

SEASONAL VARIATION IN PHYSICOCHEMICAL PARAMETERS OF RANKALA LAKE, KOLHAPUR, MAHARASHTRA, INDIA

G. K. Sontakke and P. S. Shetfalkar

Department of Zoology,
Vivekanand College, Kolhapur (An Empowered Autonomous Institute)
Email: gksontakke@vivekanandcollege.ac.in

ABSTRACT

Present study was undertaken to examine seasonal variation in the physicochemical parameters of Rankala Lake during the year February 2023 to January 2024. Water quality parameters such as pH, temperature, electrical conductivity, total dissolved solids, total alkalinity, total hardness, chloride, nitrate, and phosphate were analysed. The findings indicated that Rankala Lake's water is suitable for irrigation, domestic use, and aquaculture.

Key words- Rankala Lake, Physico-chemical parameter, Seasonal fluctuation

Introduction

Lakes are considered as precious water resources for drinking, irrigation, industrial use, recreation, and other societal demands (Giripunje and Meshram 2017). The diversity of the flora, fauna, and productivity of the wetland systems has been threatened due to polluted lake water (Ramachandra 2001). Anthropogenic activities are responsible for the release of pollutants into the lakes, apart from agricultural waste products, industrial discharges, household sewage generation etc (Taghnia et al. 2011). The physicochemical properties of water bodies change with seasons, and in addition, due to pollution (Forstner and Witlmann, 2012). Communication reports seasonal fluctuation in water quality parameters of Rankala Lake, Kolhapur, Maharashtra, to evaluate its suitability for irrigation, domestic use, and

aquaculture.

Material and Methods

Rankala Lake, located in the heart of Kolhapur city, is a well-known tourist spot. Two sampling sites were selected for the collection of the water samples, site 1 is towards D-Mart, and site 2 is the Padmaraje garden. Samples were collected between 7.00 am and 8:00 am., at intervals of 15 days in one month for the period of one year, i.e. from February 2023 to January 2024. For each sampling event, temperature and pH were measured at the site. Electric conductivity, total dissolved solids, total alkalinity, total hardness, chloride, nitrate, and phosphate, were analysed in the laboratory by using standard methods outlined by Trivedy and Goel (1986) and APHA (2023). The results obtained have been presented in Table 1.

Result and Discussion –

Table 1. Seasonal variation in physicochemical parameters of Rankala Lake of Kolhapur city during February 2023 to January 2024. (Mean \pm Standard Deviation)

Parameters \ Seasons	Summer	Monsoon	Winter
pH	7.45 \pm 0.2081	8.375 \pm 0.55	7.912 \pm 0.2160
Water Temperature (°C)	26.25 \pm 2.362	24 \pm 1.825	22 \pm 0.8164
Dissolved Oxygen (mg/L)	6.4 \pm 0.21602	7.175 \pm 0.2217	8.05 \pm 0.5446
Total hardness (mg/L)	180 \pm 9.1287	160.5 \pm 6.658	150 \pm 7.071
Total alkalinity (mg/L)	27.12 \pm 1.946	36.25 \pm 0.9574	35.025 \pm 1.391
Electric conductivity (μ S/cm)	323.35 \pm 27.58	282 \pm 16.81	300 \pm 51.63
TDS (mg/L)	284.25 \pm 12.60	224.25 \pm 4.349	227 \pm 4.760
Chloride (mg/L)	60.5 \pm 4.795	44.45 \pm 0.6658	75.2 \pm 2.3429
Nitrate (mg/L)	4.95 \pm 0.4795	4.55 \pm 0.1732	3.92 \pm 0.3095
Phosphate (mg/L)	0.92 \pm 0.0559	0.47 \pm 0.0216	0.21 \pm 0.0216

The pH fluctuated within the range of 7.4 to 8.3. The highest value of pH (8.3) was recorded during the monsoon season, while lowest (7.3) was recorded during summer season. Similar results were observed by Jadhav et al. (2013), Anekar and Donagre (2014), and Thangamalathi and Anuradha (2018). Water temperature ranged from 22 °C to 26.25 °C. Higher water temperature (26.25°C) was recorded in the summer, while lower in (22°C) monsoon.. Similar results were reported by Salve and Hiware (2008) and Chaudhari and Sitre (2020). Dissolved oxygen ranged from 6.4 to 8.05 mg/l, with higher values in the winter season. Similar results were observed by Kataria et al. (2006), Devi (2007), Landge and Meshram (2017), and Patil et al. (2022).

The dissolved calcium and magnesium in water are responsible for hardness. In present study, the hardness was within the range of 150 to 180 mg/l. Harney et al. (2013), Patil and Patil (2017), and Shweta and Aruna (2023). During the study. total

alkalinity ranged from 27.12 to 36.25 mg/l, which was highest (36.25 mg/l) during the monsoon and lowest (27.12 mg/l) during the summer seasons. Similar results are observed by Ohal et al. (2011) and Verma et al. (2011). Electric conductivity ranges from 282 to 323.35 μ S/cm, maximum being in the summer season. Similar results were observed by Ahluwalia (1999) and Mendonsa and Prasad (2019), and Stenfert Kroese et al. (2020).

Total dissolved solids (TDS) ranged between 224.25 to 284.25 (mg/l). TDS levels increased during summer season, while, rainwater dilution and rising water levels were the primary causes of the decrease in total dissolved solids during the monsoon season. Similar results were observed by Shoba and Kumar (2022) and Patil and Patil (2017). Chlorides ranged between 44.75 to 75.2 (mg/l), similar to those observed by Sahni et al. (2011). During the present study, nitrate content ranged between 3.92 and 4.95, while. Phosphate between 0.21 to 0.92 mg/l.

The overall results indicated that some anthropogenic activities are responsible for seasonal fluctuation in various physicochemical parameters. However, the water in this lake was found to be suitable for irrigation, domestic use, and aquaculture.

Acknowledgments

The authors are thankful to Vivekanand College, Kolhapur (An empowered Autonomous Institute), for providing all facilities to carry out research.

References

- Ahluwalia, A. A. (1999) "*Limnological Study of wetlands under Sardar Sarovar command area*". Ph. D. thesis, Gujarat University, Ahmedabad.
- Anekar, S., and Dongare, M. (2014). *International Journal of Advanced and Applied Research*, **2(2)**: 14.
- APHA, (2023). "*Standard methods for examination of water and wastewater*." 24th Eds. American Public Health Association, Washington D.C., pp 1516 .
- Chaudhari A. N. and Sitre S. R. (2020). *Int. Res. J. of Science & Engineering*, Special Issue A7: 510
- Devi R. T. (2007). "*Study of some aspects of hydrobiology of Alisagar dam water*" Ph.D. Thesis, S. R. T. University, Nanded.
- Förstner, U. and Wittmann, G. T. (2012). "*Metal pollution in the aquatic environment*." Springer Science & Business Media, pp 488.
- Giripunje, M. D. and Meshram, P. U. (2017). *IJRBT.*, **V (2)** :,698
- Harney, N. V., Dhumani, A. A., and Andrew R. J. (2013). "*Seasonal variations in the physicochemical parameters of Pindavani Ponds of central India*" *Science weekly*, National Agricultural Science Complex (NASC), Dev Prakash Shastri Marg, Pusa Campus, New Delhi, India 110012 pp 1-6.
- Jadhav, A. S., Patil, V. N., and Raut, P. D. (2013). *Europe. Acad. Res*, **1**:2036
- Kataria, H. C., Singh, A. and Pandey, S. C. (2006). *Pollution Research*", **25(3)**: 553
- Landge, K. E., and Meshram, C. B. (2015). "*Physico-Chemical Analysis of Lower Wardha Project Near Mangrul Dastgir, District Amravati*". *IJRBT.*, **V (2)**: 236
- Mendonsa L. and Prasad V. V. (2019). *Indian. Journal of Ecology and Natural Resources.*, **3(5)**: 1
- Ohal, R. R. and Kamble, S. M. (2011). *Nat. Envi. And Poll. Tech.*, **10(1)**: 81
- Patil R. and Patil S. (2017). *Journal of Chemical Biological and Physical Sciences*, **7(4)**:805
- Patil, S. R., Sawant, R. S., Patil, R. S., Sankpal, S. P., and Patil, G. T.(2022). *Environment and Ecology.*, **40 (4)**: 2039
- Ramachandra, T.V. (2001). *Electronic Green Journal*, **1(15)**.
- Sahni, K. and Yadav, S. (2012). *Asian J. Exp. Sci.*, **26 (1)** :61
- Salve, V. B. and Hiware C. J. (2008.) *J. Aqua. Biol.*, **21(2)**: 113
- Shoba, S. M. and Kumar, D. S. (2022). *International Journal of Food and Nutritional Sciences* **11(8)**: 2173

- Shweta, S. and Aruna, M. (2023). *International Journal of Scientific Research in Sciences and Technology* **10(3)**: 696
- Stenfert Kroese, J., Batista, P. V. G., Jacobs, S. R., Breuer, L., Quinton, J. N., and Rufino, M. C. (2020). *Science and Reports*, **10**: 14827.
- Taghinia Hejabi, A., Basavarajappa, H.T., Karbassi, A.R. and Monavari, S.M. (2011). *Environmental Monitoring and Assessment*, **182(1-4)**: 1
- Thangamalathi, S., and Anuradha, V. (2018). *IOSR Journal of Environmental Science, Toxicology and Food Technology*, **12(9)**:11.
- Trivedy, R. K. and Goel, P. K. (1986). "Chemical and Biological method for water pollution studies". Environmental publication, Karad, India, **6**: 10.
- Verma, P. U., Chandawat, D. K., and Solanki, H. A. (2011). *Life sciences leaflets*, **19**: 842