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STUDY OF CHANGES IN PHYSICO- CHEMICAL CHARACTERSTICS OF ASHTI LAKE, DISTRICT WARDHA, MAHARASHTRA, INDIA

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ABSTRACT:

The present study was aimed to estimate the current status of Physico-chemical characteristics of Ashti lake in Wardha district, Maharashtra in period January 2023 to December 2024. Changes in Physico-chemical parameters such as Ambient temperature, Water temperature, PH, Conductivity, transparency, Total dissolved solids, Free CO_2, Alkalinity, Total hardness, Chlorides, Phosphates, Dissolved oxygen, Biological oxygen demand, Chemical oxygen demand were analyzed for one year 2023 to 2024.

The results of the present study indicate that all the physical and chemical properties of Ashti lake water were within desirable limits. Favorable changes were observed in concentration of Total dissolved solids, Total hardness, chlorides, Nitrates, Phosphates, Dissolved oxygen and Biological oxygen demand. The seasonal analysis over the period of one year suggest that the lake water suitable for drinking purpose.

Keywords:- Physico-chemical, Ashti lake, Water, Parameters.

INTRODUCTION :

Water is an essential element for the life of organism on this planet. The organism either plant or an animal cannot live without water. The great solvent power of water makes it is unnecessary that water is always pure. Even the highest quality of distilled water contains dissolved gasses to a slight degree. The problem is therefore, is one of determining what quality of water is needed to meet a given purpose an then trying to achieve that quality. The problem is further enhanced because to every use which water is put like washing, irrigation, flushing away wastes, cooling, industrial production, etc. adds something to water. In fact for centuries, rivers and lake have been used as dumping grounds for garbage, human waste and industrial wastes of which many of them are highly toxic. Added to this are the materials leached and transported from land by water percolating through the soil and running off its surface to aquatic ecosystem.

In simple we can define water pollution as aquatic contamination which is not suitable for human needs. Normally water contains two kind of impurities, dissolved material and suspended particles. Dissolved materials are gasses like hydrogen sulphide, carbon dioxide etc and minerals like calcium, magnesium and other salts and suspended matter includes clay, slit, sand and microbes. In India still now several researchers have done study on physico-chemical and biological characteristics of standing and running water resources (Ingole and Ambekar 2013). The present investigation deals with physico-chemical characteristics of Ashti lake during 2023-2024.

MATERIAL AND METHODS-:

Physical Parameters:

1)Ambient and Water temperature: For measurement of temperature of water Simbhora reservoir, Thermometer of portable digital analysis kit was used.

2)pH: For the measurement of pH, portable digital water analysis kit was used.

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3) Conductivity: For the measurement of conductivity, portable digital analysis kit was used.

4) Transparency: The transparency of water was measured by Secchi's 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. Magnesium Hardness: Magnesium hardness of water samples was estimated by titrimetric method.
6. Total Solids, Total Dissolved Solids and Total Suspended Solids were estimated by Gravimetric method.
7. Biochemical Oxygen Demand (BOD): For the determination of biochemical oxygen demand, titrimetric method was used.
8. Chemical Oxygen Demand (COD): For determination of chemical oxygen demand, titrimetric method was used.
9. Chemical Oxygen Demand (COD): For determination of chemical oxygen demand, titrimetric method was used.

RESULTS AND DISCUSSION:

Physico-chemical parameters:

Seasional variation and annual average of the physico-chemical parameters analysed are represented in – Table 1

Ambient Temperature:

In the present investigation, ambient temperature ranged from 28.00Oc to 42.00Oc. Seasonally, Maximum ambient temperature (atmospheric temperature) was recorded in summer, moderate in monsoon and minimum in winter season, similar results were reported by Bhagwi rasakatal et al. (2023) observed Atmospheric Temperature was higher in summer while lower in winter at fresh water lake in Nizamabad District Telangana State.

Water Temperature:

In the present investigation, water temperature ranged from 21.12 O c to 36.20 O c. Seasonally, Maximum water temperature was recorded in summer, moderate in monsoon and minimum in winter season Thakreet et al ., (2002) recorded water temperature between 32.00oC to 37.00oC in Dhamaswadilake, Latur. Dhere and Gaikwad (2006) recorded the range of water temperature between 25.20oC to 34.00oC in Kharpara reservoir, Parbhani (M.S.)

pH:

In the present investigation, pH value ranged from 7.09 to 8.12, Seasonally, the maximum pH was recorded during summer seasion and minimum in winter and rainy season Bhagavi rasaktala et al. (2023) recorded pH value ranged from 7.1 to 8.4 at all station pH value maximum in the month of May during Summer season and minimum in the August during rainy season.

Conductivity:

During the present study, conductivity fluctuated between 0.180 megohm/cm to 0.435 megohm/cm. seasonally: the maximum conductivity was recorded in monsoon and summer season and minimum during winter. Similarly, these values are quite similar with Dhanaji Kanase et al (2016) in drinking water samples of different places in Kalegaon Tahasil, Maharashtra.

In the present investigation, the minimum conductivity found in rainy season and Maximum conductivity found in summer may be due to high evaporation rate and discharge of domestic effluents and organic matter. The seasonal variation in conductivity may be due to increase in concentration of salts entering into the lake with sewage.

Transparency:

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In the present investigation, Transparency value ranged from 41.05 cm to 85.00cm, seasonally, minimum transparency was recorded during monsoon season and maximum during Winter season, Similarly, Kadam et al. (2007) recorded the range of transparency between 41.5 to 95.0 cm and 35.0 to 85.0 cm at two stations respectively, from Masoli reservoir, District Parbhani, Maharashtra.

Transparency is a characteristic of water that varies with the combined effect of colour and turbidity. Light penetration is in fact depends partly on the light flux but mainly on the optical properties of water. The lower transparency value shows high pollution load.

Dissolved Oxygen:

In the present Investigation, dissolved oxygen value ranged from 4.85mg/ltr to 9.40 mg/ltr, seasonally, minimum dissolved oxygen was recorded during monsoon season and maximum during winter season. Khanna and Bhutiani (2003) reported the maximum values of D.O. in winter and minimum in summer from Sitapur pond, Hardwar and further stated that the maximum Dissolved Oxygen was due to phytoplankton activity. The higher values of Dissolved Oxygen during post monsoon may be due to circulation of oxygen by cooling and draw down of Dissolved Oxygen in water (Hannan, 1979)

Free Carbon Dioxide:

In the present investigation, Free CO2 value ranged from 2.70 mg/ltr to 4.70 mg/ltr, seasonally, maximum free CO2 was recorded in monsoon and summer and minimum in winter. Bandela et al (1998) have recorded maximum CO2 level in summer and minimum in winter. In the present investigation, high values recorded during summer season may be due to increase in atmospheric temperature and biological oxidation of organic matter. However. Low values of free CO2 during winter may be due to decreased water temperature and maximum utilization of CO2 by more algal blooms in winter.

Alkalinity:

In the present investigation, Alkalinity values ranged from 109.00mg/ltr to 335.00mg/ltr, Seasonally, total alkalinity was recorded maximum in monsoon, summer and minimum in winter, similar Wasudha et al. (2012) total alkalinity were observed maximum in winter and summer season due to high temperature while minimum during monsoon due to high dilution of water. Thakor et al. (2012) observed average values of alkalinity 110mg/ltr during rainy season, 115mg/ltr during winter season 136mg/ltr in summer season.

Total Solids:

In the present investigation, Total solids values ranged from 525.02 mg/ltr to 948.00mg/ltr, seasonally, Total solids values were maximum during monsoon and minimum during winter. Khanna and Bhutiani (2003) recorded the average value oftotal solids as 558.89 mg/ltr from Sitapur pond at Haridwar. Khabade et al (2002) recorded maximum total solids during monsoon and minimum during summer at Lodhe water reservoir, Tasgaon, Maharashtra.

Total Dissolved Solids:

In the present investigation , the value of total dissolved solids ranged between 308.00 mg/ltr to 678.00 mg/ltr. The maximum seasonal value observed in monsoon season and minimum value in winter season. Rana (1991) observed Total dissolved solids in the range from 150 to 850 mg/ltr in the lake Udaisagar, Udaipur. In the present investigation high values of Total solids and Total dissolved Solids during monsoon may be due to siltation, deterioration, heavy precipitation and low values during winter may be attributed to low rate of evaporation and settling of slit.

Biochemical Oxygen Demand:

In the present investigation, the minimum value of BOD was recorded 4.62mg/ltr to 13.65mg/ltr.

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Seasonally , the maximum BOD was recorded in summer season and minimum during winter season. Subhashini and Sardhamini (2004) observed BOD value was lowest during January 2.32 mg/ltr and highest value in May 20 mg/ltr. Reddy et al. (2009) stated BOD is the requirement of oxygen needed for biological degradation of organic materials, BOD determines the strength of sewage, effluents and other polluted waters.

Chemical Oxygen Demand:

In the present investigation, the minimum value of COD 7.57mg/ltr was recorded and maximum 10.09mg/ltr. Seasonally, COD values were minimum during winter season while maximum in summer, similarly Bharatnagar et al (2007) studied on Jhamari Dam and recorded the value of COD between 3.8mg/ltr to 6.09mg/ltr. Telkhade et al (2008) studied on Neri Nala Durgapur, Chandrapur and reported maximum COD 11.18mg/ltr in the month of march and minimum 8.2mg/ltr in the month of August from different sides.

In the present investigation, COD values were minimum during winter season due to settlement and dilution effect while maximum in summer may be due to less quantity of water, death and decay of aquatic flora and fauna.

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Table-1 : Seasonal variations of Physico-chemical parameters in Ashti lake during Year 2023-2024

Sr. No	**Parameters**	**Summer 2023**	**Monsoon 2023**	**Winter 2024**	**Total**
1.	Ambient Temp.(oC)	38.74+_5.20	37.40+_2.34	31.25+_2.80	35.79+_3.44
2.	Water Temp (oC)	33.90+_3.70	29.87+_2.54	25.78+_2.37	29.85+_2.87
3.	pH	7.64+_0.34	8.09+_0.07	7.22+_0.20	7.65+_0.61
4.	Conductivity megohm/cm	0.236+_0.038	0.379+_0.01	0.236+_0.012	0.283+_0.15
5.	Transparency (cm)	54.60+_5.12	29.18+_1.28	48.09+_9.82	43.95+_5.40
6.	D.O (mg/ltr)	6.38+_1.56	5.82+_0.45	9.34+_1.76	7.18+_1.25
7.	Free CO2 (mg/ltr)	4.12+_0.28	3.42+_0.43	3.16+_0.46	3.56+_0.39
8.	Alkalinity (mg/ltr)	254.00+_56.42	290.20+_42.12	272.56+_42.35	272.25+_46.96
9.	Total Solids (mg/ltr)	643.18+_50.07	840.23+_42.80	712.70+_102.09	732.03+_ 64.98
10	T. D.S (mg/ltr)	472.65+_32.76	860.76+_42.86	490.42+_80.68	607.94+_52.1
11.	BOD (mg/ltr)	12.10+_1.92	7.06+_0.72	5.22+_0.76	8.12+_1.13
12.	COD (mg/ltr)	34.12+_2.34	16.42+_1.54	30.45+_4.56	26.99+_2.81

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