Overland flow simulation using artificial neural networks (ANNs)

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ABSTRACT

Artificial neural networks (ANNs) have shown one of the most perfect tools to model complex hydrological processes like overland flow, flood forecasting and other hydrological events. In most of the research, ANNs have demonstrated better results as compared to other technique. ANNs are able to map underlying relationship between input and output data without prior understanding of the process under investigation. In the present investigation of the paper, firstly the laboratory experiments were conducted in sand soil having median size of 1 mm layer placed over an impermeable plane surface, with a uniform rectangular cross section of dimension 1 meter wide and 2 meter long. The laboratory tests were conducted to generate overflow data using rainfall simulator. The data was collected for catchment slope between 1% to 2 % and rainfall intensity fixed at 90 mm/hr. The overland flow model was developed using ANN approach for the validation of this collected experimental data. The comparison of observed and predicted runoff data reveals that the artificial neural network predicts the overland flow data reasonably well in observed hydrograph with Nash–Sutcliffe efficiency greater than 90% which is important for decision making in the area of water resources planning, management and flood forecasting etc.

Keywords: Laboratory experiments, overland flow, artificial neural networks, overland flow simulator.