

**PHYSICO-CHEMICAL ASSESSMENT OF PARDESWADI LAKE****WALUJ M. I. D. C. AURANGABAD (M. S.) INDIA****V. T. Kamble<sup>1\*</sup> and C. A. Jawale<sup>2</sup>**<sup>1</sup>Dept. of Zoology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.<sup>2</sup>Shri Madhavrao Patil Mahavidyalaya, Murum, Tq. Omerga, Dist. Osmanabad.Article Received on  
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DOI: 10.20959/wjpps20194-13428**\*Corresponding Author.****V. T. Kamble**Dept. of Zoology, Dr.  
Babasaheb Ambedkar  
Marathwada University,  
Aurangabad.**ABSTRACT**

Nature has gifted life with most precious commodity, which is water. Life is sustained by water. In the present study. Measurements of various water quality parameters play the key role in detecting the status of pollution and suitability of particular water body for various aquatic organisms and agricultural products. The present study was conducted to measure the various physico-chemical parameters of the Pardeswadi lake, at Ramrai, Jogeshwari and Kamlapur in M.I.D.C. area, Waluj Aurangabad, Maharashtra, India. The present investigation deal with the study of seasonal variations of physic-chemical characteristics of water. The study was conducted for one years from

March 2015 to February 2016. Water samples from pardeswadi lake were collected monthly and analyzed for different parameters like atmospheric temperature, water temperature, PH, Electrical conductivity, DO, BOD, COD etc.

**KEYWORDS:** Physico-chemical parameters, Water Pollution, Pardeswadi lake.**INTRODUCTION**

Water quality of the freshwater habitats provides substantial information about the existing resources which depends on the influences of physico-chemical parameter. Expanding human population brought about by the opportunities of good water supply, irrigation, fish production recreation and navigation offered by reservoirs has put enormous pressure and stress on the quality of water impounded by the reservoir. Due to unplanned management, industrial developmental work, agricultural activity, public sewage and other anthropogenic activity, water quality and biotic resources of river, lakes, reservoirs and other water bodies

are continuously deteriorating.<sup>[1]</sup> The impact of human activities in and around the reservoir is felt on the unique physical and chemical properties of water on which the sustenance of fish that inhabit the reservoir is built as well as to the functions of the reservoir. Water quality is determined by the physical and chemical limnology of a reservoir.<sup>[2]</sup> Water quality is the characteristics of water which influence its beneficial use as well as the sustainability of ecosystem. Water resources are of critical importance to both natural ecosystem and human development. The quality of water in any ecosystem provides significant information about the available resources for supporting life in that ecosystem and the suitability for human use. Good quality of water resources depends on a large number of physico-chemical parameters and biological characteristics. The reservoir serves as a rich source of water supply for irrigation, drinking, hydroelectric power generation and fish culture. The water of the reservoir should fulfill the quality required for human use as well as for the sustainability of the ecology.<sup>[3]</sup> It has deteriorated the health of these lakes owing to the discharge of untreated sewage waters from the nearby settlements into them. Hence assessment of water quality is very essential to control surface water pollution.<sup>[4]</sup> The use of the physico-chemical properties of water to assess water quality gives a good impression of the status, productivity and sustainability of such water body. The changes in physical characteristics like temperature, and chemical elements of water such as dissolved oxygen, chemical oxygen demand, provide valuable information on the quality of the water.<sup>[5]</sup> The optimum level suitable for growth of aquatic plants and animals in Pardeswadi lake. Lakes are the small aquatic ecosystems and are generally located near human civilization, due to this reason these lakes are mostly influenced by the human activities which in turn pollute them. Most of the time all the domestic waste, agricultural runoffs, sewage is drained in these lakes which elevates the causing pollution.<sup>[6]</sup> Various factors like water temperature, PH, E C, DO, COD and BOD, etc plays an important role for the growth of plants and animals in the water body. The biological oxygen demand (BOD) and the chemical oxygen demand (COD) indicates the level of pollution of a given water body. Hence physico -chemical parameters of this lake were studied for 12 month during year Feb. 2015-Jan. 2016 with respect to pollution.

## MATERIALS AND METHODS

### Study Area

The Pardeswadi lake is 0.5km from Ramrai (Pardeswadi) village to West, 0.5 km from Jogeswari to North, 1.0 km from Kamlapur to East, and 1.5 km from WALUJ(Aurangbad-Pune highway) to South and about 22 km from Aurangabad city. The present study was done

for the lake which is situated in WALUJ MIDC, AURANGABAD area and its geographical coordinates are 19°54' 0" North, and 79°29' 0" East.<sup>[6]</sup>

### Sampling

Water samples for the estimation of physico-chemical parameters were collected monthly from four different sites A, B, C, and D during different seasons (winter, summer and monsoon) over a period of one year from February 2015 to January 2016. Sample collection was done during morning hours between 09.00 a.m. to 11.30 a.m. and brought to laboratory for further analysis. Water samples were collected in plastic jerry canes. Parameters like temperature, pH were estimated on the spot while samples for dissolved oxygen(DO) and biological oxygen demand(BOD) estimation were collected in BOD bottles. DO was fixed on the spot and other parameters were analyzed in the laboratory as per standard methods prescribed by.<sup>[7,8]</sup>

## RESULTS AND DISCUSSION

### Temperature

Temperature is basically important for its effect on the chemical and biological reaction of the organisms in water. It affects many chemical and biological parameters.<sup>[9]</sup> In the present investigation maximum 31.5°C was recorded in summer and minimum 27.75°C in winter (Fig.1). Temperature is one of the important parameter which regulates the overall environment of the aquatic ecosystem. Similar temperature fluctuations were also observed by.<sup>[10,11]</sup>

Temperature has an appreciable effect on dissolved oxygen and biological oxygen demand and the aquatic organism in water body.<sup>[12]</sup>

### pH

pH is the intensity of the acidic or basic character of a solution at a given temperature. pH is the negative logarithm of hydrogen ion concentration ( $\text{pH} = -\log [\text{H}^+]$ ). The pH of water samples range from 7.0 to 7.85 and stated that the pH of water is important for the biotic communities as most of the plants and animal species can survive in narrow range of pH from slightly acidic to slightly alkaline condition.<sup>[6,13]</sup> In the present study the highest pH 9.387 was recorded at sampling station 'B' in the monsoon (Fig.2). The minimum pH 8.55 was found at the station 'C'. The values of pH are shown in table.1 Most of the waters are slightly alkaline due to presence of carbonate and bicarbonate indicating alkaline nature of water

body.<sup>[14]</sup> pH is the scale of intensity of acidity and alkalinity of water and measures the concentration of hydrogen ions.<sup>[15]</sup>

### **ELECTRICAL CONDUCTIVITY**

Electrical conductivity is measure of water capacity to convey electric current. It signifies the amount of total dissolved salt.<sup>[27]</sup> Electrical conductivity is a good and rapid measure of the total dissolved solids. Conductivity of water varies directly with the temperature and is proportional to its dissolved mineral matter content. In the present investigation, the highest EC was 5.22 micro S/cm encountered on sampling station 'B' in monsoon. The lowest record of 1.90 micro S/cm was observed on the sampling station 'B' in winter (Fig. 3). Most dissolved inorganic substances present in the water are in ionized form and contribute electrical conductivity.<sup>[21]</sup>

### **Total Hardness**

In the present investigation the highest value recorded was 340.5 mg/l at station B. The lowest value recorded was 162.75 mg/l at station C (Fig.4). The maximum amount of total hardness in water of pardeswadi lake was recorded during summer season and minimum amount was recorded during winter. The total mass of organism is greater in hard water lakes while medium lakes hold a greater variety of living organism.<sup>[22]</sup>

### **Chloride**

The chloride in drinking water originates from natural sources, sewage and industrial effluents, urban runoff containing de-icing salt and saline intrusion.<sup>[13]</sup> In the present study the highest value recorded 24.875 mg/l at station A in winter. The lowest value recorded 19.975 mg/l at station C in monsoon (fig.5). The maximum amount of chloride in water of pardeswadi lake was recorded during winter season and minimum amount was recorded during monsoon. Human body release very high quantity of chlorides through urine and faeces. The chloride concentration was used as an important parameter for detection of contamination by sewage.<sup>[16]</sup> Higher chloride values are the indicator of pollution due to organic waste was stated by.<sup>[17]</sup> Higher chloride content was considered as an index of water pollution.<sup>[24,25,26]</sup>

### **Dissolved Oxygen**

The values of dissolved oxygen reported during the studies for one year ranged in between 3.65 mg/L at B site to 6.575 mg/L at site A (Fig.6). The maximum amount of dissolved

oxygen in water of pardeswadi lake was recorded during winter season and minimum amount was recorded during summer as shown in (fig. 6). Similar results were also reported by.<sup>[18]</sup> Highest values of dissolved oxygen coincides with the highest temperature. Dissolved oxygen has immense relation with pH value supported by.<sup>[19]</sup>

### COD

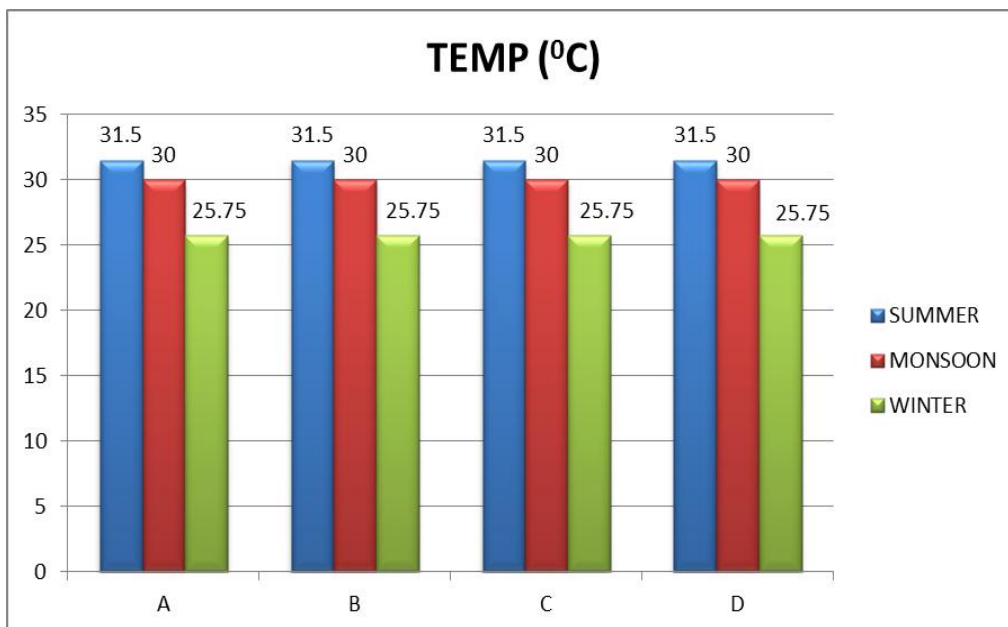
In the present study, the chemical oxygen demand (COD) values ranged from 96.25mg/L at site C in winter to 410 mg/L at site D in winter (Fig.7). The domestic sewage and industrial waste are main factors responsible for increase in COD values which they studied in Yamuna river.<sup>[20]</sup> The high COD values are found mainly in water, which may be due to the mixing of domestic and industrial waste. The level of COD seems to be the appropriate indices for assessing the pollution level of the water body.<sup>[28]</sup>

### BOD

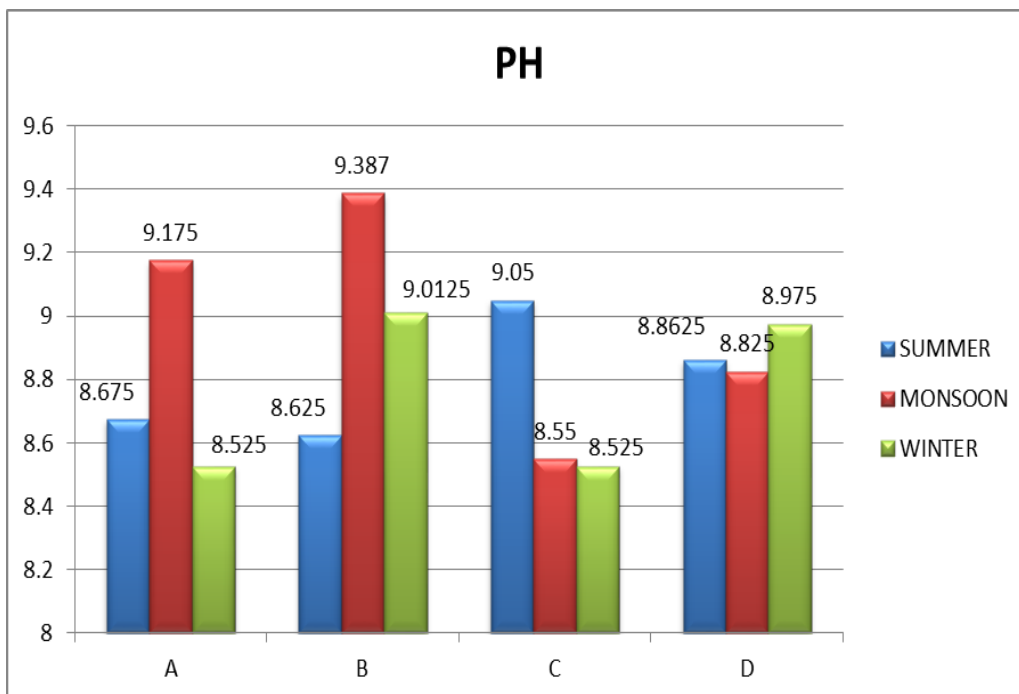
Biochemical Oxygen Demand is nothing but the amount of oxygen utilized by microorganism to stabilized the organic matter.<sup>[23]</sup> The total amount of oxygen used by microbes to breakdown the organic material in aquatic ecosystem is called biochemical oxygen demand. The biochemical oxygen demand values showed very little fluctuation throughout the year. The values ranged from 36.75 mg/L. at site C in monsoon to 62.75 mg/L at site B in monsoon to during the study year 2015-2016 (Fig.8). These higher values of BOD are may be due to heavy civilization and increased inflow of organic matter as well as domestic sewage in the water body.

**Table 1: Seasonal Variation of Physico-chemical parameters of PARDESWADI Lake in the year 2015-2016.**

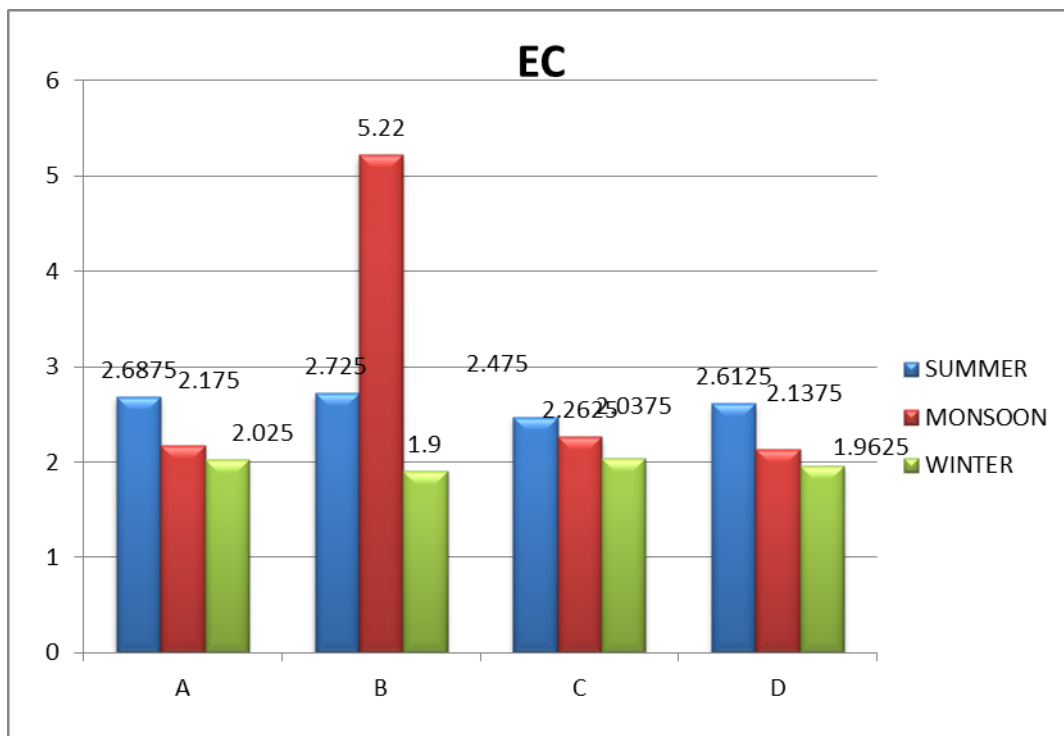
SITE	Parame-ter	TEMP °C	PH	E C micro S/cm	Chloride mg/l	T H mg/l	DO mg/l	COD mg/l	BOD mg/l
	Season								
A	Summer	31.5	8.675	2.6875	24.675	265	4	143.75	41
	Monsoon	30.00	9.175	2.175	22.275	197.5	4.675	207.5	55.75
	Winter	25.75	8.525	2.025	24.875	225.5	6.575	183.75	42.75
B	Summer	31.5	8.625	2.725	22.85	340.5	3.65	136.25	43
	Monsoon	30.00	9.387	5.22	22.125	190.25	5.25	215	62.75
	Winter	25.75	9.0125	1.90	22.90	249	6.325	202.5	43.5
C	Summer	31.5	9.05	2.475	20.2	283.25	3.7	175	56.25
	Monsoon	30.00	8.55	2.2625	19.975	236	4.9	97.5	36.75
	Winter	25.75	8.525	2.0375	20.75	162.75	6.125	96.25	56.75
D	Summer	31.5	8.8625	2.6125	21.6125	320	4.175	332.5	58.75
	Monsoon	30.00	8.825	2.1375	21.525	168.5	5.4	126.25	43
	Winter	25.75	8.975	1.9625	21.45	219.25	6.425	410	62.5



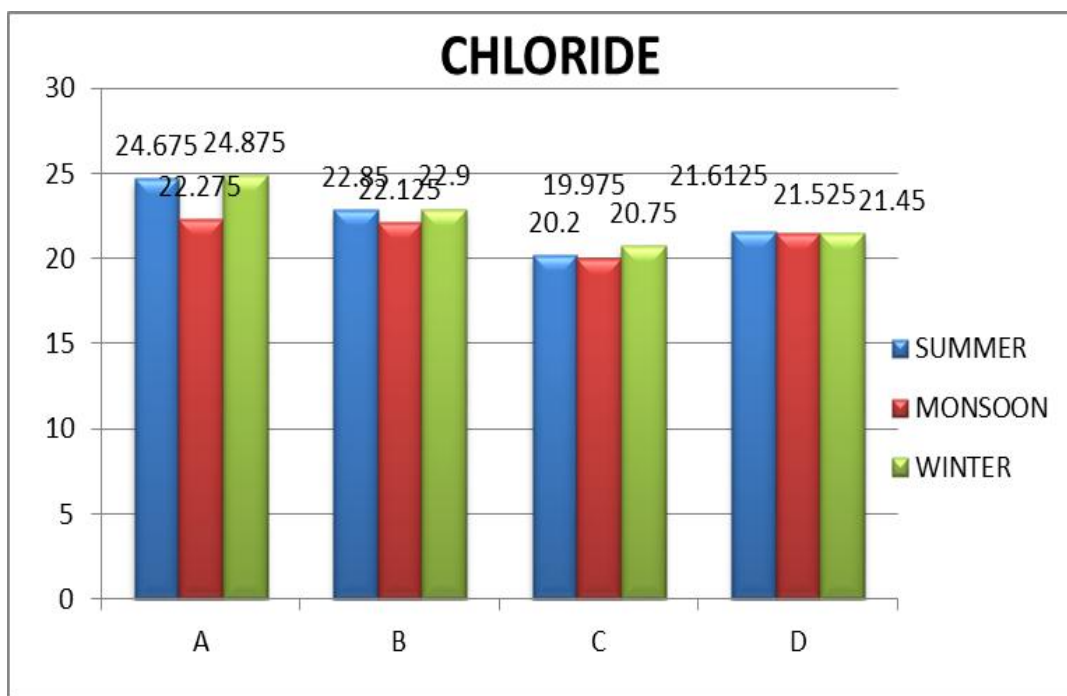
**Fig. 1: Seasonal variation in temperature °C at different sampling stations during Feb.15-Jan.16.**



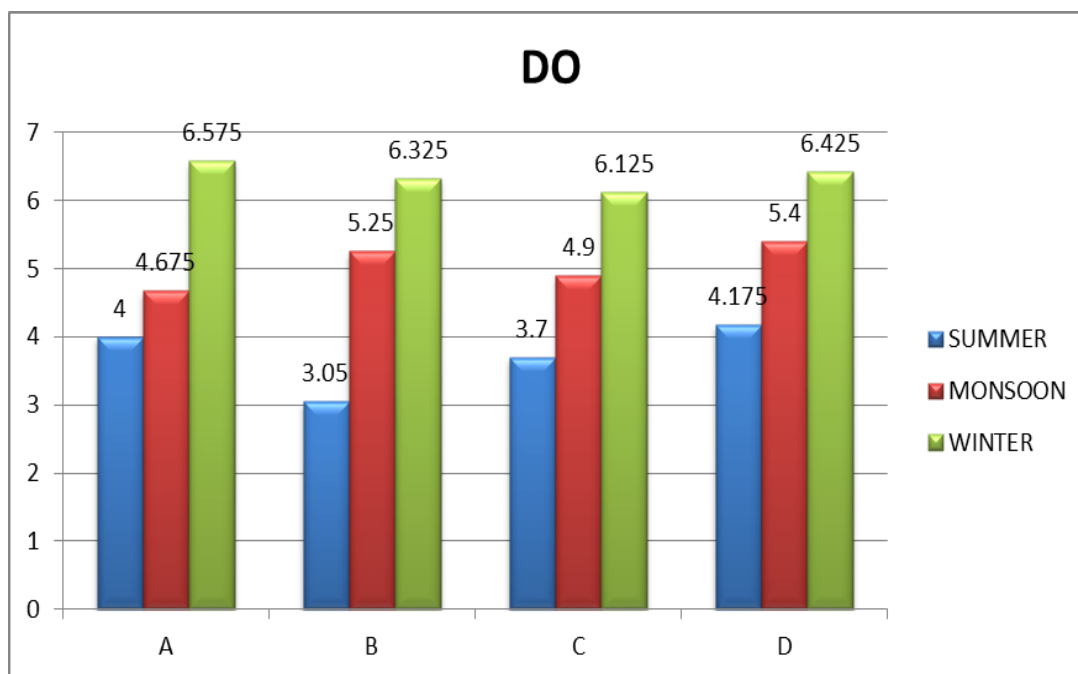
**Fig. 2: Seasonal variation in PH at different sampling stations during Feb.15-Jan.16.**



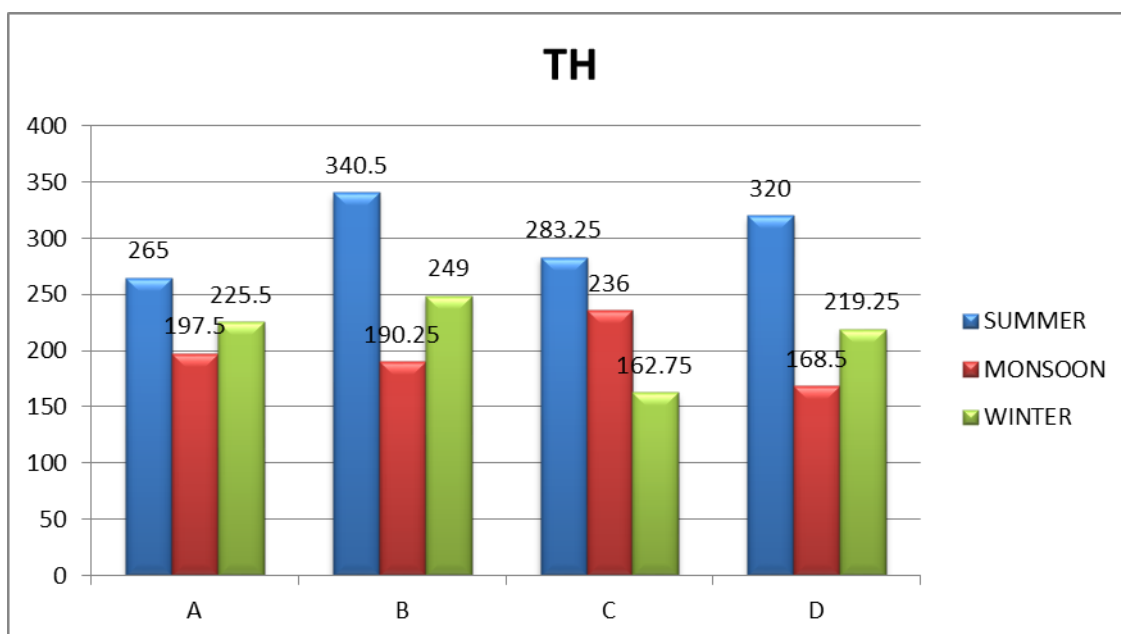
**Fig. 3: Seasonal variation in EC micro S/cm at different sampling stations during Feb.15-Jan.16.**



**Fig. 4: Seasonal variation in CHLORIDE mg/l at different sampling stations during Feb.15-Jan.16**

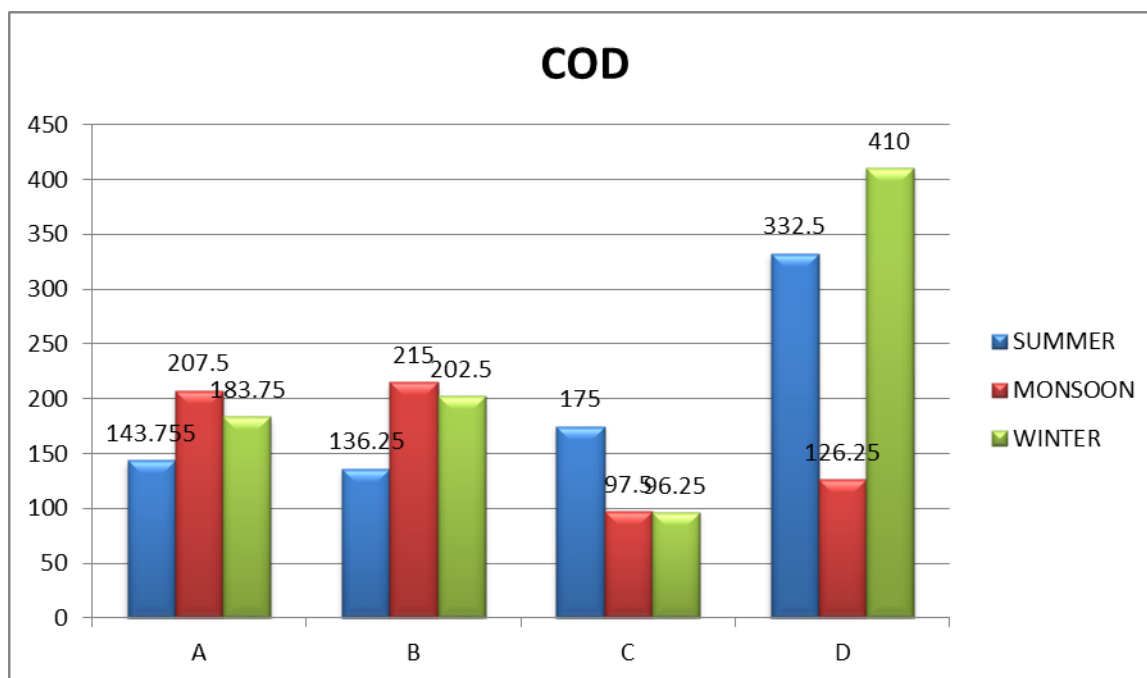


**Fig. 5:** Seasonal variation in DO mg/l at different sampling stations during Feb.15-Jan.16

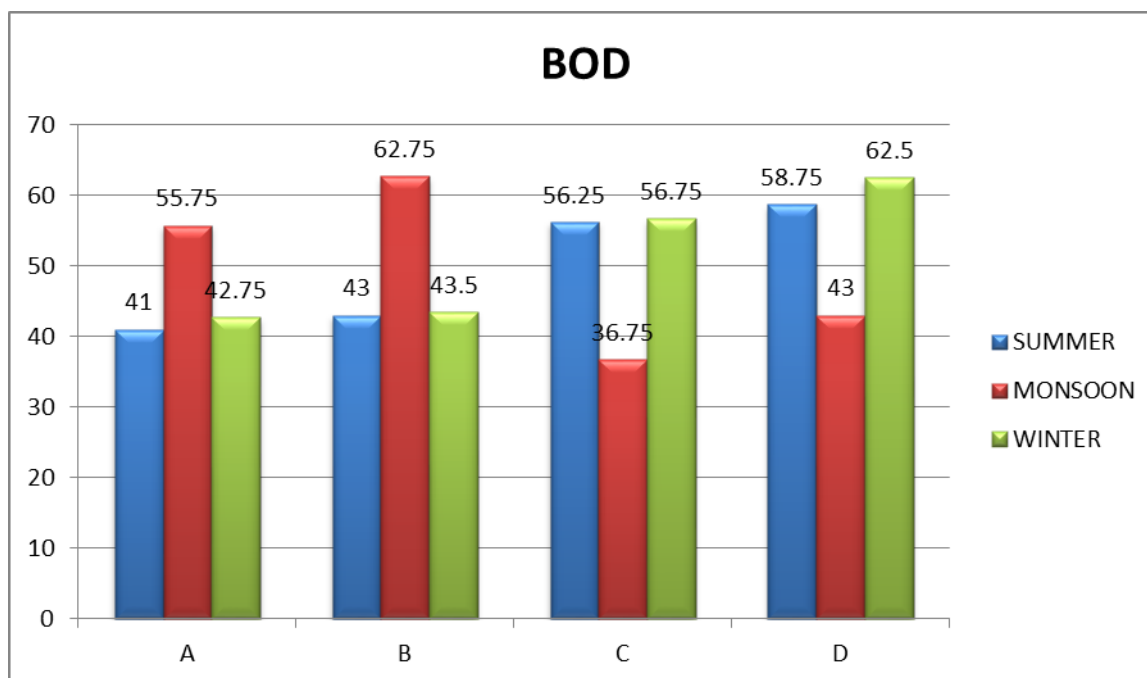


**Fig. 6:** Seasonal variation in TH mg/l at different sampling stations during Feb.15-Jan.16.





**Fig. 7: Seasonal variation in COD mg/l at different sampling stations during Feb.15-Jan.16.**



**Fig. 8: Seasonal variation in BOD mg/l at different sampling stations during Feb.15-Jan.16.**

## CONCLUSION

The present study shows that anthropogenic activities have a profound impact on Lake ecosystem. A detailed study of limnological characters clearly indicated that the lake water

not highly contaminated but there is indication of increase in pollution and it may be due to the discharge of various effluents into the lake. The Lake is polluted due to disposal of untreated sewage in the lake at number of point sources. Hence prevention of water pollution due to any cause is very important. Therefore it is necessary to control the incoming various waste.

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#### REFERENCES

1. Elmaci, A., Topac, F. O., Ozengin, N., Teksoy, A., Kurtoglu, S. and Baskaya, H. S. 2008. Evaluation of physical, chemical and microbiological properties of lake Ulubat, Turkey. *J. Environ. Biol*, 29: 205-210.
2. Sidnei, M.T., Fakio, A.L.T., Maria, C.R., Francis, A.E. and Adaunto, F. 1992. Seasonal variation of some limnological factors of Lagoa does Guarana, a Varzea lake of the Rio Paranana State of Mato Grosso do Sul, Brazil. *Rev. Hydrobiol*, 25(4): 269-276
3. Lianthumlui, A., Asha T. Landge, C. S. Purushothaman, geetanjali deshmukhe and karankumar k. ramteke (2013) assessment of seasonal variations of water quality Parameters of savitri reservoir, Poladpur, raigad district, Maharashtra, 8(4): 1337-1342.
4. Shuchun Y, Bin X, Deyang K (2010) Chronology and nutrients change in recent sediment of Taihu Lake, lower Changjiang River Basin, East China *Chin Geogr Sci*, 20(3): 202–208.
5. Moshood Keke Mustapha (2008), Assessment of the Water Quality of Oyun Reservoir, Offa, Nigeria, Using Selected Physico-Chemical Parameter *Tsurkish Journal of Fisheries and Aquatic Sciences*, 8: 309-319.
6. Kamble V. T., Jawale, C. A. some aspects of water quality parameters of pardeswadi lake waluj midc aurangabad(m.s.) india.
7. Trivedy R.K. and Goel P.K., *Chemical and Biological Methods for Water Pollution Studies*, Karad India, 1986.
8. APHA, 1995. Standard methods for the examination of water and waste water, American Public Health Association, 19<sup>th</sup> Edn.

9. Gupta, P.K., 2004. Soil, Plant, water and fertilizer analysis. *Agrobios*, 1: 318-326.
10. Koshy M. and Nayar V. T. 1999. Water quality aspects of river Pamba. *Poll. Res*, 18(4): 501- 510.
11. Sawane, A. P., Puranik P. G. and Bobdey A. D. 2007. Seasonal distribution of trace elements in water of Irai River, Dist. Chandrapur, Maharashtra. *C.P.-66, NSL*, 2007; 376-379.
12. Patil, S.S. and Ghorade I.B.: Phytoplankton diversity from Godavari river water (Maharashtra). *Indian Journal of Applied Research*, 2012; I(4): 112-114.
13. Qureshimatva, U.M., Maurya, R. R, Gamit S B, Patel R. D. and Solanki, H. A. Determination of Physico-Chemical Parameters and water quality index (wqi) of Chandlodia lake, Ahmedabad, Gujarat, india.
14. Patil, S. S. and Ghorade, I. B. 2013. Physico-chemical Assessment of Kham River at Aurangabad, (Maharashtra).
15. Waghmare, N. V., Shinde, V. D., Surve, P. R. and Ambhore, N. E. 2012. Seasonal Variation in Physico-chemical Characteristics of Jamgavanl Dam Water of Hingoli District, (M.S). India.
16. Pradeep U.Verma, Anshita R. Purohit and Naimesh J. Patel 2012. Pollution Status Of Chandlodia Lake Located In Ahmedabad-Gujarat.
17. Moundiotiya, C., Sisodia, R., Kulshreshtha, M. and Bhatia, A.L. 2004. A case study of the Jamwa Ramgarh Wetland with special reference to physic-chemical properties of water and its environs. *Journal of Environmental Hydrology*, 12.
18. Biswas P., Vardia H. K. and Ghosh A. 2011. Physico-chemical analysis of small reservoir Budha Talab in Raipur. In: *Advances in aquatic ecology*, (Ed) V. B. Sakhare. Daya Publishing House, Delhi, India, 5: 111-121.
19. Bagde, U.S, and Verma A.K., 1985. Limnological Studies on Jawaharlal Nehru University campus. *National Symposium on pure and Applied limnology. Bull. Bot. Soc. Sagar*, 32: 16-23.
20. Dakshini, K. M. M. and Soni J. K. 1979. Water quality of sewage drains entering Yamuna in Delhi. In.
21. Swarnalatha, P. and Nageswara Rao, K., 2009. Physico-chemical characteristics of ground water in greater Vishakapatnam Municipal corporation (GVMC), Andhra Pradesh. *Indian J. Environ. Prot*, 29(5): 399- 406.

22. Jadhav, R. N., Mukesh. R. Pimpliskar and Shruti Handa. 2013. Seasonal Variation in Physico-chemical Characteristics of Nirmal Lake, Vasai, Dist. – Thane, Maharashtra.(India).
23. G Srinivas reddy, D Balakarishna, T Ravinder Reddy, 2015; 3(2): 248-254 A Study of Physico-chemical and fish diversity of Nizam Sagar dam, Nizamabad, Telangana.
24. Munawar, M., (1970). Limnological studies on fresh water ponds of Hyderabad, India. *Hydrobiologia*, 31: 101-128.
25. Saha, L.C. and pandit, B, (1986).Comparative limology of Bhagalpur ponds. *Comp, physiol. Ecol*, 11(4): 213-216.
26. Thresh, J.C., Suckling, E.V and Beale, J. F., (1944).The examination of water supplies Ed. Taylor, E.W.
27. Patil, S. S. and Ghorade, I. B. 2013. Physico-chemical Assessment of Kham River at Aurangabad, (Maharashtra).
28. Patil, S. S. and Ghorade, I. B. 2013. Physico-chemical Assessment of Kham River at Aurangabad, (Maharashtra).