An analysis of evapotranspiration at dry-evergreen forest at Sakaerat Thailand.

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ABSTRACT

Evapotranspiration during the wet season (June through September 1970) was determinated by three micrometeorological methods, the energy balance (Bowen ratio), aerodynamics (Rider), and combined (Penman) methods. These results were compared with direct measurments of daily soil moisture depletion and Class A pan evaporation. The experimental site was a dry evergreen forest and an adjacent clearing area in the Sakaerat Experimen Station (Nakorn Ratchasima) of northeastern Thailand.

Very low correlations were found within and between micrometeorogical methods and direct measurements. The energy balance method gave the most consistent and comparable daily results (3.7 mm for the forest and 3.2 mm for the clearing) with pan evaporation (4.1 mm) and soil moisture deplition (3.5 mm for the forest and 5.3 mm for the clearing). The combined method gave high daily values for the forest (10.7 mm.) and the most comparable values for the clearing (4.9 mm.) with pan evaporation.

Air above the forest canopy was classes as usually in an unstable condition. Only heights of 36 and 40 m in the forest were characterized as near a neutral condition. Neutral conditions were not found for the clearing. The most suitable heights for measurement of meteorologocal parameters were 36 and 40 m for the forest, 1 and 4 m for the clearing for the energy balance and aerodynamics method and for the combined method 40 m for the forest and 4 m for the clearing. The solid forest canopy ranged from 32 to 35 m. The clearing had grass cover 50 cm in height.

The energy balance method required accurate measurement of all meteorological parameters such as dewpoint, air temperature and radiation. The aerodynamic and combined methods required more critical measurements than the energy balance method, especially in determining values of zero plane-displacement and the roughness parameter. Major difficulties in application of these equations arise due to air turbulence over the rough forest canopy. Estimations of actual or potential evapotranspiration by the aerodynamics or combined methods are of doubtful accuracy.

Therefore, the application of these two evapotranspiration equations to forests should be treated with caution in future studies.

Limitations and sources of errors for each method are discussed along with recommendations for use of the methods and measurement of meteorological parameters.