The Analytical Study of Heavy Metals present in Water Samples of Godavari River

Mayur P. Davne, Vidya Pradhan

Dr. Rafiq Zakaria College for Women Navkhanda, Jublee Park,
Aurangabad, Maharashtra, India

***Abstract*: The heavy metals found in Godavari River are near about 65 out of 105 total elements till now. There is difference in concentrations of metals from site to site. The fresh water resources are limited in comparison to marine water resources. Many Natural incident and manmade practices are making these fresh water source polluted and the content of Heavy Metals in it is increasing day by day. It is now leading as a global issue for human being and also for under water environment. Most Commonly Cd, Cr, Pb, Ni and Zn, etc are found in these sources. The concentrations of heavy metals in sample water collected from Godavari river is seen in the order Ni>Pb>Cd>Zn>Cr. And it is now very essential to control these natural, manmade practices which increase in concentration of heavy metals in River waters.**

***Keywords*: Heavy Metals, Metal Contamination, Water Analysis.**

Introduction-

Due to heavy man-made practices water resources are getting polluted day by day. In which drinking water resources are mostly affect by pollutants and in the form of heavy metals content in it. A lot of hazardous compounds are found in water resources as pollutants many of which are pharmacologically active, and several of them are either carcinogenic or mutagenic [1, 2]. Samples taken from two-thirds of the water quality stations spanning India's major rivers showed contamination by one or more heavy metals, exceeding safe limits set by the Bureau of Indian Standards [3]. The findings are part of a report, which is the third edition of an exercise conducted by the Central Water Commission (CWC) from May 2014 to April 2018. The presence of metals in drinking water is to some extent unavoidable and certain metals, in trace amounts, required for good health. However, when present above safe limits, they are associated with a range of disorders [4, 5]. The problem 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 modern technology, industrialization and civilization. Industrial effluents contributing to aquatic contamination contain very toxic substances [6, 7].

The indiscriminate release of liquid waste of organic and inorganic nature changes physio-chemical characteristics of water and causes hazard to flora and fauna including important members of food chain of man and aquatic ecosystem [8, 9]. Hence the present study is aimed to investigate some of the important heavy metals contents such as Iron (Fe), Copper (Cu), Chromium (Cr), Lead (Pb), Cadmium (Cd), Zinc (Zn) and Fluoride (F) of the Godavari river water.

MATERIAL AND METHODS-

Samples were collected in different seasons at different targeted locations of Godavari river bank such as Paithan, Kaigaon, Gangakhad and Kopargaon which are used for study. Collection of samples are collected by using the proper scientific methods, they are collected in plastic jars which are cleaned before sample collection with nitric acid and distilled water. Atomic Adsorption Spectrophotometer (AAS) method is used for the Analytical Study of Heavy Metals found in the collected water samples such as Iron (Fe), Copper (Cu), Chromium (Cr), Lead (Pb), Cadmium (Cd), Zinc (Zn) and Fluoride (F) of the Godavari river water. It has been determined by it in concentration that range from trace to macro quantities.

RESULTS AND DISCUSSION-

River water were analyzed in ppb unit and results obtained are given [Table 1 and Figure 1] of the performed study.

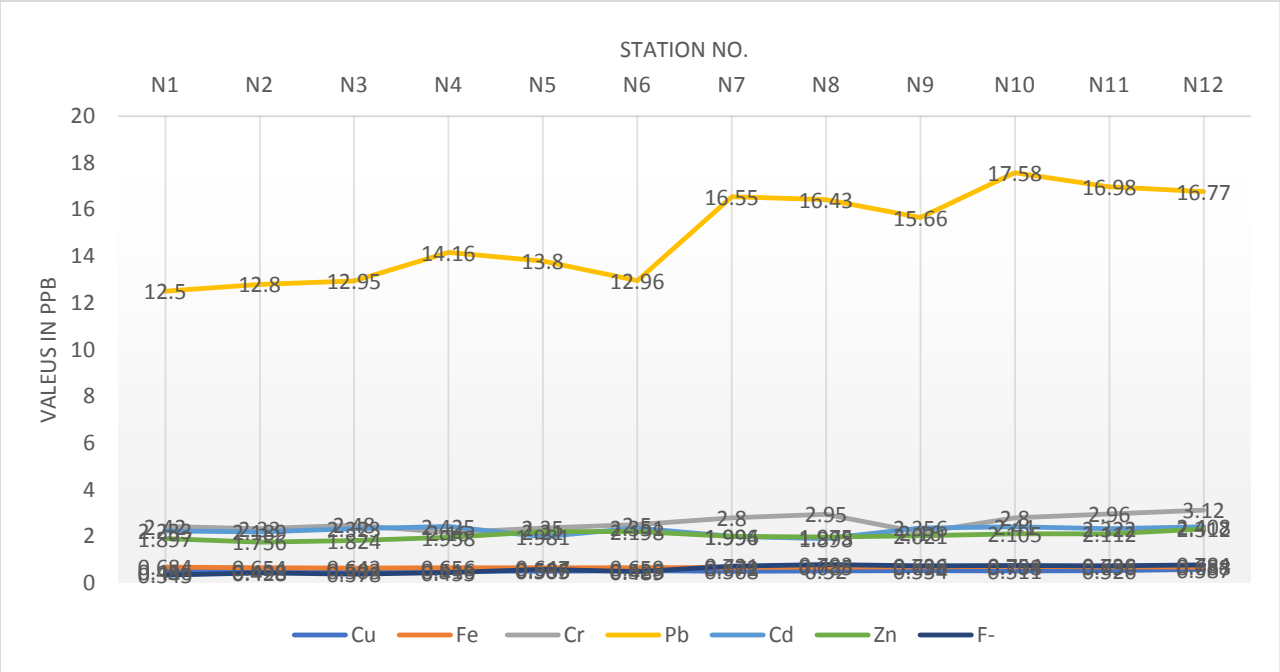
Table 1: Variation in Heavy Metals (ppb) of the Godavari River Water 2019-20 (summer and winter)

Station No.	Cu	Fe	Cr	Pb	Cd	Zn	F^-
N1	0.486	0.684	2.42	12.50	2.233	1.897	0.345
N2	0.498	0.654	2.33	12.80	2.189	1.756	0.428
N3	0.503	0.643	2.48	12.95	2.323	1.824	0.378
N4	0.516	0.656	2.16	14.16	2.425	1.958	0.453
N5	0.505	0.647	2.35	13.80	1.981	2.210	0.586
N6	0.528	0.659	2.50	12.96	2.351	2.198	0.489
N7	0.508	0.672	2.80	16.55	1.994	1.996	0.721
N8	0.520	0.685	2.95	16.43	1.898	1.975	0.793
N9	0.534	0.698	2.16	15.66	2.356	2.021	0.736

N10	0.511	0.708	2.80	17.58	2.410	2.105	0.754
N11	0.526	0.696	2.96	16.98	2.322	2.112	0.738
N12	0.587	0.688	3.12	16.77	2.408	2.312	0.784

*All values are in ppb (parts per billion).

Figure 1: Variation in Heavy Metals (ppb) of the Godavari River Water



Copper (Cu) -
The concentration of copper in ppb level during the year 2019-20(summer and winter) was varied from 0.486 (N1) to 0.587 (N2). High level of copper can cause harmful effect such as irritation of nose, mouth and eyes, nausea, vomiting, diarrhea, lesions in Gastro Intestinal Tract (GIT). In the study area in the months of monsoon the victims of above diseases have been recorded in the primary health centers.

Iron (Fe) -
The concentration of Iron in ppb level during the year 2019-20(summer and winter) was varied from 0.643 (N3) to 0.698 (N9). High concentrations of iron generally cause inky flavors, bitter and astringent taste. It can also discolor clothes, plumbing fixtures and cause scaling which encrusts pipes.

Chromium (Cr) -
The concentration of chromium in ppb level during the year 2019-20(summer and winter) was varied from 2.16 (N4) to 3.12 (N12). The major sources of chromium are the electroplating and metal finishing industries and publicly owned treatment plants relatively minor sources (other than localized contamination) are iron and steel foundries, inorganic chemical plants, tanneries, textile manufacturing, and runoff from urban and residential areas.

Lead (Pb) -
The variation of Lead metal in ppb level during the year 2019-20(summer and winter) was varied from 12.50 (N1) to 16.98 (S11). The lead concentration was increased and by excess released free metal ions into the water bodies from kitchen utensils and solubility of old paintwork from building during acidic wet deposition.

Cadmium (Cd) -
The variation of Cadmium metal in ppb level during the year 2019-20(summer and winter) was varied from 1.898 (N8) to 2.425 (N4). The possible sources of cadmium in river water system are contributed by domestic wastewater released from residential area, impetuously use of pesticides, fertilizers used in palm oil estates along the rivers bank and local air pollution caused by open burning.

Zinc (Zn) -
The concentration of Zinc in ppb level during the year 2019-20(summer and winter) was varied from 1.756 (N2) to 2.312 (N12). The zinc content was higher in summer. In summer, the water volume of the river was reduced substantially, it is likely that the heavy metal concentration increases with the anthropogenic input or it may be due to the natural and anthropogenic activities,

agricultural runoff, domestic activities, wastewater discharges, effluent discharges and another non-point source opened into water bodies.

Fluoride (F-) -

The variation of fluoride in ppb level during the year 2019-20(summer and winter) was varied from 0.345 (N1) to 0784 (N12). As fluoride is naturally present in water it becomes toxic to animal and human being when present at more than 1.0 mg/l concentration in drinking water. At the level of 1.5 mg/l, molting of teeth and bones has been reported.

CONCLUSIONS-

The conservation of river is in the interest of man as it's ecological, cultural and tourist value is immense. This study will help in understanding the number of toxic compounds (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.

REFERENCES-

[1] Agency for Toxic Substances and Disease Registry, (ATSDR) (2001a): Draft Toxicological profile for Manganese, U.S. Department of Health and Human Services, Public Health Service, Atlanta, GA, 449.

[2] Das. S.D. (2002). A text book of Environmental chemistry and pollution control measures. IIIrd edition. S. Chand Publication: 22-23.

[3] Ghorade, I.B. (2013). Ecosustainability Assessment of Godavari river water for sustainable Utilization, Ph.D. Thesis, Dr. B.A.M. University, Aurangabad.

[4] Goyal Mamta, Dhar D.N. and D.C. Rupainwar (2006). An Assessment of Ground Water Pollution and its Chemical Quality in Some Parts of Unnao District. Indian Journal of Environmental Protection. 26 (2): P 116-124.

[5] Hassan, A.A.S. (2012). Ground water quality of Aurangabad Industrial Area. Ph.D. Thesis Dr. B.A.M. University, Aurangabad.

[6] Kelkar, P.S., S.P. Pande., and M.Z. Hassn (2001): Status of industrial pollution sources in Damodar river basin. Proceddings of RAWM (IAEM) National conference on Recent Advances in Waste management: 20-22.

[7] Lohar P.S. (2000). Comparative toxicology of four heavy metals in freshwater fishes. J. of Aqua. Bio., 15 (1 & 2): 95-98.

[8] Matkar, R.R. (2008). Eco-Sutainability Assessment of Godavari river water at Jaikwadi Dam supplied to Aurangabad City. Ph.D. Thesis Dr. B.A.M. University, Aurangabad.

[9] Patil S.S., Thakur V.R., and Ghorade. I. B. (2014): Analysis of heavy metals in Jaikwadi Dam water, Maharashtra (INDIA). – IMPACT: International Journal of Research in Applied, Natural and Social Sciences (IMPACT: IJRANSS) Vol.2 (5) 2014. Pp 69-74.

[10] Schroeder, H. A. (1965): Cadmium as a factor in hypertension. Journal of Chronic Diseases, 18; 647-656.

[11] Willard, H.H, L.L, Merrytt, J.A Dean, and F.A Settle (1986). Instrumental methods of analysis (C.B.S) Publishers and Distributors, New Delhi. Pp. 140-145.