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Water quality status 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 is free from human activities, it is surrounded by a dense forest. The lake water is utilized for only wild life drinking. The studies were carried out for twelve months. Water quality assessment conducted in the Chorgaon Lake between February 2014 and January 2015. The main aim of study is to find out the water quality status of the lake. The main aim of study is to find out the water quality status of the lake. The parameters conducted were Temp., pH, Conductivity, Transparency, Hardness, Ca- hardness, Mg-hardness, TSS, TS, TDS, Dissolved Oxygen, Carbon dioxide, COD, BOD, Phosphate, Sulphate and Nitrate. The present study concluded that lake water is free from pollution, all the physico-chemical parameters were within the permissible limit.

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

INTRODUCTION

The study of Limnology is of great importance to human generation as the physico-chemical data and biological characteristics. Physical parameters of water are temperature, turbidity, suspended solids, color and odour.

Total dissolved solids, pH, alkalinity, hardness metals, organics and nutrients are chemical parameters of water. In aquatic ecosystem physico-chemical environment exert profound influence on its biotic components. It controls biodiversity, biomass and spatial distribution of biotic communities in time and space. 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.[1]

Today, with the rapid increase in population and over exploitation for different purposes, the quality of water has been deteriorating at an alarming rate, which ultimately results in depletion of aquatic biota. In many developing countries, governments are having difficulty, coping with fecal contamination and drinking water, the degradation of fresh water resources and hazardous waste pollution. Several investigators from abroad and India have contributed their efforts in studies of various aspects of physico-chemical conditions in fresh water, Gause [2], Lindeman [3], Khatavkar *et al.,* [4], Reynoldson [5], Chernoff and Dooley,[6] Eromosele *et.al,* [7], Patil and Tijare [8], Sharma *et al.,* [9] and Anbarasu and Anbuselvan [10].

METHODOLOGY

The studies were carried out for 12 months from February 2014 and January 2015. The main aim of present study is to investigate the physico-chemical characteristics of water. Sampling sites were chosen from the lake keeping in view the accessible area of the lake. Water samples for physico-chemical analysis were collected in five litter plastic cans 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 [11] and NEERI.[12]

RESULTS AND DISCUSSION

The studies were carried out for 12 months from February 2014 and January 2015 at Chorgaon Lake on physico- chemical parameters and are represented in table 4.1.1

Water Temperature

In the present study, water temperature ranged from 23.10°C to 34.80°C, minimum in the month of January and maximum in the month of May. 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 Trivedi and Goel[13] stated that temperature was higher in March and lower in November in water bodies of Satara.

pH

pH was alkaline values ranges from 7.01 to 8.30 Similar observations are reported by Yeole and Patil [26] reported the pH values in the range of 7.0 to 9.5 in Yedashi lake.

Conductivity

In the present investigation, the minimum conductivity was recorded 0.161 mmhos/cm and maximum 0.298 mmhos/cm. Khabade *et al.,*[14] observed the range of conductivity between 0.420 µmhos/cm to 0.604 µmhos/cm in Lodhe water reservoir, Tasgaon.

Transparency

In the present investigation, the minimum transparency 26.00 cm was recorded and maximum 54.00 cm. The low value of transparency in the month of August was due to high inflow of water from catchments resulting increased turbidity. Rama Devi [15] recorded the transparency between 50 cm to 70 cm in Alisagar Dam. Kadam *et al.* [16] reported the transparency range 30 cm to 105.5 cm from Masoli reservoir, Parbhani.

Total alkalinity

In the present investigation, the value of Total alkalinity ranged from 24.00 mg/l to 61.00 mg/l Similarly, Singh*, et al.,*[17]

Table: 4.1.1 Monthly variations of Physico-Chemical parameters of water in Chorgaon Lake, near Chandrapur during 2014-15

Sr. No.	Parameters	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Min.	Max.
1	**Temperature**	25.60	29.70	32.90	34.80	33.20	31.50	29.10	27.40	26.10	25.60	24.50	23.10	23.10	34.80
2	**pH**	7.22	7.32	7.46	7.66	8.01	8.30	8.20	7.35	7.22	7.01	7.12	7.18	7.01	8.30
3	**Conductivity**	0.245	0.251	0.265	0.278	0.298	0.256	0.231	0.198	0.173	0.161	0.175	0.185	0.161	0.298
4	**Transparency**	51.00	43.00	43.00	38.00	38.00	26.00	34.00	41.00	45.00	45.00	46.00	44.00	26.00	54.00
5	**Total Alkalinity**	46.00	48.00	52.00	58.00	61.00	56.00	53.00	42.00	30.00	32.00	28.00	24.00	24.00	61.00
6	**Total Hardness**	59.00	62.00	65.00	83.00	77.00	48.00	42.00	43.00	59.00	48.00	38.00	34.00	34.00	83.00
7	**Cal. Hardness**	37.00	40.00	42.00	55.00	51.00	30.00	26.00	30.00	39.00	30.00	26.00	22.00	22.00	55.00
8	**Mg. Hardness**	21.00	22.00	23.00	28.00	26.00	18.00	16.00	13.00	20.00	18.00	12.00	12.00	12.00	28.00
9	**T.S.**	300.00	431.00	442.00	593.00	428.00	623.00	512.00	332.00	320.00	316.00	309.00	255.00	255.00	623.00
10	**T.S.S.**	202.00	286.00	295.00	393.00	288.00	413.00	337.00	192.00	210.00	216.00	211.00	174.00	174.00	413.00
11	**T.D.S.**	98.00	145.00	147.00	200.00	140.00	210.00	175.00	140.00	110.00	100.00	98.00	81.00	81.00	210.00
12	**D.O.**	5.40	5.20	5.60	5.80	6.40	7.12	7.10	7.20	7.50	7.30	7.90	7.85	5.20	7.90
13	**CO_2**	3.05	3.45	4.70	5.10	5.60	5.10	5.16	4.30	3.68	4.55	3.12	3.10	3.05	5.60
14	**B.O.D.**	5.90	6.10	5.12	5.40	6.10	6.30	6.12	5.23	4.20	3.90	4.20	4.22	3.90	6.30
15	**C.O.D.**	29.00	27.00	22.00	21.00	23.00	25.00	28.00	27.00	23.00	29.00	31.00	33.00	21.00	33.00
16	**Phosphate**	0.210	0.310	0.412	0.490	0.510	0.480	0.512	0.345	0.241	0.210	0.241	0.209	0.209	0.512
17	**Sulphate**	23.00	25.00	32.00	34.00	28.00	26.00	19.00	21.00	24.00	26.00	23.00	21.00	19.00	34.00
18	**Nitrate**	0.210	0.255	0.289	0.310	0.460	0.455	0.429	0.380	0.360	0.290	0.265	0.240	0.210	0.460

(All parameter are in mg/l, except Temp = °C, Trans. = cm, Cond = µmhos/cm, pH)

recorded total alkalinity fluctuated between 366 to 790 mg/l throughout the year, with the highest value in the month of June 2015 in Silisher lake, Alwar.

Total hardness, Ca hardness and Mg hardness

In the present investigation, TH values ranged from 34 mg/l to 83 mg/l. Ca- Hardness values ranged from 22.00 mg/l to 55.00 mg/l. Mg- Hardness values ranged from 12 mg/l to 28 mg/l. 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.[18]

Total Solids, T.D.S and T.S.S .

In the present investigation, total solids ranged between 255.00 mg/l to 623.00 mg/l, total dissolved solids ranged between 174.00 mg/l to 413.00 mg/l, the total suspended solids ranged between 81.00 mg/l to 210.00 mg/l. Similarly, Shinde [19] reported a range value of total solids was recorded 459.13 mg/l to 399.54 mg/l of Harsool Savangi dam, Aurangabad.

Dissolved oxygen

In the present investigation, the minimum Dissolved Oxygen 5.20 mg/l was recorded and maximum 7.90 mg/l. Simillarly, Ravindra [20] recorded the range of D.O. between 7.61 to 9.61 mg/l and 7.58 to 9.12 mg/l from Mir Alam lake and Osmansagar reservoir, Hyderabad

Free CO_2

In the present investigation, the minimum CO_2 was recorded 3.05 mg/l and maximum 5.60 mg/l. Similarly, Rama Devi [15] recorded the range between 1.7 mg/l to 2.8 mg/l from Ali Sagar dam.

B.O.D and C.O.D

In the present investigation, the minimum value of BOD 3.90 mg/l was recorded and maximum 6.30 mg/l. Kumar *et al.,* [21] recorded BOD values from 55.92 to 61.22 mg/l in Telibandha pond, Raipur. In the present study, minimum value COD observed 21.00 mg/l and maximum 33.00 mg/l. Similarly, Bhatnagar *et al.,* [22] studied on Jhamri dam and recorded the value of C.O.D between 3.8 mg/l to 1.2 mg/l.

Phosphate

In the present investigation, a phosphate value was range between 0.209 mg/l to 0.512 mg/l. Similarly, Sisodia *et al.,* [23] recorded the range of phosphate between 0.22 to 0.69 mg/l and 0.32 mg/l to 0.74 mg/l from shallow and dipper zone of a tropical lake, Bhopal.

Sulphate

In the present investigation, the minimum value of Sulphate was recorded 19.00 mg/l and maximum 34.00 mg/l. Ramesh and, Krishnaiah [24] reported Sulphate found in the range of 32.0 mg/l to 63.2 mg/l, at all the sampling points within the desirable limit as per (BIS) standard in Bellandur lake, Bangalore.

Nitrate

In the present investigation, the minimum nitrate concentration was 0.210 mg/l and maximum nitrogen concentration was 0.460 mg/l recorded. Similarly, Gayatri *et al.*,[25] reported Nitrate values fluctuated between 72- 148 mg/l. Nitrate values were found high in all season probably due to domestic sewage and agricultural runoff of Satpala lake, Virar, Palghar, Maharashtra.

CONCLUSION

The monthly physico-chemical 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, but during rainy season T.S., T.D.S. and T.S.S. values were increased. Therefore the study concluded that Chorgaon lake indicate oligotrohic nature and there is no anthropogenic activities. Chorgaon lake untouched from domestic activities, It is surrounded by dense forest so the environmental condition of lake is good.

Conflicts of interest: The authors stated that no conflicts of interest.

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