

Evaporation and transpiration differences among successional stages of Tropical Dry Forest, Santa Rosa National Park, Costa Rica

César D. Jiménez-Rodríguez (1,2) and Julio Calvo-Alvarado (1)

(1) Tecnológico de Costa Rica, 159-7050 Cartago, Costa Rica, (2) Delft University of Technology, Delft, The Netherlands

Seasonal environments in the tropics show strong responses to changes in precipitation regimes. The monthly water availability is the main trigger for ecological responses as flowering, fructification, leaf sprouting and senescence. Among these environments, the tropical dry forests (TDF) depends directly on the soil water availability, defining the forest growing season despite the forest characteristics. However, within the same ecosystem is possible to find differences in the water fluxes due to forest age. The TDF located in Santa Rosa National Park (SRNP) in Costa Rica; shows a particular matrix of secondary forest patches varying in age, structure, and species composition allowing us to evaluate the water fluxes differences among successional stages of TDF. Three permanent plots of 1000.0 m² were selected from the Tropi-Dry project. Each plot characterized a specific successional stage of this ecosystem varying in forest structure and age. Every location was equipped to measure the hourly soil water content and forest growth, while the meteorological conditions were collected by the meteorological station of the national park. The data was collected from December 2005 to June 2009 however, due to data gaps and quality control the data analysis includes only the hydrological years between 2006 and 2009. The soil water content was measured at three depths in each plot (10, 30 and 40 cm) to determine the real evapotranspiration from the forest. The precipitation along these three years shows strong variations registering 326.5 mm-1yr-1 in the first year up to 3004.0 mm-1yr-1 during the last year, these strong changes are influenced by the ENOS phenomena in the region. Regardless the precipitation amounts the evapotranspiration do not differ strongly on a yearly basis, were 726.7 mm-1yr-1, 675.1 mm-1yr-1 and 751.6 mm-1yr-1 were exported to the atmosphere by the early, intermediate and late stages of TDF secondary forest. The yearly strong differences in precipitation do not affect the forest water use at local level, showing a relationship between physical soil conditions and forest structure regardless the precipitation amount.