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Investigations of Water Quality in Rainstorm Season in Yamuna Waterway, Allahabad

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Abstract—*We introduce a broad examination of physico-chemical parameters of water tests of Yamuna River at Allahabad. Water tests under examinations were gathered from the diverse locales of Allahabad and its connecting zones amid storm (July-September) year 2015 and 2016. The watched estimations of various physico-concoction parameters like Alkalinity, Chloride, Conductivity, Turbidity and Total hardness (TH) of tests were contrasted and standard esteems suggested by CPCB and BIS .All the physico - chemical parameters for monsoon seasons are within the highest desirable or maximum permissible limit set by CPCB, BIS except turbidity which was high while Alkalinity, Chloride, Conductivity and Total hardness are less than the values prescribed by CPCB and BIS.*

Keywords*: Deteriorating, Oligosaprobic, Pollution status, Water quality*

1. INTRODUCTION

Water contamination is the presentation of synthetic, physical, or natural operators into water that corrupts water quality and antagonistically influences the living beings that rely on upon the water. Expanded urbanization and industrialization in the bowl, has brought about contaminating the stream, since the waterway has been favored waste transfer site for modern and household effluents (singh, *et al.,* 2012) River contamination in India has now come to a state of emergency because of spontaneous urbanization and quick development of industrialization. The whole exhibit of life in water is influenced because of contamination in water (Saksena, *et al.,* 2008) River stream is profoundly factor concerning climatic circumstance and seepage design. Vertical blending is accomplished because of winning current and turbulence. Urbanization and industrialization are developed close waterways so as to draw water for different uses, yet subsequently wastewater is frequently discharged without legitimate treatment bringing about overwhelming stream contamination (Sharma, *et al.,* 2008) The level of sullying is routinely assessed by inspecting physical and segment uniqueness of the water dead body (Duran and Suicnz, 2007). Field related to water pollution of streams like Ganga (Pandey, 1985; Singh *et al.,* 1999; Sahu *et al.,* 2000; Rao *et al.,* 2000; Joshi *et al.,* 2009), Godavari (Rao *et al.,* 1993; Rafeeq and Khan, 2002), Yamuna (Meenakshi, *et al.,* 2002; Anand, *et al.,* 2006). A test has, thusly, been through to study water sullying in conduit Yamuna in Allahabad.

2. MATERIALS AND METHODS

The Water test had been gathered in Plastic jug holders from better places viz. Bargad ghat (25°41'95"& 81°82'81"), Gau ghat (25°43'07"& 81°84'64"), New scaffold (25°42'65"& 81°86'13") and Saraswati ghat (25°43'03"& 81°86'86") in Yamuna River in Allahabad locale, Uttar Pradesh. The water tests were shaped from all the four investigating stations set up on Yamuna River from July, August and September 2015 and 2016. The month to month trial of subsurface water were accumulated in the midst of consistently in the early hours of the day i.e. between 8 am to 10 am awesome thought was taken to go without spilling of water and air ascending at the period of test social occasion. A segment of the physico-synthetic characteristics of water including water Temperature were settled at the assessing stations, while distinctive parameters including Turbidity, Conductivity, Alkalinity, Total hardness and Chloride were inspected in the lab. The physico-engineered characteristics of dilute were bankrupt as shown by the systems for APHA (2005) and Trivedy and Goel (1984).

3. RESULTS AND DISCUSSION

The analyzed outcome of water feature parameters in torrential rain seasons of 2015 and 2016 of four site of Yamuna River Allahabad are obtainable in Table 1 and shown in Fig. 1- 5.

Conductivity is the measure of limit of a substance or answer for behavior electrical ebb and flow through the water. In the present study, conductivity mean fixation in stream water tests ran from 0.29 ± 0.051 to 0.61 ± 0.165 most

minimal conductivity esteem (0.27 GS cm-1) was seen at Site I and most elevated estimation of conductivity (0.69 GS cm-1) was seen at Site IV in 2015 and mean focus 0.31 ± 0.179 to 0.61 ± 0.734 least conductivity esteem (0.25 GS cm-1) was seen at Site I and most noteworthy quality (0.65 GS cm-1) was seen at Site II in 2016. Comparable perceptions were likewise reported as for Pollar River (Khare and Unni 1986). The present study is as per the above perceptions. Be that as it may, most extreme estimation of electrical conductance was recorded amid blustery season as for River Ganga at Gazipur (Shukla, *et al.*,1992).

Alkalinity is the quantitative capacity of a water test to kill a solid corrosive to an assigned pH (Singh and Nath, 2015) Alkalinity in water is because of the nearness of carbonates, bicarbonates and hydroxide constituents, which might be gotten from broke up rocks, salts or dregs (Kumar, *et al.*, 2012). The Alkalinity mean focus in waterway water tests extended from 200.3 ± 7.318 to 206 ± 0.170, Alkalinity in Yamuna stream fluctuated from 190 mgl-1 at Site II to 211 mgl-1at Site I in 2015 and mean fixation 206.3 ± 1.087 to 207.7 ± 0.631, Alkalinity in Yamuna stream differed from 192 mgl-1 to 231 mgl-1at Site I in 2016.

Chloride fixation in water demonstrates the nearness of natural waste in water, essentially of creature source (Thresh *et al.*, 1949). It increments with ammonical nitrogen which additionally owes itself for the most part to creature excreta. The Chloride mean focus in waterway water tests went from 200.4 ± 0.674 to 207.5 ± 0.535, Chloride in Yamuna stream shifted from 192.5 mgl-1 to 211.5 mgl-1at Site III in 2015 and mean fixation 197.8 ± 1.257 to 199.8 ± 1.002, Chloride in Yamuna stream changed from 190 mgl-1 at Site III to 213 mgl-1at Site III, IV in 2016. The chloride focus was entirely low in this waterway which mirrors that there is less measure of natural misuse of creature starting point and for all intents and purposes no release of civil and mechanical squanders. Low amount of water level amid spring, summer and pre storm might be the explanation behind the expansion of the chloride focus which confirmed with the investigation of Sukhija (2007).

The local wastewater which goes into waterway may include critical amount of natural matter and inorganic material that add to turbidity. The Turbidity mean focus in waterway water tests extended from 155.24 ± 6.080 to 160.36 ± 5.355, Minimum turbidity (95.61NTU) and greatest worth (200.14 NTU) was recorded at Site IV in 2015 and mean fixation 202.72 ± 0.686 to 203.50 ± 0.699 least turbidity esteem (195.12 NTU) was recorded at Site I while most extreme quality (211.12 NTU) was recorded at site IV in 2016. Turbidity values increase as a consequence of the flow of rainwater carrying suspended particles and the discharge of industrial effluents (Unni, 1985).

Cation of calcium, magnesium, iron and manganese add to the hardness of water (Shrivastava and Patil, 2002). The TH mean fixation in waterway water tests ran from 237.7 ± 0.713 to 248.7 ± 0.291, least estimation of aggregate hardness in the stream was 229 mgl-1 at Site III while greatest worth was 250 mgl-1 at Site II in 2015 and mean focus 218.3 ± 0.199 to 224 ± 1.278, least estimation of aggregate hardness in the waterway was 210 mgl-1 and most extreme quality was 237 mgl-1 at Site I in 2016. The grouping of hardness increments towards the late spring season, because of low level of water and low speed of water ebb and flow (Shukla *et al.*,1992).

The delayed consequences of watching undertaking address the fundamental examination of its sort endeavored on each one of the four site of Yamuna streams structure in Allahabad region to assess the way of water for drinking and water framework purposes. On the preface of various parameters mulled over, Yamuna River in this extend can be put under oligosaprobic. Exactly when distinctive parameters of our review are differentiated and that of Indian gages (IS, 1974, 1991) for untamed water supply, angle society and water framework, it was revealed that each and every such parameters are well inside the limits (Table 2).

Table 2: Comparison of physico - chemical parameter of Yamuna River with that of IS, BIS and CPCB

Parameter	Present study on Yamuna River 2015	2016	Indian standard	CPCB	BIS
Conductivity (μScm^{-1})	0.27 – 0.69	0.25 – 0.65	1000	25	-
Alkalinity(mgl^{-1})	190 - 211	192 - 231	200-600	600	200
Chloride(mgl^{-1})	192.5 – 211.5	190 - 213	600	250	250
Turbidity(NTU)	155.24-160.36	202.76-203.50	5	10	10
Total Hardness(mgl^{-1})	229 - 250	210 - 237	300-600	600	300

Examination of water quality for drinking explanations behind each of the four locales furthermore assumed that water was found inadmissible for drinking reason, while found fit for water framework reason. The water qualities considered for the reviews demonstrate that the conduit water in the Yamuna River is slight dirtied and can fill in as an average living space for some maritime animals and plants. There is also desperate necessity for meaning of techniques for keeping up water nature of the entire four goals in Yamuna stream of Allahabad.

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Table 1: Seasonal Variation of Water Quality in Yamuna River in Monsoon Season 2015 - 2016

Parameters	Site I		Site II		Site III		Site IV	
	2015	**2016**	**2015**	**2016**	**2015**	**2016**	**2015**	**2016**
Conductivity	0.29 ± 0.051	0.31 ± 0.179	0.60 ± 0.132	0.61 ± 0.0734	0.61 ± 0.128	0.59 ± 0.083	0.61 ± 0.165	0.59 ±0.0648
Alkalinity	203.6± 0.744	206.3 ± 2.112	200.3 ± 7.318	206.3 ± 1.087	206 ± 0.170	207.7 ± 0.631	205.7 ± 0.577	207.3 ± .912
Chloride	207.5 ± 0.535	199.8 ± 1.002	206.7 ± 0.489	197.8 ± 1.257	204 ± 1.001	198.4 ± 1.276	200.4 ± 0.674	199.1 ± 1.213
Turbidity	155.24 ± 6.080	202.76 ± 0.739	157.75 ± 5.525	203.50 ± 0.699	160.36 ± 5.355	202.78 ± 0.640	159.08 ± 5.396	202.72 ± 0.686
Total hardness	248.7 ± 0.291	224 ± 1.278	237.7 ± 0.713	222 ± 0.843	241 ± 0.869	223.7 ± 0.758	239.3 ± 0.519	218.3 ± 0.199

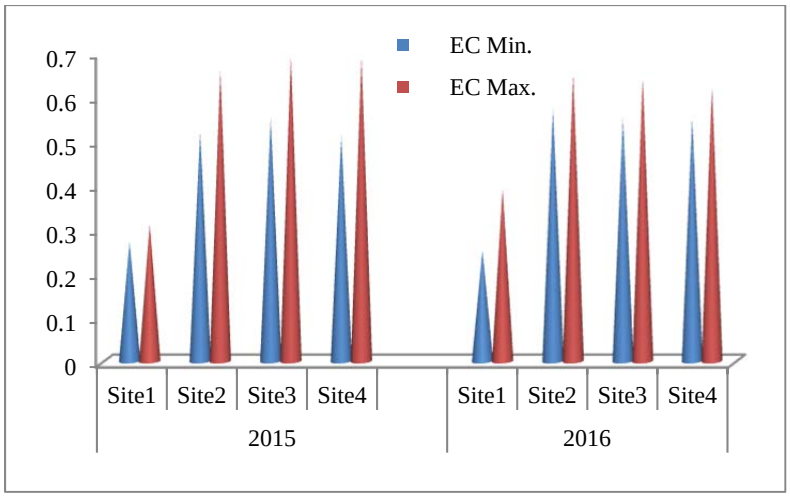

Fig.1: Variations in EC at Selected sites

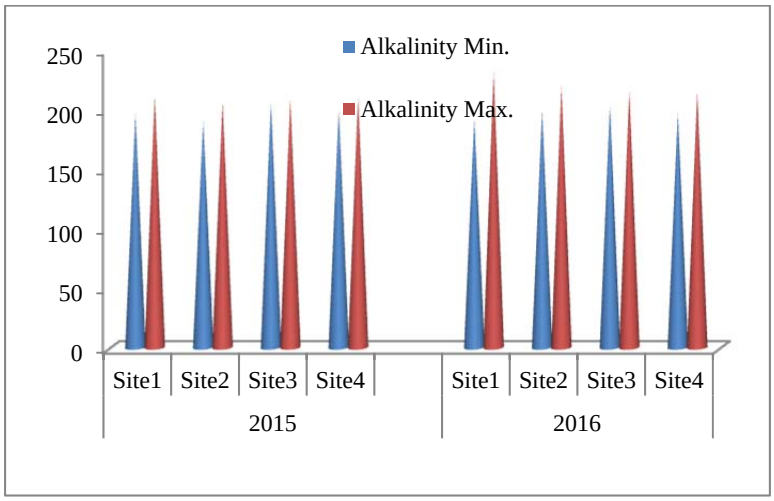

Fig.2: Variations in Alkalinity at Selected sites

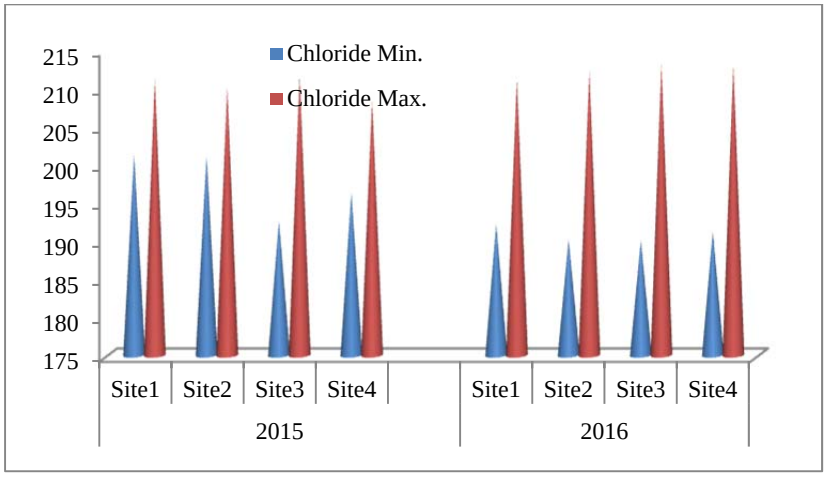

Fig.3: Variations in Chloride at Selected sites

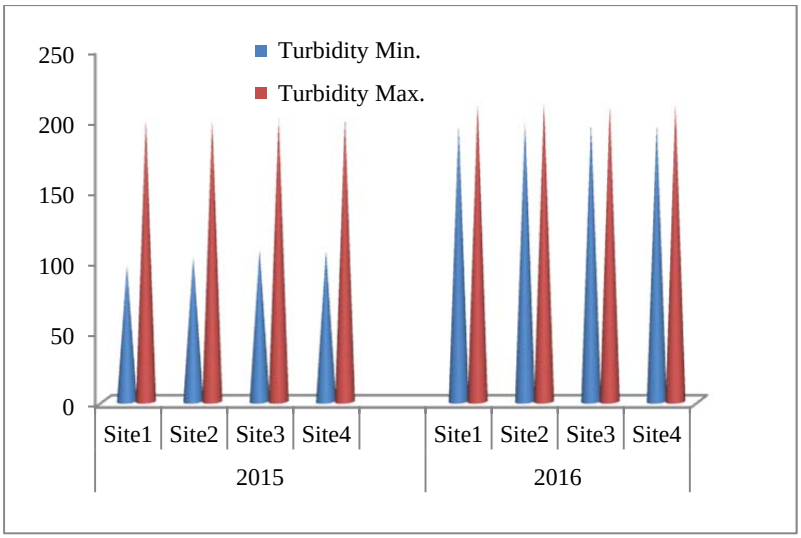

Fig. 4: Variations in Turbidity at Selected sites

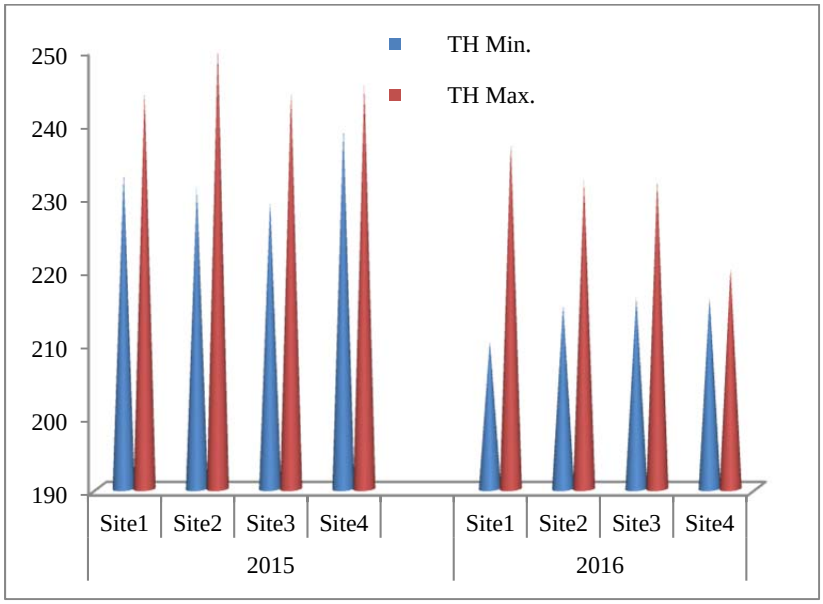

Fig.5: Variations in Total hardness at Selected sites