



STUDY OF PHYSICO-CHEMICAL CHARACTERISTICS OF SARANGPURI LAKE, DIST-WARDHA (M.S.)

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Abstract:

People on globe are under tremendous threat due to undesired changes in the physical, chemical and biological characteristics of air, water and soil. Due to increased human population, industrialization, use of fertilizers and man-made activity water is highly polluted with different harmful contaminants. Physico-chemical characteristics study of Sarangpuri lake District-Wardha was carried out from year 2008-09. The water is used for irrigation of the field. The parameters studied includes ambient Temperature, water Temperature, pH, Conductivity, Transparency, Dissolved Oxygen, Free CO₂, Total Alkalinity, Calcium Hardness, Magnesium Hardness, TDS, TS, BOD, COD. The monthly analysis over the period of one year suggest that the lake water is suitable for drinking and Domestic purposes.

Keyword: Water, Physico - Chemical, Parameters, Hardness, BOD.

Introduction:

Water is one of the most important and abundant compounds of the ecosystem. All living organisms on the earth need water for their survival and growth. As of now only earth is the planet having about 70 % of water. But due to increased human population, industrialization, use of fertilizers in the agriculture and man-made activity it is highly polluted with different harmful contaminants. Natural water contaminates due to weathering of rocks and leaching of soils, mining processing etc. It is necessary that the quality of drinking water should be checked at regular time interval, because due to use of contaminated drinking water, human population suffers from varied of water borne diseases. The availability of good quality water is an indispensable feature for preventing diseases and improving quality of life. It is necessary to know details about different physico-chemical parameters such as temperature, Transparency, Hardness, pH, DO, CO₂, TDS, TS, BOD, COD, alkalinity used for testing of water quality.

Adequate level of dissolved oxygen is essential for the self purification process in natural water systems. The DO level may indicate the effect of oxidisable wastes on receiving waters. It also indicates the capacity of a natural body of water for maintaining aquatic life and may be derived from the atmosphere and photosynthetic activity of the aquatic plants. Carbon di-oxide is added to aquatic ecosystem by directly being mixed from atmosphere, In addition to this, the other sources are rain water, inflowing ground water and the respiration of aquatic flora and fauna. Biochemical oxygen Demand (BOD) is the amount of oxygen utilized by micro organism is

stabilizing the organic matter in aerobic condition DO measurement forms the basis of BOD analysis. It gives an indication of load of biodegradable organic materials present in the water body.

Organic matter in a sample also can be reacted directly with oxygen at a high temperature to produce carbon dioxide. Too much organic matter addition to the lentic and lotic system increases the levels of COD and changes the composition of oxygen requiring organisms variation in the organic matter in turn, changes in COD levels show diversity in the autotrophic and heterotrophic populations and decreases the productivity status. The energy budgets of the aquatic bodies also directly related to the levels of chemical oxidation in prescribed periods. (Dakshin and Soni, 1979). The present study deals with physico-chemical parameters of Sarangpuri reservoir during 2008-09.

Material and Methods:

Physical Parameters-

1) For measurement of Temperature, pH and Conductivity of water of Sarangpuri reservoir, portable digital water analysis kit was used and Transparency of water was measured by Secchi disc.

Chemical Parameters-

- 1) Dissolved Oxygen: Dissolved oxygen from water samples was determined by Wrinkler's iodide azide method.
- 2) Free Carbon Dioxide: Free carbon dioxide from water samples was determined by titrimetric method.
- 3) Alkalinity: Alkalinity of water was estimated by titrimetric method.
- 4) Total Hardness: Total hardness of water

samples was estimated by titrimetric method.

- 5) Calcium Hardness: Calcium hardness of water samples was estimated by titrimetric method.
- 6) Magnesium Hardness: Magnesium hardness of water samples was estimated by titrimetric method.
- 7) Total Solids, Total Dissolved Solids: Total Solids, Total Dissolved Solids and Total Suspended Solids were estimated by Gravimetric method.
- 8) Chemical Oxygen Demand (COD): For determination of chemical oxygen demand, titrimetric method was used.

Result and Discussion:

Physico-chemical parameters-

Monthly variation and annual average of the physico-chemical parameters analysed are represented in Table-1.1

Ambient Temperature-

In the present investigation, the ambient temperature ranged between 27.05°C to 43.50°C during the year 2008-09. The minimum ambient temperature was recorded in the month of January and maximum in May. Similar results were also observed by Lendhe and Yeragi (2004). Similarly Ganesan and Sultana (2009) stated that atmospheric Temperature ranged between 30 °C to 39 °C in Chropetlake. Aher *et al.*, (2007) observed Atmospheric temperature was higher in summer while lower in winter at Kagdipura swamp.

Water Temperature-

In the present investigation, the water temperature ranged between 22.00°C to 36.50°C during the year 2008-09. The minimum water temperature was recorded in the month of January and maximum in the month of May. Thakare *et al.*, (2002) recorded water temperature between 32.0°C to 37.0 °C in Dhamaswadi lake, Latur. Dhare and Gaikwad (2006) recorded the range of water temperature between 25.20 °C to 34.0°C in Karpara reservoir, Parabhani (M.S.)

pH-

In the present investigation, the pH ranged between 7.09 to 8.10 during the year 2008-09. The minimum pH was recorded in the month of January and maximum in the month of June during the year 2008-2009. Kulshrestha *et al.*, (1992) studied the Mansarovar reservoir and recorded the pH in range of 7.2 to 9.5. Kulkarni and Zade (2012) stated that the water was alkaline throughout the year with no definite seasonal variation.

Conductivity-

In the present investigation, the conductivity ranged between 0.198 μ mhos/cm to 0.430 μ mhos/cm during the year 2008-09. The minimum conductivity was recorded in the month of February and maximum in the month of July. These values are quite similar with Narayana *et al.*, (2008). Dutta and Bhagawati (2007) recorded the conductivity range between 12.00 to 15.5 μ mhos cm⁻¹ in December and 97.00 to 98.5 μ mhos cm⁻¹ in April from Ox-bow lake of Assam. Khabade *et al.*, (2002) observed the range of conductivity between 0.420 μ mhos/cm to 0.604 μ mhos/cm in Lodhe water reservoir from Tasg

Transparency-

In the present investigation, the transparency ranged between 25.00 cm to 60.00 cm during the year 2008-09. The minimum transparency was recorded in the month of June and maximum in the month of February. Similarly, Bobdey and Sawane (2012) stated that transparency is inversely proportional to the turbidity created by inorganic and organic matter, the range of transparency range between 110 cm to 80 cm in Gandhisagar lake. Pulle (2000) observed the transparency values in the range of 28.4 cm to 87.8 cm in Isapur dam and further reported that the transparency was maximum in month of May and minimum in August. Kadam *et al.*, (2007) recorded the range of transparency between 41.5 to 95.0 cm and 35.0 to 10.5 cm at two stations respectively, from Masoli reservoir, District Parabhani, Maharashtra.

Dissolved Oxygen (DO)-

In the present investigation, the dissolved oxygen ranged between 3.90 mg/ltr to 10.87 mg/ltr during the year 2008-09. The minimum Dissolved Oxygen was recorded in the month of May and maximum in the month of January. Jadhav *et al.*, (2012) stated that amount of DO in water is important source of oxygen for respiration of aquatic organisms and observed values of DO range from 5.2 to 8.2 mg / ltr at Bori reservoir. Thakor *et al.*, (2011) observed average DO 5.9 mg/ L during rainy season 5.4 mg/ltr during winter and 4.9 mg/ltr during summer season. Paka and Rao (1997) recorded the range of DO between 2.8 to 13.6 mg/ltr from Osmania University pond, Hyderabad

Free Carbon dioxide (Free CO₂)-

In the present investigation, the Free CO₂ ranged between 2.56 mg/ltr to 4.44 mg/ltr during the year 2008-09. The minimum Free CO₂ was recorded in the month of January and

maximum in the month of April. Similarly, Rama Devi (2007) recorded the range between 1.7 mg/ltr to 2.8 mg/ltr from Ali Sagar dam. Chouhan and Sharma (2007) reported a minimum CO₂, 4.40 mg/ltr in month of June and maximum 44.0 mg/ltr in month of August from a religious lake Budha Pushkar near Ajmer, Rajasthan.

Total Alkalinity-

In the present investigation, the total alkalinity ranged between 178.00 mg/ltr to 365.00 mg/ltr during the year 2008-09. The minimum total alkalinity was recorded in the month of March and maximum in the month of October. Similarly, Warhate and Chauhan (2012) observed range of alkalinity values 230.8 mg/ L to 370 mg/ ltr in an around MIDC area Chikhalathant near Naregaon. Kumar *et al.*, (2007) studied urban pond Telibandha, Raipur and reported alkalinity between 64.5 mg/ltr to 317 mg/ltr.

Total Hardness-

In the present investigation, the total hardness ranged between 73.00 mg/ltr to 157.00 mg/ltr during the year 2008-09. The minimum total hardness was recorded in the month of February and maximum in the month of May. Similarly, Thomas *et al.*, (2011) observed the range of total hardness 230 mg/L to 457 mg /L with no significant variation. Kulkarniet.al, (1995) reported the range of hardness between 76.3 ppm to 172 ppm in Sadatpur reservoir at Ahemadnagar

Calcium Hardness-

In the present investigation, the Calcium hardness ranged between 51.00 mg/ltr to 97.00 mg/ltr during the year 2008-09. The minimum Ca- hardness was recorded in the month of February and maximum in the month of July. Solanki (2006) reported Calcium content fluctuation between 21.66 pp to 66.44 ppm, average 39.86 ppm in Bellallake, Bodhan. Khobragade (2003) reported the calcium and magnesium hardness values in range of 56.11 to 160 mg/ltr and 36 mg/ltr to 104.2 m

Magnesium Hardness-

In the present investigation, the Magnesium hardness ranged between 22.00 mg/ltr to 68.00 mg/ltr during the year 2008-09. The minimum Mg - hardness was recorded in the month of February and maximum in the month of May. Solanki (2006) reported the Mg-hardness content varied between 32.74 to 99.46 ppm in Bellallake.

Total Solids (TS) and Total Dissolved Solids (TDS)-

In the present investigation, the TS ranged

between 540.00 mg/ltr to 925.00 mg/ltr during the year 2008-09. The minimum total solid was recorded in the month of February and maximum in the month of September. Trivedi *et al.*, (2007) reported that total solid between 85 to 410 mg /ltr at closed Beel of Kalyani industrial area of West Bengal. Khanna and Bhutiani (2003) recorded the average value of total solids as 558.89 mg/ltr from Sitapur pond at Haridwar. In the present investigation the TDS ranged between 403.00 mg/ltr to 602.00 mg/ltr during the year 2008-09. The minimum total dissolved solids was recorded in the month of January and maximum in the month of September. Marganwar *et al.*, (2012) observed TDS of Ambazari lake ranges from 252-260 mg/ltr with an average 258.6 mg/ltr and Futala lake 322-357 mg/ltr with an average 336.3 mg/ltr.

Biochemical Oxygen Demand-

In the present investigation the BOD ranged between 4.46 mg/ltr to 12.98 mg/ltr during the year 2008-09. The minimum BOD was recorded in the month of November and maximum in the month of May during year 2013-2014. Kumar *et al.*, (2007) recorded B.O.D. values from 55.92 to 61.22 mg/ltr in Telibandha pond, Raipur. Anita *et al.*, (2002) recorded the range of B.O.D. from 0.4 to 26 mg/ltr in Mir Alam Lake, Hyderabad.

Chemical Oxygen Demand-

In the present investigation the COD ranged between 16.20 mg/ltr to 37.50 mg/ltr during the year 2008-09. The minimum COD was recorded in the month of September and maximum in the month of January. Similarly, Ingole *et al.*, (2009) observed values of COD between 1.9 to 8.15 mg/L and stated that COD is a measure of oxygen equivalent to the requirement of oxidizing matter content by strong organic oxidizing agent. Mohan *et al.*, (2007) worked on Naya Talab, Jodhpur and recorded the values of C.O.D. between 535.00 mg/ltr to 88.00 mg/ ltr

In present investigation Sarangpuri lake water was in permissible limit during the monthly analysis over the period of one year and suggests that the lake water is suitable for drinking and Domestic purposes.

Water of good quality is required for living organisms. The quality of water is described by its physical, chemical and microbial characteristics. But, if some correlations were possible among these parameters, then significant ones would be fairly useful to indicate the resources as usually described according to its physical, chemical and

biological or bacteriological characteristics. Therefore it is necessary that the quality of water should be checked at regular time interval, because due to use of contaminated drinking water, human population suffers from varied of water borne diseases. It is difficult to

understand the biological phenomenon fully because the chemistry of water reveals much about the metabolism of the ecosystem and explain the general hydro - biological relationship (Basavaraja Simpi *et al.* 2011).

Table 1.1 : Monthly Values of Physico-chemical Parameters of Sarangpuri lake During Year 2008-2009

Sr. No.	Parameters	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Min	Maxi
1	Ambient Temperature	40.30	38.62	37.50	34.20	34.90	33.20	30.10	27.60	37.10	38.90	41.90	44.80	27.60	44.80
2	Water Temperature	33.10	30.20	32.10	27.30	27.60	27.50	25.40	23.40	25.60	30.90	33.10	36.50	23.40	36.50
3	pH	8.10	8.05	8.12	7.85	7.75	7.60	7.12	7.23	7.28	7.46	7.98	8.05	7.12	8.12
4	Conductivity	0.365	0.398	0.420	0.356	0.289	0.310	0.301	0.289	0.198	0.254	0.260	0.289	0.198	0.420
5	Transparency	28.50	29.00	29.50	31.50	34.50	39.00	40.00	55.50	59.50	45.00	53.20	46.50	28.50	59.50
6	D.O.	5.10	5.50	5.80	6.40	6.80	7.90	9.80	10.60	8.50	7.45	6.54	4.50	4.50	10.60
7	Free CO ₂	4.12	3.50	3.12	4.12	3.65	2.90	2.86	2.45	3.20	4.23	3.52	4.12	2.45	4.23
8	Total Alkalinity	296	310	345	365	345	295	250	235	235	186	245	356	186.00	365.00
9	Total Hardness	122	126	145	156	125	121	98	86	75	98	125	154	75.00	156.00
10	Ca-Hardness	86	97	101	106	97	85	74	63	59	63	78	84	59.00	106.00
11	Mg-Hardness	36	29	44	50	28	36	24	23	16	35	47	70	16.00	70.00
12	TS	760	856	895	936	856	745	689	545	530	645	689	679	530.00	936.00
13	TDS	534	569	610	645	580	526	465	403	421	468	508	487	403.00	645.00
14	BOD	8.12	7.30	6.50	6.02	5.20	4.89	4.65	5.98	8.94	9.45	11.23	12.50	4.65	12.50
15	COD	19.50	18.20	16.50	15.30	21.50	27.60	32.40	34.51	32.50	31.20	34.60	35.90	15.30	35.90

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