

To Study of Water Quality from River of Lucknow and Effect on Human Health

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ABSTRACT

The water quality of the river is so bad that it has even let to the contamination of underlying ground water. As a result of which, women and children especially young girls have to cover a tiresome journey of 2-2.5 kms everyday to fetch clean drinking water for their families. A primary reason for this is that all three major sources of pollution (industry, agriculture and domestic) are concentrated along the rivers. Industries and cities have historically been located along rivers because the rivers provide transportation and have traditionally been a convenient place to discharge waste. Agricultural activities have tended to be concentrated near rivers, because river floodplains are exceptionally fertile due to the many nutrients that are deposited in the soil when the river overflows. Most water pollution doesn't begin in the water itself. Take the oceans: around 80 percent of ocean pollution enters our seas from the land. Virtually any human activity can have an effect on the quality of our water environment. When farmers fertilize the fields, the chemicals they use are gradually washed by rain into the groundwater or surface waters nearby. Sometimes the causes of water pollution are quite surprising. Chemicals released by smokestacks (chimneys) can enter the atmosphere and then fall back to earth as rain, entering seas, rivers, and lakes and causing water pollution.

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INTRODUCTION

The Gomti originates from Gomat Taal which was formally known as Fulhaar Jheel near Madho Tanda, Pilibhit, India. It extends to 900 km through Uttar Pradesh and meets the Ganges River near Saidpur Kaithi in Gazipur. Its water coverage is about 22,735 square km. After travelling about 240 km Gomti enters Lucknow, where it travels for 16 km. The cities of Lucknow, Lakhimpur Kheri, Sultanpur and Jaunpur are located on the banks of the Gomti and are the most prominent of the 15 towns located in its catchment area according to Kumar *et al.*, [1]. According to Srivastava *et al.*, [2] drains are the main source of water pollution especially for rivers flowing within the city carry industrial effluent, domestic waste, sewage and medicinal waste results in poisoning the water quality.

The water quality management is performed under the provision of the Water (Prevention and Control of Pollution) Act, 1974. The Act emphasizes to maintain and restore the wholesomeness of national aquatic resources by prevention and control of pollution. It was considered ambitious to maintain or restore all natural water bodies at pristine level. Planning pollution control activities to attain such a goal is not only deterrent to developmental activities but cost prohibitive also. The natural water bodies are liable to be used for various competing as well as conflicting water demands, the objective of DBU Concept is aimed at restoring and/ or maintaining natural water bodies or their parts to such a quality as needed for their best uses. According to this concept, out of several uses water body is put to, the use which demands highest quality of water is termed as "DBU", and accordingly the water body is designated. Primary water quality criteria for different uses have been identified.

With ever growing population and increasing demand of water for food production, industrial and domestic activities increases every year. No doubt, water is essential for life but 99% of the water in the world has been polluted by manmade resources mainly due to rapid urbanization, industrialization and

increasing population. Water resources and the quality of water may be insufficient to meet the long-term requirements of consumption, agriculture and other uses unless their judicious and economic uses are ensured. Making the best use of the available water resources involves not only the prevention and control of its depletion and degradation but also managing it in view of the present and future needs is necessary. Nusrat Ali, 2016. According to the gsi report, the invertebrate may have been introduced in the river by birds like waders. But since then it has been able to survive in the river's freshwater due to high levels of ph. In other areas such as Madhavpura, Isauli and Bashariaghat, gsi scientists found *Hemicypris arorai* -- another organism that survives in highly alkaline water (ph values of 8.2 to 9.1). The high ph levels of these areas were mainly attributed to the use of fertilisers in nearby fields. To further prove that pollution is changing the river's biodiversity, gsi scientists tested water samples from the tributaries of Gomti.

Pollution and Degradation of Quality

Industries discharge their liquid waste products into rivers. Our agriculture practice that uses chemical fertilizers and pesticides also contribute to river pollution as rainwater drains these chemicals into the rivers. Domestic wastes that we throw into rivers adds to pollution levels. As population grows, the size of towns and cities also grows. Studies show that domestic and industrial sewage, agricultural wastes have polluted almost all of Indian rivers. Most of these rivers have turned into sewage carrying drains. This poses a serious health problem as millions of people continue to depend on this polluted water from the rivers. Water-borne diseases are a common cause of illness in India today. Sharma *et al.* [3] carried out to study the effect on the water quality due to do river Narmada at Hoshangabad In Madhya Pradesh .The samples collected were analyzed, as per standard methods parameters such as Temperature, pH, were measured in-situ. The statistical evaluations were also made. The result showed increase in Nitrates, Phosphates, BOD, and Total Coli forms, No. of phytoplanktons.

Rai *et al.* [4] In their investigation, the samples were collected at three sewage treatment plant in Varanasi, whose wastewaters were regularly discharged into the River Ganga at Varanasi. Dinapur sewage treatment plant were recorded maximum Biological oxygen demand and Dissolved oxygen values above the permissible limit at all sites and various heavy metals Zn, Cu, Cd, Pb, and Cr were found in disposed effluent of sewage treatment plant.. All heavy metals were found to be above permissible limits in at all sites.

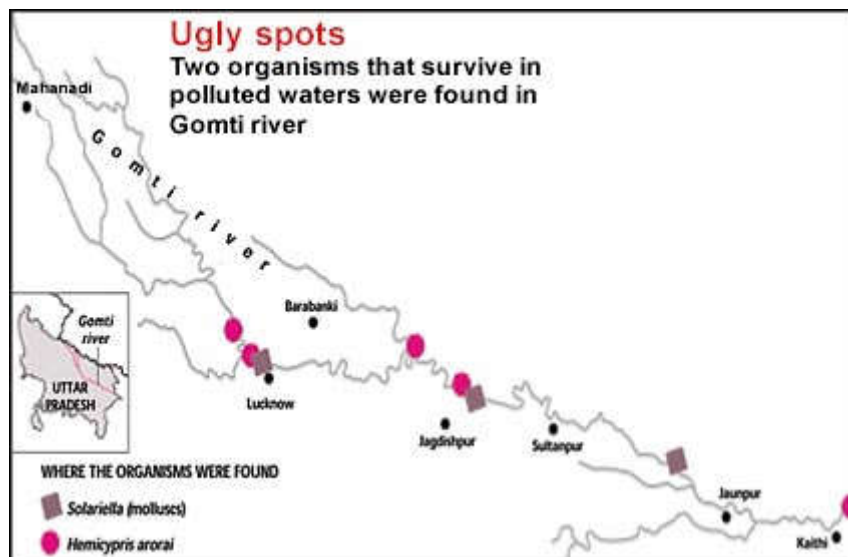


Fig1.0: Pollution Found in Gomti River (Source:- wikipedia.com)

MATERIALS AND METHODS

Site Selection

The Gomti river is tributary of Ganga River. About 240 km the Gomti enters Lucknow, through which it meanders for about 12 km. At Lucknow 9 km stretch of the Gomti was selected for the study. A total of 2 sampling sites were selected namely Mehandi ghat and Gomti barrage.

Sampling Site

Two sampling sites viz-A (Mehandi ghat), B (Gomti barrage) . Each sampling sites was further marked with 1-Northern bank, and Southern bank respectively. The water samples were collected throughout the study period during march, between 10 AM to 2.00 PM. Physico-chemical parameter were analyzed in

the laboratory expect temperature which was monitored at the sampling sites with the help of the thermometer. The chemical used for analysis were all of analytical AR grade. The physicochemical parameters were estimated according to the methods in APHA [5] .

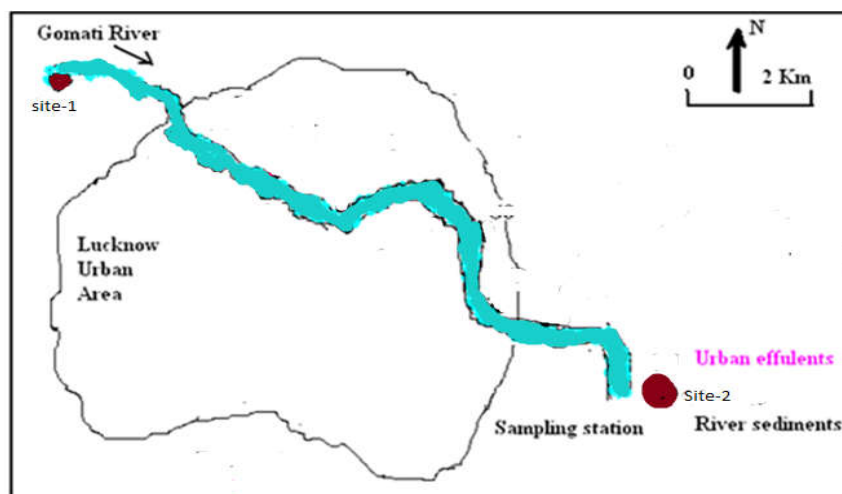


Fig. 1.0 Site for Samples Collection Area

Heavy Metal Analysis

100 ml of water sample was mixed with conc. nitric acid (10 ml) then cooled and filtered through Whatman 42 filter paper. Four Heavy metals namely Copper, Iron, Arsenic and Cadmium were detected.

RESULT AND DISCUSSION

Result of analysis of various phyco-chemical parameters of river Gomti at different two sampling sites during March 2016 are shown in Table 1 and Fig 1.1 & 1.2. These characteristic were examined according to guideline of APHA [5] and reference to IS:10500 standard as prescribed by BIS [6].The concentration of pollutants and trace elements obtained during march along with two sampling sites are summarized in Table - 1 and Fig- 1.1 & 1.2. After study of above parameter we consider that water of site I (Mehandi ghat) is fit for irrigation but not fit for drinking without proper treatment. Tatal coliform at site 1 were 300 mg/L and site 2 were 24000 mg/L. According to CPCB standard for drinking water should be less than 50 mg/L.

Table: 1 - Physicochemical Parameters of River Gomti in Lucknow during March 2016.

Sr	Parameter	Site 1 mg/L	Site 2 mg/L	Irrigation water standard	Drinking water standard
1	Cr	.006	.0012	.1	.05
2	Mn	.023	.0028	.2	.01
3	Fe	.007	.0092	.3-.5	.3
4	Co	00	00	-	-
5	Ni	.093	.111	-	-
6	Cu	.0045	.0106	.05	.05
7	Zn	.0045	.0106	-	5
8	As	.055	.0064	.05	.05
9	Mo	.031	.041	-	-
10	Se	0	0	.02	.01
11	Cd	.002	.012	.012	.01
12	Coliform	300	2400		>50
13	E.coli	ND	300		Null

©BIS (2012) Indian Standard, Drinking Water – Specification (Second Revision) IS 10500 : 2012; ICS 13006020

The concentration of trace metals during march months along two sampling sites are summerised in table 2 .Chromium was noticed in between the range of 0.006-.01234 ppm at two different sites . At site I it was found above the detection limit. Concentration of Cr was also permissible limit. Permissible limit

of chromium in drinking water are determined by WHO i.e 0.05 to 1 mg/L. This may be due to leather industry situated in old Lucknow (chawk area). Couper con was found in between 0.00457 - 0.0106 mg/L, This is due to automobile repair and electroplating on instruments, showpiece, utensils, manufacture situated in the area surrounding the river corridor.

Higher amount of Fe was also determined by Singh [7, 8]. Cd concentration was observed in between 0.002 & 0.012 mg/L at site I and site II in Gomti. Cd is extremely toxic and primary use of water high in Cd cause adverse health effect such as renal disease and cancer. Cd was absorbed strongly to sediment an organic matter (sanders et al). Source of cadmium in river is runoff of agriculture soil. Zn was also beyond the permissible limit. Source of Zn is electroplating and paints. In festival season con of Zn increases because Zn use as clay colour. Festival season like Durgapooja, Deepawali, Ganesh pooja and Vasant panchami lots of statue thrown in to river. Both site I & site II Cobalt was absent in river Gomti. Arsenic was also found above the permissible limits. Main source of arsenic is runoff water from agriculture farm. Arsenic are mainly use in pesticide overdose of pesticide accumulate in the soil and in rainy season through runoff arsenic contain compound come into the river. Higher amount of arsenic are found in river Gomti at both site. Higher concentration of Fe was also reported by Singh [7, 8]. During the entire study the Cd, Cr, Zn, Cu, Ni, Mo, Se and Fe content were noticed in beyond the permissible value among all station. Ni was detected 0.09301 and 0.1012 μ /L which is much higher than permissible limit. Ni are also come from electronic waste and electroplating industry. Mn concentration was detected in between the range of 0.023 & 0.028. Preeti Singh reported the previous report in 2014. That was within the limit but right now it was over the limit. The previous studies has been ensure that the atmospheric precipitation and sediment adsorption is very much responsible for metals concentration in surface water [8-12].

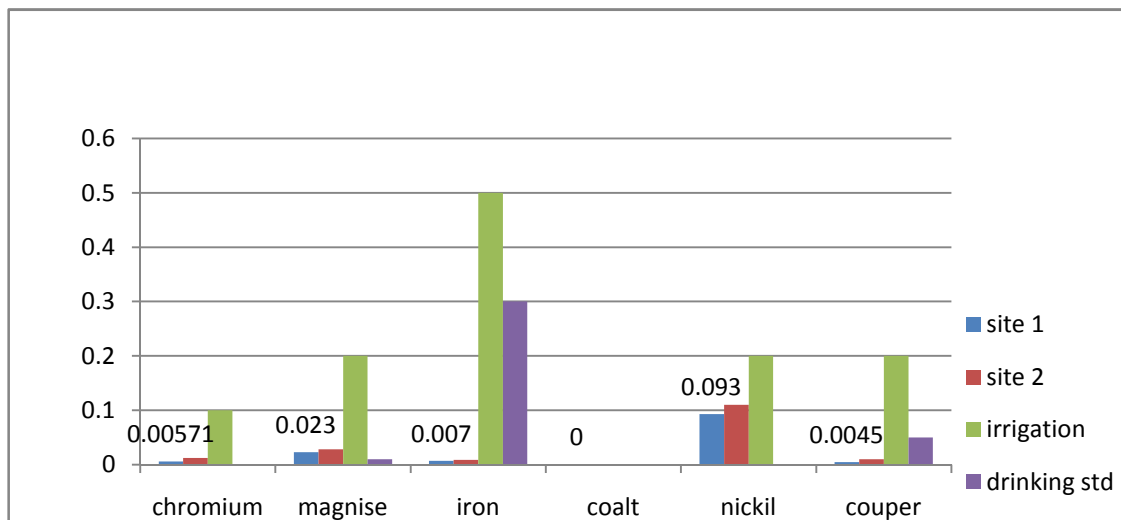


Fig 1.1: Graphical representation of heavy metals pollutants:

Graphical indication indicates the amount of heavy metal going to beyond the permissible limit. Site I and site II both the quality of water was polluted. On the basis of heavy metals Mehandi Ghat and Gomti barrage water is not fit for irrigation and drinking purpose. Heavy metals mainly come from automobile industry, electroplating industry, pesticide and herbicide industry. Electronic Solid waste was also source of heavy metals, which come from municipal.

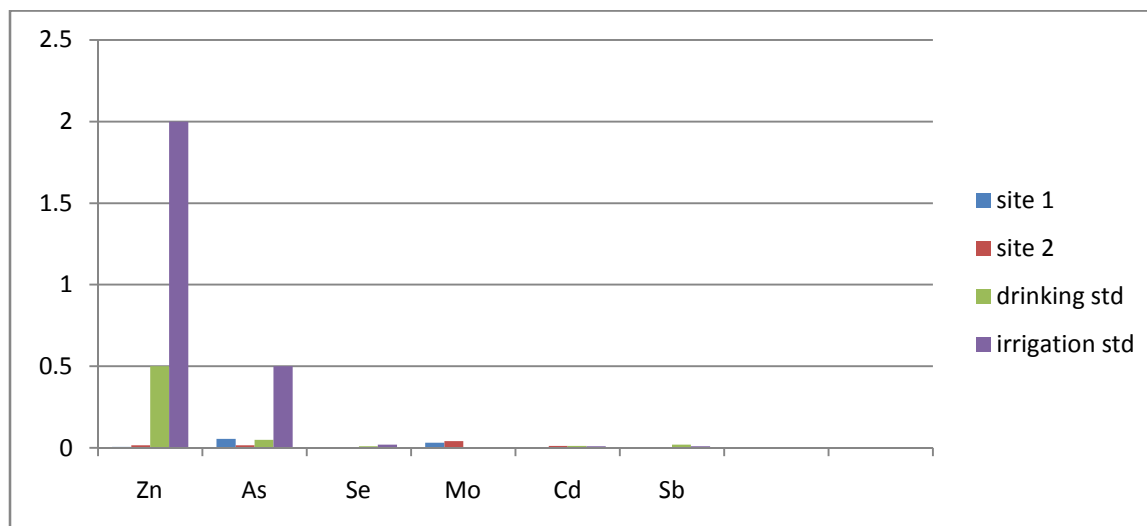


Fig1.2: Graphical representation for biological and physicochemical pollutants:

Fig 1.1 & 1.2 both are representing heavy metals present in Gomti river. I have compared Gomti water, standard for irrigation and standard of drinking. Site I some parameter are fit for Irrigation but Site II no any parameter fit for irrigation nor drinking.

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