

MAPPING GROUNDWATER RECHARGE POTENTIAL ZONES: A CASE STUDY OF THE SIVALAKULAMA CASCADE IN ANURADHAPURA, SRI LANKA

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Groundwater is a vital natural resource crucial for meeting water demands in various climatic regions of Sri Lanka. The Anuradhapura region, located in the Dry Zone, is particularly dependent on groundwater, underscoring the need to identify and manage potential zones for groundwater extraction. This study focuses on identifying groundwater recharge potential zones within the Sivalakulama cascade area (21.37 km²). Fifteen locations, representing different land use classes, were selected for soil sampling at a depth of 50 cm. Soil texture, bulk density, and porosity were measured using standard methods, while infiltration rates were determined via the double-ring method. Spatial variability maps for each soil parameter were created using Inverse Distance Weighting (IDW) interpolation. An overburden thickness map was generated by estimating the thickness of the soil layer above the bedrock. The study integrated overburden thickness, specific yield, infiltration, land use, and geological layers using a weighted overlay analysis in ArcMap, assigning ranks and weights to each layer based on existing literature. Results indicated that 44.66% of the area has moderate groundwater recharge potential, while 55.34% has good potential. The zones with good recharge potential are predominantly located in the middle to lower parts of the cascade, as determined by overlay analysis with the overburden thickness layer. These findings provide a valuable basis for future groundwater recharge projects in the region.

Keywords: GIS, IDW, Infiltration, Overburden thickness, Weighted overlay