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Evaluation of heavy metal pollution and water quality in river Yamuna in the state of Uttar Pradesh

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Abstract:
Water is a basic resource which is very important, because no organism can survive without water. Hence there is a demand for clean and unused water in adequate supply. Yamuna River which is the lifeline of the state of Delhi to Uttar Pradesh, It is one of the most polluted rivers in the country. This pollution is caused by the flow of industrial waste into the river. The reason for the lack of water quality is the heavy metals present in them and their toxicity. Due to which human health and nature is adversely affected.Fresh water has great potential to decompose some of the waste materials in the body. Heavy metals can cause damage to the nervous system, kidneys, lungs, endocrine glands and bones. These heavy metals like - Pb, Cr, Cu, Zn, Is Ni, As etc.The objective of the present study is to find out the reason for the increasing pollution load of Yamuna river water quality and heavy metal pollution. This study includes the impact of heavy metals on human health and water quality assessment.

Keywords: *Heavy metal, Pollution, Impact, Water quality*

Introduction:

River water is a natural and basic resource, without which the living organism cannot even imagine its life. Water pollution is a terrible environmental concern. This concern has arisen due to pollution if similarly the flow continues in the rivers, there will come a time when about one third of the world's population may face water scarcity (UN Climate Report, 2014).

According to UN survey report 2014, India will suffer severe consequences of water scarcity by 2025. About 85% pollution of Yamuna river comes from domestic source (CWC 2009). Pollution of Yamuna river includes sewerage, industrial waste chemicals, Including effluent, idol immersion of waste bodies.

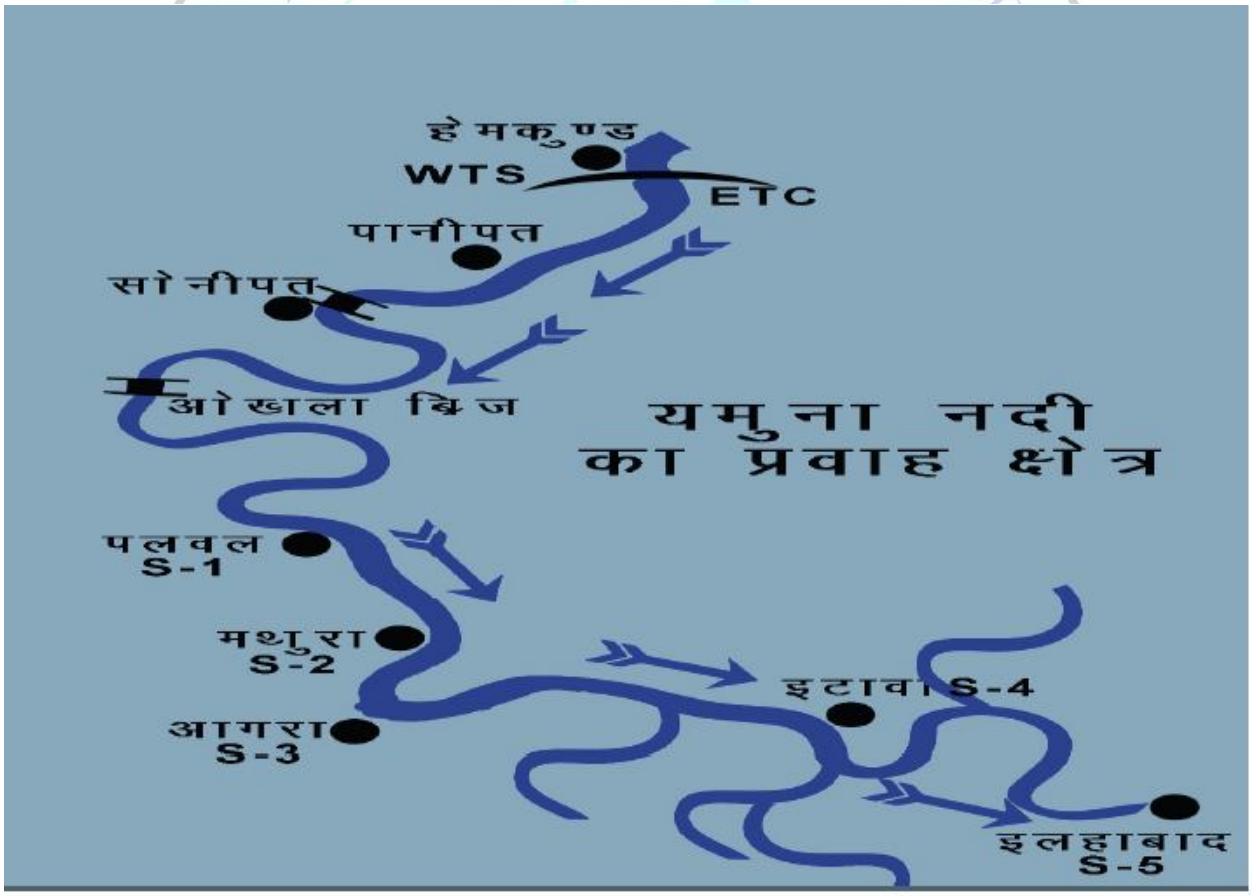
Agra is the most polluted water in Mathura Sewage plants have been set up in various urban

areas, the main objective of which is to conserve the quality of river water. Water pollution on the earth is constantly becoming an increasing problem. Clean drinking water has been polluted by toxic and chemicals Water has been polluted. According to an estimate, about 123 freshwater animal species have become extinct in America in the world.

Yamuna River Basin:

Yamuna River (Fig. 1) is the largest tributary of Ganges River. Yamuna river originates from Yamunotri glacier. It originates from Yamunotri and flows in Uttarakhand, Himachal Pradesh, Haryana, Delhi, Uttar Pradesh, Rajasthan, Madhya Pradesh and West Bengal. The total length is 1376 km. The tributaries of this river - Tons, Betwa, Cain and Sindh are major which together contribute about 71% of the catchment.

On the basis of area, the catchment basin of Yamuna has 40.2% of the Ganges basin and 10.7% of the country (Central Water Commission 2007).



Sources of heavy metal pollution in Yamuna River

Pollution levels due to ecological stress on aquatic environment. The presence of heavy metals in the Yamuna River and the assessment of water quality have been studied. The flow of industrial waste chemicals in river water household waste materials etc.? in river water Has reduced oxygen levels, which has adversely affected life and aquatic flora.

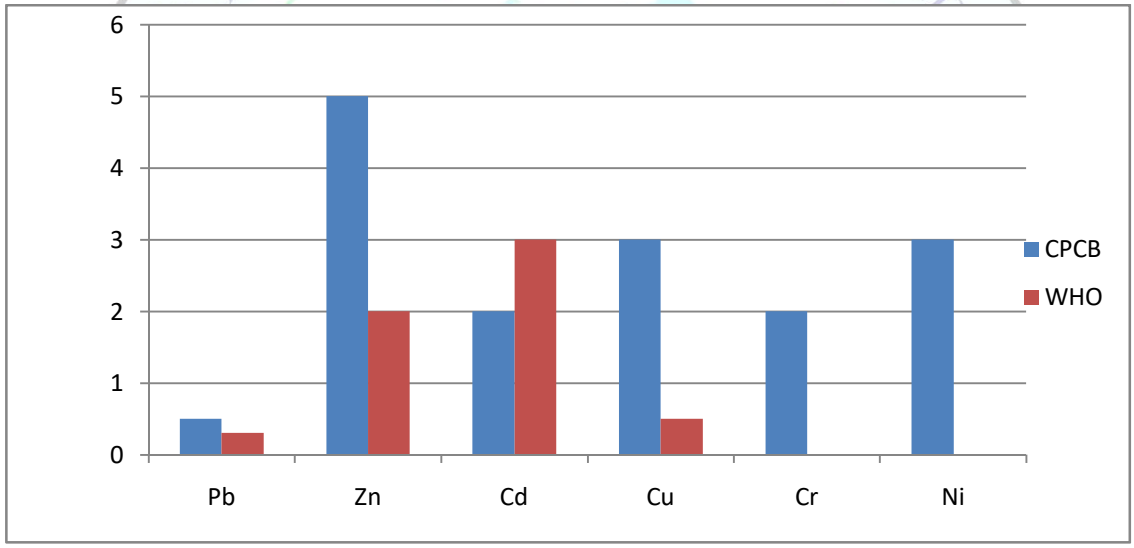
Research conducted by TERI (Yamuna Canal River 2012) showed moderate levels of toxic metal in the water. The samples were taken from areas of Haryana in Delhi. The present study selected 5 cities located on the banks of the Yamuna River in which The order of concentrations of heavy metals in water, the order of concentrations of heavy metals in soil and the level of ammonia have been assessed.

1. Order of average heavy metal concentrations on various metals of river water Fe> Cr> Mn> Zn> Pb> As> Cd

2. Order of heavy metal concentrations in soil Fe> Mn> Zn> Cr> Pb> Ni> As> Cd

3. Ammonia levels (in Okhla barrage) 1.4 to 6.6 mg per liter

Aquatic organisms such as Yamuna river water - the concentration of heavy metals in fish is much higher than the maximum perishable limit as per WHO (WHO CPCB) (Singh 2014).



WHO= World Health Organization] [CPCB= Central Pollution Control Board]

On the occasion of festivals in Uttar Pradesh, water immersion, chrome based paint, metal polish, polythene, plastic, flowers; cosmetic items are carried in river water due to idol immersion. Due to which water quality has increased (kaur 2015).various organic and inorganic metal ions in river water are of toxic nature which gives rise to severe diseases in mankind. In addition, the presence of pesticides like DDT, NDN, endosulfan, BHC has been reported in river water.

Effect of heavy metal on human health:

The heavy metal enters the human body mainly through food and water, causing serious consequences. So Table 1 depicts the effect of heavy metal on human health. In addition to Table 2, water samples from different places. Physical parameters such as pH temperature and chemical parameters such as TDS, DO, BOD, COD, chloride fluoride have been analyzed.

Methodology:

Study Area:

One of the major tributaries of the Ganga's River System in North India is the Yamuna River which has been selected for study. A total of 5 places in the present study - iyoy (S-1) Mathura (S-2) Agra (S- 3) Etowah (S-4) and Allahabad (S-5) have been selected for heavy metal pollution and water quality assessment

Sample collection Research Experiment and Research Method

Water quality parameters have measured the temperature of the water at the site using a mercury thermometer. The pH has been measured (Singh 2005) in the laboratory using a glass electrode pH meter (Metro Model 740). All other parameters are standard. The water samples are filtered through Ogk Etson filter number 42, following the protocol (APHA- 1998).

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1. Standard Method for Examination of HPH and Waste Water

2. Central Water Commission Yamuna Basin Organization New Delhi 2007

3. CPCB 2006 Water Quality Status of Yamuna River 1999 to 2005 Ministry of Environment and Forests Evaluation and Development of River Floor Range

4. CPCBMIS Sewage Treatment Status in India February 2006 New Delhi

5. Assessment of heavy metals during summer and winter season in Yamuna section through Car S 2012 India.

Table 1: Heavy metals and their effects on human health

S.no	Pollutant	Main source	Effects on human health
1	(Pb)	Paint, pesticide, battery, crystalline, glass manufacturing industry	Cognitive impairment in children, peripheral neuropathy in adults, stunted growth, etc.
2	(Cu)	Electroplating Pesticide Production and Mining	Headache Kidney Damaged Diarrhea Vomiting Nausea etc.
3	जिंक (Zn)	flost flow zinc flow from electroplating industry	Vomiting diarrhea liver, kidney damaged

4	निकल (Ni)	Flow of stainless-steel production unit electroplating factory	Neural research, cancer factors
5	(Cd)	Electroplating Ni-Cd Battery Manufacturing Nuclear Reactor TV Phosphorus	Kidney stability intestinal edema kidney hepatitis
6	(Cr)	Mining electroplating	Neuralgia failure

Table 2

S.No.	Parameter	Palval S-1	Mathuramaa Mathura S-2	Agra S-3	Itava S-4	Allahabad S-5
1	Temp(^{0}c)	28.2	28.5	29.2	29.0	31.4
2	pH	7.83	8.54	7.92	8.75	8.12
3	TDS	1115	280	364	254	380
4	D.O	3.9	5.5	3.8	5.2	5.5
5	B.O.D	4.6	8.0	7.2	12	8.2
6	C.O.D	185	158	302	347	448
7	Cl^-	967	876	650	664	660
8	F^-	0.47	0.49	0.44	0.45	0.44
9	As	0.001	0.0001	-----	------	0.0004
10	SO_4^{-2}	704	248.2	350.5	376	400

All value in Mg/L, except pH & Temp.

Table 3

Heavy Metals Mg/let.	**BIS 10500,2012**		**WHO 2011**	**European Standard 1980**
	Acceptable	**Permissible**		
As	**0.01**	**1.5**	**0.01**	**0.05**
Cd	**0.003**	**NR**	**0.003**	**0.005**
Cr	**0.05**	**NR**	**0.05**	**0.005**
Cu	**0.05**	**1.5**	**2**	➢ **3**
Fe	**0.3**	**NR**	**0.3**	**0.2**

Pb	**0.01**	**NR**	**0.01**	**0.05**
Ni	**0.02**	**NR**	**0.07**	**0.05**
Zn	**5**	**15**	**-----**	➢ **0.05**
Mn	**0.1**	**0.3**	**0.1**	**0.005**

Research Results Discussion and Conclusion:

On the basis of the present investigation, it was found that the water analysis of Yamuna river is worthy of criteria. The water of Yamuna river has been polluted. Therefore, it cannot be used as agricultural and drinking water. Necessary steps should be taken to reduce the organic and metal waste load in the Yamuna river. Otherwise mankind may have to face terrible consequences in future.

The present has carefully concluded that the water analysis of Yamuna river is worthy of parameter. The water of the Yamuna river has been polluted so that it cannot be used for drinking and agriculture aggregation functions will also have a profound impact and will become even more readily in the future.

References:

1. Alpha standard method examination of water and wastewater 19th edu. American public health association Washington DC, 1995.
2. Drinking water specification first revision ISI 10500, 1995
3. Central public health and environmental engineering organization manual on water supply and treatment ministry of works and housing, New Delhi.
4. Manual on the surface and ground water analysis Uttar Pradesh publication, 2014