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PHYSICO-CHEMICAL STUDY OF CHORGAON LAKE NEAR CHANDRAPUR, MAHARASHTRA, INDIA

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ABSTRACT:
India is blessed with natural resources of rivers, lakes, estuaries, and ponds. Lakes are naturally formed depressions filled with water and sometimes man made by construction of bunds across the depression and are used for irrigation, fishery development and recreation. The present paper deals with the monthly variation of physico-chemical characteristics of Chorgaon Lake. The studies were carried out for twelve months. Water quality assessment conducted in the Chorgaon Lake between February 2015 and January 2016. The main aim of study is to find out the water quality status of the lake. The lake water is free from pollution; all the physico-chemical parameters were within the permissible limit.

Keywords :- Chorgaon lake, Chorgaon, Physico- Chemical, Parameters COD and BOD.

INTRODUCTION :

A large number of reservoirs have come into existence in India after independence, as a part of developmental activities, to supply water to industries, irrigation, power generation and flood control measures. This area is continuously increasing with addition of more and more impoundments. Reservoir is a unique man-made biome where fluviatile and lentic conditions co-exist along with certain unique characteristics of their own. It is very essential and important to test the water before it is used for drinking, domestic, agricultural or industrial purpose. Water must be tested with different physico-chemical parameters. Selection of parameters for testing of water is solely depends upon for what purpose we going to use that water and what extent we need its quality and purity. The physical and chemical parameters exert their influence both individually and collectively and their interaction creates abiotic environment, which ultimately results the origin, development and succession of the biotic communities. About three fourth of earth's surface is hydrosphere. It has been estimated that hydrosphere contains about 1.46 × 109 cubic Kms. of water. Ocean, rivers, glaciers, lakes, ponds, streams etc. are the main sources of water. Marine ecosystems cover approximately 71% of the Earth's surface and contain approximately 97% of the planet's water.

The temperature is an important feature regulates various physico-chemical as well as biological activities. It is well known that the variation in air and water temperature may be due to location, topography and geography of the area duration of sun rays, light intensity turbidity of water, contact ground and wind velocity (Nath and De, 1998). Several investigators from abroad and India have contributed their efforts in studies of various aspects of physico-chemical conditions in fresh water, Gause (1932), Lindeman (1942), Khatavkar *et al.*, (1989), Reynoldson (1997), Chernoff and Dooley, (1979), Eromosele *et.al,*

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(1995), Patil and Tijare (2012), Sharma *et al.,* (2013) and Anbarasu and Anbuselvan (2017).

STUDY AREA:

Chorgaon is village in Chandrapur Taluka in Chandrapur District, It belongs to Vidarbh region in the state of Maharashtra. Chorgaon Lake situated near Chorgaon village 12 km. away from Chandrapur city. The storage capacity of the tank is 249.78 TCM. The catchment area is 1.140 Sq. Km around three sides of lake and the average rain fall 48.49 inches. Chorgaon has Latitude- 20°4'7.4' and Longitude -79° 22'40.4". Irrigation capacity is – 149.39 Ha.

MATERIALS AND METHODS :

The studies were carried out for 12 months from February 2015 and January 2016. The main aim of present study is to investigate the physico-chemical characteristics of water. Water samples for physico-chemical analysis were collected during 8:30 AM to 10:30 AM. Sample for dissolved oxygen was collected in 300 ml capacity BOD bottle and fixed by Winkler A and Winkler B solution at the site. The parameters like Temperature, pH and Conductivity were analyzed with the help of Thermometer and water analysis kit. Transparency was measured by Secchi disc. Physico-chemical parameters were analysed with the help of the procedures given in APHA (1998) and NEERI (1998).

RESULT AND DISCUSSION :

The studies were carried out for 12 months from February 2015 and January 2016 at Chorgaon Lake on physico- chemical parameters.

Water Temperature

In the present study, the annual average value of water temperature was recorded 28.48 ± 3.75°C during the year 2015-16. In general the average temperature decline from May to January and then slowly increased in lake water. Water Temperature in summer, was high due to low water level, high temperature and clear atmosphere. Similar observations are reported by Singh and Rai (1988) and Ahmed and Krishnamurthy (1990).

pH

In the present study, the annual average value of pH was recorded 7.59 ± 0.37 during the year 2015-16. The minimum pH value is recorded during winter and maximum during monsoon season. Similar observation was made by Adoni, (1975) decreasing volume of water due to evaporation was accompanied by progressive changes in pH.

Conductivity

In the present study, the annual average value of conductivity was recorded to be 0.220 ± 0.044 µmhos/ cm-1 during the year 2015-16. The minimum value of conductivity was recorded during winter season and maximum in during summer. Malathi (1999) had observed highest conductivity in summer which went on decreasing in monsoon and winter successively.

Transparency

In the present study, the annual average value of transparency was recorded 44.29 ± 8.53 cm. during the year 2015-16. The minimum value of transparency was recorded during monsoon season and maximum in during summer. Similar observation made by, Purshuramkar *et al.,* (2012) observed a minimum value of transparency during monsoon season and maximum in summer in Chulbandh reservoir.

Total alkalinity

In the present study, the annual average value of total alkalinity was recorded to be 44.88 ± 10.64 mg/l during the year 2015-16. Total alkalinity was recorded minimum in winter and maximum in summer. Similar observations were reported by Meshram and Dhande (2000) total alkalinity was recorded maximum in monsoon and minimum in winter in Wadali lake, Amravati.

Total hardness (Ca- Hardness and Mg-Hardness)

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In the present study, the annual average value of total hardness was recorded to be 57.38 ± 13.00 mg/l during the year 2015-16. The maximum total hardness was recorded in summer, monsoon and minimum in winter season. The annual average value of calcium hardness was recorded to be 37.96 ± 8.33 mg/l and the annual average value of magnesium hardness was recorded 20.38 ± 4.20 mg/l during the year 2015-16. The higher values of total hardness of water may be due to deposition of calcium and magnesium salt. This also supported by Bagde and Verma (1985).

Total solids

In the present study, the annual average value of total solids were recorded 381.50 ± 110.46 mg/l during the year 2015-16. The minimum total solids recorded during winter and maximum during the monsoon season. Khabade *et al.*, (2002) recorded maximum total solids during monsoon and minimum during winter and summer at Lodhe water reservoir, Tasgaon.

Total suspended solids and Total dissolved solids

In the present study, the annual average value of total suspended solids was recorded 258.17 ± 87.76 mg/l and the annual average value of total dissolved solids were recorded 127.75 ± 34.14 mg/l during the year 2015-16.The minimum TDS and TSS was recorded during winter and maximum in the monsoon season. Rana *et al.,* (1980) stated that the water contains both organic and inorganic dissolved solids which vary qualitatively and quantitatively with season. A high content of TDS and TSS elevates the density of water and such medium increase osmoregulation.

Dissolved Oxygen

In the present study, the annual average value of dissolved oxygen was recorded to be 6.57 ± 1.06 mg/l during the year 2015-16. The dissolved oxygen minimum value was observed during summer season and maximum during winter. Paka and Rao (1997) recorded the range between 2.82 mg/l to 13.6 mg/l from an Osmania University Pond, Hyderabad .

Free CO_2

In the present study, the annual average value of free CO_2 was recorded to be 4.40 ± 0.94 mg/l during the year 2015-16. The minimum CO_2 was during winter and maximum during monsoon. According to Shastri *et al.,* (1991) CO_2 enters the water partly from atmosphere and partly with the precipitation and other inputs, but largely due to infiltration through the soil as well as the metabolic activity of the organisms in the water.

Biological Oxygen Demand

In the present study, the annual average value of biological oxygen demand was recorded 5.71 ± 1.12 mg/l during the year 2015-16. The minimum BOD was during winter and maximum during summer. Similarly, Singh *et al.,* (2014) observed lowest BOD during winter and reported it to be due to lower temperature and in summer highest biological activities contributed to higher BOD values.

Chemical Oxygen Demand

In the present study, the annual average value of chemical oxygen demand was 28.91 ± 2.77 mg/l during the year 2015-16. The maximum value observed in winter season and minimum value was observed in monsoon season. Similarly, Sitre *et al.,* (2006) recorded maximum values in summer season and reported that COD is linked with heavy pollution from paper industries, domestic sewage and industrial effluents and reduced flow.

Phosphate

In the present study, the annual average value of phosphate was recorded to be 0.352 ± 0.117 mg/l during the year 015-16. The minimum phosphate was recorded during the winter season and maximum during summer and monsoon. Similarly reported by, Rajashekhar *et*

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al., (2007) stated that, the Phosphate values were maximum during pre-monsoon and minimum during post-monsoon in a minor reservoir Nadergul, District Ranga Reddy (A.P).

Sulphate

In the present study, the annual average value of sulphate was recorded 24.68 ± 3.59 mg/l during the year 2015-16. The minimum Sulphate was recorded during the winter season and maximum during monsoon and summer season. Similar observation made by, Shalini *et al.,* (2014) recorded sulphate average values was 50.91 mg/l. in Shahpura lake, Bhopal.

Nitrite

In the present study, the annual average value of nitrate was recorded 0.328 ± 0.099 mg/l during the year 2015-16. The minimum nitrate concentration was observed during winter season and maximum during monsoon season. Similar findings made by Rao (1972) had recorded an increase in nitrate concentration during monsoon, due to agricultural run-off from the catchment area.

CONCLUSION :

The seasonal and annual physico-chemical parameters data confines that slight changes have been observed in different seasons. More ever the important parameters like pH, alkalinity, DO, CO_2, BOD, COD, Sulphate, Phosphate and Nitrate values remain permissible level. The conclusion from the present investigation may be drawn that the all of the parameters were found within the permissible limit of ISI, ICMR, and WHO for human use. Choregoan Lake was not to be contaminated by human activities and no eutrophication affects aquatic life. Therefore water of the lake is useful for agriculture, irrigation and domestic purpose.

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