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Study of Heavy Metals in Neera River at Sarola Bridge and Untreated Urban Sewage Water

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ABSTRACT

River Neera is the major source of drinking water to the people of north parts of the district Satara(Maharashtra). In addition to the disposal of untreated domestic waste from the towns and villages, industrial activities are also increasing in this region. Considering the implications of water pollution on human and aquatic health, the effective management of polluted segment of the river is of prime importance. Here water quality of Neera River was assessed at Sarola Bridge in terms of critical pollution parameters in the year 2010-2011. It was found that the rivers receive industrial effluents from various industries, which are situated on the bank of river, along with the heavy loads of agricultural runoff. The present study was carried out to determine the heavy metals in water and untreated urban sewage water. The content of Cu, Zn, Pb, Fe, Cr, Cd, and As in Neera river water at Sarola bridge were evaluated using atomic absorption spectrophotometer. The report also deals with community response about Neera river. Out of the many problems perceived by the river bank residents, the priority problem reported by maximum is that of the mosquitoes and habitants.

Keywords: Heavy metals, treated, untreated sewage water, Neera River etc.,

INTRODUCTION

Heavy metals are chemical elements with a specific gravity that is at least 5 times the specific gravity of water. The specific gravity of water is 1 at 4°C (39°F). Simply stated, specific gravity is a measure of density of a given amount of a solid substance when it is compared to an equal amount of water. Some well-known toxic metallic elements with a specific gravity that is 5 or more times that of water are arsenic, 5.7; cadmium, 8.65; iron, 7.9; lead, 11.34. When toxic substances enter lakes, streams, rivers, oceans, and other water bodies, they get dissolved or lie suspended in water or get deposited on the bed. This results in the pollution of water whereby the quality of the water deteriorates, affecting aquatic ecosystems. Pollutants can also seep down and affect the groundwater deposits. Water pollution has many sources. The most polluting of them are the city sewage and industrial waste discharged into the rivers. Today, many people dump their garbage into streams, lakes, rivers, and seas, thus making water bodies the final resting

place of cans, bottles, plastics, and other household products. The various substances that we use for keeping our houses clean add to water pollution as they contain harmful chemicals. Today's cleaning products are synthetic detergents and come from the petrochemical industry. Most detergents and washing powders contain phosphates, which are used to soften the water among other things. These and other chemicals contained in washing powders affect the health of all forms of life in the water. Waste water from manufacturing or chemical processes in industries contributes to water pollution. Industrial waste water usually contains specific and readily identifiable chemical compounds. During the last fifty years, the number of industries in India has grown rapidly. But water pollution is concentrated within a few subsectors, mainly in the form of toxic wastes and organic pollutants. Out of this a large portion can be traced to the processing of industrial chemicals and to the food products industry. The effects of water pollution are not only devastating to people but also to animals, fish, and birds. Polluted water is unsuitable for drinking, recreation, agriculture, and industry. It diminishes the aesthetic quality of lakes and rivers. More seriously, contaminated water destroys aquatic life and reduces its reproductive ability. Eventually, it is a hazard to human health. Nobody can escape the effects of water pollution. The individual and the community can help minimize water pollution. By simple housekeeping and management practices the amount of waste generated can be minimized.

MATERIALS AND METHODS

A study was undertaken from March 2010 to April 2011. Water samples were collected from one sampling station and analyzed to obtain variations in the quantity of heavy metal parameters. The study site was chosen to give representation of all areas.

All the chemicals used for this work were of analytical grades. Double distilled water was used throughout the work. All glass wares used were soaked in 10 % HNO_3overnight and then washed with detergent, thoroughly rinsed with tap water and then with double distilled water.

RESULTS AND DISCUSSION

The data of heavy metals for the year 2010-2011 is presented in the observation table1. As per the data heavy metals are observed in the river water sample. Now we will see their effects on human beings.

Table 1. Data of Heavy Metals

Metals	March2010	May2010	Oct.2010	Dec.2010	Feb.2011	April2011
As (mg L^{-1})	0.012	0.010	0.003	0.006	0.009	0.011
Cd(mg L^{-1})	0.013	0.012	0.010	0.013	0.011	0.008
Cr(mg L^{-1})	0.014	0.016	0.017	0.011	0.018	0.021
Cu(mg L^{-1})	0.26	0.27	0.031	0.230	0.024	0.020
Fe(mg L^{-1})	1.661	1.735	1.083	1.632	1.584	1.931
Pb(mg L^{-1})	0.061	0.083	0.073	0.811	0.932	1.031
Zn(mg L^{-1})	0.643	1.83	0.184	1.313	1.134	1.463

Arsenic is the most common cause of acute heavy metal poisoning in adults. Arsenic is released into the environment by the smelting process of copper, zinc, and lead, as well as by the manufacturing of chemicals and glasses. Arsine gas is a common byproduct produced by the manufacturing of pesticides that contain arsenic. Arsenic may be also be found in water supplies worldwide, leading to exposure of shellfish, cod, and haddock. Other sources are paints, rat poisoning, fungicides, and wood preservatives. As is harmful to the blood, kidneys, and central nervous, digestive, and skin systems. Cadmium is a byproduct of the mining and smelting of lead and zinc. It is used in nickel-cadmium batteries, PVC plastics, and paint pigments. It occurs mostly in association with zinc and gets into water from corrosion of

zinc-coated or galvanized pipes and fittings. It is harmful to the liver, placenta, kidneys, lungs, brain, and bones. Copper at very high levels is toxic and can cause vomiting, diarrhea, loss of strength or, for serious exposure, cirrhosis of the liver. Water turns blue-green in colour as the corroded copper comes off the inside of the pipes and appears in the water as a precipitate. This reaction only occurs in a small percentage of cases.

Iron is a heavy metal of concern, particularly because ingesting dietary iron supplements may acutely poison young children. Ingestion accounts for most of the toxic effects of iron because iron is absorbed rapidly in the gastrointestinal tract. The corrosive nature of iron seems to further increase the absorption. It can cause a rusty red or brown stain on fixtures or laundry and/or cause your water to develop a metallic taste. It is harmful to the liver, cardiovascular system, and kidneys. Lead accounts for most of the cases of pediatric heavy metal poisoning it is a very soft metal and was used in pipes, drains, and soldering materials for many years. Most of this lead is used for batteries.

APPLICATIONS

The data of heavy metals is useful for knowing the quality of water which public is using for drinking purpose.

CONCLUSIONS

With these observations it is clearly stated that heavy metals are observed in the river water sample. It might be due to the small scale industries which are situated on the bank of the river.

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