STREAM QUALITY STUDIES OF VRISHABAVATHI RIVER -A CASE STUDY

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ABSTRACT

Groundwater vulnerability has become a major issue for the past many years. This study assessed the groundwater vulnerability in the region around Vrishabawathi river, near mylasandra, Bengaluru Urban District. DRASTIC model in a GIS (Geographic Information System) environment was used in this study to generate vulnerability maps. This zone was divided into parts on directional basis and six samples were collected from each zone and tested for various parameters such as pH, total hardness, total dissolved solids, total suspended solids, total dissolved oxygen etc. The topographical and hydrological parameters are used to analyze the overall vulnerability of the groundwater in the study area. The longitudes and latitudes of each of the collected samples of groundwater were noted and a spatial map was prepared of the area using ArcGIS and the data was imported. The seven basic parameters considered for the analysis were Depth to water, Net recharge, Aquifer media, Soil media, Topography, Impact of vadose and Hydraulic conductivity. Each of the parameter values were divided into ranges and a rating was allotted to them, higher the rating greater is the extent of vulnerability.

Apart from seven topographical and hydrological parameter maps, ten other maps were prepared to analyze the impact of total hardness, total dissolved solvents, pH, BOD, conductivity, alkalinity, DO etc. Each of the spatial maps show the quality of the groundwater with respect to the impact caused due to the considered parameter. A drastic index map was finally prepared, Higher the drastic index, greater is the vulnerability for groundwater pollution.

Keywords: *Alkalinity, BOD, DO, Drastic model, Drastic index, Electrical conductivity, Hardness, pH, Turbidity, TDS, TSS, Vrishabavathi river.*

1. FIELD STUDIES

The Vrishabhavathi River is a tributary of the Arkavathy river. It originates at the Kadu Malleshwara Temple in Malleswaram and flows through several areas in the city including Rajarajeshwari nagar, Kengeri and Bapuji Nagar and meets the Arkavathy River near Bidadi in the outskirts of the city. It drains a major parts of Bangalore metropolis and is an outlet for domestic and industrial effluent of that area. Earlier this surface water is mainly used for agricultural and drinking purposes. Since this watershed lies in Bangalore urban and rural area, today this water is only used for agricultural purpose which is also not safe. With domestic sewage and industrial pollution of lakes and waterbodies in Peenya Industrial Area, the Vrishabhavathi too became polluted and would often throw up toxic froth. Today it flows throughout the year, carrying an estimated 600 million liters a day (MLD) of wastewater discharged by the city. In the Urban region already, there are two treatment plants having capacity of 180 MLD of

Primary and Secondary and 75 MLD of tertiary in Rajarajeshwari arch and Mylasandra respectively. Further there are no treatment plants along river stretch. After Mylasandra again there are so many tributaries that will join the river which adds up the industrial, Agricultural and domestic pollutants.

1.1 SITE LOCATIONS OF SAMPLES COLLECTED

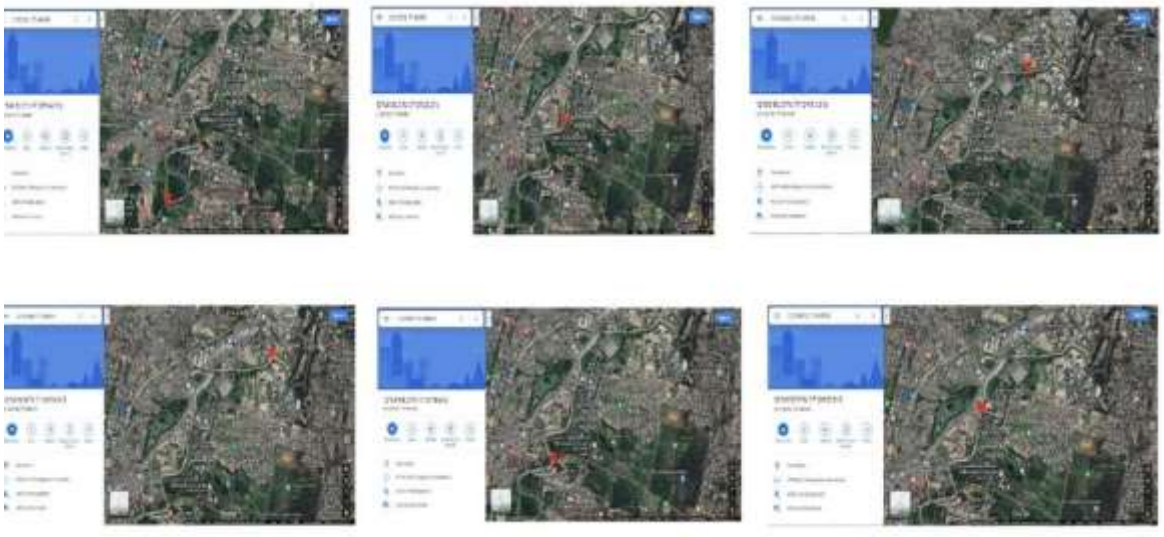

Fig -1:(1a,1b,1c,1d,1e,1f)

(from 1a to 1f, location maps showing the sampling station of the study area along with their latitude and longitude)

2. LAB WORK AND ANALYSIS

This chapter briefly presents the results of the sampling and analysis of samples. Samples collected were tested for different parameters from 6 sampling stations located in vrishabavathi river near mylasandra and obtained the following results

Table -1

SAMPLE STATION	S1	S2	S3	S4	S5	S6
ph.	6.61	6.65	6.69	6.73	7.94	7.01
ACIDITY	88	140	128	112	104	124
ALKALINITY as CaCO3(mg/l)	128	284	200	296	208	268
TURBIDITY(NTU)	412	2	0	0	0	0
ELECTRICAL CONDUCTIVITY	0.73	1.04	0.66	1.81	0.67	0.99
TOD (mg/l)	0.25	0.36	0.26	0.62	0.26	0.37
TOTAL HARDNESS as CaCO3(mg/l)	492	504	454	438	113	309
TSS (mg/l)	268	294	237	251	72	348

TDS (mg/l)	987	936	918	873	467	375
BOD (mg/l)	625	536	424	528	432	246

For better understanding bar graphs have been plotted from the obtained test results with x axis indicating sampling station (S1, S2, S3, S4, S5, S6) and y axis indicating concentration in (mg/l)

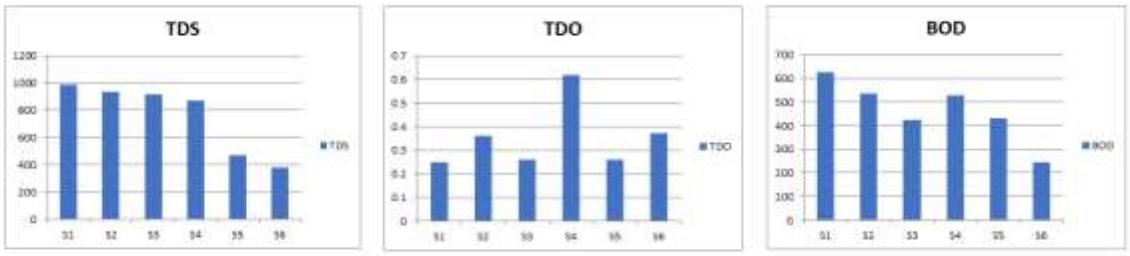

Fig- 2 :(2a,2b and 2c are the bar graphs plotted showing variation of TDS, TDO and BOD at 6 stations)

2.1 DRASTIC MODEL MAPS

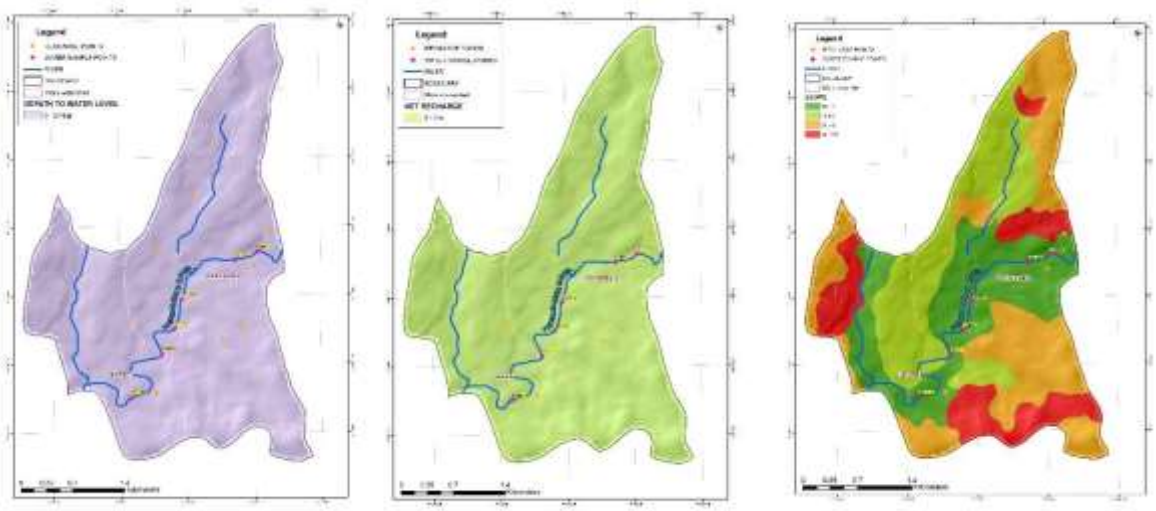

Fig -3:(3a,3b,3c)

(3a,3b and 3c are the drastic model maps obtained for depth to water, net recharge and slope parameters.)

3. DISCUSSION

Obtained test results were compared with the water quality standards [IS 10500 (2012)].

From the studies it is found that ph. of collected sample at all the sampling points are well within the limits. Alkalinity at points S2, S4, S6 is high and S3, S5 is moderate and S1 is less. Turbidity at S1 is very high and high at S2,less at S3, S4, S5, S6 .Total dissolved oxygen at all points are very less within permissible limits which indicates aquatic organisms cannot survive .Hardness at point S2 is very high, S1, S3, S4, S6 is high and S5 is low. Total dissolved solids at S1, S2, S3, S4 is high and S5 moderate, S6 low whereas BOD at all the points is very high.

4. CONCLUSION

- Vrishabhavathi river was a source of holy water to the people lived in the early years. Urbanization has led to the significant contamination of air, soil and water (groundwater specifically) in the region.
- From the lab studies and preliminary drastic studies, it is found that vrishabavathi stream is not preferred for drinking.
- The DRASRTIC model parameters and the additional parameter such as pH, hardness, DO, BOD, TSS etc. show some major zones of contamination and hence the water clearly is unfit for drinking.
- From the depth to water level, net recharge and slope studies using drastic model it is found that surrounding area is highly vulnerable hence aquifer media, soil media, vadose zone, hydraulic conductivity studies have to be made.

5. REFERENCES

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