

# Estimating Water Use through Satellite Remote Sensing

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## Problem and Research Objectives

A recent evaluation of the water budget at Lower Rio Grande has shown that 56% of water is unaccounted for (Magallanez and Samani, 2001). The 56% likely includes domestic water use, riparian vegetation use, supplementary farm irrigation pumping, and off-season runoff. In order to better account for the various uses of water and sources of beneficial and non-beneficial use and ultimately to optimize the use of water resources, a realistic evaluation of the amount and spatial and temporal variation of ET is needed.

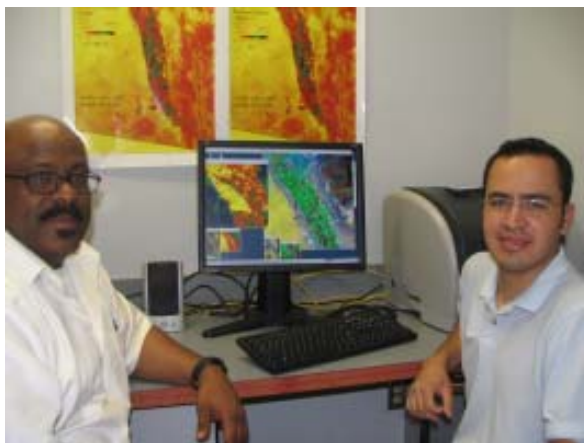
For the purposes of the effort, the primary goal is to use the spatial and temporal variation of ET information to assess and map economic return from agricultural activities. Once ET is determined, then biomass can be calculated and linked to crop yield. This could provide an excellent opportunity to evaluate the impact of various parameters such as crop type, field size, and soil on the economic return from irrigated agriculture.

## Methodology

Recent innovations in satellite technology have made it possible to process satellite data to estimate evapotranspiration (ET) with high spatial and temporal resolution. This technology (so named REEM), utilizes remote sensing parameters (land surface temperature (LST), normalized difference vegetation index (NDVI), and short wave albedo along with climate station data to arrive at an estimate of ET. These ET maps will be processed by overlaying agricultural field boundaries (initially, pecan orchards) to arrive at a field by field estimate of total ET. This is then linked to biomass and crop yield for a determination of economic return.

## Principal Findings

Due to the many “false starts” in the creation of vector files that delineate the pecan orchards, there has been considerable delay in arriving at the necessary information to complete the task. However, we now have established procedures for the determination of two parameters of special interest: 1) tree count/density and 2) percent canopy cover, which will be compared to NDVI (normalized difference vegetation index) and then to ET – this is the “link” between biomass and ET. This will be the major topic of Aldo Piñon’s M.S. thesis.



*Professor Salim Bawazir and Aldo Piñon review ET maps of the Lower Rio Grande.*



*Graduate student Aldo Piñon takes measurements in a pecan orchard.*

