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PHYSICOCHEMICAL CHARACTERISTICS OF KAPSI LAKE, KAPSI DIST. AKOLA (MAHARASHTRA) INDIA

Biological Science

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ABSTRACT

Physicochemical characteristics features of water of Kapsi lake, Kapsi were studied during December 2023 to November 2023. Monthly water sample were collected from selected 8 stations of Kapsi lake, with the help of Ruttner water sampler from specific depth. Colour, odour, turbidity, transparency, pH, conductivity, T.D.S. Dissolved oxygen, Free C02, Total Hardness, Calcium hardness, Magnesium, P.Alkalinity, Total alkalinity, Chloride, Sulphate, Nitrate of water were studied . Colour of water is apparent and seston Odour of the water is earthy. water temp 28 - 29 degrees Celsius were recorded. Monthly variation of physicochemical characteristics features of water were studied monthly and station Wies variation in physicochemical characteristics were recorded. Minimum value of nitrate 0.010 mg/lit.at station no.1 were recorded. Maximum value of physicochemical characteristics were recorded at station no. 8 and it is of magnesium. Coefficient of co-relation of physicochemical were also studied.

KEYWORDS

Kapsi Lake, Kapsi, Physicochemical Characteristics, Coefficient Of Corelation.

INTRODUCTION

Water is one of the ubiquitous elements in world that support vitality in every ecosystem whether it is aquatic, terrestrial or arrival. Water quality of any aquatic ecosystem can be better understood through information about its physical, chemical and biological regime. Aquatic ecosystem is the most varied ecosystem hence it's hydrobiology vary one to another water body. The physicochemical properties of water and co-related dependence of all vital activities make it mandatory to take an account of its hydrobiological investigation to understand ecology of a reservoir. Present study deals with an evaluation of water quality in terms of physicochemical characteristics of Kapsi reservoir, a tropical reservoir meant for purpose of fisheries activity. It was constructed near Akola: Kapsi village in Akola District of Maharashtra. It is surrounded by Slum areas Rivers and reservoirs play a major role in agricultural, fishery along with the use of water for drinking purposes. Several factors which determine the water quality of a reservoir includes seasonal climatic changes (Chapman, 1996: Barik et al., 2010), seasonal precipitation, wind action, geologic origin of the catchment basin and pattern of hydrological cycle prevalent in the lake (Tundisi &Straskraba, 199). Several limnological parameters such as conductivity, total dissolved solids, phytoplankton and reservoir morphometry have been used in estimating potential fish yields from reservoirs. Several physicochemical or biological factors, in suitable range, help in increased activities and growth for aquatic animals. On the other hand, some factors exert stress and adversely affect

Water is the basic and primary need of all vital life processes and it is now well established that the life first arose in aquatic environments. Ever since the pre-historic times man has been intimately associated with water, and it has been conclusively proved by the evidences of past civilizations that all historic human settlements were around inland freshwater resources. Even today it is the major consideration for all socioeconomic, cultural, industrial, and technological developments. But hardly 1% of the global water reserve that lies in the form of inland freshwaters is available for direct use to the infrastructure associated with life. Eventually, Limnology-a new inter-disciplinary science with multifarious dimensions has emerged, which deals with the study of structural and functional attributes of the lentic fresh environment and problems associated with them.

The study of lakes as a science started as early as 1887 when Fofbes described the lake as a 'Microcosm'-a little world within itself. Forel (1901) for the first time, designated these studies as 'limnology' and wrote an inspiring book 'The Science of Lakes which provided an impetus for investigations on freshwaters and many workers entered into this new field. Among the pion, er workers, the contributions of Naumann, Welch, Birge, Juday, Thienemann, Ohle, Pearsall, Brehm and Ruttner had laid down firm foundations. An epoch making monographic contribution by G.E. Hutchinson, 'A treatise on Limnology appeared a little later. The global consciousness towards the freshwater systems arose by this time and ultimately the International Biological Pro- gramme and International Man and Biosphere Programme (No. 5) were floated to generate information on the structure and function of inland aquatic environments, their productivity, and the impact of human interference on them, realizing that freshwater resources are finite and may limit the growth and development of mankind on this planet.

Freshwater systems of India received du: scientific attention rather late, and the pioneering works of Prashad, Pruthi, Ganapati, Chacko, Zafar, Krishnamury and Sreenivasan, mostly on South Indian Waters, are the mile- stones in the history of Indian Limnology. The Republic of India rightly perceived the conclusions drawn by the International Environmental Conference (1972) and focussed the attention of entire scientific community on the non-availability of good quality of water in sufficient quantities and the problems of its management, realizing that the fast depleting water resources.

MATERIALAND METHOD

Study Area: The village kapshi lake is located in Akola Tahsil of Akola District in the State of Maharashtra in India. It comes under Akola community Development Block. The nearest town is Akola, which is about 20 kilometers away from Kapshi Lake.

The total area of village is 836.67 hectares. Kapshi Lake is village panchayat location in the Akola district of Maharashtra States. India. The latitude 20.5876787 and longitude 76.960249 are the geocoordinate of the Kapshilake.

Kapshi Lake, Akola is suitated at Akola in India. It is located at Near chikhalgaon Nagpur- Aurangabad highway Patur taluka dist Akola Maharashtra pin code of Kapshi Lake Akola is 444006 in India.

Current temprautre 25.32 and Maximum Minimum temperature 25.32 and Maximum temperature is 33.44. Light rain with humidity 33% and wind speed of 7.96 mph. The Kapshi Lake weather 10-4-2023 26.8°C to 36.3°C broken clouds, light rain. Scattered clouds.

Sample Collection

Water samples of eight different stations were collected from the kapsi lake reservoir region for a period of one year (December 2022 to December 2023) for The evaluation of physic-chemical parameters and enumeration of microbial Populations. Samples were collected during the first week of every month in Sterile Plastic containers, and stored at 40C till analyzed. They were then tested For various physicochemical and microbiological parameters using standard Methods.

1. Water Temperature. As a result of impinging solar radiation and the atmospheric the lake may some changes such as mixing of lake water by convection currents or setting up of thermal stratification. These two processes have far reaching implications on the general limnological characteristics of the lake. The temperature of the lake water, therefore, must be recorded depth-wise to understand the effect of these two processes. This can be done by using a good grade mercury thermometer (0 to 50°C with 0.2°C least count) or thermophone.

2. Conductivity. An atom which has lost or gained one or more electrons is no longer electrically neutral and is called an ion. Atoms of metals with loss of electrons give positive ions, called cations and carry a charge equal to the number of electrons lost. The non-metals by gaining electrons acquire additional negative charge, giving negatively charged ions the anions. Electrolytes in a solution dissociate into the respective ions and impart conductivity to it. The more the conductivity of water the lesser is its resistance to electric flow, thereby indicating higher concentration of dissolved (ionised) salts and higher trophic status of the system

Principle. The specific conductivity of water or a solution is its capacity to conduct electric current and depends on the nature and concentra- tion of ionised salts. It can be defined as the electrical conductivity of one cubic centimeter of a solution and can be expressed in siemens(s) or mhos.

Requirement:- Conductivity cell, conductivity meter (Flico make water quality analyser), beakers etc.

Method:- Keep the function switch to 1000 position and calibrate to CAL. Mark. Dip the conductivity cell in the sample and connect the terminals to the If the deflection is negligible, disconnect the cell and calibrate to CAL For x 100 position. Reconnect the cell and note the reading. If deflection is still negligible move the switch to x10, calibrate and read.Turn the switch to 'off' position, disconnect and wash the electrode with distilled water.

3. Dissolved Oxygen (D.O.). It is of paramount importance to all living organisms and is considered to be the lone factor which to a greater extent can reveal the nature of the whole aquatic system at a glance, even when information on other chemical, physical and biological prarters the is not available. The occurrence of dissolved oxygen in water may be mains attributed to two distinct phenomena (i) direct diffusion from the air, and o photosynthetic evolution by aquatic autotrophs. The first one purely a physical process and depends on the solubility of the oxygen under the influence of temperature, salinity, water movements etc whereas, the latter is a biological process and depends on the availability of light and the rate of metabolic processes resulting in diurnal fluctuations Eutrophic water bodies have a wide range of dissolved oxygen and show elinograde oxygen curve in which oxygen is more a surface and depletes fast with the depth; in contrast, the oligotrophic lake have narrow range of D.O and show orthograde oxygen curve in which the oxygen content increases with the depth to saturation levels.

4. Free Carbondioxide. Free carbondioxide dissolved in water is essentially the only source of carbon that can be assimilated and incorporated into the skeleton' of the living matter of all the aquatic autotrophs; once fixed it can further be utilized by the organisms of categories. La the absence of free CO, plants utilize the bicarbonates. Carbondioxide dissolved in natural waters actively participates in the carbonate system.

Principle. It is the normal practice to distinguish, free carbondioxide as the concentration of CO,H,CO, which is estimated by titrating the sample with standard alkali titrant to pH 8.3.

Requirement. Sodium hydroxide (0.02272 N), phenolphthalein indicator, (burette, pipette, Erlenmeyer flasks, measuring cylinder, Titration assembly stand, clamps

Method- Take 50 ml of sample in a flask and add 2 drops of phenolphthalein indicator (if slight pink colour develops then free carbondioxide is absent). If the solution remains colourless, titrate with standard alkali titrant to Note the reading and calculate the free carbendioxide in milligram perLitre

5. Alkalinity. In most natural waters bicarbonates and sometimes carbon present in appreciable amounts. Their salts get hydrolysed Qc and produce clamps hydroxyl ions, consequently raising the pH.

Principle. Alkalinity is determined by titrating the sample with a standard solution of strong acid. Alkalinity due to hydroxide and carbonate is determined to the first end point (pti 8.5) usin, phenolphthalein indicator and bicarbonate alkalinity is determined to the second ad point (pH 4.5) using methyl orange indicator.

Requirement. Sulphuric acid (0.02 N) phenolphthalein indicator, methyl orange indicator, titration assembly.

Method- Take 50 ml sample in Erlenmeyer flask and add two drops of phenolPhthalein indicator. If a slight pink colour appears, titrate with acid titrant to a colourless end Point and note the reading as 'p' add 2 drops of methyl Orange in the same flask and continue to Titrate further till the colour changes from yellow to orange. This reading as 't (total volume of the titrant used for both the titrations).

6. Sulphate. Sulphates are generally present in appreciable concentrations and impart hardness to the water. Mostly they are present in amounts More than adequate for freshwater productivity.

Principle. Sulphates get precipitated with barium ions in acid solution to form BaSO, crystals of uniform size (glycerol-ethanol sol tion is added As stabilizer), which are estimated spectrophotometrically at 420 nmn against a standard curve drawn from different known concentrations.

Requirement. Spectrophotometer, Barium chloride, NaCl-HCI solution. Sulphuric acid (C.02 M), glycerol-ethanol solution, magnetic stirrer, conical Bask, Whatman filter paper No. 1 etc.

Method: Filter the sample through Whatman filter paper No. 1. -Take suitable aliquot (e.g. 50 ml of sample containing not more than 10 mg/l sulphate).

Add 0.15 g of barium hloride and mix for 30 minutes using a magnetic stirrer. Moura absorbance against distilled water blank at 420 nm.- compare with standard curve.

7. Total Hardness. Total hardness in water is the sum of the concentrations of alkaline earth mal cations (e.g. Ca, g). In most freshwaters nearly all the hardness is imparied by the calcium and magnesium ions which are in combination with bicarbonates and

carbonates (temporary hardness) apart from sulphates, chlorides and nitrates. When free carbondioxide and bicarbonates are removed from water by photosynthesis The carbonates get precipitated as marl. Determination of this parameter Helps us in deciding the use pattern of water.

Principle. Eriochrome black T forms wine-red complex compound with metal ions (Cat and Mg++). The di-sodium salt of EDTA extracts the metal Ions from the dye-metal ion complex as colourless chelate complexes leaving a blue coloured aqueous solution of the dye.

Requirement. Standard EDTA titrant (0.01 M), Eriochrome black T Indicator, ammonia buffer solution, titration assembly.

Method;- Take 50 ml of the sample in a flask add 1 ml of ammonia buffer and 5 drops of indicator solution.
The colour of the sample turns wine-red.
Titrate with EDTA solution, until a clear blue colour appears.
Note the readings and calculate the total hardness.

8. Calcium Hardness : calcium is essential for all organism, being an important cell wall constituents and regulates various physiological function in animals too. It has a direct effect on PH and carbonate system. Contribute of calcium ions to the hardness water can be measured by the compleximetric titration method.

Principle : Murexide indicator form pink coloured complex with ca ions. With the addition of the di-sodium salt of EDTA the ca++ forms colourless chelate leaving behind a purple solution of the dye.

Requirement. Standard EDTA solution (0.01 M). Murexide indicator mixture, sodium hydroxide solution (8%), titration assembly.

Method: Take 50 ml of the sample in a flask and add 1 ml of 8% sodium hydroxide solution followed by a pinch of murexide indicator misture.
-The colour of the sample turns salmon pink.
Titrate with standard EDTA solution until the colour changes to purple.
Note the reading.

9. Magnesium Content. Magnesiura forms the nucleus of the porphy rin ring of the chlorophyll and therefore is an essential constituent of all the primary producers. If the calcium hardness as calcium carbonate is known:
The magnesium content can be calculated as follows:
Magnesium in mg (Total hardness-Calcium hardness) x 0.243

10. Silicates. Silicate is the soluble reactive form of silica, which is an Important structural constituent of the body of diatoms and sponges. It is often found dissolved in natural waters in considerable quantities and shows marked seasonal variations.

Principle. In acid solution silicic acid and its derivatives react with molybdate ions forming yellow heteropoly acids (molybdo silicic acids), which Are then reduced to silico molybdenum blues. Its absorbance is measured spectrophotometrically at 810 nm.

Requirement. Spectrophotometer, acid ammonium molybdate, reducing agent, silicon standard solution, flask, pipettes.

Method: Take 3 ml of acid ammonium molybdate reagent in a 50 ml flask and add 25 ml sample (containing not more than 50 mg silica). Mix well and add 15 ml of the reducing agent and fill upto 50 ml with Distilled water.
Shake thoroughly and allow to stand for 3-hours.
Read absorbance at 810 nm against distilled water blank.
Compare with the standard curve made by using different dilutions of known standard solution.

Table 1: Physicochemical characteristic features of Kapsi Lake Kapsi District Akola During December 2022 to November 2023

Parameter	December	January	February	March	April	May	June	July	August	Sept	October	Nove	Average	Minimum	Maximum
Colour	apparent	apparent	seston	seston	apparent	apparent	apparent	seston	seston	seston	apparent	apparent	6.03	2.27	12.51
Odour	petrichor	petrichor	petrichor	petrichor	petrichor	petrichor	petrichor	earthy	earthy	earthy	petrichor	earthy	-	-	-
Turbidity(NTU)	4.64	4.10	3.89	4.10	2.25	2.25	12.55	11.06	9.02	9.16	4.46	5.25	6.42	2.25	12.55
Sechi disc Transparency (meter)	0.122	0.087	0.083	0.082	0.084	0.078	0.054	0.084	0.082	0.101	0.114	0.110	0.090	0.054	0.120
pH	9.34	8.53	8.28	8.33	8.83	8.77	8.28	8.25	8.25	8.33	8.23	8.38	8.51	8.23	9.34
Water Temp (°C)	28.1	28.75	28.92	29.0	29.13	24.34	13.00	13.25	13.66	13.80	14.00	14.10	21.33	13.00	29.13
Conductivity (u mhos/cm)	0.68	0.67	0.64	0.84	0.94	0.66	0.77	0.68	0.72	0.74	0.85	0.86	0.76	0.64	0.94
TDS (mg/lit)	0.547	0.891	0.584	0.555	0.845	0.609	0.611	0.547	0.891	0.584	0.555	0.845	0.672	0.547	0.891
Dissolved O2 (mg/lit)	5.6	6.4	6.9	5.9	6.2	6.24	5.84	5.6	6.4	6.9	5.9	6.2	6.04	5.6	6.9
Free CO2 (mg/lit)	9.6	11.4	7.6	4.4	4.4	7.8	9.6	9.6	10.8	6.0	2.4	4.4	7.55	2.4	11.4
Total Hardness (mg/lit)	256.0	450.0	290.0	240.0	230.0	315.0	272.6	256.0	450.0	230.0	240.0	230.0	281.22	230.0	450.0
Calcium Hardness (mg/lit)	132.3	157.5	136.7	147.0	157.0	158.9	141.7	132.3	157.5	136.7	147.0	157.0	148.08	132.3	158.9
Magnesium (mg/lit)	223.0	417.0	192.0	243.0	250.0	240.8	242	248	260	265	190	255	308.07	192.0	417.0
p. Alkalinity (mg/l)	0.2	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.2	0.1	0.2	0.1	0.15	0.1	9.2
T. Alkalinity (mg/l)	10.5	9.5	10	11.5	10.8	10	10	10.5	9.5	10	9.5	9.5	10.25	9.5	11.5
Chloride (mg/l)	130.94	130.96	130.96	130.99	130.92	130.92	130.94	130.91	130.94	130.91	130.94	130.96	130.96	130.91	130.99
Sulphate (mg/l)	0.63	0.59	0.60	0.47	0.60	0.47	0.60	0.64	0.51	0.62	0.59	0.60	0.62	0.04	0.62
Nitrate (mg/l)	0.040	0.050	0.020	0.032	0.050	0.056	0.056	0.060	0.058	0.052	0.044	0.036	0.045	0.020	0.060
Phosphate (mg/l)	0.091	0.091	0.092	0.085	0.085	0.087	0.088	0.092	0.085	0.091	0.085	0.087	0.882	0.83	0.92
Silicate (mg/l)	0.05	0.04	0.04	0.06	0.02	0.01	0.05	0.02	0.05	0.04	0.05	0.04	0.057	0.02	0.1

DISCUSSION

Temperature of water is basically important because it effects biochemical Reactions in aquatic organisms. A rise in temperature of water leads to the speeding up Of chemical reactions in water, reduces the solubility of gases and amplifies the tastes And odour. Temperature of water found in the range 13.97 to 17.69 pH regulates Most of the biological processes and bio-chemical reactions. In a balanced ecosystem pH is maintained within the range of 8.83 to 9.14 (Chandrasekhar et al., 2003). Due to diurnal variations in the water temperature of a system, pH of a water body is a diurnally variable property (Ojha and Mandloi, 2004). In this study pH values were found in the range of 8.83 to 9.14 in the water samples. At all the locations of sampling points are within the desirable limits. Oxygen content of a water body is important for direct need of many oranisms. Majority of chemical and biological processes undergoing in the water body also depend on the presence of oxygen. It is also essential to maintain the higher forms of biological life and balance the populations of various organisms. Further, Oxygen is also known to affect the solubility and availability of many nutrients and hence, it is one of the most significant parameter affecting the productivity of aquatic systems (Wetzel, 1983). The factors affecting oxygen content in natural waters include input from atmosphere And photosynthesis and output from respiration, decomposition and mineralization of Organic matter as well as losses to atmosphere in this study dissolved oxygen is found To be 15.91 to 18.14 mg/l. Though carbon dioxide is readily soluble in water, very little Carbon dioxide is present in sample because of the small amount of it being present in The atmosphere. Apart from this, decomposition of organic matter and the respiration Of aquatic plants and animals also contribute to the free carbon dioxide. In this study Free cos is found in the range of 28.42 to 33.53 mg/l.

The term 'hardness" is frequently Used to assess the water quality and is governed principally by the concentration of Calcium and magnesium and sometimes by iron and aluminum salts, which combined Largely with bicarbonate and carbonate, sulphate, chloride and other anions of mineral Acids. Iron and aluminum are generally present in negligible amount in water. Most of The calcium and magnesium were present in natural water as bicarbonate, sulphate and Sometimes as chlorides and nitrates.

Hardness producing substances react with soaps, forming insoluble compounds before lather is produce Alkalinity of any water body is mainly due to carbonates, bicarbonates and hydroxide ions. It is an indes of nutrients status in water body. High alkalinity is a function of ion exchange that is calcium ions are replaced by sodium ions and later contributed to alkalinity (Sharma and John, 2009). Alkalinity is imperative for fish and aquatic life as it buffers against rapid changes of pH (Sheeja and Ebanasar,2006)

CONCLUSION

Preliminary physicochemical parameter viz... water temperature, pH, Conductivity, Free CO2, Dissolved oxygen, Total dissolved solids, Phenolphthalein alkalinity, total alkalinity, total hardness, calcium hardness As CaCO, Calcium hardness as Ca++, Magnesium content, Sulphate, Phosphate, nitrate and silicate of Uma Reservoir were studied for two months From December 2022 to April 2023. Sample were collected from the six Selected station of the kapshi lake.

Temperature
It is well known fact that the water temperature directly as well as indirectly influences many abiotic and biotic components of aquatic ecosystem. Many hydrobiological features, such as density. viscosity, conductivity speciation of nutrient salt etc. undergo changes with the temperature. It also reflects to the dynamics of the living organisms such as metabolic and physiological behavior of aquatic ecosystem. In the present investigation the minimum water temperature recorded during December, 2022 (28.0° C) at station no. 2 and maximum was recorded in the month of February 2023 (29°C) at station number 1 in the reservoir water.

pH
The pH of the reservoir varied sharply during investigation at the four stations. It was much higher in April (9.55) than March (9.21). Thus the pH of water tended to be higher during April 2023. Is it well known fact that changes in the pH concentration of water will Bring about a slight changes in the structural and functional variations in the in the Organisms of the water body. According to Central Pollution Control Board 17 (CPCB), 70% of the pollution in rivers is from Untreated sewage. Organisms of the water body. In the present study, the pH concentration has Been recorded from December 2022 to April 2023 from four selected station of The kapshi lake. Minimum pH recorded at station no. 2 (8.52) and Maximum were at station no. 1(9.35) and maximum to note that the pH values Were shows basic to more or less alkaline throughout the period of study.

TDS
Minimum TDS recorded at station no. 1 (0.54) and maximum were at Station no. 4 (0.981) during March 2023. Minimum TDS recorded at station no. 4 (0.510) and maximum were at station no. 1 (0.841) during April 2023 Reading Show a clear cut positive correlation of high degree of organic matter and Algal growth.

Electrical Conductivity
Electrical conductivity (EC) is always high in the sites and minimum Which is positively related to high quantity of dissolved salts. Another notable Point is that EC is more pronounced in the month of March and April. This May be due to the high influx of surface run off post monsoon rains.

Total Hardness
Hardness in water is due to the natural accumulation of salts from Contact with the soil and geological formations or it may enter from the direct Pollution by human activities. In the present study total hardness ranges from 230 to 450 mg/L.

Water with 250 ppm of hardness is considered to be soft Hardness of 300 pm is however, permissible for domestic use. Whereas it should be 2 to 80 ppm for boiler feeders, 10 to 250 ppm for various food Processing industries and 0.05 ppm for laundry and textile industries. Minimum hardness recorded at station no. 4 (230) and maximum were at Station no. 2 (450) during December 2022. Minimum hardness recorded at station No. 1 (230) and maximum were at station no. 4 (458) during April 2023

Dissolved Oxygen
Dissolved oxygen is one of the most important parameters of the water Quality, directly affecting survival and disturbing flora and fauna in an Ecosystem. The quantity of dissolved oxygen in water is directly or indirectly Dependent on water temperature, partial pressure of oxygen in the air amount of chlorophyll content. The dissolved oxygen concentration recorded high During March 2022 at Station no. 4 (23.32) and Dissolved oxygen Concentration recorded minimum during April 2023 Station no. I (9.28)

Free Carbon Dioxide
The amount of free carbon dioxide depends on the decomposition of Top soil and chemical nature underlying rocks. By far, it is relatively abundant In natural waters and it important in photosynthetic activity requires no Further explanation. Minimum Carbon dioxide recorded at station no. 3 (2) And maximum were at station no. 2 (10) during March 2023.Minimum Carbon dioxide recorded at station no. 3 (3) and maximum were at station No. 1 (4) during April 2023.

Alkalinity
In the present study it could be observed that total Alkalinity values in The PKV reservoir indicated that similar pattern of fluctuations though with Minor differences. The higher values of total alkalinity in kapshi lake reaches up to 490 mg/l $CaCO_3$ during December to April months. At Station 2 Phenolphthalein alkanity were ranges between 37 mg/l to 40.4 Mg/lit.

Phosphate
It is important parameters to assess the water quality. Photosynthesis And respiration play an important role in the self- purification of natural water .Minimum Phosphaterecorded at station no. 1 (0.83)and maximum were at station no. 3 (0.91) during March 2023.Minimum Phosphate recorded at station no. 3 (0.17) and maximum were at station no. 2 (1.52) during April 2023

Sulphate
In the present study it could be observed that Sulphate values in the kapshi lake indicated that similar pattern of fluctuations though with minor differences. Minimum Sulphate recorded at station no. 1 (0.02) and maximum were at station no. 4 (4.38) during December 2022. Minimum (2.61) during April 2023

Silicate
In the present study it could be observed that Silicate values in the kapshi lake indicated that similar pattern of fluctuations though with minor differences. Minimum Silicate recorded at station no. 1 (0.10) and maximum were at station no. 2(0.08) during December 2022. Minimum Silicate recorded at station no. 1 (0.06) and maximum were at station no. 3 (0.04) during April 2023

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