International Journal of Pharmacy and Biological Sciences
ISSN: 2321-3272 (Print), ISSN: 2230-7605 (Online)
IJPBS | Volume 8 | Issue 1 | JAN-MAR| 2018 | 44-65
Research Article | Biological Sciences | Open Access | MCI Approved| ज्ञान-विज्ञान विमुक्तये
|UGC Approved Journal |

MONTHLY VARIATIONS IN PHYSICO-CHEMICAL PARAMETERS OF PERUR CHETTIPALAYAM LAKE, COIMBATORE, TAMILNADU, INDIA

Anusiya Devi, K* and Lekeshmanaswamy M

PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore – 641 029, Tamilnadu, India

***Corresponding Author Email: dranudevi@gmail.com**

ABSTRACT

Objectives: *In the present study an attempt has been made on physico - chemical characteristics of Perur Chettipalayam lake located in Coimbatore of Tamilnadu.* ***Method:*** *The samples were analyzed on the same day in the laboratory for different physico-chemical parameters following the standard methods. The study was carried out for a period of 12 months (Jul 2015 - Jun 2016). Monthly details have been collected and were represented. Different parameters were taken in the study were Physico-chemical parameters - Temperature, colour, electrical conductivity, suspended solids, dissolved solids, total solids, light penetration, pH, dissolved oxygen, carbonates, bicarbonates, total hardness, dissolved carbon-di-oxide, biological oxygen demand and chemical oxygen demand along with standard deviation.* ***Results:*** *The result shows higher range in all parameters when compared to the permissible limit given by World Health Organization (WHO), Indian Council of Medical Research (ICMR) and Bureau of Indian Standards (BIS).* ***Conclusion:*** *Thus, the present study concludes that lake water was polluted, and the lake water is not suitable for consumption.*

KEY WORDS

KEY WORDS

Physical, chemical, monthly variation, WHO, ICMR and BIS

INTRODUCTION

Water is a universal solvent & it exist in three states - solid, liquid & vapour (Ndamitso, 2013). Water is the most known and most abundant of all known chemical substances, which occur naturally on the surface of the earth. It is fundamentally important to all plants, animals and man (Ajewole, 2005).

Pollution of rivers and streams has become one of the most crucial Environmental problems (Otieno, 2008). Environmental pollution is one of the undesirable side effects of industrialization and an important aspect of environmental degradation (Jothinarendiran, 2012).

A pond stands for a natural or man-made water reservoir having an area between 2 ha and 1m (20, 000 m^2 or ~5 acres) that can grips water for some months of the year (mainly for four months or may be more) (Rajiv, 2012). Ponds and tanks are important multi-usage components, they are sources of irrigation, fishery and other domestic purposes (Hocioglu and Dulger, 2011). Ponds with water in large quantity for most part of the year are available in Coimbatore and also it has only a very few rivers like Siruvani to supply water. But the quality of water obtained from these ponds is not reliable because it contains suspended matter and number of other impurities

(Kaufman, 1970).

The lakes have complex and fragile ecosystem, as they do not have self-cleaning ability and therefore readily accumulate pollutants (Lokeshwari and Chandrappa, 2006). The pond water is mainly affected due to pilgrims and ritual activities by the people living in the nearby areas (Gupta *et al.,* 2011a). Uncontrolled domestic waste water discharge into the pond have resulted in eutrophication of ponds as evidence by substantial algal bloom, dissolved oxygen depletion in the subsurface water, large fish kill and malodour generation (Pandey and Pandey, 2003).

Limnology covers the biological, chemical, physical, geological and other attributes of inland waters including rivers, streams, wetlands, lakes, ponds and springs pools etc., It is an interdisciplinary science which deals with the detailed field as well as laboratory studies to understand the structural and functional aspects and suggest solution to all the problems associated with the freshwater environment (Adoni *et al*., 1985).

Water quality generally means the component of water which must be present for optimum growth of aquatic organisms (Ehiagbonare and Ogundiran, 2010). The quality of surface water also depends on the equilibrium between the physical, chemical and biological characteristics of the surrounding environment (Langmuir, 1997).

The wide array of pollutants discharged into aquatic environment may have physico - chemical, biological, toxic and pathogenic effects (Goel, 2000).

As temperature is characterizes as the degree of coldness or hotness in the body of an organism either live on land or in water (Bhatnagar and Devi, 2013).

The electrical conductivity is the capacity of waters to conduct current, and is caused by the present salt, acids and bases, called electrolytes, capable of producing cations and anions. As the conductivity is directly related to the presence of dissolve salts, its magnitude can give the fair idea of the level of dissolved solids. A factor of 0.65 can be employed to convert the conductivity values in µmho/cm at 25°C into dissolve solids (Holmes and Talsma, 1981).

Total suspended and dissolved solids affect metabolism and physiology of fish and other aquatic organisms. They are products of run offs. They increase with increased rainfall and have adverse effects on dissolved oxygen and carbon dioxide. Suspended solids in water are directly proportional to dissolved solids. Dissolved solids could directly influence water conductivity, the higher the dissolved solids the higher the conductivity (Lawson, 2011).

The turbidity/ transparency influenced number of aquatic parameters like planktonic biomass, visibility and suspended particles of any water body (Singh, 1980; Saxsena, 1987; Salam and Rizvi, 1999).

pH is most important in determining the corrosive nature of water. Lower the pH value higher is the corrosive nature of water. pH was positively correlated with electrical conductance and total alkalinity (Gupta *et al.,* 2009).

The measurement of DO can be used to indicate the degree of pollution by organic matter, the destruction of organic substances and the level of self-purification of the water. Its determination is also used in the measurement of biochemical oxygen demand (BOD) (Eniola, 2005; Okonko *et al.,* 2008).

Carbon dioxide is the end product of organic carbon degradation in almost all aquatic environments and its variation is often a measure of net ecosystem metabolism (Smith and Hollibaugh, 1997, 1993; Hopkinson 1985).

The biochemical oxygen demand (BOD) check is a widely used manner to compute the consumption of oxygen in water by the decay and disintegration of organic matter (Sullivan, Synder and Stewart, 2010).

Chemical Oxygen Demand (COD) test determined the oxygen required for chemical oxidation of organic matter with the help of strong chemical oxidant. The test can be employed for the same purpose as the BOD test taking into accounts its limitations. COD determination has an advantage over BOD determination in that the result can be obtained in about 5 hours as compared to 5 days required for BOD test. Further, the test is relatively easy, gives reproducible result and is not affected by interference as the BOD test (NEERI, 1986).

The developed regression equations for the parameters having significant correlation coefficients can be successfully used to estimate the concentration of other constituents. A systematic study of correlation and regression coefficients of the water quality parameters not only helps to assess the overall water quality but also to quantify relative

concentration of various pollutants in water and provide necessary cue for implementation of rapid water quality management programmes (Sami *et al.,* 2011).

Therefore, the accurate determinations of physico-chemical parameters in aquatic environment are of ultimate important for controlling their pollution, this study aims at providing additional information to existing data on water quality assessments of Perur Chettipalayam lake.

Aims and Objectives of the Study are

1. To estimate the physico - chemical parameters of Perur Chettipalayam lake
2. To compare the result with standard limits
3. To determine environmental condition of the pond and predict pollution status.

MATERIALS AND METHODS

Perur Chettipalayam is a Census Town city in district of Coimbatore, Tamilnadu. The Perur Chettipalayam Census Town has population of 17,809 of which 8,891 are males while 8,918 are females as per report released by Census India 2011. The Perur Chettipalayam Lake with abundant acacia trees attracts as many as 77 species of birds. The Latitude and Longitude of Perur Chettipalayam Lake is 10.9718 and 76.906 respectively.

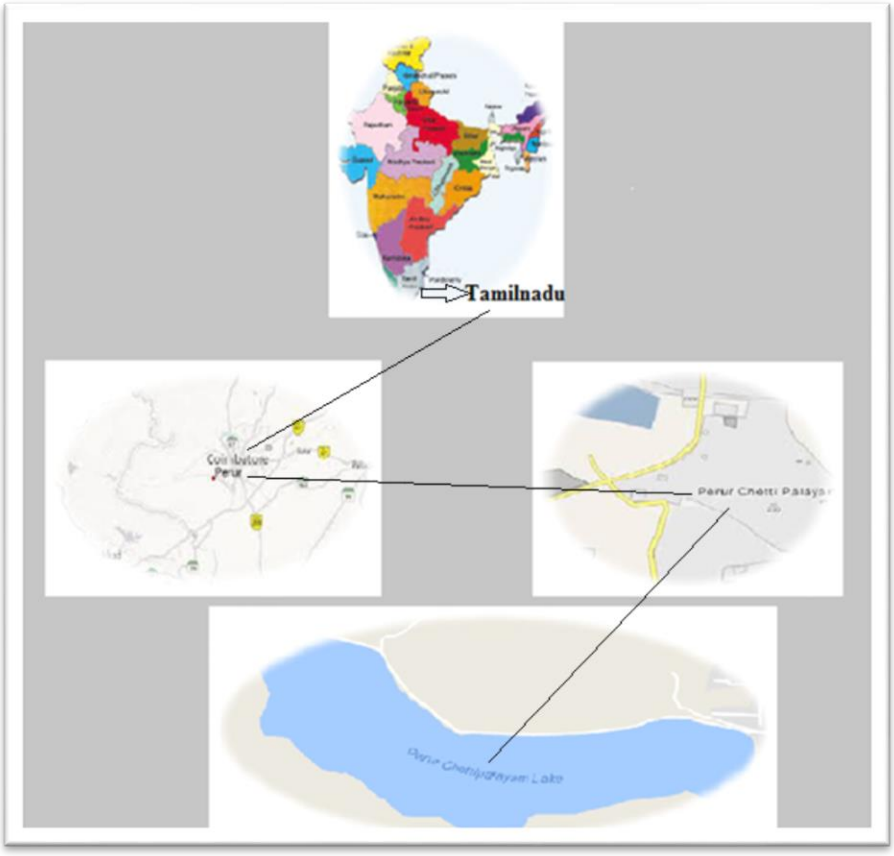
Plate I Shows Perur Chettipalayam lake

Plate II Shows the Dumping of wastes

Plate III Shows the mixing of sewage water

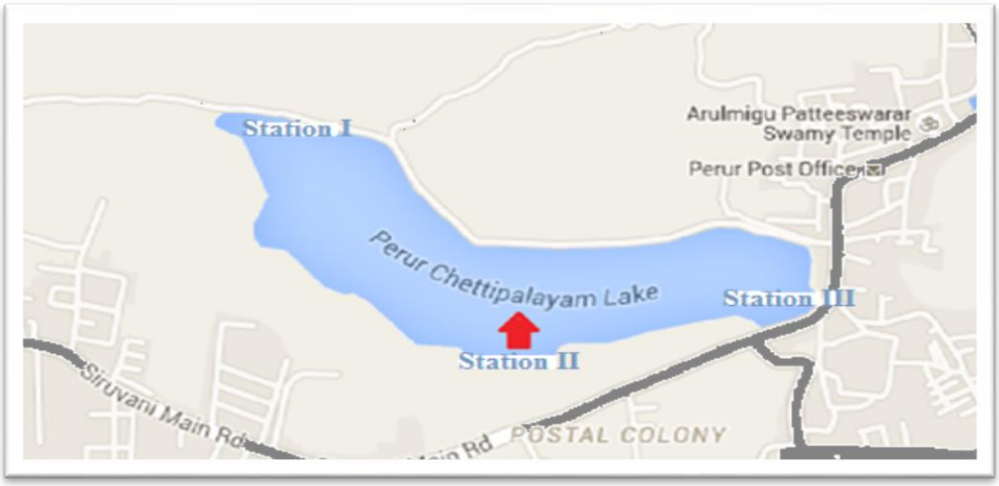
STUDY AREA

Map No. 1 Shows Perur Chettipalayam lake



Maps showing

1. Tamilnadu state
2. Coimbatore District & Perur city
3. Perur Chettipalayam (Study area)
4. Perur Chettipalayam lake



Map No. 2 Study area showing the different research location

Table No. 1. Basic Information of the Perur Chettipalayam Lake

S. No	DETAILS	
1	Location	Tamilnadu, India
2	Latitude	10.9718
3	Longitude	76.906
4	Total area	12-16 acres
5	Max. Depth	12-14 feet

For the present study, the samples were collected from Perur Chettipalayam lake at below mentioned three stations.

1. Station I: Before mixing of sewage water
2. Station II: At the point of mixing sewage water
3. Station III: After mixing of sewage water

For the present study water samples were collected for a period of 12 months (Jul 2015 - Jun 2016). Every month samples were collected at the surface of the pond at 11.30 am - 12.30 pm in order to maintain uniformity.

Preservation of Samples

Samples were collected in clean white polythene containers. The preservation procedure includes keeping the samples in the dark, adding chemical preservative, lowering the temperature to retard reactions or combinations of these. Collected samples were brought to the laboratory and kept in the refrigerator for analysis. Samples for the determination of dissolved oxygen were preserved by adding 1ml of Manganous sulphate, 1ml of alkaline iodide and 1 ml of concentrated sulphuric acid by anonymous (1965).

Samples were analyzed for

Physico-chemical parameters

Temperature, colour, electrical conductivity, suspended solids, dissolved solids, total solids, light penetration, pH, dissolved oxygen, carbonates, bicarbonates, total hardness, dissolved carbon dioxide, biological oxygen demand and chemical oxygen demand.

Table No. 2: Methods used for the study

S. No	Physico - chemical analysis	Methods
1	Temperature	Thermometer
2	Colour	Identified visually
3	Electrical conductivity	Direct Reading Conductivity Meter No. 304
4	Suspended solids	What man No. 1 filter paper
5	Dissolved solids	Evaporation Method
6	Total solids	Suspended Solids + Dissolved Solids
7	Light Penetration	Secchi disc
8	p^H	Systronic Digital p^H meter No. 335
9	Dissolved oxygen	Winkler's method Anonymous (1965)
10	Carbonates and Bicarbonates	APHA (1998)
11	Total Hardness	APHA (1998)
12	Dissolved CO_2	Lind (1974)
13	Biochemical Oxygen Demand (BOD)	Modified Winkler's method (5 days incubation)
14	Chemical Oxygen Demand (COD)	Liebig reflex condenser method

Analysis of Water samples

Physico-chemical Parameters

- **Temperature**

In each sampling station, temperature of the lake was measured with a mercury-in-glass thermometer which was inserted to the depth level of the water of about 2 cm from surface for 3 minutes. The readings were expressed in degrees Celsius (^{0}C).

- **Colour**

Visual comparison: About 20 ml of the sample and 20 ml of distilled water were taken in two separate wide mouthed test tubes. The results were tabulated (as clear, greenish, greyish, brownish, blackish etc.,) by comparing the colour of the sample with distilled water.

- **Electrical conductivity**

Apparatus required: Conductivity meter No. 304

Procedure: The electrode of the conductivity meter is dipped into the sample and the readings are noted for stable value shown as µmhos or Siemen(s).

- **Suspended solids**

A known quantity of the sample (10 ml) was taken and filtered using What Man No.1 filter paper. The residue was taken out and dried in an oven at a temperature of 105^{o}C for an hour, cooled and weighed. This gives the amount of suspended solids in the water samples.

- **Dissolved solids**

The filtrate obtained from the above process was evaporated, dried, weighed and recorded as the quantity of dissolved solids in the water samples.

- **Total solids**

The amount of total solids present in the water samples can be calculated by adding the suspended solids with that of the dissolved solids.

- **Light penetration**

Transparency is a characteristic of water that varies with the combined effect of colour and turbidity. It measures the light penetrating through the water body and is determined using Secchi disc.

Apparatus required: Secchi disc, a metallic disc of 20 cm diameter with four quad rats of alternate black and white on the upper surface. The disc with centrally

placed weight at the lower surface is suspended with a graduated cord at the center.

Procedure: Transparency is measured by gradually lowering the Secchi disc at respective sampling points. The depth at which it disappears in the water (X_1) and reappears (X_2) is noted. The transparency of the water body is computed as follows:

Transparency (Secchi Disc Transparency)

$= (X_1 + X_2) / 2$

Where,

X_1 - Depth at which Secchi disc disappears

X_2 - Depth at which Secchi disc reappears

- **pH**

The effect of pH on the chemical and biological properties of liquids makes its determination very important. It is one of the most important parameter in water chemistry and is defined as -log $[H^+]$ and measured as intensity of acidity or alkalinity on a scale ranging from 0 - 14. If free H^+ are more it is expressed acidic (i.e. pH < 7), while more OH^- ions is expressed as alkaline (i.e. pH > 7). In natural water pH is governed by the equilibrium between carbon-di-oxide/ bicarbonate/ carbonate ions and ranges between 4.5 and 8.5 although mostly basic. It tends to increase during day largely due to the photosynthetic activity (consumption of carbon-di-oxide) and decreases during night due to respiratory activity. Waste water and polluted natural waters have pH values lower or higher than 7 based on the nature of the pollutant. pH of the samples was determined by using Systronic Digital pH meter - No. 335.

- **Dissolved oxygen**

Oxygen dissolved in water is a very important parameter in water analysis as it serves as an indicator of the physical, chemical and biological activities of the water body. The two main sources of dissolved oxygen are diffusion of oxygen from the air and photosynthetic activity. Diffusion of oxygen from the air into water depends on the solubility of oxygen and is influenced by many other factors like water movement, temperature, salinity etc., Photosynthesis, a biological phenomenon carried out by the autotrophs depends on the plankton population, light condition, gases etc., Oxygen is considered to be the major limiting factor in water bodies with organic materials. Estimation of dissolved oxygen in the water samples was analysed by the Winkler's method Anonymous (1965).

- **Carbonates and Bicarbonates**

Carbonates and Bicarbonates of the sample was estimated by the procedure given by APHA (1998).

- **Total Hardness**

Hardness is predominantly caused by divalent cations such as calcium, magnesium, alkaline earth metal such as iron, manganese, strontium etc., The total hardness is defined as the sum of calcium and magnesium concentrations both expressed as $CaCO_3$ in mg/L. Carbonates and bicarbonates of calcium and magnesium cause temporary hardness. Sulphates and chlorides cause permanent hardness. Total Hardness of the sample was estimated by the procedure given by APHA (1998).

Table No. 3: Hardness Chart *(for drinking water)*

Soft	0 – 60 mg/L
Medium	60 –120 mg/L
Hard	120 - 180 mg/L
Very Hard	> 180 mg/L

- **Dissolved CO_2**

The important source of free carbon-di-oxide in surface water bodies is mainly from respiration and decomposition by aquatic organisms. It reacts with water partly to form calcium bicarbonate and in the absence of bicarbonates gets converted to carbonates releasing carbon-di-oxide. The dissolved CO_2 in the water sample was estimated by using the method given by Lind (1974).

- **BOD**

Biological Oxygen Demand (BOD) is the amount of oxygen required by microorganisms for stabilizing biologically decomposable organic matter (carbonaceous) in water under aerobic conditions. The test is used to determine the pollution load of wastewater, the degree of pollution and the efficiency of wastewater treatment methods. Bacteria for degrading the organic matter (under aerobic conditions) requires the addition of nutrients and maintaining the standard conditions of pH, temperature and absence of microbial growth inhibiting substances. BOD of the sample was estimated by the

procedure given by Modified Winkler's method (5days incubation).

- **COD**

Chemical oxygen demand (COD) is the measure of oxygen equivalent to the organic content of the sample that is susceptible to oxidation by a strong chemical oxidant. The intrinsic limitation of the test lies in its ability to differentiate between the biologically oxidisable and inert material. It is measured by the Liebig reflex condenser method.

RESULTS AND DISCUSSION

The present study was undertaken to study the physico-chemical characteristics of water samples which were taken from Perur Chettipalayam lake. The light green colour is due to the algal growth. The results obtained by each physico-chemical of water samples listed in the following tables in the form of minimum and maximum range of values. These results were compared with WHO (1963), BIS: IS 10500 (2012) and ICMR (1975) drinking water standard.

Physico-chemical Parameters

The results of physico-chemical parameters of water samples from the three stations in Perur Chettipalayam lake are presented in Table 4 to 8.

Temperature

During the study period of Twelve months, the values of water temperature was ranged from 25°C to 33.5°C during the months of July 2015 to June 2016. The minimum temperature of (25°C) was recorded in the month of Sep 2015. The maximum temperature of (33.5°C) was recorded in the month of Apr 2016.

Temperature is one of the essential and changeable environmental factors, since it influences the growth and distribution of flora and fauna. Temperature is an important parameter, with vital role in chemical and biological activities. The excessive amount of nutrients in water bodies along with higher temperature favours the growth of algae and aquatic weeds (Wetch, 1952). Thripathaiah *et al.,* (2012) and Shyamala *et al.,* (2008) also reported the range of temperature in between 24.75 to 28.5°C and 26.3 to 27.2°C respectively. Higher temperature during summer was due to greater heating (Adebowale *et al.,* 2008).

Electrical conductivity

During the study period of Twelve months, the values of Electrical conductivity was ranged from 90 to 340.15 during the months of July 2015 to June 2016. The minimum Electrical conductivity of 90 was recorded in the month of Jan 2016. The maximum Electrical conductivity of 340.15 was recorded in the month of May 2016.

Conductivity is a measure of the ability of an aqueous solution to carry an electric current. This ability depends on the presence of ions; on their total concentration, mobility and valence; and on the temperature of measurement. Increasing levels of conductivity and cations are the products of decomposition and mineralization of organic materials (Abida, 2008). Kataria *et al.,* (2011) and Shrivastava and Kanungo (2013**)** also reported a range of EC in between 296 to 723 µmhos/cm and 115.11 to 212.13 µmhos/cm respectively.

Suspended solids

During the study period of Twelve months, the values of Suspended solids was ranged between 10 to 90 mg/l. The minimum value of 10 mg/l was recorded in the month of Jan 2016. The maximum value (90 mg/l) was recorded in the month of July 2015.

Dissolved solids

During the study period of Twelve months, the values of dissolved solids was ranged between 15 to 1485.35 mg/l. The minimum value of (15 mg/l) was recorded in the month of Jan & Apr 2016. The maximum value (1485.35 mg/l) was recorded in the month of Aug 2015.

The total concentration of dissolved solids in a water body found useful parameter in describing the chemical density as a fitness factor and as a general measure of edaphic relationship and productivity of the water (Jhingran, 1982). Shrivastava and Kanungo (2013) reported the range of TDS in between 152.12 - 265.97 ppm.

Total solids

During the study period of Twelve months, the values of the value of total solids (Suspended and dissolved) was ranged between 25 to 1586.2 mg/l. The minimum value of (25 mg/l) was recorded in the month of Jan 2016. The maximum value (1586.2 mg/l) was recorded in the month of Sep 2015.

Water as a universal solvent, dissolved different type of materials as compare to other solvents (Welch, 1952).

Light penetration

During the study period of Twelve months, the values of light penetration was ranged between 200 to 298 mg/l. The minimum value of (200mg/l) was recorded in the month of Oct 2015. The maximum value (298 mg/l) was recorded in the month of Feb 2016.

Transparency or light penetration depends on the intensity of sunlight, suspended solid particles, turbid water received from catchment area and density of plankton etc., (Mishra and Saksena, 1991; Kulshrestha and Sharma, 2006). Mustapha (2009) reported that low transparency in the wet season might be due to the washing of debris, organic matter and silt into flood plain through run off.

pH

During the study period of Twelve months, the values of pH were ranged between 5.0 to 9.9. The pond was found to be alkaline in nature throughout the study period. The minimum pH value was noticed as (5.0) during the month of Oct 2015. The maximum pH value was noticed as (9.9) during the month of May 2016.

pH of water is an important indication of its quality and provides information in many types of

geochemical equilibrium or solubility calculations (Hem, 1985). The range for pH in water for domestic use is 6.5 to 8.5 (WHO, 1983). Choudhary *et al.,* (2014) reported a range of pH in between 7.0 and 8.3

Dissolved oxygen

Dissolved Oxygen was recorded very low concentration throughout the period of investigation. During the study period of Twelve months, the values of dissolved oxygen was found to range from 2.00 to 8.85 mg/l. The amount of dissolved oxygen was found to be maximum (8.85 mg/l) during the month of Jan 2016. The minimum dissolved oxygen value (2.00 mg/l) was recorded during the month of Jun 2016.

Fritsch (1907) stated that the oxygen contents in tropical water would be low considering their high temperature.

Carbonates (CO_3^-)

During the study period of Twelve months, the values of Carbonates was ranged between 37 to 99 mg/l. The minimum value of (37 mg/l) was recorded in the month of Jul 2015. The maximum value (99 mg/l) was recorded in the month of Apr 2016.

Bicarbonates (HCO_3^-)

During the study period of Twelve months, the values of Bicarbonates was ranged between 100 to 590 mg/l. The minimum value of (100 mg/l) was recorded in the month of Apr 2016. The maximum value (590 mg/l) was recorded in the month of Oct 2015.

The carbonates and bicarbonates are the major components of alkalinity of surface water (Muhammad *et al.,* 2000).

Total Hardness

The water samples are slightly alkaline due to the presence of carbonates and bicarbonates. During the study period of Twelve months, the values of total hardness ranged from 156-670 mg/l. Minimum value of (156 mg/l) was recorded during the month of Apr 2016. The maximum value of (670 mg/l) was recorded during the month of Oct 2015.

Total Hardness (TH) is due to the concentration of alkaline earth metals. Calcium and magnesium ions are the principal cations imparting hardness (Shinde *et al.*, 2011). Hardness results from the presence of divalent cations of which Ca^{++} and Mg^{++} which are most abundant in groundwater. The higher hardness value in summer season was mainly attributed to rising temperature, thereby increasing the solubility of Ca^{++} and Mg^{++} salts (Garg, 2003).

Dissolved CO_2

During the study period of Twelve months, the values of dissolved carbon dioxide ranged from 2.05 to 8.80 mg/l. Minimum value of (2.05 mg/l) was recorded during the month of Jul 2015. The maximum value of (8.80 mg/l) was recorded during the month of Mar 2016.

Free CO_2 concentration in water indicates the presence of decomposable organic matter, bacterial action on organic matter and physiological activities of biotic components. CO_2 content of water is essential sources of carbon that, can be assimilated and incorporated into the skeleton of living matter specifically in aquatic autotrophs. The amount of free CO_2 present in stagnant water is generally maintained by diffusion from atmosphere, respiration of animals along with plants and bacterial decomposition of organic matter (Misra, 1991).

BOD

During the study period of Twelve months, the B.O.D values were ranging from 1.75 to 15.65 mg/l. An increase in the B.O.D values (15.65 mg/l) was recorded in the month of May 2016. A decrease in the B.O.D value (1.75 mg/l) was recorded in the month of Aug

2015. The high value of BOD indicates the presence of domestic, industrial wastes in huge quantities.

Biological oxygen demand is a measure of the oxygen in the water that is required by the aerobic organisms. The biodegradation of organic materials exerts oxygen tension in the water and increases the biochemical oxygen demand (Abida, 2008). The level of BOD depends on temperature, density of plankton, concentrations of organic matter and other related factors (Parvatesam *et al.,* 1993). Fokmare and Musaddiq (2002) recorded high value of biochemical oxygen demand (BOD) as 20.00 mg/l in river Purna and said that this river is highly polluted due to organic enrichment, decay of plants and animal matter in the river. Thus, the high value of BOD encountered in both rivers, above the permissible limit of WHO (<2 mg/l), indicates the pollution by biochemically degradable organic wastes from various sources.

COD

During the study period of Twelve months, the COD values were ranging from 5.40 to 44.70 mg/l. An increase in the COD values (44.70 mg/l) was recorded in the month of May 2016. A decrease in the COD value (5.40 mg/l) was recorded in the month of Jan 2016.

COD found reliable parameter for analysis of water pollution. Chemical oxygen demand (COD) is a measure of the oxidation of reduced chemicals in water. It is commonly used to indirectly measure the number of organic compounds in water. The measure of COD determines the quantities of organic matter found in water. This makes COD useful as an indicator of organic pollution in surface water (King *et al.*, 2003 and Faith, 2006).

Table No. 4: Data on seasonal variations in Physico - chemical characteristics of Perur Chettipalayam lake at Coimbatore for the year 2015 – 2016

Seasons	Parameters	Temperature (°C)			Colour			Electrical Conductivity (µmhos/cm)		
	Months	SI	SII	SIII	SI	SII	SIII	SI	SII	SIII
Rainy	Jul	26.6±0.15	26.2±0.25	26.5±0.35	Brownish	Brownish	Brownish	115.33±0.25	260.25±0.20	220.15±0.10
	Aug	26.8±0.10	26.2±0.25	26.5±0.35	Brownish	Brownish	Brownish	125.10±0.10	280.33±0.19	260.15±0.10
	Sep	26.0±0.36	25.0±1.00	25.5±0.32	Brownish	Black	Dark Brown	116.25±0.16	300.15±0.10	290.00±5.42
	Oct	26.5±0.40	26.0±0.36	26.0±0.36	Brownish	Black	Dark Brown	130.15±0.01	250.05±0.05	210.15±0.10
	Nov	27.5±0.35	26.0±0.36	26.4±0.25	Colourless	Dark Brown	Brownish	110.33±0.02	200.45±0.27	150.00±0.66
Winter	Dec	27.0±0.41	26.2±0.25	26.5±0.40	Colourless	Dark Brown	Brownish	102.05±0.05	220.25±0.10	210.15±0.10
	Jan	27.5±0.35	26.0±0.36	26.5±0.40	Greenish	Dark Brown	Brownish	90.00±2.00	200.80±0.26	140.25±0.25
	Feb	27.0±0.41	26.4±0.25	26.5±0.40	Greenish	Dark Brown	Brownish	100.25±0.09	250.10±0.10	200.15±0.10
	Mar	30.0±2.00	26.2±0.25	28.0±0.26	Greenish	Black	Dark Brown	150.33±0.02	280.00±5.73	240.25±0.25
Summer	Apr	34.8±0.15	31.0 ±1.00	33.5±0.30	Greenish	Brownish	Brownish	145.00±0.90	278.15±0.10	270.33±0.10
	May	31.0±1.00	26.0±0.36	26.5±0.40	Greenish	Brownish	Brownish	172.05±0.03	340.15±0.10	210.15±0.10
	Jun	29.5±0.40	26.0±0.36	27.5±0.35	Brownish	Dark Brown	Brownish	185.00±0.07	310.00±2.96	300.00±5.84
Standards	WHO	35			-			300		
	ICMR	-			-			300		
	BIS	-			-			300		

Values were expressed as mean ± S.D of three replicates using SPSS statistical package, unit -°C & µmhos/cm except Colour otherwise stated.
Standards - World Health Organization (1963), Indian Council of Medical Research (1975) & Bureau of Indian Standards: IS 10500 (2012)

Table No. 5: Data on seasonal variations in Physico-chemical characteristics of Perur Chettipalayam lake at Coimbatore for the year 2015 - 2016

Seasons	Parameters	Suspended Solids (mg/l)			Dissolved solids (mg/l)			Total Solids (mg/l)		
Rainy	Months	SI	SII	SIII	SI	SII	SIII	SI	SII	SIII
	Jul	12.08±0.02	90.00±5.50	80.00±0.60	26.00±0.60	1465.00±0.90	1440.50±0.50	38.08±0.07	1555±0.76	1520.5±5.63
	Aug	12.05±0.05	72.05±0.56	65.25±0.20	28.05±0.05	1485.35±0.25	1420.00±5.92	40.1±0.05	1557.4±0.40	1485.25±0.25
	Sep	12.05±0.05	66.05±0.05	70.00±1.18	26.05±0.05	1520.15±0.20	1435.15±0.12	38.1±0.05	1586.2±0.25	1505.15±0.10
	Oct	12.00±0.07	82.00±1.44	62.00±2.51	28.02±0.20	1450.00±6.01	1430.50±0.40	40.02±0.05	1532±0.36	1492.5±0.50
Winter	Nov	10.05±0.05	70.05±0.05	60.20±0.20	15.02±0.10	1250.50±5.63	1200.05±0.21	25.07±0.05	1320.55±0.40	1260.25±0.25
	Dec	11.05±0.05	78.05±0.05	60.00±1.18	20.00±0.30	858.10±0.20	652.50±1.05	31.05±0.05	936.15±0.12	712.5±0.40
	Jan	10.00±0.36	60.45±0.31	50.05±0.05	15.00±0.47	715.15±0.25	500.00±5.84	25±1.00	775.6±0.20	550.05±0.05
	Feb	10.05±0.05	60.00±1.18	62.05±0.05	20.15±0.10	658.15±0.05	640.10±0.10	30.2±0.20	718.15±0.15	702.15±0.15
Summer	Mar	10.25±0.16	65.05±0.05	50.05±0.05	25.00±0.52	1459.00±5.50	1250.00±7.63	35.25±0.25	1524.05±0.27	1300.05±0.10
	Apr	10.05±0.05	75.33±0.25	65.00±0.60	15.00±0.90	1468.05±0.05	1460.50±5.63	25.05±0.05	1543.38±0.26	1525.5±0.50
	May	12.00±0.07	75.00±0.10	60.00±1.18	20.25±0.20	1455.33±0.25	1450.00±0.95	32.25±0.25	1530.33±0.25	1510±0.64
	Jun	10.00±0.36	76.00±0.32	70.15±0.15	22.05±0.05	1460.00±5.92	1410.00±3.14	32.05±0.05	1536±0.76	1480.15±0.10
Standards	WHO	500			500			30		
	ICMR	-			500			-		
	BIS	-			500-1000			-		

Values were expressed as mean ± S.D of three replicates using SPSS statistical package, unit- mg/l.
Standards - World Health Organization (1963), Indian Council of Medical Research (1975) & Bureau of Indian Standards: IS 10500 (2012)

Table No. 6: Data on seasonal variations in physico-chemical characteristics of Perur Chettipalayam lake at Coimbatore for the year 2015 – 2016

Seasons	Parameters	Light Penetration (Cms)			pH			Dissolved O_2 (mg/l)		
Rainy	Months	SI	SII	SIII	SI	SII	SIII	SI	SII	SIII
	Jul	228±1.00	230±5.92	226±1.52	5.8±0.10	7.5±0.15	6.2±0.25	7.65±0.05	6.24±0.20	7.05±0.15
	Aug	225±0.58	235±1.00	230±6.08	5.7±0.10	7.6±0.10	6.5±0.30	7.05±0.10	6.35±0.25	7.15±0.12
	Sep	214±0.47	236±1.00	220±6.42	5.6±0.20	7.9±0.15	6.6±0.15	7.60±0.20	6.20±0.41	7.05±0.10
	Oct	200±0.72	232±1.52	218±1.52	5.0±0.15	7.6±0.10	6.5±0.30	7.40±0.20	6.25±0.25	7.20±0.20
Winter	Nov	256±5.92	294±0.75	274±1.00	7.4±0.20	8.5±0.20	7.1±0.15	8.84±0.21	6.85±0.65	7.58±0.25
	Dec	250±5.61	296±0.32	275±2.08	7.5±0.15	8.0±0.20	7.5±0.15	8.69±0.11	6.70±0.20	7.45±0.16
	Jan	256±5.92	292±0.26	270±6.42	7.5±0.15	8.8±0.15	7.2±0.20	8.80±0.15	6.90±0.30	7.80±0.20
	Feb	265±0.50	298±0.36	280±6.08	7.6±0.10	8.7±0.15	7.0±0.20	8.85±0.16	6.25±0.20	7.05±0.10
Summer	Mar	260±5.92	276±1.00	243±1.52	8.0±0.20	9.8±0.20	9.0±0.30	4.55±0.05	2.20±0.25	3.90±0.15
	Apr	262±0.76	275±2.08	230±2.88	8.8±0.15	9.5±0.15	9.4±0.20	4.05±0.10	2.15±0.12	3.20±0.20
	May	260±5.92	274±2.00	240±1.00	8.5±0.20	9.7±0.20	9.9±0.10	4.15±0.10	2.10±0.20	3.50±0.50
	Jun	258±5.34	276±1.00	222±1.52	8.5±0.20	9.6±0.25	9.5±0.15	4.25±0.20	2.00±0.32	3.35±0.21
Standards	WHO	-			6.5-8.5			4-6		
	ICMR	-			6.5-8.5			5		
	BIS	-			6.5-8.5			5		

Values were expressed as mean ± S.D of three replicates using SPSS statistical package, unit- cms & mg/l except pH otherwise stated.
Standards - World Health Organization (1963), Indian Council of Medical Research (1975) & Bureau of Indian Standards: IS 10500 (2012)

Table No. 7: Data on seasonal variations in Physico-chemical characteristics of Perur Chettipalayam lake at Coimbatore for the year 2015 – 2016

Seasons	Parameters	Carbonates (mg/l)			Bicarbonates (mg/l)			Total hardness (mg/l)		
Rainy	Months	SI	SII	SIII	SI	SII	SIII	SI	SII	SIII
	Jul	37±2.00	80±1.00	65±1.00	129±0.50	550±0.72	520±5.54	166±0.40	630±5.49	585±0.36
	Aug	45±2.51	85±2.08	64±1.52	190±1.60	560±6.24	510±0.60	235±0.43	645±0.58	574±0.43
	Sep	49±1.52	79±2.00	68±1.21	143±0.50	570±5.83	540±5.61	192±0.56	649±0.43	608±7.50
	Oct	44±1.00	80±1.52	60±0.64	170±0.40	590±0.65	550±0.72	214±2.17	670±0.56	610±0.53
Winter	Nov	47±1.52	90±1.00	72±0.65	110±5.80	405±7.63	400±0.70	157±0.52	495±0.58	472±0.36
	Dec	45±1.00	96±1.52	77±0.68	130±5.40	540±0.30	480±5.53	175±0.32	636±0.49	557±0.49
	Jan	42±2.00	92±2.00	65±1.00	160±0.37	550±0.72	450±0.43	202±0.48	642±0.47	515±0.43
	Feb	49±1.52	98±2.08	73±1.08	140±5.89	460±5.54	400±0.45	189±1.20	558±0.37	473±0.49
Summer	Mar	54±1.00	90±2.51	82±1.00	120±0.75	410±0.70	340±0.30	174±0.36	500±0.61	422±0.30
	Apr	56±1.52	99±1.52	84±1.52	100±6.37	460±0.47	350±5.78	156±0.58	559±0.66	434±0.10
	May	80±2.00	94±2.00	80±2.51	140±5.89	400±0.36	320±5.54	220±5.46	494±0.52	400±0.45
	Jun	70±1.00	92±1.52	85±1.04	130±5.40	450±0.43	360±0.41	200±0.62	542±0.43	445±0.41
Standards	WHO	-			-			500		
	ICMR	-			-			200		
	BIS	-			-			200		

Values were expressed as mean ± S.D of three replicates using SPSS statistical package, unit- mg/l.
Standards - World Health Organization (1963), Indian Council of Medical Research (1975) & Bureau of Indian Standards: IS 10500 (2012)

Table No. 8: Data on seasonal variations in Physico-chemical characteristics of Perur Chettipalayam lake at Coimbatore for the year 2015 – 2016

Seasons	Parameters	Dissolved Co_2 (mg/l)			BOD (mg/l)			COD (mg/l)		
Rainy	**Months**	**SI**	**SII**	**SIII**	**SI**	**SII**	**SIII**	**SI**	**SII**	**SIII**
	Jul	2.05±0.07	5.10±0.10	5.00±0.20	1.80±0.20	5.60±0.15	5.05±0.05	7.00±0.35	35.40±0.06	30.00±0.30
	Aug	2.20±0.15	5.15±0.15	5.10±0.10	1.75±0.25	5.95±0.04	5.00±0.10	7.20±0.05	35.70±0.04	35.00±0.65
	Sep	2.15±0.10	5.20±0.10	5.10±0.10	1.85±0.05	5.90±0.05	5.55±0.04	7.10±0.09	35.95±0.04	35.40±0.20
	Oct	2.20±0.15	5.40±0.15	5.20±0.10	1.95±0.96	5.95±0.04	5.05±0.05	7.00±0.35	35.80±0.05	35.00±0.65
Winter	**Nov**	3.10±0.10	6.70±0.20	6.60±0.15	2.20±0.15	6.05±0.10	6.00±0.15	5.50±0.08	17.80±0.06	17.20±0.08
	Dec	3.00±0.32	6.50±0.30	6.30±0.10	2.15±0.05	6.45±0.03	6.20±0.10	5.60±0.11	17.70±0.05	17.00±0.32
	Jan	3.05±0.07	6.45±0.10	6.25±0.05	2.16±0.03	6.20±0.12	6.10±0.05	5.40±0.18	17.20±0.08	17.05±0.05
	Feb	3.00±0.32	6.60±0.15	6.40±0.05	2.10±0.05	6.00±0.15	6.00±0.15	5.90±0.05	17.60±0.03	17.40±0.15
Summer	**Mar**	4.95±0.10	8.80±0.10	7.70±0.16	2.40±0.04	14.95±0.04	14.55±0.09	8.00±0.12	43.80±0.04	43.45±0.05
	Apr	4.55±0.40	8.20±0.15	7.15±0.08	2.75±0.06	15.65±0.14	15.05±0.05	8.15±0.05	43.90±0.05	43.70±0.07
	May	4.80±0.25	8.70±0.20	7.10±0.06	2.45±0.04	14.85±0.05	15.45±0.06	8.60±0.03	44.70±0.06	44.00±0.36
	Jun	4.05±0.05	8.05±0.05	8.00±0.12	2.35±0.02	14.75±0.03	14.70±0.05	8.35±0.05	44.25±0.05	44.05±0.07
Standards	**WHO**	0.5-2.0			6			10		
	ICMR	-			5			-		
	BIS	-			5			-		

Values were expressed as mean ± S.D of three replicates using SPSS statistical package, unit- mg/l.

Standards - World Health Organization (1963), Indian Council of Medical Research (1975) & Bureau of Indian Standards: IS 10500 (2012)

Table No. 9: Correlation Coefficient for physical parameters of Perur Chettipalayam lake, Coimbatore at Station I for the year 2015-16

CORRELATIONS							
CORRELATION COEFFICIENT	**PARAMETERS**	**TEMP**	**EC**	**SS**	**DS**	**TS**	**LP**
Spearman's rho	**TEMP**	1.000	.421	-.602(*)	-.631(*)	-.600(*)	.813(**)
	EC		1.000	.081	.343	.371	.140
	SS			1.000	.732(**)	.811(**)	-.607(*)
	DS				1.000	.984(**)	-.627(*)
	TS					1.000	-.649(*)
	LP						1.000

*. Correlation is significant at the 0.05 level (2-tailed)
**. Correlation is significant at the 0.01 level (2-tailed)

Table No. 10: Correlation Coefficient for physical parameters of Perur Chettipalayam lake, Coimbatore at Station II for the year 2015-16

CORRELATIONS							
CORRELATION COEFFICIENT	**PARAMETERS**	**TEMP**	**EC**	**SS**	**DS**	**TS**	**LP**
Spearman's rho	**TEMP**	1.000	-.126	.026	-.067	-.159	.194
	EC		1.000	.070	.657(*)	.594(*)	-.424
	SS			1.000	.280	.420	-.532
	DS				1.000	.965(**)	-.711(**)
	TS					1.000	-.823(**)
	LP						1.000

*. Correlation is significant at the 0.05 level (2-tailed)
**. Correlation is significant at the 0.01 level (2-tailed)

Table No. 11: Correlation Coefficient for physical parameters of Perur Chettipalayam lake, Coimbatore at Station III for the year 2015-16

CORRELATIONS							
CORRELATION COEFFICIENT	**PARAMETERS**	**TEMP**	**EC**	**SS**	**DS**	**TS**	**LP**
Spearman's rho	**Temp**	1.000	.323	-.077	.075	.075	.196
	EC		1.000	.633(*)	.577(*)	.592(*)	-.653(*)
	SS			1.000	.477	.537	-.591(*)
	DS				1.000	.993(**)	-.669(*)
	TS					1.000	-.690(*)
	LP						1.000

*. Correlation is significant at the 0.05 level (2-tailed)
**. Correlation is significant at the 0.01 level (2-tailed)

Table No. 12: Correlation Coefficient for chemical parameters of Perur Chettipalayam lake, Coimbatore at Station I for theyear 2015-16

CORRELATIONS									
CORRELATION COEFFICIENT	**PARAMETERS**	**pH**	**DO**	**CARBONATES**	**BICARBONATES**	**TH**	**DCD**	**BOD**	**COD**
Spearman's rho	**pH**	1.000	-.456	.727(**)	-.562	-.270	.833(**)	.860(**)	.485
	DO		1.000	-.607(*)	.140	-.154	-.463	-.476	-.918(**)
	CARBONATES			1.000	-.338	-.028	.720(**)	.712(**)	.752(**)
	BICARBONATES				1.000	.898(**)	-.486	-.600(*)	-.123
	TH					1.000	-.158	-.308	.193
	DCD						1.000	.940(**)	.424
	BOD							1.000	.399
	COD								1.000

*. Correlation is significant at the 0.05 level (2-tailed)
**. Correlation is significant at the 0.01 level (2-tailed)

Table No. 13: Correlation Coefficient for chemical parameters of Perur Chettipalayam lake, Coimbatore at Station II for the year 2015-16

CORRELATIONS

CORRELATION COEFFICIENT	PARAMETERS	P^H	DO	CARBONATES	BICARBONATES	TH	DCD	BOD	COD
Spearman's rho	pH	1.000	-.502	.590(*)	-.770(**)	-.708(*)	.932(**)	.888(**)	.445
	DO		1.000	-.201	.356	.385	-.528	-.448	-.870(**)
	CARBONATES			1.000	-.550	-.475	.615(*)	.724(**)	-.025
	BICARBONATES				1.000	.986(**)	-.846(**)	-.699(*)	-.323
	TH					1.000	-.783(**)	-.602(*)	-.322
	DCD						1.000	.911(**)	.490
	BOD							1.000	.438
	COD							.438	1.000

***. Correlation is significant at the 0.05 level (2-tailed).**

****. Correlation is significant at the 0.01 level (2-tailed).**

Table No. 14: Correlation Coefficient for chemical parameters of Perur Chettipalayam lake, Coimbatore at Station III for the year 2015-16

CORRELATIONS

CORRELATION COEFFICIENT	PARAMETERS	pH	DO	CARBONATES	BICARBONATES	TH	DCD	BOD	COD
Spearman's rho	pH	1.000	-.497	.867(**)	-.863(**)	-.865(**)	.879(**)	.975(**)	.474
	DO		1.000	-.698(*)	.554	.535	-.529	-.544	-.878(**)
	CARBONATES			1.000	-.821(**)	-.816(**)	.881(**)	.880(**)	.519
	BICARBONATES				1.000	.998(**)	-.874(**)	-.861(**)	-.456
	TH					1.000	-.876(**)	-.860(**)	-.452
	DCD						1.000	.847(**)	.493
	BOD							1.000	.448
	COD								1.000

***. Correlation is significant at the 0.05 level (2-tailed).**

****. Correlation is significant at the 0.01 level (2-tailed).**

CONCLUSION

1. The present study clearly reveals the toxicity and pollution level of sewage water being discharged in the lake. It has been found that discharged sewage water adds its harmful inputs along with some hazardous chemicals and heavy metals.
2. The conductivity, TS and TH is very high at exit point due to heavy organic pollutants discharged through sewage waste of city area. High BOD values indicate biogenic pollutants in lake water.
3. Environmental condition of the pond was not good due to the continuous dumping of waste materials especially wastes from community toilets.
4. Water samples were not in agreement with the WHO, BIS & ICMR guideline on the basis of their physico-chemical characteristics. So, there is an immediate need of restoration, improvement and proper management of these secret water bodies for the human and environment.
5. Awareness programs must need to educate local villagers to safeguard the Precious lake and its surrounding.

REFERENCES

1. Adebowale, K.O., Agunbiade, F.O. and Olu - Owolabi, B. I. Impacts of natural and anthropogenic multiple sources of pollution on the environmental conditions of Onto State Costal Water Nigeria. *EJEAF Che*. 2008; 7 (4): 2797-2811.
2. Adoni, A., Joshi, D.G., Gosh, K., Chourasia, S.K., Vaishya, A.K., Yadav, M. & Verma, H.G. A work book on limnology. Pratibha Publisher, Sagar. 1985; 166pp.
3. Ajewole, G. Water: An overview. Food forum magazine. Nigeria Institute Food Science. 2005.
4. APHA – AWWA, Standard methods for the examination of water and wastewater, 19th Ed. American Publication Health Association, Washington. 1998; 136.
5. Bhatnagar, A. and P. Devi. Water quality guidelines for the management of pond fish culture. *International Journal of Environmental Sciences.* 2013; 3(6): 1980-2009.
6. Choudhary P, Dhakad NK, Jain R. Studies on the Physico-Chemical Parameters of Bilawali Tank, Indore (M.P.) India. IOSR *Journal of Environmental Science, Toxicology and Food Technology* (IOSRJESTFT). 2014; 8(1): 37-40
7. Ehiagbonare JE, Ogundiran YO, 2010. Physico - chemical analysis of fish pond waters in Okada and its environs, Nigeria. African J. Biotech., 9 (36), 5922-5928.
8. Eniola, K.I.T. Biodegradability studies on detergent surfactant in effluent using resident bacteria of detergent-polluted freshwater bodies in Ilorin, Nigeria. *Ph.D. Thesis submitted to Department of Microbiology, University of Ilorin.* 2005; *Pp: 129.*
9. Fokmare, A.K. and Musaddiq, M. A study of physico-chemical characteristics of Kapsi Lake and Purna river waters in Akola district of Maharashtra, India. *Nat. Environ. Pollut. Technol.* 2002; 1, 261-263.
10. Fritsch F. E. (1907); The Sub-aerial and Fresh Water Algal Flora of the *Tropics. Ann. Bot. 21*: 236-275.
11. Garg, S. Water quality of wells and bore wells of 10 selected locations of Chitrakoot region. *Indian J. Env. protec.* 2003; 23(9): 966-974.
12. Goel, P. Water pollution: Causes, effect and control. New Age International Publishers, Ltd. New Delhi. 2000.
13. Gupta, A. K, K Mishra, P Kumar, C Singh and S Srivastava. Impact of religious activities on the water characteristics of prominent ponds at Varanasi (u.p.), *India Plant Arch.* 2011; 11, *1*, pp. 297-300.
14. Gupta, D. P., Sunita and J. P. Saharan. Physiochemical Analysis of Ground Water of Selected Area of Kaithal City (Haryana) India, Researcher, 2009; 1(2), pp 1-5.
15. Hem JD (1985) Study and interpretation of the chemical characteristics of natural water. USGS Water Supply Paper, 2254, 117-120.
16. Hocioglu, N. and Basaran Dulger. (2011). Monthly variation of some Physico-chemical and microbiological parameters in Biga Stream (Big, Canakkale, Turkey). African J. Biotechnology, 8(9): 1929-1937.
17. Holmes A.V. and Talsma T. Land and stream salinity. Elsevier Scientific Publishing Co., Amsterdam. 1981.
18. Hopkinson, C.S. Shallow-water and pelagic metabolism: Evidence of heterotrophy in the near-

shore Georgia Bight, Marine Biology. 1985; 87, pp 19.

19. Jothinarendiran, N. (2012) Effect of Dimethoate Pesticide on Oxygen Consumption and Gill Histology of the Fish, *Channa punctatus*. *Current Biotica*, 5, 500-507.
20. Kataria HC, Gupta, MK, Kushwaha S, Kashyap S, Trivedi S, Bhadoriya R, Bandewar NK. Study of physico-chemical parameters of drinking water of Bhopal city with Reference to Health Impacts. *Current World Environment*. 2011; 6(1): 95-99
21. Kaufman DB, DiNicola W, McIntosh R. Am J Dis Child. 1970; 119: 374-376.
22. Krishnaram, H. Mohan, M., Ramchandra, and Vishalkashi, Y. (2007). Limnological studies on Kolaramma lake Kolar, Karnataka. Env.Ecol., 52(2): 364-367.
23. Kulshrestha, H. and Sharma, S. Impact of mass bathing during Ardhkumbh on water quality status of river Ganga. *J. Environ. Biol.* 2006; 27, 437-440.
24. Langmuir D. Aqueous environmental geochemistry. Upper Saddle River: Prentice- Hall. 1997.
25. Lawson, E.O. Physico-Chemical Parameters and Heavy Metal Contents of Water from the Mangrove Swamps of Lagos Lagoon, Lagos, Nigeria. *Advances in Biological Research.* 2011; 5 (1): 08-21.
26. Mishra, S.R. and Saksena, D.N. Pollutional ecology with reference to physico- chemical characteristics of Morar (Kalpi) river, Gwalior (M.P.). *In: Current trends in limnology* (Ed. Nalin K. Shastree). Narendra Publishing House Delhi, India. pp. 1991; 159- 184.
27. Misra SG and Mani D. Soil Pollution efficient offset Printer ABC, New Delhi, India. 1991; 41: 6-42.
28. Muhammad, A., A. Salam, A. Azeem, M. Shafiq and B.A. Khan. Studies on the effect of seasonal variations on physical and chemical characteristics of mixed water from rivers Ravi and Chenab at union site in Pakistan. *Journal of Research* (*Science*). 2000; 11 (1): 11-17.
29. Mustapha, M. K. Limnological evaluation of the fisheries potentials and productivity of a small shallow tropical African reservoir. *Rev. Biol. Trop*. 2009; Vol. 57(4): 1093-1106.
30. Nagarathnamma and Ramamurthy. In vivo recovery of acetyl cholinesterase activity from methyl parathion induced inhibition in the freshwater teleost, *Cyprinus carpio*. *Curr.sci*. 1983; 52(2), 74-75.
31. Ndamitso, M. M, S. Idris, M. B. Likita, Jimoh. O. Tijani, A. I. Ajai and A. A. Bala M. Physico-chemical and Escherichia coli assessment of selected sachet water produced in some areas of minna, nigar state, Nigeria. *International Journal of water resources and Environment al Engineering.* March 2013; Vol 5 (3), pp. 134-140.
32. NEERI. Manual on water and waste water analysis. National Environmental Engineering Research Institute, Nagpur. 1986.
33. Otieno, D.S. (2008). Determination of Some Physicochemical Parameters of the Nairobi River, Kenya, *Journal Applied Science Environment Management*, 12(1), 57-62.
34. Okonko, I.O. Adejoye, O.D., Ogunnusi, T.A., Fajobi, E.A. & Shittu, O.B. Microbiological and physico-chemical analysis of different water samples used for domestic purposes in Abeokuta and Ojota, Lagos Nigeria. *African Journal of Biotechnology*. 2008; *7:* 617-621.
35. Pandey, Arun K. and G.C. Pandey. Physico-chemical characteristic of city sewage discharge into river Saryu at Faizabad - Ayodhya. Him. *J. Env. Zool*. 2003; 17:85- 91.
36. Parvateesam M and Mishra M (1993). Algae of Pushkar lake including pollution indicating forms. *Phycos* 32(1&2) 27-39.
37. Rajiv, P., H.A. Salam, M. Kamaraj, R. Sivaraj and R. Balaji, 2012. Comparative Physicochemical and Microbial Analysis of Various Pond Waters in Coimbatore District, Tamil Nadu, India. Annals of Biological Research, 3(7): 3533-3540.
38. Reddy, M., Murth, D. and Prakash, T. Quality of groundwater in Karnataka with special reference to nitrate, International workshop on Integrated Water Management, Bang lore University. 2001; pp.29.
39. Salam, A and S. M. Rizvi. *Semi. Aqua. Bio. Pakistan*. 1999; 17, 212.
40. Sami G. Daraigan, Ahmed S. Wahdain, Ahmed S. BaMosa, Manal H. Obid. "Linear Correlation Analysis Study of Drinking Water Quality Data for Al Mukalla City, Hadhramout, Yemen". *International Journal of environmental sciences*. 2011; Volume 1, No. 7.

41. Saxsena, M. M. Environmental analysis of water, soil and air. *Agro-botanical Publishers, India*. 1987.
42. Shinde, S.E., S. Pathan, K.S. Raut and D.L. Sonawane. (2011) Studies on the physico-chemical parameters and correlation coefficient of Harsool-savangi dam, District Aurangabad, India. *Middle-East Journal of Scientific Research*. 8 (3): 544-554.
43. Shrivastava S, Kanungo VK. Physico-Chemical Analysis of Pond Water of Surguja District, Chhattishgarh, India. *International Journal of Herbal Medicine*, 2013; 1(4): 35-43
44. Shyamala R, Shanthi M, Lalitha P. Physicochemical analysis of Borewell water samples of Telungupalayam Area in Coimbatore District, Tamilnadu, India. *E- Journal of Chemistry*. 2008; 5(4): 924-929.
45. Singh,R.K., N. P. Srivastava and V. R. Desai. *J. Inl. Fish Soc. India*. 1980; 12, 100.
46. Smith, S.V. and Hollibaugh, J. T. Coastal metabolism and the oceanic organic carbon balance, Reviews of Geophysics. 1993; 31, pp 75-76.
47. Smith, S.V. and Hollibaugh, J. T. Annual cycle and inter annual variability of ecosystem metabolism in a temperate climate embayment, Ecology/Ecological Monographs. 1997; 67, 509.
48. Sullivan, A.B., D.M. Synder and R.A. Stewart. Controls on biochemical oxygen demand in the upper Klamath River, Oregon. *Journal of Chemical Geology*. 2010; 269: 12-21.
49. Thirupathaiah M, Samatha CH, Chintha S. Analysis of water quality using physico-chemical parameters in lower manair reservoir of Karimnagar district, Andhra Pradesh. *International Journal of Environmental Sciences*. 2012; 3(1): 172-180.
50. Welch P. "Limnological methods. The Blankston Co., Philadelphia. Toronta, Wuhrmann, K 1938, Lake", Eutrophication and its Control. In Proc. Shiga Conference on Conservation and Management of World Environment. 1952; 26-37.
51. WHO. Guidelines for drinking water quality. World Health Organisation, Geneva, Switzerland. 1983.

***Corresponding Author:**
Anusiya devi, K*
Email: dranudevi@gmail.com