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Seasonal variations in physico-chemical parameters of water of Ramsagar Pond, Gaya

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Abstract- The present study deals with the seasonal variations in physico-chemical parameters of water of Ramsagar Pond, Gaya. Water samples from this pond were analysed for various physico - chemical parameters like PH, Turbidity, Conductivity, TDS, Total Hardness, Calcium Hardness, Magnesium Hardness, Chloride, Alkalinity, Iron, Nitrate, Sulphate and Fluoride. The analysis of water sample was done by using standard methods of APHA and NEERI. The pH and turbidity of the pond water was found higher than the maximum permissible limit.

Key words: Seasonal variations, analysis, permissible

INTRODUCTION

Water is the most vital resource for all kinds of life on earth. Good quality of water is very essential for the survival of living organisms.¹ Hence, it is necessary to check the quality of drinking water at regular interval of time, as the prolonged use of contaminated drinking water leads the human population to suffer from various water borne diseases.² In the ecosystem water is considered to be most important component for the sustenance of life but the quality of water present in the water bodies like ponds is getting deteriorated due to rapid industrialization, excessive population growth, use of pesticides, release of domestic sewerage in the waterbody.^{3,4} Quality of water can be determined by studying its physico - chemical characteristics. Environmental pollutants affect the aquatic ecosystem in a synergistic manner.^{5,6} The extent of pollution

can be estimated by studying the physico - chemical, biological and radiological characteristics of the water body. The sustainability of various organisms in a pond depends upon the physical, chemical, biological and radiological factors of water of the pond.

There are five major ponds in Gaya namely Bisar, Dighi, Vaitarni, Ramsagar and Suryakund. Ramsagar pond is located in the heart of the city of Gaya. Rainwater is the main source of water for this pond. It is a perennial fish pond in the heart of the city located at 24.7826°N latitude and 85.004°E longitude. The quality of water of the pond has deteriorated to a small extent during the past few years.⁷ Urbanization may further increase the rate of anthropogenic activities overtime which could enhance trace metal accumulation in the pond and pose a serious health risk.

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Fig 1. Satellite image of Ramsagar Pond, Gaya



Fig 2. Ramsagar Pond, Gaya

MATERIALS & METHODS

Water from four different spots of Ramsagar pond were collected in 1 L plastic bottles. However, much variations in the physico - chemical parameters were not observed. The samples were then analyzed in the Laboratory of Department of Botany, Magadh University, Bodh Gaya, Bihar. Water samples from this pond were analyzed for

various physico - chemical parameters like PH, Turbidity, Conductivity, TDS, Total Hardness, Calcium Hardness, Magnesium Hardness, Chloride, Alkalinity, Iron, Nitrate, Sulphate and Fluoride. The collection and analysis of water was done during summer, rainy and winter seasons of the year 2019. Analysis of water sample was done by using standard methods of APHA (1992) and NEERI.⁸

RESULTS & DISCUSSION

Table 1- Showing the data obtained by physico-chemical analysis of water of Ramsagar Pond Gaya:

| Parameters | Summer Season | Rainy Season | Winter Season |
|---|---------------|--------------|---------------|
| pH | 10.8 | 8.8 | 9.5 |
| Transparency (cm) | 33.5 | 24.8 | 37.4 |
| Turbidity (NTU) | 68 | 77.5 | 69 |
| Conductivity(μ mho) | 1.7 | 2.1 | 1.9 |
| TDS (mg/L) | 195 | 229 | 199 |
| Total Hardness (mg/L as CaCO ₃) | 180 | 172 | 177 |
| Calcium Hardness (mg/L as CaCO ₃) | 91 | 87 | 89 |
| Magnesium Hardness (mg/L as CaCO ₃) | 89 | 85 | 88 |
| Chloride (mg/L) | 59.2 | 48.7 | 53.3 |
| Alkalinity (mg/L as CaCO ₃) | 185 | 170 | 175 |
| Iron (mg/L) | 0.4 | 0.2 | 0.3 |
| Sulphate (mg/L) | 89 | 75 | 85 |
| Fluoride (mg/L) | 1.0 | 0.72 | 0.87 |
| Nitrate (mg/L) | 0.955 | 0.730 | 0.895 |

pH of water serves as a valuable index for environmental factors like Dissolved Oxygen, free CO₂ and dissolved solids.^{9,10} Slight variations were observed in the pH values during the three seasons. The pH of the pond water was found higher than 8.5 in all three seasons with the peak value (10.8) during the summer season.

Very low transparency was observed during the monsoon season. This was due to the presence of suspended solids and suspended organic matter which entered into the pond through monsoon showers. The transparency during the rainy season was found to be 24.8 cm.

The turbidity, TDS and conductivity was found higher during the rainy season. The high values of turbidity and TDS during the rainy season was due to surface run-offs. The other parameters showed their peak value during the summer season and minimum value during rainy season. Nitrate concentration was found higher during the summer (0.955 mg/L) and minimum during the rainy season (0.730 mg/L). Except turbidity and pH, all the other parameters had their concentration within the permissible limit.

CONCLUSION

The physico-chemical parameters reveal that the pond water is not so polluted but rapid urbanization can deteriorate the quality of the water. High pH values beyond the permissible limits may create problem to the fish.

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