

**GIS-BASED INTEGRATED APPROACH FOR IDENTIFYING POTENTIAL
GROUNDWATER RECHARGE SITES IN SEMI-ARID ENVIRONMENT USING
SAATY'S ANALYTICAL HIERARCHICAL PROCESS (AHP)**

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Abstract

This study aims to identify and map the groundwater potential recharge sites in a semi-arid area, district Lakki Marwat of Khyber Pakhtunkhwa, Pakistan. Groundwater is a precious source of fresh water and one of the major components that sustains and supports entire water supply ranging from domestic use to irrigation purposes. Assessing these groundwater potential recharge sites are very important for the protection of water resource, its management systems and water quality. This study emphasises a standard methodology by integrating Geographical Information System (GIS) and remote sensing (RS) methods using various variables/parameters which have an impact on groundwater recharge. These variables include; elevation, slope, drainage density, lineaments density, soil, geology, land use / land cover and rainfall. These parameters were prepared and classified using GIS, and then weightage and classes of each parameter were assigned values using the well-known Saaty's Analytical Hierarchical Process (AHP) technique. It is an operative tool for solving the complex decision and may support the best possible options for decision makers. The total ranking score of different parameters were summed up and weighted. The resultant groundwater potential sites were classified into five categories i.e., very high, high, moderate, low and very low. These classes were compared to Tube well data from the study area in order to evaluate usability and applicability of the said approach. This groundwater potential information will be useful for effective identification of suitable locations for extraction of groundwater. The model will help resolve water related issues in a region with heavy dependence on groundwater. It can further be used for sustainable water resource planning.