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Using the institutional analysis and development (IAD) framework to analyze the acequias of El Río de las Gallinas, New Mexico[☆]

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ABSTRACT

As population and economic growth increase urban water demands, and traditional irrigation plays a smaller role in direct subsistence in New Mexico, irrigators on small, traditional systems often feel threatened. This paper uses the Institutional Analysis and Development (IAD) framework to analyze the irrigation ditches of the Gallinas River, in San Miguel County, and aims to facilitate understanding of the persistent distrust some Gallinas irrigators feel toward city, state, and federal agencies. This distrust, sometimes due to a perception of differing property rights structures that result in what many irrigators feel is unfair treatment by various agencies, and sometimes to a simple lack of understanding, is often perpetuated by recounted stories of malfeasance. Degree of social capital, knowledge of water law, and technology vary greatly. While there are not many problems with outsiders, some of the larger ditches report very poor social capital.

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1. Introduction

In New Mexico, traditional, common-property irrigation ditches are known as *acequias de común*, or *acequias* (Rivera, 1998, 2006; Rodriguez, 2006), a name which derives from the Arabic *as-sakiya*, meaning the water-bearer (Peña, 2003). Spanish settlers, who had inherited Roman and Moorish irrigation systems in southern Spain (Phillips, Hall, & Black, 2011; Simmons, 1972),

brought that technology and law to the New World. These systems dovetailed with and changed through contact with indigenous irrigation systems in the upper Rio Grande valley (Rivera, 2006; Simmons, 1972).

The term *acequia* itself carries a sort of weight in New Mexico, as not all irrigation ditches are thus called. In certain regions, for instance the Middle Rio Grande Conservancy District, some irrigation ditches are simply called ditches, while others have the status of *acequia*. Typically the term *acequia* applies to a community ditch, where there is some extent of communally owned and maintained conveyance or ditchbank easement for access to the ditch. Additionally, the traditional Spanish term for someone who irrigates from an *acequia* is *parciante*, which is not immediately interchangeable with the term irrigator. A *parciante* is really a term to designate a position within a community;

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one who partakes in the benefits of irrigation but also contributes to its upkeep, and the term has come to signify a specific relationship to common pool resource management within at least a somewhat traditional management context (Rivera, 1998; Rodriguez, 2006). Additionally, it is used almost entirely in traditionally Hispano communities. Indigenous irrigators would not necessarily call themselves *parciantes*, surely as the term hardly exists outside New Mexico in the US, with the exception of parts of southern Colorado. Some will interchangeably use the terms irrigators or *parciantes*, just as sometimes people will alternately use *acequia* or ditch. With a few exception, this paper refers to *acequias* and *parciantes* throughout. This is in part to distinguish them from other, non-communal or commercial irrigation operations, and also to use their own terminology for themselves. It is common for both Hispano and non-Hispano irrigators on an *acequia* to call themselves *parciantes*. As with any traditional, culturally embedded natural resource management system, some of the terminology is highly local, and its use provides a more accurate picture of the system than would more generic terms.

Acequias have supplied water to crops and villages in a high altitude region with scarce, variable water supplies for centuries (Gutzler, 2012; Hutchins, 1928; Rodriguez, 2006; Thomson, 2012), but with increases in population and economic growth (Broadbent, Brookshire, Coursey, Ganderton, & Tidwell, 2012), changes in water law (Hall, 2012; Keleher, 1929; NMAA, 2005; Phillips et al., 2011; Rivera, 1998; Rodriguez, 2006), ethnic composition, and property rights regimes, the *acequias* are fighting a battle against modernization and integration into an unfamiliar culture (Peña, 2003; Rivera, 1998; Rodriguez, 2006). Part of this battle is that *acequia*-irrigated farms play a decreasing role in direct subsistence in the region (NASS, 2002; Ortiz et al., 2007; Rodriguez, 2006). Nonetheless, *acequias* are still important to the social fabric of the state, have potential as alternative water management paradigms (Rivera, 1998; Rodriguez, 2006), and contribute important hydrological ecosystem services (Fernald, Baker, & Guldán, 2007; Fernald & Guldán, 2006; MEA, 2005). All of these would be properly termed 'non-market' values by economists, as no markets exist to capture their value, and their value is not part of any pricing mechanisms for the sale of water rights out of *acequias*.

New Mexico water law attempts to address these non-market values through a public welfare clause. Water rights sales in New Mexico can be legally contested for several reasons (Colby, 1995; Nunn et al., 1991), including if the sale is deemed to violate the public welfare of the state (NM Statute 72-5-23; Bokum, 1996; Brown et al., 1996; Rivera, 1998). The law also allows *acequia* associations to prohibit members selling rights if the sale is deemed harmful to the functioning of the *acequia* (NM Statutes 73-2-21.E, 73-3.4.1, 72-5-24.1; NMAA, 2005). The term public welfare is not clearly defined in statute law, however (Bokum, 1996) and is therefore subject to the discretion of individual cases or judges.

Given these concerns, it is important to examine the status of *acequia* irrigation and how it might contribute to the public welfare throughout New Mexico. Rivera (1998, 2006), Rodriguez (2006), Crawford (1993) and others (Hutchins, 1928; Lovato, 1974) provide excellent detail

Table 1

Informational requirements for characteristics in the IAD framework.

Physical/technical characteristics	Community characteristics	Institutional characteristics
I. Nature of the resource a. General classification of the <i>acequias</i> b. Size of the system	I. Information about members a. Sources of income b. Perceived and shared norms of behavior and culture	I. Design principles a. Sources of income b. Perceived and shared norms of behavior and culture
II. Technology for withdrawals and exclusion	II. Proximity to resource and between users – social capital	II. Type of resource regime a. Property rights information
III. Condition of the resource a. Flow patterns b. Excludability c. Subtractability/jointness d. Water quality Clarity of boundaries	III. Skills and assets of leaders	III. Members' ability to change rules
Boundedness of the resource Possibilities of substitution	Boundaries of the group	IV. Member and access rules V Governance – Community or bureaucratic a. Collective choice arrangements Existing arrangements for discussion of resource Problems and for Punishment Rules

on *acequia* history and function. This paper's contribution to the growing *acequia* literature is the use of interviews based on the Institutional Analysis and Development (IAD) framework (Bardhan, 1993a, 1993b; Imperial, 1999; Nugent, 1993; Oakerson, 1985; Ostrom, 1990, 1992; Yan-Tang, 1991) to examine the *acequias* of El Río de las Gallinas (the Gallinas) in San Miguel County, NM, a new application of a proven methodology on a specific drainage. The status quo this paper describes constitutes part of what could be lost if water use shifts away from *acequia* irrigation. Any decision about changes in public welfare has to take this into consideration.

2. The IAD framework

An IAD analysis examines the "design and performance of an institutional arrangement" (Imperial, 1999, p. 453), institution here meaning both organized bodies such as irrigation associations and the particular rules and structures that obtain in those bodies. Table 1 provides an overview of the data requirements for such an analysis. Variation in three categories – technical, community, and institutional – interact within the local natural resource

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