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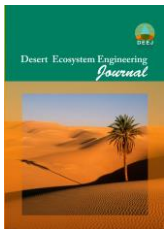

Comparative site selection of rainwater harvesting (RWH) (Case Study; Meykhoran And Khosroabad Watershed, Iran)

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Extended abstract

Introduction: Water, along with issues such as preserving the environment and eradicating poverty and hunger, is a fundamental issue in sustainable development and is an essential element of human survival and well-being. The lack of water in the arid and semi-arid regions of the world has caused the environmental conditions to be fragile. Therefore, the purpose of this research is to identify areas susceptible to rainwater harvesting in order to rehabilitate water resources in different ecosystems using a hierarchical decision making, method based on spatial analysis in the GIS environment.

Materials and methods: In this research, the factors affecting rainwater penetration and storage in the soil profile of the Ghiran and Khosrowabad watersheds of the city of Sangar, Kermanshah Province, were identified and entered the hierarchical analysis process. At first, by using expert opinions, relevant faculty members and experts, by means of paired comparison and in accordance with the method of time, the tables of value were completed and then analyzed by special vector method. For each matrix, the result of the division of the inconsistency index into the random matrix inconsistency matrix, then the matrix, is a suitable criterion for judging the incompatibility, which is called incompatibility rate. If this number is less than 0.1, the system compatibility is acceptable. Then, their importance coefficients were determined and the paired comparison tables completed. In this regard, the weight of 11 variables of vegetation, canopy, percentage and direction of gradient, rainfall, lithology, land use, soil hydrologic groups, geomorphology, elevation and erosion classes were calculated using MATLABR2009a software and based on the ArcGIS10.3 environment. Which were respectively 0188/0, 0254/0, 1365/0, 048/0, 2509/0, 0608/0, 0575/0, 1539/0, 0589/0, 0808/0, 1084/0 Came out. After determining the weight of each of these criteria, the susceptible areas of rainwater storage were identified and in the GIS environment, five levels were classified as very suitable, appropriate, moderate, unsuitable, and unsuitable, respectively, for the areas of beer and Khosrowabad, respectively (% 33, 32/41, 46/8, 47/7 and 47/5, 08/41, 53/37, 31/8, and 64/5 of the area of the basin. 59 benchmarks were expressed in general, of which 11 were the main criteria and 48 sub-criteria were considered. The selected indicators were used by the questionnaire and by experts, experts and experienced experts by group method

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during the process of engineering value and Individual and comparative method was double-valued. Tables (1 to 9) show the results of pairwise comparison of the parameters and weights obtained after the formation of a pair comparison matrix. In the AHP method, the criteria are first qualitatively and then are presented quantitatively using the table. In this process, the ratio of incompatibility is determined and if its value is less than 0.1, then there is an indication of the acceptable level of compatibility of the pairwise comparisons. In this study, the degree of inconsistency for each of the main criteria and its sub-criteria is indicated separately in the tables below given.

Result: The results of this study showed that, in addition to the rainfall factor which is the main factor, two slope factors and soil hydrological groups as the other main factors for collecting rainwater from the rest of the factors have more and more impact. According to the results obtained and the tables shown, the lowest inconsistency rate related to the gradient direction, which is equal to 0.123 (Table 8), and the highest is related to erosion, which is equal to 0906 (Table 1). The results also showed that slopes of 20-30%, which are mostly pasture and pastures, are suitable places for storing runoff. Areas with Ptanicyle have a very good harvest area that is best suited to store atmospheric precipitation in terms of coverage, slope and permeability. According to the obtained map of Figure 2, the total area of Khosrow Abad watershed (1819.68 hectares) has a total of 26.26 hectares, has a very suitable potential, 769.79 hectares suitable, 696.59 hectares average, 154.27 hectares inappropriate and 77/104 hectares are very inappropriate for collecting rainwater.

Discussion and Conclusion: The results of this study indicate that the method used has high credibility in zoning the suitable areas for implementing rainwater harvesting projects and using the process of analyzing hierarchy in the GIS environment as an effective spatial decision system in the location of areas susceptible to rainwater harvesting.

Keywords: Rainwater harvesting, AHP, GIS, site selection and Kermanshah.