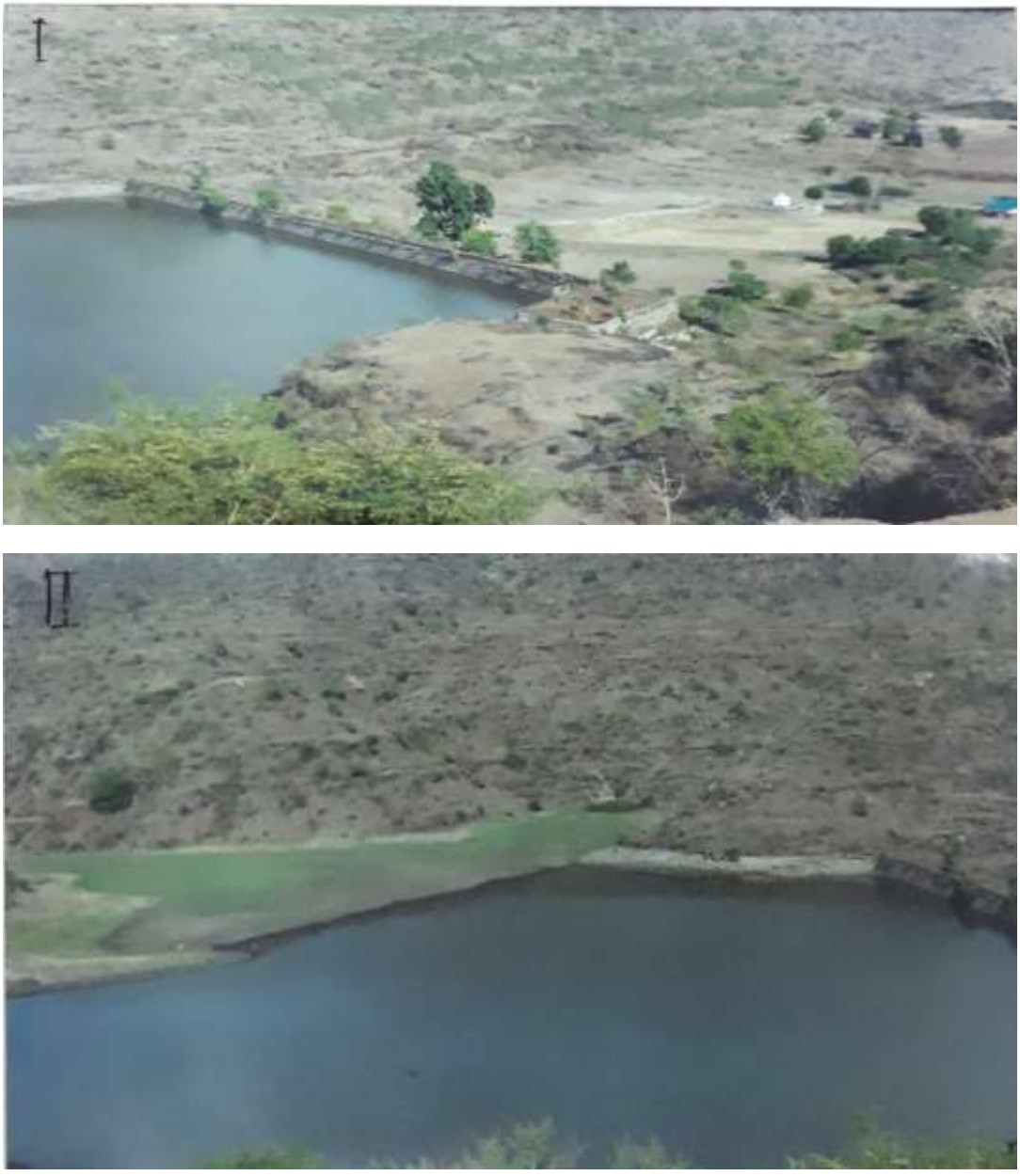
MATERIALS AND METHODS

The water samples for physico-chemical analysis were collected from Kutluq Lake, Aurangabad, (M.S.) India, at two different sites viz., from North to South and from West to East Station in the early morning between 8 am to 11 am in the first week of every month from January – December2019. The samples were collected in acid washed five liter plastic container from a depth of 5-10 cms below the surface of water. The samples were analyzed immediately in the laboratory.

The physico-chemical characteristics of the Lake water like Temperature, Conductivity. P^H, Total Dissolved Solids (TDS), (TA), TH, Ca^{2+}, Mg^{2+}, and D.O. were determined in monthly variation according to standard methods (APHA, 2005 and Trivedy and Goel, 1984).



Photograph Showing: I. from North to South and II. From West to East

RESULTS AND DISCUSSION

The monthly physico-chemical parameters data of Kutluq Lake at Daultabad Dist. Aurangabad. (M.S.) India have been presented were given below.

PHYSICO-CHEMICAL CHARACTERISTIC

Temperature (T)

In present investigation maximum value of water temperature were recorded in summer season corresponding with the atmospheric temperature. Our findings are in good agreement with those of Palharya et.al. (1993) Verma et.al., (1978) and Ganpati (1943). During summer, water temperature was higher because of low water level, clear atmosphere and greater solar radiation. Water temperature is lower in rainy season and it was due to frequent cloud, high percentage of humidity and high water level.

Physico-chemical parameters	**Summer**	**Monsoon**	**Winter**	**Average**
Temperature	29.30	24.23	20.17	24.2
pH	6.40	7.80	5.00	6.4
Conductivity	150.25	300.00	135.75	195.34
TDS	64.5	126.15	86.70	92.45
TA	400.25	530.00	402.75	444.34
TH	415.37	530.72	350.00	432.03
CL^-	130.85	364.15	150.09	215.03
Ca^{2+}	143.82	182.15	130.25	152.19
Mg^{2+}	13.35	14.25	14.55	14.05
DO	5.40	7.50	8.10	7.0

Seasonal Variations of water parameters.

Conductivity

In the present investigation maximum conductivity values were observed in the water sample. Usually high conductivity values were observed in summer season as compared to rainy and winter season which is in agreement with the observation made by Jeevan (1995) and Bansan (1984).

The conductivity is a numerical expression of its ability to carry on electric current, which in ionic strength as conductivity is a measure of total ions. The ionic strength of a sample depends on ionization of solutes and other substances dissolved in it.

Electric conductivity was maximum during monsoon 300.00 and minimum during summer and winter, 150.25 and 135.75 respectively. Electric conductivity and increases with increase in total dissolve solids.

Total Dissolved Solids (TDS)

Total Dissolved solids are the cause of suspended particles into the water body influences turbidity and transparency.

Total suspended solids were maximum during monsoon 126.15 and were minimum during winter and summer 86.70 and 64.5.

In the present investigation, the high values of total dissolved solids during monsoon may be due to siltation, deterioration and heavy precipitation. Khabade et al, (2002) recorded maximum TDS during monsoon and minimum during winter and summer at Lodhe water reservoir, Tasgaon. Khanna and Bhutiani, (2003) reported maximum TDS in monsoon, moderate in summer and minimum in winter, which supports the findings of present observations under study.

Total Alkalinity (TA)
The TA values above permissible limit, 200 ppm, in all the cases indicating presence of bicarbonate, maximum in monsoon 530.00 and minimum in winter and summer 402.75 and 400.25 respectively.

Total hardness (TH);
Hardness values are higher in most of the cases as per WHO. The values are low in winter 350.00 and high in summer and monsoon 415.37 and 530.72 respectively which is mainly due to dilution.

Chloride ($c1^{-}$):
It is a natural substance present in all potable waters and it is usually present in sewage as a metallic salt. Its concentration in fresh water is quite low and is generally less than that of sulphates and bicarbonates.
Industrial wastes, domestic sewage and excreta of man and animals are the important sources of chloride in water. It is interesting to note that about 8-15 grams of sodium chloride (NaCl) is excreted by a person per day. Chloride cannot be removed biologically in treatment of waste as it is highly soluble with cations and does not sediment and precipitate.

It is harmless up to 1500 mg/l concentration but produces a salty taste at 250-500 mg/l.

Calcium (ca2+):
Calcium is the 5th most common element found in most natural water at levels ranging from zero to 100 mg/litre. Calcium contributes to the hardness property of water and taste. Results are usually reported as calcium hardness mg/litre equivalent to calcium carbonate. Source of calcium in water is the rocks, sewage and industrial wastes. At higher ph its concentration is decreased due to its precipitation as calcium, carbonate (cac03). High concentration in water causes lather formation with soap and not desirable in washing bathing and laundry. Scale formations take place along with magnesium in boilers. It coagulates with soap and makes dirty layers on sinks, tubes etc. Calcium with sulfate inhibits malt formation and with chloride it inhibits growth of yeast. While small concentrations of calcium are beneficial in reducing the corrosion in the pipes due to the formation of thin layer of scale.

It has also been found to antagonize the toxicity of lead, aluminum zinc and toxic solutions of sodium, magnesium and potassium chlorides.

Magnesium (mg2+):
It occurs in all waters along with calcium but generally its concentration is very low then that of calcium. The sources in the natural water are rocks, sewage and industrial wastes, magnesium causes hardness of water and along with calcium poses problem of scale formation in boilers. Concentration, as high as 500 mg/litre, imparts an unpleasant taste to the water. Magnesium combined with sulfate acts as texture tc human body.

Dissolved Oxygen (DO)
The lower value of do during summer may be due to loss of oxygen to the atmosphere at high Temperature and its utilization in fast decomposition of organic matter. The maximum amount of do was observed in monsoon due to aeration of water on account of rapid flow in winter solubility of oxygen increases with decrease in water temperature. The results are well in agreement with Jain, et. al., (1996).

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