UTSA Earth and Planetary Sciences

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Klesse College of Engineering (KCEID)

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Institute for Water Research Sustainability and Policy (IWRSP)

Seminar Presentation

By

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"Water quality-related issues and applications in the Edwards Aquifer region: A look at the Helotes Creek Watershed and the transboundary Amistad Reservoir region"

Abstract

The Edwards Aquifer system is a primary source of water for communities across central and west Texas, supplying water to over 2 million people. The aquifer region faces a myriad of challenges from anthropogenic and environmental stressors, including climate change and water quality degradation. Increasing development in the recharge and contributing zones of the aquifer, particularly in the Texas Hill Country, has forced a debate on the comparative impact of different wastewater treatment and disposal practices on the quality of water that recharges the aquifer. Scientists examined and compared the impacts to the quality of water that is, or could hypothetically be, introduced to the Edwards Aquifer from the three main types of wastewater disposal facilities: on-site sewage facilities, Texas Land Application Permit facilities, and Texas Pollutant Discharge Elimination Systems. The Helotes Creek watershed in Bexar County was selected as the study area. The project team developed an integrated hydrologic model using GSFLOW and conducted a variety of mixing cell simulations created in GoldSim. The simulation analyses illustrated that most scenarios resulted in higher cumulative mass to the recharge zone relative to the base case, confirming that in cases of increased development or failure of septic systems, increased impacts to the quality of recharge to the Edwards Aquifer are to be expected. Differences in facility type may impact the delivery from the point of disposal to the Edwards Aquifer, but the bottom line is that greater discharge to the environment will result in greater mass loading to recharge.

A few hours west of Bexar County, in the Amistad Reservoir region shared by the United States and Mexico, scientists conducted water sampling to constrain the source area of Goodenough Spring, a major Edwards Aquifer spring and key component of the area's water budget. Historically, the Goodenough Spring catchment area was thought to be located north of the Rio Grande in the United States. Anecdotal evidence, however, supported the premise that the spring's source area is south of the Rio Grande, in Mexico. The lack of an established characterization of Goodenough Spring's source area limits effective management of the region's water budget and quality. Samples from Goodenough Spring and wells in Texas and Coahuila de Zaragoza were analyzed for a comprehensive suite of geochemical parameters including major ions and isotopes. Comparing the laboratory results with pre-existing water quality data allowed for investigation of transboundary linkages and preliminary delineation of Goodenough Spring's source area. Overall, results suggest the source area of Goodenough Spring is transboundary in nature, with upland regions of nearby watersheds in Mexico comprising the main components of this source area.