

# Study of Physico-Chemical Parameters of Ramsagar Pond of Gaya Town

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Key words : *Physico-chemical parameters, water pond, Pollutants, water quality.*

In the present investigation physico - chemical characters of water samples of Ramsagar Pond of Gaya town were studied on seasonal basis from the month of January to December. The water samples were analyzed for various physico- chemical characteristics like colour, turbidity, pH, conductivity, total alkalinity, hardness, total dissolved solid chloride, phosphate, nitrate, calcium and magnesium contents.

## INTRODUCTION

Water is one of the most precious natural resources because it is important for the survival of the living organisms. 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 (Das, 1989). According to an estimate, about seventy percent of the available water in our country is polluted due to discharge of effluents from industries, domestic waste, land agricultural drainage (Shrivastav and Kanungo, 2013). Fresh water has become a scarce commodity due to over exploitation and pollution (Ghosh and Basu, 1968). Chemicals are major sources of water contamination in the pond (Kataria et al., 2011).

The ponds are shallow water bodies. The water of pond is polluted mainly due to discharge of waste water from the residential area, sewerage out let, solid wastes, and detergent. Physico-chemical parameters of Ramsagar pond, Gaya have been studied which included characteristics like colour, temperature, turbidity, PH, dissolved oxygen, TDS, alkalinity, salinity and hardness.

## MATERIAL & METHODS

Water samples for the study of physico-chemical parameters were collected from different parts of the Ramsagar pond. Sampling was done at an interval of one month. The time of collection of sample was from 8:00AM to 10:00AM. Water Samples were collected manually as per requirement. The water samples were collected in pre-cleaned sterilized polyethylene bottles, atleast from five different parts of Ramsagar pond. Analysis of collected water sample was done by using standard methods of American Public Health Association (APHA-1996). Analytical reagents and chemicals were employed for the preparation of solutions and freshly prepared double distilled water was used in all experiments. The pH was measured by digital pH meters. The turbidity was also measured by digital turbidity meter. The conductivity was measured by conductivity meter. The TDS was measured by TDS meter. Nitrates, Phosphate & Chloride, were measured by spectrophotometer. The total alkalinity was determined by Titrametric method using phenolphthalein and methylene orange. The dissolved oxygen was measured by Winkler's method.

## OBSERVATION & DISCUSSION

The physico-chemical analysis of water of Ramsagar pond, Gaya revealed some important features and changes in the physico-chemical characters of this pond due to pollution. The characters studied in the present investigation included colour of water, which indicated the water to be fairly good. The colour of the water was found to vary from yellowish to greyish yellow and dark green. Temperature of water was found to be 26.78°C as an annual average. The conductivity was recorded to be 2.09 as an annual average. The change in concentration of salt has been found to fluctuate. Turbidity was measured to be 60.41 NTU. Total solid, TDS, and TSS on an average were 256.75 mgL<sup>-1</sup>, 195.37 mgL<sup>-1</sup>, and 60.83 mgL<sup>-1</sup>, respectively. This was due to various chemical substances, salt and other substances. Annual average of dissolved oxygen was found to be 9.97 mgL<sup>-1</sup> exhibiting almost inverse correlation with temperature of water. The salinity was found to be 93.07MgL<sup>-1</sup> as an annual average due to various ionic concentration, precipitation, evaporation etc. Average annual pH was found to be 10.02 and alkalinity was recorded as 163.08 mgL<sup>-1</sup>, Chloride has been found to be 57.18 mgL<sup>-1</sup>, phosphate was found to be 1.005 mgL<sup>-1</sup>, and Nitrate 0.910 mgL<sup>-1</sup>.

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**OBSERVATION**

Detailed observations have been given in the following table.

**Relevant Physicochemical parameters of water in Ramsagar Pond**

Colour	Jan GY*	Feb GY**	March Y**	April	May	June	July	Aug	Sept.	Oct.	Nov.	Dec.	Mean Value S.E.
Temp. ( $^{\circ}$ C)	13.5	18.5	31.25	35.35	42	41	35.4	27.4	24.5	21.25	17	14.25	26.78+0.790
Conductivity ( $\mu$ mho)	1.84	1.91	2.01	2.01	2.76	2.96	2.91	2.18	2.21	2.11	2.11	2.01	2.09+0.034
Turbidity (N.T.U)	60	61	52	47	38	72.5	76.5	77.5	67.5	62	57.5	54	60.41+0.984
T.S. ( $\text{mgL}^{-1}$ )	237	242	242	246	271	283	279.5	273	269	252	240	239	255.75+1.551
T.D.S. ( $\text{mgL}^{-1}$ )	180	183	183	185	210	221	213	211	209	191	178.5	180	195.37+1.529
T.S.S. ( $\text{mgL}^{-1}$ )	57	59	59	61	61	62	66	62	60	61.5	62	60	60.83 $\pm$ 1.098
D.O. ( $\text{mgL}^{-1}$ )	7.42	7.1	5.96	6.26	4.9	4.55	9.51	14.4	11.34	6.36	6.44	7.59	9.97 $\pm$ 0.255
Salinity ( $\text{mgL}^{-1}$ )	98.7	111	101.32	69.69	89.59	98.71	115.65	94	111.71	60.8	93.5	92.19	93.07 $\pm$ 1.619
Hardness( $\text{mgL}^{-1}$ )	160	164	162	170	171	195	191	188	182	177	181	160	175.08+1.133
Calcium ( $\text{mgL}^{-1}$ )	45.1	50.1	51.9	62.1	65.1	60.1	63.17	63.18	67.8	64.01	51.9	63.17	58.96 $\pm$ 0.603
Magnesium ( $\text{mgL}^{-1}$ )	27.62	27.37	26.44	25.91	25.42	32.5	31.74	30.03	27.44	27.15	31.08	23.21	27.89 $\pm$ 0.424
pH	9.45	10	10.25	10.5	10.6	10.6	9.9	9.8	10	9.85	10	9.05	10.02+0.028
Alkalinity ( $\text{mgL}^{-1}$ )	150	165	165	172	175	160	160	165	170	160	160	155	163.08 $\pm$ 0.601
Chloride ( $\text{mgL}^{-1}$ )	64.24	60.95	55.67	38.43	49.28	54.25	63.47	52.12	62.35	33.19	51.41	50.7	51.18 $\pm$ 0.936
Phosphate ( $\text{mgL}^{-1}$ )	0.95	0.975	1.085	1.07	0.91	0.915	0.94	0.94	0.955	1.045	1.115	1.165	1.005 $\pm$ 0.936
Nitrate ( $\text{mgL}^{-1}$ )	1.1	1.075	0.71	0.84	0.955	0.87	0.84	0.76	0.84	0.92	1.015	1035	0.910+0.001

\*Gy: Greyish Yellow \*\*Y: Yellow \*\*\*BG : Blue Green

In Ramsagar Pond, Gaya any fixed seasonal trend of nitrate distribution was not found. The maximum was witnessed in the winter month. However high nitrate value has been observed in monsoon month by Singh (1960) and Verma and Shukla (1970). This finding indicated that difference in the distribution of nitrate may be due to decomposition process as well as anaerobic nitrate ammonification. The lowest value of nitrate in winter and highest during summer were reported (Ajmal et al, 1985).

The inflow of large volume of water during inundation from the surrounding area also changes the physico-chemical feature of Pond (Morgan & Kalk, 1970). In the present investigation atmospheric variation has significant correlation with water temperature, TS, TDS, hardness, and other physico-chemical characters of Pond water (Azmi and Rauf, 2015 and Singh, 1960).

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