

IDENTIFICATION OF GROUNDWATER RECHARGE POTENTIAL ZONES USING GEOSPATIAL TECHNIQUES: A CASE STUDY IN *MULLAITIVU* DISTRICT IN SRI LANKA

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Sustainable management of groundwater resources are crucial for ensuring the well-being and development of communities, particularly in arid regions like the *Mullaitivu* District. This research aimed to identify and map groundwater recharge potential zones within the *Mullaitivu* District, located in the Northern Province of Sri Lanka, using geospatial techniques. Groundwater recharge zones are delineated for the *Mullaitivu* district by overlaying thematic layers: geology, geomorphology, drainage density, slope, land use/land cover, soil types, lineament density, and rainfall distribution. Using ArcGIS, eight thematic layers were generated and converted into a raster format. Weights were assigned to these eight thematic maps based on literature and the expert's opinion of the importance, influence on groundwater recharge, storage, and movement capacity. The groundwater potential of the study area is mainly influenced by rainfall, geology, and soil types. Moreover, the normalized weights of these parameters were calculated by adopting a pairwise comparison matrix of the Analytical hierarchy process (AHP) method. All layers were reclassified based on the ranks. Then, a groundwater recharge potential map was generated with the weighted overlay analysis. The resultant map is categorized into five different potential zones: very low (32.12 km²), low (220.56 km²), moderate (1541.55 km²), high (582.64 km²), and very high (50.54 km²). The results revealed that 64% of the study area falls into high to very high groundwater potential zones. The AHP approach based on GIS was an efficient technique for assessing potential groundwater zones. The result describes the groundwater potential zones in the study area, which will help better management of groundwater resources, including groundwater exploration and recharge practices. Further, these results will aid policymakers to make decisions and give scope for further research in the *Mullaitivu* district.

Keywords: GIS, Remote sensing, Sustainable groundwater management, Thematic layers, Weighted overlay