



## Statistical methods for analysis of physicochemical parameter of Surface water in Manendragarh

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**Abstract— Surface water contamination is a real public health issue that is currently garnering special attention worldwide. The purpose of this study is to assess well water quality controls by employing correlation matrix statistical techniques. The results show that all values of the allowable limits for total hardness, magnesium, chloride, fluoride, nitrate, and sulfate are found, with the exception of the maximum values for total suspended particles and dissolved oxygen.**

**Keywords— surface water (SW) Statistical methods, physicochemical parameter**

### I. INTRODUCTION

Surface water is essential for various activities like drinking, agriculture, and fisheries. However, it is contaminated with fertilizers and pesticides, making monitoring and controlling its quality a top priority. Developing countries face challenges in preserving water quality, as well water from suitable depths is protected from the surface, causing less fluctuation in supply. Water is essential for life, but industrialization has led to contamination of surface and groundwater with pollutants. Natural and anthropogenic activities determine the chemical, physical, and biological composition of water, deteriorating its quality and threatening life, economic advancement, and social success.

### II. METHODOLOGY

The purpose of this study is to assess well water quality controls through the use of statistical methods and a correlation matrix. Contamination of surface waters is a major global public health issue. During the course of two years, in 2015 and 2016, the study collected water samples from 15 sampling stations in Manendragarh and the neighboring coal field area. Thermometers, pH meters, conductivity meters, filtration techniques, EDTA titration techniques, total hardness – calcium hardness, argon titration, SPANDS method, UV spectrophotometer method, spectrophotometric Stannous chloride method, filtration method, TDS+TSS Winkler method, Winkler method, Closed reflux method, and pH meter with platinum electrode were used to determine the physicochemical parameters.

Sample for physicochemical characteristics were evaluated conferring to as per technique (APHA 22ND Ed., 2012, IS -2003). The sampling area are SW1-Manendragarh. Bisalvora River, Manendragarh, SW2-Away from Manendragarh, 3 km chainpur gram panchayat pond. SW3- Railway Station pond Manendragarh Part- 1, SW4-Away from Manendragarh, 5 km Hasiya River. SW5-Near Electrical office Jhiria Manendragarh., SW6 - Railway Station pond part-2, Manendragarh.SW7- Away from Manendragarh, 3 km Lalpur Gram panchayat pond ,SW8,Away from Manendragarh, 3 km Hasdeo River,SW9- Near Railwa,y station Manendragarh Jhiria,SW10-



Manendragarh. amakherwa pond, 3.50 km, SW11- Manendragarh T.V Tower road Pond, SW12- Away from Manendragarh, 4 km Lalpur Gram Panchayat Part-2 pond SW13 Manendragarh. Nagar Palika Pond, SW14- Near Khedia Takies Pond Manendragarh SW15- In front of Manendragarh Police station Jhiria.

### III. RESULT AND DISCUSSION

This study Correlation matrix of pre-monsoon season surface water of different Physico-chemical parameters 2015-16 in table-1. The Temperature were varied from 18 to 36 °C the uppermost temperature was observed in pre-monsoon season (2016) amakherwa pond, in Manendragarh (SW10) pH SW11 (8.61) in pre monsoon season 2015 SW11 (8.6) in pre-monsoon season 2016, EC SW12 (273.45  $\mu\text{s}/\text{cm}$ ) in pre-monsoon season 2015, SW12 (244.36  $\mu\text{s}/\text{cm}$ ) in pre-monsoon season 2016. TDS SW14 (615 mg/l), SW15 (570 mg/l) in pre-monsoon season 2015, SW14 (614 mg/l), SW15 (569 mg/l) in pre-monsoon season 2016. Total hardness all sample were permissible limit the prescribed limit value of total hardness in water is (500 mg/l WHO). Calcium SW14 (105.43 mg/l), SW15 (89.02 mg/l) in pre-monsoon season 2015 SW13 (93 mg/l) in post monsoon season 2016. Magnesium the prescribed limit value of magnesium hardness in water is (30 mg/l WHO, 2006). All samples were below the permissible limit. Chloride The prescribed limit value of chloride in water is (250 mg/l WHO, 2006). All the samples were below the permissible limit. Fluoride .The prescribed limit value of Fluoride in water is (1.5 mg/l WHO, 2006). All samples were below the permissible limit. The prescribed limit value of nitrate in water is (45 mg/l WHO, 2006 BIS, 2014). The entire sample were permissible limit. In pre-monsoon season Sulphate in water samples from 17.5 to 86.5 mg/l. All sample were permissible limit. The prescribed limit value of nitrate in water is (250 mg/l WHO, 2006). All sample was

permissible limit. The prescribed limit value of phosphate in water is (0.5 mg/l WHO, 2006). TSS All the sample was excess permissible limit except someone. SW6 (25 mg/l), SW8 (28 mg/l), SW14 (25 mg/l) in pre-monsoon season 2015. TS All the sample was below the permissible limit regular except SW14 (640 mg/l), SW15 (602 mg/l) in pre-monsoon season 2015 SW15 (646 mg/l) in pre-monsoon season 2016, DO All the sample was excess the permissible limit regular WHO (4.0 to 6.0 mg/l) SW7 and SW14 (6.0 mg/l) in pre-monsoon season 2015, SW3 (3.4 mg/l) in pre-monsoon season 2016, BOD The prescribed limit value of Biochemical oxygen demand in water (3.0 mg/l WHO, 2006). All the sample was below the permissible limit except SW3 (3.3 mg/l) in pre-monsoon season 2015 The prescribed limit value for Chemical oxygen demand in water is (10.0 mg/l WHO, 2006). All the samples were below the permissible limit except SW12 (11.1 mg/l) in pre-monsoon season 2016 .ORP High positive oxidation reduction potential will oxidize finish the microorganisms that are adverse to beings and negative oxidation reduction potential significance the healthier is for us. In pre-monsoon season Oxidation Reduction Potential in water samples of was -51 to 114 mV.

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

**Table -1: Correlation matrix of pre-monsoon season surface water of different Physico-chemical parameters 2015-16**

	Temp	pH	EC	TDS	TH	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Chloride	F <sup>-</sup>	Nitrate	Sulphate	Phosphate	TSS	TS	DO	BOD	COD	ORP	
Temp	1.000																		
pH	0.217	1.000																	
EC	0.227	0.449*	1.000																
TDS	0.185	0.429*	0.992**	1.000															
TH	-0.004	0.247	0.179	0.172	1.000														
Ca <sup>2+</sup>	0.006	0.396*	0.258	0.241	0.779**	1.000													
Mg <sup>2+</sup>	-0.013	-0.047	-0.002	0.005	0.720**	0.126	1.000												
Chloride	0.322	0.451*	0.644**	0.630	0.330	0.235	0.262	1.000											
F <sup>-</sup>	-0.060	-0.125	-0.357	-0.357	-0.525	-0.566	-0.204	0.132	1.000										
Nitrate	0.250	0.102	0.293	0.284	0.024	0.143	-0.121	0.372*	0.004	1.000									
Sulphate	-0.113	-0.043	-0.261	-0.272	-0.152	-0.090	-0.139	-0.131	0.430*	-0.166	1.000								
Phosphate	-0.264	-0.047	-0.244	-0.251	0.005	0.100	-0.103	-0.085	0.322	-0.085	0.187	1.000							
TSS	0.106	-0.206	0.280	0.294	0.470*	0.378*	0.325	0.277	-0.264	0.523**	-0.166	-0.236	1.000						
TS	0.183	0.393*	0.988**	0.997	0.207	0.259	0.040	0.637**	-0.367	0.322	-0.276	-0.262	0.370*	1.000					
DO	-0.346	0.047	-0.190	-0.201	0.088	-0.143	0.298	0.134	0.509**	0.071	0.360	-0.047	0.001	-0.187	1.000				
BOD	0.329	0.400*	0.515**	0.569**	-0.005	0.158	-0.182	0.299	-0.199	0.306	0.055	-0.035	0.241	0.569**	-0.461	1.000			
COD	0.213	0.311	0.267	0.284	0.018	-0.111	0.151	0.594**	0.134	0.212	-0.382	-0.045	-0.196	0.266	0.091	0.157	1.000		
ORP	0.059	-0.246	-0.262	-0.284	-0.120	-0.417	0.271	0.089	0.158	-0.036	0.051	-0.425	-0.033	-0.274	0.194	-0.336	0.219	1.000	

#### IV. CONCLUSION

The study showed that The EC were varied from 122.18 to 1501.09 $\mu$ S/cm the uppermost Electrical conductivity was observed amakherwa pond, in Manendragarh . The TDS were varied from 105 to 1290 mg/L the uppermost Total dissolved solid was observed amakherwa pond in Manendragarh.. The TH were varied from 23 to 210 mg/L the uppermost Total hardness was observed Nagar Palika Pond in Manendragarh. The Ca<sup>2+</sup>ion were varied from 8 to 120 mg/L the uppermost Calcium hardness was observed Nagar Palika Pond in Manendragarh. BOD the lowermost was recorded Near Electrical office Jhiria in Manendragarh and Police station Jhiria in Manendragarh (SW15). It suggests that the primary factor limiting microbial contamination of well water in the research area is inadequate well conservation. There are two plausible causes for this situation: first, the septic tanks near the wells may have leaked, and second, waste water containing animal and human feces may have runoff. Populations that utilize surface water Study water treatment methods. As an illustration, filtering water over through layers of granular materials.

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