

Pre-Monsoon Study of Physico-Chemical Parameters of Hemavathi River, Turuvekere, Karnataka, India

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ABSTRACT: The present study was carried out to assess the water quality of River Hemavathi during pre-monsoon season. It is one of the major tributary of river Kaveri. The water samples were collected near a village Turuvekere at two different points. Sample S₁ was collected from the populated area of the village and Sample S₂ one km upstream. The various physico-chemical parameters studied were temperature, pH, conductivity, TDS, turbidity, hardness, alkalinity, concentration of Ca²⁺, Mg²⁺ and Cl⁻ ions etc. All these parameters were then compared with the WHO and ISI standards to draw the final conclusion on the quality of water of the river.

KEYWORDS: Hemavathi River, Hardness, Turbidity, pH, Conductivity.

I. INTRODUCTION

All human civilizations developed near river banks to fulfil their need of water, to quench their thirst and for the food resources on which they depended such as Fishing, Farming and Irrigation of their land. During their growing need for Agriculture, men started depending upon extensive use of chemical fertilizers, pesticides, insecticides etc to get better and better yields, forgetting that this may lead to a serious damage to the quality of water. Various workers [1-8] have so far studied the quality of water of different rivers, but on river Hemavathi not much attention has been drawn. So this is a sincere effort from the authors to study the various parameters of the water of River Hemavathi a major tributary of river Kaveri near Taluk Turuvekere, where villagers use its water mainly for irrigation of their land and other domestic purposes. The study aims at the determination of various parameters such as temperature, pH, Conductivity, TDS, Turbidity, Hardness, Alkalinity, Concentration of Ca²⁺, Mg²⁺ and Cl⁻ ions etc and compare these parameters with Indian and International standards to ensure the quality of river Hemavathi water.

II. MATERIALS AND METHODS

Samples were collected from two different places in the village in plastic cans as per standard procedure. Sample-1 (S₁) from the populated locality of the village and Sample-2 (S₂) one km up the river from the village. The Physical and Chemical parameters were studied and the results were compared with the values of water qualities standards. All chemicals used were of AR grade. Double distilled water was used for preparation of reagents and solutions. Electrical Conductivity, pH, and Turbidity were determined using Systronics – Conductometer, Digital Systronics pH – meter and Turbidity - meter respectively. The major water quality parameters considered in the present study are pH, Conductivity, Turbidity, Total hardness, Temporary hardness, Permanent hardness, Alkalinity, Total dissolved solids, Calcium ions, Magnesium ions, and Chloride ions etc. Temperature of the samples was noted at their sampling points. The methods employed for determination of various parameters and their comparison with WHO and ISI standards are listed in Table 1.

III. DETERMINATION OF WATER QUALITY PARAMETERS

The parameters studied in the present study are compared with WHO and ISI standards [9, 10]. This forms the basis of result and discussion. Determination of Total hardness, Temporary hardness, Permanent hardness, Alkalinity, Total dissolved solids, Calcium ions, Magnesium ions, Chloride ions was done using standard methods [11].

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 3, Issue 9, September 2014

IV. RESULTS AND DISCUSSION

The water quality was analysed by collecting samples at two different sites Sample-1 (S₁) and Sample-2 (S₂) from populated area of the village and 1 km up the river before reaching the village respectively. The results are tabulated in the Table 2. The results obtained are compared with the international and Indian Standards. Table 1.

1. pH

pH was found to be 7.1 and 7.7 for S₂ and S₁ respectively. Sample S₂ is well within the range of WHO and ISI Standards but S₁ is on upper limit side though within the range of the said standards. Fig 1, Table 2

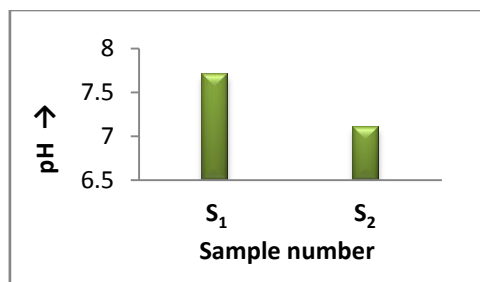


Fig 1 Graphical representation of pH

2. Electrical Conductivity(EC)

This was found to be 300 μs / cm for S₂ and 320 μs / cm for S₁, Fig 2. Table 2

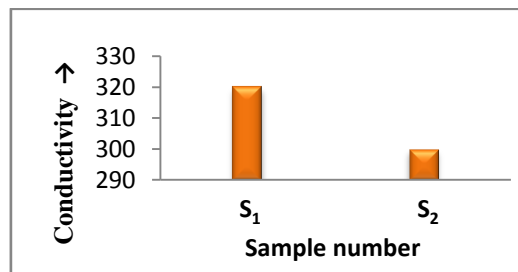


Fig 2 Graphical representation of Electrical Conductivity

3. Total Dissolved Solids (TDS)

The TDS found in the analysis was 214 and 158 mg/L for sample S₁ and S₂ respectively which is within the limit of the said standards. Fig 3, Table 2

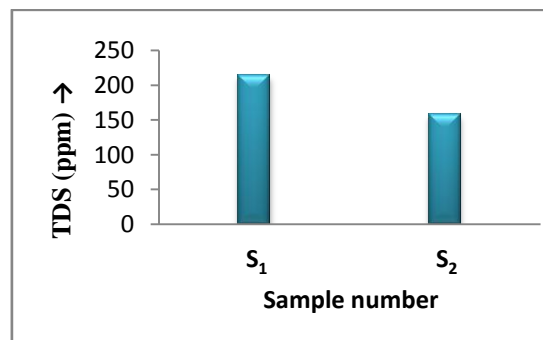


Fig 3 Graphical representation of TDS

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4. Total Hardness

S₂ and S₁ sample gave 138 mg/L and 120 mg/L of total Hardness which according to WHO standard is exceeding the limit of total hardness but is within the range of ISI standards. Fig 4, Table2

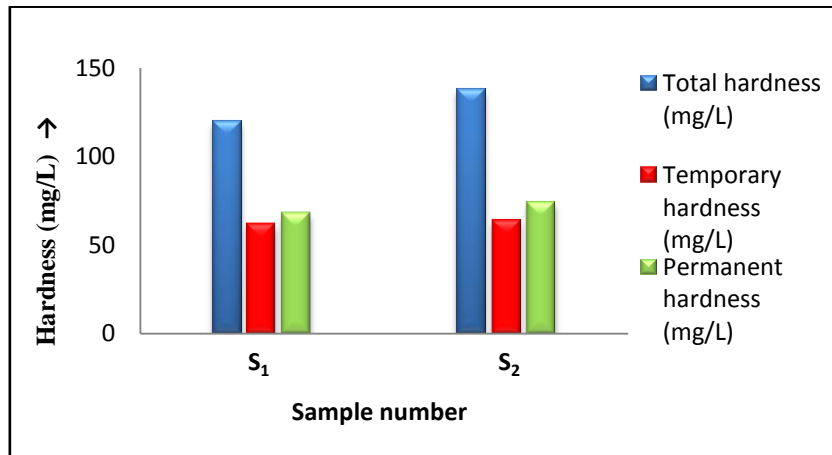


Fig 4 Graphical representation of Total, Temporary and Permanent hardness

5. Permanent Hardness

The permanent hardness which is due to chlorides and sulphate salts of Calcium and Magnesium was found to be 74 mg/L and 68 mg/L for samples S₂ and S₁ respectively. Fig 4, Table 2

6. Temporary Hardness

The bicarbonates of Calcium and Magnesium dissolved in water impart temporary hardness to water. It was found to be 64 and 62 mg/L in S₂ and S₁ respectively. Fig 4, Table 2

7. Concentration of Calcium, Magnesium and Chloride ions in sample water

Concentration of Ca²⁺ was found to be 110 mg/L and 100 mg/L samples for S₂ and S₁ respectively, whereas Mg²⁺ was found to be 28 mg/L and 20 mg/L for S₂ and S₁ samples. Fig 5a, Table 2.

Concentration of Cl⁻ ions was found to be 36 mg/L and 39.76 mg/L in sample S₂ and S₁ respectively. Fig 5b, Table 2

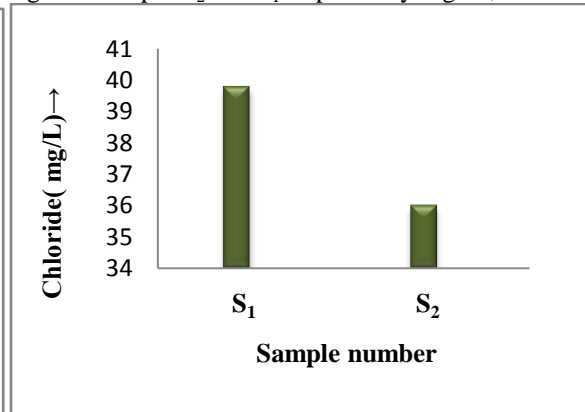
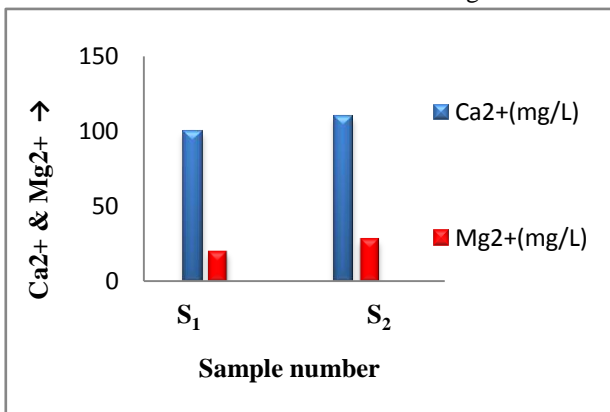


Fig 5a Graphical representation of Ca²⁺ and Mg²⁺ ions

Fig 5b Graphical representation of Chloride ions

8. Turbidity

Turbidity in the two samples S₂ and S₁ was reported to be 22 NTU and 24 NTU respectively. Fig 7, Table 2

International Journal of Innovative Research in Science, Engineering and Technology

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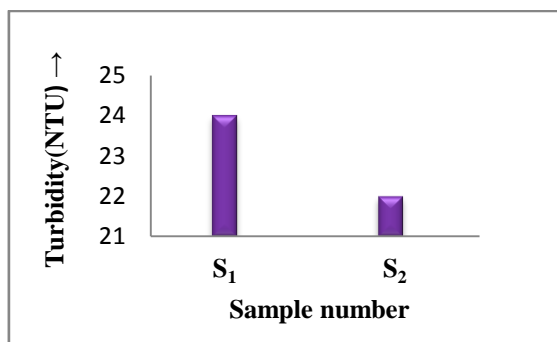


Fig 6 Graphical representation of Turbidity

9. Alkalinity

The acid neutralizing capacity of water is called alkalinity and is due to the presence of OH⁻, CO₃²⁻ and HCO₃⁻ ions in water. The alkalinity of the samples S₂ and S₁ was found to be 180 mg/L. Fig 8, Table2

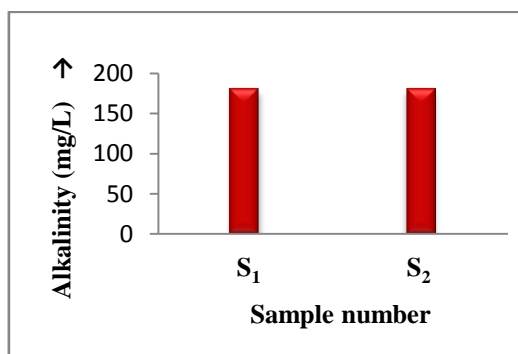


Fig 7 Graphical representation of Alkalinity

TABLE 1: Water Quality Parameters and Their WHO & ISI Standards.

SL.No	Parameters	Method	WHO Standards	ISI Standards
1	Temp.	Thermometric	-----	-----
2	pH	pHmetry	7.0 – 8.0	6.5 – 8.5
3	Electrical Conductivity	Conductometry	1400	-----
4	Total Dissolved Solid	Filtration Method	1000	500
5	Total Hardness	EDTA titration	100	300
6	Temporary hardness	EDTA titration	-----	-----
7	Permanent hardness	EDTA titration	-----	-----
8	Calcium	EDTA titration	75	75
9	Magnesium	EDTA titration	150	30
10	TA	Titration Method	120	200

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TABLE 2:Water Quality Parameters of Hemavathi river water

SL.No	Parameters	Method	S ₁	S ₂
1	Temp.	Thermometric	25 ⁰ C	24 ⁰ C
2	pH	pHmetry	7.7	7.1
3	Electrical Conductivity(μs/cm)	Conductometry	320	300
4	Total Dissolved Solid(mg/L)	Filtration Method	214	158
5	Total Hardness (mg/L)	EDTA titration	120	138
6	Temporary hardness(mg/L)	EDTA titration	62	64
7	Permanent hardness(mg/L)	EDTA titration	68	74
8	Calcium(mg/L)	EDTA titration	100	110
9	Magnesium(mg/L)	EDTA titration	20	28
10	Turbidity (NTU)	Turbidity meter	24	22
11	Chloride(mg/L)	Argentometric Titration	39.76	36
12	Alkalinity (mg/L)	Titration Method	180	180

S₁ is sample collected from the Populated area of the village site

S₂ is sample collected from 1 km above the village.

V. CONCLUSION

The above study suggests that both the samples collected from river Hemavathi at two different points were mostly in accordance with the WHO and ISI Standards except for pH, Concentration of Calcium ions and Alkalinity which was found to be on the higher side reaching the upper limit or even slightly exceeding it. This may be due to excessive use of fertilizers,pesticides and insecticides.Weathering of rocks also could lead to higher concentration of Calcium ions in water that can lead to an increased pH and thus the alkalinity. The farmers may be warned to reduce the use of excess chemicals in the soil.The other parameters were found in the safe limit that suggests that the water of the river as a whole is acceptable for drinking and other purposes.

VI. ACKNOWLEDGEMENT

The authors thank the college authorities of Sir M Visvesvaraya Institute of Technology, Bangalore, for providing facilities to carry on this work.

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DOI: 10.15680/IJIRSET.2014.0309029