

## Hydrogeomorphological Mapping Using Geospatial Techniques for Assessing the Ground Water Potential Zones

Loksha N<sup>1</sup>, Jeevan K M<sup>2</sup>, Ajith K<sup>3</sup>, Keshav Kumar G<sup>4</sup>, Dr. G Venkatesha<sup>5</sup>

<sup>1,2,3,4</sup>(UG Students, Dept.of civil engineering,DSCE college, Bengaluru, Karnataka, India)

<sup>5</sup> (Associate professor Dept. Of civil engineering DSCE college, Bengaluru, Karnataka, India)

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### Abstract:

The present study is carried out at Karnataka with reference to remote sensing and hydrogeomorphology to evaluate the potential zones of ground water occurrence. Remote sensing with its advantages of spatial, spectral and temporal availability of data covering large and inaccessible areas within short time has become a very handy tool in assessing, monitoring and conserving groundwater resources. The hydrogeomorphological maps are created for the study area.

*Keywords* — Remote sensing, GIS, Hydrogeomorphology, ground water potential zones.

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### I. INTRODUCTION

The gradual increasing in population is creating more and more demand on water for drinking and agricultural sector for increasing food production, which consequently increasing more demand for water.

The available surface water resources are inadequate to meet the entire water requirements for various purposes. So, the demand for ground water has increased over the years. Hence hydrogeomorphological mapping of ground water potential zones are important for evaluating ground water. The ground water potential zones are studied using geospatial techniques. Intensive use of satellite remote sensing in recent years has made it easier to define the spatial distribution of different ground water prospect class on the basis of geomorphology. Geospatial technologies (remote sensing and GIS) are very significant to constantly evaluate and monitor the groundwater resource. Integration of Remote sensing and Geographic information system (GIS) has proven to be effective, rapid and convenient technique producing reliable

data on geology, geomorphology, lineaments and slope and also a systematic integration of these data for exploration and delineation of groundwater potential zones. Such integrated approach enables manipulation of huge data base for a large areal extent, even inaccessible areas, thus providing a synoptic view of larger areas for rapid and cost-effective assessment of ground water occurrences.

### II. LITERATURE REVIEW

1. A.C. Pandey, R.D. Garg “**Ground water prospects evaluation based on hydro geomorphological mapping using high resolution satellite images: A case study in Uttarakhand**” (2007JISR) This paper deals with Hydrogeomorphological mapping using remote sensing data has been used conventionally for delineating ground water prospect zones in many regions.
2. Binay Kumar, Uday Kumar “**Integrated approach using RS and GIS techniques for mapping of ground water prospects in**

- Lower Sanjai Watershed, Jharkhand**”(2020 IJGG)This paper deals with present information, depicted in the form of a prospect map would provide first-hand information to local authorities and planners about the areas suitable for searching ground water followed by its suitable exploration based on information given for type of well, well depth, water quality and success rate of wells.
3. Adiat, K.A.N,Abdullah, K. **“Assessing the accuracy of GIS-based elementary multi criteria decision analysis as a spatial prediction tool”** (2012 Journal of hydrology) this paper deals with the case of predicting potential zones of sustainable groundwater resources.
  4. S Suganthi,L Elango,S K Subramanian **“Groundwater potential zonation by Remote Sensing and GIS techniquesand its relation to the Groundwater level in the Coastal part ofthe Arani and Koratalai River Basin, Southern India”**(2013 ESRJ) this paper deals with the preparation of a map of groundwater potential zones using seven thematic layers, geology, geomorphology, soil, lineament density, drainage density, rainfall and land use.
  5. G R Senthil Kumar, Shankar Karuppannan **“Assessment of Groundwater Potential Zones Using GIS”** (Frontiers in Geoscience 2014) This paper deals with the effectiveness of remote sensing and GIS in the identification and delineation of groundwater potential zones of study area.
  6. N K Narayanaswamy,H C Vajrappa,Shivanna S,S B. Bramhananda **“Remote sensing and hydro geomorphological studies to evaluate ground water potential zones of dakshinapinakini river basin, chikkaballapura and Bangalore districts, Karnataka”** (July 2016 IJRET) this paper deals with the Detailed observation on the hydro-geomorphological conditions of the basin, it is possible to decipher the groundwater occurrence is moderate to good.
  7. S.Hema,T. Subramani **“Application of remote sensing and GIS for demarcation of ground water potential zones in a part of Cauvery river basin, South india-Acase study”** (2017 Ecology, Environment and Conservation)this paper deals with the utility of remote sensing and GIS technique in delineating groundwater potential zones in highly variable terrains representing various geomorphic features/landforms.
  8. Arjun Doke **“Delineation of the ground water potential using remote sensing and gis :a case study of Ullas basin, Maharashtra,India ”**(2019 Sciendo)this paper deals with the different factors such as lithology, geomorphology, soil, drainage density, lineament concentration, slope, rainfall and land-use pattern used for identification of potential ground water zones.
  9. Rayees Ahmad Shah, Suhail Ahmad Lone **“Hydrogeomorphological mapping using geospatial techniquesfor assessing the groundwater potential of Rambiarra river basin, western Himalayas”** (2019 Applied water science) This study has recognized the interrelationships between the groundwater recharge potential factors and the groundwater recharge potential scores from the general hydrology characteristics of Rambiarra river basin.
  10. Khalid Benjmel, Mohammed Ouchchen **“Mapping of Groundwater Potential Zones in Crystalline Terrain Using Remote Sensing, GIS Techniques, and Multicriteria Data Analysis”** (2020 Water) this paper deals with the precise location of the boreholes

and the determination of the most suitable operating flows.

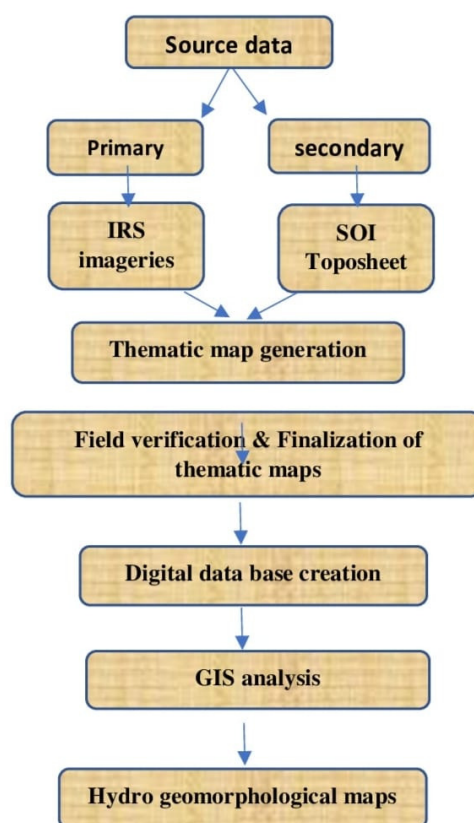
### III. OBJECTIVES

- The main objective of this study is to evaluate the ground water occurrences in the study area using geospatial techniques like GIS and remote sensing.
- The present study is undertaken to prepare hydro geomorphological map and their characteristics.
- To identify and delineate suitable ground water potential zones through the integration of different thematic layers.
- To prepare spatial variability of ground water zones.

### METHODOLOGY

The groundwater occurrences in the study area by using Geographic Information System and Satellite remote sensing data. Different types thematic maps viz., geomorphology, land use/land cover, slope and lineament maps have been prepared through the standard visual interpretation techniques using topographic maps with its corresponding Indian Remote Sensing 1C and 1D geo-coded satellite data. Ground information /data generally constitute an important database in remote sensing techniques, because they increase the interpretation accuracy to a large extent. Survey of India Topographical maps on 1:250000 scales have been used in the preparation of base map. The imagery was visually interpreted by using standard keys such as drainage pattern, shape, color, tone, texture and topography etc., to prepare the geo-morphological map. The essential information such as hydrological, geological and other data collected during the field visits were used for the finalization of the hydro-geomorphological map (Map-3). Arc GIS (3.2a) software has been used for digitization, computation and output generation purposes. determined to derive the general geomorphic

characteristics of different landforms. Groundwater occurrence in the different geo-morphological units viz. Residual hills, Pediments, Padi plain, Valley fill and Lateritic uplands are discussed.



### IV. CONCLUSIONS

From the above literature it can be conclude that the present study revealed that geospatial techniques are very important for creating hydrogeomorphological maps and for evaluating the ground water occurrence in Karnataka. Based on the prepared hydrogeomorphological maps we can evaluate the ground water potential zones in given area.

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