TARGETING AND EVALUATING GROUND WATER RESERVES IN HARD ROCK TERRAINS USING INTEGRATED GEOSPATIAL MAPPING FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT

Groundwater being the vital resource in the hard rock terrains, tapping the same requires advanced methods to precisely target and exploit the resource effectively for sustainable development. Even though coastal Dakshina Kannada districts are being blessed with heaviest rainfall, the area suffers acute water shortage thanks to its hard rock terrains of granite and granitic gneisses. But this hard rock terrain is interspersed with groundwater bearing lineaments of various categories such as fault lines, master joints, fractures, aligned stream course, etc., other than conductive and non-conductive dyke rocks. Keeping this in view, an attempt to locate and delineate such potential aquifer zones in the hard rock terrains of three water scarce panchayaths in the coastal Dakshina Kannada viz: Nitte, Belvai and Bola of Karkala taluk falling in Mulki River basin has been made for the sustainable development of the study area.

In this project, some sample studies have been carried out to understand the effectiveness of integrated geospatial mapping techniques such as remote sensing, GPS survey, geomagnetic survey, electrical resistivity survey and GIS for the delineation and evaluation of potential aquifer zones. A reconnaissance survey has been carried out using Google earth imageries and IRS P6 MX mode Satellite imagery of 4.8m spatial resolution initially and located the groundwater favourable structures in the field using GPS survey. Thematic maps of geology, geomorphology and structure of the area have been prepared and analysed for the further detailed studies. Lineaments such as fault lines, fractures, master joints, intrusive dykes etc., have been delineated before doing the field reconnaissance survey. Using GPS the samples of the above said features were located and scanned using geomagnetic profiling. Further to narrow down the location, electrical resistivity profiling or scanning using strip resistivity methods have been employed. The locations pin pointed by these methods showing low resistivity and magnetic flux values have been surveyed with vertical electrical resistivity soundings (VES) to demarcate the aquifer zones below the ground surface. The resistivity log has been compared with the drilled data log and found to be matching with the interpreted data using inverse slope method. The integrated geospatial mapping methods of geomatics with geophysical surveying found to be highly effective in targeting and evaluating high yielding potential aquifer zones in the hard rock terrains of the study area.