Ground Water Quality and Spatial Distribution of Ramanagar Taluk by Using Water Quality Index and GIS

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ABSTRACT

The quality of groundwater was assessed by determining the physicochemical parameters (pH, EC, TDS and TH) and major ions concentration (HCO3, Cl, FSO4,Ca, Mg, Na and K) around Ramanagar district, Karnataka, India. The groundwater samples were collected from bore wells covering the entire study area and analyzed using standard methods. Physico-chemical analysis data of the groundwater samples collected at predetermined locations, which forms the attribute database for the study, based on which spatial distribution maps of major water quality parameters are prepared in ArcGIS software. Analysis is done by calculating parameters such as pH, TDS, EC, TH, Total alkalinity, Sulphate, Chloride, Nitrate, Calcium, and Magnesium etc.

Keywords: Arc GIS, Ground water quality,WQI

1.INTRODUCTION

Groundwater is around the world significant for individual utilization just as for the help of natural surroundings and for keeping up with the nature of base stream to waterways. Normally they are of amazing quality. Being normally separated in their direction through the ground, they are for the most part clear, boring, and liberated from microbial tainting and require negligible treatment.

Various investigations on groundwater quality as for drinking and water system purposes have been done in the various pieces of India.

Appraisal of groundwater quality through Water Quality Index (WQI) studies and spatial dissemination of WQI using GIS innovation could be valuable for strategy creators to go to healing lengths.

 GIS can be a powerful tool for developing solutions for water resources problems to assess water quality, determining water availability, understanding the natural environment on a local and/or regional scale assessing every preliminary mix's exhibition, an ideal asphalt cover content can be chosen. All together for this idea to work, the preliminary blends should contain a scope of asphalt contents both above and beneath the ideal asphalt content. Accordingly, the initial phase in sample readiness is to assess an ideal asphalt content. Preliminary mix asphalt contents not set in stone from this gauge. ArcView GIS was used to map, query, and analyze the spatial patterns of groundwater. Assessing the quality of ground water is important to ensure sustainable safe use of these resources.

2.METHODOLOGY

Study Area:

Our study area Ramanagara taluk of Karnataka state, South India. Based on the 2011 census this area comprises 1,082,636 inhabitants with 77.51% literacy rate. It is situated between 12.7145 and 12.6003° N, and longitudes 77.2767 and 77.4702° E. The Ramanagara area is mostly hilly and plain Area.fig shows the location of the map.
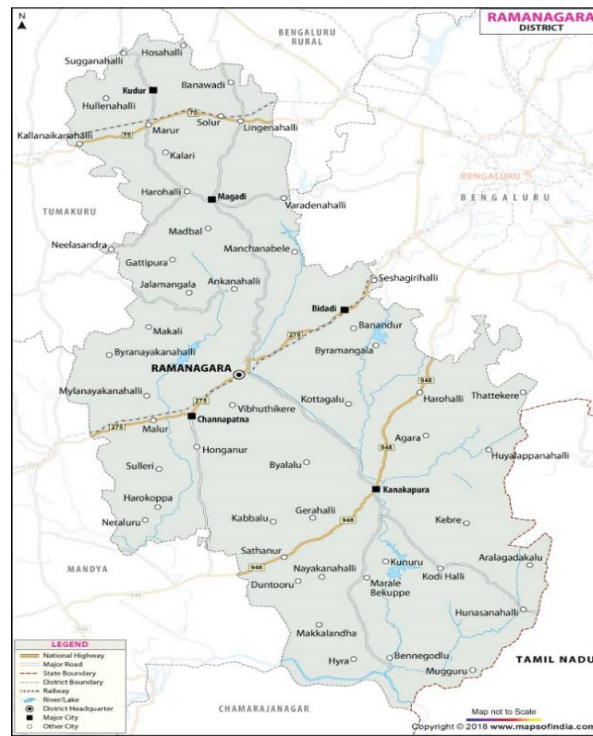
Physio-Chemical Analysis:

Fifty boreholes were chosen for this review. The areas and directions of the examining focuses are taken. The examples were gathered in a little plastic jug of one (1) liter limit flushed with refined water and shipped off the lab for guaranteed investigation. Temperature and pH estimation was done in-situ at the site of test assortment utilizing portable thermometer and pH meter (Consort P107). Tests were broke down for the accompanying boundaries: Turbidity, DO, BOD, EC(Electrical Conductivity), Sulhate, Calcium, Magnesium, Sodium and Potassium, Phosporus, Nitrate and Ammonia, TDS and TSS involving standard strategies as portrayed in BIS:10500-2012 Standard Methods. The directions of the inspecting focuses were recorded by versatile GPS. by and large water quality at a specific area and time which depends on a few quality boundaries**.**
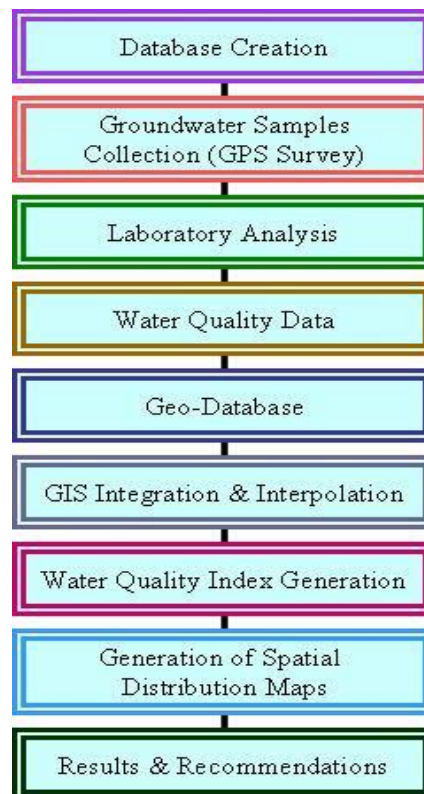
3.OBJECTIVE AND SCOPE

Nature of groundwater is significant as it controls its convenience. Generally modern region faces numerous difficulties because of release of modern effluents. It influences the nature of soil, residue and groundwater in its close by encompassing. In this manner, to meet social orders, need for water, preventive measures should be taken to guarantee wellspring of uncontaminated groundwater for drinking and farming reason. Remembering the above rules, an endeavor has been made in this review to evaluate groundwater quality in and around modern area of Ramanagara The targets of the review are:

1.Groundwater quality examination of Ramanagara modern region by assurance of different .

2. Physico-compound boundaries.

3.Interpreting the outcomes by plotting appropriate charts like Wilcox graph, USSL outlines

4.To evaluate its appropriateness to Irrigational rehearses

5.Plotting charts like Gibbs Diagram to survey rock water connection in the area

6.Trilinear graph to comprehend the Hadrochemical facies in the groundwater.

7.Conducting Correlation study to know the interdependencies of different boundaries.

8. Investigation of weighty metals and organic test.

9. Soil evaluation of the review region.

10. Utilization of nano particles for expulsion of abundances defilement.

POLLUTION :

All metropolitan water bodies in India are enduring a result of water contamination. A portion of the toxins like lead (Pb), arsenic (As), mercury (Hg), chromium (Cr) uniquely hexavalent chromium, nickel (Ni), barium (Ba), cadmium (Cd), cobalt (Co), selenium (Se), vanadium (V), oils and oil, pesticides, and so forth are exceptionally destructive, harmful and noxious even in ppb (parts per billion) territory. There are a few minerals which are helpful for human and creature wellbeing in little portions past which these are poisonous. Zinc (Zn), copper (Cu), iron (Fe), and so forth fall into this class. For horticulture, a few components like zinc, copper, manganese (Mn), sulfur (S), iron, boron (B), along with phosphates, nitrates, urea, potassium, and so on are helpful in recommended amounts. There are a few mixtures like cyanides, thiocyanides, phenolic compounds, fluorides, radioactive substances, and so forth which are unsafe for people just as creatures. In India, water contamination because of modern squanders and sewage has been expecting threatening extents contamination. Huge lakes and enormous stretches of the greater part of the waterways in India have water which is perilous for drinking reason.

EXPERIMENTAL

A total of 50 water samples (surface water samples, groundwater samples, bore wells and taps) were collected Ramanagara (district) and nearby villages, industries of the selected areas around Ramanagara namely Karenahalli, Shyanamangala Chinnagowdanahalli, Byramangala, Heggdagera, Ittumadu, Gollahalli, Lakkanadoddi, MayanahallI, Manchegowdanapalya, BYramangala, Bidadi industrial area and preserved with 2 mL nitric acid to prevent the precipitation of metals. The samples were then concentrated and subjected to nitric acid digestion. Heavy metal analyses were carried out using inductively coupling plasma method. The pH of water samples was determined by a pH-meter and conductivity were measured by a conductivity meter (Systronics).

WATER QUALITY INDEX (WQI):

Water Quality Index (WQI) Water quality record (WQI) is a significant boundary for the appraisal and the executives of groundwater. It gives a solitary number which communicates generally water quality at a specific area and time which depends on a few quality boundaries [5].

$$WQI = \Sigma W_X Q_X \ (1) = W_{BOD}Q_{BOD} + W_{DO}Q_{DO} + W_{pH}Q_{pH} + W_{PHOSPHATE}Q_{PHOSPHATE} + W_{NITRATE}Q_{NITRATE} + W_{FC}Q_{FC} + W_{TDS}Q_{TDS} + W_{TEMP.}Q_{TEMP.} + W_{TURBIDITY}Q_{TURBIDITY} \ (2)$$

Where,

W_X = weight factors of the water quality parameters

Q_X = q- value of the water quality parameters

X = water quality parameters.

Geographic Information System (GIS) Analysis:

Geographic Information System (GIS) is a PC based data framework for input, the executives, investigation, and result of geographic information and data. It manages assortment, stockpiling, recovery, control, examination, and show of spatially related data. GIS permits introduction of the water quality boundary at obscure area from know esteems to make a constant surface which will assist us with understanding the situations of water quality boundary of the review region. In the current review, the aftereffects of the physico-synthetic examination and the WQI were utilized as info information in QGIS 2.2. The inspecting areas were incorporated with the water quality information for the age of spatial conveyance maps utilizing the Inverse Distance Weighted (IDW) introduction technique.

CONCLUSION

Ground water is the major source of drinking water for majority of population in the country. Hence the quality investigation is essential. The method employed in the study is found to be suitable to study the water quality analysis around an industrial area at Ramnagar. The analysis showed the significant variation of the parameters analysed and it also shows that the influence of the parameter like Total Hardness, Fe, Mg, Ca, Total alkalinity, Total Dissolved Solids with exceedance in permissible limits. From this it can be concluded that the overall WQI values indicates that the water is good for drinking and domestic purposes after implementing certain degree of treatments.

The overall quality of ground water was estimated using water quality index. The water quality index merged all the parameters in to a single value easily recognized by the common people. The ground water quality differed in different regions of the study area, but not a single sample was found to be unsuitable for drinking.

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