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Chemical Analysis of Metal Content In Water of Son River In District Sidhi of madhya Pradesh India

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ABSTRACT: *The Present research work undertaken for Chemical Analysis of metal content in water of Son River of district Sidhi during mansoon, winter and summer season in the year 2016-17 where metals such as calcium, magnesium, potassium, sodium, copper, iron and lead were chemically analyzed from four sampling station i.e. within the area of distt-Sidhi (Rampur naikin, Churhat, Sidhi and Sihawal in the study area.) The analysis of data shows that Ca, Mg, K, Na, Cu, were found to be within acceptable limit as per standard fixed by WHO 2011 and BIS 2012 while heavy metals such as Cd and Pb found to have in higher concentration which are certainly has adverse effect on the health of living being specially to human being. The results of this research work also suggest that the periodical monitoring of the Son River Water is must.*

Key Words : *River Son, Chemical analysis, Metals.*

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I. Introduction

The district Sidhi is located in the North east border of the Madhya pradesh State of India, The Son River originate from the place Amarkantak of the nighbouring district Shahdol The son river with the total length of 784 Km. Flows from Amarkantak in the North -West direction and enters in the area of district Sidhi thereafter it flows eastward, towards U.P. Jharkhand and join Ganga at Patna, Bihar. And also known as Second largest tributary of River Ganga.The River Son from its origin to its flowing within the geographical area of district Sidhi, carries number of pollutant on aconnt of urbanization, Industrialization, and other human activities occurring along the bank of river and nearer to the river. New-a-days- river water contamination with hazardous waste is becoming common phenomena (Kumar et. at. 2010[1] Sharma and Wadia 2015[2]) The CP CB[3] (Central Pollution Central Board) also reported the same.As the report of Ritu and Manoj 2012 revealed about the contamination of river water occurred by discharge of commercial and industrial waste water treated and untreated domestic sewage, solid waste containing metal salt, agricultural practices such as fertilizer, insecticides, pesticides into river water which create multiple environmental hazard for mankind, as well as for aquatic life.As it is known that many ground water resources and rivers may have higher metal concentration due to geochemical origin of salts and naturally occurring heavy metals may be present in some areas in sufficient concentration to create pollution problem. Although trace elements are biologically beneficial in low concentration but long term exposure to sub lethal concentration may result in adverse chronic biological effects.The pollution in river system has increased which has not only degraded the quality of water but has also affected the flora and fauna. Looking into the said problem, present study undertaken to analyze the Son River Water for ascertaining the presence of harmful metals and suggesting its proper remedy as well

II. Materials and Methods

This study covered about 120 K.M. stretch of river son in the geographical area of district Sidhi from Ramput Naikin block to Sihawal block where we have marked four sampling centre, i.e. Rampur (sw-1) Churhat (sw-2) Sidhi (sw-3) and Sihawal (sw-4) in order to take the water sample for chemical analysis purpose with these four water samples, which has been collected season wise that is three times in a year (2016-2017) during mansoon, winter and in summer and analyzed . All these for knowing the concentration of Ca, Mg, Na, K, Cd, Cu, Fe, and lead (Pb) present in the Son River Water. The water samples were collected at about 15 C.M. depths from the sampling centre site using dip and grab sampling methods with pre-rinsed polythene bottles.All the samples were preserved with concentrate HNo_3 (3ML/L) and concentrate HCL (0.5 Ml/200 ML) solution for analysis at Deptt. of Chemistry S.G.S. Govt. P.G. College Sidhi (M.P.). The analysis done using standard methods (APHA) and other methods.Ca (Calcium) and Mg (Magnesium) were determined by EDTA methods, Na (Sodium) K (Potassium) determined by using flame photometer, Iron was determined by using spectrophotometer, Cd (Cadmium), Cu (Copper) and Pb (Lead) were determined by using flame atomic

absorption spectrometry, after appropriate calibration according to standard calibration procedure.The data's obtained was again analyzed using statistical methods such as mean and standard deviation methods.

III. Result and discussion

The result obtained for the concentration of various metals recorded and presented with mean value and standard deviation in the table 1-4.

Table-1 Concentration of metals during Mansoon season

S. No.	Parameter with unit	Sampling Station				Mean Value (MV)	Standard deviation (SD)
		SW-1	SW-2	SW-3	SW-4		
1.	lead (pb) mg/L	0.0783	0.0576	0.0396	0.0231	0.04965	0.0205
2.	Iron (fe) Mg/L	5.10	3.14	2.35	1.88	3.1175	1.2299
3.	Copper (cu) Mg/L	0.0024	0.0018	0.0010	0.0011	0.001575	0.00056
4.	Cadmium (cd) mg/L	0.00	0.00	0.0010	0.00	0.00025	0.00037
5.	Sodium (Na) mg/L	6.5	5.6	4.22	3.6	4.98	1.034
6.	Potassium (k) mg/L	3.00	2.87	2.5	1.9	2.5675	1.54
7.	Magnesium (mg) Mg/L	4.5	4.3	3.8	2.8	3.85	0.6576
8.	Calcium (Ca) Mg/L	32.6	31.8	26.0	13.17	25.8925	7.77

SW= (Sample Water)

Table-2 Concentration of metals during winter season

S. No.	Parameter with unit	Sampling Station				Mean Value (MV)	Standard deviation (SD)
		SW-1	SW-2	SW-3	SW-4		
1.	lead (pb) mg/L	0.0587	0.0366	0.0258	0.0261	0.0368	0.013
2.	Iron (fe) Mg/L	0.91	0.31	0.24	0.18	0.41	0.652
3.	Copper (cu) Mg/L	0.0028	0.0026	0.0017	0.0019	0.0022	0.0004
4.	Cadmium (cd) mg/L	0.006	0.005	0.004	0.003	0.0045	0.0011
5.	Sodium (Na) mg/L	55	40	30.11	18.78	35.9725	14.90
6.	Potassium (k) mg/L	2.7	2.3	2.4	2.6	2.5	0.158
7.	Magnesium (mg) Mg/L	7.8	7.6	8.7	4.2	7.075	1.710
8.	Calcium (Ca) Mg/L	28	22	23	16	22.25	4.26

Table-3 Concentration of metals during summer season

S. No.	Parameter with unit	Sampling Station				Mean Value (MV)	Standard deviation (SD)
		SW-1	SW-2	SW-3	SW-4		
1.	lead (pb) mg/L	0.0199	0.0165	0.0098	0.0049	0.06387	0.05
2.	Iron (fe) Mg/L	0.98	0.87	0.91	0.34	0.775	0.25
3.	Copper (cu) Mg/L	0.0005	0.0003	0.0002	0.0002	0.0003	0.0003
4.	Cadmium (cd) mg/L	0.008	0.006	0.005	0.007	0.0065	0.001
5.	Sodium (Na) mg/L	15.00	20.00	21.00	11.27	16.8175	3.92
6.	Potassium (k) mg/L	2.98	3.17	2.62	1.76	2.6325	0.54
7.	Magnesium (mg) Mg/L	8.9	6.7	3.3	2.8	5.425	2.50
8.	Calcium (Ca) Mg/L	18	15	17	11.3	15.325	2.56

Table-4 Showing Concentration of various metals in water of Son River During-2016-17

S. No	Parameter with unit	Season of collection			Mean Value	S.D.	BIS	WHO
		Mansoon	Winter	Summer				
1.	lead (pb) mg/L	0.04965	0.0368	0.06387	0.0501	0.01	0.01 Mg/L	0.01 Mg/L
2.	Iron (fe) Mg/L	3.1175	0.41	0.775	1.434	1.199	0.3 Mg/L	--
3.	Copper (cu) Mg/L	0.001575	0.0022	0.0003	0.001	0.000	0.05 Mg/L	--
4.	Cadmium (cd) mg/L	0.00025	0.0045	0.0065	0.003	0.002	0.003 Mg/L	0.003 Mg/L
5.	Sodium (Na) mg/L	4.98	35.97	16.81	18.92	12.77	--	--
6.	Potassium (k) mg/L	2.56	2.5	2.63	2.56	0.05	--	--
7.	Magnesium (mg) Mg/L	3.85	7.07	5.42	5.44	1.314	30.0 Mg/L	--
8.	Calcium (Ca) Mg/L	25.89	22.25	15.32	21.15	4.384	75.0 Mg/L	--

The mean value of Pb (lead) in the study area of River Son was 0.05 Mg/L which was higher than the acceptable limit of 0.01 Mg/L prescribed by WHO 2011 and BIS 2017 Standards. As it is well known that the continuous exposure to lead (Pb) is associated with anoxia, nausea, impaired renal function and hypertension (Kaur 2012 and Varghese 2015). The presence of higher concentration of heavy metals such as Pb and Cd due to their toxicity and bioaccumulation has adverse effect on the health of living being including human (Das and Kaur 2001).The mean value of Fe (Iron) is 1.43 Mg/L which was higher than that of its standard/ acceptable

value of 0.3 Mg/L and it is also almost found in natural water as well as in earth crust and an essential element for all the living being.The mean value of Cu (Copper) 0.001 Mg/L which was within the acceptable limit of 0.5 Mg/L prescribed by BIS 2012 and WHO the copper is both nutrient and drinking water contaminant.he mean value of Cd (Cadmium) is 0.003 Mg/L which was equal to the acceptable value given by BIS and WHO that is 0.003 Mg/L in the summer season its value increases that is it become 0.0065 Mg/L. As it is known that continuous exposure to higher concentration of Cd Causes severe health problems due to its toxicity effectThe mean value of Na (Sodium) is 18.92 Mg/L which is variable one and its standard value has not been given by BIS and WHO. The sodium is found in all foods and in drinking water and vital elements for living being.The mean value of K (Potassium) is 2.56 Mg/L which is also an essential element for human being. It is widely occurs in environment and in water resources. The mean value of Mg in the study area of Water of River Son is 5.44 Mg/L and was within the acceptable limit of 30 Mg/L given By BIS 2012. The mean value of Ca (Calcium) is 21.15 Mg/L and it is within the acceptable limit of 75 Mg/L prescribed by BIS 2012

IV. Conclusion

This study indicates that Water of River Son needs constant bio monitoring and present work may be used as a baseline data.

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