

Estimation of Surface Runoff and Sediment for a Watershed in Northern Iraq for Water Harvesting Based on GIS

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Abstract

The paper includes in the first stage an estimate of the runoff volume and sediment load, resulting from rainfall on a watershed of Alkhoser seasonal river, north-eastern Mosul city/Republic of Iraq, which has an area of up to 725 km². There is a proposal for construction of a rainwater harvesting dam for the supplementary irrigation in the region which is exploited by planting wheat and barley crop widely. Digital elevation model (DEM) was adopted in order to describe the topography of the region, which is one of the main factors affecting the water flow direction and velocity. It also adopted the daily data of rainfall, maximum and minimum temperature, for the period 1989 to 2007 for Mosul to estimate the volume of runoff and sediments resulting from each effective rainstorm. The applied model includes the Geographical Information System (GIS), in addition to the Water Erosion Prediction Project (WEPP). In the second stage, the Simplex method, one of the optimization techniques, is applied for simulating water balance in the dam's reservoir to determine the largest area which can be supplied with irrigation water requirements.

The results showed that the rate of the annual volume of surface water is up to 25.4*10⁶ cubic meter during the considered period, while it is 27.1*10⁶ cubic meter for the years of rainfall depths near average. These amounts are important for the supplementary irrigation to raise the productivity and benefit. The maximum irrigated area that can be supplied is 13100 hectares, which necessitates the establishment of a dam at the site of the study. Moreover, the annual rate of sediment load

Entering the reservoir at selected location is about 140212 tons.

Keywords: Surface flow and Sediments, Water Harvesting, GIS

For the abstract in Arabic see pages (25-37).

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