Determining the Effective Factors in Locating Areas Suitable to Runoff Collection and Rainwater Harvesting in Siah- Khor Basin of Kermanshah

Fariba Darabi [1], Alireza Ildoromi[*2]

1- M.Sc., Rangeland and Watershed Management, Faculty of Natural Resources and Environment, Malayer University
2- Associate Professor of Geomorphology, Faculty of Natural Resources and Environment, Malayer University

1-Introduction

Nowadays, the growth of population and increasing water consumption per capita have made water supply an important and critical issue (Ghafouri, 2008). On the other hand, the inappropriate distribution of water resources and population concentrations in arid and semi-arid regions, the occurrence of consecutive droughts and destructive floods have caused significant damages to the country. While studies have shown that the countries of the world use new methods of storing rainwater resources to reduce the effects of such problems (Farahpur, 2002).

To locate areas suitable for rainwater harvesting, Dokhani (2016) used RWH techniques, multivariate regression model and GIS. The results showed that there was a significant correlation between dependent and independent variables at the 1% level. The purpose of this study was evaluating the effective factors and selecting the sites suitable for creating rainwater harvesting systems in Siah-Khor Watershed in Islamabad, West of Kermanshah using RWH techniques and ANP analysis method in a GIS environment. Doing so, it could be possible to take effective steps to compensate for the shortages of drinking water, agricultural and industrial resources, and the storage and management of water resources considering the occurrence of drought.

2-Methodology

Siah-Khor watershed Basin of Kermanshah Lake, with an area of 9849.1 hectares is among the sub-basins of Mereg river. The most important river of which is Cham Barzeh that ends to Karkheh River after connecting to the Mereg- Qarah Su and Siemareh rivers. Landsat 8 satellite images related to June 19, 2016 were used for obtaining land use maps. In order to zone the studied area for RWH, effective hydrologic criteria, topography as well as physical factors, were selected. In order to accurately evaluate the rainwater harvesting map, 115 suitable areas, which were under operation and rainwater harvesting,

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* Corresponding author; **E-mail**: Ildoromi@gmail.com

were selected according to experts and field observations, and the ROC curve was used to assess the validity of the simulation model

3-Results and Discussion

Investigations have shown that the largest area was respectively related to the irrigated, pasture and forest agricultures, regarding which, more than 90.47% of the area and weak and very weak drainage grades with 39.28% and 37.67%, and good and relatively good grades with 10.42% and 12.63%, attributed the lowest areas to themselves. In AMCI form, the basin storage capacity increased from 37 to 722 and in AMCII, it increased from 16 to 310 pitches and in AMCIII, it reached from 7 to 136 mm. The results of the paired comparison between the main criteria and the hydrologic criterion showed that the hydrologic criterion was preferred 5.7 and 7.3, respectively, compared to the physical and topographic criteria, and the physical criterion was preferred 3.2 times to the topographic criteria. Based on the results of the ROC curve, the surface area under the curve of the studied area was 89%, representing a very good evaluation of the ANP model.

4-Conclusion

The results showed that 54.74% of the basin had a relatively high runoff coefficient and was sufficient for RWH. Moreover, 29.20% and 6.29% of the basin, especially in the lower and middle slopes, respectively, had relatively good and good grades for water harvesting; a significant part of the Siah-Khor water basin had the ability of rainwater harvesting. The results showed that the hydrologic criterion was preferred more than physical and topographic criteria and the physical criterion was preferred more then topographic criterion. Investigating the potential map of rainwater harvesting showed that relatively weak and relatively good grades attributed the highest levels and the weakest grade had the lowest level; these were consistent with the results of Mohammad et al. (2013) and Sharif et al. (2015) regarding the exactness and methodology. Field observations and the results obtained from ROC curve indicated that the integration of decision-making techniques and GIS was a useful tool for planning the rainwater harvesting in the basin and sub-basin scales. It is suggested that the locating of rainwater harvesting potentials should be done using other decision making methods in Siah-Khor basin, and the results of this study should be compared and the most efficient locating method should be selected.

Keywords: ROC curve, GIS, ANP, Siah- Khor Kermanshah

5-References

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