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Integrated Operational Methodology Using Remote Sensing, Geophysics and Hydrogeology for Micro -level Water Exploration

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Water resources development occupies a key place in India because of its role in stabilizing the Indian agro-economy. The development of the water resources in India needs an effective management of resources. T.N.Pura (Tirumakudal Narsi Pura) is located in parts of Mandya and Mysore districts of Karnataka state, India has been selected for carrying out this integrated study. It is lying between the north latitudes of 12° 7' 30" and 12° 17' 30", and East longitudes of 76° 55' and 77° 2' 30". The remote sensing techniques, geo-electrical survey and well-yield analysis have been carried for the characterizing the potential of water resources in this terrain. Firstly, remote sensing techniques have been applied for the characterization of land-cover type and their distribution to analyze the hydrological condition and for the study of hydrological processes. The vegetation vigour around T.N.Pura is evident from their maximum NDVI value, where the maximum value of 1 is and a minimum value of -1 is noticed. Secondly, from the geo-electrical techniques the indirect, valuable and reliable information on the subsurface geological and hydrogeological were obtained. The studies involved geoelectrical soundings of 31 locations around T.N.Pura. The vertical electrical sounding using Schlumberger configuration has been adopted to delineate the aquifer geometry with varying half current electrode separation to relate geo-electric and hydraulic parameters. It was observed from VES results that some places near T.N.Pura shows only two layers, wherein the demarcation of the soil layer could not be made. The weathered zone and the alluvial layer overlay the basement formation in these locations. The intermediate weathered zone and the fractured rocks constitute a single aquifer system of varied hydraulic conductivity under water table condition. Lithology and groundwater conditions, as inferred from the VES, as well as hydrological studies, are in agreement with the nearby wells for which the yield tests were conducted. VES findings of these regions indicate that the occurrence and movement of groundwater take place mostly within the weathered and fractured rocks under unconfined condition. Finally, the available yield test data for 26 wells in the study area were analysed. From this integrated study the methodological improvement in targeting water resources in a micro-level is achieved. Investigation of nature and dynamics of surface and groundwater in different water resources potential zone has both practical and research applications. A relationship among the ground measured resistivity value, field tested well yield, land cover and NDVI is observed for the identification of water resources potential zones. Analytical expressions of yield characteristics of well in different water potential zones are unique.

Keywords: Integrated approach; Remote Sensing; Geophysics; Hydrogeology