DETERMINING WATER QUALITY INDEX OF ASHOK SAGAR LAKE AT NIZAMABAD DISTRICT, TELANGANA STATE

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Abstract

Physico-chemical characteristics of the water, including its Water temperature, color, odor, pH, total hardness, chlorides, sulfate, phosphates, sodium, BOD, COD, DO, TDS, TSS, total coliform, and water quality index, were measured at the sampling site after the water samples were collected. All samples were brought to the laboratory within a predetermined amount of time, they were sampled and analyzed. The environmental health of surface water is challenged by anthropogenic activities such the discharge of sewage and industrial effluent, recreational activities, excessive fertilization of soil, and the use of pesticides. The key issue that requires an immediate solution is the deterioration of water quality and the rapid depletion of water resources. Bio-monitoring is the use of biological organisms to analyze environmental changes that are typically brought on by human activity. The most recent tool for quick and accurate water quality assessment is biomonitoring. It not only improves the physicochemical and bacteriological properties, but also provides important information on the general soundness of a water body.

Keywords: Water Quality Index, Bio-monitoring, Environmental health.

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INTRODUCTION

Water is a naturally occurring, renewable resource that is essential to maintaining all life on Earth and is always in motion as part of the hydrobiological cycle, Das, S.M. and Srivastava, V.K. 1956. Water is necessary for human consumption, household use, and irrigation. Most of the time, water in nature is not at all clean. Different types of contaminants, including dissolved gases, minerals, and suspended particles, are present. There is a very small amount of these common contaminants. However, because of human activity and urban living, a lot of unwanted chemicals are dumped into water, contaminating it. Water that has been contaminated is discolored, has an unpleasant smell, is unsafe to drink and use for household purposes, and is dangerous for people. India's rural areas lack access to a supply of clean water. Every year, bad water quality affects millions of people, and over 80% of all diseases are water-borne has a distinctive setting. Most lakes, especially those with fresh water, are used by people for things like fishing, irrigation, bathing, and watering cattle. The water quality of the majority of Indian water ecosystems, including rivers, lakes, and ponds, has been severely degraded by irresponsible practices and poor water management throughout the years, Gholami,V et al., (2022) Rajamanickam, R., & Nagan, S. (2016). The enhancement of freshwater aquatic ecosystems is directly influenced by physical elements, with temperature playing a significant effect as well, Annalakshmi, G. and Amsath, A. (2012). The availability of nutrients has a significant impact on aquatic productivity.

MATERIALS AND METHODS

Lake water analysis is an aspect of environmental monitoring. While Ashok sagar Lake is a shallow lake heavily influenced by environmental factors and human activity, poor water quality affects more than just the aquatic bionetwork. It's in the state of Telangana. As part of the reorganization of Telangana, Janakampet village, Yedpally mandal, Nizamabad district. Janakampet is a hamlet in Telangana. About 7 kilometres from Nizamabad and 26 kilometres from Basara. Agarwal A.K. & Rajwar, G.S. (2010), It is the primary source used to irrigate the nearby croplands. Site-I and Site-II were taken for estimation of water sample. The goal of the current experiment was to determine the physicochemical seasonal variation as well as to improve water quality, Chinnaiah, B. & Rao, B.D.(2011). In the study region, two sampling sites, Site-I and SiteII were chosen. Sampling site code, their specification and characters are shown in Table-1. Seasonal water samples were collected in 5-liter cans during the entire year of 2019. Chaterjee G and Raziuddin M. (2006), physicochemical characteristics such as temperature, color, odor, total suspended solids, total dissolved solids, hydrogen concentration, dissolved oxygen, biological oxygen demand, chemical oxygen demand, chloride content, phosphate content, ammonia content, and total hardness were all carefully measured during all sampling and field observations in the morning. These approaches were used to estimate the contents of all these parameters. Digital pH meters were used to measure pH, DO, BOD, and COD. Total hardness was assessed using the EDTA-titration method. Chlorides were assessed using the volumetric method. Ammonia was assessed using the calorimetric method. TSS and TDS were assessed using the gravimetric method (Trivedy and Goel, 1986; APHA, 2005). Based on the Water Quality Index (WQI), the current study assesses water quality.

The mean values of the water parameters were used to calculate the WQI. Based on their importance to water quality, sixteen water parameters were chosen for the current study. Table-2 displays the WQI range and Water Quality Status. Table-3 displays the Annual Mean and Ranges of Water Quality Parameters at Each Site, during One Year of Study Period (2019).

Table 1: Sampling Site showing specification and Characteristic features

Sampling Site Code	Specification of Area	Depth (meters)	Characteristic features
Site-I	Limnetic Area	1.0	Upper layer of the lake with massive light penetration where photosynthesis occur.
Site-II	Benthic	4.5	This includes bottom region it consists of sediment and soil

Table 2: WQI legend (House M. A., J. B. Ellis. 1987)

S.No	**WQI Range**	**Water Quality Status**
1	91-100	Excellent
2	71-90	Good
3	51-70	Medium
4	26-50	Fair
5	0-25	Poor

Table 3: Water Quality parameters at Two sites of the study period with Annual Mean and Ranges

		Mean and ranges of Water Quality	
S.No	**Water Parameter**	**Site-I**	**Site-II**
1	Water Temperature℃	20(9.5-24.5)	28(10-42)
2	Color	Colorless	Light Brown
3	Odor	Odorless	Badly odored
4	pH	7.5(3.1-8.5)	8.4(4.3-11.6)
5	BOD mg/L	10.44(2.1-30)	3.68(3-4.6)
6	COD mg/L	118.41(45-290)	174.33(100-290)
7	DO mg/L	11.04(6.78-19.2)	9.52(8-11.9)
8	TDS mg/L	205.7(134-371)	163.52(120-320)
9	TSS mg/L	347.37(120-360)	402.87(156-423)
10	Ammonia mg/L	0.6(04-08)	0.8(04-09)
11	Chlorides mg/L	30(20-45)	55(30-70)
12	Phosphate mg/L	1.0(1.0-1.2)	1.5(1.0-1.8)
13	Sulphate mg/L	6.0(1.4-8.0)	9.5(6.5-10.0)
14	Total hardness mg/L	40(18-58)	39(10-50)
15	Sodium mg/L	7.1(5.0-9.2)	9.8(5.1-9.5)
16	Coliform MPN/100 ml	1100(700-1200)	1400(800-2500)
	Overall Water Quality Index(WQI)	44	39

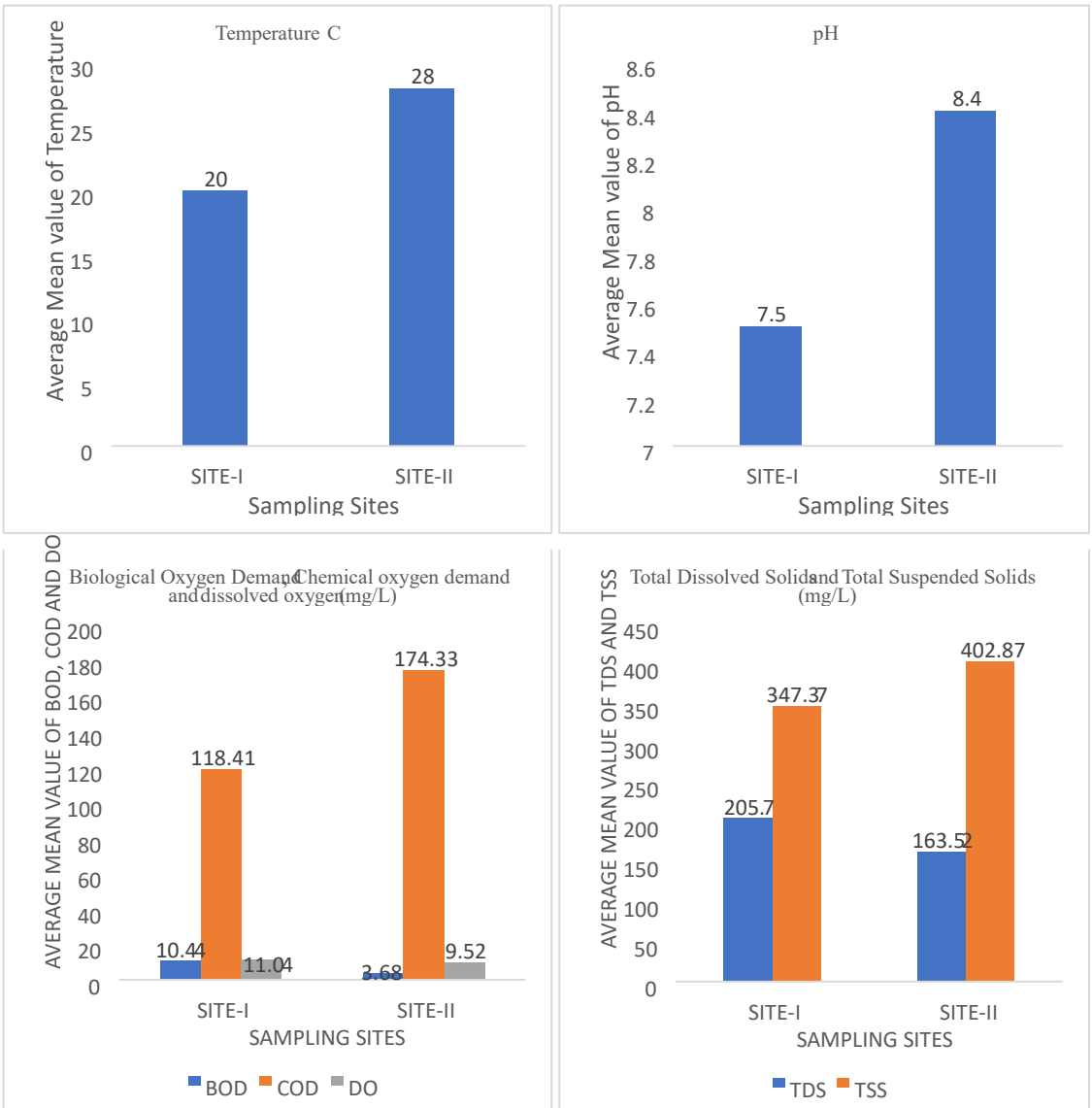

Figure 1: Physical characters of Ashok sagar Lake water showing variations

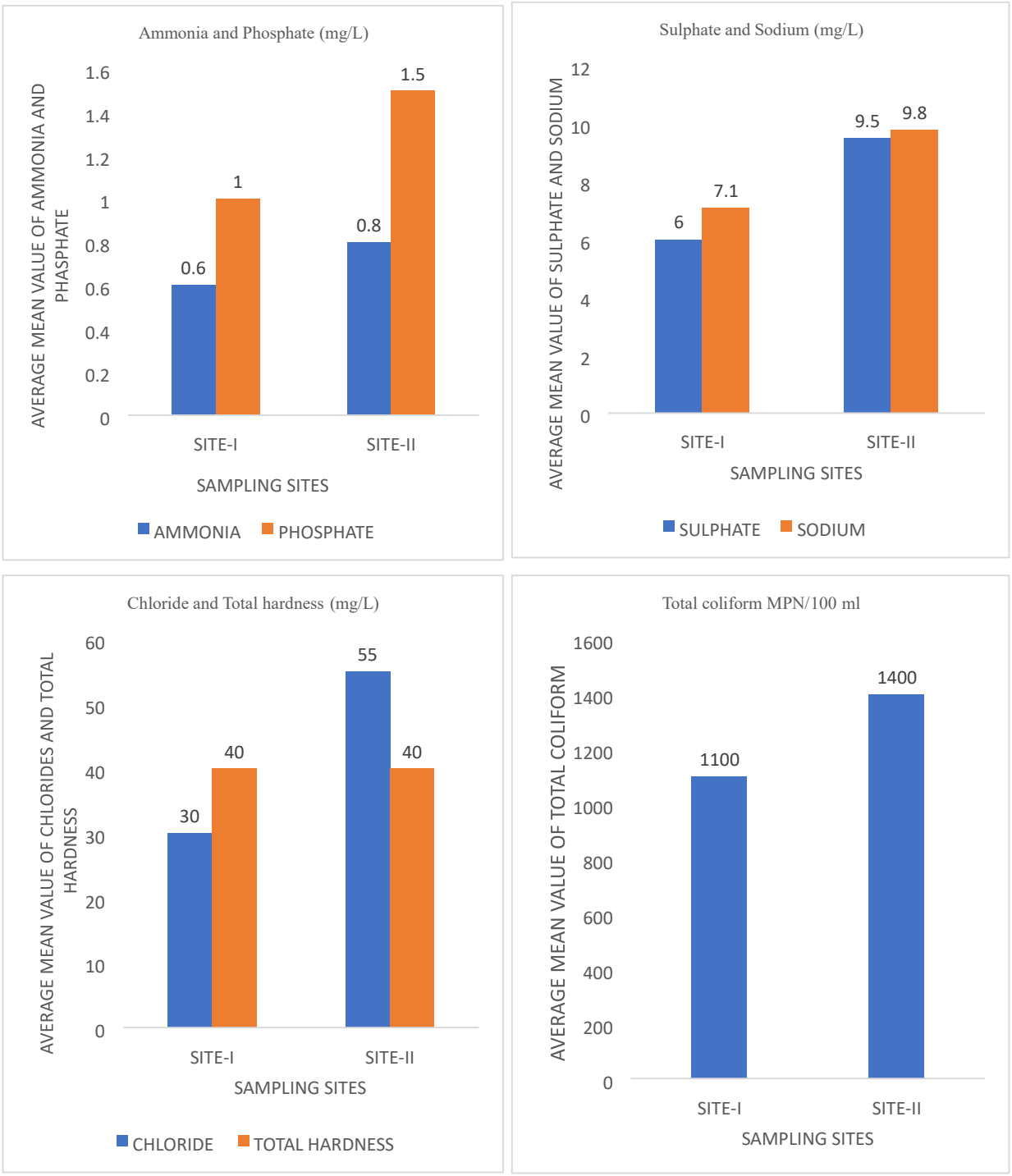

Figure 2: Chemical characters and Total coliform MPN/100 ml of Ashok sagar Lake

RESULTS AND DISCUSSION

Results of various physical, chemical, and biological parameters of the water in Ashok sagar Lake over the study period are shown in Table 3. The temperature at each of the Two sites varied from 20 to 28℃, with Site-I recording the low temperature and Site-II recording the high. pH ranged from 7.5-8.4, with the minimum value seen in Site-I and the maximum at Site-II. Minimum and maximum DO values of 9.52 to 11.04 mg/L were observed in Site-II and Site-I, respectively. BOD levels range from 3.68 to 10.44 mg/L, with Site-II recording the Minimum value and Site-I the maximum. COD from 118.41 to 174.33 mg/L, with Site-I noticing the Minimum and Site-II noticing the maximum. Total hardness ranged from 39 to 40 mg/L, with Site-II recording the Minimum value and Site-I the maximum. Ammonia content ranges from 0.6 to 0.8 mg/L, with the Minimum value being seen in Site-I and the maximum at Site-II. Phosphate content ranged from 1.0 to 1.5 mg/L, with Site-I recording the Minimum levels and Site-II the maximum. The Minimum sodium concentration was in Site-I and the maximum was in Site-II, ranging from 7.1 to 9.8 mg/L. Sulphates ranged from 6.0 to 9.5 mg/L, with the Minimum

concentration found in Site-I and the maximum in Site-II. TDS ranged from 163.52 to 205.7 mg/L, with Site-II recording the Minimum levels and Site-I the maximum. TSS ranged from 347.37 to 402.87 mg/L, with the Minimum value seen in Site-I and the maximum at Site-II. Total coliform MPN/100 ml ranged from 1100 to 1400, with the Minimum amount seen in Site-I and the maximum in Site-II.

The basic characteristics of the water sample are reflected in the physicochemical parameters, Balsubramanian, P. Sivakami.R. (2018). of the water body. The water's color, taste, and odor are signs of good water quality and are backed by values for physico-chemical parameters, Hulyal, S.B. and Kaliwal, B.B. (2009). The average pH readings indicate a state that is practically neutral. DO levels signify oxygen-rich environments. BOD readings demonstrate an organic matter-free environment. (Figures 1 and 2). Surface runoff commonly releases garbage and toxic materials into wetlands, lowering the quality of the water (Lawson, E.O., 2011). According to Kalwale, A.M. & savale, P. A. (2012), this aquatic environmental anomaly might cause changes in biological activity and was a reflection of the occurrence, distribution, and variety of biotic communities. The highest WQI score for the water sample from Ashok sagar Lake in Site-I 44, followed by 39 at

Site-II, is considered the water body with fair water quality.

CONCLUSION

When the lake water quality factors were tested, the results varied between sampling sites. The sample Site-II recorded peak values. The lake has a high concentration of nutrients, which has led to a proliferation in the growth of algae, according to the data. Ashok sagar Lake is categorized as a "Eutrophic Lake" (Nutrient-rich Lake) based on the values of the Water Quality Index (WQI) and ranges of water parameters.

REFERENCES

1. Gholami, V., Khaleghi, M. R., Pirasteh, S., & Booij, M. J. (2022). Comparison of selforganizing map, artificial neural network, and co-active neuro-fuzzy inference system methods in simulating groundwater quality: geospatial artificial intelligence. *Water resources management*, 1-19.
2. Rajamanickam, R., & Nagan, S. (2016). A study on water quality status of major lakes in Tamil Nadu. *Int J Res Environ Sci*, *2*, 9-21.
3. Annalakshmi, G. and Amsath, A. (2012). Studies on the Hydrobiological of river Cauvery and its tributaries Arasalar from Kumbakonam region (Tamil Nadu, India) with reference to phytoplankton. International journal of plant, Animal and Environmental science, 2: 37-46.
4. Lawson, E.O., 2011. Physico-chemical parameters and heavy metal contents of water from the mangrove swamps of Lagos Lagoon. Lagos, Nigeria, Adv. Biol. Res., 5: 08-21.
5. Kalwale, A.M. & savale, P. A. (2012). Determination of Physico-Chemical parameters of Deoli Bhorus Dam water. Advances in Applied science research, Pelagia research library, 3(1) 273-279.
6. Agarwal A.K. & Rajwar, G.S. (2010). Physico-chemical and microbiological study of Tehri dam reservoir, Garhwal Himalaya, India. Journal of Americal science, 6(6), 65-71. 7. APHA, AWWA & WEF (2005). Standard methods for the examination of water and waste water. 21st, Washington, DC.
8. Goel, P.K. Gopal, B and Trivedy, R.K. (1984). Impact of Sewage of Fresh water ecosystem. I General future of Fresh waterbodies and Sewage. Journal of Ecology and Environment science, 6, 83-86.
9. Hulyal, S.B. and Kaliwal, B.B. (2009). Dynamics of phytoplankton in relation to physicochemical factors of Almatti reservoir of Bijapur District, Karnataka State. Environ. Monit. Assess. 153: 45-59.
10. Balsubramanian, P. Sivakami.R. (2018). An analysis of Physico-chemical variables of water in Lower Anicut, Thanjavur District, Tamil Nadu. International Journal of Pharmacy and Biological sciences. Volume 8, 831-835.
11. Chaterjee G and Raziuddin M. (2006). Status of water body in relation to some physico chemical parameters in Asansol Town, West Bengal. Proc. Zool. Soc. India, 2006: 5(2)41-48.
12. Chinnaiah, B. & Rao, B.D.(2011). Physico-chemical characteristics of Pakhal & Ramappa Lakes, A.P. India. Nature environment and pollution technology 10 (1), 103-104.
13. Das, S.M. and Srivastava, V.K. 1956. Quantitative studies on freshwater plankton and hydrobiological factors. Indian J. Ecology, 10(6): 40-55.
14. House M. A., J. B. Ellis. 1987. The development of water quality indices for operational management. Water Science and Technology 19:145–154.