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SEASONAL DYNAMICS OF PRODUCTIVITY OF SULUR LAKE OF COIMBATORE DISTRICT, TAMIL NADU, INDIA IN RELATION TO TOTAL DISSOLVED SOLIDS, CHLORIDE AND MAGNESIUM

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ABSTRACT

The water quality parameters of Sulur Lake situated in Coimbatore District of Tamil Nadu (11˚ 01' 40" N and 77˚ 07'20" E) have been studied from July 2015 to July 2016. The present paper dealt with the seasonal variation of productivity and its relation to Total Dissolved Solids (TDS), Chloride and Magnesium. In the present study, Total Dissolved Solids of the six stations varied from 490 mg/l to 950 mg/l, Chloride ranges between 249.92 mg/l and 445.88 mg/l and Magnesium varied from 20.9 mg/l to 65.2 mg/l during the study period. Gross Primary Productivity (GPP) ranged from 1.3601 gC/m3/hr to 3.1736 gC/m3/hr, Net Primary Productivity (NPP) varied between 0.7556 gC/m3/hr and 2.8713 gC/m3/hr and Community Respiration (CR) varied from 0.1511 gC/m3/hr to 0.9067 gC/m3/hr. The data on the physico-chemical characteristics of this aquatic wetland revealed that this water body needs immediate and broad water quality monitoring and to find the remedial measures to improve this important water body in the study area. The mathematic relationships of these factors were analyzed using CURVEXPERT software and the significant relationships are expressed and their significance in the prediction of water quality is discussed

KEYWORDS: Sulur Lake, Productivity, Total Dissolved Solids, Chloride and Magnesium.

I. INTRODUCTION

Coimbatore, Indian Manchester is gifted with a unique spread of a number of wetland water bodies that store rain water, recharge ground water and provide shelter for a vast array of biodiversity. (Priyatharsini and Dhanalakshmi, 2016). Almost all the fresh water bodies are under great pressure from human population explosion and developmental activities in and around the wetland. Lake water has been used for agricultural and irrigation purposes and fish culturing by local farmers. These wetlands serve as a common reservoir of untreated industrial effluents, dumping of agricultural as well as municipal wastes bring more concern for the aquatic environment. (Manikandan *et al.*, 2016).The quality of water in any ecosystem provides significant information about the available resources for supporting life in that ecosystem. (Medudhula Thirupathaiah *et al.*, 2012). The health of lakes and their biological diversity are directly related to health of almost every component of the ecosystem. The lakes are also subjected to various natural processes taking place in the environment like the hydrologic cycle, with unprecedented developmental activities; human beings are responsible for choking several lakes to death. Storm water runoff and discharge of sewage into the lakes are a few of the common causes where various nutrients enter the aquatic ecosystems resulting in their death. (Pattusamy *et al*., 2013) Inappropriate management of water resources has resulted in their major shifts in the quantity and quality of water resources. Aquatic ecosystems have been recognized worldwide as extremely important and are sensitive to anthropogenic activities viz. urban, industrial and agricultural activities. (Abhijna, 2016). Earth is the only planet having about 70% of water. Due to increased human population, industrialization etc., it is highly polluted with different harmful contaminants. Therefore, it is necessary that the quality of drinking water should be checked at regular time interval, because due to the use of contaminated drinking water human population suffers from various water borne diseases. Water pollution is a serious problem in India as almost 70% of its surface water resources and a growing percentage of its groundwater reserves are contaminated by biological, toxic organic and inorganic pollutants. (Sagar *et al.*, 2015). Polluted surface waters cannot achieve a balanced ecosystem. Industrialization and urbanisation exhibit major impact on surface water environment in Coimbatore District, Tamil Nadu, India. Due to the developmental activities, both surface and subsurface water sources are getting polluted. Numerous textiles, automobiles, home appliances and small scale industries are located in Coimbatore. The effluents from these industries greatly disturb the quality of surface water. (Jeyaraj *et al*., 2016).

Enhanced population explosion, rapid rate of encroachments and increase in utilization of lake water for disposal and dilution of sewage etc., have not only deteriorated the water quality of lake but has also affected the biotic flora. Lakes and reservoirs hold a great promise as a source of freshwater. Unfortunately, these ecosystems are being neglected and destroyed in rural as well as in urban areas. The productivity of the lake was found to be influenced by some of the physical and chemical parameters of the lake water. In order to utilize freshwater bodies successfully for fish production, it is very important to study the physico -chemical factors which influence the biological productivity of the water body. (Archana Gupte and Nisar Shaikh, 2013).

There are several diseases have been identified among the human beings, which are caused by using contaminated water. Water borne disease infections occur during washing, bathing and consumption of contaminated water during food preparations. Therefore, it is necessary that the quality of water should be checked at regular time of interval because the financial losses due to water borne diseases have negative impact on the nation. Nowadays this is the major problem of developing countries throughout the world. (Dixit *et al.,* 2015). Water quality of urban water bodies are being changed over the time due to various reasons. Lakes are subject to various natural processes taking place in the environment, such as hydrologic cycle. With enormous developmental activities, human beings are responsible for the severe deterioration of several lakes. (Dharmasoma *et al*., 2014). The present study deals with the physico-chemical aspects of Sulur Lake. This study was designed to analyse the quality of lake water which is the main source of fish cultivation, agriculture and human consumption. The lake water is contaminated with hospital, industrial, sewage and agricultural wastes. In this present study, seasonal variations of productivity in relation to Total Dissolved Solids, Chloride and Magnesium were examined for a number of samples from six sampling sites at regular intervals during the study period. (July 2015 to July 2016)

II. MATERIALS AND METHODS

Study Area

Sulur Lake is one of the perennial, lentic and deep fresh water body lies 11º 01' 40" N latitude and 77º 07'20" E longitude. It is located 20 Kilometres away from Coimbatore. The lake is one of the biggest lake of Coimbatore and is fed by Noyyal River which is historically, ecologically and culturally significant river in Kongu region of western Tamil Nadu. The river originates in the Vellingiri and Poondi hills of the Western Ghats. The length of the bund of Sulur lake extends for about 1450 metres and water spread area of 0.332 Sq.Km. The catchment area is about 8.704 Sq. miles and the depth of the lake is 8.50 feet. The water of this reservoir is used for agricultural practices and fish cultivation. Six stations were selected for the present study.

Station 1: In this site, Water is stagnated and Some amount of surface runoff joins here.
Station 2: Fishermen used to catch fish with their shallops.
Station 3: People used to wash their belongings and all sorts of garbage thrown into the lake here.
Station 4: This site is located at the point where washing and bathing take place.
Station 5: Boating is conducted here as an entertainment for people.
Station 6: In this site, human activity is comparatively lesser.

Fig.1. Satellite view of Sulur Lake showing the location of six sampling sites.

Sampling and Analysis of Water

Water collection for the primary productivity investigation from Sulur lake was carried out for a period of 13 months from July 2015 to July 2016 by choosing six different sampling sites representing different regions of the lake. Water samples were collected from each sampling station at regular monthly intervals between 6 AM to 9 AM from the surface of the lake. The water samples for physico chemical examinations were collected separately from each spot in a clean plastic container of two litre capacity after rinsed well with the same lake water. Then, the plastic containers are closed tightly and carried immediately to the laboratory for the analysis. Along with Productivity, Total Dissolved Solids, Chloride and Magnesium in the water were estimated by the method suggested by Trivedi and Goel (1986) and APHA (1996).

Fig. 2. Shallops are stored for fishing by the fishermen in Sulur Lake.

Fig.3. Thick vegetation occupied at the bunds of the Sulur Lake. Myriad birds nest in the marshy lands of ***lake.***

III. RESULTS AND DISCUSSION

Total Dissolved Solids (TDS) are the total amount of mobile charged ions, including minerals, salts or metals dissolved in a given volume of water in mg/l. Total Dissolved Solids are directly related to the purity of water and the quality of water purification system and affects everything that consumes, lives in, or uses water, whether organic or inorganic, whether for better or for worse. (Sagar *et al*., 2015). High levels of TDS elevates the density of water which influences osmoregulation of fresh water organisms reducing the solubility of gases like oxygen and utility of water for drinking, irrigation and for industrial purposes. (Pattusamy et *al*., 2013) Water body exhibited high values of Total Dissolved Solids which is caused by the addition of huge quantities of sewage. High solids in water cause inferior potable quality of water. High level of TDS may aesthetically be unsatisfactory for bathing limits of quality standards. (Dhanalakshmi and Shanmugapriyan, 2013). In natural water, TDS is usually less than 500 mg/l. When it exceeds 500 mg/l water is unfit for drinking purposes. When the TDS is less than 300 mg/l the water is desirable for dyeing of clothes and manufacture of plastics, paper pulp etc. When the TDS is 1000 mg/l the water becomes tasteless. The maximum level of TDS tolerance limit is 2000 mg/l. (Pavender *et al*., 2016). In the present study, Total Dissolved Solids of the six stations varied from 490 mg/l to 950 mg/l during the study period. The minimum value of 490 mg/l is recorded in the month of September'15 in Stations 3 and 6.The maximum value of 950 mg/l was recorded in June'16 in station 6. Since, TDS is between 490 to 950 mg/l water is unfit for drinking purposes. The acceptable limit of TDS as per the Indian Standard- Drinking Water –Specification (ISI, 2004) is 500 mg/l, and the permissible limit is 2000 mg/l. Beyond this limit palatability decreases and may cause gastrointestinal irritation.(ISI, 2004).The high value of TDS may be due to the contamination of domestic sewage water, agriculture waste and other garbage. (Siva Manikandan and Ahmed John, 2016). The concentration of TDS at all sampling stations was relatively higher in the month of April'16, probably due to effluents from industrial units such as dyeing industries adjoining the lake. Low TDS indicates the water is less mineralized and comparatively with lesser pollutants. Durga Madhab Mahapatra *et al.*, (2011) also reported similar findings in Varhur Lake, Bangalore.

Chloride is a minor constituent of the earth's crust. The chloride in water has originated from natural resources and rain water. The natural water contains 100 mg/l of chloride when it becomes less than 100 mg/l is saline in taste. Suppose its contamination is high the water is used for agricultural purposes. The human can tolerate up to 300 – 400 mg/l of chloride content in water. (Pavender *et al.*, 2016). Presence of Chloride in water could be due to various sources like natural weathering of rocks, domestic waste and through artificial or natural chemical reactions. Salty taste of water is produced by Cl^- ions but the chemical composition and the abundance of some cations like Na^+, Ca^{++} and Mg^{++} in water generally govern the taste. (Pattusamy *et al.*, 2013). Chlorides occur in the form of salts of sodium, Potassium and Calcium in freshwater. Its concentration indicates the presence of high organic matter and hence the degree of pollution. (Kunduru Surender Reddy *et al.*, 2014). The Chloride concentration can be used as an important parameter for detection of contamination by sewage. High chloride content may harm metallic pipes and structures as well as growing plants. Chlorides in excess impact the salty taste to water and people not accustomed to high chloride are subjected to laxative effect. (Sajitha and Smitha Asok Vijayamma, 2016). High concentration of chloride during summer may be due to decomposition of organic matter. The chloride concentration is higher in organic wastes and its higher level in natural water is definite indication of pollution from domestic sewage. The ecological significance of chloride lies in its potential to regulate salinity of water and exert consequent osmotic stress on biotic communities. (Sankar Ganesh *et al.*, 2015). Chloride salts in water is indicative of pollution, especially of animal origin. (Praveen Mathur *et al.*, 2008). In the present study, Chloride content of the six stations varied from 249.92 mg/l to 445.88 mg/l during the study period. The minimum value of 249.92 mg/l is recorded in the month of December'15 in Stations 3 and 6. The maximum value of 445.88 mg/l was recorded in March'16 in station 2. The acceptable limit of Chloride as per the ISI is 250 mg/l, and the permissible limit is 1000 mg/l, beyond this limit taste corrosion and palatability is affected. High chloride content may cause corrosion and pitting of iron plates or pipes. The large quantity of chloride presence in the lake is mostly due to the use of high potash fertilizer by the cultivator, washing clothes, human and animal waste discharge. (Siva Manikandan and Ahmed John, 2016). High chloride values may be due to bathing activities and urination into the lake water. It may be due to domestic and other effluents joining them. The present findings are supported by Paul Kunwar Singh Rana (2016) in Mohan Ram Lake, Madhya Pradesh.

All natural water shows presence of magnesium but its level in a water body depends on catchment geology. (Archana Gupte and Nisar Shaikh, 2013). Decrease in the level of Magnesium reduces the phytoplankton population. (Sajitha *et al.*, 2016). Magnesium ions contribute to the hardness of water along with calcium and other ions. (Deepa *et al.*, 2016). In the present study, Magnesium content of the six stations varied from 20.9 mg/l to 65.2 mg/l during the study period. The minimum value of 20.9 mg/l is recorded in the month of May'15 in Station 1. The acceptable limit of Magnesium as per the ISI is 30 mg/l, beyond this limit encrustation in water supply structure and adverse effects on domestic use may be the result. The maximum value of 65.2 mg/l was recorded in September'15 in station 1. Srinivas *et al.*, (2017) reported similar results in Manair Dam, Telangana.

Table: 1. Primary Production in relation to Certain Physico-chemical Factors in Sulur

Parameters	July '15	Aug'15	Sep '15	Oct '15	Nov'15	Dec '15	Jan '16	Feb '16	Mar '16	Apr '16	May'16	June '16	July '16
TDS (mg/l)	730	730	670	680	630	650	670	780	800	930	840	860	760
Chloride (mg/l)	338	315	289	272	259	252	337	367	444	421	362	335	343
Magnesium (mg/l)	61.8	57.0	65.2	61.8	49.2	60.4	61.8	42.3	48.7	36.0	20.9	25.3	34.1
GPP	1.36	2.4	2	1.6	2.7	2.3	2.42	3.17	2.56	2.87	1.81	1.81	1.51

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(gC/m3/hr)													
NPP (gC/m3/hr)	1.2	1.9	1.5	1.1	1.81	1.9	2.27	2.87	2.26	1.96	1.05	1.05	1.05
CR (gC/m3/hr)	0.15	0.45	0.5	0.6	0.9	0.3	0.15	0.3	0.3	0.9	0.75	0.75	0.45

Lake Station-1 (July'15 to July'16)

Table: 2. Primary Production in relation to Certain Physico-chemical Factors in Sulur

Parameters	July '15	Aug'15	Sep '15	Oct '15	Nov'15	Dec '15	Jan '16	Feb '16	Mar '16	Apr '16	May'16	June '16	July '16
TDS (mg/l)	730	740	670	680	640	640	650	770	910	920	840	880	750
Chloride (mg/l)	335	308	285	271	259	251	335	364	445	423	360	332	340
Magnesium (mg/l)	59.9	45.3	54.5	63.3	55.5	46.2	57.9	43.8	49.2	35.5	22.9	22.9	34.1
GPP (gC/m3/hr)	2.7	3.1	1.6	1.9	2.1	1.9	2.1	3.0	2.1	2.1	1.6	1.9	1.6
NPP (gC/m3/hr)	2.2	2.7	1.36	1.66	1.2	1.05	1.8	2.8	1.6	1.2	1.05	2.0	1.20
CR (gC/m3/hr)	0.45	0.45	0.30	0.30	0.90	0.90	0.30	0.15	0.45	0.90	0.60	0.75	0.60

Lake. Station-2. (July'15 to July'16)

Table: 3. Primary Production in relation to Certain Physico-chemical Factors in Sulur

Parameters	July '15	Aug '15	Sep '15	Oct '15	Nov '15	Dec '15	Jan '16	Feb '16	Mar '16	Apr '16	May'16	June '16	July '16
TDS (mg/l)	750	750	490	670	650	640	640	780	910	930	860	900	740
Chloride (mg/l)	335	299	281	268	258	249	336	366	434	420	333	333	342
Magnesium (mg/l)	58.4	45.3	60.9	58.9	57.0	50.1	44.3	42.8	49.2	35.0	26.8	23.3	35.5
GPP (gC/m3/hr)	1.81	2.26	1.96	2.56	1.66	2.11	2.72	1.66	1.36	2.11	1.81	1.96	2.56
NPP (gC/m3/hr)	1.05	1.96	1.37	2.11	1.05	1.36	2.11	1.20	0.75	1.20	1.20	1.20	1.81
CR (gC/m3/hr)	0.75	0.80	0.59	0.45	0.60	0.75	0.60	0.45	0.60	0.90	0.60	0.75	0.75

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Lake Station-3. (July'15 to July'16)

Table: 4. Primary Production in relation to Certain Physico-chemical Factors in Sulur

Parameters	July '15	Aug'15		Sep '15	Oct '15	Nov'15	Dec '15	Jan '16	Feb '16	Mar '16	Apr '16	May'16	June '16	July '16
TDS (mg/l)	750	750		890	670	650	650	650	770	920	920	840	940	750
Chloride (mg/l)	329	301		278	265	257	252	335	363	427	418	363	337	343
Magnesium (mg/l)	59.4	61.3		57.9	56.0	54.5	45.3	34.1	41.4	49.2	35.5	26.8	22.4	36.0
GPP (gC/m3/hr)	2.87	2.87		2.41	2.26	1.66	2.56	1.66	2.26	2.56	1.96	2.41	2.56	1.96
NPP (gC/m3/hr)	2.26	2.56		2.11	1.81	1.05	1.96	1.20	1.51	2.11	1.05	1.81	1.96	1.20
CR (gC/m3/hr)	0.60	0.30		0.30	0.45	0.60	0.60	0.45	0.75	0.45	0.90	0.60	0.60	0.75

Lake Station-4. (July'15 to July'16)

Table: 5. Primary Production in relation to Certain Physico-chemical Factors in Sulur

Parameters	July '15	Aug '15	Sep '15	Oct '15	Nov '15	Dec '15	Jan '16	Feb '16	Mar '16	Apr '16	May'16	June '16	July '16
TDS (mg/l)	870	900	670	680	640	620	640	760	900	910	860	920	770
Chloride (mg/l)	316	298	276	264	252	251	337	366	428	421	363	336	345
Magnesium (mg/l)	57.5	56.5	56.0	57.5	53.1	57.5	34.1	42.3	50.1	36.5	27.7	24.3	35.5
GPP (gC/m3/hr)	2.56	3.02	2.41	1.66	2.56	3.17	1.96	2.26	1.66	2.56	1.96	2.12	1.96
NPP (gC/m3/hr)	2.40	2.87	2.11	1.20	1.51	2.41	1.20	1.36	1.20	1.36	1.20	1.0	1.05
CR (gC/m3/hr)	0.30	0.15	0.30	0.45	0.75	0.75	0.75	0.90	0.45	1.20	0.75	0.90	0.90

Lake Station-5. (July'15 to July'16)

Table: 6. Primary Production in relation to Certain Physico-chemical Factors in Sulur

Parameters	July '15	Aug'15	Sep '15	Oct '15	Nov'15	Dec '15	Jan '16	Feb '16	Mar '16	Apr '16	May'16	June '16	July '16
TDS (mg/l)	770	860	490	670	650	640	620	740	840	920	840	950	760
Chloride (mg/l)	308	295	274	261	254	249	336	363	437	423	360	337	342
Magnesium (mg/l)	58.4	55.5	54.5	55.5	51.6	55.5	31.6	41.4	47.7	38.0	25.3	23.8	35.5
GPP (gC/m3/hr)	2.87	3.17	2.11	1.96	2.56	2.72	2.41	2.41	1.96	2.87	2.11	2.26	2.11

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NPP (gC/m3/hr)	2.41	2.87	2.11	1.66	1.36	2.11	2.11	2.11	1.81	1.96	1.36	2	1.20
CR (gC/m3/hr)	0.15	0.30	0.45	0.30	0.75	0.60	0.30	0.30	0.15	0.90	0.75	0.60	0.90

Lake Station-6. (July'15 to July'16)

Primary productivity is the major component for the fish production and the potential of fish production can be estimated by primary production. Primary production is influenced by biotic as well as abiotic interactions. (Sachin kumar Patil and Patil, 2015). Gross primary productivity is the total rate of photosynthesis including the organic matter used in respiration during the measurement period. It is also referred to as total (gross) photosynthesis or total assimilation.Net primary productivity is the rate of storage of organic matter in plant tissues in excess of the respiratory utilization by plants during the measurement period. It is the rate of increase of biomass and is also known as apparent photosynthesis or net assimilation. (Ramesh and Lekeshmana swamy, 2013). Primary production was integrated not only by seasonal variation but also nutrient content, eutrophication, stratification and agricultural runoff, domestic and industrial effluent similarly anthropogenic activities. (Chougule *et al.*, 2016). Productivity of the Lake depends on the presence of plankton biomass. Primary production is an essential biological event in the aquatic ecosystem in which phytoplankton act their physiological activities as a primary producer, chemical characters of the water body. Primary productivity has been estimated by light and dark bottle method. (Trivedi and Goel, 1986)

GPP ranges from 1.3601 gC/m3/hr to 3.1736 gC/m3/hr. The minimum value of 1.3601 gC/m3/hr was recorded in March'16 - station 3. The highest value of 3.1736 gC/m3/hr was recorded in August'15 - station 2 and 6. NPP varied between 0.7556 gC/m3/hr and 2.8713gC/m3/hr. The least value of 0.7556 gC/m3/hr was recorded in March'16 - station 3 and the highest value of 2.8713 gC/m3/hr was recorded in August'15 - station 5 and 6; February'16 - station 1 and 2. CR varied from 0.1511 gC/m3/hr to 0.9067 gC/m3/hr. CR varied from the lowest value of 0.1511 gC/m3/hr in July'15 - station1 and 6; August'15 - station 5; January'16 - station 1; February'16 - station 2; March'16 - station 5. The highest value of 0.9067 gC/m3/hr is recorded in November'15 - station 1 and 2; December'15 - station 2; February'16 - station 5; April'16 - station 1,2,3,4 and 6; June'16 - station 5, July'16 - station 5.

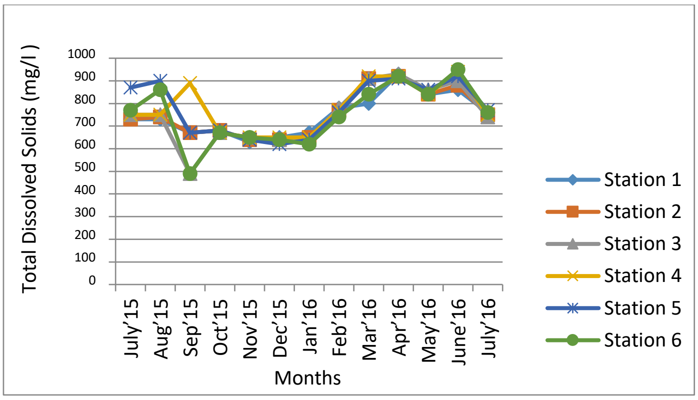

Fig. 4. Seasonal variations of Total Dissolved Solids during the period of investigation. (July'15-July-16).

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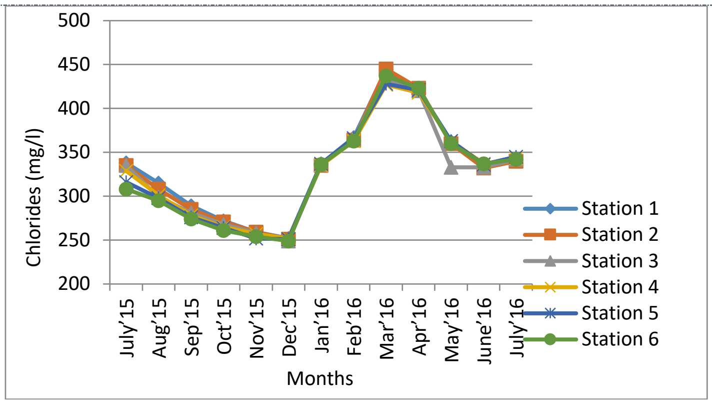

Fig. 5. Seasonal variations of Chlorides during the period of investigation. (July'15-July-16).

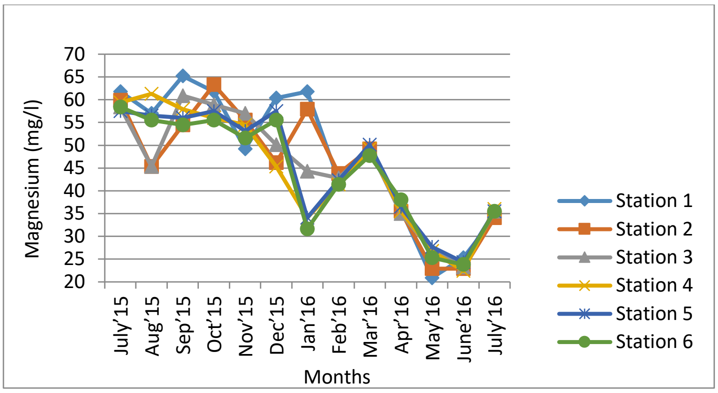

Fig.6. Seasonal variations of Magnesium during the period of investigation. (July'15-July-16).

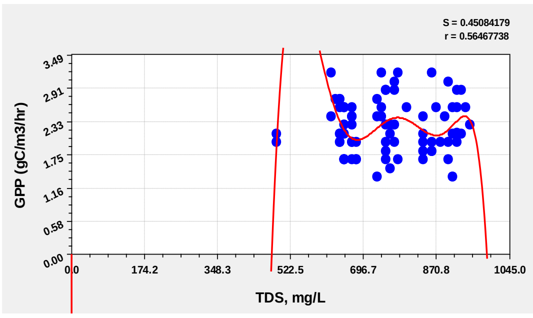

Fig.7. Polynomial fit showing the mathematical relationship between TDS and GPP.

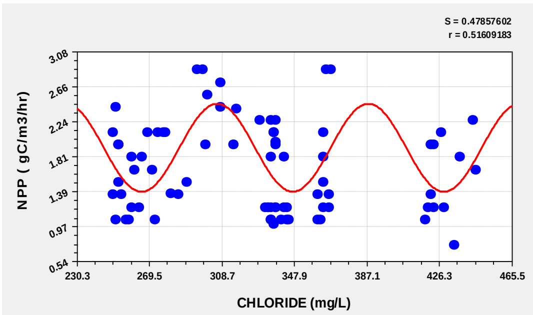

Fig.8. Sinusoidal fit showing the mathematical relationship between Chloride and NPP.

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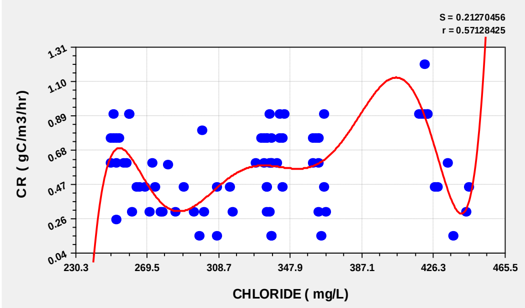

Fig.9. Polynomial fit showing the mathematical relationship between Chloride and CR.

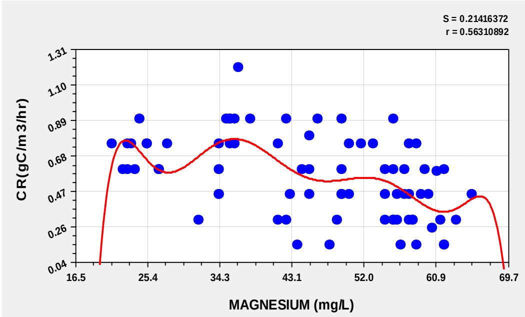

Fig.10. Polynomial fit showing the mathematical relationship between Magnesium and CR.

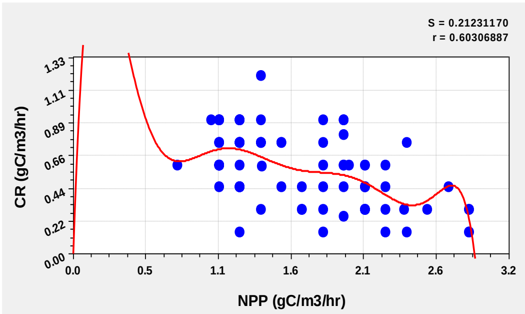

Fig.11. Polynomial fit showing the mathematical relationship between NPP and CR.

The Gross Primary Productivity was found to have significant correlation with Total Dissolved Solids (r = 0.5646), and Community Respiration with Chloride (r = 0.5712) and Magnesium (r = 0.5631), Net Primary Productivity with Community Respiration (r = 0.6030) among the different parameters recorded. Among these parameters TDS with GPP "As shown in Figure - 7", Chloride with CR "As shown in Figure -9", Magnesium with CR "As shown in Figure - 10", NPP with CR " As shown in Figure - 11" showed polynomial fit and the relationships can be expressed as follows

$TDS = 3.19149 - 18.0673\ GPP + 0.1501\ GPP^2 - 0.0005\ GPP^3 + 9.2712\ GPP^4 - 9.3174\ GPP^5 + 4.9475\ GPP^6 - 1.0851\ GPP^7$

$Chloride = -23783.255 + 439.5715\ CR - 3.1837\ CR^2 + 0.0103\ CR^3 - 6.4265\ CR^4 - 6.0394\ CR^5 + 1.9875\ CR^6 - 2.5656\ CR^7 + 1.2553\ CR^8$

$Magnesium = -862.2436 + 181.5746\ CR - 16.2728\ CR^2 + 0.8117\ CR^3 - 0.0246\ CR^4 + 0.0004\ CR^5 - 5.4397\ CR^6 + 3.5317\ CR^7 - 9.8353\ CR^8$

$NPP\ with\ CR = -8.0165 + 28.0254\ CR - 131.1853\ CR^2 + 262.4829\ CR^3 - 281.8009\ CR^4 + 174.8178\ CR^5 - 62.8028\ CR^6 + 12.1328\ CR^7 - 0.9751\ CR^8$

Net Primary Productivity with Chloride (r = 0.5160) showed sinusoidal fit "As shown in Figure - 8" and the expression can be written as

$Chloride\ with\ NPP = 1.9258 + 0.5326 * \cos(0.0768Cl - 4.66473)$

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The results clearly suggest that the Productivity can be an appropriate and easy index to predict the Total Dissolved Solids, Chloride as well as the Magnesium of water. Investigations of this non linear derivations should be made in different types of ecosystem with different characteristics for deriving a universal non linear equation for predicting such parameters.

IV. CONCLUSION

Biodiversity is rightly considered as an index of sound health of habitat and a strong base of better evolution. The overall productivity of the water body is directly regulated by physico-chemical and biological parameters. The Lake is an aquatic ecosystem for an appropriate growth, development, reproduction and survival of fauna and flora, there is desirable need to examine the quality of water at regular intervals. Therefore, rapid and reliable monitoring measures are essential for keeping a close watch on water quality and environment of this lake. A necessary step has to be taken to manage the proper waste disposal. Despite of some conservation efforts made by the authorities this lake is threatening immeasurably. Continuous monitoring of lakes should be enacted properly as from the origin point to the end to overcome these situations. This monitoring also helps in keeping the connectivity of lakes conscious. The lake water being used by local residents for drinking and agricultural purposes. There are fears that due to pollution, the numbers of the myriad birds in the lake may decline. There are allegations that untreated effluent is let into the lake. The study is quite useful in further investigation and in improvement of quality of the lake water.

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VI. REFERENCES

[1] Abhijna U.G., 2016. Monitoring and Assessment of a eutrophicated coastal lake using multivariate approaches. Global J. Environ. Sci. Manage., 2(3):275-288.
[2] APHA (1996). Standard Methods for the Examination of Water and Waste Water. 19th Edition. American Public Health Association. Washington. D.C., U.S.A.
[3] Archna Gupte and Nisar Shaikh. (2013). Seasonal variations in Physico–chemical Parameters and Primary Productivity of Shelar Lake Bhiwandi, Thane, Maharashtra. Universal Journal of Environmental Research and Technology.Vol.3, Issue 4:523-530.
[4] Chougule S.H. Darekar P.V. and Kumbhar A.C. (2016). Seasonal variation in primary productivity of Patil Lake of Tahsil, South Solapur, Maharashtra. Biological Science. Vol.5, Issue.6
[5] Deepa P, Raveen R., Venkatesan P., Arivoli S. and Samuel T, 2016. Seasonal Variations of Physicochemical parameters of Korattur Lake, Chennai, Tamil Nadu, India. International Journal of Chemical Studies, 2016. Vol. 4(3): 116-123.
[6] DhanaLakshmi V. and R.ShanmugaPriyan (2015). Qualitative Analysis of Drinking Water in Pollachi, Coimbatore, Tamil Nadu, India. International Journal of Science and Research. Vol.4. Issue 10.
[7] Dharmasoma U.Y.I.L., Ranjana U.K.Piyadasa (2014). An Assessment of Seasonal Water Quality Variation in the Inlets of Diyawanna Lake, Sri Lanka. SAITM Research Symposium on Engineering Advancements.
[8] Dixit A.K., S.K.Pandey, R.Mehta, Niyaz Ahmad, Gunjan and Jyothi Pandey (2015). Study of Physicochemical parameters of different pond water of Bilaspur District, Chattishgarh, India. Environmental Skeptics and Critics. 4(3): 89-95.
[9] Durga Madhab Mahapatra, H.N.Chanakya and T.V.Ramachandra, 2011. Assessment
[10] of treatment capabilities of Varthur Lake, Bangalore, India. Int. J. Environmental
[11] Technology and Management, Vol.14, Nos.1/2/3/4,2011.
[12] Indian Standard – Drinking Water – Specification (Second Revision ICS 13.060.20) 10500. Bureau of Indian Standards, 2004. New Delhi.
[13] Jeyaraj M., K.Ramakrishnan, A.Jai Anandhi, S.Arunachalam and P.N.Magudeswaran. (2016). Investigation of Physico- chemical and Biological Characteristics of Various Lake Water in Coimbatore District, Tamil Nadu, India. Oriental Journal of Chemistry.Vol.32, No (4), 2087-2094.
[14] Kunduru Surender Reddy, Rezene Habtae, Bixapathi, Manjula, Devarajam, 2014. Studies of some physico-chemical parameters of selected fresh water Lakes in Andhra Pradesh, India. Journal of Bioscience and Technology, Vol.5 (6). 2014, 582-590.

ISSN: 2277-9655
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[15] Manikandan R., Ezhili N., Muthulakshmi Andal., Paulo J.C. Favas, Venkatachalam P., 2016. Assessment of Physico-chemical Characteristics and the Level of Nutrient Contents as well as Heavy Metal Ions in Waters Of Three Lakes at Coimbatore, Tamil Nadu, India. J. Mater. Environ. Sci.7(7). 2259-2266.
[16] Medudhula Thirupathaiah, Ch.Samatha and Chintha Sammaiah (2012). Analysis of water quality using physico-chemical parameters in lower Manair Reservoir of Karimnagar District, Andra Pradesh. International Journal of Environmental Sciences, Vol.3 No. 1.
[17] Pattusamy V., N. Nandini, M.Vijay Kumar and K.Bheemappa (2013). Water Quality Studies of Bellandur Lake, Urban Bangalore, Karnataka, India. International Journal of Advanced Research (2013), Vol.1, Issue 4, 77-82.
[18] Pavendar .T, D.Yuvaraj , P.Alaguraja and D.Deepika. (2016). Characteristics of surface Water Quality – A Case Study in Coimbatore City Corporation, Tamil Nadu. Ijsrm. Human. Vol.4, Issue.4.
[19] Paul Kunwar Singh Rana, (2016). Physico-chemical study of Mohan Ram Lake,
[20] Shahdol. (M.P) International Journal of Applied Research. 2(1): 239-241.
[21] Praveen Mathur, Saurabh Agarwal and Mudita Nag (2008). Assessment of physico– chemical Characteristics and Suggested Restoration Measures for Pushkar Lake, Ajmer, Rajasthan, India. Proceedings of Taal 2007: The 12th World Lake Conference: 1518-1529.
[22] Priyatharasini P. and B. Dhanalakshmi (2016). Piscine Diversity of Coimbatore Wetlands, TamilNadu, India. International Journal of Fisheries and aquatic Studies. Vol. 4(4):280-285.
[23] Ramesh J. and M. Lekeshmanaswamy (2013). Studies on the primary productivity of the Pykara Dam, Nilgris, Tamil Nadu, India. Indian Journal of Natural Sciences. Vol.3/Issue/19.2013.
[24] Sachin kumar R. Patil and S.S.Patil, 2015. Seasonal changes in primary production at water reservoirs of Ajara Tahsil from Kolhapur District, M.S. India. European Academic Research. Vol.2, Issue.12.
[25] Sagar. S.S., R.P. Chavan, C.L. Patil, D.N. Shinde and S.S. Kekane (2015). Physico – chemical parameters for testing of water – A review. International journal of chemical studies. 3(4). 24-28. 20.
[26] Sajitha V. and Smitha Asok Vijayamma, (2016).Study of Physicochemical Parameters and Pond Water Quality Assessment by using Water Quality Index at Athiyannoor Panchayat, Kerala, India. Emer Life Sci. Res. 2(1):46-51.
[27] Sankar Ganesh K., R. Lawrence Xavier, M. Nagarajan and P. Sundara Moorthy. Physico-chemical Properties of Sri Sanishwaran Temple Pond Water, Tirunallar. World Scientific News. 21 (2015) 1-11.
[28] Siva Manikandan P. and S.Ahmed John (2016). Physical and chemical analysis of Mullai Periyar River water in Theni District, Tamil Nadu, India. Int. J.Curr.Microbiol. App. Sci. Vol.5,2(2016) pp.173-180.
[29] Srinivas C., Y. Seeta and P. Manikya Reddy (2017). Studies on Algal Diversity in
[30] Lower Manair Dam, Karimnagar, Telengana, India. J. Algal Biomass Utln. 8(2): 11-15.
[31] Trivedi R.K. and Goel P.K. 1986 Edition. Chemical and Biological methods for water pollution studies. Environmental publications, Karad, Alligarh.a.

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