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Accumulation of Heavy Metals in Pavana River, Pune, India

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Abstract: ***In present scenario, the river water has become wastewater due to disposal of city waste through which it flows. Most of the existing wastewater treatment plants are getting overload because of unexpected rapid urbanization and due to change in life style of common man. The quality of water is analyze at some time interval because due to the contamination of water the water borne diseases are arise which affects on the human health and aquatic life also. The heavy metals defined as the metals having high density, atomic weight or atomic number heavy metals are degrade the air, water and soil quality. It causes the health issues in plants, animals and human beings. Common sources of heavy metals are mining, industrial waste, vehicle emission, lead acid batteries, fertilizers and paints etc.***

Keywords: Aquatic life, Heavy Metals

1. Introduction

A .General

The water crises is a huge problem in India, because the contamination of large quantity of water. Water is the important component for all living organisms. Human being depend on fresh water for drinking, irrigation of crops, and industrial uses as well for production, transportation, recreation and waste disposal. In many regions of the India, the amount and quality of water available to meet human needs are limited. The gap between freshwater supply and demand will widen during the coming century because of climate change and increasing consumption of water and increasing population. The change in water quality also varies due to a change in chemical composition of the underlying sediments and aquifer. About one third of the drinking water requirement is obtained from surface sources like rivers, dams, lakes and canals. Water plays an essential role in several life activities. The aquatic environment with its water quality is considered the main factor controlling the state of health and disease in both cultured and wild fishes. Pollution of the aquatic environment by inorganic and organic chemicals is a major factors for survival of aquatic organisms and plants. The agricultural drainage water containing pesticides and fertilizers and effluents of industrial activities and runoffs in addition to sewage effluents supply the water bodies and sediment with huge quantities of inorganic anions and heavy metals. The most anthropogenic sources of metals are industrial, petroleum contamination and sewage disposal. The heavy metals defined as the metals having high density, atomic weight or atomic number heavy metals are degrade the air, water and soil quality. It causes the health issues in plants, animals and human beings. Common sources of heavy metals are mining, industrial waste, vehicle emission, lead acid batteries, fertilizers and paints etc.

2. Methodology

The map of Pimpri Chinchwad and pune district was required for detail study of Pavana River. The map is properly studied and identify the path of river flow, its tributaries and nearby vicinity observed. The survey of river path flow is carried out in that survey the various points are marked out. The Pavana River is originates from western ghat of lonavala and it meets to the Mula Mutha river.

After the survey has been taken, 5 sample sites are selected with the help of map, survey of river path and public interest. These points are from Chinchwad to Ravet. The distance between these two points are 11- 15 km. the name of selected sites are as follows

Figure 1: Sampling Station1–Ravet Bandhara

Figure 2: Sampling Station 2 – Walhekar Wadi

Figure 3: Sampling Station 3 – Keju Bai Bridge

Figure 4: Sampling Station 4 – Thergaon

Figure 5: Sampling Station 5 – Chinchwad

The type of sample collection is grab sampling. The river water sample collection were studied from standard methods for the examination of water and wastewater. From above station point 5 water sample from each station point were collected in monsoon, pre monsoon and post monsoon seasons (September 2016, February2017, and November2016) at the intermediate surface of river body and at the some intervals for the analysis of heavy metals in Pavana River of section Chinchwad to Ravet. The samples are collected in sterile polythene bottles with air tight caps. These all bottles are marked properly with their station point and sample number.

Measurement of Heavy Metals:

Each acid digested water sample of 100 cm^3 was taken in the beaker and the beaker was kept in an oven at 70°C to reduce the volume of the water up to 50 cm^3. The concentration of Cd, Co, Cr, Cu, Ni, Pb and Zn in each water sample were determined by using an Atomic Absorption Spectrometer Digestion of samples is performed essentially as described in standard method in American Public Health Association (APHA, 2012). The instrument settings were determined from the recommendations in the instruction manual (IO).

3. Result and Discussion

1. Cadmium

1) In Pre Monsoon the highest Cadmium is observed on Station 1 that is 0.0096 mg/l and lowest Cadmium is observed at Station 2 that is 0.0027 mg/l.
2) In Monsoon Season the highest Cadmium is observed on Station 5 that is 0.0041 mg/l and lowest Cadmium is observed at Station 1 & 2 that is 0.0010 mg/l.
3) In Post Monsoon Season the highest Cadmium is observed on Station 1 that is 0.0087 mg/l and lowest Cadmium is observed at Station 2 that is 0.0015 mg/l

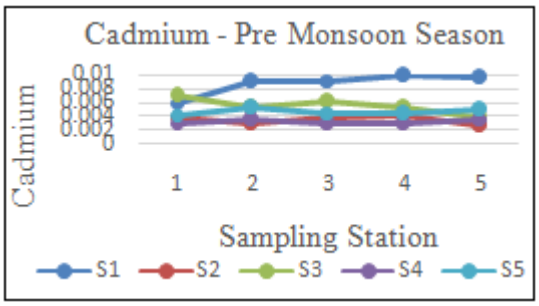

Figure 6 Showing Graphical representation for Cadmium of Pre Monsoon Season

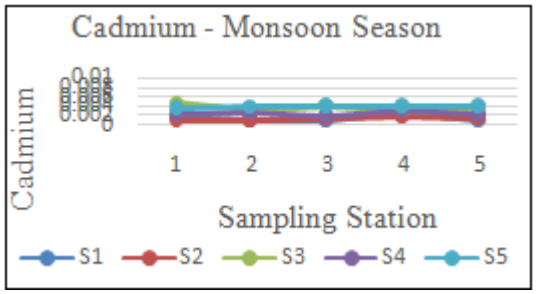

Figure 7: Showing Graphical representation for Cadmium of Monsoon Season

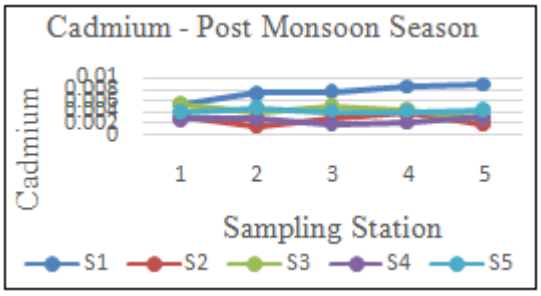

Figure 8: Showing Graphical representation for Cadmium of Post Monsoon Season

2. Chromium

1) In Pre Monsoon the highest Chromium is observed on Station 1 that is 0.31 mg/l and lowest Chromium is observed at Station 2 that is 0.10 mg/l.
2) In Monsoon Season the highest Chromium is observed on Station 1 that is 0.24 mg/l and lowest Chromium is observed at Station 3 that is 0.11 mg/l.

3) In Post Monsoon the highest Chromium is observed on Station 1 that is 0.24 mg/l and lowest Chromium is observed at Station 2 that is 0.11 mg/l

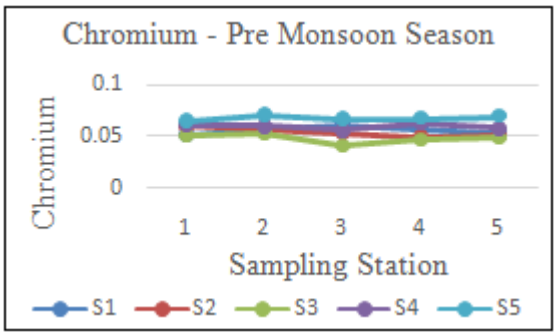

Figure 9: Showing Graphical representation for Chromium of Pre Monsoon Season

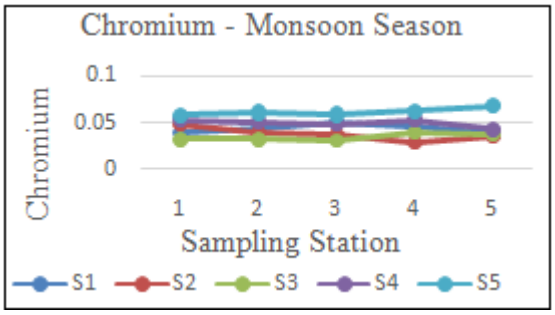

Figure 10: Showing Graphical representation for Chromium of Monsoon Season

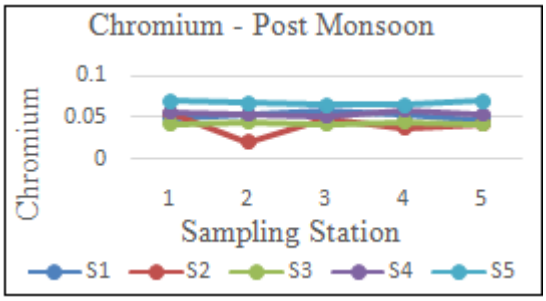

Figure 11: Showing Graphical representation for Chromium of Pre Monsoon Season

3. Nickel

1) In Pre Monsoon Season the highest Nickel is observed on Station 1 that is 0.0096 mg/l and lowest Nickel is observed at Station 2 that is 0.0027 mg/l.
2) In Monsoon Season the highest Nickel is observed on Station 5 that is 0.0041 mg/l and lowest Nickel is observed at Station 1 & 2 that is 0.0010 mg/l.
3) In Post Monsoon Season the highest Nickel is observed on Station 1 that is 0.0087 mg/l and lowest Nickel is observed at Station 2 that is 0.0015 mg/l.

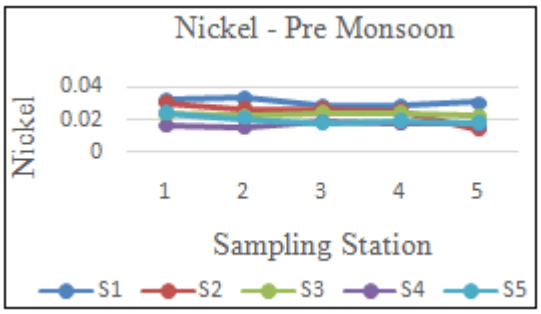

Figure 12: Showing Graphical representation for Nickel of Pre Monsoon Season

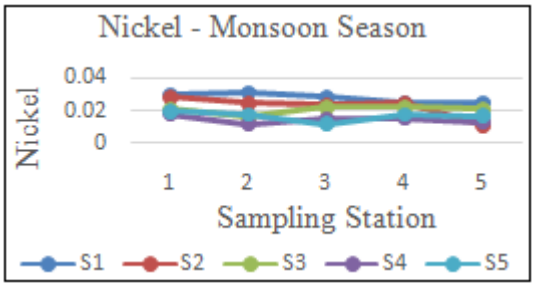

Figure 13: Showing Graphical representation for Nickel of Monsoon Season

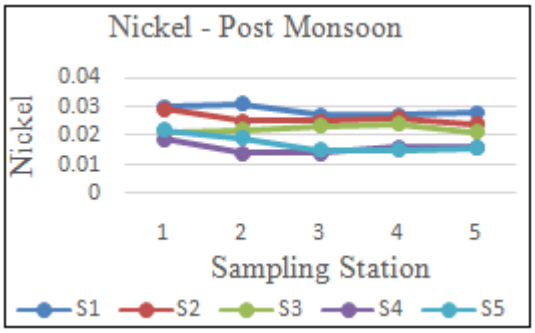

Figure 14: Showing Graphical representation for Nickel of Post Monsoon Season

4. Conclusion

The heavy metals observer in river water which exceeds the permissible limit. Heavy metals affects on the aquatic life present in river water. The river water needs treatment**.**

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