Assessment of Yamuna River Water Quality at Agra: A Case Study

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Abstract*- Present work studies of Yamuna river water quality at Agra. Rivers water is important role in ecological balance. Yamuna river is the second largest tributary of the river Ganga. Its water flows from Yamuna Nagar, Panipat, Sonipat, Delhi, Gautam Buddha Nagar, Faridabad, Palwal, Aligarh, Mathura, Agra, Etawah and Prayagraj (Allahabad). Yamuna river water has highly polluted at Agra. The reasons are being urbanization, industrialization and agriculture waste and fertilizers.So,water samples collection have been done on the basis of survey and taking samples on the different intervals at Hathi Ghat near railway bridge, Agra. These parameters were applied to pH (7.6 to 7.95), temperature (28 ^{0}C to 35.5 ^{0}C), electrical conductivity (1680 µS/cm to 1762 µS/cm), dissolved oxygen (4.5 mg/L to 4.8 mg/L), turbidity (15 NTU to 25 NTU), total dissolved solid (1300 mg/L to 1550 mg/L), salinity (0.48 ppt to 0.56 ppt), chloride (270 mg/L to 310 mg/L), acidity (11.84 mg/L to 22.28 mg/L), total alkalinity (295 mg/L to 520 mg/L), total hardness (290 mg/L to 372 mg/L), nitrate ions (33 mg/L to 40 mg/L), biochemical oxygen demand (20 mg/L to 30 mg/L) and chemical oxygen demand (75 mg/L to 90 mg/L). Mostly, water quality parameters have exceeded the desire prescribed limit of Bureau of India Standard. Yamuna river water is not perfect for drinking and domestic purposes and river water could not directly be used.so, its needs to spread the aware for the pollution status of Yamuna river publicly.

Keywords- Urbanization, water pollution, Yamuna river.

1.0 INTRODUCTION

Water is most valuable sources on earth out of which ninety seven percent surface water is salty only three percent is fresh water. It is a renewable source for all of us and is required for biotic development of environment. Surface water played an important role in the hydrological cycle. The Yamuna river is second largest tributary of river Ganga. Its water flows from Banderpooch (Himalayas), through Yamuna Nagar, Sonipat, Delhi, Gautam Buddha Nagar, Faridabad, Palwal, Aligarh, Mathura, Agra, Etawah and Allahabad [1].The river water is usually confined to a channel made up of stream bed between river banks. Its water is used as sources for domestic, agriculture and industrial usage. In total, seventy percent water is used for irrigation purposes, twenty two percent is consuming for industrial purpose and remaining eight percent is used for different domestic activities. Domestic and industrial unwanted materials are the main resource of water pollution [2]. Some industries are discharging their waste into Yamuna river which includes pulp and paper, sugar, distilleries, textiles, leather, chemical, pharmaceuticals, oil refineries, thermal power plant etc. All these industries are situated at Yamuna river bank [3].Its needs to spread the aware for the pollution status of Yamuna river publicly [4]. It suggested that Yamuna river water could not directly be used [05].

2.0 MATERIALS AND METHOD

Yamuna river is most polluted river in North India [6] Its water flows from Banderpooch, Yamuna Nagar, Sonepat, Delhi, Gautam Buddha Nagar, Faridabad, Palwal, Aligarh, Mathura, Agra, Etawah and Allahbad.Its water is very polluted at Agra. There are many industries in the surrounding area and urban waste disposal exist in the region. Water quality monitoring at Hathi Ghat, Agra. River water samples were collected in the summer season during 2014-2016 The sampling containers were washed with distilled water and ringed by river water sample. Its samples were immediately transported to the laboratory. Water samples were stored at 4^{0}C in refrigerator. Its samples were analyzed by standard method [7-8].

3.0 RESULTS AND DISCUSSION

Yamuna is one of the most polluted river in the India. Its basin is also established in large urban and industrial centers. Water pollution is increasing in it due to rapid economic development. Fourteen physicochemical parameters were analyzed by standard method and comparison has been made according to BIS.

Table 1: Water quality monitoring at Hathi Ghat, Agra.

Water quality parameters	**Unit**	**BIS**	**Hathi Ghat near railway bridge, Agra.**				
			2014	2015	2016	Min	Max
pH	--	6.5-8.5	7.6	7.95	7.7	7.6	7.95
Temperature	˚C	--	28	35.5	33	28	35.5
Electrical Conductivity	µS/cs	1000	1680	1762	1750	1680	1762
Dissolved Oxygen	mg/L	4-6	4.6	4.8	4.5	4.5	4.8
Turbidity	NTU	10	25	17	15	15	25
Total Dissolved Solid	mg/L	500	1300	1550	1437	1300	1550
Salinity	ppt	--	0.48	0.56	0.53	0.48	0.56
Chloride	mg/L	250	270	310	298	270	310

Acidity	mg/L	--	14.74	11.84	22.28	11.84	22.28
Total Alkalinity	mg/L	200	295	474	520	295	520
Total Hardness	mg/L	200	290	372	310	290	372
Nitrate Ion	mg/L	45	40	35	33	33	40
Biochemical Oxygen Demand	mg/L	10	23	30	20	20	30
Chemical Oxygen Demand	mg/L	10	75	90	80	75	90

The hydrogen ion concentration value varies from 7.6 to 7.95. The hydrogen ion concentration values are in permissible limit. The temperature ranges from 28^0C to 35.5 ^{o}C in the observation period. The EC values varied from 1680 µs/cm 1762 µs/cm. The EC values are in high permissible limit indicating high dissolve ion present in water. The dissolved oxygen value varies from 4.5 mg/L to 4.8 mg/L.The turbidity varies from 15 NTU to 25 NTU, indicating soil runoff in river water. The TDS values varied between 1300 mg/L to 1550 mg/L. Its values are above the BIS permissible limit. It indicates that, Organic matters are also present in water. The salinity values varied from 0.48 ppt to 0.56 ppt. The chloride value varies from 270 mg/L to 310 mg/L .Chloride values are above the BIS permissible limit and indicated present in salty water. The acidity values of water varied from 11.84 mg/L to 22.28 mg/L. The total alkalinity values varied 295 mg/L to 520 mg/L indicated that dissolved carbon dioxide present in river water. The total hardness values ranged between 290 mg/L to 372 mg/L. All samples total hardness values are above the BIS permissible limit. It indicates that calcium and magnesium ion is present in water sample. The nitrate values vary from 33 mg/L to 40 mg/L. The BOD values varied between 20 mg/L to 30 mg/L.and are not in permissible limit indicating organic matter contamination in water. The COD values varied from 75 mg/L to 90 mg/L. It values are above the BIS permissible limit and indicating oxidation of waterborne organic and inorganic matter present in river water.

4.0 CONCLUSIONS

Fourteen water quality parameters have been analyzed for three years. High values of turbidity, BOD, COD, total alkalinity, total hardness, TDS Chloride, and EC were found in the samples. The pH is within their respective desirable limit at site. Assessment of water quality indicated that Yamuna river water is not perfect for drinking, and domestic purposes.

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