

Estimating ET on Fine Spatial Scales in Urban Wetlands

Catherine Kuhn

School of Forestry & Environmental Studies, Yale University

Abstract. The purpose of this research project is to calculate a water budget and compare evapotranspiration methods for the Yale swale, a 5 acre forested urban wetland located adjacent to the Yale School of Forestry. This water budget will be used as the baseline against which to evaluate ongoing restoration efforts. Our project is unique because, while mass balances for larger watersheds have been thoroughly studied, our project will be the first to attempt a budget on such a fine spatial scale in an urban area. Additionally, little literature exists exploring evapotranspiration models for small urban streams. The first phase of the project involves installing instrumentation to monitor local climate conditions, soil moisture and surface water. These tools include two Solinst Level Loggers and a v-notch weir to measure stream discharge, a YSI Econet water quality monitor, soil moisture profile probes, a radiometer and a Hobo Rainwise tipping bucket to measure precipitation. Coupling the meteorological and hydrologic data from these instruments will provide a more comprehensive estimate of surface and sub-surface hydrology. The second phase involves generating estimates of evapotranspiration rates using the Penman-Monteith, Blaney Criddle and Priestley models in order to compare the appropriateness of each model for our small spatial scale. Each model will be calibrated into the water mass balance and used to predict discharge. The predictions will be compared with the actual discharge from stream gauges to identify the most appropriate model. The final phase will include creating hydrographs describing hydrologic fluxes that will then be used to inform planned green infrastructure installations for improving campus storm water management. The anticipated outcomes of this project include an evaluation of best-fit ET models for small urban wetlands as well as a physically based hydrologic budget to provide baseline data for restoration evaluations. This project provides a fascinating case study investigating water cycling in a partially restored urban wetland.