Available online www.jocpr.com

Journal of Chemical and Pharmaceutical Research, 2012, 4(9):4334-4336

Research Article

ISSN : 0975-7384
CODEN(USA) : JCPRC5

Water Quality Assessment of River Siraswa, Near- Indo-Nepal Border, India

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ABSTRACT

Ground water sample were collected fromtwo spots (Chhapkhaiyaand Ranigunj)of Siraswa riverof theTerai region near Indo-Nepal(Raxaul- Birgunj)border for investigationover a stretch of 5kms from the border during one year from June 2011 to May 2012.The analyzed data were compared with the water quality standards of WHO, ISI and BIS. The objectives of this investigationis to know the water quality of this river because lot of people depends on it. The data obtained in the investigation was not satisfactorily forthe use of living organisms for any purposes or we can say water is polluted and best for nothing.

Keywords: Water Quality, WHO, ISI and BIS, Raxaul- Birgunj, etc.

INTRODUCTION

Water is one of the most important natural resources required for the life and health of the living organisms. Due to its unique properties it is of multiple uses for living organisms. In India, about 77% of water is used in agricultural sector.Human being depends on water for almost every development activity. Out of total water available on the earth only 0.003% is available to us in the form of ground and surface water.It also a major part of aqua culture without which noone can imagine the aquatic life. So water is a vital concern for aquatic as well as terrestrial ecosystem (Simmons.1999). there are so many water resources on the earth and each resources has its own environment with fully equipped organism and interrelatedand any change in water quality leads to unbalance the whole ecosystem of the water bodies.Water quality is changed by natural as well asanthropogenic. Ground water as a resources of drinking water and even today more than half of the world'spopulationdepends onground water for survival. So its very important to know its quality for different purposes. Two spots were selected for investigation of water quality of Siraswa river (a perennial water body)near Indo-Nepal border. Onespotis inRaxaul (India) and other spot is inBirgunj (Nepal).The exact location of the spot is $84^0$85'E and $26^0$98'N.

EXPERIMENTAL SECTION

Sample water during investigation period were collected in a sterilized cleaned plastic polyethylene bottles formtwo spots Chhapkhaiya (S-1) andRanigunj (S-2). Sample water were analyzed for different abiotic (Physico-Chemical) parameterssuch as pH, Turbidity, Alkalinity, Hardness, Free CO_2, DO,BOD, Phosphate, Nitrate, Chloride, etc.using standard methods available in the laboratories of Chemistry and Zoology of the institution.

RESULTS AND DISCUSSION

Findings of the abiotic data is given in table-1.

1. Temperature: It isan important parameter and inversely related to DO. Its value ranged from 11.8^{0}C to 36.3^{0}Cat S-1 while 12.1^{0}C to 36.2^{0}C at S-2.

2. Turbidity: It decreases the transparency of waterand caused by particulate matter such as organic, inorganic matters and planktons, etc.It increases in rainy season. Its value ranged from683 to 985 at S-1 while 660 to 695 at S-2.

3. pH: It shows the acidity or alkalinity of the waters. Sampling waterwasalkaline. Its value ranged from 7.6 to 8.9 at S-1 while from 7.8 to 8.7 at S-2.

4. Total Alkalinity: It showsthe buffering capacity of water.It isdirectlyrelated to pH.100mg/l to 250mg/l is good for river water. Its value ranged from 949 mg/l to 995 mg/l at S-1 while 947mg/l to 991 mg/lat S-2.

5. Total Hardness: It is not the water pollution but indicates the moderate quality of water. Hardness is due to natural accumulation of salts from contact with soil, it may be enter through industrial effluents and domestic sewage. Its value ranged from 735mg/lto 890mg/l at S-1 while 768mg/lto 895mg/l at S-2.

6. Free CO_2: It is also an important parameter and highly soluble in water. Its solubility depends upon the temperature, pressure and minerals in water.CO_2in water bodies is contributed by the respiratory activity of animals.Its value rangedfrom 260mg/l to 309 mg/l at S-1 while 259mg/l to 306mg/l at S-2.

7. DO: It plays an important role in aquatic environmentand is essential for growth of phytoplanktonsand fish productivity. It indicatesthe organic pollution level in water. Its value ranged from 0.03 mg/l to 0.30mg/lat S-1 while from 0.01 mg/l to 0.10 mg/l at S-2.

8. BOD: It measures the pollution strength of domestic and industrial wastes in terms of oxygen utilization. Its value ranged from 6.5mg/l to 8.9 mg/l at S-1 while at S-2, it was from 7.1mg/l to 8.9mg/l.

9. Phosphate: It is useful in determining whether the pollution is due to domestic sewage. Its value ranged from 23.3mg/l to 55.8mg/l at S-1 while at S-2, it was from 28.6mg/l to 53.2mg/l.

10. Nitrate: Nitrate is an important nutrient but also a good indicator of contamination from natural and humanactivities. Levels above 45mg/l are consideredharmful to aquatic organisms and infants. Its value ranged from 69 mg/l to 115 mg/l at S-1 while at S-2, it was from 77 mg/lto 117mg/l.

11. Chloride: It is toxic in nature and its concentration in water bodies depends upon eutrophication. Above 250mg/l is not good for irrigation. Its value ranged from 287mg/l to 381mg/l at S-1 while from 342mg/lto 382mg/lat S-2.

Table-1:Abiotic data of sampling spot of the river during June -2011 to May-2012

Months → Parameters ↓		June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Temp	S-1	32.2	33.5	36.3	34.4	31.5	25.5	14.5	11.8	13.5	23.4	28.7	30.5
	S-2	32.6	36.2	35.1	34.0	33.2	24.3	14.9	12.1	14.2	25.6	29.3	31.2
Turbidity	S-1	915	985	951	862	842	732	695	683	690	710	742	783
	S-2	995	818	898	840	835	725	682	660	682	697	715	772
pH	S-1	8.5	8.7	8.9	8.6	8.3	8.5	8.3	7.9	7.8	7.6	7.9	8.2
	S-2	8.7	8.5	8.7	8.5	8.1	7.8	8.0	8.1	7.8	8.0	8.1	8.4
Alkalinity	S-1	975	949	977	995	955	965	960	970	965	959	966	972
	S-2	947	955	975	991	963	971	955	965	973	980	960	954
Hardness	S-1	795	800	835	890	875	865	750	758	735	770	795	820
	S-2	810	840	835	860	877	895	840	815	794	768	775	805
Free Co_2	S-1	301	305	283	277	260	297	309	260	275	283	261	267
	S-2	293	300	295	286	271	301	306	263	269	287	259	266
DO	S-1	0.10	0.30	0.05	0.10	0.07	0.03	0.03	0.09	0.03	0.06	0.10	0.08
	S-2	0.08	0.07	0.01	0.06	0.09	0.10	0.10	0.05	0.09	0.06	0.08	0.10
BOD	S-1	6.5	7.8	7.6	8.1	8.6	8.2	7.9	6.5	7.3	8.9	8.8	9.1
	S-2	7.1	7.5	7.8	8.2	8.3	8.5	8.2	7.6	7.1	7.8	8.5	8.9
Phosphate	S-1	42.6	46.5	45.1	49.2	46.3	51.6	55.8	32.5	36.1	33.2	37.1	32.3
	S-2	39.8	43.3	43.9	47.6	48.5	53.2	51.2	28.6	38.5	35.2	36.5	35.6
Nitrate	S-1	97	109	115	104	89	81	74	69	72	79	83	92
	S-2	93	105	117	112	101	93	86	77	83	89	93	96
Chloride	S-1	362	372	381	343	336	317	295	287	297	309	321	337
	S-2	382	376	369	372	378	367	356	349	351	342	353	359

All the data is expressed in mg/l except pH, Temperature &Turbidity.

Images of Spot:

CONCLUSION

The data obtained in this investigation is not satisfactorily for any purposes of living organisms. All the findings are beyond the tolerance limit of WHO, ISI, BIS, etc. So the river at the investigating spots are highly polluted and health hazardous.

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