

SURFACE WATER MANAGEMENT TOOL FOR ARID LANDS
OF JORDAN USING GIS

by

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ABSTRACT

In Jordan as well as most of the developing countries located in the arid regions, water is a priority issue at national and individual levels. Several programs and management practices are in place to conserve the water resources and implement new water supplies to meet the demand of various sectors of the water users. With very high demand on the ground water resources, the limited surface water becomes a promising option as a new and innovative water source. The limited rainfall amounts that fall over wide areas of the arid lands of Jordan (called the Badia) are of significant quantity and due to lack of proper management, the water is lost due to high evaporation rate.

Wadi Salma catchment is 95.63 km² located in the northeast part of the study area was selected to establish rainfall-runoff records. Also field experiments were performed at various parts of the study area to define the hydrologic response. Rainfall-runoff records showed a runoff coefficient of 14 – 24% for Wadi Salma Catchment. Rainfall simulations tests were used to estimate Curve Numbers (CN); high values (93.4 – 95.5) were estimated for different land surfaces. Also infiltration tests showed higher initial infiltration rate (f_o) of 2.5 mm/min - 3.7 mm/min for the channel beds and nearly the same final infiltration rate (f_c) of 0.2 mm/min - 0.6 mm/min for all parts.

A GIS based simulation tool was developed to simulate the runoff for the study area and two storms were used to test the model. Using initial abstraction (Ia) as 42% of

the potential soil storage (S') was found to be the best estimation for rainfall losses calculation. Using the Muskingum routing method, a traveling parameter (K) equal to the traveling time and weighting parameter (x) of 0.18 were estimated for the study area .The simulation tool calculated the peak discharge and runoff volume with acceptable accuracy for the whole catchment; the difference in peak discharge estimation was 4% - 6% and in runoff volume is 7% for the first storm and 10% for the second storm.