ABSTRACT

Laterite covers one third of the state of Kerala, a tropical humid region located in the south western part of India. Though the region receives approximately 3000 mm rainfall annually, water scarcity exists for irrigation during periods of moisture deficit. The laterite formation that overlying the bedrock, constitutes an important hydrogeological province, holding approximately 55 percent of the total dynamic ground water storage of the region. However because of the geological slopy nature, these strata do not hold much water and water drains downslope.

To study the hydrological processes active in this region a watershed was selected at AMPRS, Odakkali , Kerala. A subsurface dike was constructed across the valley at the watershed outlet to check the lateral ground water flow. The ground water recharge and storage in the watershed was monitored as there is no outflow till the water table reaches the crest of the dike. The meteorological data, water table at different observation wells and stream flow were monitored during the study period. The soil moisture characteristics and hydraulic properties were evaluated through field studies. Based on the meteorological data the monthly evapotranspiration values were calculated using Penman -Monteith method. The ground water storage corresponding to rainfall and the total water balance of the watershed were also estimated. The water table elevation data and the hydrograph analysis shown that the prominent mechanisms of runoff generation active in the watershed are saturated through flow and saturated source areas. Based on the field studies a model was developed to simulate the hydrological process. The model includes components for simulating the saturated or unsaturated vertical flow through the soil column and saturated lateral flow in the phreatic zone. The model was calibrated to determine the effective values of hydraulic conductivity and specific yield for the watershed from the observed data. Simulated values of water table elevation for a period of four years was compared with the observed values. It was found that the model simulates the water table elevation at different observation wells and the stream flow reasonably accurate. The sensitivity of the model to hydraulic conductivity and specific yield was also studied. The model was found to be effective in simulating the hydrological processes active in the humid tropics.

Key words: *Effective hydraulic conductivity, laterite, hillslope hydrology, saturated source area, saturated through flow, subsurface dike.*