DE LA SALLE UNIVERSITY

ESTIMATION OF

ON-SITE PARAMETERS OF INFILTRATION MODELS

IN DETERMINING RAINFALL EXCESS

FOR A WATERSHED

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ABSTRACT

The response of a catchment to single rainfall events was estimated using the Horton (1940), Green-Ampt (1911) and Philip (1957) models in the Doña Rita-Nasipit catchment. Double-ring infiltrometer tests were performed in the field to ascertain the parameters in the Horton model. The soil physical properties (percent sand, percent silt and porosity) were determined in the laboratory by taking samples from within the watershed. The parameters of the Green-Ampt and Philip models were determined from these soil properties using the relations of Rawls-Brakensiek (1985) from soil data. Using rainfall data for the year 1995, the runoff hydrograph was simulated and compared to the actual hydrograph of the catchment.

Results indicate that rainfall excess determined using the Green-Ampt model better simulate the actual discharge hydrographs than the Philip and Horton model. The Green-Ampt assumption of a one-dimensional coarse-textured and initially dry soil system was best represented in the basin and the rainfall events.

Measurements were made in the field to evaluate the significance of certain factors affecting infiltration like presence or absence of vegetation, direction of subsurface flow, presence of gravel and roots in the soil profile. Infiltrometer tests show that stemflow points in vegetated areas have higher infiltration rates than throughfall points. The consideration of interception in the model calculations would decrease the discharge volume as it will be an amount deducted to the gross rainfall.

Paint tests were made in the field in order to assess the flow path which the water takes. Generally, the flow path is vertical; the presence of roots and gravel in the soil material would cause lateral subsurface movement of flow especially in sloped areas. Moreover, permeability tests show that these gravel and roots in the soil material will tend to give higher conductivity values. These promotes subsurface flow as a major form of water movement and will increase the calculated runoff volume when used with the models.

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