Pima County Regional Flood Control District Monthly Brown Bag Series

Quantifying recharge from Santa Rita Mountains to Davidson Canyon, Cienega Creek, and basin aquifers

Jennifer McIntosh
Dept. Hydrology and Atmospheric Sciences, UofA

Mountain block recharge (MBR), an important component of recharge in arid climates, contributes water to adjacent basin-fill aquifer systems, which support large population centers and irrigated agriculture in the southwestern US. MBR is projected to decrease due to climate change and development within mountain blocks. The spatial distribution, quantity, and flow paths of MBR are often poorly constrained, including its hydrologic connections to surface flows and shallow alluvial or regional aquifers. Constraining these flow path and surface-groundwater interactions will help refine conceptual and numerical models of MBR.

This seminar will highlight recent results on MBR in Davidson Canyon and Cienega Creek watersheds, southeast of Tucson, AZ. Previous studies by our research group in the area suggest that Davidson Canyon's seasonal and intermittent baseflows in the Santa Rita Mountains are a mix of young (less than a decade old) groundwater in the alluvial aquifer and older, more geochemically evolved, regional groundwater within the fractured bedrock. Various geochemical analyses are applied to a time series of streamflow, shallow alluvial aquifer, regional groundwater, and precipitation data. Results suggest that minimal seasonal variations exist in the fractional contributions of precipitation and geochemically evolved groundwater, but do suggest spatial variations within the watershed with groundwater contributions increasing with distance from the mountain block. However, springs and streamflow within the mountain block still show significant (42%) contributions from regional groundwater. Decreases in precipitation contributions to Cienega Creek within the past few years highlight the sensitivity of the watershed to ongoing drought. Approximately 90-95% of precipitation is lost to evaporation while the remainder contributes to MBR. The results suggest that stresses, including climate change and development, will likely reduce remaining spring and surface flows in the Davidson Canyon watershed.

PIMA COUNTY
FLOOD CONTROL

Wednesday, August 11th, 2021: 12:00 - 1:00 PM
Online via Teams