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Dartmouth study shows US Southwest irrigation system facing decline after 4 centuries

Reduced snowmelt, socioeconomic factors reflect pressures on once isolated communities around world

Communal irrigation systems known as acequias that have sustained farming villages in the arid southwestern United States for centuries are struggling because of dwindling snowmelt runoff and social and economic factors that favor modernism over tradition, a Dartmouth College study finds.

The results reflect similar changes around the world, where once isolated communities are becoming integrated into larger economies, which provide benefits of modern living but also the uncertainties of larger-scale market fluctuations. The study appears in the journal *Global Environmental Change*.

A PDF of the study is available on request.

IMAGE: Dartmouth assistant professor Michael Cox's study shows traditional irrigation systems known as acequias are declining in the arid southwestern United States.

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Acequias evolved in the Middle East and Roman Empire and were introduced into the Americas by Spanish colonizers in the early 1600s. The term acequia refers to both communities of farmers as well as engineered irrigation canals that carry snowmelt-driven runoff to farm fields as a way for the agricultural communities to share a scarce resource in arid regions. The acequias system, which is common in northern New Mexico and southern Colorado, provides a model of communal ownership that governs water rights, distribution, disputes and other issues.

Dartmouth Assistant Professor Michael Cox, the study's author, examined the acequias of the Taos Valley in northern New Mexico. He found the acequias are declining in terms of their agricultural productivity and have mostly lost their common property-based livestock pasturing system. The changes stem from a declining amount of snowmelt and a host of socio-economic factors, many resulting from population growth in the nearby city of Taos. The factors include state-level public policies that grant private water rights to individuals, which conflicts with the acequias' water sharing traditions; newcomers who are increasing demand for what water remains; increased tourism and land use development; and declining reliance on traditions in favor of modern, highly integrated economies.

Researchers typically focus on successful examples of community-based common-pool resource management systems, but Cox's study, which used a mix of interview, survey, remote sensing and census data, is among the few to explore the deterioration of such systems.

"While some of these changes can be attributed to declines in water availability, much of the change results from social drivers, including demographic changes, regional-to-global market forces and public policies," Cox says. "It thus seems quite unlikely that the acequias in Taos will return to their historical situation, meaning the acequia farmers must adapt to the current conditions."

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Professor Cox is available to comment at Michael.E.Cox@dartmouth.edu.

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