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A STUDY ON THE LIMNOLOGICAL PARAMETERS OF GANGA LAKE (GYAKAR SINYIK) OF ITANAGAR, ARUNACHAL PRADESH

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ABSTRACT

This study has been conducted to assess the seasonal variation in lake water quality parameters and overall performance of Ganga lake (Gyakar Sinyik in local dialect). It lies in the western part of Itanagar, 6 km away from Ganga market. The lake is surrounded by small hills from either side covered with thick forest. The need of investigation is to protect the natural water body from various kinds of threats to its pristine condition. It is found that the western bank of the lake is weaken due to geological relief soil and anthropogenic activities like earth-cutting, deforestation, etc. It is found that the project site is rich in biodiversity and has significant socio-economic value. Upper portion of the upland hills are flatty in slope and huge boulders can be seen sparsely all over the site. This study has emphasized on the hydrological parameters which determines the quality of the lake water. Some parameter like

dissolved oxygen, temperature, pH, turbidity, total dissolved Solid, chlorides, nitrate, conductivity, chemical oxygen demand, biological oxygen demand, total alkalinity, total hardness of the water sample are studied to understand the quality of the lake water. Outcomes of the test conducted reveal the lake is suitable for aquatic life, but some concentration of nitrate, chlorine, turbidity and alkalinity were also reported.

Keywords: Water quality, Ganga lake (Gyakar Sinyik), Biodiversity, dissolved oxygen, pH, aquatic life.

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1.0 Introduction

Water is one of the most basic resources that mankind cannot sustain without. It is necessary to every living organism that exists; it forms a perfect attribute to both living and non-living thing. Water present on earth is abundant but it is critical in terms of quality index. About three-fourth surface of the earth is water but only 2.5 percent is fresh-water and less than 0.006 percent is suitable for human consumption. Excessive use of water for economical, commercial, industrial or recreational purpose increases with population explosion. Potable water for drinking should be essentially clear, free from chemicals, turbidity, bacteria, odour and colour. Water quality is likely to change with seasons and it may affect some aquatic life as its parameters may exceeds the favourable condition, in this light it is important to analyse the change in parameters. On the basis of geographic or climatic condition, the lake can be classified as valley lake, forest lake, high altitude lake, coastal lake, etc.

Our study site Ganga lake is a hill-lock forest lake. Ganga lake is a public recreational site, under the control of Environmental and Forest department, Itanagar, Government of Arunachal Pradesh.

Fig 1: Ganga Lake (locally called *Gyakar Sinyik*), Itanagar, Arunachal Pradesh

1.1 Watershed context

The study area consists of six watersheds area. These are (1) Pam, (2) Gira, (3) Chimpu, (4) Papu, (5) Senki, (6) Pachin. Fig 2 shows these watersheds prepared by Survey of India. These are broadly divided into two River watersheds as Pam and Palin watersheds flowing in opposite direction. Ganga lake located in Chimpu watersheds which finally conjoin pachin river watersheds.

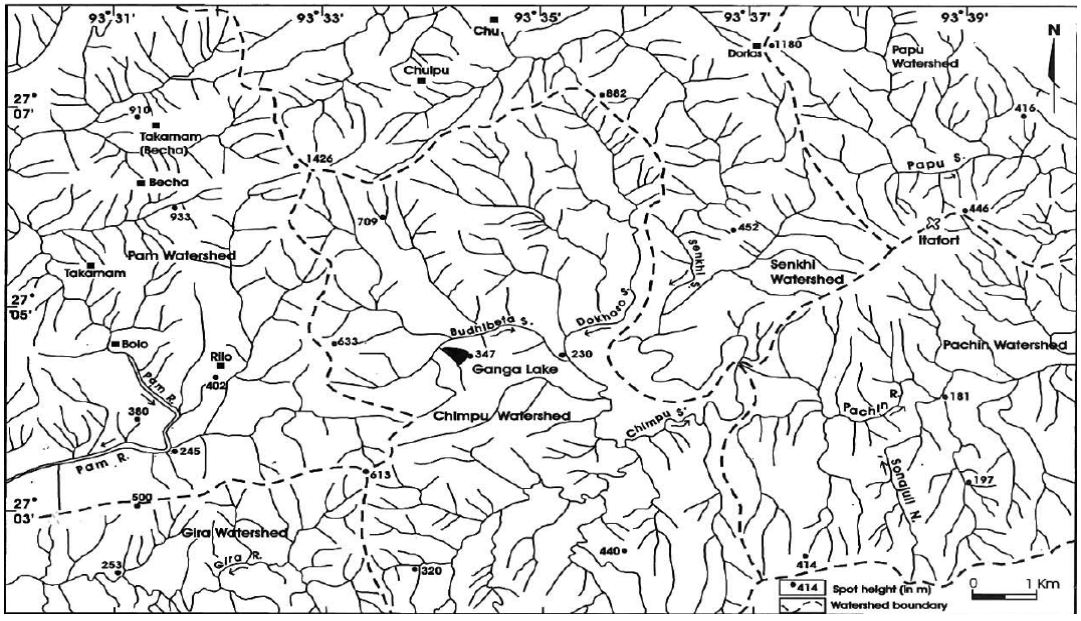

Fig 2: Drainage map with watershed boundaries. (Source: Survey of India)

So, attempt is made to understand the requirement of the lake by exploring and examining various aspects i.e., limnological, geo-environmental and mitigation strategy. Gyakar Sinyik is situated in western part of Itanagar. It serves people through various benefits such as revenue, employment, recreation to the people and form an ecological heritage. But the same activities that provide become a threat to the lake. So, this report tries to convey a message to protect those threats to the lake. Therefore, the objectives of the study:

1. To study the present condition of Ganga Lake and its surroundings to find suitable mitigation planning.
2. To study the seasonal change in water quality parameters of the lake.
3. To conduct a field survey & evaluate the geology, hydrology and vegetation.

The work tried to convey an assessment on ecosystem services potential of Ganga lake. The analysis of the result provides services and awareness of the lake which will be useful for both economic value and research point of view. Below Table 1 presents the lake ecosystem services.

Table 1: Lake Ecosystem services

Sl. No.	**Lake Ecosystem service**	**Category**	**Value type**	**Examples**
1	Pisciculture	Provision	Direct	Fish breeding e.g., carps and minnows
2	Protect from erosion	Regulation	Indirect	Roots of vegetation controls erosion
3	Potable water	Provision	Direct	Algae as fertilisers fresh water provision for small town
4	Water for Economic use	Provision	Direct	Agricultural and commercial use
5	Protect from storm and flood	Regulation	Indirect	Helpful in protecting flood
6	Self-purification of water	Regulation	Indirect	Bio-absorption by micro-organism
7	Enhance air quality	Regulation	Indirect	Purify air quality
8	Fruits and fodders	Provision	Direct	Economic value in the market
9	Energy sources	Provision	Direct	Dead wood, branch can be used as a firewood
10	Habitats for planktons	Regulation	Indirect	Planktons are useful for proper functioning of lake
11	Parasite and disease control	Regulation	Indirect	Control pest and diseases naturally

12	Form suitable soil for agriculture	Regulation	Indirect	Nearby soil good for agriculture
13	Carbon segregation	Regulation	Indirect	Control the carbon deposition
14	Maintain climatic condition	Regulation	Indirect	Maintain humidity in vicinity
15	Recreational activities	Cultural	Direct	Picnic, touring, sightseeing, fishing,
16	Scenic view	Cultural	Indirect	Aesthetics
17	Customs heritage	Cultural	Indirect	Emblematic species and believes
18	Research hotspot	Educational	Indirect	Research work biodiversity betterment

2.0 Methodology

In this work various instruments were used to conduct the experiments and to understand the various parameters to analyze the Lake water quality. Below Table 2 presents the different instruments used.

Table 2: Various parameter measured and corresponding method

Sl. No.	Water Quality Parameters	Instruments used
1	Dissolved Oxygen	Multi parameter apparatus
2	Temperature	Celsius thermometer / Turbidity Multi parameter
3	BOD	Standard method (5-day BOD test)
4	COD	Titration method
5	pH	Multi parameter apparatus
6	Turbidity	Turbidity Multi parameter
7	Total Dissolved Solid	Multi parameter apparatus
8	Total alkalinity	Titration method
9	Total coliform	Membrane filtration
10	Iron	Spectrophotometric method
11	Chlorides	Multi parameter apparatus
12	Sulphate	Spectrophotometric method
13	Total hardness	Titration method
14	Nitrate	Multi parameter apparatus

15	Conductivity	Multi parameter apparatus
16	Transparency	Secchi disc

2.1 Sampling of water

Sample stations of 3 have been established in the Ganga lake basin given in the figure 4, for various physico-chemical parameters and collected sample were tested at NERIST Environmental lab for complete one year from July 2020 to April 2021 during which four sets of reading has been recorded, first set was taken on the first week of July 2020, second on the month of October, third on January 2021 and fourth set was taken on April 2021. The selected stations are:

(i) Station-1 located at the north-western edge of the lake,

(ii) Station-2 located at mid of eastern bank and

(iii) Station-3 located at south-east bank.

2.2 Physicochemical parameters

The physicochemical parameters analysed are presented as follows:

2.2.1 Dissolved Oxygen:

The dissolved oxygen of the water sample collected from the Ganga lake is presented in Table 3 for Station 1, 2 and 3. Further Figure 3 illustrates the variation in the dissolved oxygen in different seasons.

Table 3: Dissolved Oxygen of the water sample of Ganga lake

Month	Station	Dissolved oxygen	Average value (ppm)
July	Station-1	8.50	8.53
	Station-2	8.70	
	Station-3	8.40	
October	Station-1	11.85	11.45
	Station-2	10.94	
	Station-3	11.56	
January	Station-1	13.85	14.00
	Station-2	14.25	
	Station-3	14.39	

April	Station-1	10.50	11.37
	Station-2	11.90	
	Station-3	11.70	

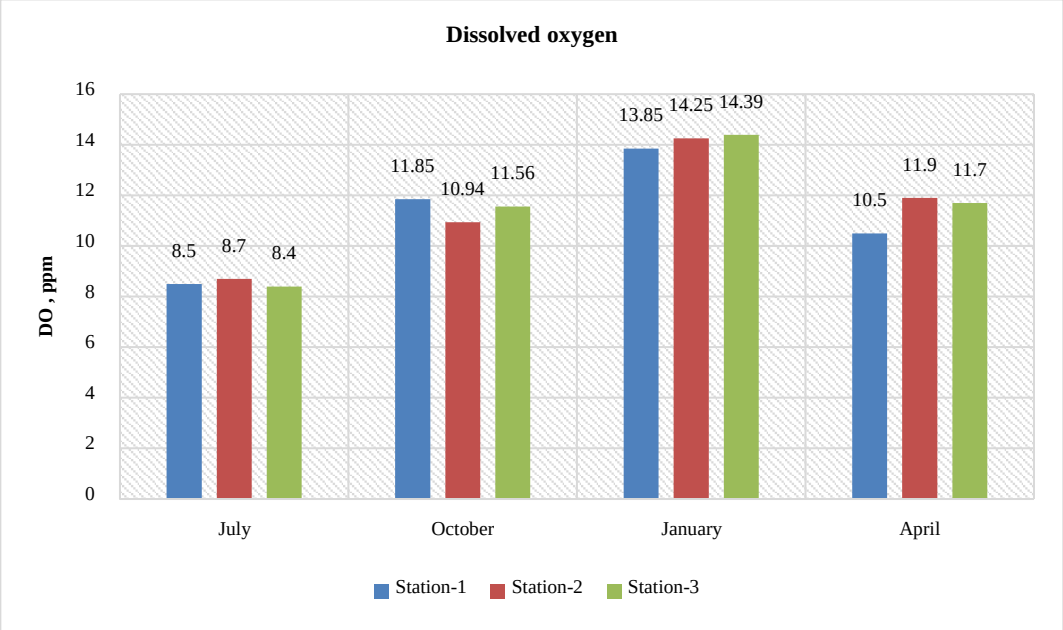

Fig 3: Seasonal variation in DO in Ganga lake

2.2.2 Temperature:

The temperature of the water of the Ganga lake is presented in Table 4 for Station 1, 2 and 3. Further Figure 3 illustrates the variation in the temperature in different seasons. The temperatures at 3 stations were recorded 3 times at each station with handy Celsius thermometer.

Table 4: Temperature of the water sample of Ganga lake

Month	**Station**	**Temp. @ surface (°C)**	**Temp. @ 0.8 m (°C)**	**Temp. @ 1.6 m (°C)**	**Avg. surface temp. (°C)**
July	Station-1	25.90	25.60	25.00	26.27
	Station-2	26.10	25.80	25.10	
	Station-3	26.80	26.10	24.70	

October	Station-1	22.90	22.45	22.00	23.13
	Station-2	23.30	22.48	22.23	
	Station-3	23.20	22.56	21.89	
January	Station-1	13.80	14.25	14.28	14.03
	Station-2	14.40	14.62	14.85	
	Station-3	13.9	14.20	14.39	
April	Station-1	21.5	21.00	19.89	21.80
	Station-2	21.90	21.56	21.00	
	Station-3	22.00	21.70	20.85	

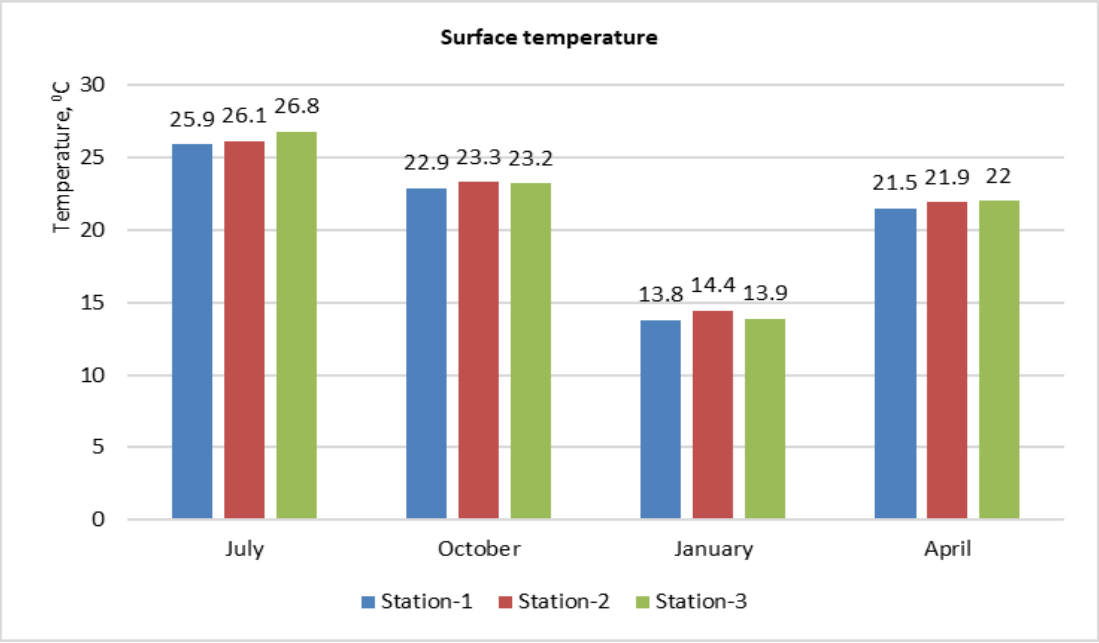

Fig 4: Seasonal variation in surface temperature in Ganga lake

2.2.3 Biochemical Oxygen Demand:

The BOD of water samples was determined by Standard method (5-day BOD test). The results of the BOD of the water sample of the Ganga lake is presented in Table 5 for Station 1, 2 and 3. Further Figure 5 illustrates the variation in the temperature in different seasons.

Table 5: BOD content of the water sample of Ganga lake

Month	Station	BOD	Average value (ppm)
July	Station-1	4.8	4.86
	Station-2	4.6	
	Station-3	5.2	
October	Station-1	3.5	3.80
	Station-2	4.1	
	Station-3	3.8	
January	Station-1	2.7	3.00
	Station-2	3.2	
	Station-3	3.1	
April	Station-1	3.5	3.46
	Station-2	3.3	
	Station-3	3.6	

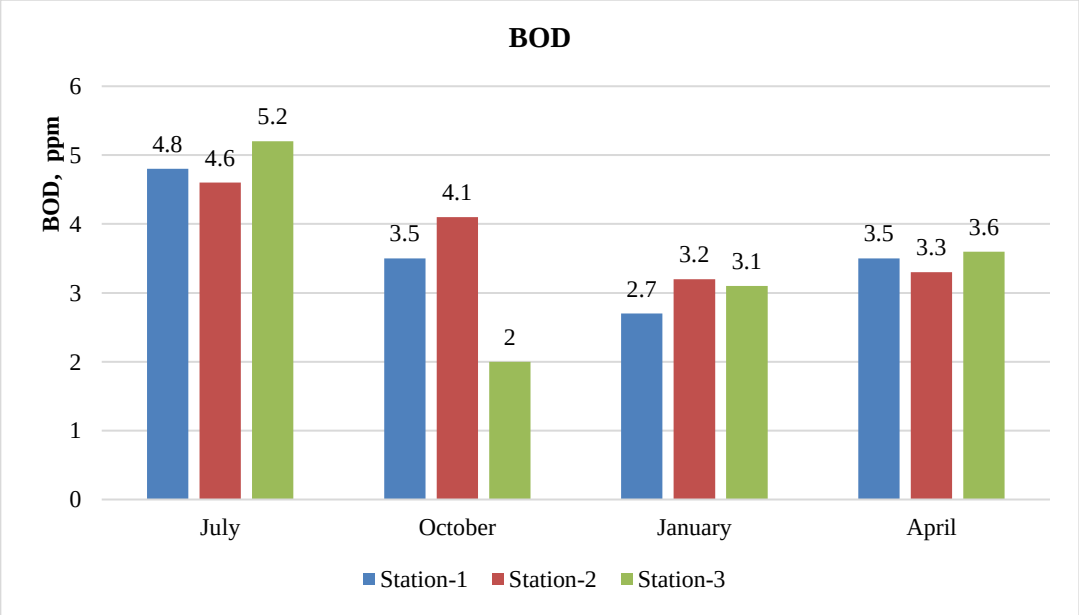

Fig 5: Seasonal variation in BOD in Ganga lake

2.2.4 Chemical Oxygen Demand:

The COD of collected samples were determined by titration method. The results of the COD of the water sample of the Ganga lake is presented in Table 6 for Station 1, 2 and 3. Further Figure 6 illustrates the variation in the temperature in different seasons.

Table 6: COD content of the water sample of Ganga lake

Month	**Station**	**COD**	**Average value (ppm)**
July	Station-1	36.0	34.77
	Station-2	32.8	
	Station-3	35.5	
October	Station-1	26.0	25.37
	Station-2	25.3	
	Station-3	24.8	
January	Station-1	21.1	19.90
	Station-2	18.0	
	Station-3	20.8	
April	Station-1	23.0	23.53
	Station-2	22.6	
	Station-3	25.0	

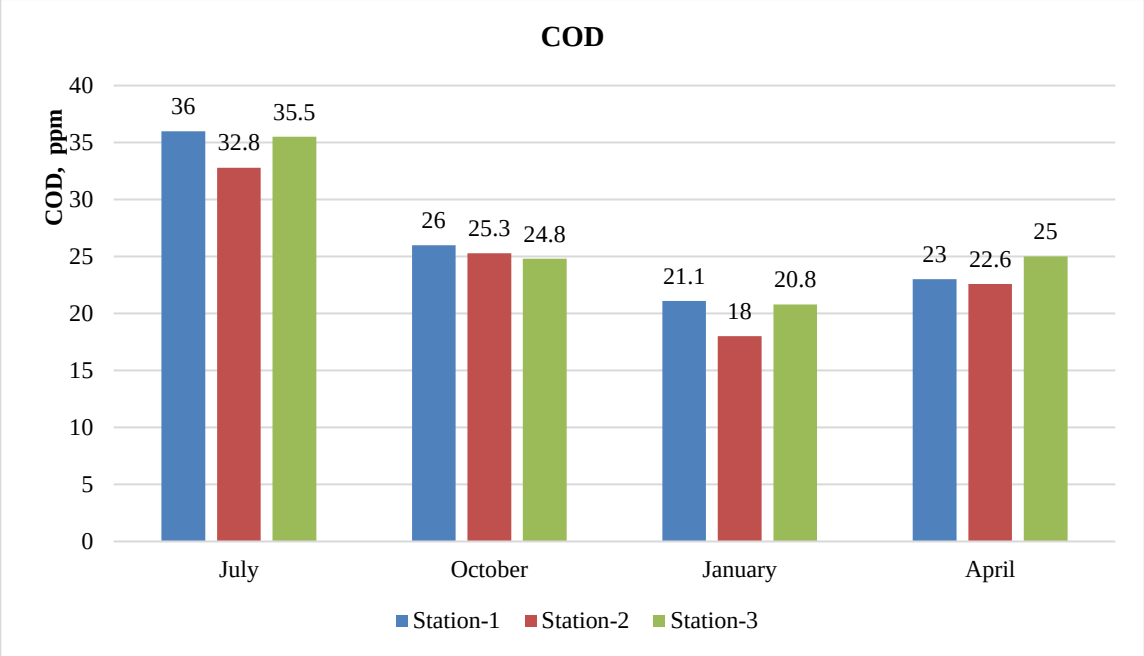

Fig 6: Seasonal variation in COD in Ganga lake

2.4.5 Water transparency:

Water transparency (T) is measured by light penetration mechanism by using 20 cm Sechhi disc. The formula used for determining the water transparency,

$$T = (X+Y)/2$$

Where, X is the depth to which the disc cannot be seen, Y is the depth at which the disc can be seen when raised slowly.

The results of the water transparency of the water sample of the Ganga lake is presented in Table 7 for Station 1, 2 and 3. Further Figure 7 illustrates the variation in the Water transparency in different seasons.

Table 7: Water transparency of the water sample of Ganga lake

Month	Station	X	Y	Average of X & Y (T)	Average value (m)
July	Station-1	2.22	2.18	2.20	2.35
	Station-2	2.83	2.77	2.50	
	Station-3	2.39	2.31	2.35	

October	Station-1	1.92	1.88	1.90	1.82
	Station-2	1.71	1.69	1.70	
	Station-3	1.87	1.83	1.85	
January	Station-1	1.67	1.63	1.65	1.66
	Station-2	1.6	1.56	1.58	
	Station-3	1.85	1.65	1.75	
April	Station-1	2.35	2.25	2.30	2.17
	Station-2	2.30	2.20	2.25	
	Station-3	1.98	1.94	1.96	

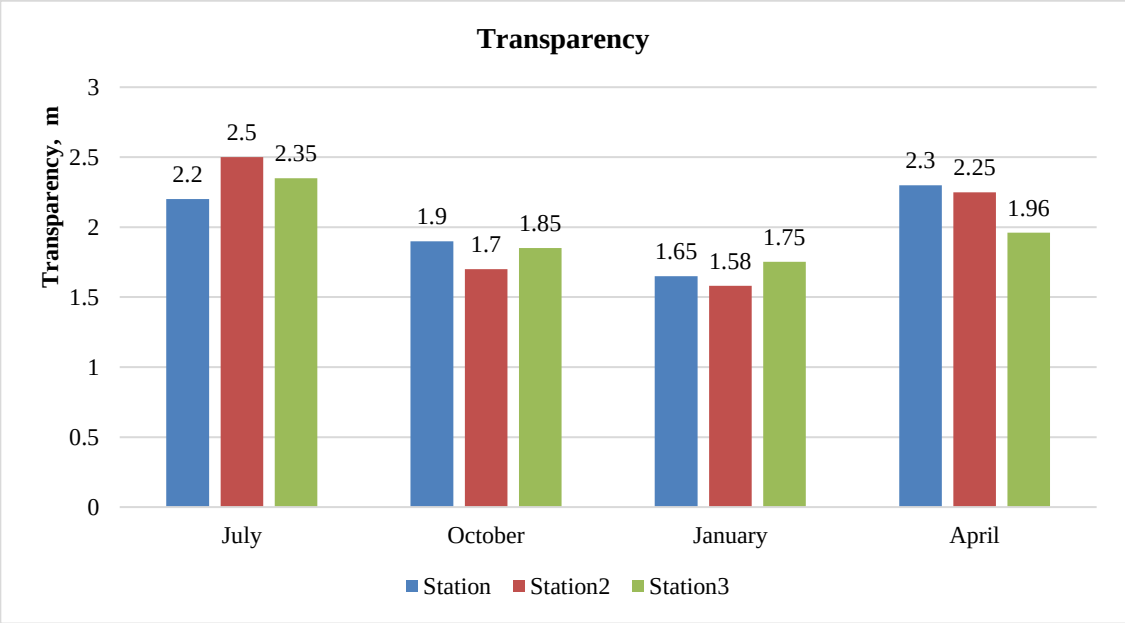

Fig 7: Seasonal variation in transparency in Ganga lake

2.4.6 pH:

A multiparameter kit was used to measured pH of the samples collected. The results of the pH of the water sample of the Ganga lake is presented in Table 8 for Station 1, 2 and 3. Further Figure 8 illustrates the variation in the pH in different seasons.

Table 8: pH of the water sample of Ganga lake

Month	Station	pH	Average
July	Station-1	7.65	7.68
	Station-2	7.54	
	Station-3	7.86	
October	Station-1	7.10	7.04
	Station-2	6.90	
	Station-3	7.12	
January	Station-1	6.45	6.50
	Station-2	6.53	
	Station-3	6.52	
April	Station-1	6.75	6.86
	Station-2	6.98	
	Station-3	6.85	

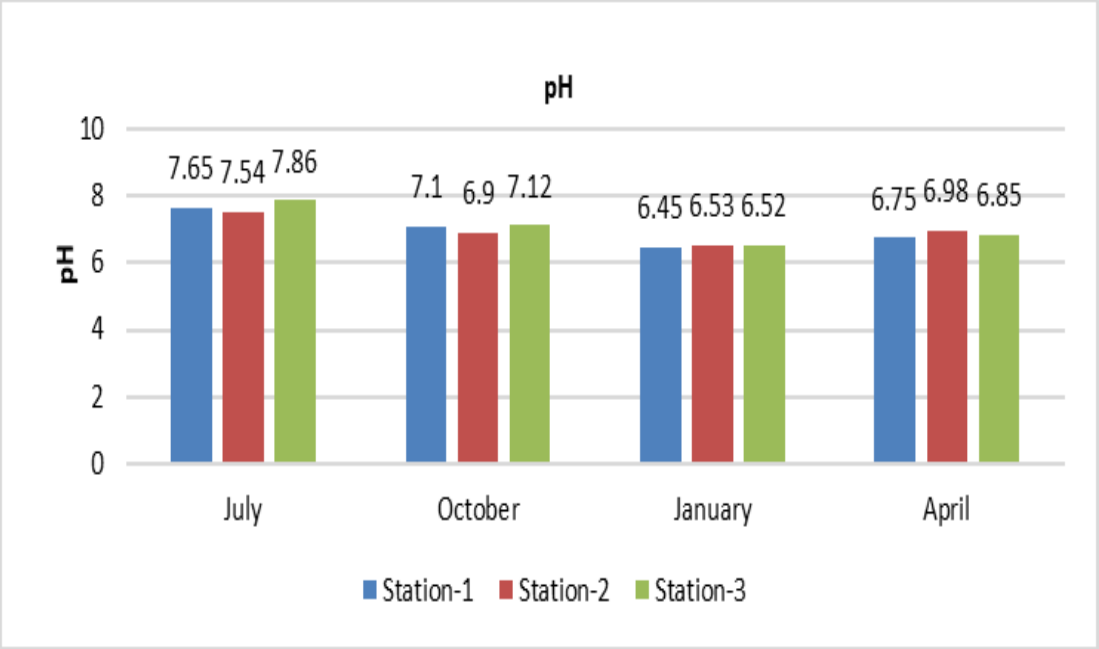

Fig 8: Seasonal variation in pH in Ganga lake

2.4.7 Turbidity:

The turbidity of the water samples was measured by using a digital turbidity meter. The results of the turbidity of the water sample of the Ganga lake is presented in Table 9 for Station 1, 2 and 3. Further Figure 9 illustrates the variation in the turbidity in different seasons.

Table 9: Turbidity of the water sample of Ganga lake

Month	Station	Turbidity	Average value (ppm)
July	Station-1	51.20	53.77
	Station-2	55.30	
	Station-3	54.80	
October	Station-1	18.40	20.77
	Station-2	23.60	
	Station-3	20.30	
January	Station-1	14.60	15.60
	Station-2	16.50	
	Station-3	15.70	
April	Station-1	36.20	41.50
	Station-2	45.80	
	Station-3	39.50	

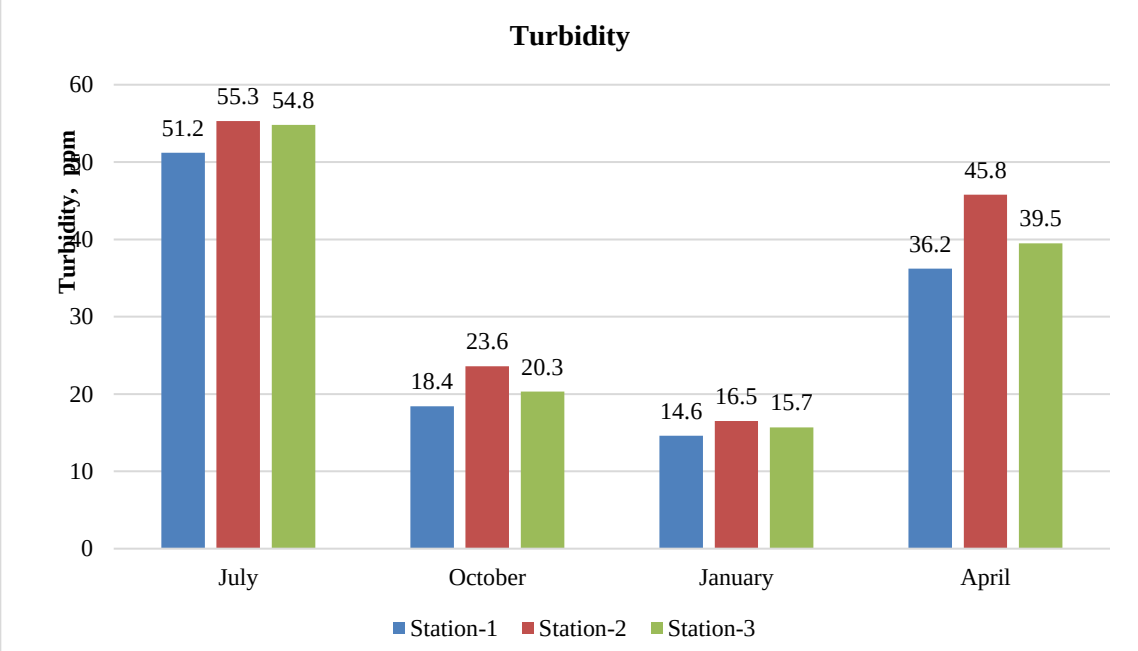

Fig 9: Seasonal variation in turbidity in Ganga lake

2.4.8 Total Dissolved Solid:

The results of the total dissolved solids of the water sample of the Ganga lake is presented in Table 10 for Station 1, 2 and 3. Further Figure 10 illustrates the variation in the total dissolved solids in different seasons. The TDS of the water samples were measured by using digital multiparameter.

Table 10: TDS of the water sample of Ganga lake

Month	Station	Total Dissolved Solid	Average value (ppm)
July	Station-1	121.50	118.60
	Station-2	115.30	
	Station-3	119.00	
October	Station-1	56.50	57.23
	Station-2	58.00	
	Station-3	57.20	
January	Station-1	45.50	43.00
	Station-2	39.80	
	Station-3	43.70	
April	Station-1	71.30	69.77
	Station-2	68.80	
	Station-3	69.20	

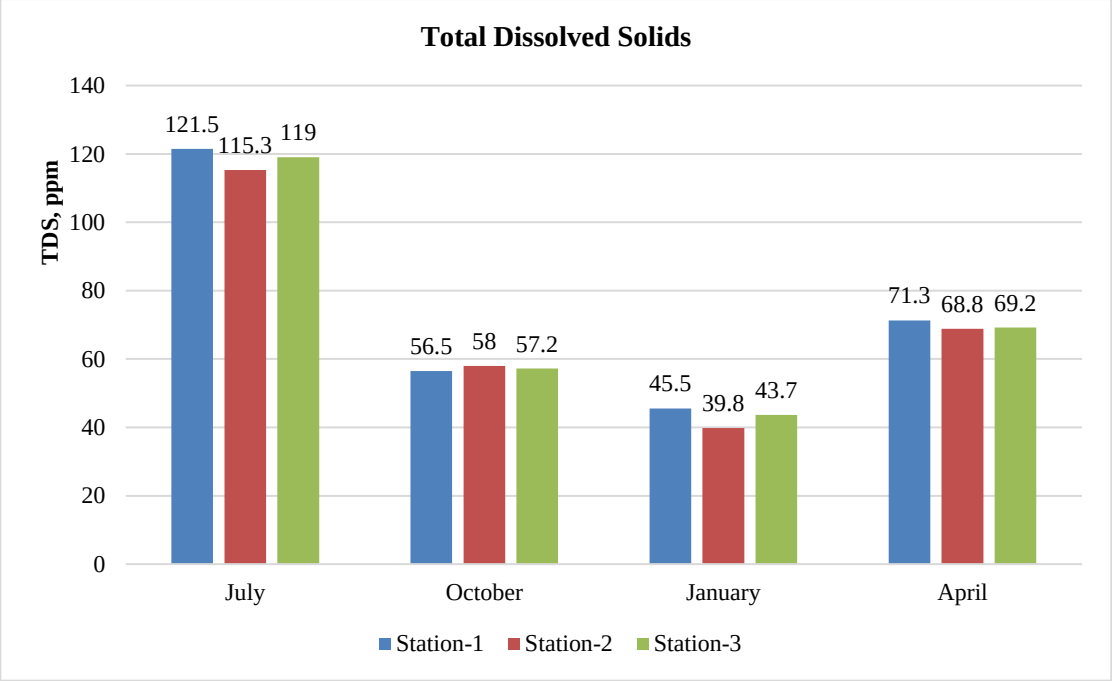

Fig 10: Seasonal variation in TDS in Ganga lake

2.4.9 Total Alkalinity:

The water sample was titrated with 0.02 N NaOH with methyl orange indicator to find out Total alkalinity (i.e., alkalinity due to CO_3, OH and HCO_3). Total volume of titrant was noted when the colour changes from Yellow to orange.

Total alkalinity as ppm = Volume of titrant used x N x 50,000 / vol. of sample.

The results of the total alkalinity of the water sample of the Ganga lake is presented in Table 11 for Station 1, 2 and 3. Further Figure 11 illustrates the variation in the total alkalinity in different seasons.

Table 11: Total Alkalinity of the water sample of Ganga lake

Month	Station	Total alkalinity (T)	Average value (ppm)
July	Station-1	210	208
	Station-2	213	
	Station-3	201	
October	Station-1	225	230
	Station-2	231	

	Station-3	234	
January	Station-1	280	268
	Station-2	256	
	Station-3	269	
April	Station-1	196	198
	Station-2	198	
	Station-3	201	

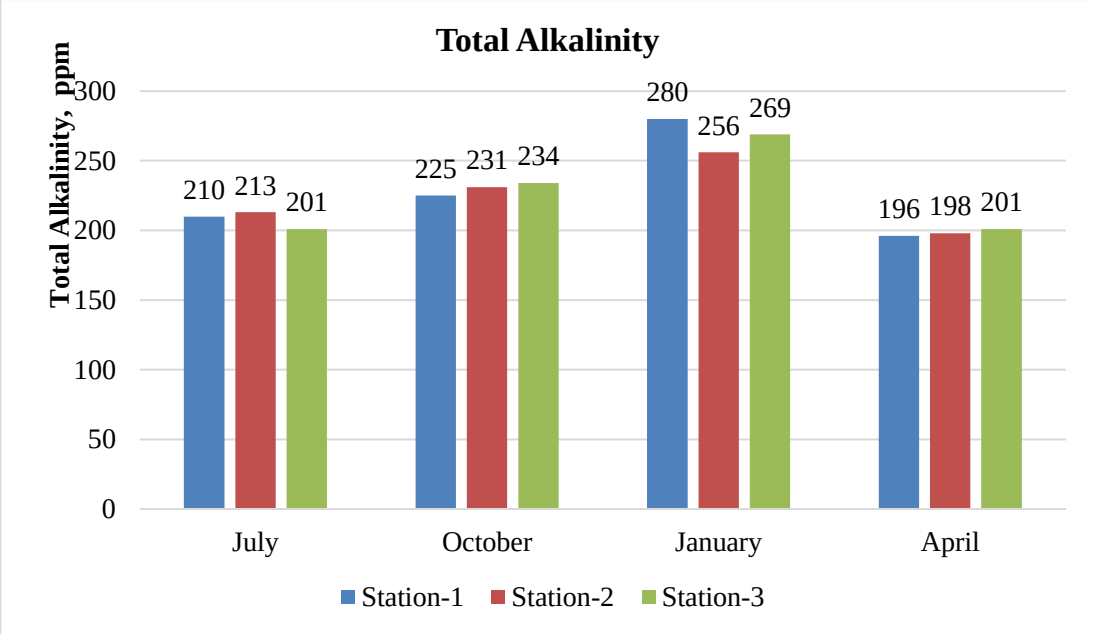

Fig 11: Seasonal variation in Total alkalinity in Ganga lake

2.4.10 Coliform Bacteria:

The Total coliform bacteria present in water samples was determined by using membrane filter technique. The results of the total dissolved solids of the water sample of the Ganga lake is presented in Table 12 for Station 1, 2 and 3.

Table 12: Coliform bacteria of the water sample of Ganga lake

Month	Total Coliform count
July	Positive
October	Positive
January	Positive
April	Positive

2.4.11 Specific conductivity:

The Specific conductivity was determined using a multi-parameter. The results of the Specific conductivity of the water sample of the Ganga lake is presented in Table 13 for Station 1, 2 and 3.

Table 13: Specific conductivity of the water sample of Ganga lake

Month	Station	Specific conductivity (mS)	Average (mS)
July	Station-1	0.075	0.074
	Station-2	0.069	
	Station-3	0.078	
October	Station-1	0.046	0.051
	Station-2	0.052	
	Station-3	0.056	
January	Station-1	0.025	0.025
	Station-2	0.021	
	Station-3	0.030	
April	Station-1	0.059	0.060
	Station-2	0.061	
	Station-3	0.060	

2.4.12 Chloride:

The chloride content of samples was determined using a multi parameter. The results of the chloride content of the water sample of the Ganga lake is presented in Table 14 for Station 1, 2 and 3. Further Figure 12 illustrates the variation in the chloride content in different seasons.

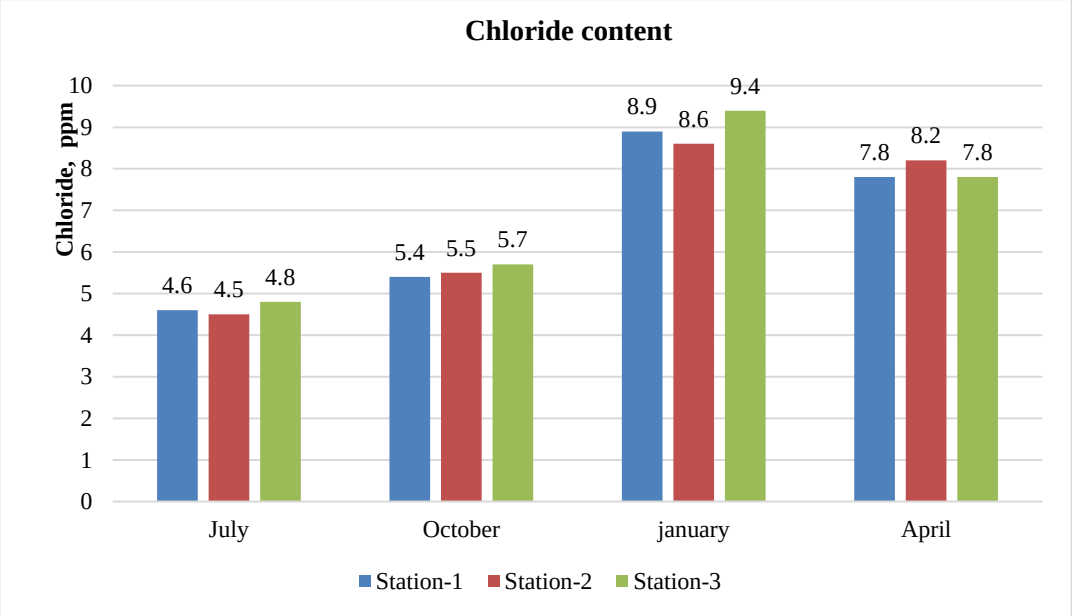

Fig 12: Seasonal variation in chloride content in Ganga lake

Table 14: Chloride content of the water sample of Ganga lake

Month	Station	Chloride content	Average value (ppm)
July	Station-1	4.60	4.63
	Station-2	4.50	
	Station-3	4.80	
October	Station-1	5.40	5.53
	Station-2	5.50	
	Station-3	5.70	
January	Station-1	8.90	8.97
	Station-2	8.60	
	Station-3	9.40	

April	Station-1	7.80	7.93
	Station-2	8.20	
	Station-3	7.80	

2.4.13 Sulphate:

The sulphate content of samples was determined using a spectrophotometer. The results of the chloride content of the water sample of the Ganga lake is presented in Table 15 for Station 1, 2 and 3. Further Figure 13 illustrates the variation in the sulphate content in different seasons.

Table 15: Sulphate content of the water sample of Ganga lake

Month	**Station**	**Sulphate content**	**Average value (ppm)**
July	Station-1	21.80	25.20
	Station-2	23.30	
	Station-3	30.50	
October	Station-1	11.50	11.50
	Station-2	12.02	
	Station-3	10.98	
January	Station-1	10.60	10.33
	Station-2	9.84	
	Station-3	10.54	
April	Station-1	15.30	15.60
	Station-2	15.40	
	Station-3	16.10	

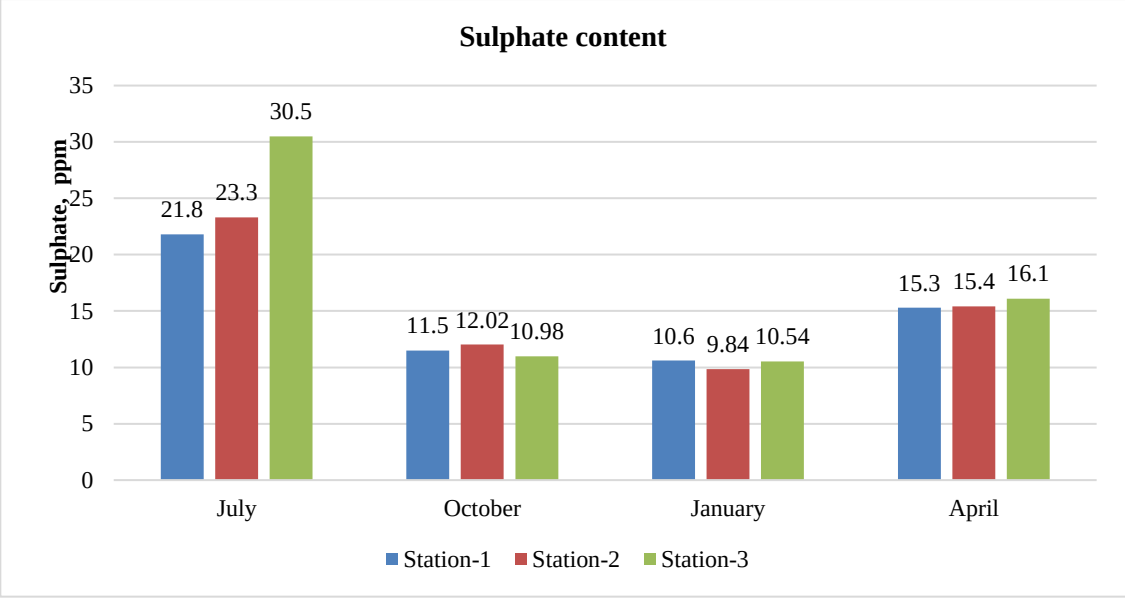

Fig 13: Seasonal variation in sulphate content in Ganga lake

2.4.14 Iron:

The Iron content of samples was determined using a spectrophotometer. The results of the iron content of the water sample of the Ganga lake is presented in Table 16 for Station 1, 2 and 3. Further Figure 14 illustrates the variation in the iron content in different seasons.

Table 16: Iron content of the water sample of Ganga lake

Month	Station	Iron content	Average value (ppm)
July	Station-1	0.450	0.370
	Station-2	0.370	
	Station-3	0.290	
October	Station-1	0.050	0.077
	Station-2	0.100	
	Station-3	0.080	
January	Station-1	0.120	0.157
	Station-2	0.200	
	Station-3	0.150	
April	Station-1	0.130	0.120
	Station-2	0.110	
	Station-3	0.120	

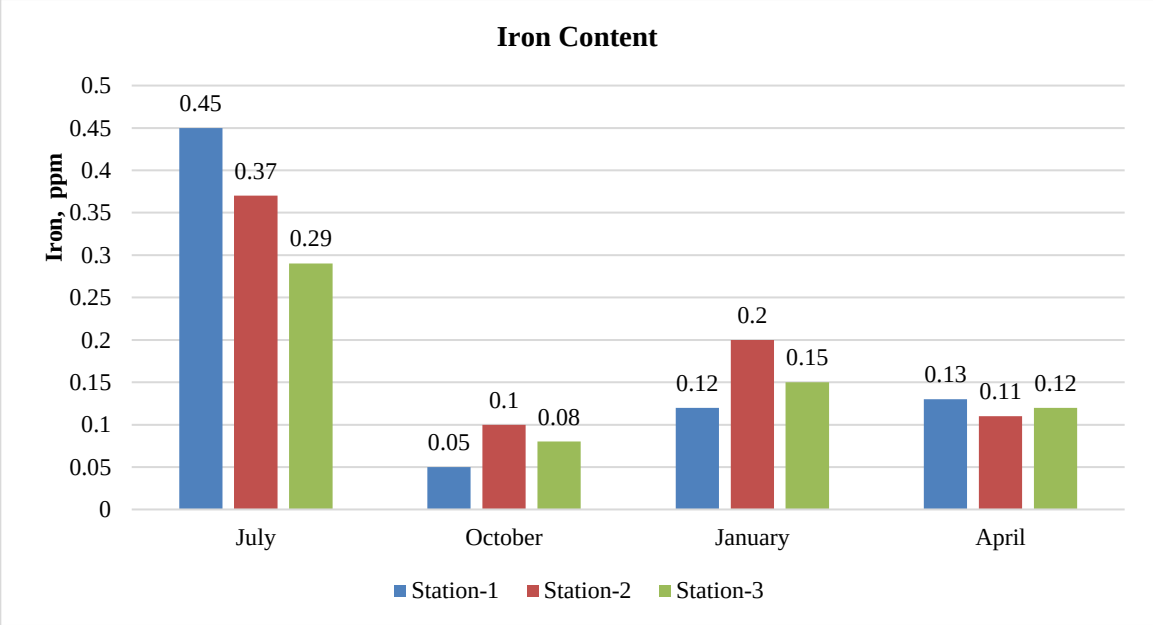

Fig 14: Seasonal variation in iron content in Ganga lake

2.4.15 Total hardness:

Total water hardness was calculated by EDTA method. The results of the total hardness of the water sample of the Ganga lake is presented in Table 17 for Station 1, 2 and 3. Further Figure 15 illustrates the variation in the total hardness content in different seasons.

Table 17: Total hardness of the water sample of Ganga lake

Month	Station	Total hardness	Average value (ppm)
July	Station-1	76.50	80.17
	Station-2	81.00	
	Station-3	83.00	
October	Station-1	62.60	65.77
	Station-2	67.70	
	Station-3	67.00	
January	Station-1	50.00	57.67
	Station-2	65.00	
	Station-3	58.00	
	Station-1	69.50	

April	Station-2	69.00	70.00
	Station-3	71.50	

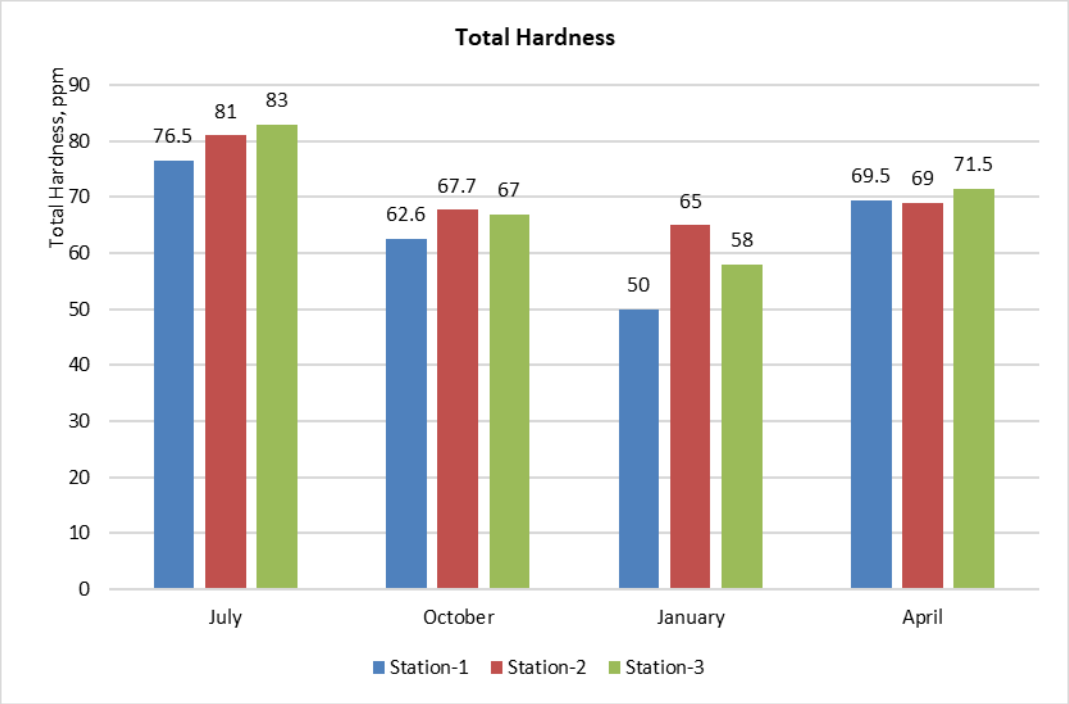

Fig 15: Seasonal variation in Total Hardness in Ganga lake

2.4.16 Nitrate (NO_3-N):

The nitrate content of water samples was determined by using a multiparameter. The results of the nitrate content of the water sample of the Ganga lake is presented in Table 18 for Station 1, 2 and 3. Further Figure 16 illustrates the variation in the nitrate content in different seasons.

Table 18: Nitrate content of the water sample of Ganga lake

Month	Station	Nitrate content	Average value (ppm)
July	Station-1	6.83	6.88
	Station-2	6.54	
	Station-3	7.28	
October	Station-1	7.97	8.17
	Station-2	8.09	

	Station-3	8.46	
January	Station-1	3.64	3.86
	Station-2	3.98	
	Station-3	3.96	
April	Station-1	4.56	4.71
	Station-2	4.61	
	Station-3	4.95	

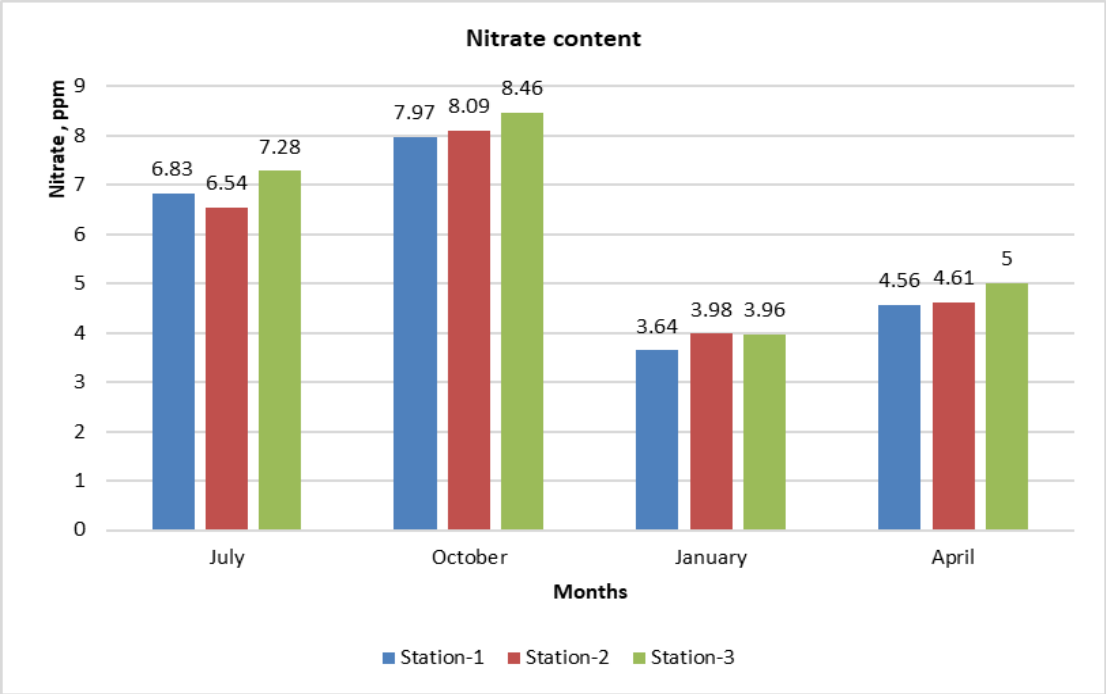

Fig 16: Seasonal variation in Nitrate content in Ganga lake

3.0 Discussions

1) The maximum permissible limit of pH ranges from 6.5 to 9 according to WHO recommendation. Thus, the pH of Ganga Lake being range 6.45 to 7.86 that is found to be suitable for sustaining aquatic life. pH is measured high in the month of July and low in January.
2) The range of DO content determined from sample stations of Ganga Lake is minimum of 8.4 ppm in the month of July at station-3 and maximum of 14.39 ppm in January at station-3. DO is found to be quite favourable for the aquatic

organisms of the lake. Minimum DO requirement to sustain life for aquatic life is 6 ppm.

3) COD assess the amount of Oxygen required to decompose the organic substance in water body. COD value in Ganga lake is ranges minimum of 18 ppm in the winter and maximum of 36 ppm in monsoon. Its high value is detrimental to aquatic life.
4) Water sample were kept for 6 days incubation period for COD, BOD calculation. BOD conveys about the organic load in water body. BOD concentration in Ganga lake is under permissible limit and it ranges between 2 ppm in October and 5.2 ppm in month of July. So, lake water is suit for aquatic life.
5) The average maximum and average minimum temperature in the area ranges from 26.27 °C in July and 14.03 °C in January respectively. During the project session temperature at the depth of 0.8 m and 1.6 m has been measured and noted. Temperature tends to change with the changing seasonal variations.
6) This study shows the conductivity, turbidity and transparency of the lake is quite good, these parameters ensure fit for aquatic life. Lake water shows higher conductivity in the month of July around 0.07 mS/cm and lower values in January. Lake water was found to be turbid during monsoon period due to entry of storm water along with minute particles, while in winter, turbidity measures lower values. It ranges from 14.6 ppm in winter to 55.3 ppm in July. During the summer season transparency of water shows highest at station-2 of 2.5 m measured by sechhi disc and its value decreased to 1.58 m in January due to higher concentration of suspended matters present and low sunlight.
7) Ganga lake's alkalinity is Alkaline in nature and ranges from 196 ppm in April to 280 ppm in January at station-1.
8) Chloride content of Ganga lake ranges from 4.5 ppm in July to 9.4 ppm in January which are far below the acceptable permissible value (200 ppm).
9) Total hardness of the Ganga lake ranges from 50 ppm to 83 ppm which is under moderate hardness. In winter its value decreases slightly. So, water can be used for some domestic purposes.
10) Iron content of lake water is under permissible limit (1-3 ppm). Iron present in water is colourless but when it exposes to air, it turns reddish in colour. Some

threshold of iron is also essential for our health. Study found that the iron content ranges from 0.05 to 0.45 ppm.

11) Nitrate load in the lake lie between 3.64 ppm to 8.46 ppm which is considered relatively low. The nitrate concentration generally comes from floral deposition and hydrophytes in some stretch of the lake. Station-3 has comparatively higher concentration of nitrate as per the result.
12) Coliform bacteria are found to be present in the lake water.

4.0 Conclusions and Recommendations

This section presents the findings of the study and deals with the possible future scope for the lake and some mitigation planning strategy. By observing the physicochemical parameters and planktons present in the lake, the study concluded as:

1. Outcome of the test conducted reveals the lake is suitable for aquatic life, but some concentration of Nitrate, Chlorine, Turbidity, Alkalinity were also reported.
2. Results from this study shows that the three sampling stations studied were not polluted as much, seasonal variations studied are under controlled and values observed were under the WHO standard. However, it becomes necessary to monitor the various attributes to avoid future pollution and betterment of the lake to get maximum benefits.
3. BOD, COD, DO parameters are suitable for pisciculture, so the lake have capacity to hold adequate fish culture for economical and research purposes.
4. During the exploration algal growth at southern stretch of the basin has been observed. Also, some phytoplankton can be seen which indicate some amount of nutrient is present. All these problems need to be counteracted by herbicide or algaecide; de-weeding is also a good option if possible.
5. Soil texture of the site is sandy, gneiss and loamy texture, which show poor Shivalik sedimented rock. The soil strata are prone to seepage as composition of soil is porous.
6. Study found that the Coliform bacteria are present in the lake water, it may cause water-borne disease if not treated well. Most of the coliform bacteria do not cause disease, even though for drinking purpose water should is not suitable. It is commonly found in soil and dead vegetation.

7. Pollutants like plastic bags, bottles, rusted metal parts, organic waste, semi-decomposed woods were witnessed during exploration, these threats hamper the aesthetic view of the lake surroundings.

5.0 Mitigation planning strategy

The mitigation strategy described in this section involves avoidance, minimization of lake water impacts and compensatory mitigation for unavoidable impacts. To report the socio-economic significance of the Lake, several proposals have to be put forth. Following are some suggested strategies that can be implemented to Ganga Lake:

1. The lake should be monitor at regular interval by implementing conservation program headed by group of experts.
2. Scheme to conserve the overall resources of the lake and complete the job on time.
3. Rules and laws should be enactment for land encroachments and strict action against defaulters.
4. Restrictions of picking pebbles, boulders, sand, gravel, growing of vegetables inside the Ganga lake premises, and demarcation of buffer zones.
5. Control for algal growth in scientific way.
6. Checking of pH and other parameters to stabilise the water quality for aquatic life suitability.
7. Organising Eco-tourism program.
8. Awareness program by promoting through media, associations and student campaigns.
9. Enhancement program such as embankment, rest house, cafeteria etc.,
10. Seepage flow controlling system and Construction of water control structure in the western bank.
11. Intensive planting and seeding in the littoral zone of the lake to ensure prevention of erosion and beautify the whole lake.
12. Intensive control of non-native species which may disturb the originality of the environment.
13. Setting up of boundary wall with barb wire to prevent entry of wild animals and thief.

It is an urge to the lake authority to maintain a proper hygienic condition of the lake by keeping a strict watch on throwing of wastes like plastic bottles, cans, etc., it is critical to prevent the deterioration of the lake habitat and also to attract potential tourism.

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