IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

STUDY OF PHYSIOCHEMICAL CHARACTERISTIC OF SAKHARE LAKE FROM DAHANU TALUKA OF PALGHAR DISTRICT, MAHARASHTRA

Mr. Rahul N. Ozare[1], Dr. Pankajkumar K. Gogari[2],

Sonopant Dandekar Shikshan Mandals's M.H Mehta Sr.Science college, Palghar-401404

Abstract

Water is one of the most prevalent chemicals and comes in a variety of forms. Lakes are critical lentic freshwater habitats, with water quality influenced by a variety of environmental and seasonal factors. Three sites were chosen based on anthropogenic interference, and physio-chemical parameters of surface water were studied for the sixth month of the year 2020. Different physio-chemical characteristics utilized for water quality testing, such as temperature, pH, Turbidity, Hardness, Alkalinity, DO, BOD, COD, Phosphate, Chloride, Nitrate-Nitrogen, Nitrite-Nitrogen, Ammonia-Nitrogen, Silicate, must be understood in detail.

Drinking water is an essential component for all living things. Lake water is a vital natural resource that contributes to human health, economic prosperity, and ecological diversity.This research will help raise public awareness about the importance of maintaining a healthy and environmentally friendly environment. These bodies of water are extremely valuable, and their water should be protected from pollution.

Introduction

Water is a primary natural resource and a basic need for most species. Lakes are defined as a body of standing water that occupies a basin and is not connected to the sea. Fisheries, drinking water, scenic beauty, power generation, increased property values, and great systems for ecological studies are all provided by lakes of various sizes.Water quality features offer the base for analysis suitability of water for different uses and improve the present conditions(Dey et al., 2021).Lakes are a vital component of the natural environment, defining both the topography and the ecosystem's functioning. Lakes have become the focus of environmental research during the last few decades due to their vast diversity in terms of genesis, geographical position, hydrological regimes, and substrate features. Water quality is determined by a variety of abiotic and biotic variables that are part of the ecosystem. By the end of the century, withdrawals for agriculture have increased slightly whereas industrial withdrawals have probably doubled (World watch Institute, 1999).

Abiotic variables are usually the governing forces of the environment, influencing the well-being of species, their distribution, and the ecosystem's functioning.Water crisis due to Industrialization, Urbanization, Development activities and population explosion(Jindal et al., 2014). The purpose of this study is to evaluate the water quality of Sakhare Lake, which is an important water resource and the source of livelihood for a huge population in the Palghar district of India. However, a number of studies have been conducted in the Sakhare Lake watershed to identify zooplanktons, molluscan fauna, 8 diversity of aquatic insects, 9, 10 aqua status11, and diversity of fishes12. According to reports, the lake's diversity is dwindling.

12 The current study examines the lake's water quality using physiochemical measures such as dissolve oxygen, conductivity, pH, and total alkalinity.

Material and method

Study Area: Sakhare lake, Dahanu taluka

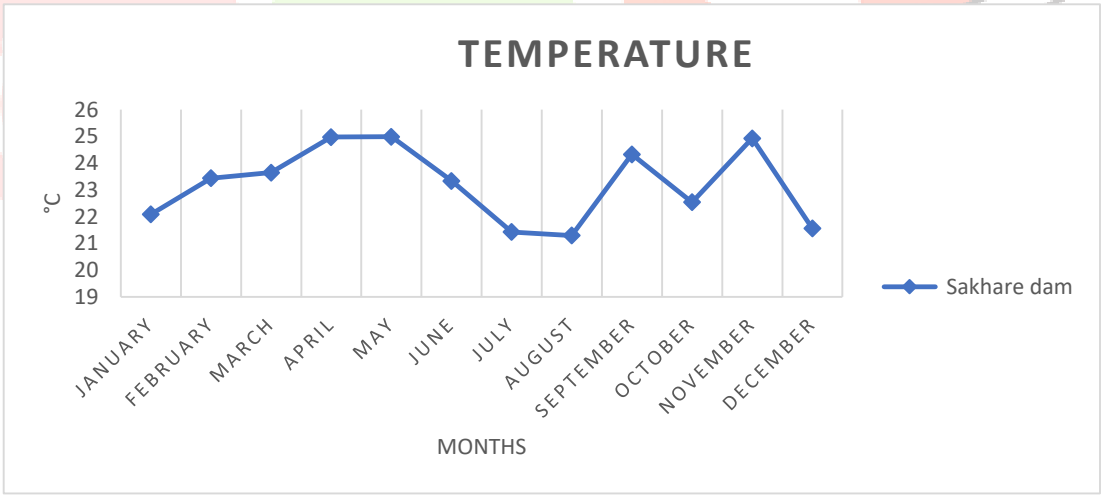
Physiochemical study was conducted for the a period of one year from 1st January 2021 to 30th December 2021

Sample collection: Water sample were collected in sterile, clean glass stoppered sampling bottles from the site of lake. For sampling of water, glass bottles were sterilized with potassium dichromate solution overnight and rinse with distilled water carefully for further analysis (Sudhir B., 2013). some of the hydrobiological parameters were analysed on the spot, while others were brought to the laboratory under ideal condition.

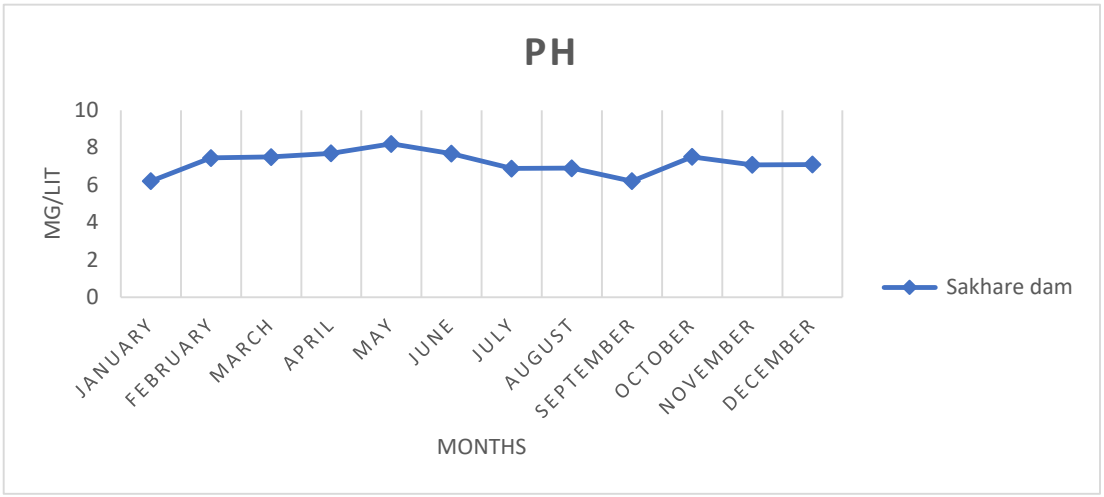
Sample analysis: In the physiochemical study of lake water, parameters include Temperature, PH, Turbidity, Hardness, Alkalinity, Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Phosphate, Chloride and Nitrate-Nitrogen,Nitrite-Nitrogen, Ammonia-Nitrogen, Silicate were estimated.

RESULT AND DISCUSSION

Water Temperature: Water temperature range of lake surface during the study period was 21.3°c to 24.99°c. in the month of August, the lowest water temperature was recorded i.e. 21.3°c while May was the month with the highest temperature i.e. 24.99°c. Temperature start to drop from June to December and again increase from January to May due to environmental conditions. All environmental factors affects on biological properties of water .Arise in temperature of the water leads to the speeding up of the chemical reactions in water,reduces the solubility of gases and amplifies the tastes and odours (Karim and Panda, 2014)

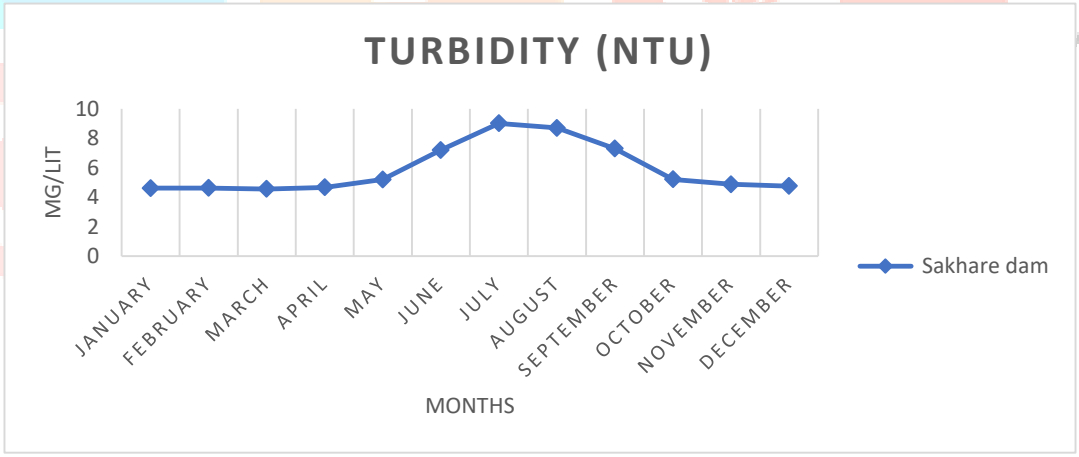


PH: Because pH is a major role in most biochemical interactions, the pH of water is an essential water quality measure. Industrial, agriculture and domestic water pollution affects the pH of lake water. During the analysis, the pH in the Lake Sakhare varied from 6.21to 8.2 The pH of natural water is often between 4.4 and 8.5. The maximum pH value measured during the examination period was 8.2, while the lowest was 6.21. The pH of water is important because many biological activities can occur only within a narrow range.(Trivedi et al., 2010). was observe that maximum pH in the months of May which indicates high rate of photosynthesis in water. The pH of Lake Sakhare was shown to be considerably positive connected with free CO2 and phosphate, while total alkalinity, dissolved oxygen, and nitrate were found to be strongly negative correlated.

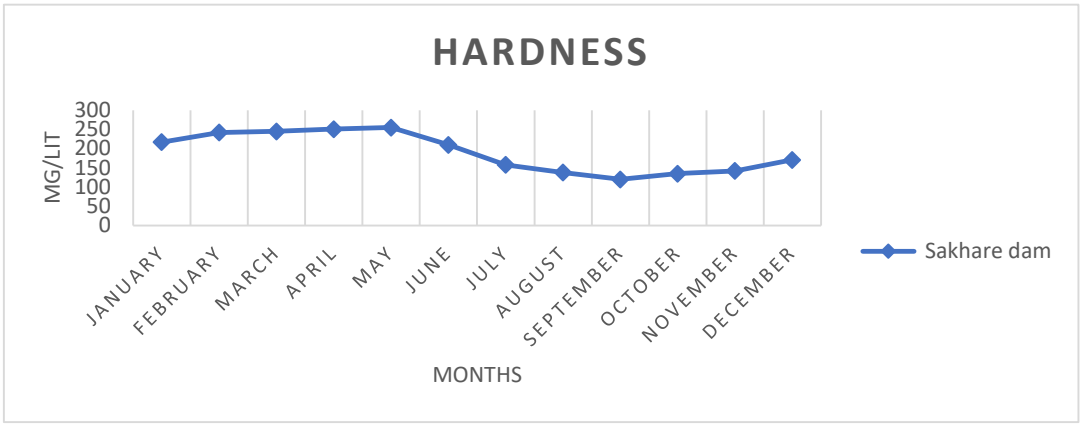


Turbidity: The highest levels of water turbidity were observed in July, with values of 9.02NTU. Human activity, a drop in water level, and the presence of suspended particle matter could all contribute to excessive turbidity. The lowest values4.56NTU were recorded in March. During the winter and summer seasons, silt and clay settle, resulting in minimal turbidity, whereas during the rainy season, clay, silt, and other suspended particles contribute to turbidity levels.

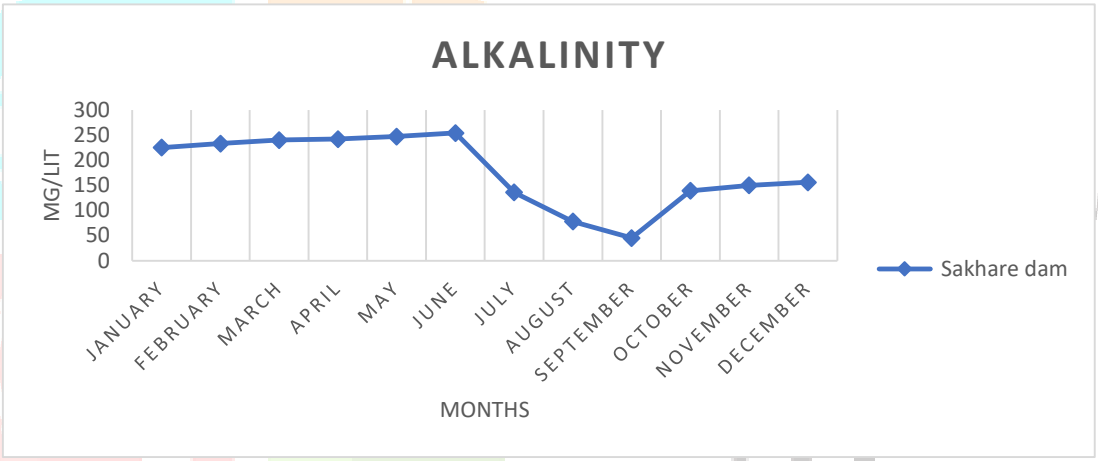
Turbidity in natural waters restricts light penetration thus limiting photosynthesis, which consequently leads to depletion of oxygen content (Ramchandra, 2007. The intensity of light scattered by the sample in specified settings compared to the intensity of light scattered by a standard reference suspension in the same situation. The turbidity increases as the intensity of scattered light increases.



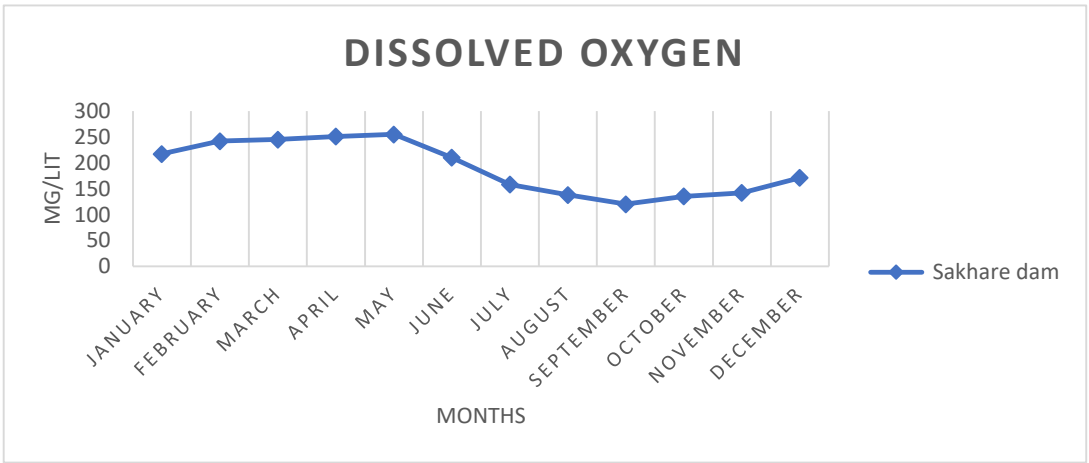
Hardness: Hardness is induced by the presence of calcium and magnesium dissolved salts. It's measured in parts per million (ppm) or milligrams per litre (mg/L). The maximum hardness of the lake water was found in the month of May, the value detected were 255mg/L. The hardness of water is not a pollution parameter but indicates water quality(Giripunje and Meshram, 2017)Minimum hardness 120mg/L were detected in the month of September. The sort of hardness in the water was investigated further as transient and permanent. The bicarbonates of calcium and magnesium that cause temporary hardness in the water whereas the chlorides and sulphate of calcium and magnesium that cause permanent hardness in the water.



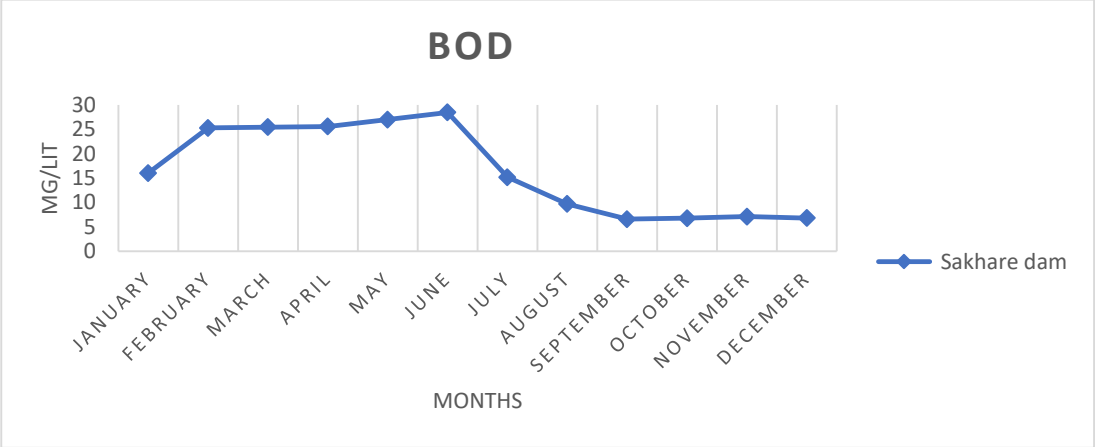
Alkalinity: The capacity of water to buffer or neutralize an acid is measured in alkalinity. It is caused by the presence of anions such as carbonates, bicarbonates, and hydroxides, which reduce H+ ions and raise the pH of water. By modifying the pH of the soil, irrigation of land with very alkaline water may result in a drop in crop production. Alkalinity ranges from minimum 45mg/L to maximum 254mg/L, in the one year study of lake water. The highest value (254mg/L) was recorded in June and the lowest value (45mg/L) recorded in September.Higher values of alkalinity registered during summer might be due to the presence of excess of free CO2 product as a result of decomposition process coupled with the mixing of domestic waste(Patil et al., 2012)



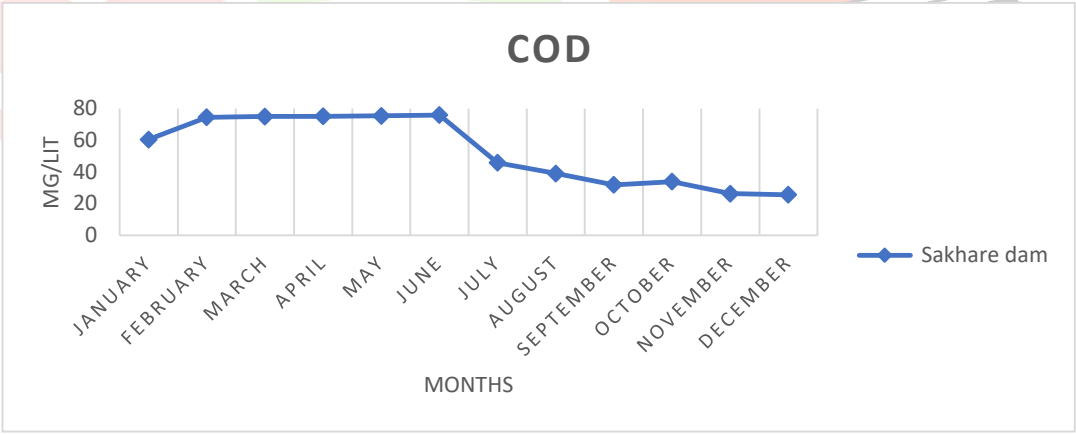
Dissolved oxygen : At 0°C to 25°C, the solubility of dissolved oxygen in natural water bodies typically ranges from 15 mg/L to 8 mg/L. The highest levels of Dissolved Oxygen were detected in July and August with readings of 5.1mg/L. The lowest Dissolved Oxygen was recorded in September, with a reading of 3.6 mg/L. The amount of dissolved oxygen in lake water is considerably correlated with transparency and significantly negatively correlated with temperature, conductivity, turbidity, and free oxygen.CO2, nitrate, and phosphate concentrations. The dissolved oxygen play a role of regulator of metabolic the seasons with the highest concentration in summer and the lowest in winter.(Lianthuamluaia et al., 2013)



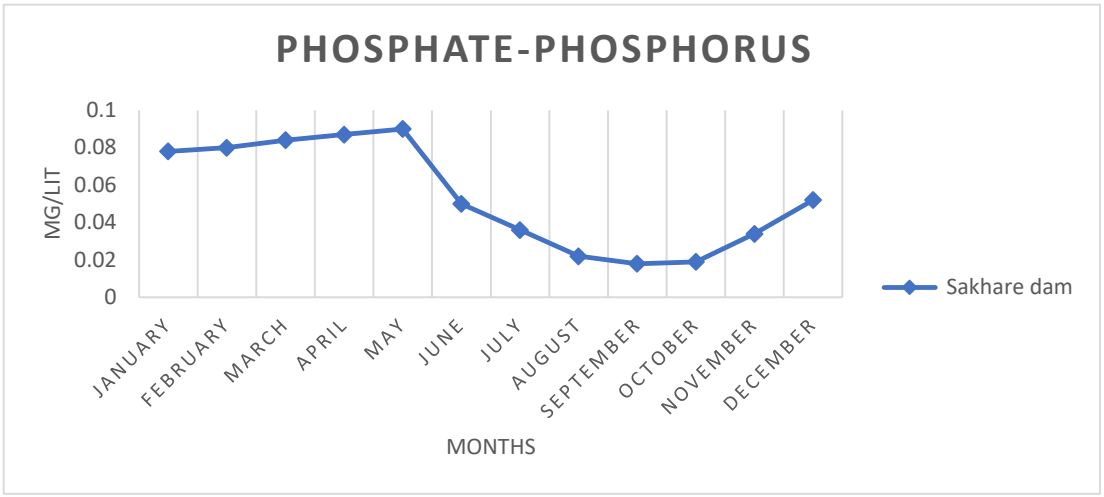
Biological oxygen demand: The amount of contaminant in a water body is measured by Biological Oxygen Demand. BOD refers the oxygen used by the microorganism in the aerobic oxidation of organic matter(Verma et al., 2012). As a result, microorganisms in water demand a greater amount of oxygen to degrade it. Biological Oxygen Demand is a unit of measurement for organic material contamination in water, measured in milligrams/L. The amount of dissolved oxygen necessary for the biological degradation of organic molecules and the oxidation of some inorganic materials is referred to as BOD. In Sakhare lake maximum biological oxygen demand observed in the month of June which was ranges 28.5mg/L. Minimum value was detected 6.6mg/L in the month of September.



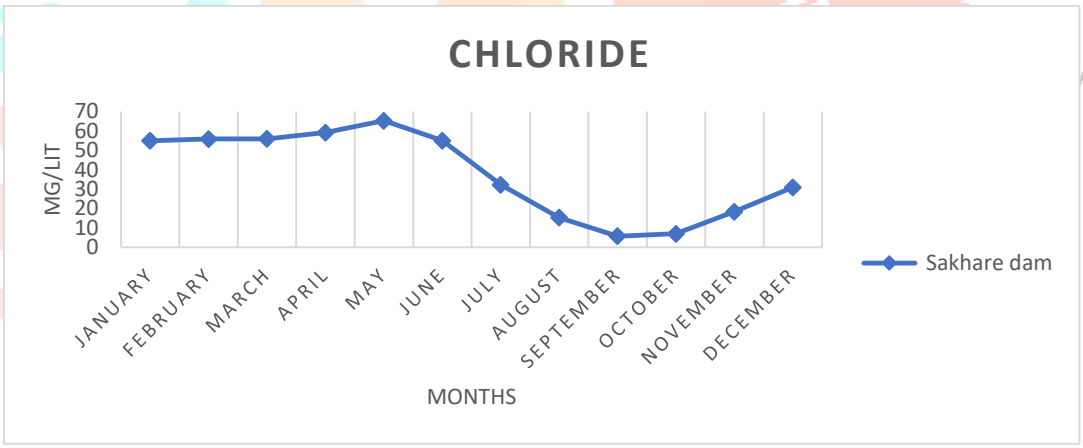
Chemical oxygen demand: The oxygen demand of biodegradable pollutants, as well as the oxygen demand of non-biodegradable oxidisable pollutants, is measured using the COD test. Chemical oxygen demand is a water quality indicator that measures not only the number of biologically active substances such as bacteria, but also biologically inactive organic matter in the water. Both BOD and COD are important markers of a surface water supply's environmental health. Chemical oxygen demand (COD) is a measure of the oxygen equivalent of the organic matter content of water that is susceptible to oxidation by a strong chemical oxidant (Sakhare et al,. 2014sw).They're routinely employed in waste water treatment, but they're only used in general water treatment on rare occasions. COD of Sakhare lake was observed maximum75.85mg/L in the month of June and minimum 25.5mg/L in the month of December.



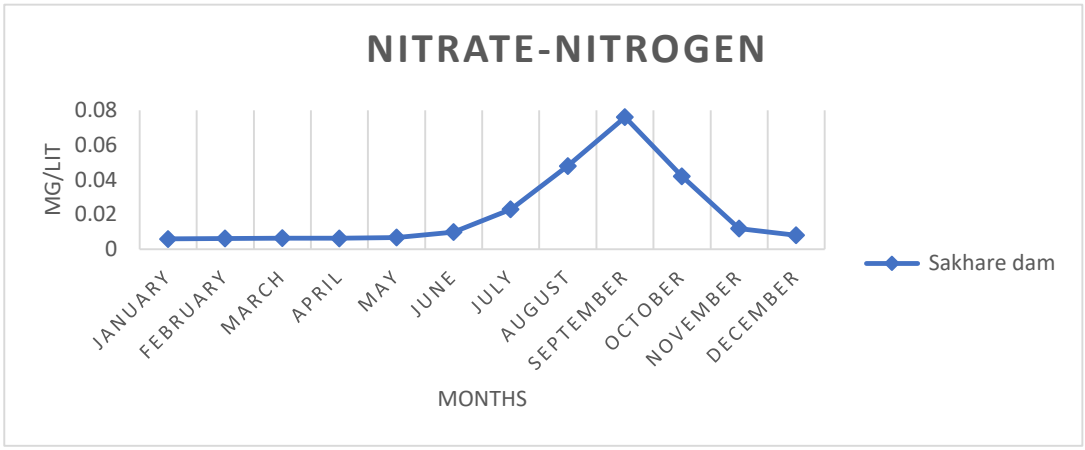
Phosphate: Phosphate is required for organism growth and, in general, affects primary productivity in water. Phosphate concentrations were observed highest in May, with values of 0.09mg/L. The lowest levels of phosphate observed, 0.018mg/L in September. The phosphorous contents (orthophosphate and acid hydrolysable phosphate) in water may be due to the geological reasons and human activity, particularly from the Detergents(Khuhawar et al., 2009). Phosphate has a positive significant link with water, pH and turbidity but dissolved oxygen, alkalinity, and nitrate levels have a negative significant correlation.



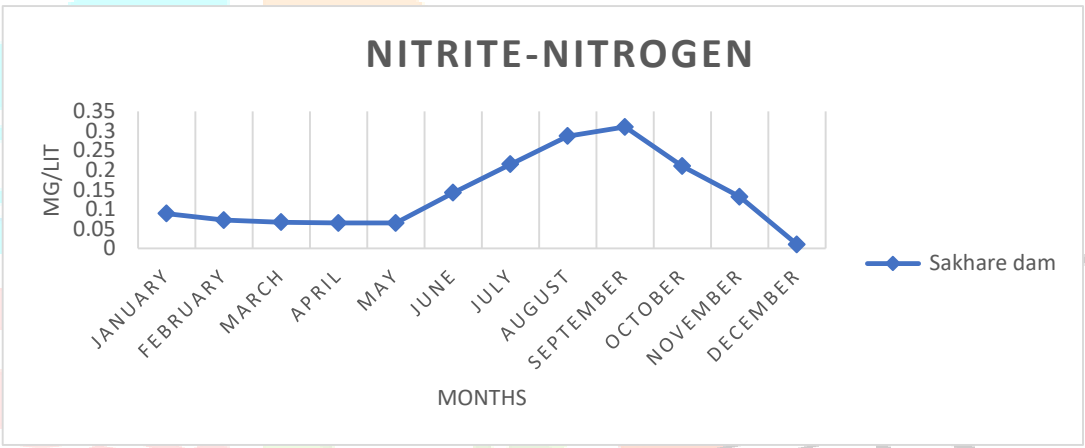
Chloride: Chloride ions are found in water in the form of various salts. NaCl, KCl, MgCl2, and CaCl2 are the most prevalent salts. They are particularly water soluble. Chloride in water can come from either natural or man made sources. Surrounding rock or soil, as well as seawater intrusion in coastal areas, are natural sources. Fertilizers, road salting, industrial wastewater, animal feeds, septic tank effluents, and other human sources are examples.(Purohit et al., 1990) The high chloride concentration of the lake water may be due to high rate of evaporation or due to organic waste of animal Origin(Prasad et al., 1985). The contamination of chloride-rich sewage and municipal waste effluent may cause high chloride levels in water. Excess chloride, on the other hand, gives water a salty taste, and people who aren't used to excessive chloride experience a laxative effect. 65.2mg/L was the maximum value of chloride estimated in May and minimum value 5.81mg/L was found in the month of September.



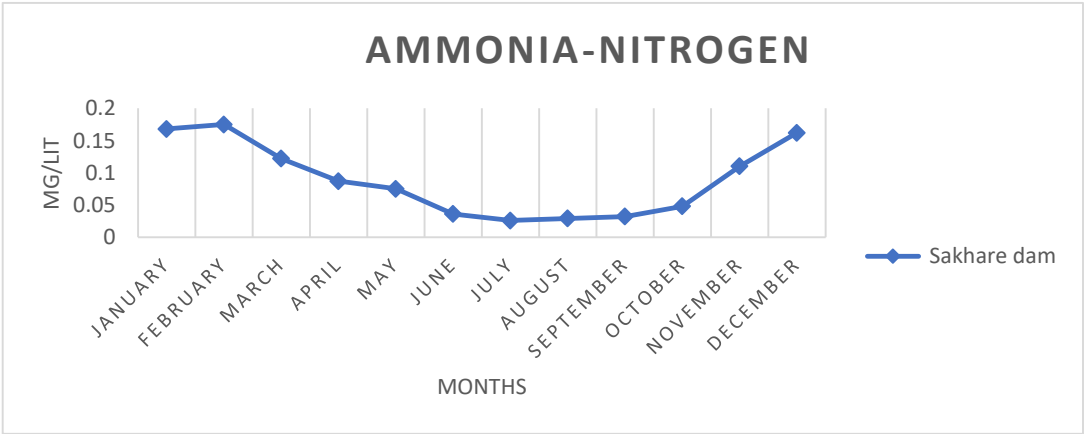
Nitrate- nitrogen: In the process of stabilization, nitrate nitrogen is a sign of prior contamination. the maximum value was found during the monsoon season, while the lowest value was observed during the post monsoon season. Nitrate concentrations increases June to September from 0.01 to 0.076+mg/L and then start to decreases October to April. The current study demonstrates a drop in nitrate concentrations in the post-monsoon period, which could be attributed to nitrogen use by phytoplankton and periphyton. The Nitrate contamination is common in basic extrusive granite formation and also may be attributed to the percolation of large amount of organic wastes from effluent nitrate fertilizers and other wastes like sewage disposal which on decomposition by microorganism results in the production of nitrates(Kumar and Prasad, 2014)During the monsoon, the value was at its highest, owing to the massive amounts of drainage water dumped into the lake. Temperature, pH, conductivity, and turbidity were found to be strongly adversely linked with nitrate.



Nitrite- nitrogen: In the nitrogen cycle, nitrite is a form that is in between nitrification and de-nitrification events. It is an incredibly unstable ion that, depending on the water's conditions, can either become ammonia or nitrate. Nitrite concentration start to increase from May to September and then start to decreases from October.Maximum Nitrite-estimated in the month of September 0.31mg/L and minimum 0.065mg/L in April and May. NO2 and NO3 were negatively correlated while PO4, non-significantly correlated with the density of diatoms(Patil et at., 2 011). There was no significant negative association found between nitrite and any of the water quality metrics, however there was a strong positive correlation with nitrate.

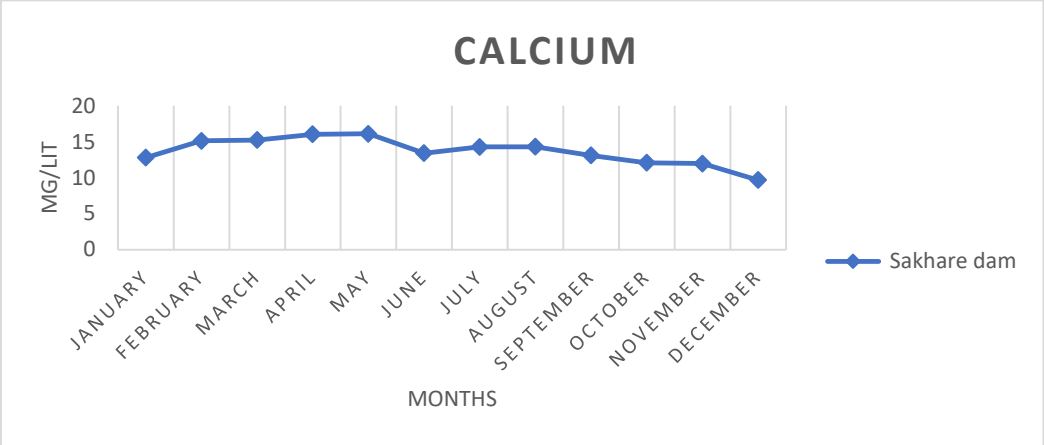


Ammonia-nitrogen: The ammonification of organic materials is the primary source of ammonia in water bodies. Fish and other biota are harmed by ammonia at higher quantities. The toxicity of ammonia increases with the pH because at higher pH most of the ammonia remains in the gaseous form(Garge, 2009). Concentration of Ammonia -nitrogen increases from month of October to February and then again start to decreases from March to September Ammonia. 0.175mg/L was the maximum value detected in the month of August and minimum value 0.026mg/L detected in the month of July exhibited a substantial negative link with temperature, pH, DO, and CO2, but no significant positive correlation with any of the water quality measures.

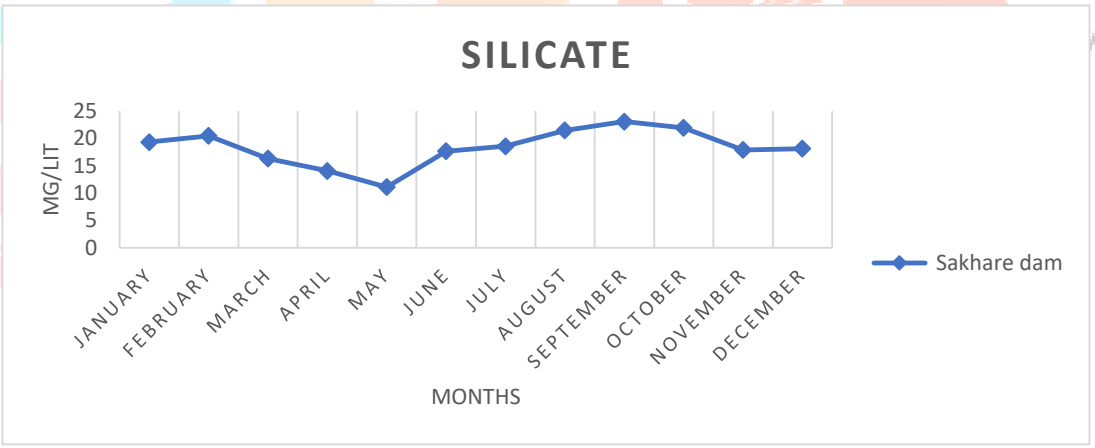


Calcium: Mg+2 and Ca+2 play significant roles in the hardness of the water. The overall concentration of calcium and magnesium ions in a water sample is known as water hardness, and it is represented by the

concentration of calcium carbonate. Highest level of calcium 16.1mg/L was detected in the month of May and lowest level of calcium 9.67mg/L detected in the month of December.Calcium and magnesium ions are the main principal ions imparting hardness to the water, and prevent leather forming(Nenavath and Kiran, 2016)



Silicate (SiO2): The predominant form of silica in an undissociated state is orthosilicate. Diatoms absorb a significant amount of dissolved silica during the construction of their cell walls. Orthosilicate is the most common type of silica in its undissociated condition. As they build their cell walls, diatoms take in a large quantity of dissolved silica. Silicate (SiO2) diatoms which are major component in many lakes and river. diatom utilization can modify greatly the conditions and flux rates of dissolved silica in lakes and river streams (Wetzel and Likens, 1991). The catchment runoff may be the cause of the high concentration during the winter and monsoon seasons. The assimilation of silicate by diatoms throughout the summer may be the cause of the low concentration of silicate. Silicate had a high negative association with phosphate, alkalinity, hardness, DO, and CO2, but a strong positive correlation with nitrate.



Parameter	Jan	Feb	Mar	April	May	June
Temp °c	22.09	23.44	23.65	24.98	24.99	23.34
pH	6.21	7.45	7.5	7.7	8.2	7.68
Turbidity (NTU)	4.61	4.62	4.56	4.67	5.2	7.2
Hardness(mg/L)	217	242	245	251	255	210
Alkalinity (Mg/L)	225	233	240	242	247	254
DO (Mg/L)	4.6	4.5	4.7	4.6	4.9	5.0
BOD (Mg/L)	16.05	25.3	25.47	25.59	27	28.5
COD (Mg/L)	60.4	74.4	74.87	74.97	75.34	75.85
PO4-P(Mg/L)	0.078	0.08	0.084	0.087	0.09	0.05
Chloride (Mg/L)	54.91	55.8	55.91	59.1	65.2	55.01
NO3-N(Mg/L)	0.006	0.0063	0.0065	0.0064	0.0068	0.01
NO2-N(Mg/L)	0.089	0.072	0.067	0.065	0.065	0.142
NH3-N(Mg/L)	0.168	0.175	0.122	0.087	0.075	0.036
Silicate (Mg/L)	19.32	20.44	16.31	14.04	11.08	17.65
Calcium(Mg/L)	12.8	15.12	15.23	16.05	16.1	13.42

Parameter	July	Aug	Sept	Oct	Nov	Dec
Temp °c	21.43	21.3	24.33	22.54	24.93	21.56
pH	6.89	6.9	6.21	7.51	7.08	7.1
Turbidity (NTU)	9.02	8.7	7.3	5.21	4.87	4.76
Hardness(mg/L)	158	138	120	135	142	171
Alkalinity (Mg/L)	136	78	45	139	150	156
DO (Mg/L)	5.1	5.1	3.6	3.7	3.8	4.1
BOD (Mg/L)	15.2	9.7	6.6	6.8	7.1	6.81
COD (Mg/L)	45.71	38.92	31.8	33.8	26.2	25.5
PO4-P(Mg/L)	0.036	0.022	0.018	0.019	0.034	0.052
Chloride (Mg/L)	32.21	15.34	5.81	7.02	18.42	30.91
NO3-N(Mg/L)	0.023	0.048	0.076	0.042	0.012	0.0081
NO2-N(Mg/L)	0.215	0.287	0.31	0.21	0.132	0.01
NH3-N(Mg/L)	0.026	0.029	0.032	0.048	0.110	0.162
Silicate (Mg/L)	18.54	21.44	23.06	21.92	17.88	18.12
Calcium(Mg/L)	14.28	14.31	13.11	12.09	11.980	9.67

Conclusion: Sakhare lake is the major source of aquatic food and drinking water for local people, the city for urban use and agriculture all receive water from it. Water that has been contaminated is not fit for consumption. The lake is also threatened by unauthorized tourism-related activities and cultural appropriation.

Several kinds of floating, dissolving, suspended, microbiological, and bacteriological pollutants are present in water. Level of C.O.D and B.O.D much higher than permissible limit which indicates that water is not suitable for drinking purpose.

Reference

1. KARIM and R.B. PANDA2. 2014. Assessment of Water Quality of Subarnarekha River In Balasore Region, Odisha, India. Current World Environment. 9(2), 437-446
2. Dey, S. Botta, R. Kallam, R. Angadala, J. Andugala. 2021.Seasonal variation in water quality parameters of Gudlavalleru Engineering College pond.Current Research in Green and Sustainable Chemistry.,4,100058
3. Jindal Kumar Manoj, Deshmukh Poonam, Tamrakar Ruchi. 2014. Testing and Analysis of Drinking Water Quality of Underground Water
4. Lianthuamluaia, asha t. Landge, c. S. Purushothaman, geetanjali deshmukhe and karankumar k. Ramteke. 2013. Assessment of seasonal variations of water quality Parameters of savitri reservoir, poladpur, raigad District, maharashtra. An international quarterly journal of life science. 8(4), 1337-1342
5. located near Rural Area of Risali Chhattisgarh, India. Int. Res. J. Environment Sci. 3(5), 44-47
6. Manisha D. Giripunje and Pravin U. Meshram. 2017. Assessment of water quality of fresh water lakes of different regions in Maharashtra state, India. IJRBAT. 2, 698-703
7. Patil, J. V., Ekhande, A. P. and Padate, G. S. 2011. Study of Lotus Lake: Its abiotic factors their correlation with reference to seasonal changes and altitude. Ann. Biol. Res. 2: 44-56.
8. Patil. P.N, Sawant. D.V and Deshmukh. R.N. 2012. Physico-chemical parameters for testing of water. International journal of environmental sciences. 3, 1194-1207
9. Prasad, B.N., Jaitly, Y.C. and Singh, Y., Periodicity and interrelationships of physic-chemical factors in ponds. In: A.D. Adoni (eds.) Proc. Nat. Symp. Pure and Apply. Gmnol. Bull. Bot. Soc. Sagar., 32, 1-11, (1985)
10. Priyanka Trivedi, Amita Bajpai and Sukarma Thareja. 2010. Comparative Study of Seasonal Variation in Physico - Chemical Characteristics in Drinking Water Quality of Kanpur, India With Reference To 200 MLD Filteration Plant and Ground Water. Nature and science. 8(4), 11/17
11. R.K. Garge, R.J. Rao and D.N. Saksena. 2009. Water quality and conservation management of Ramsagar reservoir, Datia, Madhya Pradesh. Journal of Environmental Biology. 30(5), 909-916
12. Ramachandra, T V & Solanki, Malvikaa. (2007). Ecological assessment of lentic water bodies of bangalore Environmental Information System [ENVIS] Centre for Ecological Sciences. ENVIS Technical Report 25.
13. Rudresh Kumar K.J, T.J.Renuka Prasad. 2014. Seasonal variation of nitrate in naturalwater of bangalore north. International Journal of Advanced Research. 2,1120-1122
14. Sakhare, Seema & Kamble, Nitin. 2014. Assessment of sewage pollution of lentic and lotic ecosystems from gadhinglaj tahsil, district kolhapur, maharashtra. International Journal of Pharma Sciences and Research. 5, 594-605
15. Venkatesh Nenavath and Dr. B. R. Kiran. 2016. Seasonal variations in physico-chemical characteristics of water of fresh water tank of karnataka, india. (IJCRME). 1, 2455-5428

16. Verma et al 2012. Water Quality Analysis of an Organically Polluted Lake by Investigating Different Physical and Chemical Parameters . Int. J. Res. Chem. Environ. 2, 105-111

17. Wetzel, R. G. and Likens, G. E. 1991. Limnological analyses (2nd ed.). Springer-verlag, New York. p. 93.

18. World watch Institute (1999). World Resources 1998-99. Oxford University Press. P 3

19. Y. Khuhawar, M. Aslam Mirza, S. M. Laghari & R. Araain. Limnonlogical Study of Baghsar Lake District Bhimber, Azad Kashmir. Pak. J. Bot. 41(4), 1903- 1915