

Soil as indicator of hillslope hydrological behaviour in the Weatherley Catchment, Eastern Cape, South Africa

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Abstract

There is an interactive relationship between soil and hydrology. Identifying and interpreting soil properties active in this relationship can enhance our understanding of the hydrological behaviour of soils and the hillslopes in which they occur. This study was conducted in the Weatherley research catchment, South Africa, where a hillslope in the upper part of the catchment was selected for detailed study. Soil properties and their spatial distribution in the hillslope were interpreted and related to their predicted hydrological response. From these interpretations a conceptual model of hillslope hydrological behaviour was developed. Vertical drainage was considered to be dominant in the upper areas of the hillslope as indicated by the presence of freely-drained apedal soils. These soils recharge the mid- and lower slope. Soils showing clear indications of interflow (A/B and soil/bedrock interface) dominate on the midslope. The valley bottom is covered by gleyed soils which is an indication of long periods of saturation. These saturated conditions favour overland flow due to saturation impairing infiltration. The conceptual model was then evaluated using hydrometric measurements in the form of tensiometers and streamflow hydrographs. Results confirm the reliability of the model and accentuate the contribution that soil science can make to the science of hydrology.

Keywords: conceptual model, hillslope hydrology, hydropedology, soil properties