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Research Article

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

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Abstract

Ground water sample were collected from two spots (Chhapkhaiya and Ranigunj) of Siraswa river of the Terai region near Indo-Nepal (Raxaul- Birgunj) border for investigation over a stretch of 5 kms 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 investigation to know the water quality of this river because lot of people depends on it. The data obtained in the investigation was not satisfactorily for the 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 beings depend 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 none 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 resource has its own environment with fully equipped organism and interconnected any change in water quality leads to unbalance the whole ecosystem of the water bodies. Water quality is changed by natural as well anthropogenic. Ground water as a resource of drinking water and even today more than half of the world’s population depends on ground 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. One spot is in Raxaul (India) and other spot is in Birgunj (Nepal). The exact location of the spot is 84°85’E and 26°98’N.

Experimental Section

Sample water during investigation period were collected in a sterilized cleaned plastic polyethylene bottles from two spots Chhapkhaiya (S-1) and Ranigunj (S-2). Sample water were analyzed for different abiotic (Physico-Chemical) parameters such as pH, Turbidity, Alkalinity, Hardness, Free CO₂, 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 is an important parameter and inversely related to DO. Its value ranged from 11.8°C to 36.3°C at S-1 while 12.1°C to 36.2°C at S-2.

2. **Turbidity**: It decreases the transparency of water and is caused by particulate matter such as organic, inorganic matters and planktons, etc. It increases in rainy season. Its value ranged from 683 to 985 at S-1 while 660 to 695 at S-2.

3. **pH**: It shows the acidity or alkalinity of the waters. Sampling water was alkaline. 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 shows the buffering capacity of water. It is directly related 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 947 mg/l to 991 mg/l at 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/l to 890mg/l at S-1 while 768mg/l to 895mg/l at S-2.

6. **Free CO₂**: It is also an important parameter and highly soluble in water. Its solubility depends upon the temperature, pressure and minerals in water. CO₂ in water bodies is contributed by the respiratory activity of animals. Its value ranged from 260mg/l to 309 mg/l at S-1 while 259mg/l to 306 mg/l at S-2.

7. **DO**: It plays an important role in aquatic environment and is essential for growth of phytoplanktons and fish productivity. It indicates the organic pollution level in water. Its value ranged from 0.03 mg/l to 0.30 mg/l at 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 human activities. Levels above 45mg/l are considered harmful 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/l to 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/l to 382mg/l at S-2.

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

<table>
<thead>
<tr>
<th>Parameters →</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
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<tbody>
<tr>
<td><strong>Temp</strong> S-1</td>
<td>32.2</td>
<td>33.5</td>
<td>36.3</td>
<td>34.4</td>
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<td>14.5</td>
<td>11.8</td>
<td>13.5</td>
<td>13.5</td>
<td>23.4</td>
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<tr>
<td>S-2</td>
<td>32.6</td>
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<td>35.1</td>
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<td>34.0</td>
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<td>14.9</td>
<td>12.1</td>
<td>14.2</td>
<td>14.2</td>
<td>25.6</td>
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<td>913</td>
<td>985</td>
<td>951</td>
<td>862</td>
<td>842</td>
<td>732</td>
<td>695</td>
<td>683</td>
<td>690</td>
<td>710</td>
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<td>783</td>
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<td>S-2</td>
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<td>818</td>
<td>898</td>
<td>840</td>
<td>835</td>
<td>725</td>
<td>682</td>
<td>660</td>
<td>682</td>
<td>697</td>
<td>715</td>
<td>772</td>
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<tr>
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<td>8.7</td>
<td>8.9</td>
<td>8.6</td>
<td>8.3</td>
<td>8.5</td>
<td>8.3</td>
<td>7.9</td>
<td>7.8</td>
<td>7.6</td>
<td>7.9</td>
<td>8.2</td>
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<tr>
<td>S-2</td>
<td>8.7</td>
<td>8.5</td>
<td>8.7</td>
<td>8.5</td>
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<td>8.0</td>
<td>8.1</td>
<td>7.8</td>
<td>8.0</td>
<td>8.1</td>
<td>8.4</td>
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<td>977</td>
<td>995</td>
<td>955</td>
<td>965</td>
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<td>959</td>
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<td><strong>Hardness</strong> S-1</td>
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<td>890</td>
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<td>865</td>
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<td>758</td>
<td>735</td>
<td>770</td>
<td>795</td>
<td>820</td>
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<td>835</td>
<td>860</td>
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<td>0.08</td>
<td>0.07</td>
<td>0.01</td>
<td>0.06</td>
<td>0.09</td>
<td>0.10</td>
<td>0.10</td>
<td>0.05</td>
<td>0.09</td>
<td>0.06</td>
<td>0.08</td>
<td>0.10</td>
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<tr>
<td>S-2</td>
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<td>0.07</td>
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<td>0.06</td>
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<td>0.10</td>
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<td>0.06</td>
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<td>45.1</td>
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<td><strong>Chloride</strong> S-1</td>
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<td>381</td>
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<td>S-2</td>
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</table>

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

REFERENCES