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Study of Heavy Metal contents of Kundalika River water at Roha, Dist. Raigad (M.S.) India

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Abstract: *A study was carried out to assess the water quality in terms of the heavy metal content of Kundalika River near Roha, Dist. Raigad (Maharashtra), India. Heavy metals are probably harmful and insidious pollutants because of their non biodegradable nature. Most of the heavy metals are toxic to many aquatic organisms and for human being. A study was therefore undertaken to assess the variation in some of the heavy metal contents of Kundalika river water near Roha. Samples were collected mainly from this area in the year 2019-20 and brought to the laboratory for the analysis purpose. Selected metals like Ni. As, Pb, Cd, Zn and Cr are estimated by using atomic absorption spectrometer, Perkin Elmer AA200. It was found that the concentration of few heavy metal of Kundalika river at Roha site exceeds the permissible limit slightly, whereas metal like Cd and Ni were below the permissible limits. The presence of heavy metal concentration in traces can be attributed to regular sand dredging activity in the river. Overall water quality of river at sampling location can be considered as supportive to the aquatic life. The quality of heavy metals in river water should be checked time to time; as heavy metal accumulation will cause numerous problems to living being. Therefore, passing awareness is needed for the betterment of water quality for the sake of its use.*

Keywords: Kundalika River Water, Heavy Metals, Roha Town, Spectrometer.

I. INTRODUCTION

"Water quality" is a term used here to express the suitability of water to sustain various uses or processes. Any particular use will have certain requirements for the physical, chemical or biological characteristics of water; for example, limits on the concentrations of toxic substances for drinking water use, or restrictions on temperature and pH ranges for water supporting invertebrate communities. Water environment can be divided into surface and ground water. Surface water bodies include Rivers, lakes, streams, creeks etc. whereas ground water is present beneath earth's surface in soil pores, stone fractures and aquifers. Quality of water plays an important role in determining its use for various purposes. Hence it becomes essential to study quality of water in these resources in order to evaluate any chances of contamination from anthropogenic or developmental activities.The Crises of water pollution by trace metal is now well known to be crucial all over the world and especially in a developing country like India, everybody is facing the problem of ever widening threat of water pollution due to advance modern Technology, industrialization, civilization and urbanization (Ghorade, 2013).

II. MATERIALS AND METHODS

Over 90% of Kundalika's water is consumed by industries, including RCF's THAL Project and many MIDC all across. This unfortunately has resulted in pollution, especially dues to Roha's chemical industries releasing a lot of effluents (chemical waste) in the river. On the cards are to use 9000 Quesecs of water by the upcoming Reliance and Essar's new projects in the Villa MIDC. This could kill the rafting besides considerably reducing the river's downstream water levels at Kolad. The river will die a little more and become more placid and shallower at Roha town. The latitude of Roha is 18.439472 and longitude is 73.118263.

River water was sampled at three locations, upstream (KW1), at site (KW2) and downstream (KW3) during the year 2019-20. Kundalika River is the only significant surface water body present in the vicinity of the study area. Hence river water sampling was carried out during the study period.

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All water samples were collected in one liter pre-cleaned plastic cans using Niskin sampler. After collection samples were preserved with suitable preservatives and brought to the laboratory with utmost care. Then analysis was carried out to determine the concentration of various metals like Nickel (Ni), Arsenic (As), Lead (Pb), Cadmium (Cd), Zinc (Zn) and Chromium (Cr), in the present work. Atomic Absorption Spectroscopy (AAS) has proved itself to be the most versatile instrumental technique for the qualitative analysis of trace metal in liquid sample (APHA, AWWA 1998, . De, A.K, 1998, Skoog, et al., 1986).

III. Results and Discussion

In the study areas following heavy metals in the creek water were analyzed in mg/lit and results obtained are given Table No.1 to Table No.3.

Table 1: Shows the observed values of Heavy metals presents in creek water samples in the year 2019-20 (Rainy Season).

Sr. No	Parameter	Unit	KW1	KW2	KW3	Standard mg/lit
1	Nickel	mg/L	<0.1	<0.1	<0.1	**0.02**
2	Arsenic	mg/L	<0.1	<0.1	<0.1	**0.01**
3	Lead	mg/L	<0.1	<0.1	<0.1	**0.01**
4	Cadmium	mg/L	0.065	0.075	0.01	**0.003**
5	Zinc	mg/L	0.0210	0.0125	0.0192	**5**
6	Chromium	mg/L	0.250	0.265	0.245	**0.05**

Table 2: Shows the observed values of Heavy metals presents in creek water samples in the year 2019-20 (Winter Season)

Sr. No	Parameter	Unit	KW1	KW2	KW3	Standard mg/lit
1	Nickel	mg/L	<0.1	<0.1	<0.1	**0.02**
2	Arsenic	mg/L	<0.1	<0.1	<0.1	**0.01**
3	Lead	mg/L	<0.1	<0.1	<0.1	**0.01**
4	Cadmium	mg/L	0.072	0.085	0.01	**0.003**
5	Zinc	mg/L	0.0212	0.0142	0.0222	**5**
6	Chromium	mg/L	0.310	0.270	0.255	**0.05**

Table 3: Shows the observed values of Heavy metals presents in creek water samples in the year 2019-20 (Summer Season)

Sr. No	Parameter	Unit	KW1	KW2	KW3	Standard mg/lit
1	Nickel	mg/L	<0.1	<0.1	<0.1	**0.02**
2	Arsenic	mg/L	<0.1	<0.1	<0.1	**0.01**
3	Lead	mg/L	<0.1	<0.1	<0.1	**0.01**
4	Cadmium	mg/L	0.095	0.086	<0.1	**0.003**
5	Zinc	mg/L	0.03	0.0148	0.0238	**5**
6	Chromium	mg/L	0.304	0.276	0.269	**0.05**

3.1 Nickel and Arsenic

The Nickel concentration was recorded as < 0.1 mg/L in all three seasons. The pollution of water with nickel and chromium arises from industrial sources or agricultural activities. It is regarded as essential trace metal but toxic in large amount to human health. It is considered as carcinogenic to human [Salem et al; 2000]. It is also reported that high dose of nickel in rats and dogs were significantly decreasing their body weights (Ambrosr et al; 1976, Matkar, R.R. 2008).

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3.2 Lead

The Lead concentration was recorded as < 0.1 mg/L in all three seasons. Acute poisoning of lead is relatively rare and generally restricted to occupational setting. Lead is toxic for aquatic organism but less than Cd and Hg. It is most dangerous heavy metal pollutant to mankind, but mainly as air pollutant. Leaded gasoline, pipes, fittings, solder and the service connections of some household plumbing systems contain lead that contaminates the drinking water mainly with lead and cadmium. It is dangerous element, it is harmful even in small amounts (Salem et al; 2000, Patil S.S. et al, 201).

3.3 Cadmium

The concentration of cadmium is high as 0.304 mg/L in summer season and is lowest as 0.01mg/L in rainy season. The higher levels of Cd obtained in the sample is might be due to contribution from other sources such as agricultural runoff (where fertilizers are used), leaching of Ni-Cd based batteries and other wastes (Eralagere et al; 2008).

3.4 Zinc

The highest concentration of zinc was recorded as 0.300 mg/L in summer season and lowest concentration was recorded as 0.0125mg/ i.e. rainy season. The presence of zinc increases cadmium toxicity and accumulation in aquatic plants. The highest mortality with cadmium was obtained when Zn: Cu ratio was one, has been studied by given a sub-lethal chronic load of zinc to fish by uptake from water (Vediya and Shrivastava, 2008, Patil S.S. et al, 2014).

3.5 Chromium

The highest concentration of Chromium was recorded as 0.304 mg/L in the summer season and lowest concentration was recorded as 0.245 mg/L in rainy season. Chromium is generally moderately toxic to algae and other aquatic plants. The concentration of serum cholesterol is correlated with chromium in drinking water (Vediya and Shrivastava, 2008).

IV. CONCLUSION

This study will help in understanding the amount of heavy metals being received in the river and its biological magnification in animals, particularly those at the lower level of food chain. This study will also help to make aware those local people or adjacent farmers for proper management of waste disposal and also to minimize use of synthetic inputs. The study indicated that increase in toxic waste day by day in river produced biological magnification in food chain, which is a challenge to scientists, policy makers, administrators and all those involved in the conservation of the environment. MIDC activity near the banks of the river needs to be checked. This will improve the drainage, and reduce pollution. However, a participatory approach in the management of the water body is desirable. Creating awareness among the people in the neighborhood, and attempting reorientation of the stakeholders towards the cause of conservation of the reservoirs are important from this point of view.

Overall water quality of creek at sampling location can be considered as supportive to the aquatic life. The quality of heavy metals in river water should be checked time to time; as heavy metal accumulation will cause numerous problems to living being. Therefore, passing awareness is needed for the betterment of water quality for the sake of its use.

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