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Estimation of Soil Infiltration Using Different Erosion Components in Different Land Uses

Hamzeh Saeediyan[1*], Hamid Reza Moradi[2], Abdal Salehpoor Lashkarga[3]

1- Assistant Professor, Department of Soil Conservation and Watershed Management Research, Kerman Agricultural and Natural Resource Research Center, Agricultural Research, Education and Extension Organization, Kerman, Iran
2- Associate professor, Department of watershed management engineering, college of natural resource, Tarbiat modares university, Noor, Iran
3- Master of Science in Remote Sensing and GIS, University of Science and Research in Tehran and Expert in Agriculture, Mirza Koochak Khan, Ahvaz Sugarcane Development Company

1-Introduction

Soil infiltration situation indicates soil behavior against water reaching the soil surface. This phenomenon determines the amount of both the water reaching the soil surface and rainfall losses. Soil infiltration of a basin has unique parameters based on its climate, soil conditions, and buildings. Soils are a set of discontinuous particles among which pores exist so that water can move from a point with more energy to a point with less energy; this property is called the passage of water through continuous pores. Gachsaran marl formation has a thickness of about 1600 m and consists of salt, anhydrite, colorful lime marl, and some shale from a lithology point of view. The age of this formation is lower Miocene (Ahmadi, 1999: 714). Estimation of soil infiltration using various erosion components can be a useful method to determine soil infiltration in the shortest time and at the lowest cost.

2-Methodology

In this study, soil infiltration was estimated using erosion different components in different land uses in deposits of Gachsaran formation by selecting a part of the Kuhe Gach watershed of Izeh city with an area of 1202 hectares. The relationship between soil infiltration and erosion different components, such as sediment rate, runoff rate, and runoff and erosion threshold, in different land uses of Gachsaran formation was determined by the multivariate regression. Then, different erosion components were sampled at six points with three replicates and different rainfall intensities of 0.75, 1, and 1.25 mm/min in three land uses of rangeland, residential area, and agricultural land using a rainfall simulator. SPSS and Excel software was used for statistical analysis. A portable Kamphorst rainfall simulator used in this study has a plot size of 625 cm^2,

* Corresponding author; **E-mail**:hamzah.4900@yahoo.com

which determines the characteristics of soil, erosion, and water infiltration, and is suitable for soil research. It is used as a standard method to determine the soil infiltration of surface deposits in the field. The experimental plot area was selected 625 cm^2 with a smooth gradient. The preparation of the testing area was followed by installing and setting the rainfall simulator and then starting a chronometer upon observing the precipitation on the screen. The amount of plot infiltration was determined at 10-min intervals (Kamphorst, 1987: 407).

3-Results and Discussion

The estimation of soil infiltration was acceptable and appropriate in some models in this study, which have a lower regression coefficient. Therefore, it is not possible to make appropriate comments about the estimation of the models only using regression coefficients and other statistical coefficients nor the significance levels of observational and estimated data as well as the minimum square mean of errors (MMSEs); in some cases, the MMSEs are not sufficient and require more studies (Jain and Kumar, 2006: 272). Despite scientific advances and improvement of measuring equipment, regression models are still used by researchers in different fields due to simplicity.

4-Conclusions

The results showed that the most positive and negative effects of different erosion components on estimating soil infiltration were related to sediment rate, runoff, and erosion threshold in all three mentioned land uses in three precipitation intensities (0.75, 1, and 1.25 mm min). Meanwhile, the role of sediment rate in estimating soil infiltration was slightly higher than runoff, and erosion threshold and runoff rate had no role in estimating soil infiltration in this method due to a high correlation of data.

Keywords: Soil infiltration, Runoff, Sediment, Kuhe Gach

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