

Mapping the Riparian Vegetation Evapotranspiration Using Airborne and Landsat Imagery Over the Republican River, Nebraska

Osama Akasheh, Christopher Neale, Burdette Barker, Babak Safa, and Derrel Martin

University of Nebraska, Daugherty Water for Food Global Institute, Daugherty Water for Food Global Institute, United States
(oakasheh@gmail.com)

Natural forest and riparian vegetation receive less attention concerning their water use. As the dependency on rivers for fresh water increases, rivers ecosystem analysis becomes essential for proper water management and riparian vegetation conservation. In order to determine the riparian vegetation water use, it is essential to map the riparian vegetation and identify their species. The resulting map will provide the areas and locations of different riparian vegetation including the invasive species. In this study we will show the use of both satellite and airborne imagery to map the riparian vegetation and estimate its evapotranspiration (ET) near the Republican River in Nebraska, USA, using the two source energy balance model. In the summer of 2009 four flights were conducted using a AisaEagle Airborne Hyperspectral Imaging System and a FLIR SC640 thermal digital camera. The AisaEagle acquired visible and near-infrared images in the waver band over 400 - 970 nm of the electromagnetic spectrum, while the thermal infrared captured images in the range of 800-1200 nm. Early and mid-season images were primarily acquired to classify the overstory cottonwood (*Populus spp.*) vegetation and the late-season images were primarily acquired to classify the understory vegetation and the invasive Eastern Red Cedar (*Juniperus virginiana*) after the senescence of cottonwood leaves. The land use map was developed using an unsupervised classification technique followed by manual recoding. In addition to using airborne imagery we will estimate the riparian vegetation ET using Landsat 5 and 7 for the same period for a longer river section. The resulting ET values will be validated using an eddy covariance flux tower installed within the study area.