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Impact of Paper mills effluent on different aquatic Ecosystem in and around of Champa, C.G. (India).

KEYWORDS: Water quality, Paper Mill, Physico-chemical parameter, Statistical value and public health.

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ABSTRACT *Paper and pulp industrial waste waters are associated with the nutrients, undesirable materials and heavy metallic elements. Its balance Concentrations are useful for eutrophication of water system are useful for agricultural purpose, but high amounts are creating adverse effect. We have taken extensively study of GW and SW in and around of Hasdeo river, in which Madhyabharat paper mills effluents being continuously discharged. For this aim we have chosen eight different selected spots: Four SW and Four GW respectively. Water samples were collected at the period of pre monsoons 2013 (Mar to May) in pre-cleaned jerry canes and subjected for analysis of physicochemical, phenol and selected heavy metals like Fe, Cu, Zn and Mn by standard method as per IS Procedures. The three Monthly experimental results were interpreted by the statistical means. The result were found beyond the desirable limit for Turbidity (34.167 NTU), TS (573.542 mg/L), TH (330.833 mg/L), COD (94.417 mg/L), Sodium (397.917 mg/L) and phenol (0.013 mg/L) as the basis of these selected water parameters. The WQI were found in the ranging 117.067 (MG3) to 120.933 (MS1). These elevated values of these parameters are of great concern to public health when the water from these bore wells are consumed by people without treatment.*

1.Introduction:

Although the fresh water in nature is very little; approximately 1% but due to over industrialization this fresh water recourses gradually decline. In addition, waste water is available source of micronutrient (N, P, K), inorganic matter and organic matter, which is needed for maintaining for fertility of soil (Bhatia, 1998; Rusan et al, 2007; Weber et al, 1996). The pulp and paper industries are consider as one of the most polluter industries of the world. This industry uses large quantity of fresh water and lignocellulogic materials in the process of production of paper and it generates large quantity of effluents. This effluents is characterized by dark colour, foul order high organic content and high concentration of nutrients that causing eutrophication of receiving water (Locorate et al, 2003; pokhrel et al, 2004). This paper and pulp mills effluents are in one hand increase the all kind of nutrient in water sources but in other hand enhanced the depletion of oxygen content as resulting of fish kill and foaming order .

1.1. Description of the Study Sites:

Champa city is situated on the banks of Hasdeo river and 12 km. away from in Janjgir-Champa district headquarter in the state of Chattisgarh, India. It is located between 22.05° N to 82.65° E latitude, topographically height of the area is 253 meters from means sea level and average temperature 49°C and average rain fall 1157.1 mm, geologically the study field is high grade of metamorphic stone of archean age. The manufacturing and production units of many big and small companies are located at the bank of Hasdeo river, Champa viz. Madhya Bharat Paper Limited (MBPL), Prakash Industries Ltd., CSPGCL's Marwa Power Plant and many mega power projects are in under construction. The different water sources of the investigating field are continue getting various kind of polluter from the above mentioned industrial units and domestic sources consequently water quality have been deteriorated. So it is necessary to analyze the extent of pollutants present in the water of Hasdeo river and adjourning areas. In this paper we have deal only the Pre-Monsoon (Mar – May 2013) assessment of some selected SW and GW and the results were interpreted by the statistical quality such as coefficient of correlation, % CV and WQI for grading the water sources.

2. Material and Method:

In our study, we have selected total eight sampling spots (shown in Fig.I) as the basis of environmentally significant in which four from the Hasdeo river at Birgahani (MS_1), Deoraha (MS_2), Pithampur (MS_3) and Garapali (MS_4) and the remaining four from the nearby borewell of Birgahani (MG_1), Deoraha (MG_2), Pithampur (MG_3) and Garapali (MG_4) respectively. Both Surface and Ground water samples were collected every month of the pre monsoon season (Mar'2013 to May'2013). In two liter capacity of polyethylene jerry canes and (one for physical and chemical analysis and another for metal analysis) previously soaked with 8M HNO_3 and clean with detergent followed by rinsing with double distilled water. The collected water sample was preserved in ice cooled chamber and kept in dark room (De, 2006; Rand, 1976). Analysis was carried out by the standard protocol (APHA,1995;Orebiyi, 2010; Clesceri,1991; WHO,1993; BIS,1993; Verma,2000; De,2006; Rand,1976; HACH,2000; Allen,1974; Vogel,1978) as per standard method within a short period of time, so as to get more reliable and accurate results.

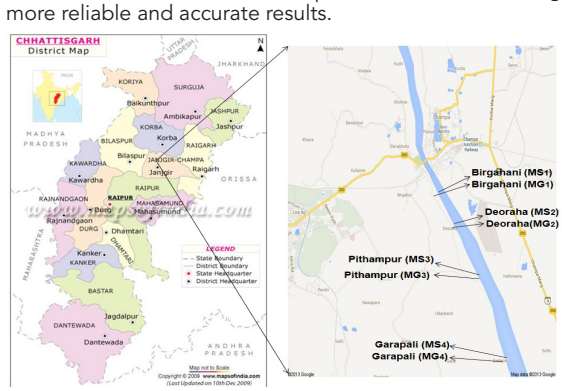

Fig. I: Location of study area

3.Result and Discussion:

The results are given in the Table-I while Statistical parameters-Mean, SD, SE, WQI and Correlation matrix are displayed in Table-II to IV.

Volume : 4 | Issue : 6 | June 2014 | ISSN - 2249-555X

P^H : In our investigation P^H ranges were noted 7.14 at the sampling spot MG_3 (Mar'2013) to 7.9 at the Site of MS_2 (Apr'2013) and MS_4 (May'2013) respectively. The above ranging P^H indicate water is neutral to basic in nature, which is under the range of acceptable for drinking water suggested by WHO, 1993 and BIS, 1991; 6.5 -8.5.

Table I: Average value of Physico-chemical and metallic element analysis.

Parameters / Sampling Spot	MS1	MG1	MS2	MG2	MS3	MG3	MS4	MG4
Temperature	29.367	29.433	29.333	29.333	29.533	29.267	29.300	29.333
P^H	7.510	7.323	7.813	7.580	7.383	7.203	7.743	7.370
Conductivity	1198.333	1121.000	1151.000	1116.333	1084.000	1006.000	1052.333	987.667
Turbidity	62.667	15.000	80.667	26.667	17.333	12.000	52.333	6.667
TS	566.333	417.000	892.000	420.000	553.667	421.000	678.333	640.000
TDS	324.667	301.000	735.333	287.000	384.000	323.333	463.667	512.333
TSS	241.667	116.000	156.667	133.000	169.667	97.667	214.667	127.667
Alkalinity	523.333	634.000	563.667	669.667	344.333	416.667	127.333	351.667
Total Hardness	349.333	292.667	312.333	327.000	367.333	344.333	314.667	339.000
Chloride	143.340	158.010	596.683	504.053	235.360	195.763	77.797	344.667
Fluoride	0.867	1.020	0.887	0.980	0.977	0.940	1.053	0.960
Sulphate	398.667	268.000	446.667	310.000	257.333	228.667	365.333	287.667
D.O	6.307	4.783	6.547	4.770	5.260	4.843	5.683	3.690
BOD	3.867	4.460	4.603	4.680	4.613	5.087	4.053	4.810
COD	132.333	115.667	108.667	81.000	104.333	87.667	83.333	58.333
Nitrate	35.810	24.167	45.960	31.960	37.193	27.660	45.330	24.963
Phosphate	0.163	0.170	0.267	0.140	0.130	0.140	0.110	0.133
Sodium	296.000	413.667	336.000	596.667	289.000	475.667	302.333	474.000
Potassium	9.667	7.000	10.000	9.667	9.667	11.000	12.333	8.333
Calcium	118.000	91.050	97.843	122.003	110.393	119.977	116.980	101.480
Magnesium	23.673	22.037	16.160	11.320	19.123	26.683	11.767	16.050
Iron	0.393	0.600	0.388	0.454	0.272	0.457	0.170	2.303
Copper	0.013	0.009	0.006	0.075	0.012	0.008	0.031	0.022
Zinc	0.091	0.353	0.237	0.117	0.180	0.283	0.091	0.417
Manganese	0.367	0.099	0.061	0.049	0.058	0.043	1.256	0.066
Phenol	0.005	0.006	0.009	0.007	0.008	0.013	0.038	0.016

*** All parameters in mg/Lit. except Conductivity (µ S/cm), Turbidity (NTU) and P^H**

MS_1– Birgahani (River Water), MG_1– Birgahani (Borewell Water), MS_2– Deoraha (River Water), MG_2–Deoraha (Borewell Water), MS_3– Pithampur (River Water), MG_3– Pithampur (Borewell Water), MS_4– Garapali (River Water) MS_4– Garapali (Borewell Water).

Table II: Statistical Parameter of water Quality

Parameters	N	MEAN	S.D	S.E	%CV	MIN	MAX	RANGE	Indian Drinking water Std. IS: 10500, 1993, Edition 2.2 (2003-09)	WHO Rec. 1999
Temperature	8	29.363	0.084	10.383	0.287	29.266	29.533	29.266 -29.533	***	27-28
PH	8	7.491	0.211	2.655	2.823	7.203	7.813	7.203 -7.813	6.5-8.5	6.5-8.5
Conductivity	8	1089.583	71.806	423.675	6.590	987.666	1198.333	987.666 -1198.333	***	1000
Turbidity	8	34.167	27.410	22.156	80.224	6.666	80.666	6.666 -80.666	5-8 NTU	5 NTU
TS	8	573.542	164.147	200.229	28.620	417.000	892.000	417 -892	520-2050	***
TDS	8	416.417	151.819	114.787	36.458	287.000	735.333	287 -735.333	500-2000	1000
TSS	8	157.125	49.702	85.442	31.632	97.666	241.666	97.666 -241.666	20-50	***
Alkalinity	8	453.833	179.821	185.026	39.623	127.333	669.666	127.333 -669.666	300-600	***

Volume : 4 | Issue : 6 | June 2014 | ISSN - 2249-555X

Total Hardness	8	330.833	23.900	123.508	7.224	292.666	367.333	292.666 -367.333	300-600	500
Chloride	8	281.959	184.457	50.678	65.420	77.796	596.683	77.796 -596.683	200-1000	200-1000
Fluoride	8	0.960	0.063	0.306	6.523	0.866	1.053	0.866 -1.053	1-1.2	1.5
Sulphate	8	320.292	75.975	140.950	23.721	228.666	446.666	228.666 -446.666	200-400	250
D.O	8	5.235	0.928	2.230	17.730	3.690	6.546	3.69 -6.546	5	***
BOD	8	4.522	0.395	1.367	8.746	3.867	5.086	3.866 -5.086	5	***
COD	8	96.417	23.327	46.787	24.194	58.333	132.333	58.333 -132.333	10	***
Nitrate	8	34.130	8.514	12.661	24.947	24.166	45.960	24.166 -45.96	45	50
Phosphate	8	0.157	0.048	0.058	30.812	0.110	0.266	0.11 -0.266	***	***
Sodium	8	397.917	111.357	104.652	27.985	289.000	596.666	289 -596.666	***	200
Potassium	8	9.708	1.598	3.418	16.460	7.000	12.333	7 -12.333	***	***
Calcium	8	109.716	11.559	41.719	10.536	91.050	122.003	91.05 -122.003	75-200	200
Magnesium	8	18.352	5.540	8.370	30.186	11.320	26.683	11.32 -26.683	<30	***
Iron	8	0.630	0.688	0.139	109.320	0.170	2.303	0.17 -2.303	0.1-1.0	0.3
Copper	8	0.022	0.023	0.005	105.642	0.005	0.075	0.005 -0.075	0.05	2
Zinc	8	0.221	0.123	0.032	55.705	0.091	0.416	0.091 -0.416	5	3
Manganese	8	0.250	0.421	0.130	168.428	0.043	1.256	0.043 -1.256	0.1	0.5
Phenol	8	0.013	0.011	0.002	83.845	0.005	0.037	0.005 -0.037	0.001	***

Electrical Conductivity: For healthy aquatic life the conductivity value should be ranging 150-500 µS cm^{-1}. Minimum conductivity was observed 867 µS/cm at the sampling site MG_3 in the month of May' 2013, while maximum EC was found on the sampling point MS_2 (Mar'2013); 1231 µS/cm, which is above the maximum permissible level as per WHO,1993 standard. The high value of the EC in water sample suggested the dissolve of inorganic and organic salt in water in high concentration. Such types of Result were earlier reported by the (Adewoye et al, 2013)

Turbidity : It was detected 6 NTU as low on the investigation site MG_4 in the month of Apr'2013 which is within permissible limit, while 89 NTU reported as the higher value on the MS_1 in May'2013. The Maximum value was beyond the acceptable range i.e., 5-25 NTU as set by WHO, 1993 and BIS, 1991. Similar observation was recorded by the (Prakash and Somashekar, 2006).

Suspended and Dissolved Solid: TS was noted in the ranges from 390 to 923 mg/L on the sampling point MG_3 (May-2013) and MS_2 (May'2013) respectively. TDS only measure of filtrate water sample. 224 mg/L on the sampling spot MG_4 in the month of Mar' 2013 and 818 mg/L of the location site MS_2 in the month of May'2013. TSS was noted in the ranges from 81 to 295 mg/L on the sampling point MG_3 (Apr-2013) and MS_1 (Apr' 2013) respectively. The values of TS and TDS were within the permissible unit while Maximum TSS value crossed the maximum allowable limit. Although high suspended dissolved particles have not serious health hazard, but those peoples who are suffering from kidney and constipation problems mere affected of these parameters.

Alkalinity :The cause of alkalinity in water is due to the presence of various dissolve ions such as OH^-, HCO_3^-, PO_4^{3-}, BO_3^-etc (Verma, 2000). The desirable and maximum permissible unit is suggested by various water monitoring agencies such as WHO, 1993 and BIS, 1991; 300mg/L to 600 mg/L. In our study period minimum and maximum both values were noted in Apr'2013 as 121 mg/L at the sampling location MG_3 and 671 mg/L of the sampling spot MG_2 (Mar'2013). Similar observation was recorded by the (Senthilkumar et al, 2011).

Total Hardness: Total hardness is computed by sum of temporary hardness and permanent hardness. The sources of hardness of water is chiefly due to the dissolve of OH^-, HCO_3^-, Cl^- and SO_4^- ion of Ca^{2+}, Mg^{2+}, Fe^{2+} and Mn^{2+}(De, 2006). In study region its ranges were recorded 268 mg/L to 569 mg/L from sampling point MS_2 (Mar'2013) and MS_4 (Mar'2013). These values are similar reported by (Pathan et al, 2009). The highest value was crossed the ranges according to WHO,1993 standard drinking water; 500 mg/L hardness of water does not create adverse effect on human health.

DO : Dissolve oxygen is important water quality parameter which determine organic pollution of water (Orebiyi E.O et al., 2010). According to various water monitoring agencies its desirable value is 5 mg/L. In our study 3.48 mg/L to 6.8 mg/L reported as low and high values at the sampling spot MG_4 (Apr'2013) and MS_2 (Apr'2013). The minimum value indicated the water sources are highly polluted by organic contaminants.

BOD : It was noted on ranging from 3.50 mg/L on the sampling point MS_1 in the month of Apr-2013 to 5.16mg/L in the month of Mar-2013 at the sampling point MG_3.Some water samples were showed slightly above the permissible limit prescribed by ISI, 1993, 5mg/L.

COD: The ranging was obtained from 57 mg/L (MG_4) in the month of Apr'2013 to 145 mg/L (MS_1) in the month of Apr'2013. The higher value is too fold greater than the above permissible value according to standard drinking water agency as per BIS, 1991; 10 mg/L.The high value may cause the presence of high content of carbonaceous particle and suspended particles in different water bodies.

Chloride: The potentially of Cl^- in microbes killing is depended upon the P^H and people accustomed to higher chloride in water are subjected to laxative effect (Verma, 2006). In our minor assessment the ranging was found from73 mg/L to 600 mg/L from in MS_4 (Mar'2013) and MS_2 (Mar'2013) respective-

Volume : 4 | Issue : 6 | June 2014 | ISSN - 2249-555X

ly under the desirable limit as per WHO and BIS. Similar observation was reported by (Maheshwari et al, 2012).

Fluoride: Its desirable amount spread from 1 to 1.5 mg/L is useful for human being. Its concentration is increased beyond the permissible limit 1 to 1.5 mg/L (WHO,1993) causes health hazardous. In this work ranging was obtained from 0.83 mg/L to 1.06 mg/L for MS_1 (Mar'2013) and MG_2 (May'2013) respectively. The observed value was within the standard range (Jayanthi et al, 2011).

Sulphate: The minimum and maximum value was calculated as 305 mg/L and 459 mg/L from MG_3 (Apr'2013) and MS_2 (May'2013) respectively. These values were identically reported by (Jayanthi et al, 2011).

Nitrate: In study area minimum value was recorded 23.81 mg/L on the sampling point MG_4in the month of Nov (2012) while 31.22 mg/L as maximum on the location spot MG_2 in the month of Oct-2012. These ranges were cover the permissible ranges, 45 mg/L. as per BIS.

Phosphate : Domestic sewage and chemical fertilizer are chief source of phosphate in water. In this research work phosphate was obtained in the range of 0.1 mg/L from MS_4 sampling point in the month of May-2013 to 0.24 mg/L on MS_2 in the month of Apr-2013.

Sodium: Domestic sewage is chief source for increase the amount of sodium in water. In our investigation observed value was 242 mg/L to 620 mg/L from MS_4 (Apr-2013) and MG_2 (Apr-2013) respectively. The high value was three times higher than the maximum values; 200mg/L.

Potassium: Its permissible range in drinking water is 10mg/L as per BIS, WHO and ICMR standard. 6 mg/L was detected as minimum on sampling spot MG_2 in the month of Mar'2013 while 13 mg/L at the sampling spot MS_4 in the month of Apr'2013 which is above the permissible limit.

Calcium: Its compound makes water hard as a resulting less foaming with soap. In our research work the ranging was observed from 78.02 mg/L to 130.34 mg/L from MG_1 (Apr-2013) and MG_2 (Apr-2013) respectively. The range was under permissible according to standard value. These observations are identical with (Gomathi et al, 2012).

Magnesium: 11 mg/L was reported on the sampling spot MS_4 in the month of Mar'2013 while 28.27 mg/L was noted on the sampling location MG_3 in the month of Apr'2013.

Iron: In our study 0.08 mg/L (MS_4, May-2013) to 0.79 mg/L (MG_1, Mar-2013) were reported. The amount of iron is high which is above the permissible limit as per drinking water standard. These observations are identical with (Gomathi et al, 2012).

Copper: In our study minimum amount was detected as 0.025 mg/L on the sampling spot MG_1 in the month of Mar-2013 while 0.053 mg/L was reported in the month of May-2013 on the sampling location MG_1 & MG_4 respectively.

Zinc : In our study minimum amount was detected as 0.03 mg/L on the sampling spot MG_3in the month of Apr-2013 while 1.05 mg/L was reported on MG_4(May-2013) sampling location respectively.

Manganese: In our study minimum amount was detected as 0.039 mg/L on the sampling spot MG_2in the month of Apr-2013 while 3.63 mg/L was reported on MS_4, Mar-2013 sampling location respectively.

Phenol: In our study minimum amount was detected as 0.006 mg/L on the sampling spot MS_1 in the month of Mar-2013 while 0.1 mg/L was reported on MS_4 (in the month of May'2013).

Correlation Matrix : The value of 'r' was calculated on the monthly basis as follows:

253 correlation coefficient 'r' among various water quality parameters were observed in which 153 positive (+) while 99 negative (–) correlation. Higher positive correlation was found between $SO_4^{2-}$and Turbidity (r = 0.960) while higher negative correlation was seen between DO and TSS (r = –0.906) Minimum positive r value was detected between $F^-$and BOD (r = + 0.007) while minimum negative correlation was occurred between Phenol and Fe (r = –0.011). Near about 28 correlations were found above the significant at 5% level (r >0.649).

Table III: Correlation Matrix of water Quality

	Temp.	PH	Cond.	Turb.	TS	TDS	TSS	Alk.	T.H	Cl–	F–	SO42-	D.O	BOD	COD	NO3–	PO43–	Na	K	Ca	Mg	Fe	Cu	Zn	Mn	Ph
Temp.																										
PH	-0.215																									
Cond.	0.294	0.438									Significant at 5% level, r > 0.649															
Turb.	-0.214	0.842	0.670																							
TS	-0.136	0.739	0.145	0.716																						
TDS	-0.183	0.621	-0.014	0.557	0.953																					
TSS	0.111	0.544	0.520	0.663	0.390	0.094																				
Alk.	0.111	-0.082	0.576	0.045	-0.291	-0.200	-0.347																			
T.H	0.265	-0.352	-0.166	-0.219	-0.124	-0.201	0.207	-0.283																		
Cl–	-0.126	0.403	0.162	0.245	0.393	0.533	-0.330	0.513	-0.115																	
F–	0.117	-0.067	-0.449	-0.459	-0.315	-0.279	-0.185	-0.393	-0.373	-0.386																
SO42-	-0.236	0.876	0.629	0.960	0.770	0.620	0.650	0.069	-0.266	0.333	-0.448															
D.O	0.012	0.646	0.737	0.913	0.521	0.346	0.665	0.051	-0.062	0.051	-0.448	0.776														
BOD	-0.136	-0.491	-0.622	-0.598	-0.224	0.054	-0.906	0.159	0.136	0.431	0.007	-0.606	-0.590													
COD	0.415	0.087	0.845	0.494	0.010	-0.134	0.444	0.395	-0.043	-0.208	-0.422	0.360	0.723	-0.545												
NO3–	-0.054	0.856	0.369	0.828	0.730	0.575	0.654	-0.342	-0.022	0.163	-0.118	0.745	0.807	-0.472	0.238											
PO43–	-0.039	0.428	0.540	0.625	0.578	0.644	-0.058	0.535	-0.370	0.627	-0.599	0.614	0.555	0.033	0.448	0.324										
Na	-0.389	-0.308	-0.342	-0.529	-0.521	-0.328	-0.717	0.459	-0.154	0.414	0.137	-0.435	-0.668	0.626	-0.570	-0.617	-0.167									
K	-0.481	0.425	-0.172	0.398	0.278	0.170	0.401	-0.610	0.223	-0.149	0.054	0.262	0.421	-0.156	-0.165	0.672	-0.212	-0.253								
Ca	-0.349	0.021	-0.065	0.031	-0.314	-0.440	0.307	-0.235	0.526	-0.185	-0.058	-0.063	0.107	-0.101	-0.139	0.182	-0.522	0.160	0.695							
Mg	0.111	-0.697	0.054	-0.209	-0.371	-0.346	-0.170	0.182	0.274	-0.419	-0.421	-0.344	0.050	0.143	0.498	-0.432	0.087	-0.169	-0.225	-0.062						
Fe	-0.136	-0.317	-0.530	-0.459	0.067	0.188	-0.352	-0.071	0.066	0.171	-0.036	-0.226	-0.717	0.355	-0.608	-0.562	-0.133	0.373	-0.479	-0.356	-0.080					
Cu	-0.215	0.267	0.000	-0.111	-0.295	-0.309	-0.031	0.187	-0.073	0.319	0.322	-0.019	-0.264	0.008	-0.439	-0.017	-0.358	0.632	0.135	0.496	-0.695	-0.014				
Zn	0.012	-0.542	-0.515	-0.557	-0.057	0.178	-0.732	0.119	-0.209	0.117	0.052	-0.449	-0.645	0.617	-0.345	-0.667	0.142	0.315	-0.632	-0.698	0.290	0.728	-0.406			
Mn	-0.279	0.490	-0.045	0.373	0.253	0.062	0.644	-0.688	-0.218	-0.537	0.459	0.347	0.311	-0.664	-0.055	0.543	-0.371	-0.451	0.636	0.298	-0.379	-0.300	0.107	-0.520		
Ph	-0.440	0.353	-0.501	0.105	0.294	0.228	0.276	-0.840	-0.179	-0.373	0.571	0.109	-0.022	-0.223	-0.493	0.401	-0.439	-0.209	0.672	0.237	-0.459	-0.011	0.115	-0.197	0.863	1

Volume : 4 | Issue : 6 | June 2014 | ISSN - 2249-555X

Water Quality Index: Water quality index was calculated for different sampling locations, the results were found in the ranges of 117.067 at the sampling point MG_3 to 120.933 at the MS_1 which is beyond the standard ranges. The high value of this statistical parameter indicated high loading of various kinds of pollutant. All the sampling point showed very high values of WQI (>100); Table IV, indication of intrusion of pollutants through leaching or percolation of surface water via paper mill industrial effluentand domestic garbage.

Table IV: Water Quality Index

Sampling Spot	∑QiWi	∑Wi	WQI = ∑QiWi / ∑Wi
MS1	23.023	0.196	120.933
MG1	23.076	0.196	117.733
MS2	22.997	0.196	117.333
MG2	22.997	0.196	117.333
MS3	23.154	0.196	118.133
MG3	22.945	0.196	117.067
MS4	22.971	0.196	117.200
MG4	22.997	0.196	117.333

4.Conclusion:

We have taken minor but deeply month wise monitoring of Surface and Ground water in the eight sampling spots MS_1 to MS_4 and MG_1 to MG_4in and around the Madhyabharat Paper Mill industry. From the results of experiment it may be concluded that the Ground and Surface water is polluted in references of EC (1231µS/cm), turbidity (89 NTU), TSS (295 mg/L), DO (3.48mg/L), COD (145 mg/L), Phosphate (0.24mg/L), Sodium (620 mg/L), Potassium (13 mg/L), Iron (0.79 mg/L), Cu (0.053 mg/L), Manganese (3.63 mg/L) and phenol (0.27 mg/L). These qualities were marginally higher than the standard values of drinking water. Higher Positive correlation of significant was calculated out between SO_4^{2-} vs Turbidity (r = + 0.960) indication that of both parameters are significantly correlated and follow similar kind of pattern together (increasing or decreasing). WQI reported >100 in all the sampling point indicating more loading of pollutant in that water sources and the Ground water sources, basically bore well water are not suitable for drinking. Industrial effluents need a continuous monitoring and proper management before their discharge. We have suggested to peoples by comparing prior treatment is necessary before human Consumption for especially potable and agricultural purpose.

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