Identification of groundwater potential zones using multi influence factor approach: a study of district Mohmand, Khyber Pakhtunkhwa

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The massive usage of groundwater in municipal, agricultural, industrial, and other initiatives makes it one of the most significant natural resources. Around the world, more than 1.5 million people are dependent on groundwater to meet their daily water needs. Over the last few decades, Pakistan has drastically changed from being a water-abundant to a water-stressed country. The water crisis in Mohmand District has aggravated in last couple of years, causing several wells and water supply schemes to dry up because of the prolonged dry spell and depletion of the water table in the hilly areas. In this study, the geographic expansion of groundwater potential zones in district Mohmand was evaluated using the geospatial multi-influencing factor methodology. In the current study, effective factors were slope, drainage density, geology, rainfall, soil, land use/land cover, and lineament density. Multi-influence factor (MIF) approaches are used to calculate the weight and score of each effective parameter. Based on how well they recharge aquifers and how much groundwater is potentially present, the subclasses were assigned a weightage of (A) (Major effect) and (B) (minor effect) within each influencing parameter. Using ArcGIS 10.5, the groundwater potential zone was then defined after the thematic layers were combined with a weighted overlay tool. Our results were categorized into four zones namely poor, moderate, good, and very good potentiality. This study found that zones with very good groundwater potential covered an area of 25.78 km2 (1.20% of the total area), good zones covered an area of 161 km2 (7.53%), moderate zone covers a total area of 1088.92 km2 (50.81%), and poor zone covers an area of 866.7 km2 (40.44%). The study found that the geospatial-assisted multi-influencing factor approach is a practical and effective technique for the evaluation of groundwater potential zones and can be successfully used to improve the conceptual understanding of groundwater resources of District Mohmand, Khyber Pakhtunkhwa Pakistan.

Keywords: Multi-influencing factor; Geographic information system; Groundwater Potential zones; Weighted overlay; Arc GIS