

SOIL MOISTURE AND GROUNDWATER RECHARGE UNDER
A MIXED CONIFER FOREST

Robert R. Ziemer (Pacific Southwest Forest and
Range Experiment Station, U.S. Forest Service,
Arcata, CA 95521)

The depletion of soil moisture within the surface 7 m by a mixed conifer forest in the Sierra Nevada was measured by the neutron method every 2 weeks during 5 consecutive summers. Soil moisture recharge was measured periodically during the intervening winters. Groundwater fluctuations within the surface 17 m were continuously recorded during the same period. Each fall, a wetting front progressed from the soil surface, eventually recharging the entire 7 m measurement depth to "field capacity". During the recharge period, although the top portions of the soil was at "field capacity", the trees continued to deplete soil moisture from the drier soil below the wetting front into early winter. The progress of the wetting front was variable within and between neutron access tubes from year to year. The position of the wetting front on a given date was a complex function of the amount, duration, and intensity of rainfall and the physical characteristics of the location of each access tube. Groundwater levels began to rise within days after rainfall, whereas weeks or months were required for the wetting front to progress through the unsaturated zone above the water table. Daily water budget calculations based on the Thornthwaite, Hamon, or Blaney-Criddle methods performed poorly in predicting either soil moisture depletion or recharge.