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Zoning Areas in Need of Underground Water in the Catchment Basin of Mahi Dasht Kermanshah

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Abstract

1-Introduction

In recent decades, the demand for water has intensively increased in arid and semi-arid regions of Middle East and North Africa (Souissi et al., 2019:1, 2). Nowadays extensive use of underground water resources has been converted to a challenge in arid and semi-arid regions (Gaur 2 et al., 2011). Excessive use of underground water resources may cause problems such as the reduction of water level, the reduction of quality and pollution of underground water, which can cause water tension (Souissi et al., 2019, 2). To cope with this hydrologic crisis, optimal programming and management of underground water resources seems essential (Singh et al., 2017, 1440:3). Mahi Dasht plain is one the most important plains of agriculture in Kermanshah and the country and had a significant share in the production of various rainfed and irrigated agricultural products. Underground water resources of Mahi Dasht as the main source of providing the required main water of human societies of Mahi Dasht catchment area has faced the reduction of water level due to improper harvesting and the occurrence of droupht. Zoning and identifying regions in need of being recharged by underground water of Mahi Dasht plain has had an important role in the management and recovery of the balance of these resources and the conduction of this study was a necessity. The purpose of this study was zoning and identifying those regions who are in need of being recharged by underground water of Mahi Dasht using potential recharge index method.

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2- Methodology

In this study, eight parameters of lineaments, drainage density, land use, topography slope, soil, annual rain and geomorphology in potential recharge index method for zoning regions in need of being recharged by underground water were utilized. Each of these eight parameters can be divided into low, moderate, high and very high classes based on their nature and the amount of effect in feeding underground water (Table 1). Based on the categorization of Shaban et al., (2006), each of the classes allocated the following scores to themselves: low class (score 1 to 2), moderate class (score 2 to 4), high class (score 4 to 6) and very high class (score 6 to 8). Each of these eigth parameters had their specific weights and lithology parameter of 33% as well as soil parameter of 3% had the most and the least weights (Table 1). Finally, the eigth parameters were scored based on Table 1 and according to the WLC method, they were integrated using the following equation and the RP was provided.

$$Pr=(RFw*RF_r)+(LG_w*LG_r)+(GG_w*GG_r)+(SG_w*SG_r)+(LD_w*LD_r)+(DD_w*DD_r)+(LC_w*LC_r)+(SC_w+SC_r)$$

3- Results and discussion

In the catchment basin of Mahi Dasht, almost 80% of the area had very high, high and moderate potential recharge. The reason behind this issue can be attributed to the appropriateness of geographical conditions and geology of the basin. According to lithology, almost 80% of the area of the studied basin was made up of quaternary deposits and carbonate makers; this issue had an utmost role in recharging underground water resources. In Mahi Dasht basin, Mareg River follows the fault path of Mahi Dasht and mountain areas of the basin specially carbonate regions of that, are extremely tectonic, which leads to the more penetration and high recharging of the underground water resources. Geomorphologic conditions of Mahi Dasht plain is appropriate for being recharged with underground water, since 43% of the area of the basin is made up of torrential-alluvial plain landforms and alluvial fans. Agricultural, garden and jungle uses have included 78% of the area of the studied basin; this

issue has an important role in recharging underground water resources of the basin. Almost 58% of the area of Mahi Dasht basin has soils with A and B hydrologic groups, which created appropriate potential recharge for the underground water of this basin. Almost 80% of the area of the studied basin of the constructional plain level of Mahi Dasht has a slope of less than 10 degrees which contrives the appropriate condition for being recharged with underground water in the basin. The studied basin had a mean rain of 590 mm, which stated the appropriate raining condition of the basin for being recharged with underground water resources. Wide parts of Mahi Dasht basin especially in the foothills had a high drainage density, which had an utmost effect in the recharging of underground water resources.

4-Conclusion

The level of Mahi Dasht plain has been located in an area having very high recharge potential due to the appropriateness of lithological, tectonic, geomorphologic-topographic, land use, soil and climate conditions. The area having very high recharge potential coincided on rough country regions and geomorphologic, slope and lithological conditions had the highest limitations. Moderate potential area coincided on north mountain basin. Bed outcrop of penetrative carbonate makers, the high lineaments` density and high rains caused moderate recharge potential in these regions. Most of the areas of south heights of the basin were located in the area having low recharge potential due to the bed outcrops of impenetrable makers of Kashkan, Amiran, Gorpi and Ladiolarite. Finally, it could be stated that Mahi Dasht basin wouldn't face limitations in terms of appropriate areas for underground water resource recharging. The bed and margin of Mareg River and the level of Mahi Dasht plain and its surrounding areas were appropriate for underground water recourses` recharging.

Keywords: Groundwater resources, Water feeding potential PRI Model, Alluvial plain, Mahidasht Catchment area

5-References

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