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RESEARCH ARTICLE

Impact of Industrial Effluents and Domestic Waste on Water of the river Harnandi between Baghpat and Greater Noida (U.P.)

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ABSTRACT

The Ghaziabad region is well known industrial zone of Northern India and have large number of distillation units, paper mills and stone crushing units. This paper throws light on the Physico Chemical characteristics of the river Harnandi between Baghapt and Greater Noida stretch. It was observed that heavy metal pollution increase when we move from Baghpat to Ghaziabad and decreases when we further move towards Greater Noida. Organic pollution and BOD level increased many folds than permissible limits in Ghaziabad. Concentration of inorganic ions gradually decreases from Baghpat to Greater Noida. Where population density is high, organic pollution dominates and where industries are more heavy metal and inorganic ion load is more. The results clearly indicates that industrial effluents and domestic waste causes severe pollution.

KEYWORDS

Pollution, BOD, Chromium Stone Crushing.

INTRODUCTION

The river Harnandi one of the tributaries of the river Yamuna, is one of the major water resources of the Western Uttar Pradesh. It originates from Shivalik range passes through districts like Saharanpur, Muzaffarnagar, Baghpat, Ghaziabad and Greater Noida before merging Yamuna river ahead of Danpur. It is a perennial river whose water is used for drinking irrigation as well as for fishing purposes. Today the status of the river Harnandi is degrading day by day. Therefore, regular monitoring of the river is essential. Ghaziabad, in Western District of U.P. Uttar Pradesh is one of the big center for a large number of industries.

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river has been identified to a depth of 185 meters in Meerut (Lewis) 2007.

The Harnandi river's River runs along national highway 24 Ghaziabad a stretch of 30 Km has turned red of the National Highway 24 Ghaziabad has turned red due to stone crushing units operating on its banks and raising a health care. These units fetch large stones from Hills, crush them into sand use the Harnandi water is the process and then drain the effluent back into the river. Stone crushing units also discharges significant quantities of particulate pollutant as well. The primary effluents of these industries are directly affected ecological status of the river. Therefore, in the investigation physicochemical characteristics of The river Harnandi has been studied to assess the impact of industrial effluent and domestic waste.

MATERIAL AND METHOD

Three sampling stations were selected for the study are Barnawa, Baghpat, Hindon Bridge Ghaziabad and Momnath Village Greater Noida. Water was collected from sampling stations in sterilized bottles. pH and temperature were measured at the spot. A water sample collected once in a month from Sep 2015 to August 2016. The samples were analyzed fro various parameters according to the standard method of APHA-AWWA-WPCF(1998). Trivedi and Goel (1986) and Khanna and Bhutiani (2004).

RESULTS AND DISCUSSION

Physiochemical characteristics of Harnandi river water samples from sampling stations are presented in Table 1 The metal pollution in Harnandi river was assessed for Cd, Cr, Fe. and Pb. The metal concentration in water showed wide temporal variations compared with bed sediments because of variability in water discharge and variation in suspended solid loadings Metal ratios for the bed sediments of the river Harnandi were determined and the general trend of relative mobility was observed as Cr > Pb > Fe > Cd.

The water quality monitoring results obtained indicate that the organic and heavy metal contamination are continued to be critical in the water body, and this is mainly due to the discharge of domestic waste water and industrial waste mostly in untreated form. As we go from Baghpat to Greater Noida, the form of pollution shifts from organic to heavy metal due to increases in industries in the vicinity the Harnandi river. Ghaziabad is a growing industrial city and highly populated. The population still continues to grow mainly on account of its rapid industrialization and its proximity to Delhi. A large number of people reside here but carry on their trades in Delhi or are employed there. The municipal corporations are unable to treat this increasing load of municipal sewage flowing into river water. Secondarily receiving river water also do not have adequate water for dilution. Therefore, the oxygen demand and bacterial population are increasing day by day. This is mainly responsible for water borne diseases.

The urban areas are responsible for more than 25% of the sewage generation in the region. The small towns and rural areas do not generate a

Table 1 : The Value of Physico-Chemical Parameter Observed in Harnandi River within Baghpat-Greater Noida stretch

S.No.	Parameters	Barnawa-Baghpat	Hindon Bridge Ghaziabad	Momnath Village Greater Noida
1	Color	Brownish	Muddy	Muddy
2	pH	7.42	7.66	7.40
3	Turbidity (NTU)	0.92	4.08	5.11
4	DO (mg/l)	5.40	5.75	6.32
5	COD (mg/l)	171.12	174.32	172.26
6	BOD (mg/l)	27.00	40.00	46.00
7	Total Solid (mg/l)	180.00	220.00	255.00
8	TDS (mg/l)	550.00	573.00	582.00
9	Conductivity (μmhos)	0.45	0.88	2.56
10	Chloride (mg/l)	152.00	151.99	159.32
11	Nitrate (mg/l)	9.21	16.32	16.54
12	Fluoride (mg/l)	0.181	0.273	0.269
13	Hardness (mg/l)	199.00	289.15	300.18
14	Calcium(mg/l)	112.10	116.32	117.00
15	Magnesium (mg/l)	58.18	81.32	81.41
16	Iron (mg/l)	0.273	0.214	0.266
17	Chromium VI (mg/l)	0.055	0.043	0.051
18	Lead (mg/l)	0.02	0.06	0.20
19	Cadmium (mg/l)	0.005	0.015	0.001

significant amount of sewage obviously due to low per capita water supply. The waster-water generated from such areas, percolate into the soil or evaporate, and thus does not contribute to the pollution of water resources. Hence the focus was laid on large urban and industrialized areas.

CONCLUSION

The pollution increasing trend indicates that as the population density and number of industries increases from Baghpat to Greater Noida heavy metal load in the river becomes more alarming. High level of pollution at

Ghaziabad site is probably due to the presence of discharge from industries around it as well as the occurrence of massive soil erosion due to less vegetation in this region which contributes a lot in raising of organic contaminants in the river. Heavy metal accumulation in human beings is detrimental to his health as heavy metals cause following defects in the human body.

Cadmium: Toxic to humans, it can enter through ingestion, intraperitoneal, subcutaneous, intramuscular and intravenous routes. Highly toxic to freshwater and marine organisms. Increased exposure can increase the risk of lung cancer.

Chromium: The metal exists in two forms, i.e. trivalent and hexavalent. Hexavalent chromium in high doses has been implicated as the cause of digestive tract cancers, cutaneous and nasal mucous membrane ulcers.

Lead: Affects human central nervous system, moderate irritation occurs when ingested. Lead is a cumulative poison. Increased amount in the body eventually causes disability. Lead can cause irreversible behavioral disturbances, neurological damage and other developmental problems in young children and babies.

The contribution of different point sources to the River Harnandi has also been assessed. The highest metal loads were related to the highest flow of the river and thereby increased both by surface runoff and sediment resuspension. Industries producing inorganic chemicals, fertilizers, dyes, paints, Pharmaceuticals, and battery were identified as hazardous as their waste is non-degradable and tedious to recycle (CPCB 1982-83).

The Biochemical-Oxygen demand (BOD) is one of the most important indicators of pollution level, between Baghpat and Greater Noida stretch, was within 25-50 mg/l. The lower value of DO and reduced biological system are due to high concentration of toxic substances an oxidizable organic matter in effluents as also reported by Datta Roy et al. (1984).

Harnandi is a primary source of water to the highly populated and predominantly rural population of western Uttar Pradesh. It drains a catchment area of about 5,000 km of farmland while also flowing through some towns and villages. About 80 functional industrial units are located in the vicinity of the river Harnandi.

Major industries in this area include paper and textiles stone crushing, dairy units and slaughterhouses. "Harnandi river no longer serves for domestic purposes as it is too polluted," says the study. The river is now only used for the watering and washing of livestock. Use of the river for disposal of untreated human sewage is one of the primary cause of poor water quality within the Harnandi river. The river receives large volumes of untreated sewage and municipal waste.

The river receives a high load of degradable and non-degradable domestic litter. The river water is odorous and becomes the breeding house for disease-causing pathogen and vector. Any person using this water for domestic purposes will exhibit symptoms of heavy metal poisoning. Because of the contaminated river and ground water, villagers along the Harnandi river suffer from serious illnesses such as cancer, neurological disorders, stomach and digestive disorders, skin lesions and respiratory disorders.

Adverse Health Effect arising out of the river pollution are visible in the upper reaches along the village like Bhadoli, Morty, Dolce and Suthana the cases of reproductive disorder, congenital disability, skin problem are all reported.

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