



Physico-chemical study of holy reservoir Mansi Ganga at Goverdhan (District Mathura)

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Abstract

Physico-chemical quality of water of Mansi Ganga was studied. The duration of study was July 2008 to June 2009. Three sampling sites were selected for study. The parameters studied were Temperature, Turbidity, pH, DO, BOD, COD, Ammoniacal Contents, Nitrate contents, Total Dissolved Solids, Suspended Solids, Calcium Hardness, Magnesium Hardness. The concentration of the parameters like pH, DO, BOD, COD, Ammoniacal Contents, Nitrate contents, Total Dissolved Solids, Suspended Solids were found above the tolerance limits.

Keywords: Pollution, Pollutants, D.O., B.O.D., C.O.D., Turbidity, Effluents, Hardness, Goverdhan.

Introduction

Water is an essential element for all kinds of life. Water reservoir play an important role because they serve the purpose of various human activity such as bathing, washing, cattle drinking, Pooja Archana and Achaman, disposal of sewage and also disposal of industrial waste. At the time of cultural evaluation natural resources have been exploited by man. The increment in industrialization, decrement in forest and agriculture land and explosion in population have destroyed the natural resources. Mansi Ganga is one of the holiest and religious reservoir of India mainly of 'BrajKshetra'. It is situated in Govardhan town, about 22 km. away from main city Mathura. It has great religious importance, so millions of pilgrims from every corner of the world visit 'BrajKshetra' every year. According to a ritual, a bath in the Kunda after completion of Parikrama of 'Girraj' mountain, gives the desired fruits to the

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devotees. Therefore, every day there is a large gathering of people at the bank of the Mansi Ganga. The water of the Mansi Ganga receives pollutants in the form of detergents (used in bathing and washing) raw milk, flowers, sweets, Dhooops and other things used for Pooja purpose.

Material and Methods

The sampling was done in second week of each month in glass bottle with capacity 300 ml. The physico-chemical characters of the water were determined on the spots, with the help of 'Portable water detection kit' (Model no. CK-710, manufactured by 'Century Instruments Pvt. Ltd., Chandigarh). The temperature was measured on the spot by using temperature sensitive electrodes of the portable water detection kit. Other physico-chemical parameters from samples determined in laboratory using the method suggested by APHA (1985) and NEERI manual (1986). The results were compared with standard permitting parameters as suggested by WHO and ISI. For digestional and pre concentration of water samples standard methods were



followed (Chakraborty *et al.* 1987 and Subramaniam 1987).

Results and Discussion

Temperature is one of the most important physical factors which regulates the natural processes in the environment. It was found in accordance with the seasonal changes. It ranged between 16.9 –36.3 °C. It was higher in May, June and July and lower during winter months i.e. December and January.

Turbidity is one of the common ways to measure the extent of pollution. It is generally caused by untreated and

undecomposed organic matter, sewage and industrial waste. It was very high in July and August because of the ‘Guru Purnima’ and Shraavan Maas’ when there is a mass gathering in the town and millions of peoples take bath in Mansi Ganga. It ranged between 57 NTU to 119 NTU.

pH is an important valuable indicator, which shows the acidic or alkaline nature of water. The water of RadhaKunda was found slightly alkaline. It ranged between 7.2 – 8.8. It is in accordance with Mathur *et.al.* (1987), Dakshiniet *al.* (1979) and Singh *et. al* (1988).

Table 1: Physico chemical parameters of Mansi Ganga

Parameters	Rains				Winters				Summers				Min.	Max	Avg.
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun			
Temp.	30.3	30.7	23.4	26.4	22	19.9	16.9	22.3	23.9	28.1	32.2	36.3	16.9	36.3	26.0
Turbidity	117	119	101	84	78	106	57	75	89	74	86	112	57	119	91.5
pH	7.5	7.2	7.8	8.6	8.4	7.7	8.8	7.9	7.6	8.3	8.6	7.8	7.2	8.8	8.0
D.O.	2.2	2.3	4.2	6.9	4.2	8.8	8.9	3.8	12.8	5.4	2.1	1.88	1.88	12.8	5.3
B.O.D.	36.7	33.8	5.4	9.8	20.1	4.5	5.1	23.2	10.9	24.9	44.1	48.2	4.5	48.2	22.2
C.O.D.	43.4	23.9	13.1	21.2	34.6	18.6	11.1	34.2	16.2	61.1	46.3	64.4	11.1	64.4	32.3
T.D.S.	517	409	415	531	621	461	430	514	674	594	606	706	409	706	539.8
S.S.	428	413	451	389	471	509	341	429	491	421	488	512	341	512	445.3
Ammonia	1.38	1.76	0.22	0.62	0.19	0.03	0.17	0.43	0.82	0.86	1.65	2.01	0.03	2.01	0.8
Nitrate	3.11	4.61	10.5	3.61	1.24	8.41	8.4	3.15	4.6	1.84	1.64	0.94	0.94	10.5	4.3
Ca Hardness	455	441	371	298	345	461	351	284	413	384.4	345	421	284	461	380.8
Mg Hardness	142	84	94	150	167	207	174	94	129	124	187	214	84	214	147.2

All parameters are in mg/l except pH , Temp (°C), and Turbidity (NTU)

Oxygen is the important factor that supports the aquatic life. It is equally essential for the decomposition of chemical waste and dead matter. D.O.showed highly fluctuating trend. It

was maximum in winter but lower in summer.It ranged between 1.88 -12.8 mg/l. (Kumar & Sharma, 2005).BOD is the direct measure of the extent of pollution in the water body. It is the amount of O₂ required by living aquatic



organisms for their physiological process. It was found very high in summer and comparatively low in winter. It ranged between 4.5-48.2 mg/l. The findings were similar to those observed by Kumar & Sharma (2004). It is the amount of oxygen required for the decomposition of chemical waste. A high value of COD shows a higher accumulation of organic waste in the pond. It was found higher during summer and lower during winter. It was maximum (64.4 mg/l) in the month of June. It was in accordance with the observations made by Shankar *et al.* (1986), Reddy *et al.* (1985) and Sangu *et al.* (1983). Total dissolved solids also serve as indicator of pollution. Trend was found to be highly fluctuating. It ranged between 409-706 mg/l. TDS add to turbidity (Saxena *et al.*, 1993 and Siddiqui *et al.*, 1994) and therefore positive correlated with turbidity, temperature, BOD and COD. TSS were found very fluctuating. TSS were higher in summer and lower in winter and ranged between 341-512 mg/l. The findings were similar to those observed by Mathuret. *al.* (1987), Saxena *et al.* (1991) and Shahji *et al.* (1993). Organic nitrogenous matter is destroyed by microbial activity with the production of ammonia. Higher concentration occurs in water polluted with sewage, containing nitrogenous contents. The values of ammonia exhibited tremendous fluctuations. It ranged between 0.03-2.01 mg/l. Ammonia production takes place from non-oxidized accumulated garbage, (Sharma *et al.* 1983, and Shekher *et al.* 1985). The nitrate contents show the state of oxidization of nitrogenous components present in the water. Presence of higher nitrogen contents shows the presence of high DO and low BOD. (Bhaumik *et al.*, 1985). Nitrate contents ranged between 0.94-10.50 mg/l. Hardness of water due to dissolution of Ca and Mg salts. Hard water does not give lather with soap and

have high boiling point. There was no sharp difference in the hardness throughout the year. It showed a positive relation with temperature, DO, SS, this is because the high temperature increases the density of ions in the water.

Summary & Conclusion

From the above observations it was concluded that Mansi Ganga is highly polluted and the use of its water may cause skin diseases and gastro-intestinal problems. It was found in worst condition. Remedial measures are required to sustain the good quality of water and also to save the life of people.

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