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STUDY ON SEASONAL VARIATIONS IN PHYSICOCHEMICAL PARAMETER OF RADHARANI MAANSAROVAR (KUND) MATHURA (U.P).

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Abstract

Water is an essential factor survival for all living beings. Water pollution is becoming a big problem due to Environmental changes and increasing anthropological activities in a surrounded the water bodies. The present study on evaluation of physicochemical parameters of Radharani Maansarovar kund Mathura (U.P). During working period investigated seasonal variations in physicochemical parameters like pH, temperature, DO, BOD, TDS, Transparency, hardness etc. Sample collection of Kund different four sites into in two season summer and monsoon at morning time in (2024). pH (6.86/6.7), Temperature (29.33/32.66) °C, DO (2.93/3.63mg/l), TDS (9.13/8.7ppm), Transparency (14/9.66ntu), Hardness (54.26/54.33mg/l) and BOD (10.56/11.9mg/l) showed mean value in summer and monsoon in Radharani Maansarovar Kund. Find that according to seasonal changes physicochemical parameters is changed of this Kund. According to WHO guideline the physicochemical parameter of this aquatic ecosystem (Kund) indicate that water becoming polluted will favorable conditions for Eutrophication. The research work will very helpful for proper monitoring and maintenance of Radharani Maansarovar Kund and aware the local people which is bath and throw debris into it.

Keywords: Radharani Maansarovar (Kund), seasonal variation, physicochemical parameter, water pollution, Eutrophication, Aquatic ecosystem.

1. Introduction

Water is the essential resources for all living being for their survival and growth. The quality of drinking water play a major role in maintaining human and other organism health. Due to increases human population, industrialization, urbanization and wide use of fertilizers in agriculture, stagnant water bodies are polluted with different unfavorable pollutants. therefore

it is essential that the quality of drinking water should be examined at regular time intervals because due to utilization of polluted drinking water human population can suffer from various water-borne diseases.

As like running water bodies stagnant water bodies have more complex and fragile ecosystems because they do not have self-cleaning ability like that of running water bodies. So stagnant water bodies could have more quantities of pollutants. Now days increasing anthropogenic activities in and around the water bodies are influencing the aquatic system and the physico-chemical properties of water also. In the world many stagnant water bodies are present.

Similarly, Radharani Maansarovar kund is also a stagnant water body. It is located in district Mathura latitude 27.594351° and longitude 77.735528° at Vrindavan Mant road. It is approximately 17km from Mathura and 7km away from Vrindavan. Radharani Maansarovar is under Piproli Khadar Gram Panchayat. Through it is being looked after by Theerth Vikas Trust Mathura (U.P). Many fresh water lakes in the world are experiencing changes in water quality, water budget and ecological structures associated with rapid urbanization, agricultural developments and changes in human activities in areas surrounding these water bodies like that Radharani Maansarovar is a well-known site of worship. This water body is routinely contaminated by the frequent visitors of numerous individuals who bathe in it and discard various foreign objects into it. Because of human activities, this water body biotic and abiotic factors are affected. The present study aims to investigate the seasonal variation in physico-chemical parameters of Radharani Maansarovar Mathura (kund).

2. Method And Material

The present study was carried out on Radharani Maansarovar (Kund), located in Raya mant road Mathura (U.P). The water sample collection from the kund at different four sites into two seasons summer and monsoon at morning time in 2024. The water sample collection in 500ml clean polyethylene bottles with full precautions, for analysis of different physicochemical parameters in the laboratory. Some water quality parameters like Temperature, Total dissolved solids, Dissolved Oxygen, Hardness measured at the site itself with the help of water analysis kit. For some other physico-chemical parameter analysis take help from other standard laboratory.

3. Result And Discussion

In this study 24 total water samples were collected 12 in summer (March, April and May) and 12 in Monsoon (June, July and August) season from Radharani Maansarovar (kund) Mathura. These 24 water samples were analyzed for the seasonal variation in physicochemical parameters like that Air temperature, water temperature, pH, Transparency, water level depth, Total hardness, Total dissolved solid, biological oxygen demand, dissolved oxygen, nitrogen, magnesium, iron, calcium, alkalinity, phosphorus, Sulphur, manganese etc.

In the present study the data disclose that there were considerable seasonal variations in water quality with respect to their physicochemical parameters. Physicochemical parameter analysis

of Radharani Maansarovar (kund) water sample studied in different season of 2024. Kund water is greenish color.

Table.1-Seasonal variation in physicochemical parameters in Radharani Maansarovar (Kund) Mathura (U.P) during 2024.

S.N	Parameters	summer			Average value	monsoon			Average value
		March	April	May		June	July	August	
1	Air temperature(°C)	27	33	40	33.33	42	36	32	36.66
2	Water temperature(°C)	23	29	36	29.33	35	34	29	32.66
3	Transparency	15	16	11	14	11	9.5	8.5	9.66
4	pH	5.9	7.9	6.8	6.8	6.6	6.7	6.8	6.7
5	Total Hard ness(mg/l)	53.9	54.9	54	54.26	54.5	53.9	54.6	54.33
6	Total dissolved solids(mg/l)	9.3	9.4	8.7	9.13	8.5	8.8	8.9	8.73
7	Biological oxygen demand(mg/l)	8.9	10.9	11.9	10.56	12.9	10.9	11.9	11.9
8	Dissolved oxygen(mg/l)	2.9	2.7	3.20	2.93	3.50	3.70	3.70	3.63
9	Nitrogen(mg/l)	0.51	0.60	0.54	0.55	0.60	0.55	0.62	0.59
10	Magnesium(mg/l)	1.05	1.04	1.03	1.04	1.02	1.03	1.05	1.03
11	Iron(mg/l)	2.1	2.9	2.9	2.63	3.2	3.1	2.7	3
12	Calcium(mg/l)	21.9	21.5	21.2	21.5	21.3	22.9	21.8	22
13	Alkalinity(mg/l)	4.9	5.45	5.55	5.3	5.50	5.62	5.71	5.59
14	Phosphorus(mg/l)	0.62	0.63	0.52	0.59	0.56	0.57	0.54	0.55
15	Sulfur(mg/l)	1.8	1.7	1.6	1.7	1.6	1.7	1.5	1.6
16	Manganese(mg/l)	1.3	1.2	1.05	1.18	1.95	1.15	1.02	1.37

The result of physicochemical parameter are summarized in the table 1. Air temperature range varies from 27°C to 42 °C and water temperature range varies from 23°C to 36 °C in summer and monsoon seasons during study period of kund. Water temperature showed an inverse

relationship with dissolved oxygen. Such an inverse relationship has also been reported by Bowyer, et al., (2014).

Transparency is an indicator of water quality and can be affected by factors like eutrophication (excess nutrients) and pollution. According to this study transparency of water find 8.5 to 16 in summer and monsoon (table 1). highest transparency occurs in summer and lowest in monsoon. transparency of this kund low from standard value. if the water transparency is too low, indicate a number of problems like-Excessive growth of algae, excess of sediment, biological pollution. Matta, et al., (2017) in their study concluded that total alkalinity shows a positive relationship with depth of visibility, temperature, pH, TDS, total hardness, phosphate, conductivity, chloride, silicate, and respiration. Sharma, et al., (2021) in their research in Hinton River found that during pre-monsoon season pH was Between 6.8 to 7.8 while during post monsoon season 7.2 to 8.2. The result points out that average value of pH slightly acidic 6.7 to 6.8 in summer and monsoon of this kund. Chouhan, et.al.(2022) find that pH fluctuated between 6.7 to 8.2. The minimum pH was recorded during monsoon. During the study hardness of water slightly fluctuated 53.9 to 54.33mg/l in summer and monsoon season it is suitable for aquatic life in kund.

The average value of total dissolved solids (TDS) during study was vary in two season 9.13 to 8.73mg/l summer and monsoon (table 1) it is low range of recommended range. According to this range of TDS kund water indicate a lack of essential minerals in the water. The observation is supported by the study of Agarwal, et al., (2010) in their study on Physicochemical and microbiological study of Tehri dam.

Biological oxygen demand (BOD) represents a crucial indicator water quality, measuring the amount of dissolved oxygen consumed by microorganisms to decompose organic matter in a water sample. The peak value of oxygen during winter was also observed in river Mini in their study by Pate, et al., (2013). Lakhera et al. (2021) determined the biological oxygen demand (BOD) found 3.90 mg/L in monsoon and 1.35 mg/L in winter on River Ganga water at Rishikesh. The present study average value of BOD of kund water 10.56 to 11.9 mg /l this BOD level indicates moderately polluted environment of Radharani Maansarovar kund.

Dissolved oxygen (DO) is a crucial water quality parameter in stagnant water body, essential for the survival and health of aquatic life. Dissolved oxygen shows a significant negative relation with temperature by Zhzng et al., (2015). In the present study average value of Dissolved oxygen (DO) occurs lowest 2.93 mg/l in summer and highest 3.63mg/l in monsoon during study period of kund. It is low from the recommended range of DO in water. Low level of DO can lead to fish stress, disease and even mortality.

Nitrogen exists in various forms in water like ammonia, nitrite and nitrate. Ammonia is toxic to aquatic life while nitrite can be harmful in higher concentrations. Nitrate is generally the least toxic form and it can be utilized by plants as nutrient. In this study find that average value of nitrogen 0.55 to 0.59 in summer and monsoon. Tyagi, et al., (2014) in their study on Assessment of water quality for drinking purpose in Pauri found that high evaporation increases the concentration of nitrate. Chouhan et al, (2022) also found rich contents of

nitrate, with maximum 4.49 mg/l during summer and minimum of 2.8 mg/l during monsoon. Singh, et al., (2010) also noted in their study on Physico-chemical properties of water samples from Manipur River system that nitrate content is maximum during summer. Kumar and Yadav, (2014) studied the physicochemical characteristics of Jodhpur lakes found that nitrate showed positive relation with temperature, TDS, pH, alkalinity, total hardness, chloride, silicate, electrical conductivity, fluoride, and productivity and claimed that during monsoon season phosphate value lower than other seasons. In this work find that average value of Magnesium 1.03 to 1.04mg/l in both seasons. its concentration low from recommended concentration for aquatic organisms. Like that Iron, sulfur, phosphorus also find in this kund water, average value of Iron was 2.63 to 3 mg/l, Sulfur 1.7 to 1.6mg/l phosphorus 0.59 to 0.55mg/l in summer and monsoon. Iron concentration was significantly higher than the acceptable limit 3mg/l > 0.3mg/l phosphorus is an essential nutrients for life, high concentration can lead to excessive Algal growth, potentially causing Algal bloom, phosphorus concentration of this kund within the range typically found in productive fish, phytoplankton growth in kund.

Calcium is a key component of water hardness; calcium level are important for aquatic life and aquatic ecosystem health. The average value of calcium between 21.9 to 22mg/l in summer and monsoon. This concentration of calcium considered low and may require supplementation to support healthy aquatic life and kund ecology.

Manganese is an essential micronutrient for aquatic life. In the present study, the value of Manganese varied between 1.37 to 1.18 mg/l with maximum in monsoon and minimum during summer (2024). According to WHO recommends a concentration of 0.1 mg/l for the protection of freshwater aquatic life.

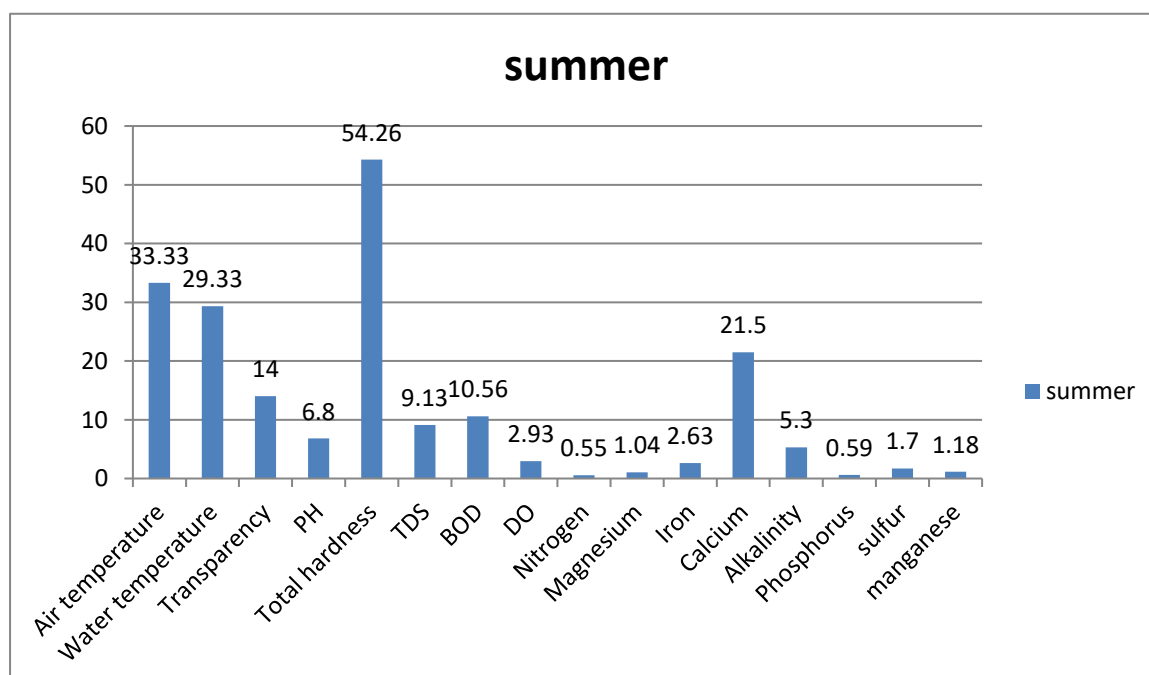


Figure-1 Seasonal variation in physicochemical parameter of Radharani Maansarovar kund Mathura.

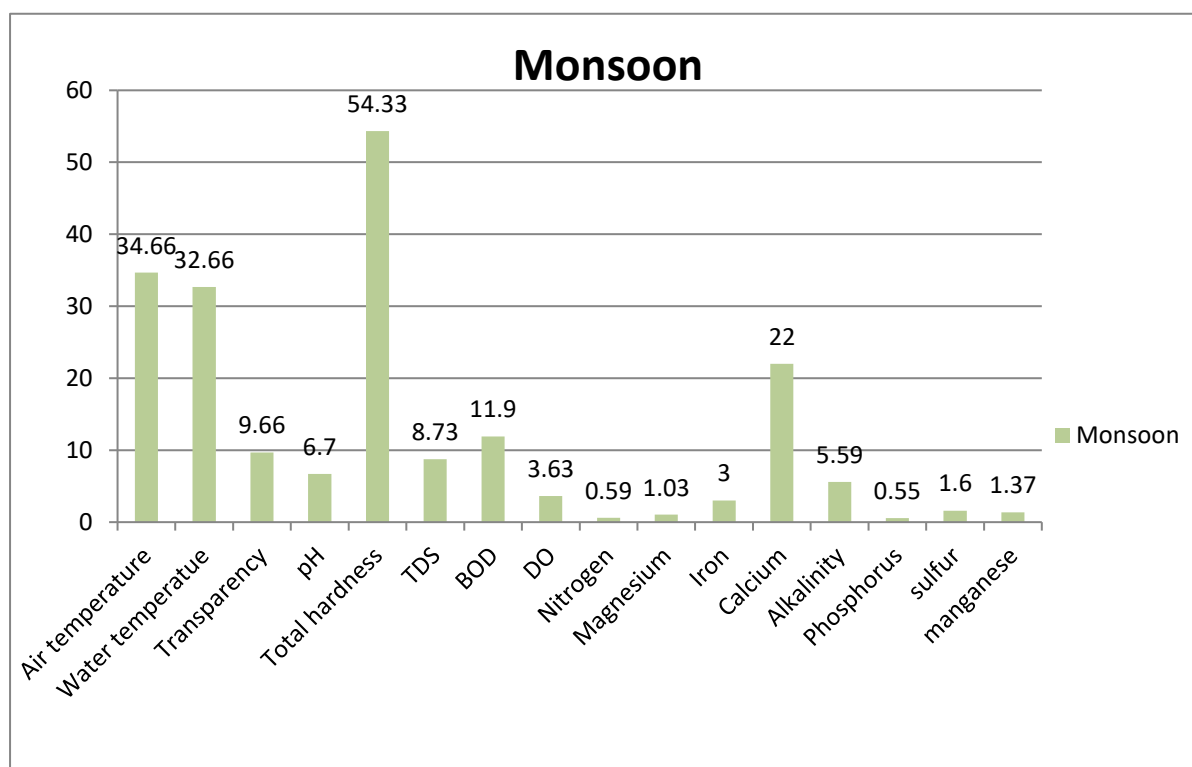


FIGURE-2 Average value of seasonal variation in physicochemical parameter of Radharani Maansarovar kund Mathura.

In this study find out that kund show alkalinity between 5.3 to 5.59mg/l this range indicates that kund is acidic condition. Low alkalinity can lead to several issues in a kund including stunted fish population and increased toxicity from metal leaching into the water.

4. Conclusion

In the present study kund water physicochemical parameter show variations in different season. The physicochemical parameter of stagnant water body can alter by natural reason and Human activities. The kund water sample result are clear to show the low DO, High BOD levels point out in water quality due to organic pollution. This condition is not suitable for human health (which bath in it) and Aquatic ecosystem. As like limited oxygen availability can cause potentially kill fish and other organisms of this Aquatic ecosystem .pH, Alkalinity also showed low range from recommended ranged which indicated that water becoming acidic of this kund which not suitable for some living organism in aquatic ecosystem.

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