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Research Article

Analysis and Seasonal Variations of Physico-Chemical Characteristics in a Fresh Water Lake of Warangal District, Telangana State

Rajani. V¹ and G. Benarjee^{2*}

Fisheries Research Laboratory, Department of Zoology, Kakatiya University, Warangal-506 009.
Telangana State, India



*Corresponding author:

E-mail: vrphd.zoology@gmail.com

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ABSTRACT

The present study carried on the physico-chemical parameters of Velair Lake in Warangal district, Telangana State for the period from June 2016 to May 2017. Water samples were collected from the lake and analyzed using standard laboratory methods and procedures. The results of the water analysis showed a variation in some of the parameters at the different sampling stations within the lake. The parameters that were studied included Water Temperature(°C), Electrical Conductivity(μmhos/cm), Total Dissolved Solids(mg/l), Water Transparency(Cm), PH, Dissolved Solids(mg/l), Carbon Di Oxide(mg/l), Total Alkalinity(mg/l), Chlorides(mg/l), Biological Oxygen Demand(mg/l), Phosphates(mg/l), Nitrates(mg/l) and Ammonia(ppm) have been estimated. The results obtained confirmed seasonal variations and fluctuations of various physico-chemical parameters during the study period. These results revealed that, the physico-chemical parameters of the fresh water lake were within the permissible limits and can be used for home, irrigation and pisciculture purposes.

1. Introduction

Water is the important need of life and it is an essential component of all forms of lives, from micro-organism to man (Priyanka Trivedi et al 2010). Water is scarce and valuable resource and it is highly essential for the river regimes and causing problem of pollution of water (Nighojkar Abhineet et al 2014). Water resources are of critical importance to both natural ecosystem and human development. It is also essential for agriculture, industry and human existence. The healthy aquatic ecosystem is depending on the physico-chemical and biological characteristic's (Medudhula. Thirupathaiiah et al 2012). The quality of water in any ecosystem provides signifying information about the available resources for supporting life in that ecosystem (Rajesh et al 2002). Water bodies are essential segment of the environment of human beings. Lakes are not only affecting their surroundings they also influence on the neighboring agriculture lands and human health. Fresh water biology deals with the physiogeography natural history and the influence of biotic and abiotic factors of the lake. Physico-chemical parameters play an important role to determine the water quality. Fresh water resources have been widely used for water supply, irrigation, hydro chemical propagation, navigational and procurement of food control purpose present days human beings applied different pesticides' and fertilizers to use for better yielding. These are the main cause to increase nutrition value of lake and it water bodies and bio-pesticides use necessary to

agriculture practices. Adarshkumar et al.,(2006). These are the factors, which usually fluctuate according to seasons within a year. Since monthly changes are quite gradual and slight fluctuations in monthly characteristics exist between successive years, calculation of seasonal trends from the regular monthly observations is much more useful to explain ecological status.

2. Material and Methods

The physico-chemical parameters of water were analyzed on monthly bases for a period of one year from June 2016 to May 2017. The parameters like Water Temperature, Electrical Conductivity, Total Dissolved Solids, Water Transparency, PH, Dissolved Oxygen, Free Carbon di Oxide, Alkalinity, Chlorides, Biological Oxygen Demand, Phosphate, Nitrate and Ammonia were determined by APHA (1998).

3. Results and Discussion

3.1 Methods for transforming the EPN into various Formulations

The present study on the Physico-chemical parameters of Velair Lake is presented in Table 1 & 2. The main purpose of analyzing physical and chemical parameters of water is to determine the ecological status of a water body. The study was carried out for a period of one year from June, 2016 to May 2017. Monthly and Seasonal variations of physico-

Table-1. Monthly variation of physico-chemical parameters of Velair Fresh Water Lake during 2016-2017

Month	June	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Tem °C	28.17	28.07	27.62	27.32	27.47	26.35	25.22	22.60	27.25	27.45	27.90	29.10
	±0.17	±0.17	±0.29	±0.29	±0.42	±0.26	±0.22	±0.36	±0.20	±0.26	±0.25	±0.25
EC (µmhos/cm)	125.50	138.60	151.62	172.00	156.60	160.00	163.50	153.80	125.50	130.80	131.50	140.20
	±0.46	±0.49	±0.51	±3.36	±1.25	±1.36	±0.67	±0.99	±1.29	±0.87	±0.58	±1.28
TDS(mg/l)	45.00	48.60	53.00	55.70	67.45	70.00	45.60	70.00	45.60	54.50	54.50	52.20
	±0.18	±1.00	±0.72	±0.57	±0.44	±0.39	±0.84	±0.91	±0.82	±0.43	±1.08	±1.05
Transparency (cm)	40.00	45.10	42.00	51.60	46.50	48.52	50.00	60.50	48.40	52.60	55.70	45.50
	±0.78	±0.84	±0.81	±0.31	±0.43	±0.41	±0.78	±0.43	±0.39	±0.62	±0.67	±0.47
PH	7.20	6.80	6.30	6.22	6.12	6.62	6.82	7.17	6.50	6.12	6.52	6.82
	±0.31	±0.25	±0.35	±0.25	±0.22	±0.38	±0.33	±0.27	±0.39	±0.27	±0.45	±0.25
DO(mg/l)	7.00	7.20	7.40	7.00	7.10	7.00	6.60	6.47	6.25	6.40	6.67	6.85
	±0.21	±0.25	±0.25	±0.18	±0.25	±0.24	±0.36	±0.33	±0.25	±0.31	±0.40	±0.19
Free CO2(mg/l)	2.00	2.10	2.50	2.40	2.45	2.47	2.50	2.40	2.55	2.65	2.80	2.50
	±0.53	±0.49	±0.43	±0.46	±0.49	±0.46	±0.45	±0.46	±0.42	±0.58	±0.63	±0.45
Alkalinity (mg/l)	40.00	41.30	35.00	41.50	46.60	50.40	53.20	60.10	38.20	47.80	52.40	55.60
	±1.82	±1.50	±1.82	±1.29	±1.29	±0.45	±0.69	±1.66	±2.10	±1.24	±1.09	±0.81
Cl (mg/l)	25.50	23.52	20.30	22.60	26.70	27.40	28.32	29.80	33.50	30.10	35.65	40.20
	±0.81	±1.02	±1.01	±0.80	±0.96	±1.09	±0.99	±0.96	±1.09	±1.02	±0.47	±1.39
BOD(mg/l)	4.20	4.60	5.10	5.60	5.70	6.00	6.20	7.00	4.00	4.60	5.00	4.00
	±0.47	±0.49	±0.43	±0.36	±0.36	±0.43	±0.43	±0.43	±0.43	±0.49	±0.54	±0.43
Phosphate (mg/l)	2.10	2.10	2.40	2.60	2.10	2.35	2.80	3.00	1.80	1.90	2.00	2.20
	±0.47	±0.51	±0.39	±0.37	±0.47	±0.44	±0.49	±0.45	±0.43	±0.43	±0.43	±0.43
Nitrate (mg/l)	0.45	0.58	0.62	0.55	0.65	0.73	0.72	0.55	0.46	0.49	0.53	0.45
	±0.04	±0.04	±0.07	±0.04	±0.04	±0.02	±0.03	±0.04	±0.04	±0.04	±0.02	±0.04
Ammonia (ppm)	2.15	2.45	2.60	2.40	2.30	2.25	2.15	2.10	1.80	2.10	2.15	2.22
	±0.31	±0.36	±0.35	±0.33	±0.29	±0.44	±0.31	±0.29	±0.24	±0.29	±0.36	±0.40

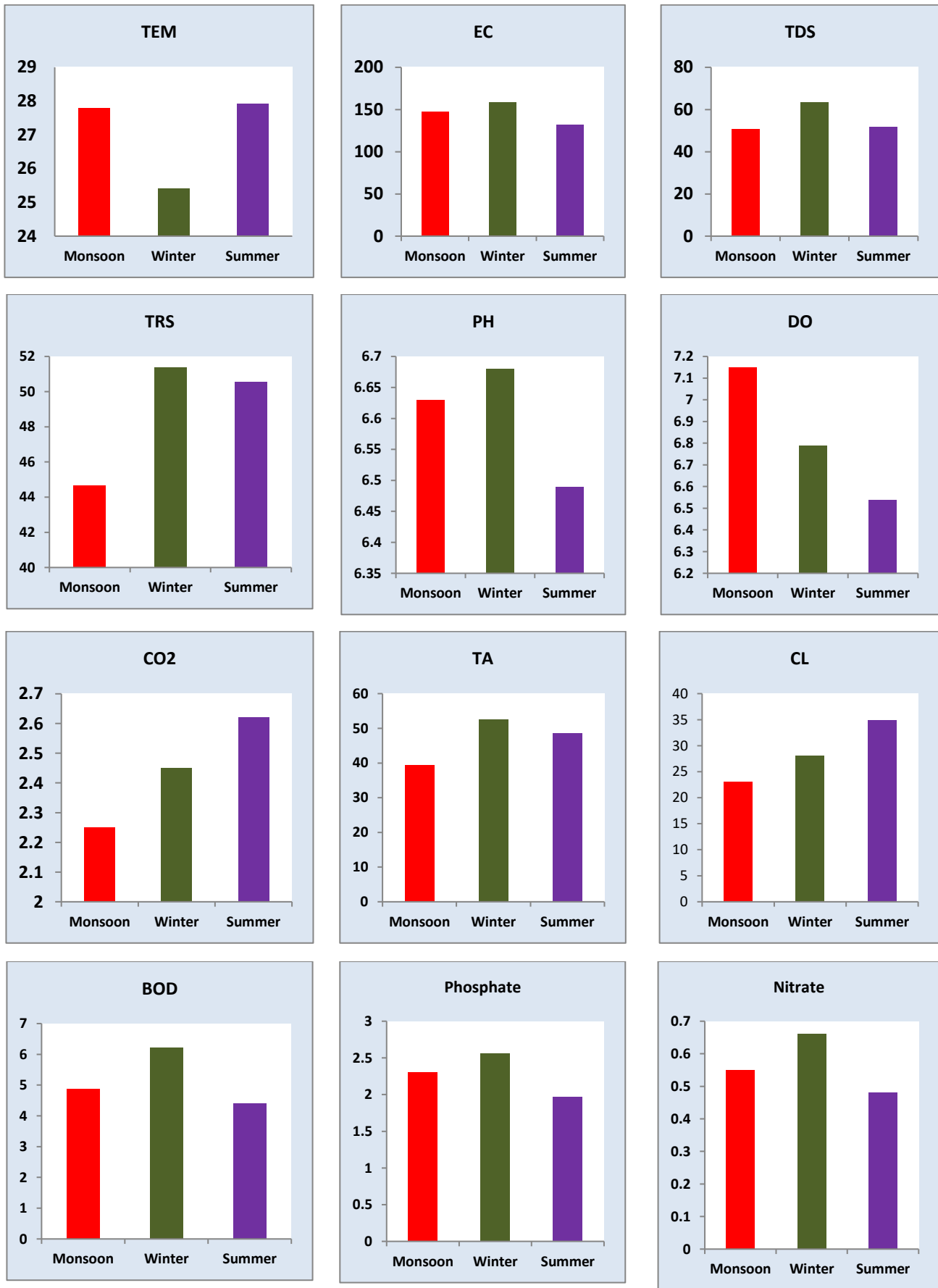
Table 2: Seasonal variations of Physico-chemical parameters of Velair Lake 2016-2017

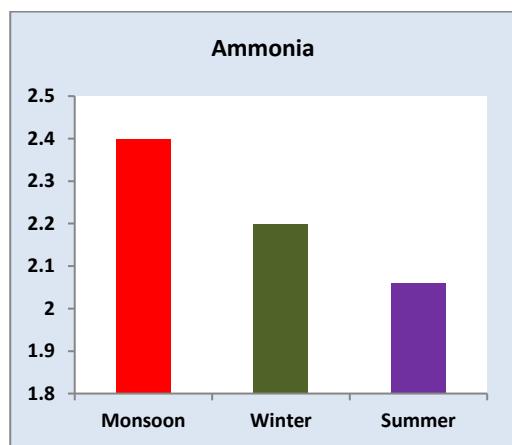
Season	Tem °C	EC (µmhos/cm)	TDS (mg/l)	Transparency (cm)	PH	DO (mg/l)	FreeCO2 (mg/l)	Alkalinity (mg/l)	Cl (mg/l)	BOD (mg/l)	Phosphate (mg/l)	Nitrate (mg/l)	Ammonia (ppm)
Monsoon	27.79	146.93	50.57	44.67	6.63	7.15	2.25	39.45	22.98	4.87	2.30	0.55	2.40
	±0.39	±19.82	±4.73	±5.07	±0.45	±0.19	±0.23	±3.04	±2.15	±0.60	±0.24	±0.07	±0.18
Winter	25.41	158.47	63.26	51.38	6.68	6.79	2.45	52.57	28.05	6.22	2.56	0.66	2.20
	±2.08	±4.20	±11.83	±3.24	±0.43	±0.30	±0.04	±5.69	±1.33	±0.55	±0.41	±0.08	±0.09
Summer	27.92	132.00	51.70	50.55	6.49	6.54	2.62	48.50	34.86	4.40	1.97	0.48	2.06
	±0.82	±6.08	±4.20	±4.50	±0.28	±0.26	±0.13	±7.57	±4.22	±0.48	±0.17	±0.03	±0.18

chemical parameters were analyzed in three different seasons such as Monsoon season, winter season and summer season. Temperature is one of the most physical parameter, due to the fact of its effects on bio-chemical reaction and populace fluctuations of water body are seen the rise in temperature

velocity up the bio-chemical response and reduces the solubility of gases. The temperature ranges from 22.60°C to 29.10°C. The maximum values were recorded during summer while the lowest were winter season. Similar observations are according to Vijay Kumar et al. (2009), David and David

Figure-1. Seasonal variations of Physico-Chemical Parameters of Velair Lake 2016-2017





(2012). Electrical Conductivity is the potential of an aqueous solution to cross-electrical present, which depends on ions and their complete awareness, mobility and temperature. Electrical Conductivity ranges from 125.50(μ mhos/cm) to 172.00 (μ mhos/cm). The highest EC values were recorded during monsoon season while the lowest EC values were recorded during summer season. Total Dissolved Solids ranges from 45.00 (mg/lit) to 70.00(mg/lit).The highest TDS values were recorded during winter season while the lowest TDS values were recorded during monsoon season. Transparency indicates the productive nature of this water on the basis of clarity values as proposed by Sharma and Durve (1991). Water Transparency ranges from 40.00(cm) to 60.50(cm). The highest water transparency values were recorded during winter season while the lowest water transparency values were recorded during monsoon season.pH is an important parameter that determines the suitability of water for various purposes. PH ranges from 6.12 to 7.20. The highest PH values were recorded during winter season while the lowest PH values were recorded during summer season. DO is one of the significant parameter in water quality evaluation. It reproduces the physical and biological processes existing in the water. Non polluted surface water is normally. Dissolved Oxygen ranges from 6.25(mg/lit) to 7.40(mg/lit).The highest DO values were recorded during monsoon season while the lowest DO values were recorded during summer season. Similar observations are according to (Saloom and Duncan 2005).Free carbon dioxide in water occurs due to respiration of aquatic biota, decomposition of organic matters and also due to infiltration through the soil. Carbon-dioxide is an important component of the buffer system and influences carbonates and bicarbonate concentrations in water. Higher level of free CO₂ observed during summer might be due to the decomposition of organic matters (Chakravarty, et. al., 1959). Co₂ ranges from 2.00 (mg/lit) to 2.80 (mg/lit).The highest Co₂ values were recorded during summer season while the lowest Co₂ values were recorded during monsoon season. Alkalinity ranges from 35.00(mg/lit) to 60.10(mg/lit). The highest TA values were recorded during winter season while the lowest TA values were recorded during monsoon season. Chloride content in water is regarded as an indication of organic load of animal origin from the catchment area (Kumar et al., 2004),Jana (1973) and Govindan and Sundaresan (1979) observed that higher concentration of chloride in the summer period could be also due to sewage mixing, increased temperature and evaporation by water. Chloride ranges from 20.30(mg/lit) to 40.20(mg/lit). The highest chloride values were recorded during summer season while the lowest

chloride values were recorded during monsoon season. Similar observations are according to Kedar et al., (2007).Biochemical oxygen demand test assay procedure involved measurement of oxygen consumed by bacteria while stabilizing organic matter under aerobic conditions, It is necessary to provide standard conditions of nutrient supply, pH, absence of microbial growth inhibiting substance and temperature because of low solubility of oxygen in water.BOD ranges from 4.00 \pm 0.43 to 7.00(mg/lit). The highest BOD values were recorded during winter season while the lowest BOD values were recorded during summer season. Similar observations are according to Sayeshwara et al. (2011), Pawar and Sonawane (2012). Phosphates are essential for the growth of organism and a nutrient that limits primary productivity of the water body. Phosphate ranges from 1.80(mg/lit) to 3.00(mg/lit). The highest phosphate values were recorded during winter season while the lowest phosphate values were recorded during summer season. Nitrate ranges from 0.45(mg/lit) to 0.73 (mg/lit). The highest nitrate values were recorded during winter season while the lowest nitrate values were recorded during summer season. Ammonia ranges from 1.80 (ppm) to 2.60 (ppm). The highest nitrate values were recorded during monsoon season while the lowest nitrate values were recorded during summer season.

4. Conclusion:

The present study concludes that, Velair lake water was not found to be polluted. The physico - chemical parameters values were within the permissible limits. Finally, this lake water is best for fish culturing and irrigation purpose.

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Competing Interests

The authors have declared that no competing interests exist.

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