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Application of the analytical hierarchy process(AHP) to groundwater potential mapping in upper part of Langat Basin

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In Malaysia, groundwater is always being national issues and rises as an alternative source for water supply especially during drought season. Groundwater resources in Malaysia also are being underutilized compare to other nations such as Thailand, China, Austria and Denmark. Conventional approach of groundwater exploration using geological, hydrogeological and geophysical method normally involved high budget and time consuming. Remote sensing technique provides advantages of spatial and spectral data, having access to large coverage and inaccessible areas with regular revisit capability. Meanwhile Geographical Information Systems (GIS) was used to integrate the spatial layers, handling and analysing the large amount of data. The main objective of this paper is to integrate remote sensing, GIS and multi criteria analysis of Analytical Hierarchy Process (AHP) in identifying groundwater potential zones in the Upper part of Langat Basin, Selangor.

The study area covers parts of the Upper Langat Basin and located in Hulu Langat district of Selangor state, Malaysia. It is within the latitude 2° 53' north to 3° 15' north and longitude 101° 43' east to 101° 58' east, with an area of around 500 km square. In this study, eight thematic layers of groundwater parameters i.e. lineament, geomorphology, rainfall, lithology, drainage, landuse, slope, and soil were extracted from satellite images and available maps. Remote sensing data of Landsat imagery was interpreted to produce lineaments, and geomorphology. DEM (Digital elevation model) was used for lineaments, geomorphology and slope. Meanwhile drainage, landuse, lithology and soil were extracted from ancillary maps data. The assigned weights for groundwater parameters were normalized using AHP.

The result of predicted map has been classifie into four classes of groundwater potential zones: very high, high, moderate and low. Very high groundwater potential constitutes only about 15% of the total area. High potential category has about 17% meanwhile about 33% comprised of moderately groundwater potential. Areas with low potential constitute 34% of the total study area. Actual bore well yield data compiled by the Department of Minerals and Geoscience, Malaysia (JMG) were used for model validation. Accuracy assessment of predicted groundwater potential map with bore well yield was performed using correlation coefficient The correlation coefficien result is equal to 0.72. It concluded that the output of this integrated approach is cost effective techniques in investigating groundwater potential zones in Malaysia. These outputs can be used for future planning of groundwater exploration and development by related government agencies and private sectors in Malaysia.