

Simulation of Water Harvesting with a Sand Ditch using WASH_2D

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Capture of surface runoff by constructing ditches has been widely practiced. Filling the ditch with sands may be useful to conserve its shape and minimize area for ditch. Through a series of laboratory experiment, we have confirmed the effect of a sand ditch to enhance groundwater recharge. To optimize design such as width, depth, and spacing under various combinations of soil and climate, numerical model may be applied to save time and cost for experiments. The purpose of this study was to incorporate surface runoff process into a numerical model to solve two-dimensional water flow and solute movement, WASH_2D, and demonstrate its performance in a numerical experiment. We employed the Manning equation which presents overland flow velocity as square root of hydraulic gradient, caused by slope of ground surface and/or non-uniform depth of standing water. Results of the numerical experiments matched with experimental results: enhanced downward drainage, enhanced storage by surrounding soil and prevention of run off beyond the sand ditch. The modified WASH_2D is now ready to be applied to optimize design of sand ditches.