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An empirical analysis on quality of water of river Yamuna from Agra to Etawah

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Abstract
It has revealed that the Yamuna River in Agra has almost 'died' - and there are no signs of healing as even after treatment, the water remains toxic and unfit for any purpose. Bacteriological water quality status in terms of total coliform and faecal coliform count was studied.

Keywords: water quality, river Yamuna

1. Introduction

Yamuna is the sub-basin of the Ganga river framework. Out of the aggregate catchment's territory of 861404 sq km of the Ganga bowl, the Yamuna River and its catchment together add to a sum of 345848 sq. km territory which 40.14% of aggregate Ganga River Basin (CPCB, 1980-81; CPCB, 1982-83). It is a vast bowl covering seven Indian states. The water water is utilized for both abstractive and in river utilizes like water system, residential water supply, and modern and so on. It has been subjected to over misuse, both in amount and quality. Given that an expansive populace is subject to the water, it is of noteworthiness to save its water quality. The water is dirtied by both point and non-point sources, where populace is the real donor, trailed by Agra and Etawah. Around, 85% of the aggregate contamination is from residential source.

River Yamuna is the biggest tributary of the River Ganga. The standard of the river Yamuna starts from the Yamunotri icy mass close Bandar Punch (38o 59' N 78o 27' E) in the Mussourie scope of the lower Himalayas at a rise of around 6320 meter above mean ocean level in the area Uttarkashi (Uttranchal). The catchment of the Yamuna river framework covers parts of the conditions of Uttaranchal, Uttar Pradesh (U.P.), Himachal Pradesh, Haryana, Rajasthan, Madhya Pradesh and the whole Agra. The water Yamuna navigates a separation of around 1370 km in the plain from Saharanpur region of Uttar Pradesh to the juncture with river Ganga at Allahabad. The significant tributaries of the river are Tons, Betwa, Chambal, Ken and Sindh and these together contribute 70.9% of the catchment zone and adjust 29.1% is the immediate waste of principle River and littler tributaries. Based on territory, the catchment bowl of Yamuna adds up to 40.2% of the Ganga Basin and 10.7% of the nation.

Fig 1

Even expensive water treatment technologies are incapable of treating the polluted river water. And, the conventional water processes based on chemical filtration and biological treatment is not suitable for removing the Total Dissolved Solids (TDS)."

2. Review of literatures

River water quality can be surveyed by the investigation of supplements, science, and science. The criteria for a sound water are that it ought to contain no less than 5 mg/L of Dissolved Oxygen (essential for the survival of marine life) and around 3 mg/L of Biochemical Oxygen Demand. Encourage the Pathogens (illness causing bacteria's) spoke to by the Fecal Coliforms tallies ought not surpass 500 for each 100 mL of water. India River water qualities have been classifications in five classes that are -

Class A: The River water is fit for drinking after appropriate

sterilization with the expansion of chlorine or fading powder.

Class B: Under this classification the river water is fit just to bathe.

Class C: The River water is fit for drinking simply after appropriate treatment (screening to evacuate physical issues or particulate, for example, paper, plastic, and so forth.

Class D: Under this class the water water is fit just for fish and untamed life and

Class E: River water is reasonable just for mechanical cooling, water system, and so on. Yamuna River has a place with class E [2].

Since 1975, there had been fast urbanization, Industrialization and rural advancement in Yamuna bowl, which have straightforwardly or in a roundabout way influenced the Yamuna water quality. Yamuna water quality is additionally influenced by the six floods in the river. Water at different places up and down its length, these blasts hindered the river of the water and framed the lotic (rivering) condition. By and large the majority of the slop get kept at upriver of the blasts. This settled contaminated materials moves to downriver alongside sudden arrival of water from the blasts and builds the water contamination.

3. Yamuna water quality status

Biological Oxygen Demand (BOD)

It gauges the rate of oxygen utilized by natural life forms in the water body to decay the natural issue dirtied by sewerage or modern effluents. Popularity of BOD shows that the level of broke up oxygen is falling, and river's marine life and biodiversity is in risk. It is caused by the nearness of abnormal state of natural toxins and nitrate in water body.

The BOD level in Yamuna from Agra to Etawah. Agra is typically runs from 1 to 3 mg/L. Up to Etawah Yamuna is loaded with marine life, yet past that wastewater channels outfall in Yamuna began. From Agra to Etawah downriver the BOD level reaches from 3 to 51 mg/L. The BOD level was likewise found over as far as possible in Mathura, Agra, Etawah and Bateshwar.

Concoction Oxygen Demand (COD)

COD past as far as possible is the pointer of the natural and inorganic toxins in the water body. The COD level in Yamuna ranges from 1 to 50 mg/L from its cause to Etawah. Past Etawah Yamuna River begins accepting huge measure of wastewaters from various deplete inside Agra and numerous downriver areas. The COD level begin expanding from Agra Bridge and found over as far as possible (ranges from 3 to 155 mg/L) up to Juhika.

Broken down Oxygen (DO)

DO level in Yamuna from its beginning to Etawah is discovered typical, however past that it began diminishing. After Wazirabad the DO level begins diminishing definitely and

Water quality observing and investigation of Yamuna River is consistently completed by Central Pollution Control Board (CPCB) since 1977. According to the report of CPCB, 2006 diverse water quality parameters of Yamuna River are as per the following-

Table 1: Quality of water of river Yamuna from Agra to Etawah on different parameter

Site	Parameter	YEAR														
		1996¹	1997¹	1998#	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agra Canal at kalindi Kunj	DO(mg/l)	0.35	0.00	5.70	1.80	0.63	0.50	0.10	0.30	0.00	0.60	0^	0^	0.00	0.00	0.00
	BOD(mg/l)	26.50	44.00	12.50	9.30	9.50	18.00	12.30	18.00	24.70	14.30	28.3^	22.25^	13.80	14.75	16.00
Majhawali /Palwal	DO(mg/l)	0.50	0.00	6.20	8.7@	5.25	7.70	8.43	3.90	3.93	4.70	3.05	5.53	2.4	2.75	1.15
	BOD(mg/l)	22.00	26.50	6.00	16.00	13.25	20.30	17.70	15.80	17.30	22.50	26.00	22.25	20.80	16.75	20.25
Mathura u/s	DO(mg/l)	8.10	5.20	5.70	11.7@	9.13	8.50	8.27	6.90	5.90	6.90	5.40	5.42	5.30	5.28	6.67
	BOD(mg/l)	4.00	5.50	2.80	6.30	8.50	8.80	11.00	13.30	11.30	11.80	15.30	14.75	13.50	8.50	11.25
Mathura d/s	DO(mg/l)	8.50	8.15	6.20	8.8@	6.18	7.20	10.60	6.90	5.60	6.40	5.77	6.40	5.80	6.30	6.57
	BOD(mg/l)	2.50	3.50	5.30	5.70	10.50	11.00	10.30	9.30	9.30	8.00	15.00	10.75	14.80	8.75	8.75
Agra u/s	DO(mg/l)	10.65	10.85	7.60	8.60	9.83	11.80	13.50	4.70	13.90	11.60	8.40	7.30	6.00	7.67	6.02
	BOD(mg/l)	4.50	8.50	5.80	6.30	7.50	9.50	11.30	16.30	15.00	11.60	15.00	15.00	13.00	9.25	8.25
Agra d/s	DO(mg/l)	1.65	1.90	5.70	7.10	4.90	0.90	4.30	5.40	8.43	6.30	8.17	7.03	8.40	4.67	9.12
	BOD(mg/l)	9.00	7.00	12.80	10.00	17.00	26.50	16.30	29.50	24.00	15.00	14.80	19.25	21.00	16.25	12.25
Batteshwar	DO(mg/l)	13.90	9.60	9.00	18.1@	8.68	9.30	7.33	4.70	8.77	13.50	9.68	10.95	12.00	8.95	12.88
	BOD(mg/l)	11.00	6.00	4.80	7.70	9.00	7.80	12.30	10.30	6.00	11.00	14.00	15.75	18.00	13.75	11.75
Etawah	DO(mg/l)	11.16	8.05	8.50	13.2@	10.73	10.60	9.70	5.80	10.80	13.40	16.90	11.28	11.80	10.88	12.62
	BOD(mg/l)	7.00	5.50	6.50	9.70	4.50	7.30	10.30	10.80	5.30	10.50	15.50	13.25	16.30	11.25	11.00
Udi	DO(mg/l)	9.71	10.65	8.70	10.7@	7.95	8.10	8.17	4.30	10.70	8.20	13.30	8.88	8.30	9.00	8.82
	BOD(mg/l)	2.00	1.50	1.00	1.70	1.00	1.30	2.70	2.80	1.70	4.50	6.00	1.75	2.30	1.00	2.00

Yamuna which acts as the life line for the majority of the cities like Yamuna Nagar (Haryana), Panipat, Sonipat, Agra, Noida, Faridabad, Mathura and Agra plays a major role in polluting the river. Yamuna river flow is restricted through several barrages such as Tajewala barrage, Wazirabad Barrage, Okhla Barrage, Gokul barrage, Agra, Etawah etc. These barrages are directly or indirectly affecting the river water quality and aquatic ecosystem.

4. Conclusion

The Agra sewage framework can be reprimanded for it and steps ought to be taken from not putting the modern waste into the water as the vast majority of the businesses are on the banks of Yamuna. In Agra water water is dark and it scarcely rivers. Presently it's turned out to be basic to boost the utilization of the current treatment offices and guarantee the reuse of treated effluents. All waste, lawful and illicit, sewered and unsewered must be caught and treated and not blended with untreated sewage. Brought together sewage treatment plants can't be considered as great in light of the fact that the cost of transporting waste to the treatment office and transporting treated profluent back to the point of reuse makes them excessively costly, making it impossible to run. In this manner, treatment offices should be built near the wellspring of sewage age. Catchment region outline is likewise an imperative segment of water quality administration. Keeping in mind the end goal to lessen toxin loadings at an outfall, it is important to look at and enhance water utilize hones in the regions where poisons begin. Promote the crude sewage must be dealt with before it is released into the river water.

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