

Assessment and Mapping of Groundwater Potential Zone using GIS- and Remote Sensing-Based Multi-Influencing Factor and Multiple Regression Analysis in Bueng Kan Province Thailand

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This study involves the potential combined application of advanced techniques and tools including remote sensing, geographical information system (GIS), multiple regression analysis to assess and map the groundwater potential; zones in Bueng Kan province, Thailand. Several well-classified thematic groundwater occurrences and movement controlling layers, i.e. lithology, slope, landuse and landcoverage (LULC), rainfall, lineaments, soil, and drainage density were assigned with a groundwater potential-dependent weight based on assimilated remote sensing and localized geospatial data sets. Multiple regression models have been tested with 12 independent controlling variable data sets for the best match by minimizing errors. Groundwater potential assessment of the study area qualitatively classified into very high, high, medium-high, medium, and low zones which accounted for 2.22%, 26.93%, 56.74%, 13.84%, and 0.26% of the entire area. The cross-validation of the resultant model was carefully carried out using spring, hand-dug, deep well yield data, and vertical electrical sounding carried out at different points to locate water-bearing formations/fracture zones. The results reveal that 89% of springs were overlaying with good and/or very good groundwater potential zones and 58% of deep well shows the same match, whereas 42% of deep well overlays moderate zone. As a result, the map generated using this platform could be used as a justified reference in selecting appropriate sites for groundwater resource exploitation to support domestic consumption and agricultural activities in rain-fed zone.

Keywords: Groundwater Potential, Multiple Regression, Groundwater Mapping, Remote Sensing.