



RESEARCH ARTICLE

SEASONAL VARIATIONS IN PHYSICO- CHEMICAL PARAMETERS OF PEDDACHERUVU LAKE, DUBBAK SIDDIPET DISTRICT, TELANGANA STATE, INDIA

*¹Rachana, A. and ²Raj Kumar, B.

¹Department of Botany, Government Degree College, Siddipet, Telangana, India

²Department of Botany, Osmania University Hyderabad, Telangana, India

ARTICLE INFO

Article History:

Received 25th March, 2017

Received in revised form

16th April, 2017

Accepted 16th May, 2017

Published online 20th June, 2017

Key words:

Peddacheruvu,
Physico-chemical Parameters,
Seasonal variations,
Eutrophication.

ABSTRACT

In present work an attempt has been made to assess the variations in physico-chemical parameters in the lake waters of Pedda Cheruvu lake Dubbak, Siddipet District, Telangana state. The study is carried out for a period of one year from may 2015 to April 2016. Monthly data has been collected and assessed seasonally. Different Physico-Chemical parameters like Air Temperature, Water Temperature, Turbidity, pH, DO, Calcium, Magnesium, Chlorine, Phosphates, Nitrates, Nitrites, Sulphates and Silicates were analyzed at monthly intervals. The results indicate that the lake is progressing towards eutrophication.

Copyright©2017, Rachana and Raj Kumar. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Rachana, A. and Raj Kumar, B., 2017. "Seasonal variations in physico- chemical parameters of Peddacheruvu lake, Dubbak Siddipet District, Telangana State, India", *International Journal of Current Research*, 9, (06), 51685-51688.

INTRODUCTION

Life exists on the planet earth because of the precious element water without which life cannot be assumed. It is one of the precious gift to man. During the course of civilization man settled in the places where the water resources were abundant. But in today's scenario the growing population has accelerated the man's activities like industrialization, agriculture and urbanization which have put tremendous pressure on fresh water resources by depleting them with indiscriminate use and mismanagement. Fresh water is the renewable resource, that the worlds supply of clean water is decreasing day by day. Awareness of importance of water and its conservation is the need of the hour. Biodiversity rich fresh water ecosystem's are currently declining faster than the marine and land ecosystems. The present study aims at assessing the quality of the lake water and to suggest strategies to conserve the lake.

MATERIALS AND METHODS

Study area: The present lake selected for the investigation is Pedda Cheruvu lake, at village Dubbak, Siddipet district

*Corresponding author: Rachana, A.

Department of Botany, Government Degree College, Siddipet, Telangana, India.

It is situated on Coordinates: 17°10'32"N 78° 39'31"E. The lake water is used for various purposes. Such as irrigation, fish catching, peoples washing and bathing. (Figure-1)

Sampling collection and analysis

The sampling stations were selected on the basis of the length and area of the lake and the degree of pollution load being added to the lake.

The water samples for the present study were collected at monthly intervals for a period of one year from may 2015 to April 2016. Samples were collected every month from the surface of the lake water from morning 10am to 12am to maintain uniformity. The analysis for the physico- chemical parameters were carried out as per APHA (4) methods.

RESULTS AND DISCUSSION

PHYSICO CHEMICAL PARAMETERS: (expressed as mg/l except pH and temperature)

(Chemical parameters expressed as mg/l except pH, Air Temperature, Water Temperature and Turbidity)



Pedda Cheruvu Lake, Figure-1

Table 1.

Months (2015-16)	Air Temp (°C)	Water Temp (°C)	Turbidity (NTU)	pH	DO	Cl ⁻	Hardness	Ca ²⁺	Mg ²⁺	NO ₃ ⁻	NO ₂ ⁻	PO ₄ ³⁻
May-15	40	36	16	8	5.4	285.0	288	30.2	56.8	0.13	0.001	0.12
Jun-15	38	36	8	7	8	184.7	194	15.0	40.9	0.1	0.002	0.05
Jul-15	36	34	6	7.3	7.7	156.9	165	12.7	38.8	0.09	0.012	0.02
Aug-15	34	32	6	7.2	8.6	166.9	156	11.8	35.2	0.08	0.009	0.09
Sep-15	28	26	10	7	10.5	205.6	118	6.7	27.2	0.07	0.007	0.04
Oct-15	32	30	8	7	9.2	184.3	102	20.6	19.9	0.03	0.005	0.02
Nov-15	32	30	9	7.2	9	252.1	216	18.6	23.9	0.06	0.025	0.06
Dec-15	30	28	6	7.3	8.4	207.0	204	19.7	34.3	0.08	0.024	0.05
Jan-16	29	27	7	7	9.5	234.0	254	26.9	35.1	0.03	0.039	0.04
Feb-16	30	28	12	7.4	7.2	278.8	233	24.8	38.9	0.08	0.019	0.06
Mar-16	34	32	13	7.6	8.5	222.7	265	26.2	42.7	0.1	0.026	0.07
Apr-16	37	35	15	7.8	6	255.5	214	36.3	43.7	0.08	0.023	0.05

Air temperature and water temperature (°C)

Air temperature was recorded 40°C (may) maximum in summer season and the minimum of 28°C (sep) in monsoon season, The water temperature was recorded maximum 36°C (may) in summer season and minimum in 26°C (sep) in monsoon season. Temperature plays an important role which governs the role of biota in the lentic system. (Figure-2).

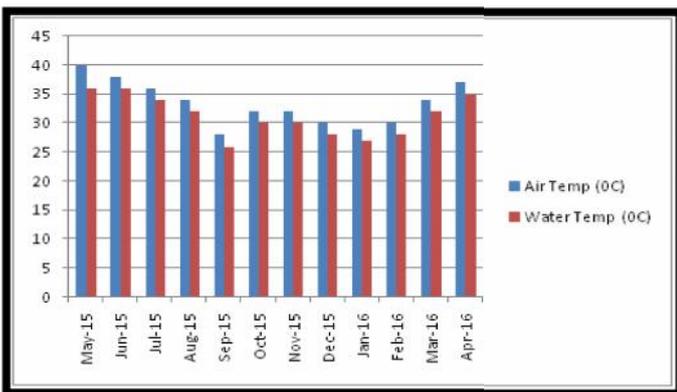


Figure 2.

TURBIDITY

The turbidity concentration decreases light penetration in the lake waters due to the presence of different suspended particles such as clay, silt, planktons etc. The high concentration of turbidity increases the temperature of the water because the suspended solids absorb heat. The lake water turbidity values were high 16NTU (may) during summer and low 6NTU (aug) during monsoon season. (Figure-3)

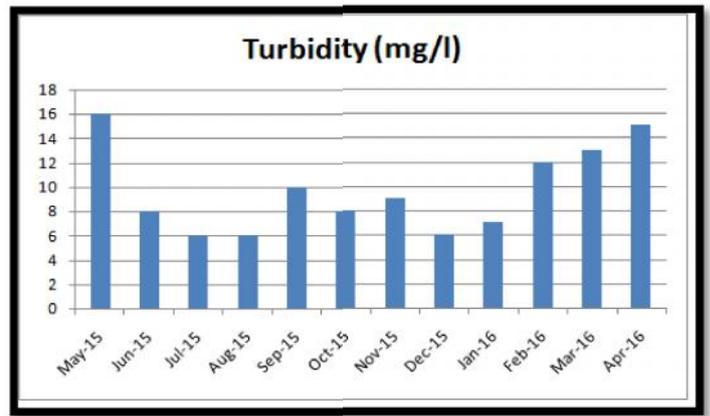


Figure 3.

pH

The maximum PH values 8.0 (may) were recorded in summer season and minimum values 7.0 (sep) were recorded in monsoon season. The PH value is normally associated with photosynthetic activity and microbial activity which will be accelerated due to high temperatures in summer season. The present results of alkaline PH values throughout the year are coinciding with findings of Mishra *et al.* (Figure-4).

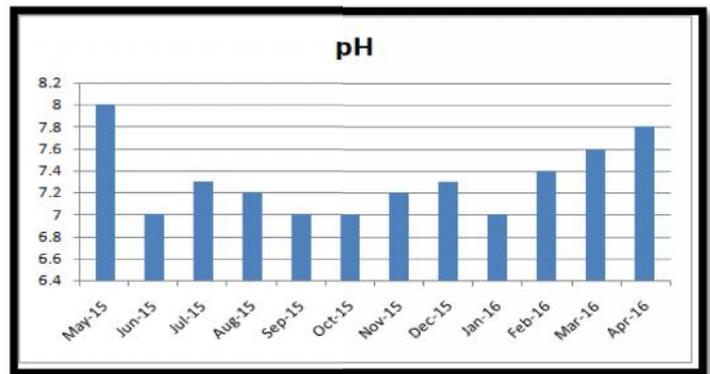


Figure 4.

DISSOLVED OXYGEN (mg/l)

Dissolved oxygen is one of the important parameters of water quality assessment. Dissolved oxygen was high 10.5mg/l (Sep) during monsoon season and low 5.4mg/l (may) during the summer season. Dissolved oxygen levels could be low during summer season due to high photosynthetic activity of phytoplanktons with increased temperature in summer. Dissolved oxygen higher values in monsoon season can be attributed due to inflow of water into the lake because of rains. Dissolved oxygen showed inverse relationship with temperature. (Figure-5),

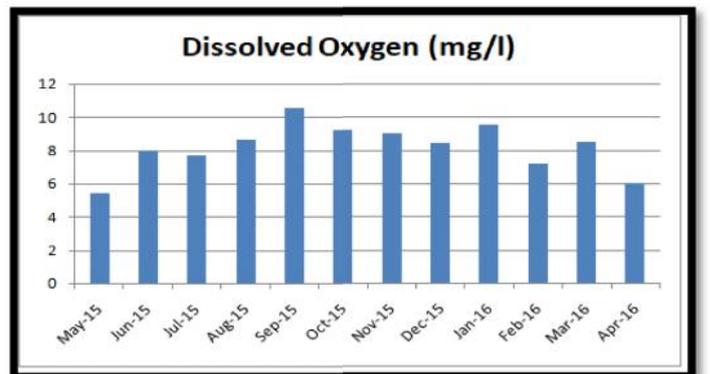


Figure 5.

CALCIUM (mg/l)

Calcium is an important nutrient present in water bodies and plays important role in aquatic ecosystem. The maximum values 36.33mg/l (Apr) of calcium were recorded in summer season and minimum 6.72mg/l (sep) amounts were recorded in monsoon season. Calcium richness in water could be attributed to high concentrations of bicarbonates as was evident in the observations of Prasad and Manjula (1980) (Figure-6).

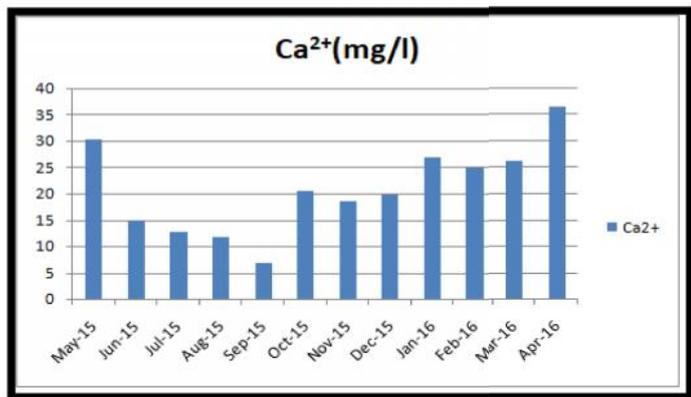


Figure 6.

MAGNESIUM (mg/l)

Magnesium is the micronutrient required in enzymatic reactions of organisms and is required by chlorophyllous organisms as magnesium is the component of porphyrin of the chlorophyllous molecule. In present study magnesium is always higher than calcium. This is in contradiction to observations of vijaya (1999) and Pullareddy (2004). The maximum amounts 56.68mg/l (May) of magnesium was recorded in summer season and minimum amount 19.86mg/l (Oct) was recorded in winter season (figure-7).

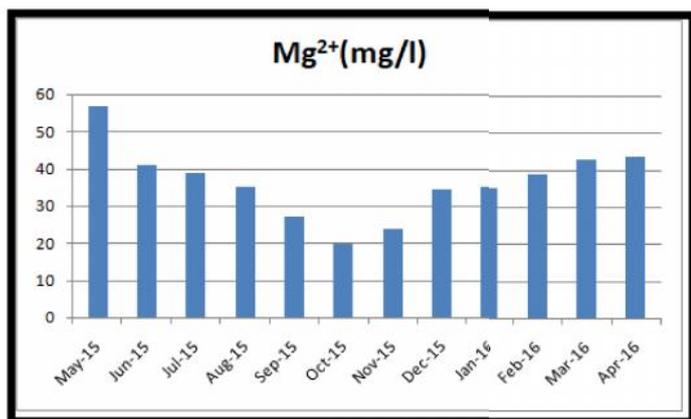


Figure 7.

TOTAL HARDNESS (mg/l)

The maximum amount 288 mg/l (May) of total hardness was recorded in summer season and minimum amounts 102mg/l (Oct) were recorded in monsoon season. The increase in hardness values in the lake water during summer can be attributed to decrease in water level of lake due to high temperatures and evaporation and also increases in concentrations of pollutants (Figure-8).

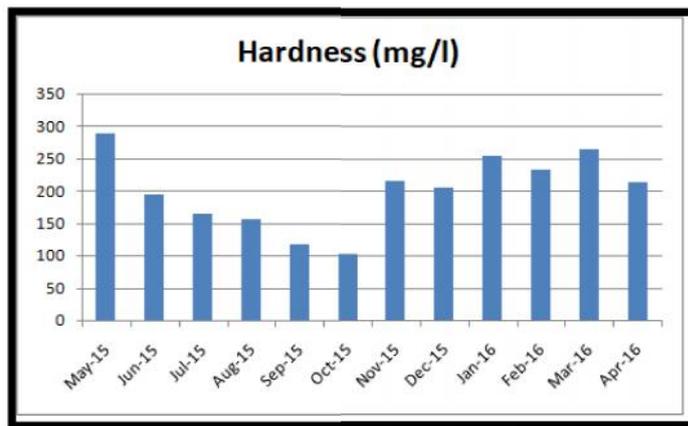


Figure 8.

CHLORINE (mg/l): The chlorine content was recorded maximum 284.99mg/l(May) during summer season and minimum 156.89mg/l (Jul) during winter season (Fig). The higher concentrations of chlorine is the indicator of pollution of rich organic matter. The rich concentrations of chlorine can be attributed to sewage disposal and lower concentrations of chlorine may be due to absorption by living organisms (Figure-9).

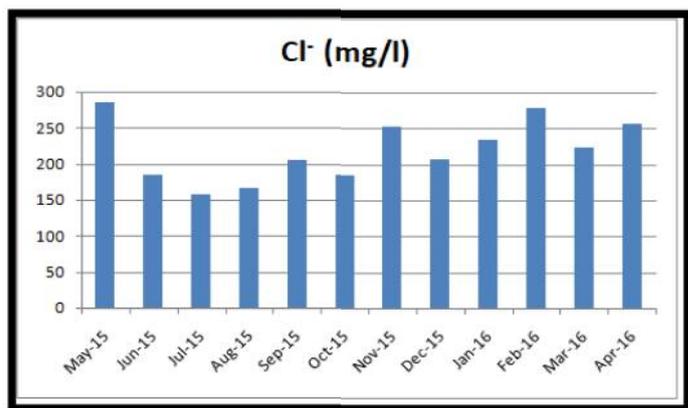


Figure 9.

PHOSPHATES (mg/l)

The high concentrations 0.12mg/l(may) of phosphate were recorded in summer and low concentrations 0.02mg/l (Oct) in monsoon season. Biotic sources of phosphate concentrations in lentic system are the domestic sewage, agricultural drainage and the release of laundry detergent into the aquatic system (Figure-10).

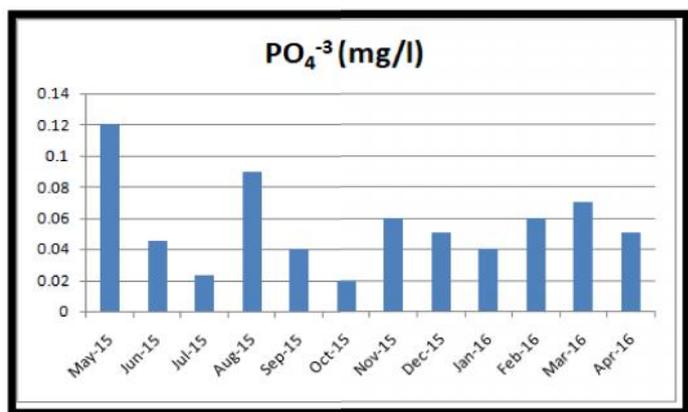


Figure 10.

NITRATES (mg/l)

During the study period the lake waters has shown high concentration 0.126mg/l (May) of nitrates in summer season and low concentrations 0.034mg/l (Oct) during winter season. Nitrate is contributed to the ecosystem as a byproduct of bacterial nitrification and also domestic sewage contains high amounts of nitrogenous wastes (Figure-11).

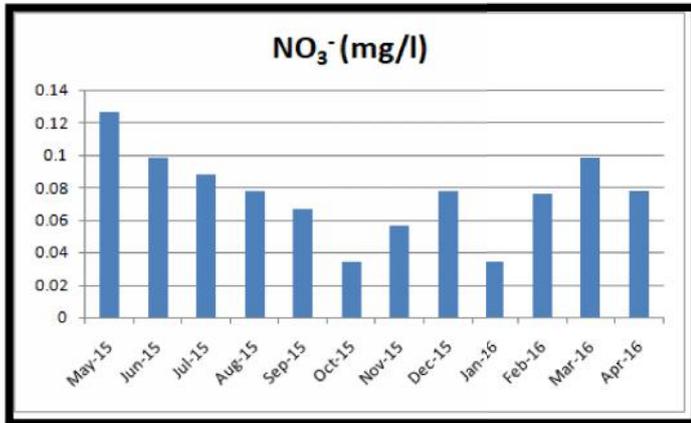


Figure 11.

NITRITES (mg/l)

Nitrites usually occur in small concentrations in unpolluted fresh water. The concentrations of nitrites are attributed due to sewage disposal and animal wastes. Nitrites in present investigation were recorded in minimal concentrations (figure-12).

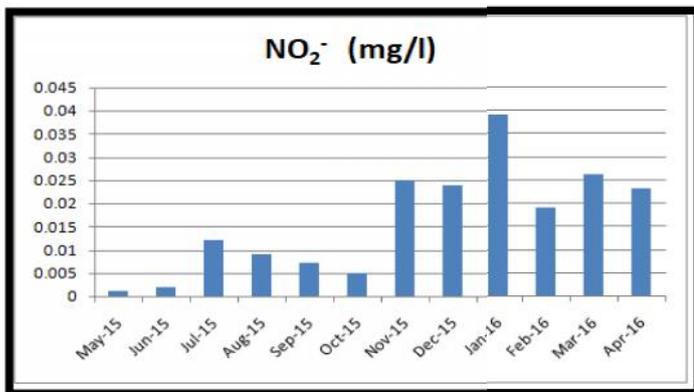


Figure 12.

Conclusion

The results of the physico-chemical parameters in the lake are indicating that the lake is proceeding towards eutrophication. The analysis of physico-chemical parameters had indicated dumping of pollutants like domestic waste and sewage into lake water which are leading to eutrophication. The study suggests that social awareness of conserving the lakes should be created by organizing programs on conservation of lakes and also periodic monitoring of water quality should be done to protect the lakes from further degradation.

REFERENCES

- Ansari, K.K. and Prakash, S. 2000. Limnological studies in Tulsidas Tal of Tarai region of Balampur in relation to fisheries poll. *Res.* 19 (4) 651-655.
- APHA, 1998. Standard methods for the estimation of water and waste, 20th ed. American Public Health Association, Washington, DC.
- Arya, S., Kumar, V., Raikwar, M., Dhaka, A. and Minakshi 2011. Physico-chemical analysis of selected surface water samples of laxmital (pond) in Jhansi city, U.P. Bundelkhand region. *Central India journal of experimental sciences* 2(8) 01-06.
- Dwivedi, B.K. and Pandey, G.C. 2002. Physico-chemical factors and algal diversity of two ponds Girjakund and maqubara pond, Faizabab pollution research, 21,361-370.
- Elayaraj, B. and Selvaraju, M. 2015. Seasonal variations in physico-chemical parameters of Sri Kamatchiamman temple pond Chidambaram Taluk, Tamilnadu. *Journal of Environmental Treatment Techniques* vol,3, issue 2 pages 126-133.
- Goher. Mis, M.E.M. 2012. Chemical studies On the precipitation and dissolution of some chemical elements in Lake Quran, Ph.D. thesis Fac of sci. Al-Azhar Univ., Eyzpt.
- Govindan, T. and Sunderesan, B.B. 1979. Seasonal succession of algal flora in polluted water of Adyar River. *Indian Journal of Environment and Health*, 2(1) 131-142.
- Hra, Sharma, S.R. and Yadav, P.K, 1992. Phytoplanktonic communities in relation to environmental conditions in lentic waters at Gwalior (MP) *J. Environ. Boil.* 13(4):291-196.
- Mishra, R.R., Rath, B. and Thatoi, H. 2008. Water quality assessment of aquaculture ponds located in bhitakanika Mangrove Ecosystem, Orissa, India. *Turkish Journal of Fisheries and Aquatic Sciences*, 71-77.
- Prasad, B.N. and Manjula, 1980. Ecological study of Blue-green algae in river Gomati. India. *J. of Env. Hlth.* 22 (2):151-168.
- Pulla Reddy, P. 2004. Limnological Studies on Ramanpad Lake with reference to Water Quality. Ph.D. Thesis Osmania University, Hyderabad, India.
- Singare, P., Trivedi, M. and Mishra, R. 2011. Assessing the physico-chemical parameters of Sediment Ecosystem of Vasai Creek at Mumbai, India. *Marine Science.* 1(1), 22-29.
- Swarnalatha, N. and Narsingrao, A. 1998. Ecological studies of Banjara lake with reference to water pollution. *J. Environ. Biol.* (2) 179-186.
- Trivedy, A.K. and Goel, P.K. 1987. Chemical and biological methods for water pollution studies. Environmental publications. Karad, India.
- Vijaya, 1999. Eutrophication studies in two lakes of Hyderabad city, A.P., India Ph.D. Thesis Osmania University, Hyderabad, India.
