

II. WRENSS - a model-based procedure for estimating the annual evapotranspiration from forested and partially forested catchments.

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The publication Water Resources Evaluation of Non-point Silvicultural Sources by the U.S. Environmental Protection Agency and U.S. Forest Service contains a useful hydrologic procedure for estimating the annual water yield change that will result from a change in land use, such as the change from forested to partially cleared. The first letter of each word forms the acronym WRENSS, which is how most refer to the hydrologic procedure. The procedure is based on a regionalization of parameters within the WATBAL and PROSPER models for seven climatic zones in the United States; four of these zones are marginally present in Canada.

The WRENSS procedure estimates actual evapotranspiration under various vegetation densities and spatial arrangements. Precipitation is the only climatic variable used. None of the data more conventionally used to estimate evapotranspiration, i.e., temperature, wind, and solar radiation, are needed. WRENSS's power lies in its simplicity and minimal data requirements, as it is relatively easy to obtain the necessary data and use the procedure.

Seasonal volume of precipitation is used with regionalized curves or functions and topographic aspect to derive the potential evapotranspiration for a user-specified location within a climatic-vegetative region. The potential evapotranspiration is acted upon, again with the aid of a nomograph or function, by vegetation, the physical arrangement of the vegetation, and the topographic aspect to derive simulated actual annual evapotranspiration. The difference in simulated annual evapotranspiration between any two vegetated states is the change in water available for streamflow.

Since the WRENSS procedure is a simple way to estimate actual annual evapotranspiration, it also presents an attractive way to estimate the annual water yield from ungauged watersheds. If the precipitation data available for a particular watershed are accurate and spatially representative, then the annual precipitation (P) and estimated annual evapotranspiration (ET) can be used in the water balance equation ($P - ET = RO + SC = GRO$) to provide an estimate of generated runoff (GRO) from an ungauged catchment. If storage change (SC) is negligible from year to year, then generated runoff will be the same as annual water yield. If storage changes are not negligible, then the WRENSS-simulated generated water yield values must be averaged over a sufficiently long period so that the average storage change equals zero. The WRENSS procedure is only useful for annual water yield estimation and it cannot be used to produce routed daily, monthly, or seasonal streamflow. The lack of accurate and spatially representative precipitation data is the problem most often encountered when WRENSS (or for that matter, any procedure that relies on accurate estimates of water balance components) is used in this manner.



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