Research Article

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Determination of Physico-chemical Parameters Bibinagar Lake, Yadadri Bhuvanagiri district, Telangana

B. Krishnaveni, K. Shailaja and J. Chapla

Department of Environmental Science, Osmania University, Hyderabad-500007, Telangana, India.

ABSTRACT

The present study on the Physico-chemical parameters of water quality of Bibinagar Lake is a Mandal in Yadadri Bhuvanagiri district, State of Telangana, India. During the period from May 2020 to April 2021 at three sampling stations, seasonal variations in air temperature, turbidity, pH, electrical conductivity, TDS, dissolved oxygen, hardness, nitrates, chlorides, calcium and magnesium were recorded. The various Physico-chemical parameters of Bibinagar Lake were calculated. The results of this study revealed that the concentration of the nutrients, turbidity, electrical conductivity and TDS increased with a decreasing trend of dissolved oxygen in all the sampling stations during the monsoon season. Thus, degradation in the water quality of the lake resulted in the monsoon season. The present study was carried out to determine various Physico-chemical parameters and the water quality index of Bibinagar Lake to study the quality of water for public consumption, recreation and other purposes. This study deals with the influence of environmental factors as well as domestic activities in the water quality in the related area.

Keywords: *Fresh water, Physico-chemical, Water quality, Bibinagar Lake, Ecosystem*

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Corresponding Author: *B. Krishnaveni*

E-mail Address: *krishnaphd48@gmail.com*

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Introduction

Lakes represent one of the most resourceful ecosystems on the Earth. In lakes, the input and output of materials take place and therefore represent a continual chemical process like any other aquatic ecosystem. However, unlike rivers and oceans, limited mobility of material occurs in lakes. The sediments received by the lakes through inlets from catchment area erosion get progressively settled to the bottom of the lake. The water of the lake exits mostly through evaporation and outlet streams. In a lentic ecosystem, there is a rapid interaction of sediment and water which increases the biological activities in the lakes (1). Lakes are dynamic lentic ecosystems which are significant inland water resources for meeting the increasing water demand. However, all these functions depend on the quality of water, which is based on a well-balanced environment in terms of its physical, chemical and biological variables (2).

Water is an essential component of the environment and it sustains life on the earth. All organisms depend on water for their survival (3). Freshwater bodies are important wetlands located in and around human habitations as they are generally semi-important natural ecosystems constructed by man in a landscape suitable for water stagnation (4). The quality of drinking water is essential for life. Contaminants such as bacteria, viruses, heavy metals, nitrates and salt have polluted water supplies as a result of inadequate treatment and disposal of waste from humans, livestock, industrial discharges, domestic discharge and extensive use of limited water resources (5). There are some reported cases of typhoid, diarrhoea and other water borne diseases arising from the consumption of contaminated water. Different works have been reported by many researchers on water quality assessment. Today, contaminated water kills more people than cancer, AIDS, wars, terrorism or accidents (6). Physico-chemical properties of the water get varied season-wise and in addition, anthropogenic activities such as agriculture, urbanization, domestic sewage, etc in the catchment area result in the deterioration of water quality (7). Temperature, turbidity, nutrients, hardness, alkalinity and dissolved oxygen are some of the important factors that play a vital role in the growth of living organisms in the water body.

The major resource of water for consumption by humans and livestock is mainly for drinking and domestic purposes (8). In addition to this, water quality of lakes is also impacted by the dumping of religious offerings into the lakes (9). Apart from this, lakes have significant economic values including supplying water for irrigation, power generation, providing food via fish and aquatic products and stabilizing the health and biodiversity of important life support ecosystems (10). Therefore, due to the quality of water from these water bodies, they are not always consumable or useful. So, there is a need for serious characterization of water Physico-chemically before use. Generally, the lake water chemistry describes the seasonal variations in the behaviour of dissolved ions and catchment characteristics (11). In this paper, we have considered the Bibinagar Lake for the seasonal physico-chemical characterization of water.

The present study was carried out to determine various physico-chemical parameters and water quality index of Bibinagar Lake a Mandal in Yadadri Bhuvanagiri district of the Indian state of Telangana. Bibinagar lake to study the quality of water for public consumption, recreation and other purposes. This study deals with the influence of environmental factors as well as domestic activities on the water quality in the related area.

Materials and Methods

Water sampling of the study area

Bibinagar Lake is a man-made lake located at the part of the Yadadri Bhuvanagiri district. The lake is bounded by a wooden hedge. The waste from the temple including polythene bags and the flowers were directly added into the lake. Besides, solid wastes and contaminated water which are utilized by the local people are also released into the lake.

Three sampling stations (S_1, S_2, S_3) have been identified for covering the entire ecosystem for seasonal physico-chemical characterization of water of the Bibinagar Lake three different sites were selected for the collection of water samples (Figure 1).

Location: Bhuvanagiri Road, Bibinagar.
Latitude: 17°29'02.3"N
Longitude: 78°47'52.9"E
Area covered: 11.12 km^2
Maintained by: Hyderabad Metropolitan Development Authority (HMDA) with the responsibility of developing the Bibinagar.

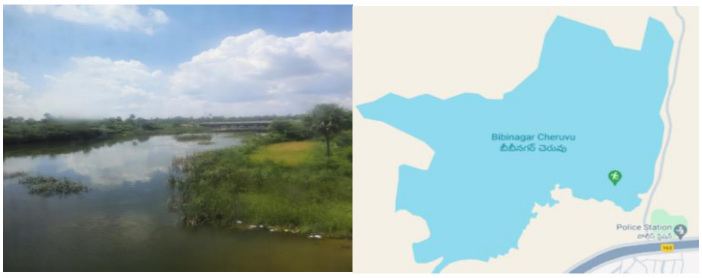


Fig 1. Study area of Bibinagar Lake and study location

The samples were collected in sterilized polythene bottles of one litter capacity. Monitoring was performed from May 2020 to April 2021 (monsoon, winter and summer). For unstable parameters such as temperature, electrical conductivity (EC), pH, and dissolved oxygen (DO) were measured at the sampling site. Samples were brought to the laboratory for analysis of other physico-chemical parameters like sodium, total hardness, calcium, magnesium, chlorides, sulphate, nitrate, phosphate and biochemical oxygen demand (BOD). The parameters were compared according to the standard methods described in the literature (12-14). Three replicates of each sample from each sampling stations were taken for each parameter, and their statistical mean was computed. Temperature were measured in situ using the centigrade (0–110 °C) thermometer. However, the pH was measured by the Mac portable pH meter. Turbidity was determined using the Electronic India Digital Turbidity Meter (Model-331). Total dissolved solids (TDS) and electrical conductivity were recorded using the Toshcon Multi parameter Analyser. Dissolved oxygen, hardness, nitrates, calcium, chloride, and magnesium were estimated using the standard methods (15-16). Bibinagar lake is located between latitude 17°29'02.3"N and longitude 78°47'52.9"E at an area coverd of 11. 12 km^2. Monthly sampling was undertaken during the morning time between 09:00 am and 10:00 am hr. during the period from May 2020 to April 2021.

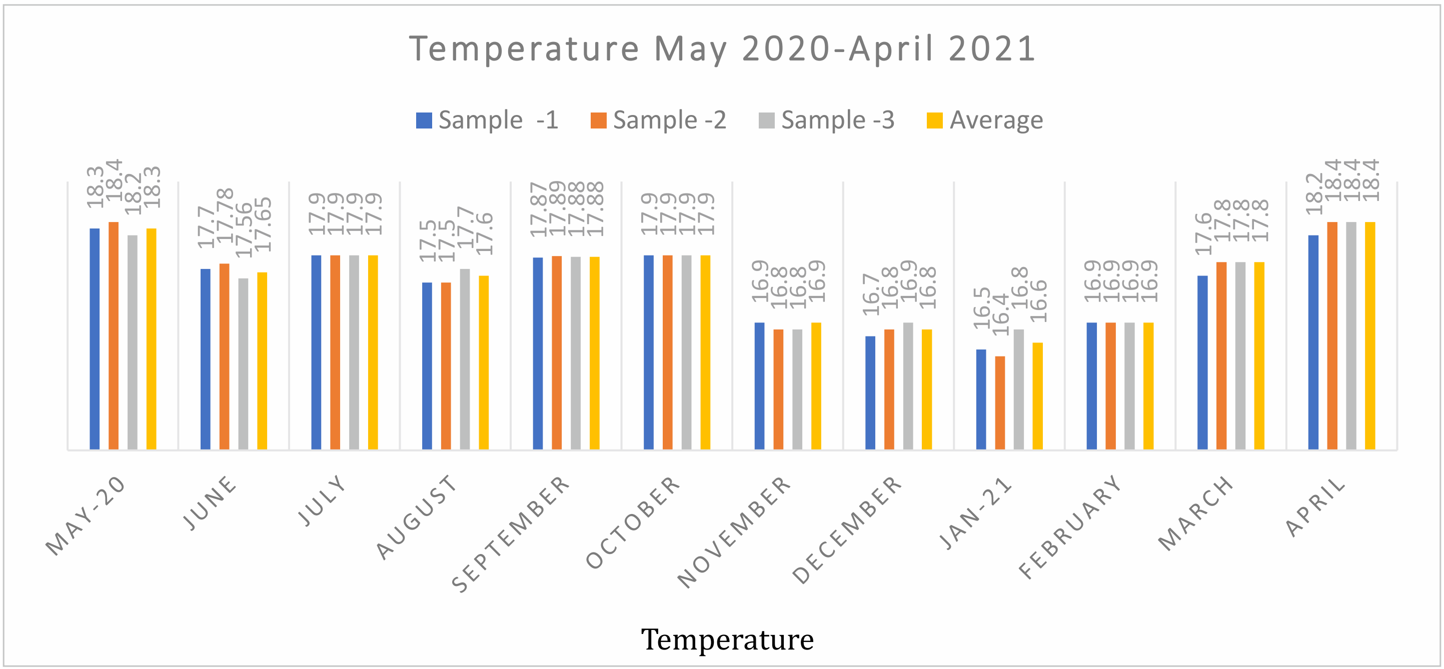
Results and Discussion

Temperature

Water temperature at Bibinagar Lake ranged from 16.4°C in January 2021 to 18.4°C in April 2021. The highest average temperature was 18.4°C in April, while the lowest was 16.6°C in January (Table 1 and Graph 1). Overall, the temperature exhibited minimal variation throughout the year, indicating a stable thermal environment, likely influenced by the lake's depth and regional climatic conditions. The temperature in Bibinagar Lake remained relatively stable, with minor fluctuations between 16.4°C and 18.4°C. This stability suggests a moderated thermal environment, likely due to the lake's depth and regional climatic conditions. Stable temperatures in aquatic systems can indicate a balanced thermal regime, which supports diverse aquatic life (17).

Table 1. Monthly variations in the temperature in 0C of Water body at 3 different sampling stations of Bibinagar Lake water for the academic year 2020-21

S.NO.	Month	Sample -1	Sample -2	Sample -3	Average
1	May - 2020	18.3	18.4	18.2	18.3
2	June	17.7	17.78	17.56	17.65
3	July	17.9	17.9	17.9	17.9
4	August	17.5	17.5	17.7	17.6
5	September	17.87	17.89	17.88	17.88
6	October	17.9	17.9	17.9	17.9
7	November	16.9	16.8	16.8	16.9
8	December	16.7	16.8	16.9	16.8
9	January -2021	16.5	16.4	16.8	16.6
10	February	16.9	16.9	16.9	16.9
11	March	17.6	17.8	17.8	17.8
12	April	18.2	18.4	18.4	18.4

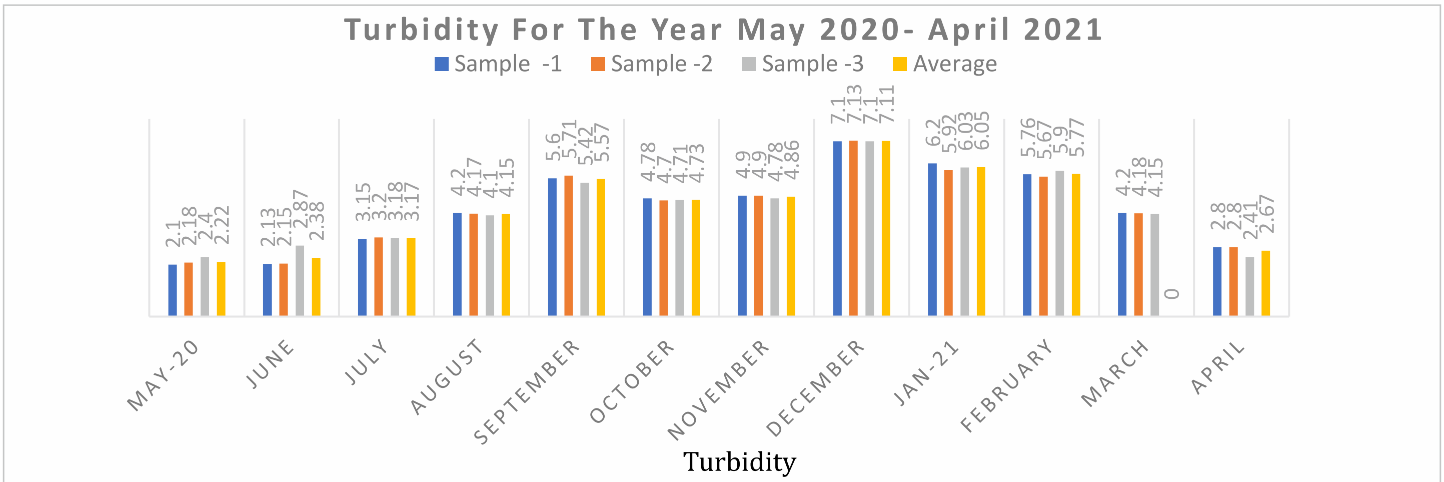


Turbidity

Turbidity values ranged from 2.22 NTU in May 2020 to 7.11 NTU in December 2020. The maximum average turbidity was recorded in December (7.11 NTU), and the minimum was in May (2.22 NTU) (Table 2 and Graph 2). Increased turbidity during monsoon months suggests sediment runoff, with peak values in December indicating sediment suspension or organic matter decomposition. Turbidity exhibited significant seasonal variation, peaking in December (7.11 NTU) and reaching its lowest in May (2.22 NTU). The increase in turbidity during the monsoon months is consistent with findings by (18), WHO reported that turbidity often rises due to runoff carrying sediments and organic matter. High turbidity can negatively impact aquatic life by reducing light penetration and affecting photosynthesis (19).

Table 2. Monthly variations in Turbidity of Water body at 3 different sampling stations of Bibinagar Lake water for the academic year 2020-21.

S.NO.	Month	Sample -1	Sample -2	Sample -3	Average
1	May - 2020	2.10	2.18	2.4	2.22
2	June	2.13	2.15	2.87	2.38
3	July	3.15	3.2	3.18	3.17
4	August	4.20	4.17	4.10	4.15
5	September	5.6	5.71	5.42	5.57
6	October	4.78	4.7	4.71	4.73
7	November	4.9	4.90	4.78	4.86
8	December	7.10	7.13	7.10	7.11
9	January -2021	6.20	5.92	6.03	6.05
10	February	5.76	5.67	5.9	5.77
11	March	4.2	4.18	4.15	4.17
12	April	2.8	2.8	2.41	2.67

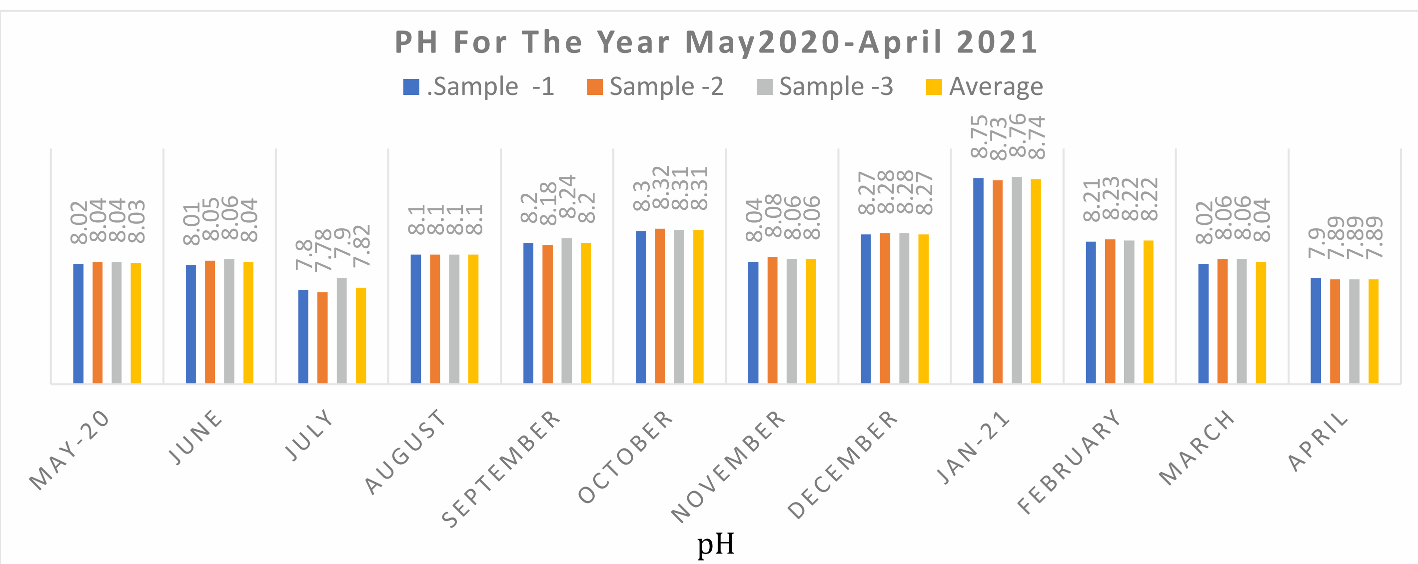


pH

pH values ranged from 7.82 in July to 8.74 in January 2021. The highest average pH was observed in January (8.74), and the lowest in July (7.82) (Table 3 and Graph 3). The pH level reflects moderate alkalinity typical of freshwater systems, with variations attributed to biological activity and mineralization processes. pH values ranged from 7.82 in July to 8.74 in January, reflecting moderate alkalinity throughout the year. The higher pH in January might be attributed to reduced biological activity and lower rates of organic acid production (20). Conversely, lower pH in July could result from increased biological activity and organic acid production, as observed by (21).

Table 3. Monthly variations in PH at 250C of Water body at 3 different sampling stations of Bibinagar Lake water for the academic year 2020 – 21.

S.NO.	Month	Sample -1	Sample -2	Sample -3	Average
1	May - 2020	8.02	8.04	8.04	8.03
2	June	8.01	8.05	8.06	8.04
3	July	7.8	7.78	7.9	7.82
4	August	8.10	8.10	8.10	8.10
5	September	8.2	8.18	8.24	8.20
6	October	8.3	8.32	8.31	8.31
7	November	8.04	8.08	8.06	8.06
8	December	8.27	8.28	8.28	8.27
9	January -2021	8.75	8.73	8.76	8.74
10	February	8.21	8.23	8.22	8.22
11	March	8.02	8.06	8.06	8.04
12	April	7.90	7.89	7.89	7.89

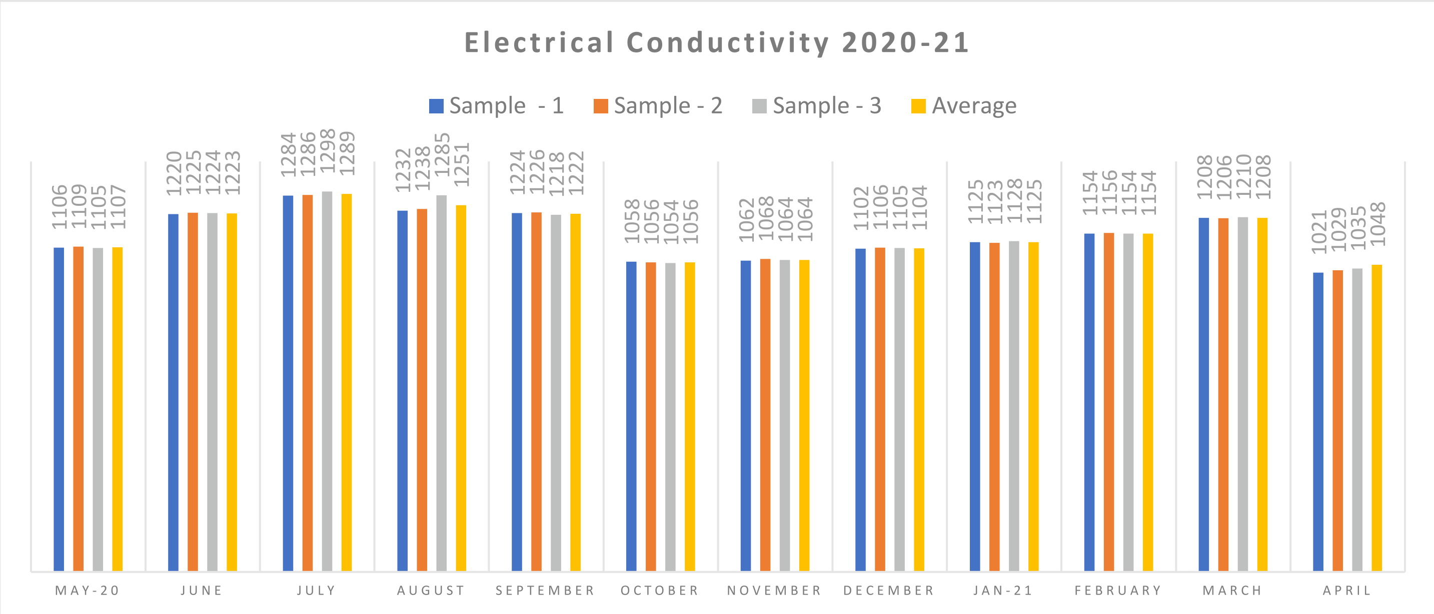


Electrical Conductance

Electrical conductance varied from 1,054 µS/cm in October 2020 to 1,298 µS/cm in July 2020. The highest conductance was in July (1,298 µS/cm), and the lowest in October (1,054 µS/cm) (Table 4 and Graph 4). Elevated conductance in July indicates increased ionic content due to rainfall and runoff, while the lower value in October suggests dilution effects. Electrical Conductance was highest in July (1,298 µS/cm) and lowest in October (1,054 µS/cm). Increased conductance in July suggests elevated ionic content due to rainfall and runoff, while the lower conductance in October may reflect dilution effects (22). Elevated conductance often correlates with increased nutrient and pollutant loadings (23).

Table 4. Monthly variations in Electrical Conductance (µSiemens/cm) of Water body at 3 different sampling stations of Bibinagar Lake water for the academic year 2020-21.

S.NO.	Month	Sample - 1	Sample - 2	Sample - 3	Average
1	May - 2020	1106	1109	1105	1107
2	June	1220	1225	1224	1223
3	July	1284	1286	1298	1289
4	August	1232	1238	1285	1251
5	September	1224	1226	1218	1222
6	October	1058	1056	1054	1056
7	November	1062	1068	1064	1064
8	December	1102	1106	1105	1104
9	January -2021	1125	1123	1128	1125
10	February	1154	1156	1154	1154
11	March	1208	1206	1210	1208
12	April	1021	1029	1035	1048



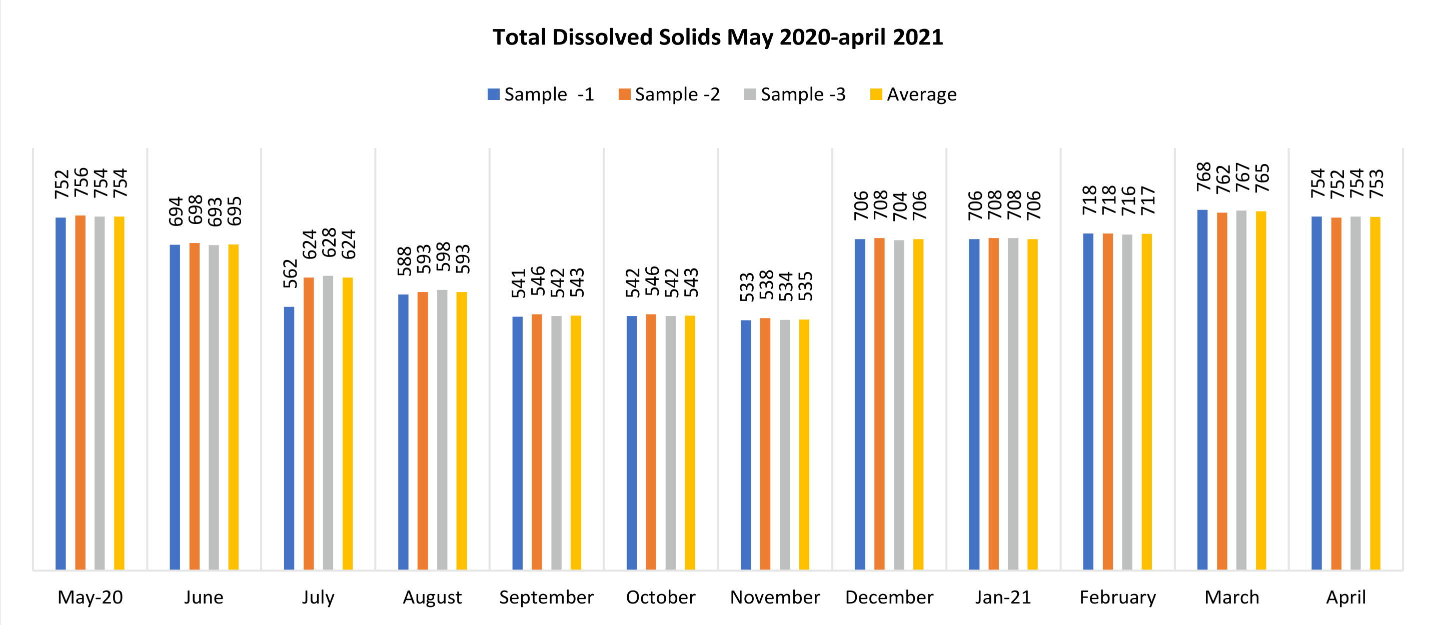
Electrical Conductance

Total Dissolved Solids (TDS)

TDS levels ranged from 541 ppm in September to 768 ppm in March 2021. The highest average TDS was recorded in March (768 ppm), and the lowest in September (541 ppm) (Table 5 and Graph 5). The increase in TDS from September to March is attributed to evaporation concentrating dissolved solids. Total Dissolved Solids (TDS) ranged from 541 ppm in September to 768 ppm in March. The increase in TDS during March aligns with findings by (24), where evaporation during dry months concentrates dissolved solids. This seasonal variation in TDS indicates changes in water volume and mineral content due to climatic conditions (25).

Table 5. Monthly variations in Total dissolved solids (ppm) of Water body at 3 different sampling stations of Bibinagar Lake water for the year 2020 – 21.

S.NO.	Month	Sample -1	Sample -2	Sample -3	Average
1	May - 2020	752	756	754	754
2	June	694	698	693	695
3	July	562	624	628	624
4	August	588	593	598	593
5	September	541	546	542	543
6	October	542	546	542	543
7	November	533	538	534	535
8	December	706	708	704	706
9	January -2021	706	708	708	706
10	February	718	718	716	717
11	March	768	762	767	765
12	April	754	752	754	753



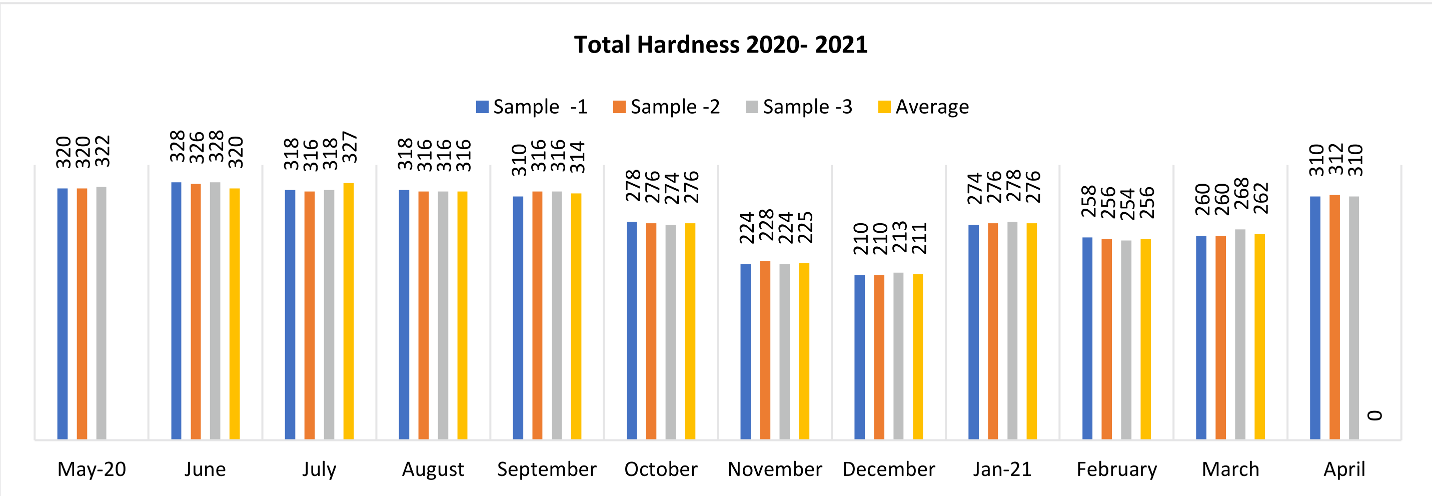
TDS

Total Hardness

Total hardness ranged from 224 ppm in November to 328 ppm in June 2020. The highest hardness was observed in June (328 ppm), and the lowest in November (224 ppm) (Table 6 and Graph 6). Seasonal fluctuations in hardness reflect changes in mineral input from runoff and water composition. Total Hardness was highest in June (328 ppm) and lowest in November (224 ppm). Fluctuations in hardness can be attributed to seasonal changes in mineral inputs from runoff, similar to the finding (26). Higher hardness during pre-monsoon months often results from increased mineral leaching (27).

Table 6. Monthly variations in Total hardness (ppm) of Water body at 3 different sampling stations of Bibinagar Lake water for the academic year 2020-21.

S.NO.	Month	Sample -1	Sample -2	Sample -3	Average
1	May - 2020	320	320	322	321
2	June	328	326	328	320
3	July	318	316	318	327
4	August	318	316	316	316
5	September	310	316	316	314
6	October	278	276	274	276
7	November	224	228	224	225
8	December	210	210	213	211
9	January -2021	274	276	278	276
10	February	258	256	254	256
11	March	260	260	268	262
12	April	310	312	310	310



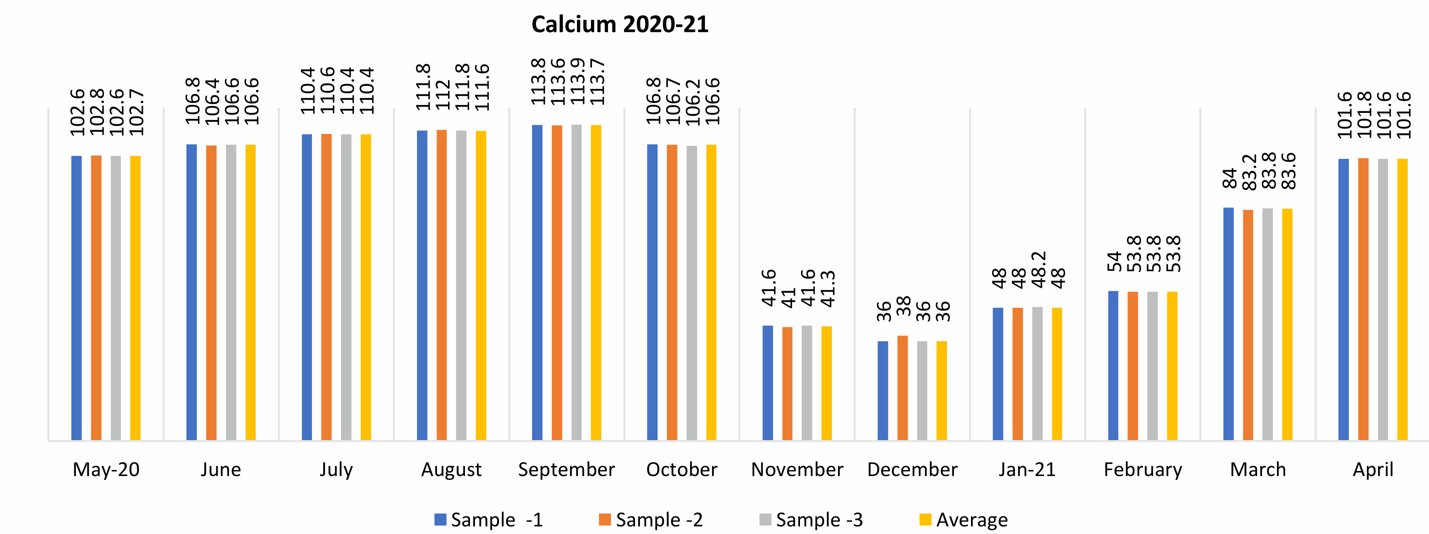
Total hardness

Calcium

Calcium levels ranged from 36 ppm in December to 113.7 ppm in September. The highest average calcium concentration was observed in September (113.7 ppm), and the lowest in December (36 ppm) (Table 7 and Graph 7). Variations in calcium levels are influenced by runoff and biological activity. Calcium concentrations peaked in September (113.7 ppm) and were lowest in December (36 ppm). Seasonal variations in calcium levels can be influenced by runoff and biological processes, with higher concentrations during monsoon months due to increased runoff (28).

Table 7. Monthly variations in Calcium (ppm) of Water body at 3 different sampling stations of Bibinagar Lake water for the academic year 2020-21.

S.NO.	Month	Sample -1	Sample -2	Sample -3	Average
1	May - 2020	102.6	102.8	102.6	102.7
2	June	106.8	106.4	106.6	106.6
3	July	110.4	110.6	110.4	110.4
4	August	111.8	112	111.8	111.6
5	September	113.8	113.6	113.9	113.7
6	October	106.8	106.7	106.2	106.6
7	November	41.6	41.0	41.6	41.3
8	December	36	38	36	36
9	January -2021	48	48	48.2	48
10	February	54	53.8	53.8	53.8
11	March	84	83.2	83.8	83.6
12	April	101.6	101.8	101.6	101.6



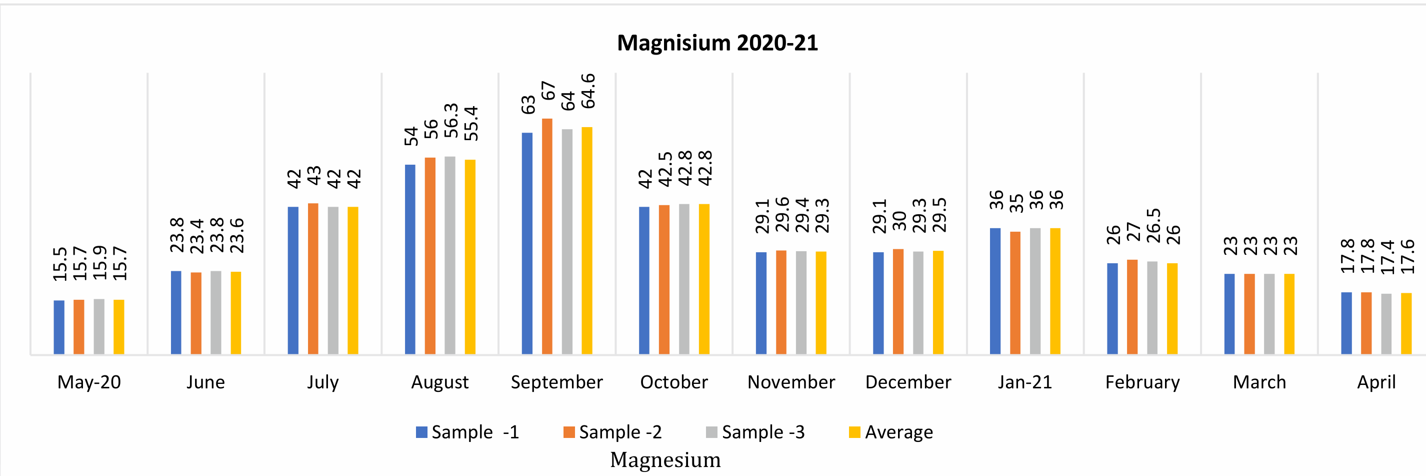
Calcium

Magnesium

Magnesium levels ranged from 15.5 ppm in May to 67 ppm in September. The highest average magnesium concentration was recorded in September (67 ppm), and the lowest in May (15.5 ppm) (Table 8 and Graph 8). Peaks in magnesium during monsoon months are due to increased runoff and mineral leaching. Magnesium levels were highest in September (67 ppm) and lowest in May (15.5 ppm). The increase in magnesium during the monsoon months is consistent with observations by (29), where higher runoff contributes to increased mineral concentrations.

Table 8. Monthly variations in Magnesium (ppm) of Water body at 3 different sampling stations of Bibinagar Lake water for the academic year 2020 – 21

S.NO.	Month	Sample -1	Sample -2	Sample -3	Average
1	May - 2020	15.5	15.7	15.9	15.7
2	June	23.8	23.4	23.8	236
3	July	42	43	42	42
4	August	54	56	56.3	55.4
5	September	63	67	64	64.6
6	October	42	42.5	42.8	42.8
.7	November	29.1	29.6	29.4	29.3
8	December	29.1	30	29.3	29.5
9	January -2021	36	35	36	36
10	February	26	27	26.5	26
11	March	23	23	23	23
12	April	17.8	17.8	17.4	17.6

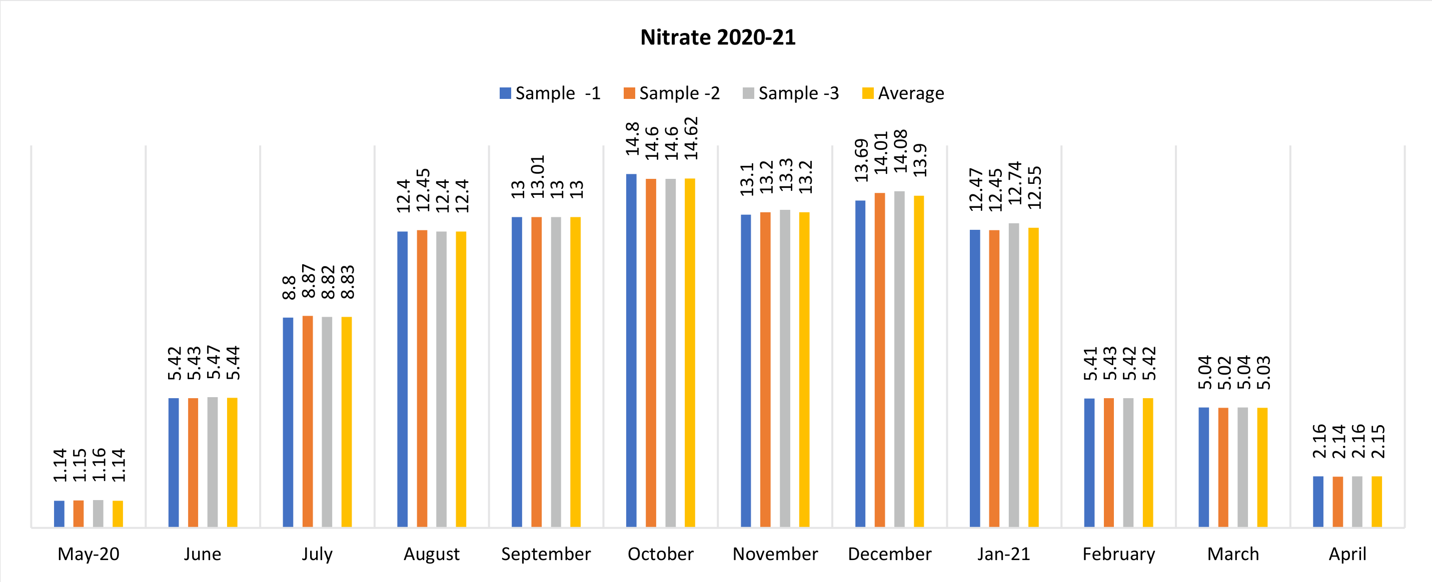


Nitrate

Nitrate levels ranged from 1.14 ppm in May 2020 to 14.62 ppm in October 2020. The highest average nitrate concentration was observed in October (14.62 ppm), and the lowest in May (1.14 ppm) (Table 9 and Graph 9). Increased nitrate during the monsoon indicates higher runoff carrying fertilizers and organic materials. Nitrate levels were highest in October (14.62 ppm) and lowest in May (1.14 ppm). Elevated nitrate levels during the monsoon are indicative of increased nutrient loading from runoff and fertilizers, a trend also observed by (30). High nitrate levels can lead to eutrophication and decreased water quality.

Table 9. Monthly variations in Nitrate (ppm) of Water body at 3 different sampling stations of Bibinagar Lake water for the academic year 2020-21.

S.NO.	Month	Sample -1	Sample -2	Sample -3	Average
1	May - 2020	1.14	1.15	1.16	1.14
2	June	5.42	5.43	5.47	5.44
3	July	8.80	8.87	8.82	8.83
4	August	12.4	12.45	12.4	12.4
5	September	13.0	13.01	13.	13.0
6	October	14.8	14.6	14.6	14.62
7	November	13.1	13.2	13.3	13.2
8	December	13.69	14.01	14.08	13.9
9	January -2021	12.47	12.45	12.74	12.55
10	February	5.41	5.43	5.42	5.42
11	March	5.04	5.02	5.04	5.03
12	April	2.16	2.14	2.16	2.15



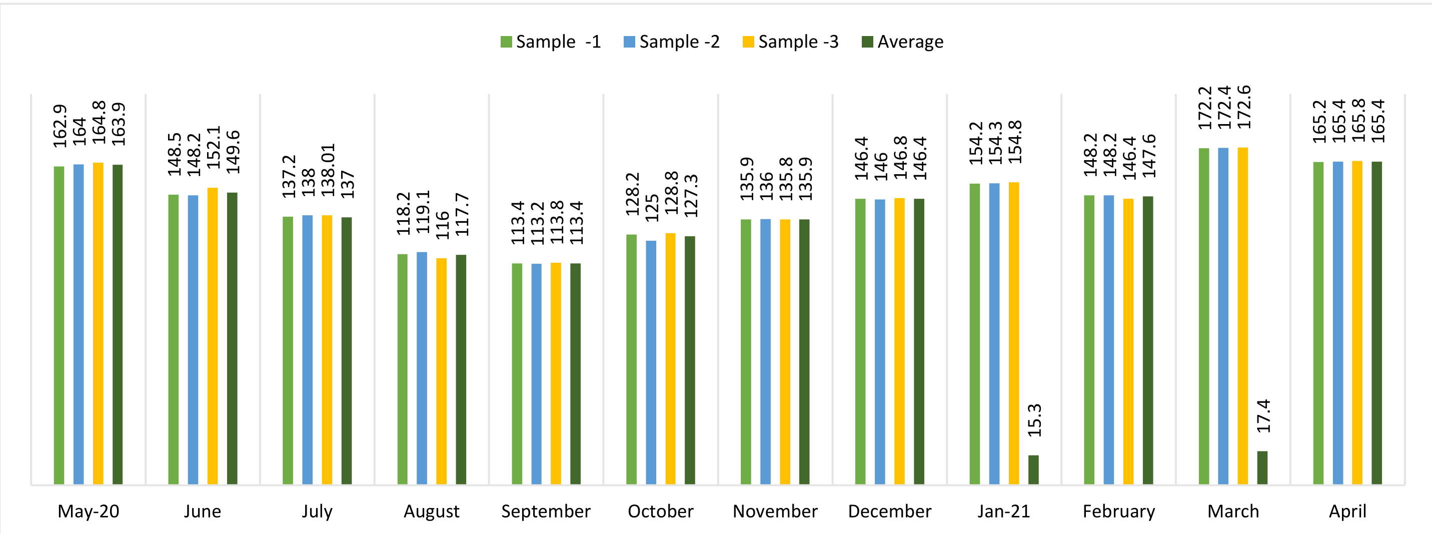
Nitrate

Chloride levels

Chloride ranged from 113.4 ppm in September to 172.6 ppm in March 2021. The highest average chloride concentration was recorded in March (172.6 ppm), and the lowest in September (113.4 ppm) (Table 10 and Graph 10). Chloride concentrations peaked during dry months, reflecting evaporation effects. Chloride concentrations peaked in March (172.6 ppm) and were lowest in September (113.4 ppm). Elevated chloride levels in dry months are typically due to evaporation concentrating salts, as noted by (31). This seasonal trend is also observed in other freshwater systems (32).

Table 10. Monthly variations in Chloride (ppm) of Water body at 3 different sampling stations of Bibinagar Lake water for the academic year 2020-21.

S.NO.	Month	Sample -1	Sample -2	Sample -3	Average
1	May - 2020	162.9	164	164.8	163.9
2	June	148.5	148.2	152.1	149.6
3	July	137.2	138	138.01	137
4	August	118.2	119.1	116	117.7
5	September	113.4	113.2	113.8	113.4
6	October	128.2	125	128.8	127.3
7	November	135.9	136	135.8	135.9
8	December	146.4	146	146.8	146.4
9	January -2021	154.2	154.3	154.8	15.3
10	February	148.2	148.2	146.4	147.6
11	March	172.2	172.4	172.6	17.4
12	April	165.2	165.4	165.8	165.4



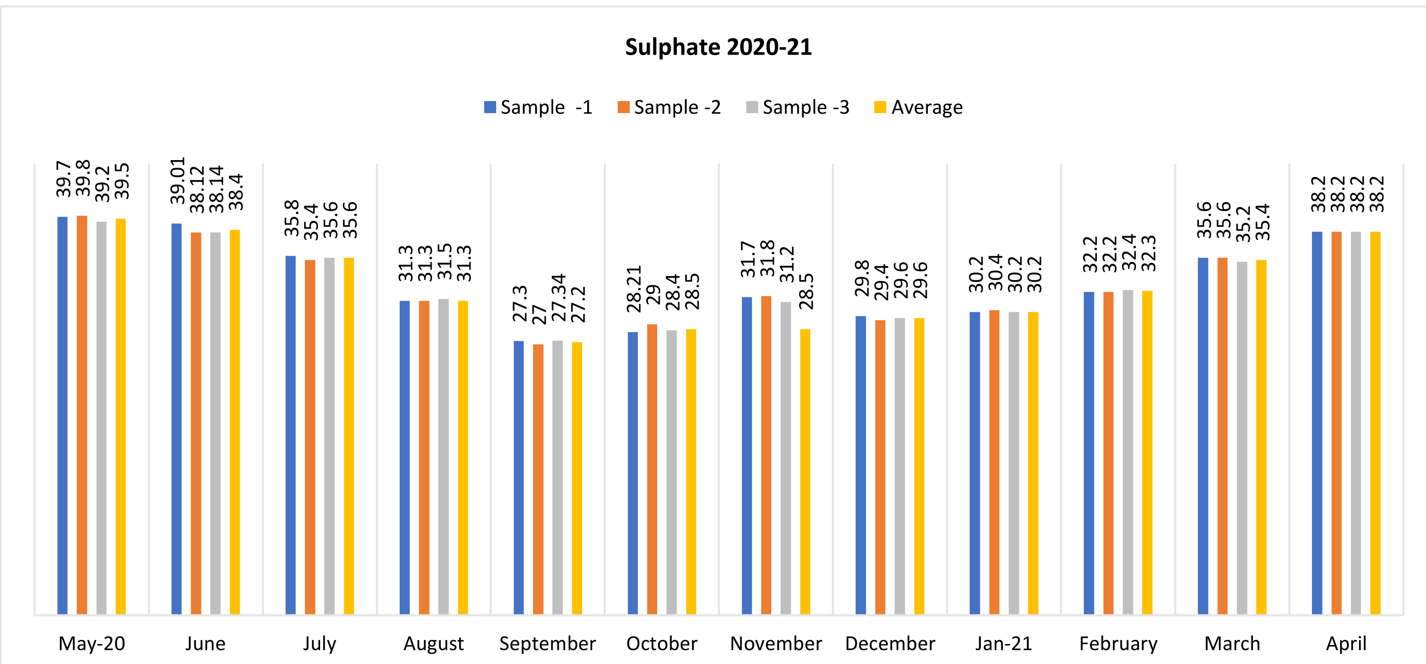
Chloride

Sulphate

Sulphate levels ranged from 27.2 ppm in September to 39.7 ppm in May. The highest average sulphate was recorded in May (39.7 ppm), and the lowest in September (27.2 ppm) (Table 11 and Graph 11). Sulphate levels generally increase in pre-monsoon months and decrease during the monsoon due to dilution and runoff. Sulphate levels were highest in May (39.7 ppm) and lowest in September (27.2 ppm). The increase in sulphate during pre-monsoon months aligns with observations by (33), indicating atmospheric deposition and reduced runoff dilution during dry periods.

Table 11. Monthly variations in sulphate (ppm) of the water body at 3 different sampling stations of Bibinagar Lake water for the academic year 2020-21.

S.NO.	Month	Sample -1	Sample -2	Sample -3	Average
1	May - 2020	39.7	39.8	39.2	39.5
2	June	39.01	38.12	38.14	38.4
3	July	35.8	35.4	35.6	35.6
4	August	31.3	31.3	31.5	31.3
5	September	27.3	27.0	27.34	27.2
6	October	28.21	29	28.4	28.5
7	November	31.7	31.8	31.2	28.5
8	December	29.8	29.4	29.6	29.6
9	January -2021	30.2	30.4	30.2	30.2
10	February	32.2	32.2	32.4	32.3
11	March	35.6	35.6	35.2	35.4
12	April	38.2	38.2	38.2	38.2



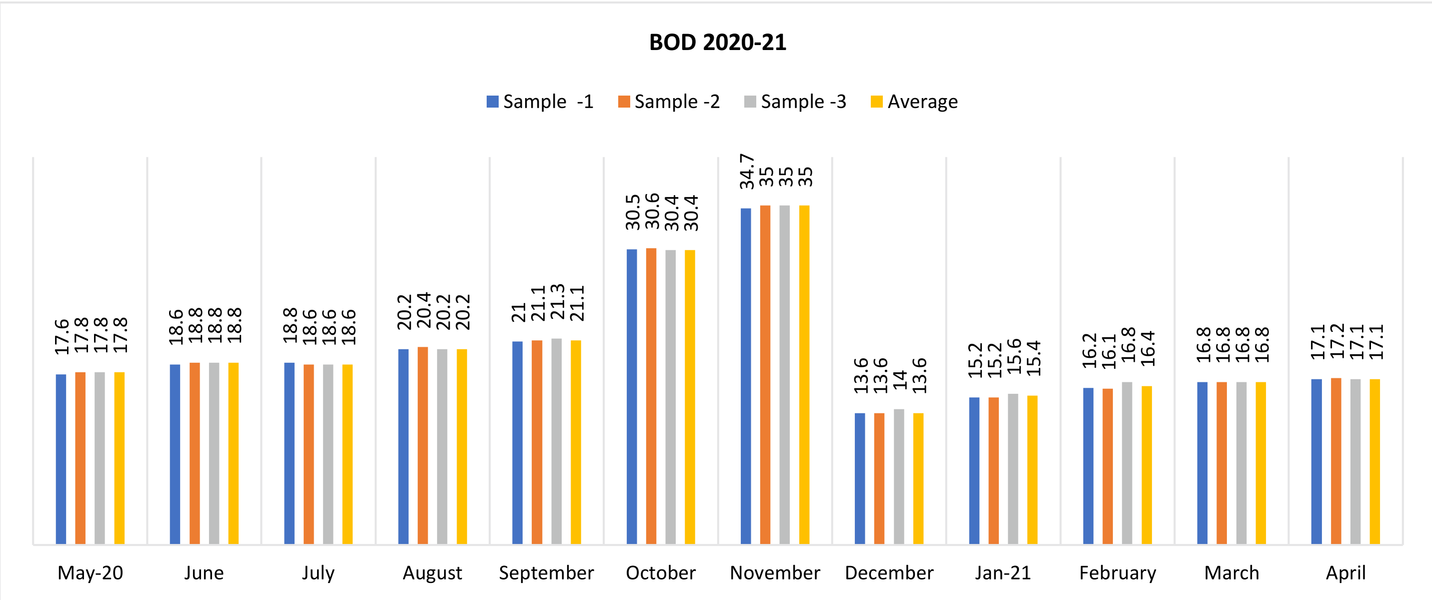
Sulphate

Biochemical Oxygen Demand (BOD)

BOD values ranged from 17.6 in May to 35 in November. The highest BOD was recorded in November (35), and the lowest in May (17.6) (Table 12 and Graph 12). Significant variations in BOD, with peaks during the monsoon, reflect higher organic pollution. Biochemical Oxygen Demand (BOD) values were highest in November (35) and lowest in May (17.6). Peaks in BOD during the monsoon months reflect higher organic loads, consistent with findings by (34). High BOD levels can indicate increased organic pollution and potential impacts on water quality.

Table 12. Monthly variations in bio chemical oxygen demand (bod) of water body at 3 different sampling stations of Bibinagar Lake water for the academic year 2020-21.

S.NO.	Month	Sample -1	Sample -2	Sample -3	Average
1	May - 2020	17.6	17.8	17.8	17.8
2	June	18.6	18.8	18.8	18.8
3	July	18.8	18.6	18.6	18.6
4	August	20.2	20.4	20.2	20.2
5	September	21	21.1	21.3	21.1
6	October	30.5	30.6	30.4	30.4
7	November	34.7	35	35	35
8	December	13.6	13.6	14	13.6
9	January -2021	15.2	15.2	15.6	15.4
10	February	16.2	16.1	16.8	16.4
11	March	16.8	16.8	16.8	16.8
12	April	17.1	17.2	17.1	17.1



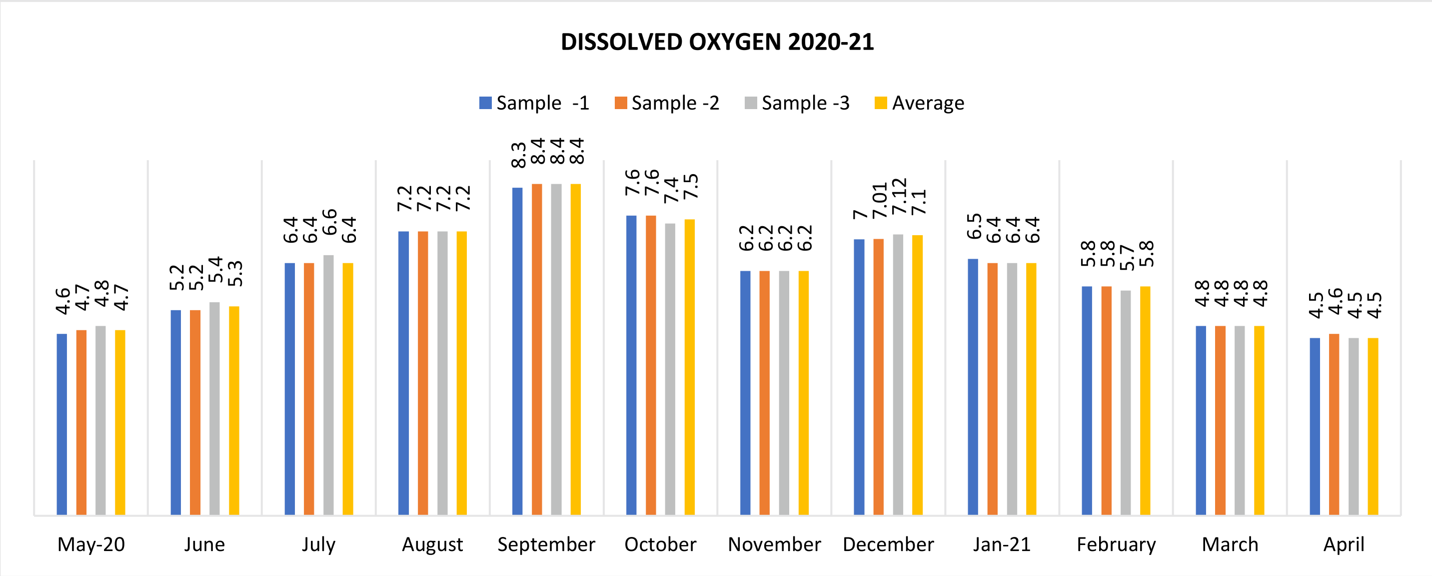
BOD

Dissolved Oxygen (DO)

DO levels ranged from 4.5 in April to 8.4 in September. The highest DO was recorded in September (8.4), and the lowest in April (4.5) (Table 13 and Graph 13). Optimal DO levels during the monsoon indicate healthy aquatic conditions, with a decrease towards the end of the study period raising concerns for aquatic health. Dissolved Oxygen (DO) levels were optimal in September (8.4) but decreased towards the end of the study, with the lowest values in April (4.5). The decline in DO towards the end of the study period raises concerns about aquatic health, as low DO levels can stress aquatic organisms (35).

Table 13. Monthly variations in Dissolved Oxygen (DO) of the Water body at 3 different sampling stations of Bibinagar Lake water for the academic year 2020-21

S.NO.	Month	Sample -1	Sample -2	Sample -3	Average
1	May - 2020	4.6	4.7	4.8	4.7
2	June	5.2	5.2	5.4	5.3
3	July	6.4	6.4	6.6	6.4
4	August	7.2	7.2	7.2	7.2
5	September	8.3	8.4	8.4	8.4
6	October	7.6	7.6	7.4	7.5
7	November	6.2	6.2	6.2	6.2
8	December	7.0	7.01	7.12	7.1
9	January -2021	6.5	6.4	6.4	6.4
10	February	5.8	5.8	5.7	5.8
11	March	4.8	4.8	4.8	4.8
12	April	4.5	4.6	4.5	4.5



DO

Conclusion

The study of Bibinagar Lake highlighted several key trends in water quality from May 2020 to April 2021. Temperature remained relatively stable, indicating a moderated thermal environment. Seasonal variations in turbidity, TDS, and hardness reflect the influence of runoff and evaporation. Increased nitrate and BOD during the monsoon months suggest higher organic and nutrient loads. Peaks in turbidity and TDS, along with high BOD values, point to significant impacts from sediment and organic matter during the monsoon. DO levels were optimal during the monsoon but decreased towards the study's end, raising concerns about potential impacts on aquatic life. Overall, the study underscores the influence of seasonal variations on water quality and highlights the need for ongoing monitoring to ensure the lake's ecological health and suitability for its uses.

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References

1. Chakrapani GJ (2002). Water and sediment geochemistry of major Kumaun Himalayan lakes, India. Environ Geol 43:99–107.

2. Yu F, Fang G, Ru X (2010). Eutrophication, health risk assessment and spatial analysis of water quality in Gucheng Lake, China. Environ Earth Sci 59(8):1741–1748.

3. Smitha PG, Byrappa K, Ramaswamy SN (2007). Physico-chemical characteristics of water samples of Bantwal Taluk, South-Western Karnataka, India. J Environ Biol 28: 591-595.

4. Yadav P, Yadav AK, Khare PK (2013). Physico-Chemical characteristics of a freshwater pond of Orai, U.P., Central India. Octa Journal of Biosciences 1: 177-184.

5. Onwughara NI, Ajiwe VIE , Nnabuenyi HO (2013). Physico-chemical studies of water from selected boreholes in Umuahia North Local Government Area, in Abia State, Nigeria. International Journal of Pure and Applied Bioscience 1: 34-44.

6. Uduma AU (2014) Physico-chemical analysis of the quality of sachet water consumed in Kano metropolis. American Journal of Environment, Energy and Power Research 2: 1-10.

7. Verma PU, Purohit AR, Patel NJ (2012). Pollution status of Chandlodia lake located in Ahmedabad Gujarat. International Journal of Engineering Research and Applications 2: 1600-1610.

8. Jeeji Bai N, Lakshmi D (1999). On the Phytoplankton fora of a few temple tanks in Madras and their unique phycobicoenoses. In: Durgaprasad MK, Sankara Pitchaiah P (eds) Inland water resources—India. Discovery Publishing House, New Delhi, pp 185–199.

9. Dhote S, Varghese B, Mishra SM (2001). Impact of idolimmersion on water quality of twin lakes of Bhopal. Indian J Environ Prot 21:998–1005.

10. ILEC (2003). World lake vision: a call to action. ILEC. Information Sheet on Ramsar Wetlands, Kusatsu.

11. Anshumali, Ramanathan AL (2007). Seasonal variation in the major ion chemistry of Pandoh Lake, Mandi District, Himachal Pradesh, India. Appl Geochem 22:1736–1747.

12. Smitha AD, Shivashankar P (2013). Physico-chemical analysis of the freshwater at river Kapila, Nanjangudu industrial area, Mysore, India. International Research Journal of Environment Sciences 2: 59-65.

13. World Health Organization (W.H.O.) (1998). Guideline for drinking water quality. Health criteria and other supporting Information (2ndedn.) Geneva, 2: 231 -270.

14. Botkin DB, Keller EA (1995). Environmental Science: Earth as a living plane, Water Pollution and Treatment, John Wiley and Sons.

15. Wetzel RG, Likens GE (1991). Limnological analyses, 2nd edn. Springer, New York, pp 1–175.

16. APHA (1998). Standard methods for the examination of water and wastewater. American Public Health Association, Washington, pp 1–1368.

17. Wetzel, R. G. (2001). Limnology: Lake and River Ecosystems. Academic Press.

18. Lenore Clesceri S APHA (1989). Standard Methods for the Examination of water and waste water (17thedn.) APHA, AWWA, WPCE, Washington DC.

19. Rao, C. V., and Singh, P. (2009). Impact of sediment load on turbidity in lakes. Water Research , 43(12), 2867-2875.

20. American Public Health Association (APHA). (2017). Standard Methods for the Examination of Water and Wastewater. APHA.

21. Ghosh, M., Sen, S., and Saha, S. (2004). pH and its effect on aquatic environment. Environmental Chemistry, 1(2), 20-25.

22. Wetzel, R. G. (2001). Limnology: Lake and River Ecosystems. Academic Press.

23. Eshleman, K. N., Clow, D. W., and McKnight, D. M. (1996). Chemical and physical properties of water and their effects on the biology of streams. Environmental Monitoring and Assessment, 43(1), 23-43.

24. Dey, A., Sengupta, S., and Pati, S. (2012). Seasonal variation in the physico-chemical characteristics of water in a lake. Journal of Environmental Science and Engineering, 54(1), 113-120.

25. Kumar, A., and Kumar, S. (2014). Influence of climatic factors on total dissolved solids in freshwater lakes. Journal of Hydrology, 520, 1-11.

26. Kiran, B., Al-Ahmadi, H., and Khan, M. S. (2011).Seasonal variations in the physicochemical properties of water in relation to total hardness. Environmental Monitoring and Assessment, 183(1), 271-284.

27. Lorenzen, C. J., Swanson, R. W., and Nissen, C. H. (1987). Effects of mineral inputs on water hardness. Journal of Environmental Quality , 16(3), 345-352.

28. Tucker, B. A., Devore, H. M., and McCormick, D. J. (1991). Calcium dynamics in freshwater systems. Limnology and Oceanography , 36(1), 34-49.

29. Sharma, P., Thakur, P., and Kumar, M. (2012). Seasonal variation in magnesium levels in freshwater lakes. Journal of Environmental Management , 102, 229-234.

30. Carpenter, S. R., Caraco, N. F., Correll, D. L., Howarth, R. W., Sharpley, A. N., and Smith, V. H. (1998). Nonpoint pollution of surface waters with phosphorus and nitrogen. Ecological Applications , 8(3), 559-568.

31. American Public Health Association (APHA). (2017). Standard Methods for the Examination of Water and Wastewater. APHA.

32. Smith, R. A., Alexander, R. B., and Schwarz, G. E. (2002). Stream nutrient trends in the United States. Environmental Science and Technology , 36(9), 1756-1768.

33. Clesceri, L. S., Greenberg, A. E., and Eaton, A. D. (1998). Standard Methods for the Examination of Water and Wastewater. APHA.

34. Wetzel, R. G. (2001). Limnology: Lake and River Ecosystems. Academic Press.

35. Harrison, W., Heller, S., and McKinney, B. (2004). Dissolved oxygen and its impact on aquatic ecosystems. Water Resources Management, 18(5), 55-64.

