

ASSESSMENT OF GROUNDWATER QUALITY IN & AROUND RANEBENNUR TALUK, HAVERI DISTRICT, USING GIS

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Abstract – Water is recognized as blue gold in existence for all life being. To meet the ever growing requirement of water for domestic and farming, it is essential to assess the ground water quality. Water quality Index is a successful way to commune water quality in countrywide studies. Ground water samples for various parameters like Ph, total hardness, Ca, bicarbonates, Mg, nitrates, sulphate, TDS, Chloride, Fe, Mn, fluoride is assessed as per WHO standards using WQI. In present work, groundwater quality parameters were analysed, integrated water quality map of Ranebennur Taluk was prepared using ARC GIS 9.3, then spatial analysis is done.

Key Words: Ground water, Water quality index, ARC GIS 9.3.

1. INTRODUCTION

Water exists for all life being; yet more than one billion nations diagonally the globe is destitute of protected drinking water. The circumstances are grim especially in emerging country, as the lack of clean deices and all elementary rights. Underground drinking water is gradually accumulating pollutants since engineering (Sinha *et al.*, 2008).

Groundwater is attractive an significant foundation of water contribute in many region in India &overseas, since nearby has be a substantial, demands for clean water owing inhabitants growth. Increase of urban zones has negatively affected the groundwater superiority due to over operation of property and important disposal practice. Consequently, it is necessary to determine the portability of water before it is used for human expenditure (Sinha *et al.*, 2008). Ground water is precious and most broadly disseminated natural reserve in side earth.

The average annual ground water revives from rainfall and leakage from canal and extra irrigation scheme is of the order of 68 million hectare per meter of which only 4 %that is 27 million hectare per meter in-expensively. The current exploitation of groundwater is 12.9 million hectare per meter.

1.1 STUDY AREA

- The study area is situated in Haveri district of Karnataka state in India

- The present study area Ranebennuru taluk, extends from north latitudes 14°24'00"-14°47'00" and east longitudes 75°29'00"- 75°49'00".
- Ranebennuru is the chief city covers an area of 906.643 sq.Km.
- The taluk has 107 villages, 35 gram panchayats, one town municipality.
- Karnataka's most important river Tungabhadra and tributary of Krishna flow.
- The population is involved in agriculture and small scale industries.

1.2 OBJECTIVES OF THE STUDY

- To find out the Physico-Chemical characteristics of groundwater of Ranebennur taluk, Haveri district.
- To compare the Physico-Chemical characteristics of groundwater samples with WHO standards.
- To find the Water Quality Index (WQI) for obtained data.
- GIS mapping for obtained parameters.

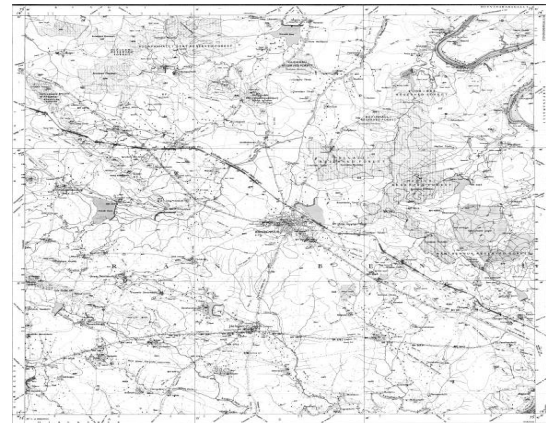
2. METHODOLOGY

- Water samples were collected from 20 locations in clean polythene bottles during two periods (pre-monsoon and post-monsoon) and
- evaluated for major physical and chemical parameters employing the standard methods given by APHA, 1998
- pH, electrical conductivity. Turbidity, Total dissolved solids (TDS). Alkalinity and bicarbonate (HCO₃) titrating with H₂SO₄. Total hardness (TH) as CaCO₃ and calcium (Ca), Magnesium (Mg). Sodium (Na) and potassium (K). Chloride (Cl). Sulphate (SO₄), Phosphate (PO₄) and Nitrate (NO₃). Dissolved Oxygen and fluoride analyzed.

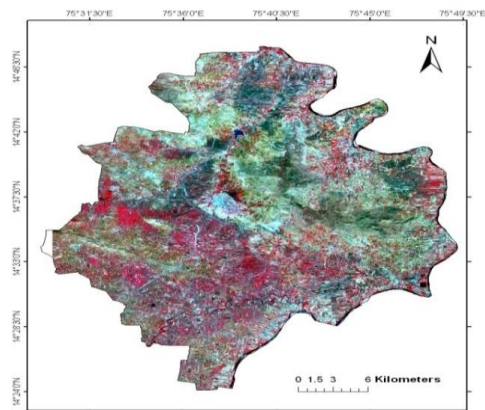
Code	Location	Longitude	Latitude
S1	Madavapur	75.6100	14.7820
S2	Hanumapura	75.6110	14.7520

S3	Vallapura	75.6190	14.7280
S4	Honnathi	75.6390	14.7470
S5	Chavdanapura	75.6650	14.7470
S6	Chikkakuruvathi	75.6920	14.7780
S7	Haranogiri	75.7070	14.7410
S8	Gudaguru	75.6520	14.7140
S9	Maiduru	75.6600	14.7120
S10	Udagatti	75.7340	14.6910
S11	Belur	75.7540	14.7200
S12	Medleri	75.7340	14.6700
S13	Gangapura	75.6560	14.6790
S14	Bevinahalli	75.6560	14.6940
S15	Devaragudda	75.6100	14.6980
S16	Kakola	75.6010	14.6850
S17	Hanumanahatti	75.5630	14.6560
S18	Basalikatte	75.6640	14.6320
S19	Rahutanakatte	75.7040	14.3600
S20	Aremallapura	75.7560	14.6370

Table 3.2 Sampling locations along with their longitude and latitude



Toposheet of Ranebennur



Satellite image OF Ranebennur

Geographical information system (GIS)

- GIS is a tool to define risk region that require planning for water quality prevention program
- ARCGIS provides a broad range of dominant spatial modeling and study feature. GIS analysis perform integrate faster data and vector data analysis.
- To determine the ground water quality of the study area various thematic maps on 1:50,000 scales were equipped.
- Drainage map was equipped from Survey of India toposheet and satellite data.
- Contour map, Digital Elevation model, land use and land cover map were also prepared
- ArcMap is use to generate Esri's ArcGIS suite of geospatial processing program and also used principally to view, edit, create, and analyze geospatial data

RESULTS AND DISCUSSION

Physico-chemical Characteristics

- The chemical composition of ground water differs with many complex factors.
- The physico-chemical analysis of water samples can reveal the quality of the groundwater and its evolution.
- pH is in b/w 6.59 to 8.12 within boundary
- EC -high values of EC at S-18 location
- TDS - S 20 location has high TDS in pre monsoon some locations has max TDS values than limit by WHO

Sample ID	WQI	Sample ID	WQI
1	204.27	11	173.77
2	211.45	12	126.45
3	182.84	13	182.91
4	200.25	14	181.16
5	212.40	15	165.95
6	222.79	16	177.85
7	209.70	17	162.25

8	172.11	18	250.84
9	200.81	19	313.14
10	192.61	20	345.54

Table 4.4 WQI values of pre-monsoon samples

Sample ID	WQI	Sample ID	WQI
1	201.00	11	170.79
2	212.86	12	117.22
3	178.01	13	180.55
4	195.65	14	178.70
5	207.97	15	160.67
6	218.61	16	178.73
7	241.94	17	151.93
8	172.02	18	241.73
9	197.37	19	308.74
10	188.09	20	335.48

Table 4.5 WQI values of post-monsoon samples

Sl No	WQI	Status	Pre monsoon samples	Post monsoon samples
1	0-25	Excellent	-	-
2	25-50	Good	-	-
3	51-75	Fair	-	-
4	76-100	Poor	-	-
5	101-150	Very poor	12	12
6	Above 150	Unfit for Drinking	1,2,3,4,5,6,7,8,9,10,11,13,14,15,16,17,18,19,20,	1,2,3,4,5,6,7,8,9,10,11,13,14,15,16,17,18,19,20

GEOGRAPHIC INFORMATION SYSTEM

ARC VIEW GIS 9.3

Using Arc view special variation of ground water quality map were integrated. Map shows ground water quality in Ranebennur taluk Haveri District.

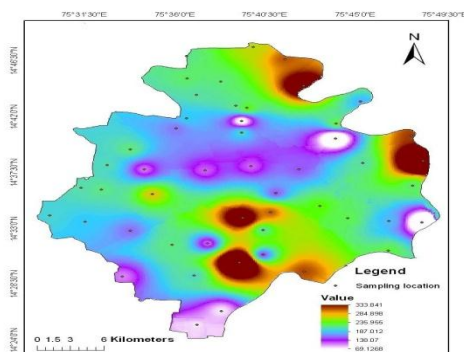


Figure 5.1a Spatial Variation Map of Ca Pre monsoon season during study period

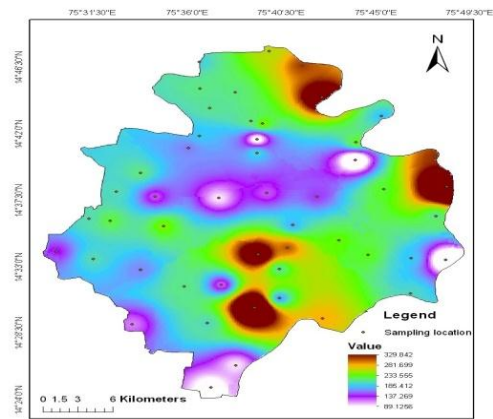


Figure 5.1b Spatial Variation Map of Ca Post monsoon season during study period

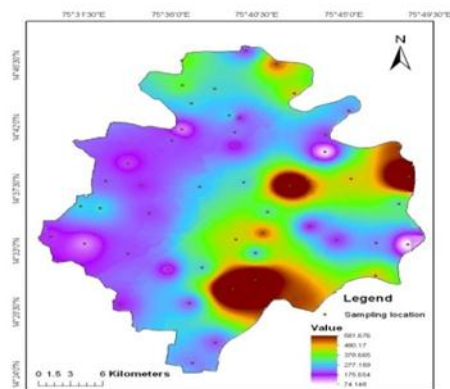


Figure 5.3a Spatial Variation Map of Cl Pre monsoon season during study period

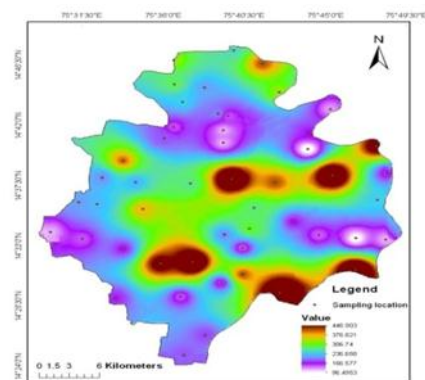


Figure 5.3b Spatial Variation Map of Cl Post monsoon season during study period

3. Conclusion:

The overall aim of this work is to develop an integrated database combine the existing spatial and non-spatial data sets connected to groundwater resources information acquired by Statistics, measure WQI in the Ranebennur Taluka, Haveri District, Karnataka State using a GIS and evaluate the states and associations of the

groundwater conditions at the provincial and local levels. Ground water in Ranebennur Taluk region requires precautionary actions before drinking so as to prevent poor health effects on human being.

4 Recommendations

On light of the results revealed from the research, the following recommendations are proposed:

- Monitoring of groundwater should concentrate on areas having high vulnerability, also areas subjected to high pollution load.
- A new laws and regulations must be defined for the study area depending on groundwater vulnerability; these regulations will specify which kind of activities is These maps were built depending on the available data. And since they were built on a GIS database, the map could be easily modified by adding new collected data on the GIS database, so the map will be always up to date.
- Groundwater vulnerability assessment maps are not the sole source methodology for environmental management decisions, but can lead other specific evaluations to places that are more appropriately in need for assessment.

5 Further Work

- Considering the future research, the following works can be considered: a) to conduct the GPR measurements in different well sites of the Central Water Source Area and use the acquired data for groundwater level analysis at the regional level, thus using the GPR for estimation of ground water level at both local and regional levels;
- To integrate various data sets related groundwater level change, if we use continuously observed in a well water level data and compare it to other GPR and geophysical data sets, we could understand the dynamics of the seasonal water table change and we could improve more detailed subsurface structure imaging.

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