

NUTRIENT AND SALT MASS BALANCE ON THE LOWER ARKANSAS RIVER AND A CONTRIBUTING TRIBUTARY IN AN IRRIGATED AGRICULTURAL SETTING

Alexander Huizenga, Ryan T. Bailey, Timothy K. Gates¹

The Lower Arkansas River Basin is an irrigated, agricultural valley suffering from high concentrations of nutrients and salts in the coupled groundwater-surface water system. The majority of water quality data collection and associated spatial analysis of concentrations and mass loadings from the aquifer to the stream network has been performed at the regional scale (> 500 km²). This study attempts to monitor and quantify hydro-chemical processes on a small spatial and temporal scale in specific locations in the region. Using a suite of in-stream instruments and observation piezometers along the stream corridor, a 4.7 km reach of the Arkansas River, as well as a 2 km reach of a contributing tributary, Timpas Creek, were monitored in order to quantify mass inputs and outputs of nutrients (N, P). Monitoring included growing season length water quality sampling, as well as two high-intensity monitoring events. Using this monitoring data, a mass-balance approach was used to quantify groundwater-surface interactions and exchanges for nitrate loadings in the Arkansas River. Results suggest that significant in-stream processing of nitrate occurs in the Arkansas River during low discharges and that nitrate degradation through denitrification and vegetative uptake occurs in the riparian zones of the river and creek. The information and data gathered from this research will clarify the needs for future data gathering efforts in the region and provide a database from which to draw for future small-scale groundwater-surface water modelling efforts in the Lower Arkansas River Valley.

¹Alexander Huizenga, Graduate Student, Civil and Environmental Engineering Department, Colorado State University, Fort Collins, CO 80523
Ryan Bailey, Assistant Professor, Civil and Environmental Engineering Department, Colorado State University, Fort Collins, CO 80523
Timothy Gates, Professor, Civil and Environmental Engineering Department, Colorado State University, Fort Collins, CO 80523

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