



Modern disturbances to a long-lasting community-based resource management system: The Taos Valley acequias



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ABSTRACT

Long-lasting community-based resource management systems have offered scholars important lessons in the study of human–environment relations. The examination of such systems has suffered from a sampling bias, however, in that it has focused disproportionately on successful systems. There are fewer studies that have explored the deterioration of such systems, particularly with an interdisciplinary approach. This shortfall is problematic given the increasing social and biophysical disturbances that communities are facing as they become more integrated into, and affected by, larger-scale processes.

This study addresses this gap by analyzing the modern condition of a long-lasting community-based irrigation system known as the acequias in northern New Mexico. Using a mix of interview, survey, remote sensing, and census data, I examine the extent to which important indicators for the acequias have shifted in the last several decades and explore reasons for these changes. A mix of statistical and qualitative comparative techniques is used to conduct the analysis.

By examining longitudinal data we find that the acequias are producing less than they have in the past and have mostly lost their common-property-based livestock pasturing system. While some of these changes can be attributed to similar declines in water availability, much of the change results from social drivers including demographic changes, regional-to-global market forces, and public policies. Overall the shift of the acequias to their current state is a result of their integration into a much larger-scale set of social and economic forces than they have experienced in the past. This shift will be very difficult to reverse, meaning the acequia farmers must adapt to the current condition. It is likely that these themes are common across many community-based resource management systems in many locations. In the future, further progress should be made in synthetically comparing such cases in ways that have already been done for long-lasting successful systems.

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1. Introduction

Much work has been done to analyze community-based common-pool resource (CPR) management. Partly as a response to theories promoting only private and public property as the possible CPR management regimes, this work has established a set of variables that affect the likelihood of successful community-based resource management (Ostrom, 1990; Agrawal, 2001; Basurto, 2005; Imperial and Yandle, 2005). Many of these variables have been established by case studies of historically resilient systems.

Meanwhile, examples of cases where historically resilient local systems are confronting a modern suite of socio-economic and biophysical disturbances, along with increased connectivity to

external environments, have become increasingly important (e.g. see Lam, 2001; Cinner and McClanahan, 2006). This importance largely results from the fact that many systems that have persisted for a very long time are struggling to adapt to novel disturbances. Thus, developing our understanding of these new processes is relevant for many traditional systems in the world today. Based on the language developed by Schoon and Cox (2012), by disturbances I mean any of the following: (1) statistically unusual fluctuations in flows into or out of a system or in the parameters describing that system, or (2) changes in the level of connectivity among elements of the system or between the system and its external environment.

These two types of cases, the historic and the modern, can be seen as addressing two different sets of research questions: first, how have such systems persisted in their pre-modern context and up to the current period; and second, are they adapting or failing to adapt to the modern social and economic context, and why? The majority of the CPR-based literature has addressed the former rather than the latter of these questions.

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In this paper I address the second question by analyzing the modern context of a long-lasting case of community-based CPR management. The case in question is the Taos Valley acequia irrigation systems in northern New Mexico. An acequia is a community of irrigating farmers (also called *parciantes*) that share a network of canals. “Acequia” can also mean an irrigation canal, and the main canal used by an acequia community is frequently referred to as “la acequia madre” (the mother ditch).

The acequias systems in New Mexico have persisted for centuries, but are currently facing a suite of disturbances resulting from their integration with large-scale social and economic forces such as public policies, market dynamics and land use change (see [Ortiz et al., 2007](#)). To analyze the acequias’ response to these challenges I first examine important historical trends, including changes in vegetative cover in acequia-irrigated areas, changes in livestock counts, and demographic shifts in Taos valley. These trends illustrate the extent to which the acequia systems have fundamentally changed from their pre-modern context. I then attempt to explain these trends by analyzing the results of a survey of acequia *parciantes*. To conduct these analyses multiple data sources were collected, including interview and survey data as well as data from the U.S. agricultural census and imagery from NASA’s Landsat program. A mix of statistical and more qualitative techniques were used to analyze these data.

The remainder of this paper is structured as follows. The second section describes the Taos acequias and the study site. The third section describes the relevant theoretical background. The fourth section describes the methods employed, while the fifth section describes the results of these methods, and the sixth and seventh sections discuss these results and conclude the paper.

2. Study area

The case analyzed in this study is an irrigation system composed of 51 acequias in the Taos Valley of northern New Mexico, a state in the arid Southwestern United States. The acequia farmers in New Mexico and in parts of Southern Colorado are the

descendants of the Spanish colonists who moved north along the Rio Grande from Mexico beginning around 1600. These colonists themselves had adopted water institutions brought to Spain by the Moors and the Romans (see [Phillips et al., 2011](#)). In addition to incorporating some aspects of Tlaxcalteca and Puebloan cultures, the colonists brought with them several traditional Spanish irrigation traditions, most importantly the institutional regime of common property ([Simmons, 1972](#); [Rivera, 1998](#)). Water within each acequia is considered common property, and compliance with community obligations is required in order for an individual to maintain his/her individual water rights (see [Keleher, 1930](#) and [Hall, 2012](#)).

Pasture lands were an additional historically important resource that was somewhat separate from the irrigation infrastructure and governing institutions, although the acequias historically reflected a common combination of irrigation and pasturing activities, both being frequent adaptations to arid conditions. While the irrigated parcels of land are privately held, the pasture lands, along with water and the main irrigation ditch that conveys the irrigation water, were traditionally held as common property.

Each acequia has a well-defined government, led by a *mayordomo* and three commissioners (a president, a secretary and a treasurer). The *mayordomo* is a type of executive officer who is in charge of running the acequia. He or she decides how water is distributed within his or her acequia and monitors for infractions. This usually includes maintaining a list of *parciantes* that sets an order in which they are to obtain their water along a rotation. This list is set as the *parciantes* contact the *mayordomo*, either in person or on the phone, asking for water. The *mayordomo* also is in charge of enforcing this rotation, monitoring for violations and confronting those who do not comply with acequia rules. The commissioners serve several administrative, legislative, and judicial roles. They are frequently called on to arbitrate disputes and support the *mayordomo* in enforcing ditch rules. These responsibilities have been more recently codified in the bylaws increasingly being adopted by acequia around the state (see [NMAA 2010](#)).

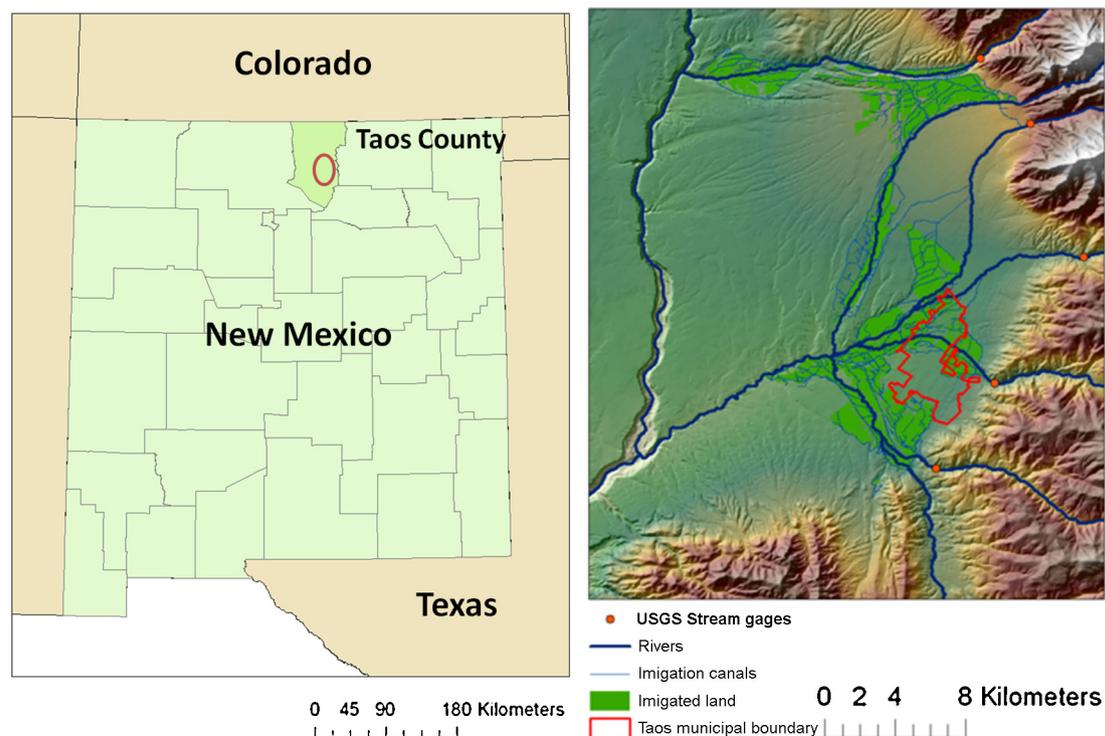


Fig. 1. Study area.

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