Physico-Chemical and Biological Analysis of Dohan River, Ganwali Neem Ka Thana

Anita Mahariya [1] * , Prof.(Dr.) Shiv Kumar Singh [2]

1. Research Scholar, Faculty of Basic & Applied Science, Maharishi Arvind University, Jaipur, Rajasthan, India
choudharyani39@gmail.com ,

2. Supervisor, Faculty of Basic & Applied Science, Maharishi Arvind University, Jaipur, Rajasthan, India

Abstract: Water quality monitoring is crucial for environmental and public health management. This study evaluates seasonal variations in key physicochemical parameters of the Dohan River, Ganwali Neem ka Thana, across different months during 2023-24. Parameters such as air and water temperature, pH, turbidity, dissolved oxygen, total dissolved solids (TDS), and various ions were analyzed over a year. The results indicate significant seasonal variations, highlighting the impact of climatic conditions on water quality.

Keywords: Physico-chemical characteristics, water quality, pollution, fresh waterbodies

- X -

INTRODUCTION

Water quality is influenced by both natural and anthropogenic factors. Seasonal variations significantly affect water chemistry, impacting aquatic life and human consumption. This study aims to analyze the monthly fluctuations in physicochemical parameters of the Dohan River to understand water quality trends.

MATERIALS AND METHODS

Water samples from the Dohan River were analyzed for multiple physicochemical parameters over twelve months. Measurements included air and water temperature, turbidity, pH, dissolved oxygen (DO), total dissolved solids (TDS), carbonate, alkalinity, biochemical oxygen demand (BOD), total hardness, and various ions (calcium, magnesium, chloride, fluoride, nitrate).

RESULTS AND DISCUSSION

Based on the Result Table 1 the following results were obtained which are explained below-

Temperature and pH

Air temperature varied from 9.0°C (January) to 30.0°C (July), while water temperature ranged from 8.6°C (January) to 26.0°C (July). The pH values showed slight fluctuations, with the lowest (7.56) in June and the highest (8.67) in October, indicating neutral to slightly alkaline conditions.

Turbidity and Conductivity

Turbidity decreased from 19.7 NTU in July to 8.1 NTU in April, reflecting seasonal sedimentation changes. Specific conductivity ranged from 116.5 mMhos/cm (October) to 2200.0 mMhos/cm (June),

indicating variations in dissolved ions.

Table 1: Monthly Fluctuation in Physico-Chemical Characteristics of Dohan River, Ganwali Neem ka thana during 2023-24

Sr. No.	Parameters	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June
1	Air Temperature (°C)	30.0	27.0	25.0	25.0	18.0	15.0	9.0	13.0	19.0	22.0	27.0	28.0
2	Water Temperature (°C)	26.0	24.0	22.0	21.2	15.0	16.0	8.6	12.9	18.0	21.0	25.0	25.0
3	Turbidity (NTU)	19.7	18.6	17.1	15.6	14.1	12.6	11.0	10.1	9.4	8.1	8.9	8.0
4	pH	8.66	8.46	8.51	8.67	8.23	8.27	8.28	8.21	8.12	8.01	8.0	7.56
5	Specific conductivity (mhos/cm)	1386.1	1392.2	1553.8	1161.5	1695.3	1815.3	1861.5	1969.3	2000.0	2061.5	2123.0	2200.0
6	Dissolved oxygen (mg/l)	7.8	7.7	8.1	8.4	9.2	11.2	13.3	12.3	8.4	7.2	6.2	6.7
7	TDS	901	907	1015	1070	1102	1180	1210	1280	1300	1340	1380	1430
8	Carbonate (mg/l)	187	177	179	189	193	198	250	210	273	231	187	173
9	Bicarbonate alkalinity (mg/l)	121	144	166	195	230	282	320	330	307	269	190	180
10	Total alkalinity (mg/l)	160	170	174	185	190	198	200	220	223	211	190	170
11	BOD (mg/l)	92.7	142.7	139.2	114.0	142.7	137	109	123	146	138	140	145
12	Total Hardness(mg/l)	280	310	340	380	420	480	520	550	530	480	380	350
13	Calcium (mg/l)	64	65	73	78	80	82	83	88	98	122	134	140
14	Magnesium(mg/l)	28.8	30.0	46.0	50.0	58.0	61.0	7.0	79.2	84.0	99.0	178.0	210.0
15	Chloride(mg/l)	285	301	309	330	362	382	388	400	410	435	446	450
16	Fluoride	0.78	0.79	0.82	0.88	0.91	0.99	1.10	1.20	1.23	1.34	1.45	1.50
17	Nitrate(mg/l)	5.57	6.67	14.0	28.0	32.0	48.0	56.0	68.0	69.0	72.0	75.0	78.0

Dissolved Oxygen and TDS

DO levels peaked at 13.3 mg/l in January, decreasing to 6.2 mg/l in May, suggesting seasonal biological activity influences. TDS fluctuated from 901 mg/l (July) to 1430 mg/l (June), indicating increased solute concentration in summer.

Alkalinity and Hardness

Bicarbonate alkalinity varied from 121 mg/l (July) to 320 mg/l (January), and total alkalinity followed a similar trend. Total hardness ranged between 280 mg/l (July) and 550 mg/l (January), with calcium and magnesium levels peaking in warmer months.

Nutrients and Contaminants

Chloride increased from 285 mg/l (July) to 450 mg/l (June). Nitrate concentrations showed a sharp increase from 5.57 mg/l (July) to 78.0 mg/l (June), indicating potential anthropogenic influence.
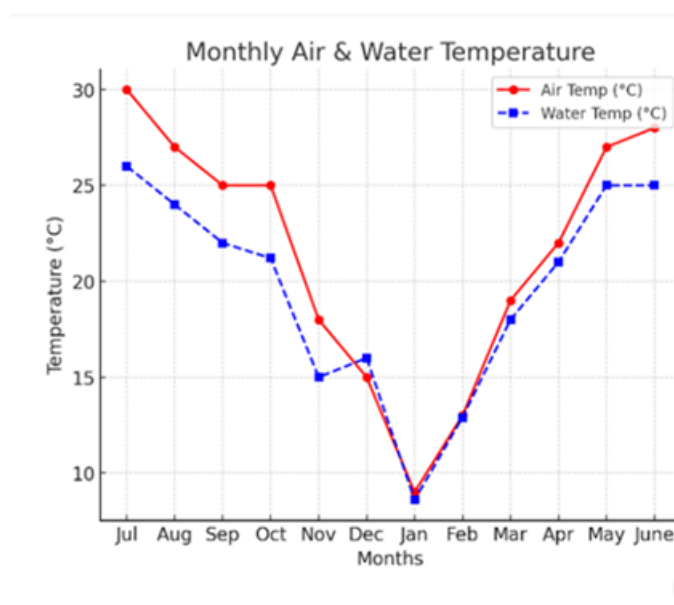

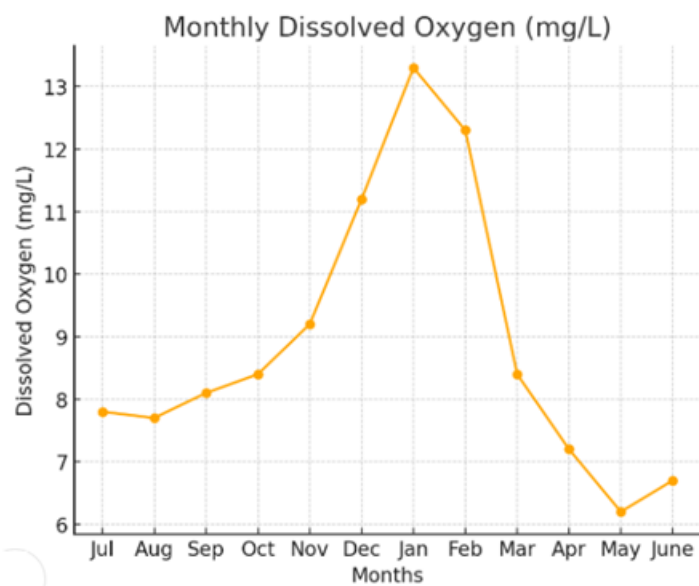**Figure 1: Monthly Variation in air and water temperature**
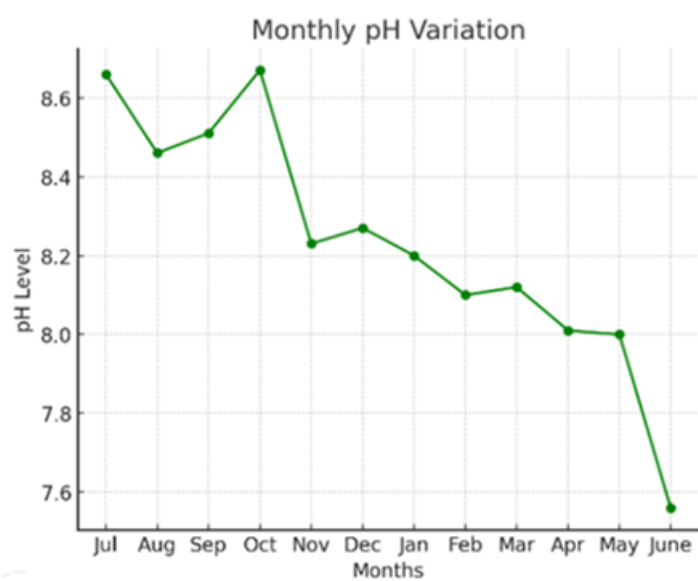
Figure 2: Variation in Dissolved Oxygen (DO)

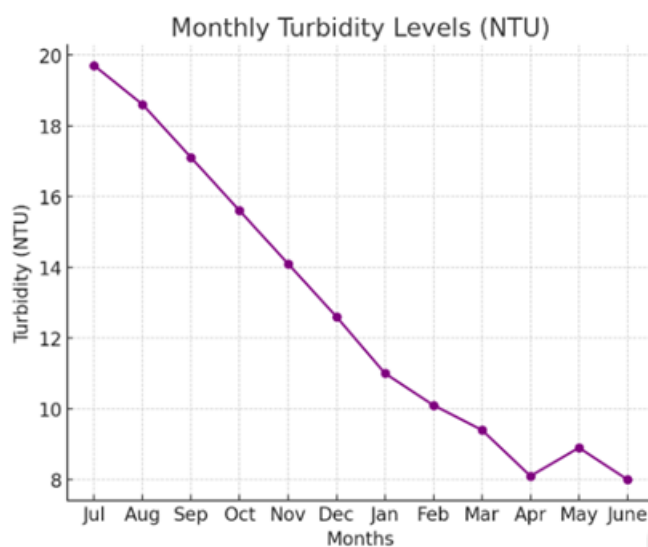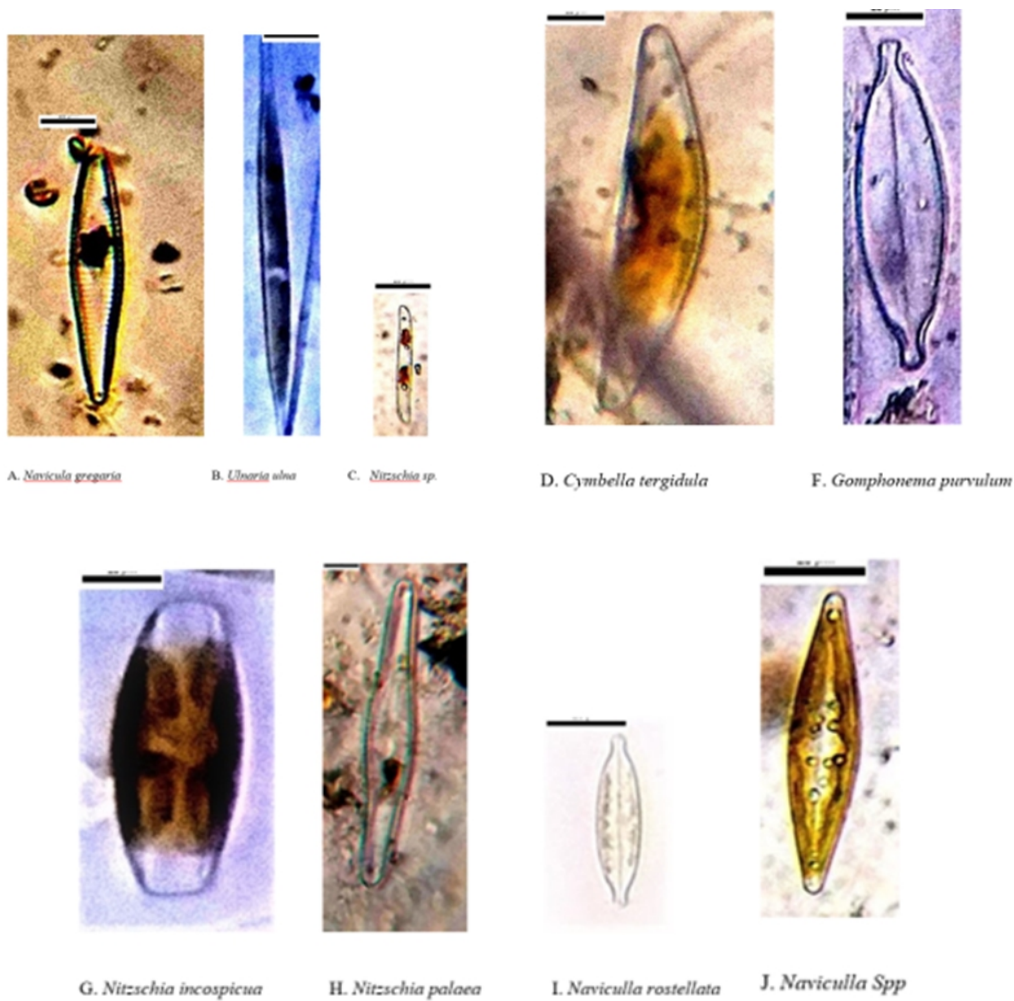
Figure 3: Showing Monthly Variation in pH

Figure 4: Showing Monthly Variation in Turbidity

A. *Navicula gregaria*   B. *Ulnaria ulna*   C. *Nitzschia sp.*   D. *Cymbella tergidula*   F. *Gomphonema purvulum*

G. *Nitzschia incospicua*   H. *Nitzschia palaea*   I. *Naviculla rostellata*   J. *Naviculla Spp*

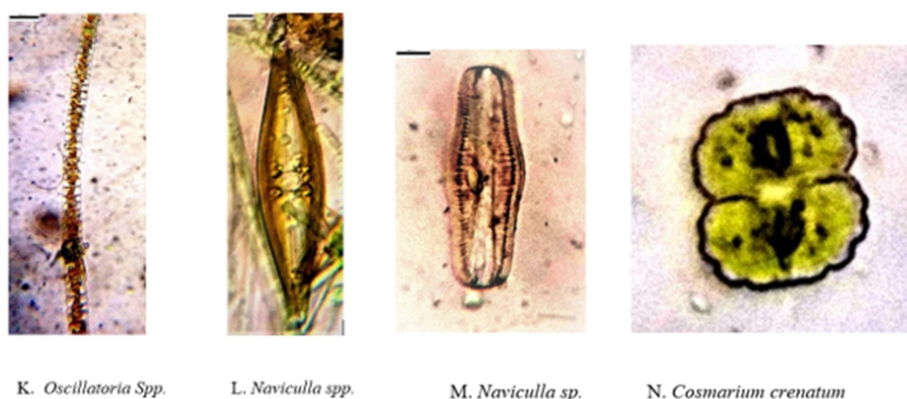K. *Oscillatoria Spp.*   L. *Naviculla spp.*   M. *Naviculla sp.*   N. *Cosmarium crenatum*

Figure 5: Showing Phytoplanktons in different freshwater bodies

Phytoplanktons

After microscopic examination of water samples which were preserved in a refrigerator in Lugol's solution 11 different phytoplankton species were identified. These species are the following.

Navicula gregaria, Ulnaria ulna, Nitzschia sp., Cymbella tergidula, Gomphonema purvulum, Nitzschia incospicua, Nitzschia palaea, Naviculla rostellata, Naviculla Spp, Oscillatoria Spp., Cosmarium crenatum

CONCLUSION

This study highlights significant seasonal variations in water quality parameters of the Dohan River, Ganwali Neem ka Thana. Understanding these trends is essential for water resource management and pollution control. Future research should focus on long-term monitoring and the impact of human activities on water chemistry.

References

1. APHA (2017). Standard Methods for the Examination of Water and Wastewater, 23rd Edition. American Public Health Association, Washington, D.C.

2. Bhatnagar, A., & Devi, P. (2013). Water quality guidelines for the management of pond fish culture. International Journal of Environmental Sciences, 3(6), 1980-1993.

3. Kumar, R., Singh, R., & Sharma, S. (2020). Seasonal variations in the water quality of Indian rivers: A review. Journal of Environmental Science and Pollution Research, 27(3), 3425-3440.

4. Patil, P. N., Sawant, D. V., & Deshmukh, R. N. (2012). Physico-chemical parameters for testing of water – A review. International Journal of Environmental Sciences, 3(3), 1194-1207.

5. Trivedi, R. K., & Goel, P. K. (1986). Chemical and Biological Methods for Water Pollution Studies. Environmental Publications, Karad, India.

6. WHO (2022). Guidelines for Drinking-water Quality, 4th Edition. World Health Organization, Geneva.

7. Singh, V., & Mathur, P. (2005). Investigation of variations in physicochemical characteristics of a freshwater reservoir of Ajmer city, Rajasthan. Indian Journal of Environmental Sciences, 9(1), 57-61.

8. Mishra, A., & Mukherjee, A. (2018). River water quality and ecosystem sustainability: A case study on Indian river systems. Environmental Monitoring and Assessment, 190(4), 210.