Applying remotely-sensed cottonwood cover data to evaluate groundwater fluctuations in riparian floodplain aquifers in Southwest Colorado

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Abstract

Quantifying water availability has become imperative to understanding riparian ecosystems and maintaining water resources in the southwest. Here we investigate the possibility of using remotely sensed riparian woody vegetation cover values as a proxy for floodplain aquifer variation. On the Dolores River in southwestern Colorado, narrow-leaf cottonwood (*Populus angustifolia*) has decreased in both canopy cover and annual growth during periods of drought due to its intense reliance on floodplain aquifers (Dott et al., 2016; Coble and Kolb, 2012). This study uses data from a regulated section of the Dolores River, where percent cover values for *P. angustifolia* have been measured on the ground since 1989, and groundwater levels have been monitored since 2010 (Dott et al., 2016). River discharge and riparian aquifer groundwater levels in this system co-vary. GIS analysis of remotely sensed images is an effective technique to quantify inter-annual variation in canopy cover in riparian systems (Kamp, *et al.* 2013; Qi, *et al*. 2000). So far, we have tested the efficiency of cover values derived from National Agriculture Imagery Program (NAIP) color infrared (CIR) imagery by comparing it to cover values obtained by ground measurement at our study site. Next, we are working on quantifying and illustrating the correlation between groundwater levels and canopy cover values. Ultimately, we will determine whether; 1) the GIS-derived cover values prove to be an effective method when compared to traditional vegetation cover methods, 2) the correlation between groundwater levels and cottonwood cover can be used as a proxy to estimate groundwater levels for years without well data on the Dolores River, 3) this correlation can be used to estimate groundwater levels of other downstream river sections on the Dolores River. This technique of using remotely sensed cover values of woody vegetation as a proxy for groundwater availability may have implications for historical investigations of past droughts, and predictive power for the impacts of decreased water availability in the future.

Biography

Zach Sforzo is a senior at Fort Lewis College receiving his B.S. in geology and GIS Certificate in December 2017. Zach grew up in the Rocky Mountains near Vail, Colorado and received an A.A. from Colorado Mountain College in Edwards, Colorado before attending Fort Lewis College in 2015. Zach uses his GIS and geology background to tutor other students through the Native American Center at Fort Lewis College and his primary foci include groundwater geology, hydrology, GIS and GIST, geological engineering, sequence stratigraphy, and petroleum geology. Zach Sforzo is the President of the American Association of Petroleum Geologists Student Chapter at FLC and through this he strives to provide his colleagues with industry field trips, subject talks from professionals, and overall networking opportunities for students with professionals and alumni. After graduation, Zach plans to experience the geology industry before attending graduate school.