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Seasonal Variations In Physico-Chemical Parameters And Heavy Metals Concentration In Water And Sediment Of Kolavoi Lake, Chengalpet, India

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Abstract: A study was conducted on physico-chemical parameters and heavy metals in water and sediments of Kolavoi Lake,Chengalpet during September 2010 to August 2011.The water temperature varied between26.8^{o}C and 30.8^{O}C,pH 7.11and 8.25,DO 7.8 and 10.2mg/L,BOD 9.4 and 11.5mg/L, COD 19 and 20.8mg/L,TDS 424 and 694mg/L,Nitrate 2 and 19 mg/L,Nitrite 0 and 0.47mg/L,Chloride 21 and 162mg/L,Fluoride 0 and 0.45mg/L, Sulphate 1 and 36mg/L, Phosphate 0.07 and 0.6mg/L, Silica 1.89 and 18.13mg/L, Free ammonia 0.22 and 2.43mg/L,Potassium 2 and 12mg/L, Sodium 22and 110mg/L, Magnesium 12 and 25mg/L,Calcium30 and 62mg/L, Total hardness 160 and260mg/L, Total carbonate 171 and276mg/L,Electrical conductivity 446 and 913 and Turbidity 0.9 and 13.2 mg/L.The Concentration of heavy metals Cd, Cu, Cr, Pb, Fe are varied seasonally from BDL -0.004 mg/L, 0.078-0.126mg/L, BDL-0.008mg/L, 0.098-0.142mg/L,7.230-8.076mg/L respectively. Among all the metals analysed in the sediment, Fe was observed to be the highest during summer and Cd, the lowest during pre- monsoon.
Key words: Physico-chemical parameters,Heavy metals,Kolavoi Lake,Chengalpet,Sediment.

INTRODUCTION

Water is the prime resource of man's food supply and most important household and industrial tool.One of the most important crises of 21stcentury is the availability of drinking water,a resource material to our survival and growth.The quality of water is subjected to major physical,chemical and biological changes due to the influx of sediments and dissolved substances. Water quality assessment generally involves analysis of physico- chemical, biological and microbiological parameters and it also reflects on abiotic and biotic status of the eco system. Assessment of water quality in a region is an important aspect for any developmental activity of the region[1].

Many reports are available on the physico-chemical features of lakes such asthe pulicat lake (S.Kamala kannan et al., 2007), the Kallar lake, the Madivala lake etc. The characteristics of various lakes were analysed by Govindasamy et al.[2], Rajasegar[3], Balasubramanian and kannan[4], Karthikeyan et al.[5], Saravana kumar et al.[6], and Gowda et al.[7].

The lakes are one of the most productive eco systems.They are very important economically in fishing, agriculture, industrial, tourism and

educational and scientific researches. Therefore, the accurate determination of heavy metals and physico-chemical parameters in aquatic environment is of ultimate importance for controlling pollution. The present study provides additional information to existing data of this important waterbody.

MATERIALS AND METHODS

Kolavoi Lake is subjected to enormous anthropogenic stress, and receives heavy inputs of domestic water and sewage. The lake water is used for drinking purpose of cattle and the local people use it for agriculture, aquaculture and for industrial purposes. Sampling sites are selected by keeping in mind the feeding sources of lake. The study period of one year was divided into four seasons based on the intensity and duration of rainfall as pre-monsoon, monsoon, post-monsoon and summer from September 2010 to August 2011. The water samples after collection were subjected to analysis following the procedures prescribed by APHA (1985)[8]. The parameters namely Temperature, pH and Selective heavy metals were analysed at regular intervals.Field data like Temperature, Dissolved oxygen, pH were measured in forenoon.Temperature was measured by using mercury in glass thermometer, pH was measured by Elico pH meter and DO was estimated by the Winkler's method.Samples of water were collected from the stations of the lake. Collections werecarried out in the morning using 2 Litre plastic cans and 250mL reagent bottles.They were immersed well below the water surface, filled to capacity and brought to the laboratory, properly closed. All the analysis were carriedout based on the standard methods of APHA et al., For the heavy metals' analysis the samples were preserved by adding 5 ml of conc.HNO_3 in 1 litre of sample to maintain the pH below 4, following the procedure suggested by Agemian and Chare (1975).The samples were then filtered through the Whatman filter paper No.40 and the filtrate is directly used for analysis in the Atomic Absorption Spectrophotometer. The sediment analysis was carried out by digesting the sample of 250 mg with a mixture of 1ml of concentrated H_2SO_4, 5ml of concentrated HNO_3 and 2ml of concentrated $HClO_2$, a few drops of Hydrofluoric acid were added in order to achieve complete dissolution of the material. The mixture was boiled, evaporated to near dryness and suspended in 10ml 2N HCl. This was passed through a filter paper and made up to 25 ml with double distilled water.Concentrations of Cd, Cu, Cr, Pb and Fe were determined by Atomic Absorption Spectrophotometer.

RESULTS

The results of physico-chemical parameters of water samples from the four stations of Kolavoi Lake of chengalpet are presented in table 1a – table 1d and graphs 1-22.

Water temperature is a controlling factor in the biological characteristics of a lake and influences its physical and chemical nature. The surface water temperature condition of the study area during the period was ranged from 26^oc to 30.7^oc. The maximum temperature was observed in the months of May and June (30.7^oC) and the minimum temperature was observed (26^oC) in the months of September and October. During the study period the temperature values were more or less similar in all the locations.The mean values are 28.90±0.9 (lcn-1), 29.50±0.6 (lcn-2), 29.10±0.9 (lcn-3), and 28.81±1.1 (lcn-4).

Table 1-a : Physico-Chemical Parameters Of Kolavoi Lake –In Summer

PARAMETERS`	LOCATION-1	LOCATION-2	LOCATION-3	LOCATION-4
Appearence	Colourless and clear	greenish	Turbid	Colourless and clear
odour	None	none	None	none
turbidity	1.1	6.0	13	1.7
TDS	576	504	646	590
Electrical conductivity	811	701	913	820
pH	7.38	8.25	7.35	7.85
Total carbonates	200	180	232	180
Total hardness	240	212	260	180
Calcium	58	51	62	43
Magnesium	23	20	25	17
Sodium	70	64	90	110
Potassium	8	4	8	12
Iron	0.15	0.04	0.50	0.10
Magnesium	0	0	0	0
Free ammonia	0.34	0.60	0.90	0.41
Nitrite	0.01	0.001	0	0
Nitrate	9	8	16	13
Chloride	127	113	145	162
Fluoride	0.45	0.24	0.33	0.41
Sulphate	1	1	2	2
Phosphate	0.08	0.08	0.29	0.24
Silica	4.60	4.40	4.60	6.02
Tidy’s Test	1.1	1.2	1.6	1.3
Temperature	30.8	30.6	30.4	30.3
DO	7.8	8	8.2	8.3
BOD	11.2	11.1	10.8	10.4
COD	20.8	20.7	20	20

pH-Hydrogen ion concentration, DO-Dissolved Oxygen, BOD-Biological Oxygen Demand, COD-Chemical Oxygen Demand.

Table 1-b : Physico-Chemical Parameters Of Kolavoi Lake –In Post-Monsoon

PARAMETERS`	LOCATION-1	LOCATION-2	LOCATION-3	LOCATION-4
Appearance	Colourless and clear	greenish	Turbid	Colourless and clear
Odour	None	Algal smell	None	None
Turbidity	0.9	2.2	10.6	1.3
TDS	456	424	562	477
Electrical Cond.	643	599	787	653
PH	7.95	7.87	7.47	7.95
Total Carbonate	189	181	213	171
Total Hardness	180	176	211	162
Calcium	43	42	49	32
Magnecium	17	17	19	13
Sodium	64	52	78	103
Pottasium	8	4	6	11
Iron	0.12	0.18	0.21	0.08
Free Ammonia	0.22	2.1	2.43	0.33
Nitrite	0.008	0.008	0.001	0.006
Nitrate	7	6	13	11
Chloride	99	89	123	143
Flouride	0.02	0	0.27	0.13
Sulphate	2	1	2	6
Phospate	0.07	0.11	0.36	0.21
Silica	2.57	2.77	2.86	3.47
Tidy’s Test	1	1.6	1.7	1.1
Temperature	29	30	29.8	29.6
DO	8.5	8.3	8.3	8.5
BOD	11	10.8	10.5	10
COD	20.8	20.2	20	20

pH-Hydrogen ion concentration, DO-Dissolved Oxygen, BOD-Biological Oxygen Demand, COD-Chemical Oxygen Demand.

Table 1- c :Physico-Chemical Parameters Of Kolavoi Lake –In Pre-Monsoon

PARAMETERS	LOCATION-1	LOCATION-2	LOCATION-3	LOCATION-4
Appearance	Slightly turbid	Slightly greenish	Turbid	Slightly turbid
Odour	None	None	None	None
Turbidity	8.2	13.2	12.6	9.4
TDS	392	458	428	316
Electrical Cond.	550	653	607	446
PH	7.11	7.80	7.51	7.50
Total Carbonate	176	184	180	192
Total Hardness	160	210	196	176
Calcium	36	48	44	38
Magnecium	17	22	21	19
Sodium	48	59	45	22
Pottasium	2	4	2	2
Iron	0.36	0.041	0.55	0.78
Free Ammonia	0.70	1.08	0.41	0.25
Nitrite	0.16	0.02	0.06	0.03
Nitrate	6	9	4	2
Chloride	89	148	119	48
Flouride	0.32	0.38	0.32	0.22
Sulphate	16	21	36	14
Phospate	0.61	0.16	0.19	0.07
Silica	11.41	13.91	18.13	10.42
Tidy’s Test	1.6	2.1	0.9	0.8
Temperature	27	27.8	27.7	26.8
DO	9.6	9.1	9.3	10.2
BOD	10	9.8	10	10
COD	20	20	20	20

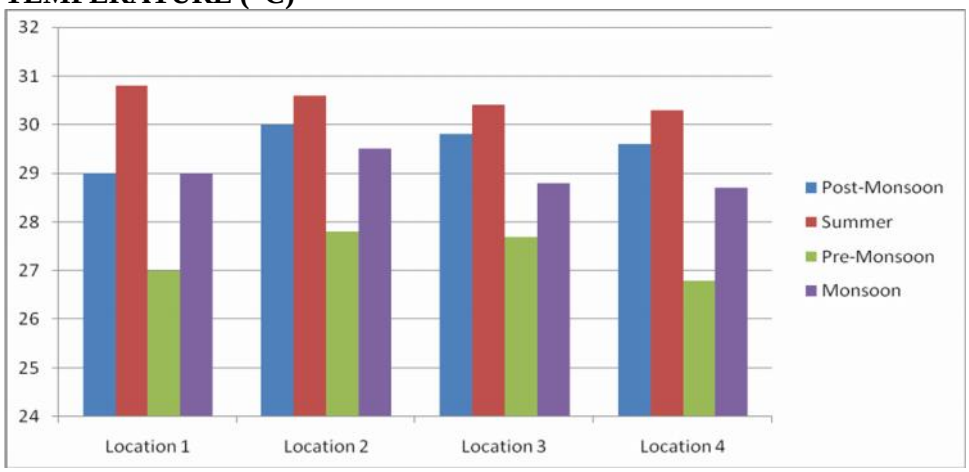
pH-Hydrogen ion concentration, DO-Dissolved Oxygen, BOD-Biological Oxygen Demand, COD-Chemical Oxygen Demand.

Table 1-d : Physico-Chemical Parameters Of Kolavoi Lake –In Monsoon

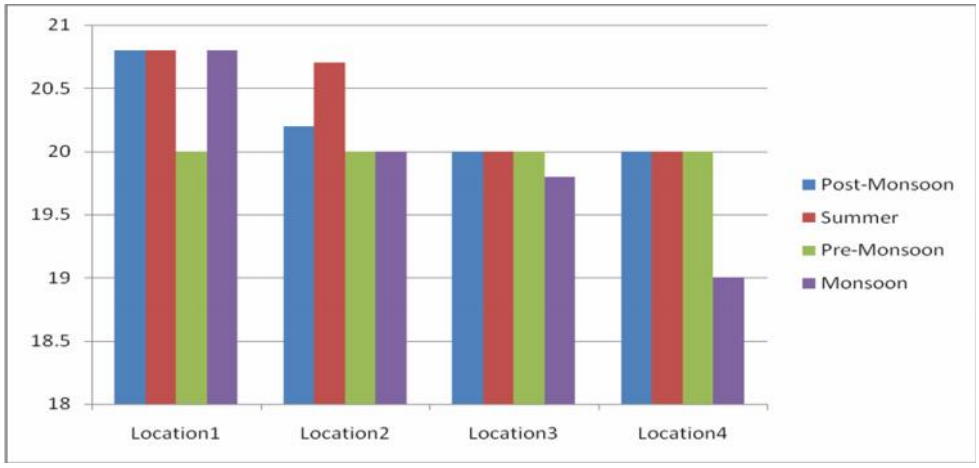
PARAMETERS	LOCATION-1	LOCATION-2	LOCATION-3	LOCATION-4
APPEARANCE	Colourless and clear	Slightly greenish	Slightly green	Colourless and clear
Odour	None	none	None	none
Turbidity	2.5	11.4	11.7	3.4
TDS	438	380	417	454
Electrical conductivity	609	524	694	604
pH	7.45	7.98	7.86	7.65
Total carbonates	248	200	276	237
Total hardness	224	128	174	176
Calcium	54	30	32	41
Magnesium	21	12	17	16
Sodium	34	60	89	62
Potassium	2	4	6	6
Iron	0.29	0.07	0.80	0.21
Magnesium	0	0	0	0
Free ammonia	1.11	1.82	2.17	1.26
Nitrite	0.24	043	0.47	0.18
Nitrate	7	12	19	9
Chloride	22	21	47	113
Fluoride	0.16	0.24	0.26	0.22
Sulphate	17	2	3	18
Phosphate	0.37	0.13	0.39	0.39
Silica	2.43	1.89	1.97	3.42
Tidy’s Test	1.6	1.8	1.8	1.7
Temperature	29	29.5	28.8	28.7
DO	8.5	8.8	9.8	9.7
BOD	11.5	10.1	9.5	9.4
COD	20	20	19.8	19

pH-Hydrogen ion concentration, DO-Dissolved Oxygen, BOD-Biological Oxygen Demand, COD-Chemical Oxygen Demand.

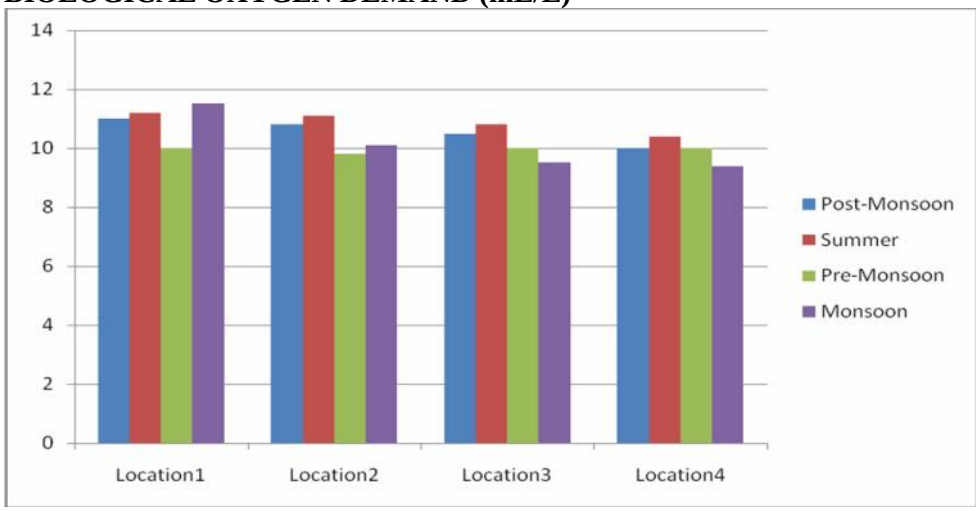
Graph 1
TEMPERATURE (^{O}C)



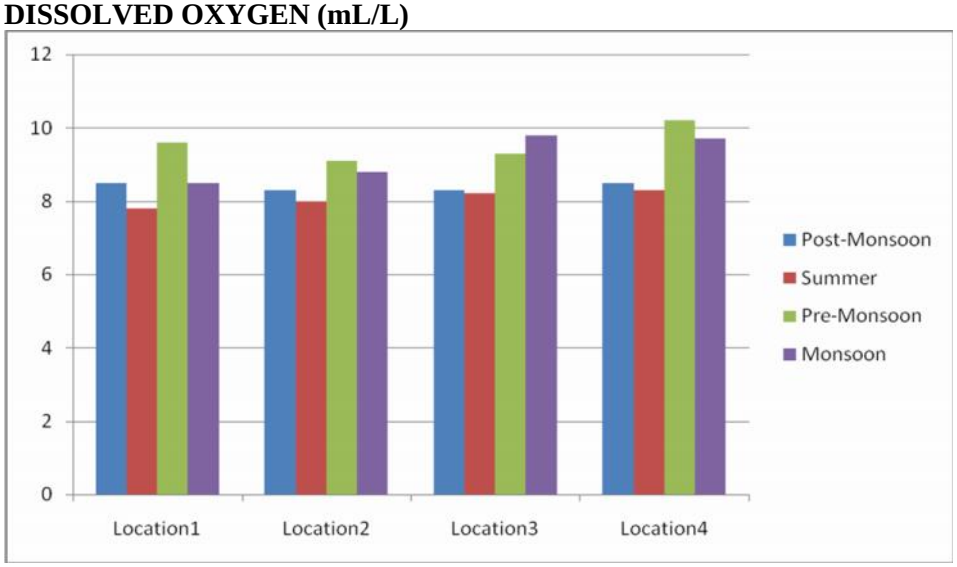
Graph 2
CHEMICAL OXYGEN DEMAND (mL/L)



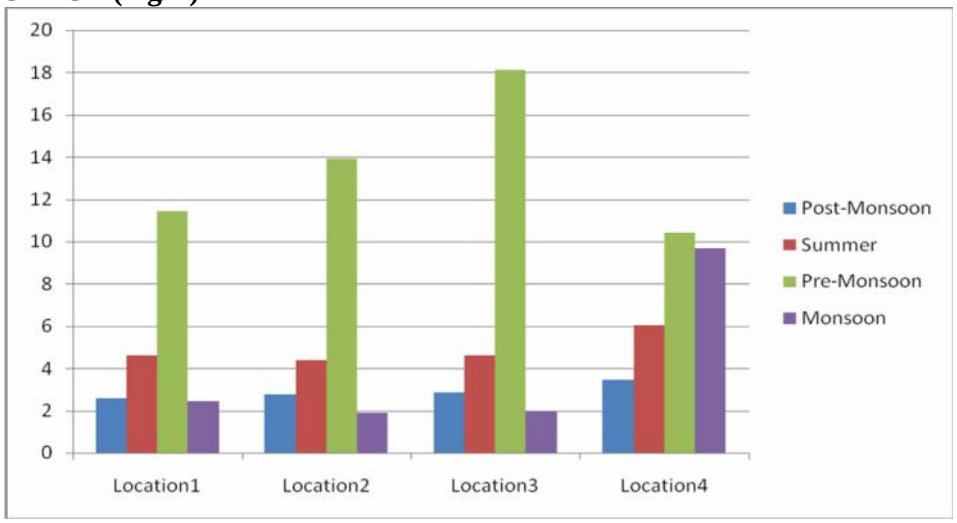
Graph 3
BIOLOGICAL OXYGEN DEMAND (mL/L)



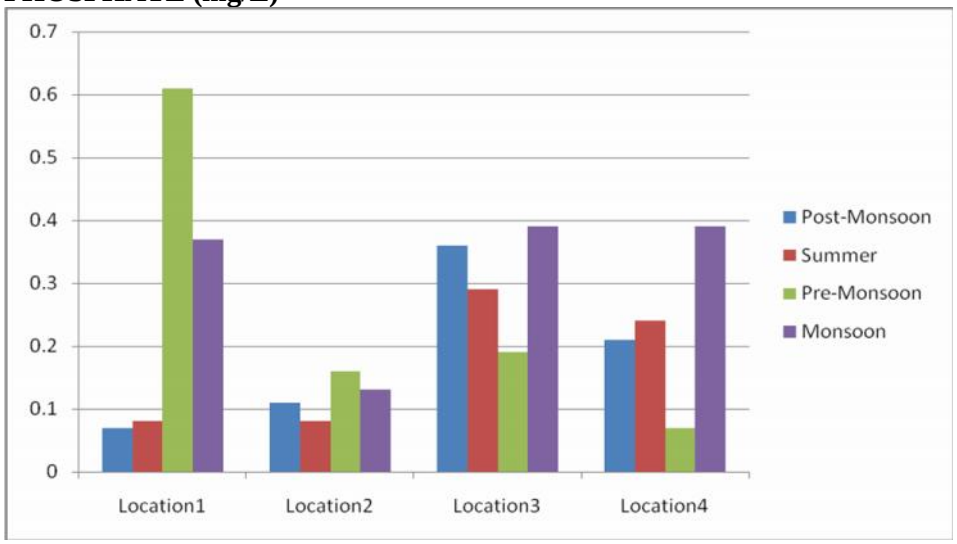
Graph 4
DISSOLVED OXYGEN (mL/L)



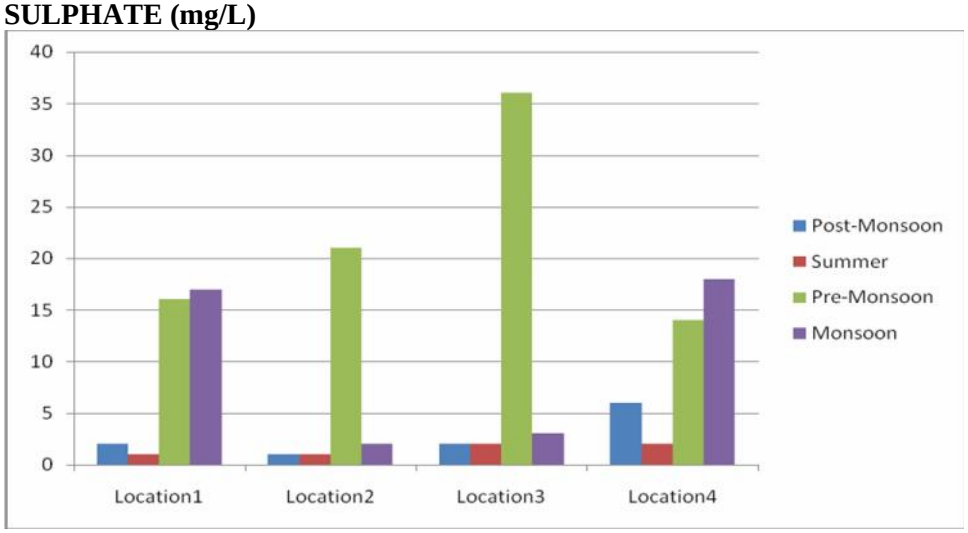
Graph 5
SILICA (mg/L)



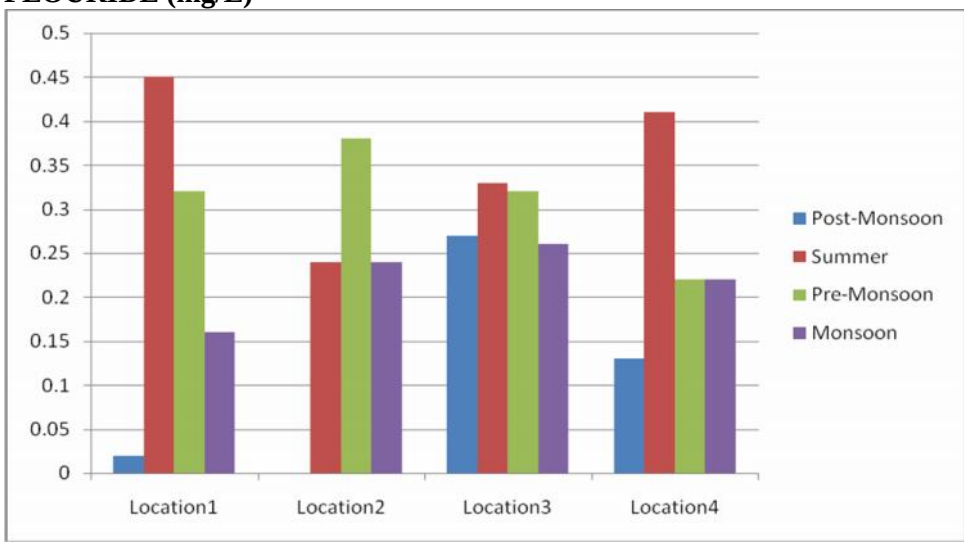
Graph 6
PHOSPHATE (mg/L)



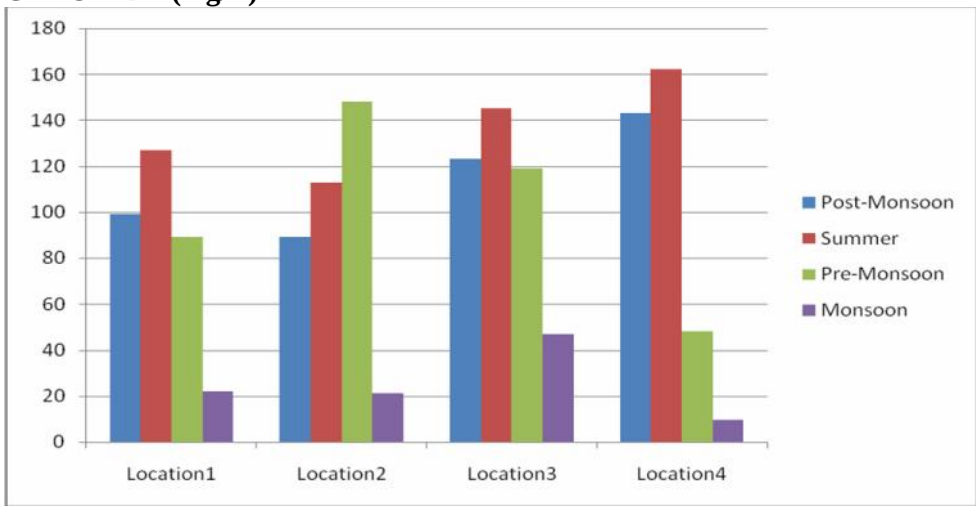
Graph 7
SULPHATE (mg/L)



Graph 8
FLOURIDE (mg/L)

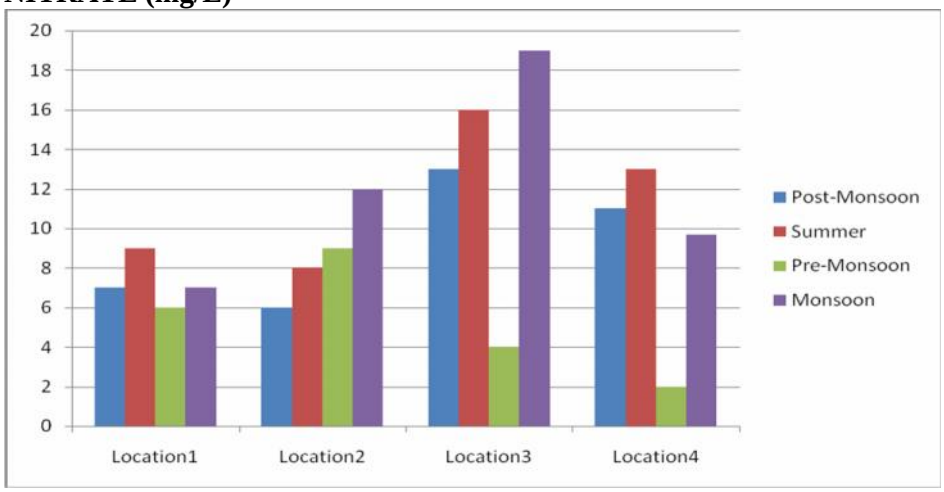


Graph 9
CHLORIDE (mg/L)



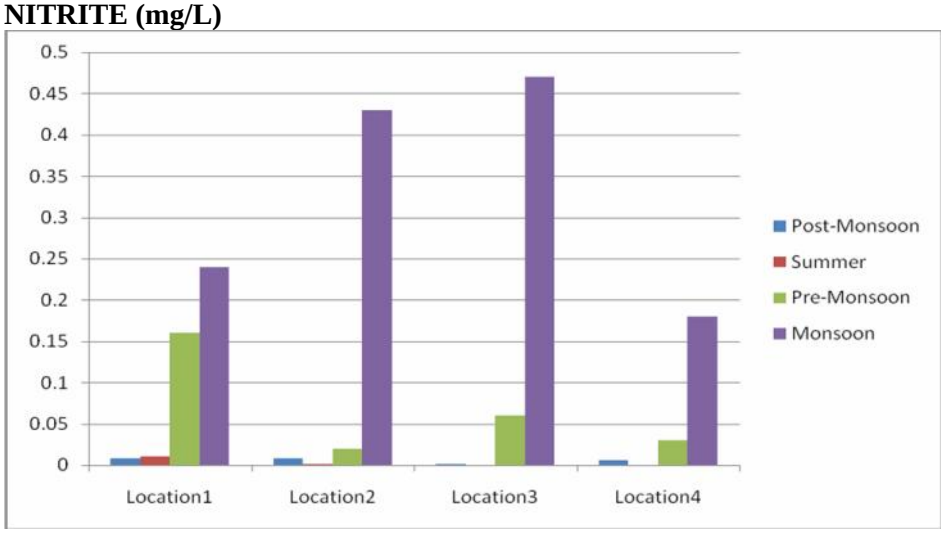
Graph 10

NITRATE (mg/L)



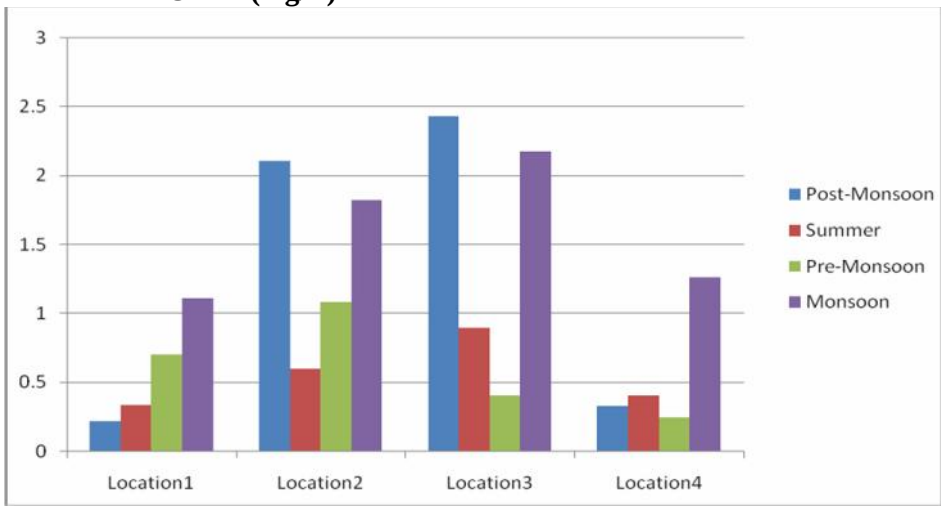
Graph 11

NITRITE (mg/L)



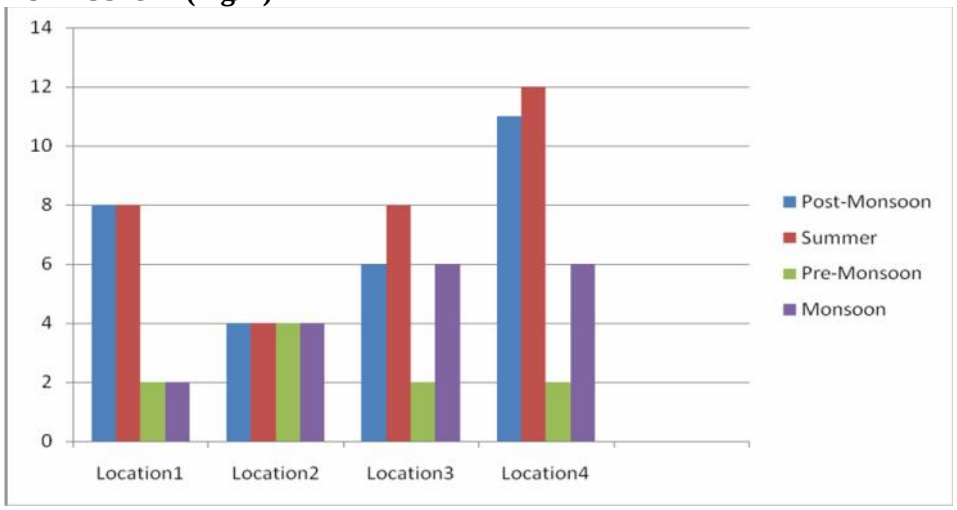
Graph 12

FREE AMMONIA (mg/L)



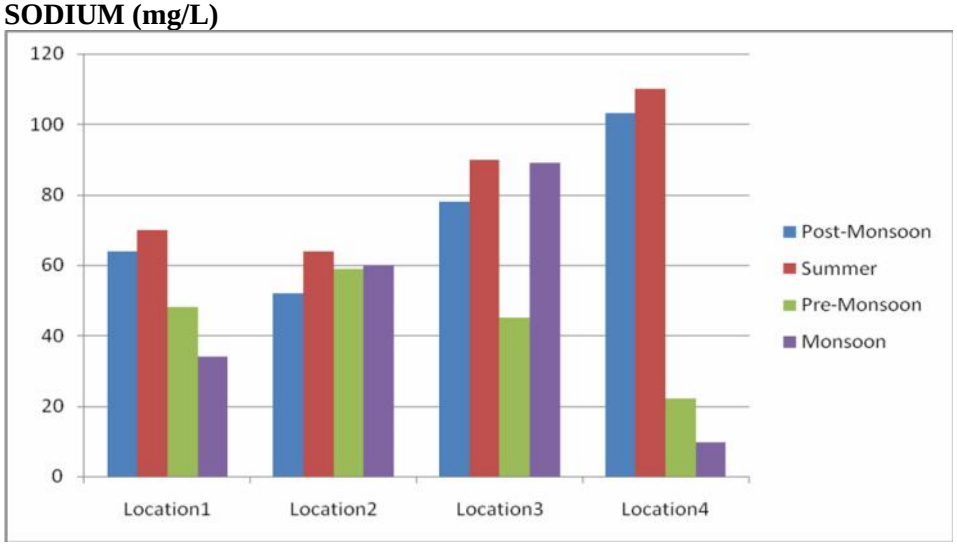
Graph 13

POTASSIUM (mg/L)



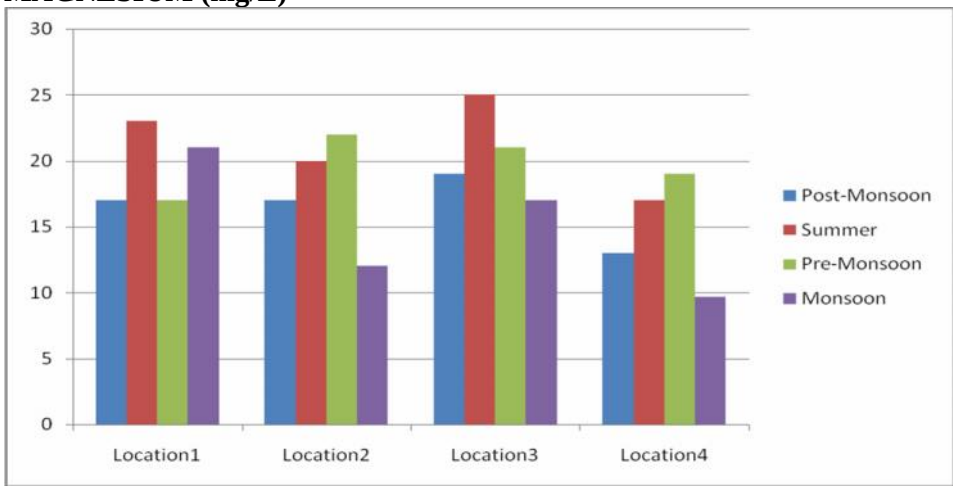
Graph 14

SODIUM (mg/L)



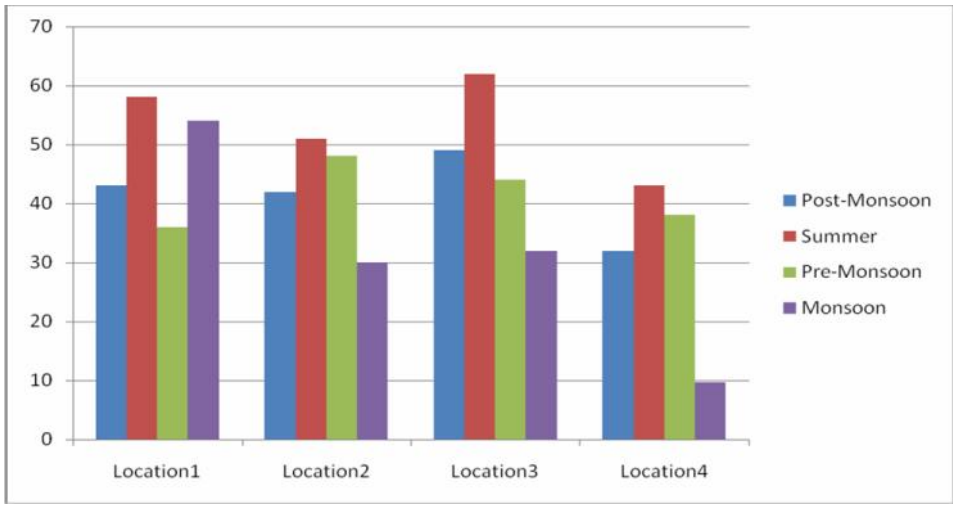
Graph 15

MAGNESIUM (mg/L)

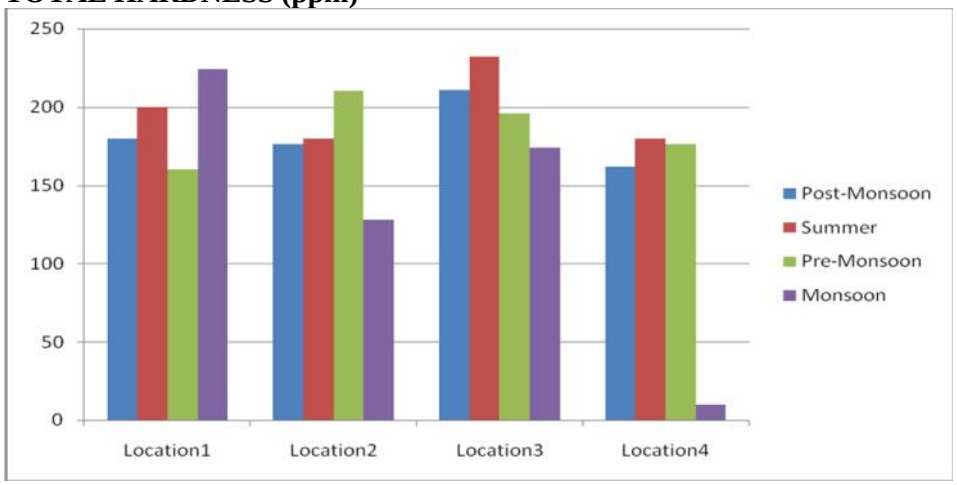


Graph 16

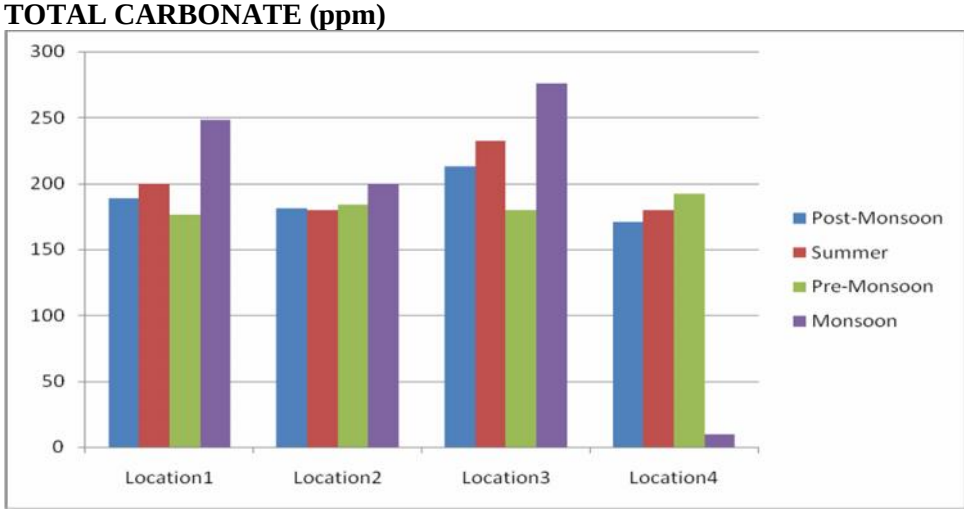
CALCIUM (mg/L)



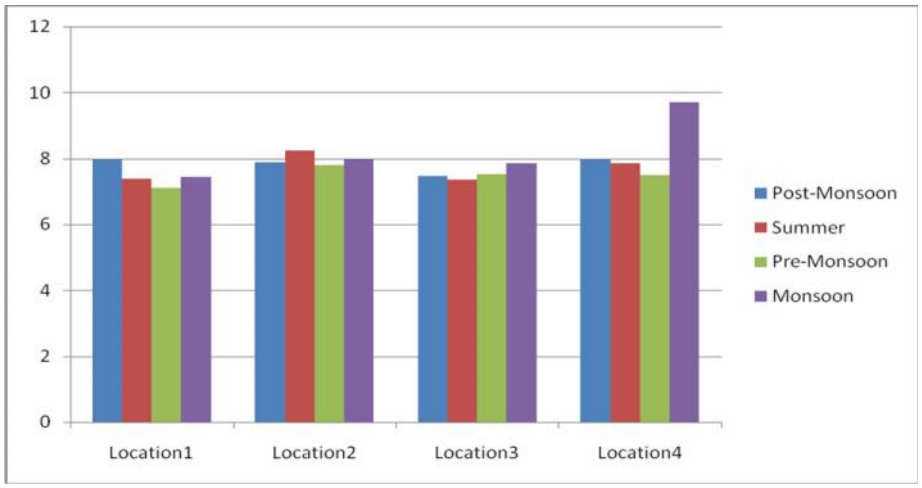
Graph 17
TOTAL HARDNESS (ppm)



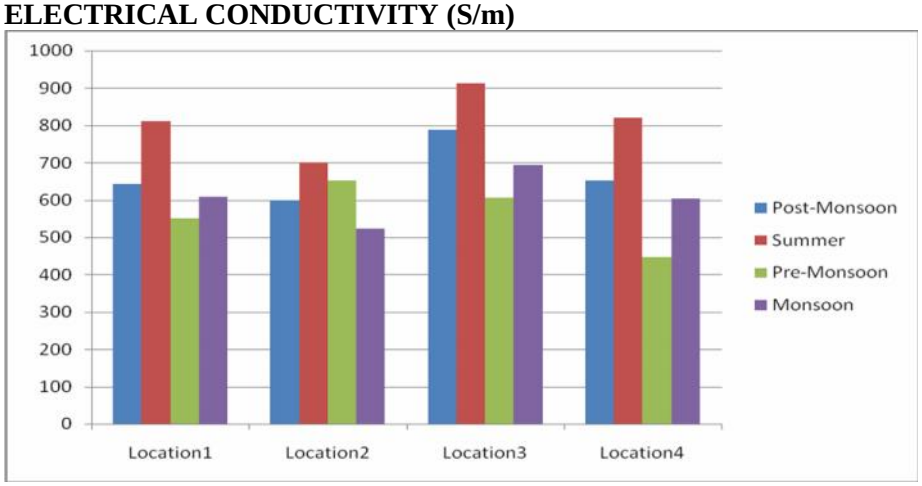
Graph 18
TOTAL CARBONATE (ppm)



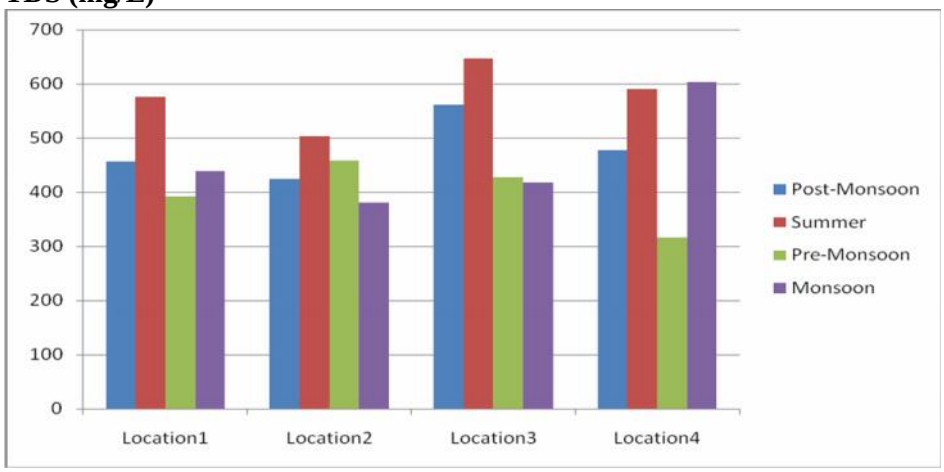
Graph 19
pH



Graph 20
ELECTRICAL CONDUCTIVITY (S/m)

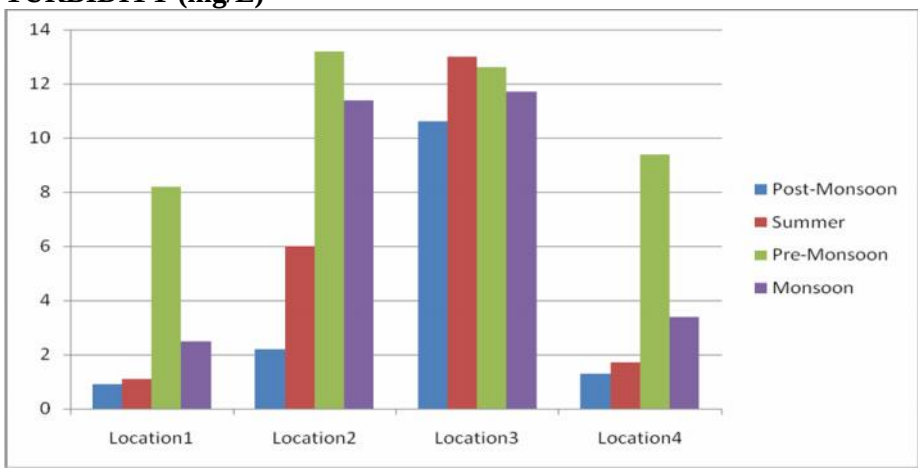


Graph 21
TDS (mg/L)



Graph 22

TURBIDITY (mg/L)



APPEARANCE

The kolavoi lake water sample has shown its appearance as clean and clear throughout the period except at locations 3 and 2. They appeared turbid and green during post monsoon and summer.

pH

The pH of the water sample showed a great variation and it ranged from 7.11 to 8.25. The water of Kolavoi Lake was found to be alkaline during the months of study period and the maximum pH was found in the months of summer. The mean values were7.47±2.3 (lcn-1), 7.90±0.14 (lcn-2), and 7.5 0.±0.16 (lcn-3), 7.7±0.16 (lcn-4).

DISSOLVED OXYGEN

Dissolved oxygen is an important factor determining the productivity of water body. It is essential for the metabolism of aquatic organisms. The change in the DO content of water is of great Limnological significance. During the study period, the DO values were ranged from7.8 to 10.2mg/l. The highest value of DO (10.2mg/l) was recorded at location 4 during the month of September. The lowest value was recorded at location 1 during the April month.The mean values were 8.60±0.5 (lcn-1), 8.50.±0.4 (lcn-2), 8.90.±0.6 (lcn-3), and 9.10±0.7 (lcn-4).

TOTAL DISSOLVED SOLIDS

The TDS ranged from 316mg/l to 646mg/l. The highest value of TDS (646mg/l) was recorded at location 3 during the month of June. The lowest value of TDS (316mg/l) was recorded at location 4 during the August month. The minimum and maximum mean values were 465.5±55.3 (lcn-1), 441.5±39.5 (lcn-2), 513.25±90.7 (lcn-3), and 459.3±74.2 (lcn-4).

ELECTRICAL CONDUCTIVITY

The electrical conductivity of water sample ranged from 446 to 913. The maximum value was observed at location 3 during the month of June, and the minimum value was 446 in a location 4 in the month of September. The mean values were 653.25±78.9 (lcn-1), 619.3±57.8 (lcn-2), 750.3±99.7 (lcn-3), and 630.7±105.7 (lcn-4).

TOTAL CARBONATES

The total carbonates ranged from 171mg/l to 276mg/l. The highest value was recorded in location 3 in the month of December and the lowest value was recorded in location 4 in the month of March. The mean values were in the ranges of 203±22.4 (lcn-1), 186±6.9 (lcn-2), 225±28.8 (lcn-3), and 195±21 (lcn-4).

TOTAL HARDNESS

The total hardness is the sum of calcium and magnesium concentrations. It is used to measure the capacity of water to precipitate soap. During the study period, the total hardness ranged from 128mg/l to260mg/l. The maximum value observed in location 3 was in the month of June and the minimum value was in the location 2 in the monthofDecember.Themeanvalueswere207±37 (lcn1), 199.5±11.8 (lcn2), 235.7±32.3 (lcn3), 188.7±24.1 (lcn-4).

CALCIUM

Calcium level was estimated and given in the table. The values ranged from 30mg/l to 62mg/l. The highest value was observed in location 3 in the month of June and the lowest value was observed in location 2 in the month of October. The mean values were 47.7±8 (lcn-1), 42.7±6.7 (lcn-2), 46.7±8.7 (lcn-3), and 38.5±3.5 (lcn-4).

MAGNESIUM

The highest value was recorded in location 3 as 25mg/l and the lowest value was recorded in location 2 as 12mg/l in the monsoon season.The mean values were 19.5±-2.5(lcn-1)17.7±3.2 (lcn-2), 20.5±2.5 (lcn-3), 16.3±1.8 (lcn-4).

SODIUM
The amount of sodium was found to be fluctuating during the period of investigation. The lowest level of sodium was found during September (22mg/l) at location 4 and the highest level was found in June at location 4 (110mg/l).The mean values were 54±13 (lcn-1), 58.7±3.3 (lcn-2), 75.5±15.2 (lcn-3), and 74.3±32.3 (lcn-4).

POTASSIUM
The ranges of potassium in the water sample were found to be from 2mg/l to 12mg/l. The maximum value was obtained in location 4 in the month of June and the minimum value was in location 1 in the month of July.The mean values were 5±3 (lcn-1), 4±0 (lcn-2), 5.5±1.8 (lcn-3), and 7.7±3.8 (lcn-4).

IRON
The highest value was observed in location 4(0.80mg/l) in the month of December and the lowest value was observed in location 2 (0.041mg/l) in the month of August.

FREE AMMONIA
The ranges of free ammonia were from 0.22mg/l to 2.43mg/l. The maximum value was observed in location 3 in the month of January and the minimum value was in the same month at location 1.The mean values were 0.59±0.31 (lcn-1), 1.4±0.56 (lcn-2), 1.5±0.8 (lcn-3), and 0.56±0.35 (lcn-4).

NITRITE
During the period of observation, the nitrite values ranged from 0 to 0.47mg/l. The highest value was recorded in location3 in the month of December and the lowest value was observed in locations 3&4 in the month of June.The mean values were 0.104±0.9 (lcn-1), 0.114±0.15 (lcn-2), 0.133±0.14 (lcn-3), and 0.054±0.5 (lcn-4).

NITRATE
The water sample showed the nitrate concentration ranged between 2mg/l and 19mg/l. The highest value recorded in location 3 in December and the lowest value was in location 4 in August.The mean values were 7.25±0.9 (lcn-1), 8.75±1.7 (lcn-2), 13±4.5 (lcn-3), and 8.75±3.4 (lcn-4).

CHLORIDES
The chloride ions ranged from 21mg/l to 162mg/l. The maximum value was found in location 4 in the month of June and the minimum value was in location 2 in the month of October.The mean values were 84.25±31.1 (lcn-1), 92.75±37.8 (lcn-2), 108.5±30.7 (lcn-3), and 116.5±36 (lcn-4).

FLOURIDES
The fluoride ions ranged from 0 to 0.45mg/l. The highest value was at location 1 during April and the lowest value was at location 2 in March.The mean values were 0.24±0.15 (lcn-1)0.21±0.05 (lcn-2), 0.29±0.03 (lcn-3), 0.25±0.08 (lcn-4).

SULPHATES
The level of sulphate was ranging from 1mg/l to 66mg/l. During the month January, it was minimum at location 2 and it was maximum at location 3 in September.The mean values were 9±7.5 (lcn-1), 6.3±7.4 (lcn-2), 11±12.6 (lcn-3), and 10±6 (lcn-4).

PHOSPATES
The water sample showed the phosphate concentration ranged from 0.07mg/l to 0.61mg/l. The maximum value was at location 1 in July and the minimum value was at locations 1 and 4 in the months January and July respectively.The mean values were 0.28±0.16 (lcn-1), 0.12±0.025 (lcn-2), 0.30±0.07 (lcn-3), and 0.23±0.09 (lcn-4).

SILICA
During the study period, the concentrations of silica ranged from 1.89mg/l to 18.13mg/l. The maximum value of silica 18.13mg/g was noticed at location 3 during the month of July and the minimum value 1.89mg/l was noticed at location 2 during the month of October.The mean values were 5.25±3.07 (lcn-1), 5.74±4.08 (lcn-2), 6.89±5.6 (lcn-3), and 5.83±2.38 (lcn-4).

TURBIDITY
The turbidity ranged from 0.9mg/l to 13.2mg/l. The highest value was noticed at location 2 in July and the lowest value was noticed at location 1 in March.The mean values were 3.2±2.5 (lcn-1), 8.2±4.1 (lcn-2), 11.98±0.83 (lcn-3), and 3.95±2.7 (lcn-4).

CHEMICAL OXYGEN DEMAND
The water sample showed the COD level from 19mg/l to 20.8 mg/l. The highest value was noticed in location-1 in the months of monsoon and summer seasons, and the lowest value was noticed in the location -4in the months of monsoon season, the mean values were 20.6±0.15 (lcn-1.20.2±0.23 (lcn-2), 19.9±0.07 (lcn-3), and 19.7±0.37 (lcn-4).

TRANSPARENCY
Sacchi disc transparency of the kolavoi lake of Chengalpet varied from 38cm to 52cm. The transparency was found to increase gradually from 42cm to 48cm and then showed fluctuations.

HEAVY METALS

The water sample on an average contained cadmium 0.0027mg/l, chromium 0.0055mg/l, copper 0.106mg/l, lead 0.127mg/l, ferrous 7.673mg/l and zinc 0.229mg/l. [Table-2]

Table 2: Assessment of Heavy metals concentration in water

SEASONS	Cd	Cr	Cu	Pb	Fe	Zn
POST MONSOON	0.003	0.008	0.126	0.138	7.820	0.232
SUMMER	0.004	0.006	0.078	0.098	8.076	0.264
PRE MONSOON	BDL	0.008	0.100	0.132	7.567	0.218
MONSOON	0.004	BDL	0.122	0.142	7.230	0.204

Measured in mg/L. BDL-Below Detectable Level

The sediment sample contained the cadmium at below the detectable level (BDL), chromium 0.771mg/kg, copper 0.471mg/kg, lead 0.127mg/kg and ferrous 241.67mg/kg.[Table-3].

Table 3: Assessment of heavy metals in sediments

SOURCE	Cd	Cr	Cu	Pb	Fe
SEDIMENT	BDL	0.771	0.471	0.127	241.67

Measured in mg/Kg. BDL – Below Detectable Level

DISCUSSION

Surface temperature showed an increasing trend from November through June and was influenced by the intensity of solar radiation, evaporation,fresh water influx and cooling and mix up with ebb and flow from adjoining neritic waters[6].The observed low value in September was due to strong wind and rain,the high value during summer could be attributed to solar radiation[9,10]. Temperature over 30^{o}C can cause regression in growth and decay in plants.

The pH values recorded were in the accepted levels.It poses direct or indirect effect on photosynthesis and growth in plants.The maximum value observed during summer might be due to biological activity[2] and photosynthetic activities[11].

Nitrate could be formed by oxidation of ammonia[3].The organic materials of catchment areas during ebb tide, rise the nitrate level[9]. The low value during pre monsoon season may be due to its utilization by phytoplankton[12,13].

Nitrite might be formed by reduction of nitrate,oxidation of ammonia and recycling of nitrogen and by bacterial decomposition of planktonic detritus[2].Nitrite was high during monsoon and was low in summer seasons.

The weathering's of rocks,the fertilizersand the detergents are the sources of inorganic phosphate[13]. The high amount of phosphate observed duringmonsoon season could be due to turbulence and mixing in water column,while the low amount observed during the post monsoon season could be due to high salinity and the utilization of nitrite by phytoplankton[3].

The environmental protection agency secondary regulations advise a maximum contamination level(MCL) of 500mg/l for total dissolved solids. When it exceeds 1000mg/l it is generally unfit for human consumption. The increase in TDS is due to presence of K, Cl, Na, Cd, Pb and nitrates. High levels may produce undesirable taste. Leaves, silt, industrial wastes and sewage and pesticides and inorganic materials may raise the level of TDS in the waterbody. In kolavoi Lake the TDS values were observed above 500mg/l in summer season.

The influx of fresh water from drainage carrying silicate leached out from rocks and also from bottom sediment[2,3]. The low value observed in summer might be due to phytoplankton activity[9]. In kolavoi lake, silica was low in monsoon season.

Electrical conductivity is a basic index to select the suitability of water for agricultural purposes (Kataria et al., 1995). EC in water is due to ionization of dissolved inorganic solutes and is a measure of total dissolved solids and salinity[14]. EC value was less in September due to rain water but it was high in summer due to mineralization of organic matter in the bottom water (Kavi et al., 1980).

Hardness is governed by the contents of Ca,Mg and Fe.Higher value was observed in summer and lower in monsoon due to anthropogenic influences.

Dissolved oxygen is an important measure of purity for all waters and the productivity of aquatic systems (Wetzel, 1983). The reduction of DO might be due to organic load through the sewage. The factors affecting the DO content are atmosphere and photosynthesis, respiration and decomposition.

During summer the decrease of calcium level in water is due to photosynthetic activity of macrophytes (Karul et al., 1980). The calcium amount was inversely proportional to water level[15]. The rise of calcium is due to leaching from calcium rich mineral rocks.

The acceptable limit of magnesium in water is 50 mg/l. The maximum permissible limit is 100 mg/l (ICMR, 1975).The concentration of Mg varied according to water level. Increasing during low water level and decreasing during high level of water[15].

The fluctuations of potassium were noticed in all seasons. It was observed in low level during rainy season and was observed high in summer season.

Sodium was not same at all the locations.The maximum value was recorded at location 4 during summer season and the minimum value was noted in location 4during September. It increases when the water level decreases.

Chloride ions excess in water indicates the degree of pollution and it is usually associated with sodium, potassium and calcium.

Biological oxygen demand increases as the bio degradable organic content increases in water. BOD above 6 mg/l in water body is considered polluted and high BOD values are attributed to the stagnation of water body leading to the absence of self-purification (Iqbal and Katariya, 1995).BOD values were noticed in higher levels in location 1 and 2 where the agricultural activity and anthropological disturbances are higher.

Chemical oxygen demand: COD high level indicates presence of all forms of organic matter, both bio degradable and non bio degradable and hence the degree of pollution in water. It is the measure of oxygen consumed during the oxidation of organic matter.COD values were observed higher in location 1 where the farming activities are carried out.

Conclusively, in this study the water quality properties in terms of its physico- chemical parameters and heavy metals concentrations in water and sediment from the Kolavoi Lake of Chengalpet were assessed. It would form a useful tool for further assessment and monitoring of this water body.

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