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Analysis of water quality by physico-chemical parameters in Dashaudh Lake Rampur Naikin dist. Sidhi (M.P.)

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Abstract

This Paper Present to study of the Physico-chemical Parameters of Dashaudha lake, Rampur Naikin district Sidhi in Madhya Pradesh. The study was carried out for a period of two years *i.e.* March 2020 to Feb. 2022. Water samples were collected monthly from surface water and analyzed for Temp, pH, Electric conductivity, Total hardness, Alkalinity, TDS (Total dissolved solid), Chloride, DO (Dissolved oxygen). This study was aimed to estimate current status of Physico-chemical characteristics.

Keywords: Water sample, physico-chemical parameters, pollution, aquatic organisms

Introductions

Water is the most important in shaping the land and regulating the climate. It is one of the most important compounds that profoundly influence life. Water is one of the most important and abundant compounds in the ecosystem. All living organisms on the earth need water for their survival and growth. Groundwater is used for domestic and industrial water supply and also for irrigation purposes all over the world. In the last few decades, there have been tremendous increases in the demand for freshwater due to the rapid growth of the population and industrialization's accelerated pace. According to the WHO organization, about 80% of all human beings' diseases are caused by water. Once the groundwater is contaminated, its quality cannot be restored quickly, and device ways and means to protect it. Groundwater plays an important role in supplying water to much of the global population for agriculture, drinking water, and industrial purposes.

Water of adequate purity which is the life blood of our species, is of vital importance in the existence of life (Uduma and Uduma, 2014) ^[1]. Fresh water is one of the most important natural resources crucial for the survival of all living beings. It is even more important for human beings as they depend on it for food production, industrial and waste disposal, as well as cultural requirements (Abdullah *et al.* 2010) ^[2]. Ponds have been used since time immemorial as traditional source of water supply in India.

Water quality generally means the component of water which must be present for optimum growth of aquatic organisms. The productivity depends on physico-chemical characteristics of the water body. The determinant of good growth in water body includes dissolved oxygen, hardness, turbidity, alkalinity, nutrients, temperature, etc. Conversely, other parameters like biological oxygen demand, and chemical oxygen demand indicate pollution level of a given water body. In most water bodies, various chemical parameters occur in low concentrations. However, the water of the ponds, lakes and river is polluted mainly due to discharged waste water from residential areas, sewage outlets, solid wastes, detergents, automobile oil wastes, fishing facilities and agricultural pesticides from farmlands (Bhat *et al.* 2012) ^[3]. Water resources are declining day by day at the faster rate due to rapid urbanization and population load. Deterioration of the water quality is now a very big problem. Increasing water pollution causes not only the change of water quality but also threatens human health and the balance of aquatic ecosystems, economic development, and social prosperity. Therefore, urgent to need to take the important step toward applying an appropriate quality management plan in order to eliminate water pollution.

Study Area

Rampur Naikin is a town and Nagar panchayat (A settlement in transition from rural to urban) in the Sidhi district of the Indian state of Madhya Pradesh. The latitude 24.34 and longitude 81.47 are the geocoordinate of the Rampur Naikin.

Dashaudh Lake is situated in Rampur Naikin, behind the police station and about 500 meters away from the main road. This lake is very deep. This lake is famous since the time of Rampur Kothi. Fish farming is also done in this lake and almost different type of Macro-benthic faunas are present and acts like bioindicator.

Materials and Methods

The physico-chemical characteristics of water is important determinant of the aquatic system. Their characteristics are greatly influenced by climatic vegetation and general composition of water. The water samples were collected from different sites in plastic bottles and transported immediately to the laboratory in bottles to avoid unpredictable changes in different physico-chemical

parameters. The samples were put to examination in the laboratory of Zoology Deptt. Govt. Model Science College Rewa to determine some physico-chemical parameters. The selected parameters including water temperature, pH, EC (electric conductivity), TDS (total dissolved solids), TH (total hardness, Cl^- , DO (Dissolved oxygen), alkalinity were analyzed. The present study was carried out in the month of March, 2020 to Feb. 2022. Observation and analysis were done every month however, the results are expressed on seasonal basis as variation was of less magnitude. Three clearly defined seasons were identified as rainy (July-October), winter (November- February) and summer (March-June). The sampling was done during morning hour (7:30 to 10:30 am).

Results and Discussions

The physico-chemical parameters are essential and fundamental to know the tropical status of an aquatic ecosystem. Table No. 1 represent the seasonal variation in physico-chemical parameters of the Dashaudha lake, Rampur Naikin.

Table 1: Seasonal Variation of Physico-chemical Parameter in Dashaudha Lake, Rampur Naikin, district Sidhi (M.P.) during March 2020 – Feb. 2022. (All parameters are in mg/l except temp, EC and pH)

Variables		First Year (March 2020-Feb.2021)			Second Year (March 2021-Feb. 2022)		
		Summer	Rainy	Winter	Summer	Rainy	Winter
Water	Temp. (°C)	25.32	26.17	19.63	25.29	26.16	19.60
	Transparency (cm.)	28.36	26.76	71.56	28.41	21.73	71.58
	pH	7.91	7.76	8.13	7.90	7.05	8.09
	EC ($\mu\text{mhos/cm}$)	376.24	279.44	196.33	376.23	279.44	196.34
	DO	5.95	6.60	7.35	6.05	6.66	7.40
	Free CO_2 (mg/l)	87.54	80.52	72.04	87.56	80.55	72.10
	TDS (mg/l)	120.22	105.19	80.11	120.23	105.21	80.07
	Total Alkalinity (mg/l)	122.90	119.54	122.79	122.85	119.59	122.81
	Total Hardness (mg/l)	191.62	151.14	120.00	191.74	151.10	120.04
Sediment	Chloride (mg/l)	47.97	36.67	32.53	48.08	36.67	32.45
	pH	8.1	9.4	8.8	8.3	8.6	8.2
	EC ($\mu\text{mhos/cm}$)	194.25	160.21	186.33	188.14	174.6	155.7
	TDS (mg/l)	124.56	105.8	95.64	122.6	99.7	101.3
	Organic matter	69.28	26.84	56.74	68.36	30.14	46.84

Water temperature directly as well as indirectly influences many abiotic and biotic components of aquatic ecosystem. It is the basic environmental factor that effects chemical and biological reaction in water. All the metabolic and physiological activities of life processes are greatly influenced by water temperature. Water temperature is important for calculating the solubility of oxygen and carbon dioxide and bicarbonate and carbonate equilibrium (Hutchinson, 1957) [4]. During winter month the water temperature was found to be minimum, whereas the summer month exhibited the maximum water temperature. Many workers observed similar trends while working on different water bodies (Mishra *et al.* 2008, Sharma and Capoor, 2010 and Mishra and Singh, 2022b) [5-7]. In the present investigation atmospheric temperature varied from 19.60 °C to 26.17 °C. Rise in temperature speed up the biochemical reactions and reduce the solubility of gases. The atmospheric temperature was always found higher than the water temperature.

pH is considered as an important ecological factors and is the result of the interaction of various substances in

solutions in the water. It is the scale of intensity of acidity and alkalinity of water and measure the concentration of H^+ ions. In the present investigation, the pH is recorded between 7.05 to 8.13 in Dashaudha lake. The maximum pH were reported during summer seasons and minimum during monsoon. High values of pH during summer might be low water levels and concentration of nutrients in water. The decrease pH values were due to dilution caused by the rainwater during monsoon. Jakher and Rawat (2003) [8] observe the maximum pH during summer and explained this by correlating rise of temperature with increase in rate of photosynthesis which results in higher consumption of carbon dioxide. Kataria *et al.* (1996) [9] observe that maximum pH in the months of May indicates high rate of photosynthesis.

The specific conductivity of water or a solution in its capacity to conduct electric current and depends on the nature and concentration of ionized salts.

The conductivity of a sample is a numerical expression of its ability to carry on electric current which in turn depend on the ionic strength.

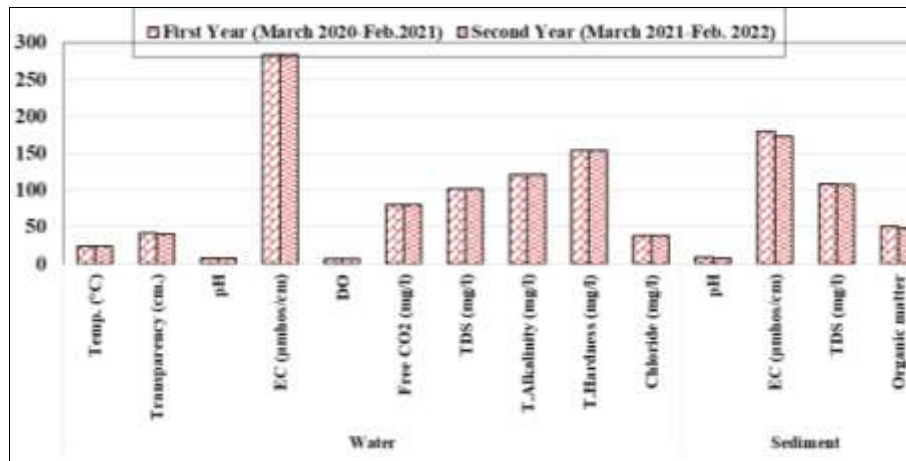


Fig 1: Graph analysis of Physico-chemical Parameter in Dashaudh Lake, Rampur Naikin, district Sidhi (M.P.) during March 2020 – Feb. 2022. Values are averages

In the present investigation seasonally maximum conductivity was recorded during summer season and minimum recorded during the monsoon season. It ranged from 196.33 to 376.24 in first year and 196.34 to 376.23 in second year. Shukla and Shukla (2022) [10] recorded the maximum conductivity during the summer season in Mohan Ram Talab at Shahdol district. Kashyap (2016) [11] too recorded the maximum conductivity during the summer and minimum during the monsoon season in Rewa district, Madhya Pradesh.

In the present investigation, high values of TDS during summer and lower in monsoon. It ranged from 80.07 mg/l to 120.23 mg/l were recorded. Higher values of TDS during summer can be attributed to low water level and high rate of evaporation of water and addition of calcium and magnesium salts and lower in rainy due to dilution. Same result are also founded by Kashyap (2016) [11] and Shukla and Shukla (2022) [10].

Alkalinity is a measure of buffering capacity of the water. It is generally imparted by the salts of carbonates, bicarbonates, phosphate, nitrates, borax, silicates etc., together with the hydroxyl ions in a free states (Jain and Seethapati, 2016) [12]. In the present investigation the total alkalinity ranged 119.54 mg/l. to 122.90 mg/l. The alkalinity values were maximum during summer and minimum during rainy seasons. The increased alkalinity during summer and winter was due to the concentration of nutrients in water. The decrease was due to dilution caused by the rainwater during monsoon. The result is also in close conformity with the finding of Mishra *et al.* (2013) [13] and Kashyap (2016) [11].

Total hardness of water is the sum of the concentrations of alkaline earth metals cations. Hardness is generally governed by calcium and magnesium salts which largely combines with bicarbonates and carbonates giving temporary hardness and with sulphates, chlorides and others anions of a minerals acids causing permanent hardness. In the present investigation the total hardness was recorded in the range of 120.00 mg/l. to 191.74 mg/l. Total hardness were higher during the summer season and lower in rainy season. This could be as a result of low water levels, increases in rate of evaporation at high temperature and the lower rainy season value could be due to dilution. Similar observations were found by various workers (Naik & Purohit, 1996; Yadav *et al.* 2013; Kashyap 2016 and Shukla & Shukla (2022) [14, 15, 11, 10]. On the basis of the observation, the water of the present pond appears to be hard.

Chloride as anion occurs in all natural waters in widely varying concentrations. The origin of chloride in surface water is from weathering and leaching of sedimentary rocks, domestic and industrial wastes discharge, municipal influence etc. In the present investigation, the values of chloride recorded are as under 32.45 mg/lit. to 48.08 mg/lit. The chloride content was at its peak in summer and lowers down during winter season. The higher concentration of chloride is considered to be an indicator of pollution. Concentration of higher chloride in the summer period could be also due to sewage mixing and increased temperature and evaporation by water. Similar result were obtained by Trivedi *et al.* (2009) [16].

Dissolved Oxygen levels are considered as the most important and commonly employed measurement of water quality and indicator of a water body's ability to support desirable aquatic life. Like terrestrial animals, fish and other aquatic organisms need oxygen to live. Dissolve oxygen plays an important role in precipitation and dissolution of organic substances in water. In the present investigation the values of dissolve oxygen recorded ranges between 5.95 mg/lit. to 7.40 mg/lit. in Dashaudha lake. In the present investigation the high values of dissolve oxygen during winter seasons was due to low temperature and high photosynthetic activities and low values of dissolve oxygen during summer is due to high temperature and high rate of oxidation of organic matter, lesser solubility of gas at high temperature and high metabolic rate of organisms. The oxygen concentration also decreases with increase in the salinity. Same observations were found by various workers (Ali *et al.* 1994 and Salam *et al.* 2000) [17-18].

Conclusion

Understanding the quality of water is as important as that of its quantity, since, it is the main factor determining the suitability of water for drinking, agricultural, domestic and industrial purposes (Venkateswaran, *et al.* 2011) [19]. In the Present study provides a base line data for the conservation and monitoring of the pond. It was found that the pond water was unsafe for drinking purposes. Therefore some effective measures are required to enhance the drinking water quality by conservation of water bodies and making water quality management plan for this region.

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References

1. Uduma AU, Uduma MB. Physico-chemical analysis of the quality of Sachet water consumed in Kano metropolis. *Americal. Journal of Environmnt. Energy and Power Res.* 2014;(2):01-10.
2. Abdullah S, Iqbal MA, Fazil MI. Physico-chemical Analysis of the Fresh Water at Kundalika Dam, Upli Dist. Beed, (M.S.) India. *Global Journal of Environmental Research.* 2010;4(1):01-05.
3. Bhat MM, Narain K, Ahmad A, Shukla RN, Yunus M. Seasonal Variations of Physico-chemical Characteristics in several Ponds of Lucknow city affected by Urban Drainage. *Advanced in Environmental Biology.* 2012;6(10):2654-2663.
4. Hutchinson GE. *A treatise on limnology & II Geography, Physics and Chemistry.* John Willey Inc. New York, 1957, 1.
5. Mishra RR, Rath B, Thatoi H. Water Quality Assessment of Aquaculture Ponds Located in Bhitarkanika Mangrove Ecosystem, Orissa, India. *Turkish Journal of Fisheries and Aquatic Sciences.* 2008;8:71-77.
6. Sharma R, Capoor A. Seasonal Variations in Physical, Chemical and Biological Parameters of Lake Water of Patna Bird Sanctuary in Relation to Fish Productivity. *World Applied Sciences Journal.* 2010;8(1):129-132.
7. Mishra R, Singh N. Assessment of water quality status of major aquatic bodies of Vindhyan region (M.P.) India, *International Journal of Advanced Academic Studies.* 2022b;4(3):18-22.
8. Jakher GR, Rawat M. Studies on physico-chemical parameters of a tropical lake, Jodhpur, Rajasthan, India. *Journal of Aquatic Biology.* 2003;18(2):79-83.
9. Kataria HC, Iqbal SA, Chandilya CB. Limnochemical studies of Tawa reservoir. *Indian Journal of Environment Protection.* 1996;16(11):841-846.
10. Shukla B, Shukla N. Physicochemical analysis of Mohan Ram Talab of Shahdol (M.P.), *International Journal of Advanced Academic Studies.* 2022;4(3):189-191.
11. Kashyap VR. Physico-chemical analysis of various water samples of Rewa district (M.P.) India. *International Journal of Applied Research.* 2016;2(1):311-313.
12. Jain CK, Seethapati PV. Limnological studies of kay Amkula Lake. *Indian Journal of Environment Protection.* 1996;16:61-568.
13. Mishra MK, Mishra N, Pandey DN. An assessment of physico-chemical characteristics of Bhamka pond, Hanumana, Rewa District, India. *International Journal of Innovative Research in Science, Engineering and Technology.* 2013;2(5):1781-1788.
14. Naik S, Purohit KM. Physicochemical analysis of some community ponds of Rourkela, *International Journal of Environment and Pollution.* 1996;16(9):679-684.
15. Yadav P, Yadav VK, Yadav AK, Khare PK. Physico-chemical Characteristics of Fresh Water Pond of Orai, U.P. Central India. *Octa. Journal of Bioscience.* 2013;1(2):177-184.
16. Trivedi P, Bajpai A, Thareja S. Evaluation of Water Quality: Physico-Chemical characteristics of Ganga river at Kanpur by using correlation study. *Nature and Science.* 2009;1(6):91-94.
17. Ali M, Salam A, Hussain MZ. Effect of Seasonal Variations on Physico-chemical Parameters of Zaidi Fish Farm, Punjab Univ. *Journal of Zoology.* 1994;9:53-58.
18. Salam A, Ali M, Khan BA, Rizvi S. Seasonal changes in physico-chemical parameters of river Chenab Muzaffar Garh, Punjab, Pakistan, *Journal of Biology Science.* 2000;4:299-301.
19. Venkateswaran S, Elangomannan M, Suresh M, Prabhu MV. Evaluation of Physico-Chemical Characteristics in Groundwater Using GIS - A case Study of Chinnar Subbasin, Cauvery River, Tamil Nadu, India. *CLEAR IJRAGS,* 2011, 1(1).