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Surface water quality using Correlation matrix analysis in Manendragarh

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Abstract— **The determination of levels of iron, lead, chromium, cadmium and arsenic and physicochemical parameter of surface water will be used to sensitize the general population of Manendragarh on the importance of environmental management. Arsenic concentration in all season of water samples was found to be non-detectable.**

Keywords— ***Correlation matrix, Manendragarh, Iron, Lead, Chromium, Cadmium and Arsenic***

I. INTRODUCTION

Human activities often lead to water scarcity, with 80% of used water returned untreated, affecting flora and fauna. WHO Guidelines aim to address this issue by adapting relevant legislation. Clean water resources are crucial for ecosystems and human wellbeing. Rapid population growth and urban wastage negatively impact clean water availability. 70% of industrial waste is discharged into water bodies, causing pollution and polluting 5.5 trillion m3. Surface water quality is influenced by natural and anthropogenic processes, especially in urban and rural areas. It is determined by physical, chemical, and biological parameters, with relationships between parameters often achieved using multivariate statistical techniques.

II. MATERIAL AND METHOD

Manendragarh is a township of the MCB district. MCB district is a study zone in the North-Western fragment of the Chhattisgarh state in Central India. Area of Manendragarh has immense reserves of high-grade petroleum. The main coal girdles are in the Hasdo basin. There are minor fire clay, red oxide, deposits of limestone, and in Manendragarh. Water samples of Manendragarh its surrounding coal field area were collected from 15 sampling location for the period of pre monsoon and summer seasons for two sequential years, 2015 and 2016.

III. RESULTS AND DISCUSSION

Correlation studies of heavy metals in summer season of surface water

Table-1. showed that the result of correlation studies between heavy metals parameters in summer season in surface water during 2015-16.

The Iron has been found negative correlation between Lead (-0.451), Cadmium (-0.195) and Chromium (-0.283). Lead has been found positively correlated with Chromium (0.543) and negative correlated with Cadmium (-0.490). The Cadmium

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showed the negative correlation with Chromium (-0.268). It can be concluded that only Lead and Chromium parameters showed that statistically significant correlation at 1 % level of significance and rest of the parameters showed the statistically non-significant associated with each other's.

Correlation studies of heavy metals in pre monsoon season of surface water

Table-2 showed that the result of correlation studies between heavy metals parameters in pre monsoon seasons with surface water during 2015-16.

The Iron has been found negative correlation between Lead (-0.429), Cadmium (-0.201), and Chromium (-0.314). Lead has been found positively correlated with Chromium (0.345) and negative correlated with Cadmium (-0.445). The Cadmium showed the positive correlation with Chromium (0.063). It can be concluded that none of the parameters showed that the statistically significant associated with each other's.

Table1-1: Correlation matrix of summer surface water of different metals concentration 2015-16

Parameter	Iron	Lead	Cadmium	Chromium
Iron	1.000			
Lead	-0.451 NS	1.000		
Cadmium	-0.195 NS	-0.490 NS	1.000	
Chromium	-0.283 NS	0.543**	-0.268 NS	1.000

Note: * significance at 5 per cent level of significance, ** significance at 1 per cent level of significance

Table1-2: Correlation matrix of pre-monsoon season surface water of different metals concentration 2015-16

Parameter	Iron	Lead	Cadmium	Chromium
Iron	1.000			
Lead	-0.429 NS	1.000		
Cadmium	-0.201 NS	-0.445 NS	1.000	
Chromium	-0.314 NS	0.345 NS	0.063 NS	1.000

Note: NS Non significance

IV. CONCLUSION

The study will also notify the authorities in environment management on the level of heavy metal pollution Manendragarh municipal city hence providing a reference for future studies on the same. The results from the study will also be used to regulate the curative action to be taken including conduct of the water to eliminate the heavy metals where the levels are too high.

The prescribed limit value of iron in water is (0.3 mg/l WHO, 2011 BIS, 2014). All the sample were excess the permissible limit, except someone The iron was varied from 0.0 to 4.685 mg/L the uppermost Iron was observed in pre-monsoon season (2016) Lalpur Gram panchayat pond in Manendragarh.. The prescribed limit value of Lead in water (0.01 mg/l WHO, 2011 BIS, 2014). All samples were excess the permissible limit except

Away from Manendragarh, 3 km Lalpur Gram panchayat pond (0.0 mg/l), Manendragarh T.V Tower road Pond, Away from Manendragarh, 4 km Lalpur Gram Panchayat Part-2 pond Manendragarh. Nagar Palika Pond
Near Khedia Takies Pond Manendragarh In front of Manendragarh Police station Jhiria (0.0 mg/l). The prescribed limit value of cadmium in water (0.003mg/l WHO, 2011 BIS, 2014). All sample were below the permissible limit. The prescribed limit value for chromium in water (0.05 mg/l WHO, 2011 BIS, 2014). All the samples were below the permissible limit.

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