

# *Acequias de Común:* **The Tension between Collective Action and Private Property Rights**

John R. Brown and José A. Rivera

## **Introduction**

For four hundred years, the acequias (irrigation canals) of the upper Río Grande in New Mexico have functioned as common property regimes utilizing Moorish-Iberian technologies transplanted in colonial times to the northern borders of *Nueva España* (New Spain). During their *entrada* up the Río del Norte, now the Río Grande, Spanish-Mexican officials, colonists and Franciscan friars encountered a terrain and climate not unlike that of arid and semi-arid southeastern Spain. To establish the first Spanish colony of *La Provincia del Nuevo México* in 1598, the settlers chose a site near confluence of the Río del Norte and its tributary from the west, the Río Chama. For a time, they occupied an existing Indian Pueblo on the eastern bank of the Río del Norte, calling it San Juan de los Caballeros, only to relocate this first capital to the opposite bank about a year later, to another temporary site, San Gabriel. By 1610, they had finally established a permanent capital for the fledgling province at Santa Fe, the oldest capital city in the United States.

Arriving on July 11, 1598, the first Spanish Governor, Juan de Oñate, allowed scarcely a month to pass before rounding up a labor force of 1500 Indians to begin the construction of an irrigation canal at the first colony in the vicinity of San Juan de los Caballeros. Though the fate of this project remains unknown, by the early 1600s, acequias were constructed and were flowing at the other two sites, first at San Gabriel and then Santa Fe. (Simmons 1991; Hammond and Rey 1953) At these and other locations north and south of Santa Fe, the building of the *acequia de común* (commons ditch) was usually the first public works project of the early settlers, completed ahead of the church and government buildings. Presently, some one thousand acequias imprint the rural landscapes of the upland and intermountain valleys of New Mexico, having survived virtually intact through a succession of political, legal and administrative changes during the Spanish (1598-1821), Mexican (1821-1848), Territorial (1848-1912) and the Statehood (1912- ) periods.

The *acequias de común* are self-governing institutions and have continued to perform the essential services for the communities that they founded: enabling agricultural production, sustaining popular participation, promoting income distribution and equity, and very importantly, protecting the watershed resources essential to the goals of permanent human occupation and settlement. After the end of World War II, however, population growth, migration and other socioeconomic changes began to pave the way for other alternatives to development, helping to accelerate trends that had been emerging since the adoption of the New Mexico Water Code of 1907. By now, water markets, urbanization, over-appropriation of water supply, competition from other stakeholders, land development and other pressures have converged and likely will intensify into the new millennium. Among the water stakeholder groups in the region, the acequias are the most dispersed, the least financed and the most fragile. How will these collective action institutions fare in these times of increased resource use and calls for water conservation, modernization of irrigation infrastructure and more efficient (market) allocations?

As in other parts of the world, the acequia common property regimes of the upper Río Grande face many challenges brought about by technological, economic and demographic changes beyond their ability to control. Historically, community-based irrigation systems have been able to reduce uncertainties of resource supply by mobilizing collective labor initially to construct and then to maintain their systems while preventing and resolving conflicts within their internal groups of users. The performance of these functions in turn has created a stream of benefits for individuals and their families, as well as the collective, legitimizing the common property institution in the process. Moreover, the collective action that assured the users of a dependable water supply, and thus created a water right value to the individual, has involved a mutual understanding of an implicit if not stated “collective right” held by the irrigation group itself to preserve and protect the value thus created. The recognition of this right by members of the collective and by the external world is essential to the survival of the institution. For the acequia to continue to survive, the members must voluntarily accept their reciprocal obligations. But equally important, outsiders must understand that the positive externalities the institution creates for the society at large are of such value that they override its “inefficient” use of water.

Among members of the *acequias de común*, this reciprocal interdependence has been constitutive of a way of life. This is evident in the behavior of the *parciantes* (as irrigator-members are called) who have opted, far more often than not, to maintain historic water sharing customs rather than adopting the more artificial, and in some cases impracticable, system of priority dates attached to privately-held water rights. (Under New Mexico’s prior appropriation doctrine, water is allocated on the basis of “first in time, first in right,” meaning that senior water rights users can call for their priority rights in times of scarcity or inadequate flows at the expense of more junior rights.) Through long experience, acequias over time have worked out local arrangements for water rotation to insure that all farm headgates are supplied with a proportionate share of available water. Until recently, the two opposing systems had not forced users to choose one value over another. Intensification of competition for the limited water supply, however, has increasingly pitted the common property values inherent in the *comuna* (community) of irrigators against the pressures of emerging water markets.

The main purpose of this paper is to achieve a better understanding of the collective rights of irrigators (or other common property resource users) in the face of pressures that threaten to privatize the use of the communal resource. In the first section, the paper sketches the history of the upper Río Grande acequias from their Moorish-Iberian roots, demonstrating how these traditional systems evolved by adapting to local, ecological requirements during the Spanish, Mexican and American periods. Particular attention is paid to the elements that constitute the *comuna* of irrigators in order later to be able to compare the features of this institution with those of the market-oriented system of private rights with which it is now in contention. The traditional system of common property resource governance has placed value on a set of communal rights and responsibilities that are increasingly being challenged by another value system that views water rights as a commodity, putting at risk the acequias both as physical watercourses and as democratic institutions for local water management.

The second section examines the institutional environment of acequia water management in the contemporary period. It looks at the acequias in the larger context of the river ecosystem of which they are a part. It takes account of population and development pressures, the systems of rules and rule-ordered relationships within which they operate, the role of custom and tradition in acequia governance, and the communities of understanding and interest that impinge on them. In

this context it also examines new institutional innovations: state and regional water planning and water banking proposals designed to facilitate the transfer water rights from the places of historic use to locations well outside their “areas of origin.”

In the final section, the paper summarizes the acequias’ current responses to these changes and other strategies that have been recommended for dealing with the forces that threaten to destabilize them as common property resource (CPR) management regimes. We also pose questions for further research in terms of the consequences of alternative institutional arrangements for the continued vitality or decay of acequia communities in the upper Río Grande region that we believe suggest policy lessons for the stabilization and sustainability of common property institutions elsewhere in the world.

## 1. New Mexico’s Acequias – a Brief History

*Sin agua la tierra no vale nada.*

### *The Moorish-Iberian Roots of Acequias*

The word, “acequia,” derives from an Arabic term, “*saqiya*” and its verb “*saqa*,” meaning “to irrigate.” (Castañer Martín 1983, 12) Berbers from North Africa as well as other Arabs from Egypt, Yemen and Syria occupied southern Iberia for over seven hundred years. When they were expelled by the *conquistadores* (Christian Kings and military who reconquered Spain and subsequently redistributed the irrigated lands), they left behind much of the hydraulic landscapes still evident today in the regions of Valencia, Murcia and Andalucia. When *Conquistador* King James I encountered the infrastructure of Islamic irrigation works in the kingdom of Valencia, he prohibited the modification of these systems and indicated that any repairs that might be needed should be undertaken only in conformance with the manner and form of the original. In his decree granting land use privileges to the returning Spanish colonists, he authorized the taking of river water for irrigation purposes “...*según que antiguamente era y fue establecido y acostumbrado en tiempo de sarracenos*” (as established and customary in the time of the Muslims). In another decree, 1238, he specifically granted the use of the acequias of Valencia to the settlers: “*Damos y concedemos perpetuamente todas y cada una de las acequias de Valencia, excepto la que va a Puzol, de modo que podais regar a la manera que de antiguo es costumbre...*” (We grant and concede in perpetuity each and all of the acequias of Valencia, except the one that goes to Puzol, so that you might irrigate in accordance with ancient custom.) (Box Amorós 1992, 77)

Most historians recognize the antecedent water development and irrigation works originated by the Iberians and then the Romans in the centuries prior to the Islamic occupation. However, they also agree that the *musulmanes* recreated the Roman agrosystems and developed new areas of *huerta* irrigation through the use of novel hydraulic technologies such as the *azud* or small scale diversion dam, *norias* or animal driven wells, and *cenias* or Persian water wheels. For evidence of the Islamic imprint in Spanish irrigation, historians point to the extensive Arabic terminology and toponyms in the agricultural regions. They also cite the continued use of many of the techniques for elevating, measuring and distributing water that have persisted in many parts of southeastern Spain and that were later transplanted to colonial America. (Glick 1995; Box Amorós 1992; also, see Butzer, et al. 1985)

When the Spanish *conquistadores* set out to occupy and develop the northern frontiers of *Nueva España* across the Atlantic, they were guided by the set of policies issued to colonial

officials as the Laws of the Indies and the accompanying ordinances, the *Ordenanzas de Descubrimiento, Nueva Población de las Indias dadas por Felipe II en 1593*. Recompiled in 1681, the Laws of the Indies and the ordinances provided the framework for colonists and provincial governors to follow when selecting sites for permanent settlement. Proximity and access to water and other natural resources, such as timber, pastures and fertile lands for cultivation, were stipulated as essential for the formation of communities. When expeditions were sent into the arid frontiers of northern New Spain, much time was spent examining not just lands for new settlements but, even more importantly, the availability of reliable water supplies for domestic as well as irrigation development. Early exploration maps and texts of the region designated the locations of and named not only perennial rivers, creeks and lakes, but also other minute water features such as “tiny ponds, dry arroyos, muddy watering holes, and minuscule springs.” (Meyer 1984, 77)

Though the *ordenanzas* were implemented loosely in response to local conditions and resources available in the immediate surroundings, of great significance is that fact that the acequia irrigation works became one of the principal institutions that made colonization a reality in the northern provinces of New Spain. In most places, acequias were constructed in tandem or even before the local mission, church or presidio. In northern Mexico, *Nuevo México*, Texas and the *Californias*, the earthen canals made possible the establishment of *misiones*, *villas*, *municipios*, and the more dispersed *ranchos*, *plazas* and *poblaciones*. When permanent streams could not be located, other designs to accomplish the same purpose would be improvised. These included capturing the flows of natural springs (Alta and Baja California, New Mexico, Texas) or damming arroyos to impound the intermittent flows from scarce rainwater events in the desert lowlands (Baja California missions).

Prior to appropriating water from a stream or alternate source, the settlers would examine the soil in the area contemplated for the *huertas* (gardens) and *labores* (cultivated fields), to make sure it was not too sandy or porous for ditch construction and water conveyance. (Dobkins 1959) Finally they would identify a suitable place for the *toma* or *saca de agua*, a location along the banks or a river or stream where water could feasibly be diverted by constructing a *presa* (dam) made of local materials such as rocks, brush and timber. For the most part, these engineering works were low-level diversion structures. They were designed not to impound water but simply to raise its level in a river bed enough to allow it to enter the canal headgate on one or both banks, following a Moorish technique used in the construction of *azudes*. In the arid and semi-arid frontiers of *Nueva España* the river systems were not formidable enough to warrant the construction of more substantial reservoir systems. (Glick 1970, 176-77; Gomez 1990)

### ***Adoption and Adaptation in New Mexico***

In the case of New Mexico, the Spanish policies for occupation and settlement were followed with significant regularity by the successive waves of colonists arriving from Zacatecas, Mexico City and other recruitment locations in the central valley of Mexico. During the early period of Spanish exploration, *El Reino del Nuevo México* was expansive with indeterminate boundaries, loosely encompassing the territory north of Nueva Vizcaya (now the State of Chihuahua in Mexico) with no fixed boundaries east or west. (D. Cutter and Engstrand 1996) The first Spanish-Mexican communities were established along the Río del Norte corridor north and south of Santa Fe from Taos to Socorro either on the Río del Norte or alongside its

tributaries. (C. Cutter 1995) On the larger streams, the settlers built wing dams protruding into the river from one of the banks; these simple structures were usually sufficient to channel water into the acequias during the irrigation season when natural flows were highest. Streams with intermittent flows, on the other hand, required the construction of dams across the width of the watercourses in order to impound portions of the flows and form small reservoirs.

These *presas* were constructed of forest timbers, juniper brush, boulders, rock slabs, earth and other locally available materials, resulting in structures that often resembled beaver dams. (Rivera 1999). To complete the infrastructure needed for irrigation, the settlers excavated the main canal (*acequia madre*) off one or both banks of the river, thereby extending the irrigable lands adjacent to the watercourse for several miles downstream. Typically, each *acequia madre* was cut perpendicular to the stream source at the upper end of the community in order to then convey water downstream, parallel to the river alongside the foothills or natural slope of the terrain, all the while enclosing the practical limits of irrigable land. Then, at the bottom end of the community, the ditch was made to return to the original stream through a *desagüe* channel.

The commons ditch, described in the Spanish of the times as the “*acequia de común*,” was the main force that established a distinct place, defining the boundaries of the community, and bonding the irrigators by obligating them to the collective management of the local water system and their corporate village as a whole. The idea of a common property ditch for all irrigators in any new settlement was replicated time and again in the province and, in fact, was the key to both the development and economic survival of local communities. (Rivera, in Finch 1999) Expansion of settlements to the upper reaches of the Río del Norte and beyond to the western and eastern tributaries frequently was accompanied with petitions by groups of restless *vecinos* (citizen neighbors) for more land and water to support the growing population in the region. Repeatedly, settlers themselves took initiative to branch out in search of new territories just when the local natural resources, especially water from rivers, creeks and springs, began to show signs of stress. (Rivera 1998, 8-9)

The irrigation practices that the settlers imported to the region were principally those that had been developed in similar climatic areas of southeastern Spain. As Glick (1970) has noted, the allocation, distribution, and administration of irrigation waters during the colonial period, and continuing into the present, have been strikingly similar to those of medieval Valencia, practices that have survived there as well. The *cequier* (water chief) or *partidor de aguas* (water distributor) during Spanish medieval times compares with the *acequia mayordomo* (ditch superintendent) of New Mexico. In addition to role similarities of irrigation officials, other parallels with Old World traditions can be discerned at the organizational level. In medieval Valencia, the basic irrigation unit in the society was the *comuna*, defined by Glick as a group or community of irrigators all irrigating from a single main canal. His description of the *comuna* could also be used to describe the functions of the historic *acequia de común* or, for that matter, the modern day acequia association of New Mexico. According to Glick (1970, 34),

[t]he primary business of the commons as a whole was to enact regulations for the distribution of water and maintenance of the canal system and then to elect the executive and administrative officers to whom authority for the day-to-day running of the canal's normal affairs was delegated. Ordinances [of 1435] established the duties of the *cequier* and his assistants, set fines for various misdemeanors, and stipulated obligations of the *hereters* regarding observance of turns, maintenance of the canal, and contribution of dues.

In colonial New Mexico, the structure and form of the community acequia as a corporate body developed in tandem with the evolution of the customs, traditions and local practices, and eventually, the more formalized rules and regulations of self-government. First and foremost, the acequias were communal. Given the harsh, semi-arid surroundings, they were an element of sheer necessity for the establishment and subsequent sustenance of the entire human settlement. Their construction, maintenance, and magnitude of operations were beyond the capabilities of individual cultivators and irrigators. Ownership in common and shared responsibilities for the cyclical labor were vital to the economic welfare of the entire community. (Rivera 1998, 52)

Construction of the *presa* and the system of canals was only the first step; annually, repairs would be needed as would the ritual of cleaning the canals early each spring at the start of the irrigation season. The annual *limpia* or cleaning of the acequia was and still remains an important event. At this time, the officers and irrigators, informally in small groups or as a whole, discuss a broad range of timely acequia issues, such as the condition of the *presa* in the river, any repairs that might be needed, the amount of expected water flows based on the winter snowpack in the sierra peaks, ditch finances, and other items of importance to the irrigators or to the community as a whole. Thus, the cleaning of the acequia not only marks the beginning of the agricultural season, it is also an occasion for the *vecinos* to address other local issues, reconfirming the sense of traditions that undergird the social and political life of the community. At the time of this annual ritual, the *parciantes* renew their strong attachment to the locality, assuring the continuance of place for yet another cycle of irrigation and community antiquity. (Rivera 1998, 98, 147-148).

In brief, the historic role of the acequia institution of New Mexico has been significant and impressive. The acequia can accurately be described as the birthplace of community. As noted earlier, the *toma de agua* at the *presa* location upstream made permanent occupation in the semi-arid environments of the region possible for scores and then hundreds of rural *plazas* and *ranchos*. The steps involved – first locating suitable points for diverting the stream and other sources, the assessment of soils and other natural resources in the vicinity of the diversion, and the construction of the engineering works – together established the foundations of community, a process that was replicated in the small but numerous watersheds of the upper Río Grande. Once established, the *acequias de común* wedded the appropriators into a common future and livelihood, as often expressed in the phrase, “Water is the lifeblood of the community.” After more than four centuries, the acequias have withstood the test of time, making them the oldest water management institutions in the United States with strong historical ties to the even more ancient systems of medieval Europe and northern Africa. But will the acequias survive for long into the new millennium?

## 2. The Contemporary Situation

*Un río, un problema.*

This section discusses the context, both physical and institutional, within which acequias operate as CPR institutions, and explicates several dimensions of the problematic circumstances

they face as increasing competition and the advent of water markets pose new social dilemmas for *parciantes*.<sup>1</sup>

### ***The physical and technical characteristics of the acequias’ water use***

Flows in the Rio Grande and its tributaries vary greatly within a year and from year to year, depending on the depth of the winter snow pack and the frequency and intensity of summer (“monsoon”) thunderstorms. There is some evidence that “El Niño” and “La Niña” events in the Pacific Ocean affect both winter and summer precipitation over New Mexico’s northern mountains, and that longer-term global climate changes may play a role in the amplitude of recent wet-dry oscillations. The short- and long-term effects of climatic changes are a matter of scientific hypothesis and beyond the scope of this paper, except to the extent that speculation about such effects may increase farmers’ sense of the uncertainty and unpredictability of supply, with resultant impact on the acequia institution. Maass (Maass and Anderson 1978, 1; 365) asserts that in responding to such uncertainty and the insecurity it generates, individuals join together to create mechanisms for capturing, allocating and distributing water. Such insecurity binds them together to share the cost of creating and maintaining the infrastructure, to create and enforce rules for sharing limited supplies in times of drought, and to deal collectively with neighbors up- and downstream.<sup>2</sup>

### **The Acequia System**

The general hydraulic system for an acequia (as for any gravity-flow irrigation system using surface water) has three elements:

- A diversion requirement. The size and condition of the commonly-held works (*obras*) including the *presa*, the *acequia madre*, headgates (*compuertas*) and laterals (*sangrías*) must be sufficient to divert and convey reliably enough water to fulfill all the individual farm consumptive use requirements. This includes provision for losses (seepage and evapotranspiration) as well as the hydraulic “head” required to deliver water to the furthest farm gate at the tail end of the system.
- An allocation system. This includes both the shared technology (checks; headgates, etc.) and the operational rules (see below) for using it to distribute water and monitor use.
- Provision for return flows required both for individual and collective benefits to *parciantes* (keeping land from getting waterlogged) and benefits to the stream and downstream users

---

<sup>1</sup> In Elinor Ostrom’s formulation, “Social dilemmas occur whenever individuals in interdependent situations face choices in which the maximization of short-term self-interest yields outcomes leaving all participants worse off than feasible alternatives.” (1998, 1)

<sup>2</sup> The arguments made by Maass and Anderson proceed from individualist, “rational actor” assumptions about the nature (and fragility) of collective action, community formation and solidarity. However, their arguments support a much stronger set of propositions about the nature of the irrigation institutions themselves and their role in shaping the thought processes and decision-making of members of irrigation communities. Providing a dependable supply of water at a “cost irrigators will pay” is an objective of these institutions, but not the only, or even the most important one. Other objectives emphasizing equity and participation need not be subsidiary and merely instrumental, but intrinsic values – ends in themselves. This has importance for the discussion of acequia survival strategies in the final section of this paper.

(environmental benefits and reuse of water). Return flows also involve both technology (maintaining *desagüe* or drains) and use rules (to be discussed below).

Though individual acequias and acequia systems vary considerably in size and in their use of “modern” technology (e.g., concrete and iron in the construction of *compuertas*), acequias typically reflect their lengthy history as hand-dug, dirt-lined ditches with works constructed from locally-available materials. As a result, substantial labor must be contributed each year to clean, repair and maintain the fragile infrastructure. Rapid spring snowmelt or a thunderstorm during the summer “monsoon” season may cause breaches requiring emergency repairs. Responsibility to contribute labor or funding for such work is shared by the *parciantes*.

In recent years, and especially since Congress passed the Water Resources Development Act of 1986, acequia systems have benefited from extension of programs that had hitherto focused on large conservancy and irrigation districts. The act provided funding for rehabilitation of community ditches and acequias without requiring the economic analysis normally associated with such projects. Acequias were to be restored “... for their cultural and historic value to the region. Congress had found [them] ... to have been significant in the settlement and development of the West.” (Wozniak 1998, 137) This and additional funding through the New Mexico legislature have, since the mid-1980s, spurred many acequias to seek grants, contracts and loans to rehabilitate and “modernize” diversion structures and other works.

### Local Environmental Effects

Though criticism of flood irrigation as generally a “wasteful” practice has mounted in recent years (see for example Wilson and Lucero 1997) there is also evidence that the longstanding water management practices of the northern New Mexico acequias have been environmentally sustainable. As non-acequia population and development pressures have increased over the past forty years, the amount of land irrigated in the region and the acequias’ use of water have declined. As new demands for water have created environmental stresses on the Rio Grande and its tributaries, the acequias have been looked to as potential sources of water that might be transferred to other uses.

In this context, most observers would agree that acequias:

- Mitigate downstream damage caused by spring floods and other high water events, reducing flood flows by spreading water on upland fields;
- Alter the landscape by widening the riparian corridor, contributing to the expansion of habitat for a variety of species of plants and animals (Peña 1998, 166-168);
- Contribute significantly to recharge of the shallow aquifer; and
- In times of low stream flow, can cause local desiccation of the stream between the *toma* (point of diversion) and *desagüe* (return flow to the stream), as well as reducing the amount of water available to downstream users.

### Acequias in the Rio Grande/Rio Bravo System

Most of New Mexico’s estimated 1000 acequias are located in the north-central part of the state, and most of those in the Rio Grande watershed are on small to medium-sized tributary streams in the three counties of Rio Arriba, Taos and Santa Fe. The amount of water diverted (or “withdrawn”) from these streams for flood irrigation (mostly by acequias) is about 212 thousand

acre-feet per year (af/year). The amount by which these diversions actually deplete the surface waters (that is, withdrawals less return flows) is about 80 thousand af/year, about 38% of withdrawals. Total land area irrigated by surface water in these counties is about 68,000 acres (31,000 hectares). This amounts to a consumptive use of about 1.2 acre-feet per acre. (Wilson and Lucero 1995, 141)

Although this is a significant amount of water in a semiarid state, even the complete cessation of irrigation agriculture in these three counties would make little difference in terms of solving long-term water supply problems in the Rio Grande Valley, either in New Mexico or further downstream. Under the terms of the Rio Grande Compact, in an “average” year, Colorado is required to deliver about 330 thousand af/year to the Rio Grande at the New Mexico border. In that same “average” year the rivers and streams of the northern counties tapped by the acequias add 800 thousand af/year to the Rio Grande (See Map 1).

The “average” yearly flow of the river at the Otowi gauge – just below the acequia activity in the three northern counties – is about 1.15 million af/year. Uses in the next 160 miles below that, the “Middle Rio Grande Valley” (including Albuquerque), reduce the average annual flow to around 700-800 thousand af/year.<sup>3</sup> Under the terms of the compact, Texas is entitled to the bulk of that (Middle Rio Grande Water Assembly 1999). Just 60 thousand af/year is reserved for Mexico.

It is important to stress that the Rio Grande’s flow is highly variable. Although New Mexico has been able to comply with the terms of the compact, in recent years it has done so partially because the past three decades have been relatively wet. Moreover, the state has been able to supplement the river with return flows of mined groundwater (70,000 af/year from treated municipal wastewater, primarily from Albuquerque) and annual infusions of “non-native” water from the Colorado River system supplied by the San Juan-Chama diversion project, which transfers water from the Colorado River basin. (Middle Rio Grande Water Assembly 1999)

In its nearly 1900 mile (3000 km.) course to the Gulf of Mexico, the Río Grande/Río Bravo is essentially dry in the 250-mile reach below El Paso and Juarez until replenished by the Río Conchos flowing northeast from the Sierra Madre of Chihuahua. Deforestation has in recent years reduced the flow of the Conchos drastically. Before 1962, the average annual flow at the mouth of the Rio Grande was about 3 million cubic meters (2460 af). The 1990-1995 average was zero. (Rio Grande / Rio Bravo Basin Coalition 1999)

If current trends were to continue, the population of the Basin would double, from about 13 million today (only about 1 million of whom live in New Mexico) to more than 25 million by 2050. Rising demands on a highly variable (and likely shrinking) water supply appear to be creating an environmentally unsustainable situation, contributing to pressures for institutional changes that will reduce transactions costs for the transfer of water rights.

---

<sup>3</sup> Average deliveries mandated by the Rio Grande Compact for 1972-1997 were 786 thousand acre-feet/year delivered to Elephant Butte Reservoir in southern New Mexico, and available to Texas from that point.

## *Rules and rule-ordered relationships affecting acequias*

### **New Mexico Water Law**

Acequias clearly partake of the characteristics of common property resource institutions. Above we have traced how these self-organized communities of settlers adapted an irrigation institution that had its roots in Spain to local conditions. Their reciprocal commitments and a common stake in its success enabled them to create an infrastructure and manage it to regulate access to, share responsibility for and apportion a common-pool resource, assuring equitable benefits to community members. Over time the acequia institution has evolved; during the American “territorial period” (1848-1912) the rules governing acequias became more uniform and formal throughout the New Mexico Territory.

In many rural areas acequias were (and still are) often the most readily identifiable sub-county organizations capable of collective action for community problem solving. As inadequate as the American government has been in respecting the property guarantees of the Treaty of Guadalupe Hidalgo, it did early on recognize the acequias’ importance. In 1851, the legislative assembly wrote their customary and traditional rules into the first water laws of the territory, as discussed above. In taking this and subsequent actions, successive territorial assemblies both expanded acequia authorities and limited their autonomy.

New Mexico’s acequias acquired an additional source of state-sanctioned authority in being designated (in the 1880s and 90s) quasi-public corporate entities with broad powers to sue and be sued, enter into contracts, assess fees, acquire property by eminent domain and promulgate by-laws and regulations for governing the acequia. During most of the twentieth century, however, these powers did not extend to acquiring or holding title to water rights. In a 1914 decision, *Snow v. Abalos*, that affirmed the acequias’ corporate powers, the New Mexico Supreme Court also said that “[w]hile a ditch through which water is carried is owned by the constructors as tenants in common, water rights acquired by the parties are not attached to the ditch but are appurtenant to the land to be irrigated.” Water rights were understood to be owned solely by individual *parciantes*, until the state enacted an important change in the law in 1987.

In being recognized as “political subdivisions of the state” (73-2-28 NMSA 1978) acequias have also had their autonomy restricted. Though the “acequia statutes” to some extent simply codified customary and traditional practice (as we shall show), they also ensured that local practice conforms to uniform standards in a number of matters. The membership, rules for election and duties of each acequia’s *comisión* and *mayordomo*, for instance, are defined by statute (73-2-12 and 73-2-13 NMSA 1978).

New Mexico, like most western states, asserts public ownership of “all natural waters flowing in streams and watercourses” and makes these waters “subject to appropriation for beneficial use” (72-1-1 NMSA 1978). The rule allocates water on the basis of the doctrine of prior appropriation: “Priority in time shall give the better right” (72-1-2 NMSA 1978). Acequia *parciantes*’ claims to water rights rest on their having historically and continually put water to use for irrigation purposes. The “basis, measure and limit” of such rights is their beneficial use to irrigate “specified lands” to which they are appurtenant. Because the state remains the owner of all waters – water rights are usufructary – these rights are subject to loss through forfeiture or abandonment.

The administration of water in New Mexico is the responsibility of the State Engineer, whose office (OSE) maintains records of declared and adjudicated water rights. Most rights to

surface water in New Mexico have not been adjudicated. Adjudication is conducted on a stream-by-stream basis and is a complicated legal proceeding involving substantial investigation to establish for each claimant (e.g., *parciante* on an acequia) a priority date and amount of the right. Preceding adjudication water right holders may file a declaration of their rights with the OSE. Declared rights, as well as those adjudicated, may be sold or transferred, although their validity may be challenged. Most acequia *parciantes*, however, have never declared their rights, but have simply claimed them by continuing to use water as their ancestors did.<sup>4</sup>

Despite the fact that irrigators’ water rights are based on their historical use of water on specific lands, those rights may be severed from the land and transferred (through sale, lease or other arrangement) to a new use or point of diversion (72-5-23 and -24 NMSA 1978). As water rights (particularly senior rights) become more valuable, an increasing number of *parciantes* are filing water right declarations and considering their options.

All applications to the State Engineer to appropriate surface water or to transfer existing water rights may be objected to by anyone who believes that the granting of the application will be detrimental to the objector’s own water rights. Objections may be made on the basis of impairment, or that granting the application will be “contrary to the conservation of water...or detrimental to the public welfare of the state.” Acequias, as political subdivisions of the state, have standing to protest any water right transfer application (72-5-5 NMSA 1978). This provision is significant in both a micro- and a macro-perspective. First, it includes the right of an acequia to protest a transfer application by a *parciante* on that acequia (because the transfer could affect the hydraulic viability or the corporate integrity of the acequia itself). Second, it includes its right to protest an application elsewhere in the state, which, if granted, may undermine the stability of the acequia institution generally.

Since passage of the water conservation and public welfare statute in 1985 (72-5-23 NMSA 1978), individual acequias and associations of acequias have been able to exercise their right to protest a number of water transfer applications they believed would produce negative public welfare impacts should the transfers be approved. Thus far, however, no hearing or ruling by the State Engineer has fully determined how effectively this statute can protect acequia water rights, because “public welfare” was left purposely vague in the statute. The results have been mixed or unclear in the few test cases that have been concluded. More water transfer cases are pending, including some that will likely produce clearer outcomes one way or another. (See Rivera 1998, 161-62.)

Since 1987, in addition, acequias themselves have been recognized to have the power to acquire water rights from *parciantes*, to transfer them, and to protect them from loss for nonuse. This recent provision in New Mexico’s water law (73-2-22.1 NMSA 1978) has the potential to enable an acequia to keep water rights in the community by acting as a local “water bank.”

---

<sup>4</sup> Personal communication with David Benavides, staff attorney with Northern New Mexico Legal Services, Inc. Benavides notes that in the first half of the 20<sup>th</sup> century (following enactment of the 1907 New Mexico water code) a “handful” of declarations was filed that usually pertained to entire acequias, rather than individual water rights. In the last half of the century, it was more likely for individual *parciantes* to file declarations, usually to establish the basis for transferring a water right. Benavides cites a lack of “SEO [State Engineer Office] file numbers” in hydrographic surveys as evidence that most rights remain undeclared. He believes “only a few percent” are declared.

Finally, in the last two sessions of the New Mexico legislature, bills have been introduced to create a mechanism for a statewide water market, to facilitate transactions for moving water rights to more economically efficient uses. Though the bills have died in committee each year (partly because of efforts of regional and statewide associations of acequias), similar legislation is likely to receive increasing support in coming years. The reasons for the acequias’ opposition to this legislation are discussed below. First, it is necessary to understand something of the role that custom and tradition continue to play as a counterbalance to the legal framework just outlined.

### Custom and Tradition

As we have shown, affirmative state law and judicial precedent have enshrined the role of customary law and traditional practice in the acequia institution. Custom and tradition function at the constitutional (rules about how the rules are made), collective choice (the rules governing the institution), and operational (application of the rules to behavior) levels. (Kiser and Ostrom 1988) Two examples will suffice to illustrate the contemporary significance of their importance.

In 1998 the New Mexico Supreme Court clarified the law with respect to elections of acequia officers. The relevant statute reads in part:

Only those having water rights in the acequia or ditch and who are not delinquent in the payment of their assessments ... shall be allowed to vote; ... votes ... shall be in proportion to the interest of the voter in the ditch or water, or in proportion to the number or amount of his water rights.” (73-2-14 NMSA 1978)

Acequias had differed in their election procedures. Some followed a “one *parciante*, one vote” rule; others had voted in proportion to their *derechos de agua* (water rights). Early in the twentieth century the attorney general had opined that the correct reading of the statute was that water users should vote in these elections in proportion to the amount of water rights they owned and used in the previous year (Op. Att’y Gen. 105). This had not stopped a large number of acequias from continuing to follow the other rule, however.

In *Wilson v. Denver* (1998) the plaintiffs, a few *parciantes* who held substantial numbers of water rights on an acequia, sued acequia officials. They claimed they had a right to vote in proportion to their water rights and that acequia elections based on a majority vote of the *parciantes* were contrary to New Mexico law. The Supreme Court, however, held that each acequia could select the voting scheme that would most effectively achieve the purposes for which the acequia was established, as long as the voting class was comprised of all persons who possessed water rights on the acequia. The court said that voting could be based on proportionality of water rights, proportionality of ditch ownership, or a majority of those using the ditch for the distribution of water. In ruling that the state legislature intended for each acequia to choose the voting method most suitable to its needs, the court specifically took note of the legislature’s intent to preserve local customs in the distribution of water in a ditch (see 72-9-2 NMSA 1978).

The second example goes to fundamental principles governing the allocation of water. It involves the state’s recognition that the prior appropriation doctrine, so seemingly absolute in New Mexico, is in fact a recent superimposition, and that it has not entirely replaced customary law or practice. The state filed a lawsuit (*New Mexico v. Abeyta*) to adjudicate the water rights on two stream systems within the Taos Valley, the Rio Hondo and the Rio Pueblo de Taos, in 1969. The ongoing adjudication process involves some 4,300 claimants and 83 separate ditches,

as well as the Indian Pueblo of Taos, the town of Taos, and the United States government (as proprietor of the Carson National Forest). (See Map 2.) In *Acequia Culture* Rivera (1998) summarizes the effort of a coalition of acequias in the early 1990s to have local practices incorporated into the adjudication decree.

They claimed that customary usage permitted the sharing of stream and ditch waters in times of need, irrespective of the more strict system of priority dates stipulated in state water law. Application of the priority system ... they feared, could erode the communal basis that made settlement in their semiarid lands possible in the first place. In this traditional philosophy, the common welfare has always dominated local water administration.

... [T]he commissioners who filed the motion argued that the custom of *repartimiento* was in effect prior to the Treaty of Guadalupe Hidalgo of 1848.... Furthermore, the first water code of the new territory, the Kearny Code, recognized and protected acequia traditions as did the territorial laws of 1851-52: watercourses in place at the time prior to U.S. jurisdiction “shall not be disturbed” and the “laws heretofore in force concerning water courses...shall continue in force.” (166 [citations omitted])<sup>5</sup>

In their affidavit the community acequia commissioners declared they would follow the *repartimiento* system, agreeing that “... they will continue to ... be bound by their customary divisions and allocations of water [and that] they will not make calls or demands for water between and among themselves based on priority dates.”<sup>6</sup>

Although they also argued on practical grounds that enforcing an allocation system based on strict priority – where a number of ditches on a stream had different priority dates – would be a “nightmare,” the commissioners’ main argument went to the foundation of the acequias’ communal purposes. The process of community formation along the streams of the region had depended on *repartimiento*. Had it not been for institutional arrangements for sharing among older and newer communities, many would not have survived or have even been founded. If a strict priority system were now to be enforced, and “[i]f ditches holding senior rights exercised their rights to the entire flow [in times of low water], the centuries-old tradition of mutual aid would be broken, removing the foundation of community interdependence.” (Rivera 1998, 169)

In the “custom and tradition” hearings before the Special Master, the acequias’ goal was to get the court to recognize allocation through *repartimiento* and *auxilio* (mutual aid) in its final

---

<sup>5</sup> The concept of *repartimiento de aguas* and its application to water adjudications is considered by Daniel Tyler (1995). Tyler, an historian and an expert witness for the Taos Valley acequias in the “custom and tradition hearings” discussed here, notes the importance given by settlers and officials alike to the role of “*costumbres comunmente tenido en toda la población*” (customs commonly held among the people) in the development of rules for their communal land grants and acequias. With regard to acequias he notes that “New Mexicans paid strict attention to local arrangements. Gradually, and over a long period of time, they developed criteria for resolving water related disputes. While the importance of *prioridad* (priority) was recognized, New Mexicans incorporated other equally important principles into their system of *repartimiento* (division) of water: *antigüedad* (age or length of time) and *primacia* (precedence) – essentially the concept of first-in-time-first-in-right – were mentioned frequently; *necesidad* (need), *igualdad* (equity), *bien común* (common good), and *perjuicio del tercero* (injury to a third party) were other factors entering into the resolution of disputes.” (159-160)

<sup>6</sup> *State of New Mexico v. Eduardo Abeyta and Celso Arellano et al.*, affidavit in the United States District Court for the District of New Mexico, Exhibit 1, “Motion to Adjudicate Local or Community Customs of Water Diversion or Allocation Between and Among Acequias on the Río Lucero and Arroyo Seco.” No. CIV-7896 SC and No. CIV-7939 SC, filed March 18, 1991.

decree. They reasoned that the sale of land or water rights could imperil communities with junior rights if the new owners did not follow the customs voluntarily. In his report the Special Master found in principle that it was proper for adjudications to incorporate traditional customs of *repartimiento*. Then the State Engineer agreed to three important stipulations:

1. Article 8 of the Treaty of Guadalupe Hidalgo protects water rights which were valid under the prior sovereigns of Spain and Mexico as of 1846;
2. Under Spanish and Mexican law, water allocations or *repartimiento de aguas* were [based] on equity, common good, need, noninjury to [third] parties and earlier use, not on first use alone; and
3. In Northern New Mexico water has traditionally been shared in times of shortage so that every acequia would have some water.<sup>7</sup>

Finally, the state agreed to additional stipulations regarding several claimed customs that the Special Master had rejected. The only remaining claims not agreed to involve either cases where the acequias themselves disputed a claimed custom, or those that involve Pueblo Indian water rights. (See discussion below.) Although the court’s order adopting these stipulations was entered in December 1993, the Pueblo appealed on the basis that it had not been notified of the decision and order.

These examples illustrate the extent to which custom and tradition remain operative principles in the functioning of acequia institutions, as well as the self-awareness of acequia officials regarding potential threats to the institutions and the importance of strategic collective action in ensuring that water rights remain in the community. They also illustrate that state officials are highly aware of and take seriously the importance of customary rules and practices. In current negotiations in the ongoing Taos Valley stream adjudication involving the acequias, Taos Pueblo, the town of Taos and federal interests, the OSE has agreed to forbear applying the prior appropriation rule where acequias have implemented *repartimiento* practices and solutions to allocation problems involving parties in addition to the acequias themselves.<sup>8</sup>

### Externally Imposed Rules Constraining Action

The interests of other parties sharing the Rio Grande Basin, and the diverse sets of rules that apply to the expression and enforcement of their claims, complicate the picture still further. Each of them poses serious challenges for acequias seeking to discourage transfers and to retain water rights in the community. Space does not permit us to present much detail in the cataloguing of the applicable laws. The more salient ones, however, are outlined below.

*Indian law.* Native American (Indian Pueblo and other tribal) reserved water rights are paramount. They are protected by federal law, and are not subject to state jurisdiction. Though

---

<sup>7</sup> *State of New Mexico v. Eduardo Abeyta and Celso Arellano et al.*, stipulations on behalf of the state of New Mexico, 1991 [May 20, Charlotte Benson Crossland transcript], 15-17.

<sup>8</sup> Oral report of John Shomaker, hydrologist, regarding the Taos Valley negotiations in *New Mexico v. Abeyta*, to the Action Committee of the Middle Rio Grande Water Assembly, August 18, 1999. In his presentation, Shomaker discussed how separating the development of a “wet water plan” from legal water rights issues has enabled the parties to come to interim agreements that meet real and immediate needs. Without giving up any rights, members of the Taos Valley Acequia Association and the Pueblo agreed to honor historic sharing agreements and the OSE has promised to administer water rights in conformity with these agreements. (Taos Pueblo appealed the *repartimiento* stipulations to protect its rights; if limited so as not to affect the Pueblo, it would be unlikely to object to them.)

many are in litigation, none of the water rights of the eighteen Pueblos within the Rio Grande system has been quantified to date. (In the *Abeyta* case, Taos Pueblo filed a motion to suspend adjudication and sought federal support for negotiations among the parties claiming rights to the use of water in the Taos Valley, leading to the current negotiations for a “wet water plan.”)

Tribal water rights claims encompass both historic and continuing uses and future needs for growth and economic development. Since the acequias’ rights, though ancient, and all other rights (except other federal reserved rights) are junior to those of the tribes, their unquantified status presents a major source of uncertainty about all other claims.

*Federal environmental and resource management laws and regulations.* A multitude of federally protected and direct federal interests abounds in New Mexico. The Fish and Wildlife Service protects wildlife and their habitats under a number of statutes, most notably the Endangered Species Act. The state and at least one tribe (Isleta Pueblo) monitor and enforce federal water quality standards under provisions of the Clean Water Act. Flood protection and drainage infrastructure are built and maintained through various U.S. Army Corps of Engineers projects, Bureau of Reclamation dams and other works. Major tracts of federal lands are managed by the U.S. Forest Service (National Forests), the Fish and Wildlife Service (National Wildlife Refuges), and the Bureau of Land Management. All these federal resource management agencies are responsible to ensure that their activities comply with the National Environmental Policy Act (NEPA) as well as other federal environmental laws and regulations. Many of these activities involve managing river flows, and sometimes, federal preemption of water.

*The Rio Grande Compact.* The Compact, an interstate agreement between Colorado, New Mexico and Texas, and a treaty with Mexico (Shupe and Folk-Williams 1988, 12) pose strict requirements for delivery of water to Texas and to Mexico (as noted earlier). The costs to the state, should it default on its delivery requirements to Texas (as it has done in the past), can be extremely high in both water and monetary damages. The State Engineer is empowered to take necessary steps (including buying and retiring water rights, as he has done on the Pecos River) when water shortages threaten New Mexico’s ability to meet its delivery requirements.

*Instream flow.* New Mexico, uniquely among western states, has not recognized “instream flow” in its laws as a “beneficial use” of water. Legally, beneficial use has been assumed to require a diversion of water from a stream or its impoundment behind a dam. In 1998, in response to legislators’ concerns spurred by environmental and recreational interests, the New Mexico Attorney General issued an opinion which recognized that instream flow could be considered a beneficial use, and thus that water rights might be transferred for such purposes. The opinion suggested that practical difficulties existed in metering and measuring the amount of water *not* diverted from a stream, making approval of an instream flow transfer application unfeasible in the near future. However, the opinion raised fears within the acequia community of new threats to their rights to divert sufficient water to meet acequia hydraulic requirements, particularly in dry years. (Op. Att’y Gen. 98-01)

*Statewide and regional water planning.* Water planning initiatives mandated by New Mexico law had their genesis over thirteen years ago. Their initial intent was to protect New Mexico’s waters from expropriation by other states (notably Texas). In 1987, a federal court (citing a Supreme Court decision in *El Paso v. Reynolds*) ruled that New Mexico’s attempt to place an embargo on exporting water to other states was unconstitutional. In response, the New Mexico legislature amended several water statutes. The changes included giving the State Engineer

authority to deny an application if it is *contrary to conservation or detrimental to the public welfare* of the state. These criteria, significantly, apply to all appropriations and transfers, not just interstate transactions. The legislature also enacted laws establishing a process for locally organized regional water planning. The rationale behind this is that if New Mexicans can prove their own citizens’ need for water, the state can defend itself against attempts by other states to appropriate its water for use elsewhere. The process emphasizes public participation to determine what the public welfare may mean for each region, and how it can best be protected.

Acequias may have a large stake in participating in regional water planning, since these efforts may ultimately lead to the creation of new institutional arrangements (at either the state or regional level, or both) for managing water in New Mexico. One issue is the extent to which the State Engineer will be required to weigh the value of traditional cultural uses of water in considering transfer applications. More generally, it is unclear how effective regional planning mechanisms will be in influencing such decisions. Can a water-planning region with significant rural interest define the public welfare so that impacts on its economy and the area of origin of water rights are included? (Bokum 1996, 1998)

*Water banking legislation.* Simultaneously with these planning activities, legislative efforts are continuing in New Mexico to ease the development of market arrangements for allocating water. The most comprehensive of these initiatives has been an attempt during the 1999 and 2000 legislative sessions to pass a statewide “water banking” bill. A water bank is a mechanism enabling owners of conserved or temporarily unused water rights to “deposit” those rights for lease to others for a given period. Depositors receive compensation and avoid possible loss of the rights because of non-use. In its original form the bill envisioned a single entity with a seven-member board appointed by the state’s governor, which would establish requirements for deposits and leased withdrawals, monitor and enforce permitted uses, and facilitate transfers.<sup>9</sup>

Acequias’ opposition to the 1999 bill stemmed from their communities’ loss of control over the conserved or surplus water banked. They acknowledged that the bill could help individuals preserve their rights through periods of non-use, and enable them to benefit financially from the lease of such rights to others. It would also encourage conservation so that a greater portion of the rights would be available to put into the bank. But the bill placed no value

---

<sup>9</sup> The importance of the water banking idea stems from the assumption, implicit throughout this paper, that New Mexico’s rivers and streams are fully appropriated – that is, there is no more “wet water” than there are water rights claims. Most observers would agree that the situation is one of current over-appropriation, and that accommodating new water uses will require transfers from existing uses. It is worthwhile quoting some of the purposes of the 1999 bill, because they suggest the range of interests that a centralized statewide water banking authority was intended to serve.

The purposes of the act are to: ... C. encourage the conservation of water and ensure that conserved and surplus water is available for other uses and users through transfers administered by the New Mexico water bank authority; ... F. facilitate voluntary transactions that would release water from low-value uses and direct them toward high-value applications and sharing profits from these arrangements with water depositors; ... G. provide legal mechanisms for conserving and salvaging water that is otherwise surplus to customary agricultural and other beneficial uses while preserving the rightful possession of a water right...; ... I. Provide a market conduit for unused, conserved or surplus water rights and resources; ... K. promote economic development in the state by providing alternative water availability solutions for agricultural, environmental, municipal, industrial, commercial, recreational and residential uses in the state. (44<sup>th</sup> Legislature, New Mexico, 1999. House Bill 455 and Senate Bill 512. Santa Fe: Legislative Council Service.)

on keeping in the community either the water or the right to determine how it should be allocated. It facilitated breaking the link between the water and the land with which the right was associated. Amended water banking legislation submitted this year moved in the acequias’ direction, making provision for regional banking arrangements, which might enable acequia communities to control their own conserved water locally. However, acequia representatives and others opposed the new bill because it lacked provisions against forfeiture, and because they had not been adequately involved in its drafting. Like its predecessor, the bill died in committee.

### ***People and communities of understanding affecting or affected by the acequias***

For purposes of this analysis we will focus only on the parties that most acequia officials view as having interests in greatest opposition to or conjunction with their own interests. Although important, federal and interstate compact requirements tend not to be regarded by acequia interests as immediate threats to their survival or as sources of support.

### **The Indian Pueblos**

The Pueblo communities along the Rio Grande and its tributaries are the only claimants to water rights more senior than those of acequia *parciantes*. Indian and Hispano communities have coexisted for four centuries, sharing the same streams and often the same ditches. The historical record of this relationship is mixed, reflecting both exploitation of Indian labor (the *encomienda* system of the earliest days of Spanish settlement) and evolving cooperation based on the principles of the Law of the Indies mandating respect for Pueblo communities and property.

The relationship has become strained in recent times as the Pueblos and the acequia communities have sought to define their water rights with reference to conflicting historical and legal principles. Michael Meyer<sup>10</sup> sees a lack of mutual understanding of each other’s antecedent principles lying at the root of current conflicts over water. The acequias invoke the principles of *repartimiento* in characterizing their historic relationship. The Pueblos, on the other hand, believe that they cannot accept “customary” arrangements without putting their rights in parity with the acequias’, extinguishing their property rights by depriving them of seniority. They assert their sovereignty in insisting that they must retain their senior (aboriginal) rights, which are guaranteed by the United States.

Acequias that share water sources with Pueblos fear that this means the Pueblos will attempt to claim rights to as much water as possible at their expense, and that this threatens acequia viability. The level of mutual suspicion runs high on many stream systems. However, progress reportedly being made in the Taos Valley “wet water plan” negotiations discussed above suggests that it may be possible to find non-zero-sum solutions to bridge this gap if the parties are willing to forbear asserting their rights, or challenging those of others, while focusing on solving immediate problems.

### **Development Interests**

The fastest growing water uses in the last twenty years have been municipal (including residential) and industrial. The City of Albuquerque is reportedly New Mexico’s largest and

---

<sup>10</sup> Presentation to a joint meeting of the Taos Valley Acequia Association and the New Mexico Acequia Association in Taos, October 9, 1999.

most aggressive purchaser of water rights. Although embarked on a conservation program that has reduced water use per capita significantly over the past few years, that city’s growth and development agenda does not rely on savings alone as a source of water. Although there are dissenting views, in general officials of growing cities and towns in the Rio Grande corridor, developers and pro-development interests share the view that New Mexico has (or somehow can find) sufficient water to accommodate new high-tech industries and the largely out-of-state workforces they would bring with them.

This increasingly urbanized population knows little or nothing about the acequias or about the cultures that have sustained the rural landscapes of New Mexico (although they may have been attracted to the state in part because of them). Municipal and industrial development interests view acequia *parciantes* (and irrigation agriculture more generally) principally as sources of purchasable water rights. To the extent that they can depict agricultural uses of water as wasteful, changes in institutional arrangements that would make transfers easier would be more readily justified. It is no accident that the sponsors of the water banking legislation in both houses of the New Mexico legislature represent Albuquerque districts.

### **Environmental Organizations**

Two principal strains of environmental consciousness and activism in New Mexico are relevant to acequia survival. Groups allied with the first strain have as a paramount goal increasing and expanding wilderness protections and the restoration of pristine conditions wherever possible. They regard stream diversions as inherently damaging, and view the costs of displacing human settlement and livelihood as necessary to the restoration of the natural order. Though they couch their rhetoric in more general terms (e.g., pointing to “agriculture” as a cause of non-point source pollution), acequias view these groups’ agendas as clearly hostile to their interests. In recent years “market environmentalists” have advocated policies that would recognize buying up water rights to dedicate to instream uses as a strategy for achieving their objectives. They have also been effective at using environmental lawsuits to force federal agencies to increase stream flows to protect endangered fish species.

Supporters of a “softer” strain of environmentalism view a human presence on the landscape as normal (or, at any rate, inevitable). While concerned with issues like forest health, clean water and biodiversity, these organizations have worked to achieve their purposes within the context of support for “environmental justice” and sustaining rural communities. While not unambiguously supportive of current acequia practices, they regard the acequia communities as having been responsible stewards of the land and watershed and having provided over considerable time what Devón Peña (1998, 166-68) calls “ecological services.” Not the least of these services is the fact that acequias, through their ability to oppose transfers, have effectively “sequestered” water rights, slowing what otherwise might have been a headlong rush to move water from “areas of origin communities” (Hoffman-Dooley 1996) to support urban development.

### **Acequia *Parciantes***

Finally, it is the *parciantes* themselves who are most likely to be determinative of the fate of the acequias. As we have shown, the modern water laws of New Mexico allow water rights to be severed from land and traded in the marketplace as a commodity property. This factor, taken together with the hierarchical principles embodied in the doctrine of prior appropriation, has weakened the powers of the historic *acequia de común* as a collective enterprise.

From the traditional perspective, water and land uses are intertwined; water use rights can be sold, but only as attachments to the land. *Sin agua la tierra no vale nada*. (Without water land is of no value.) The traditional acequia irrigators of New Mexico are inheritors of a collective memory of the loss of the commons lands of their community land grants in the late 19<sup>th</sup> century through a process of privatization, subdivision and sale (or, more accurately, theft).<sup>11</sup> Many who share this memory wonder whether history may be repeating itself with respect to their ancestral water rights and the acequias, and they vigorously oppose all attempts to transfer water away from the acequia or from irrigation use. This viewpoint has predominated strongly among the leadership in recent annual meetings of the New Mexico Acequia Association (NMAA), which has passed resolutions supporting acequia-level water banking, but with the proviso that the water rights not leave the acequia or irrigation.<sup>12</sup>

For others, however, there are competing values. More individualistic in their orientation and divided on the question of water right transfers, some *parciantes* clearly view their water rights at some level as tradable commodities with no necessary connection to the land. Moreover as water prices rise, so do incentives for rent seeking. Though these differences can be described in terms of understandings about the nature of the water property right and whether its value is simply a price, they reflect a more fundamental struggle that is taking place within families (often between generations), and within individuals themselves. No longer as dependent on the land or irrigation water for their livelihoods, they are “freed” also from the economic *interdependence* that brought together their ancestors to create the acequia institution in the face of an uncertain water supply.

### ***The Problem***

The future of the acequias of the upper Rio Grande as stable, longstanding, self-governing institutions delivering vital benefits to their members (and spillover benefits to the larger society) is in doubt at the end of the twentieth century. By the year 2015, New Mexico is expected to accommodate 650,000 new residents, the equivalent of adding another Albuquerque and New Mexico’s next three largest cities combined, at a time when all of the Río Grande’s surface waters are already fully appropriated. Of all the water uses in the region, traditional acequia agriculture appears the most vulnerable to water transfers. Compared to other water uses, acequia irrigation does not produce rates of economic return that would seem necessary to ward off repeated attempts to transfer these water rights to other purposes and places.

Increasing activity in the water markets of the region has brought into question the ability of the *parciantes* to hold together as a *comuna* of irrigators. They find it increasingly difficult to determine and predict into future years the stability of their resource system in terms of assured water delivery, scheduling, maintenance and the integrity of their own governance rules. How do

---

<sup>11</sup> In the decades following the Treaty of Guadalupe Hidalgo in 1848, which promised to respect the property rights of inhabitants of the lands ceded to U.S. jurisdiction, the commons lands in community land grant concessions under both Spanish and Mexican governments were lost to speculation and legal theft. The territorial courts of New Mexico viewed the commons not as the usufructary property of the community, but as fee simple property owned by each resident. Once individual shares and parcels were determined, speculators could easily buy up the subdivided parcels from their “owners” (who might not even have access to them) for a fraction of their worth. A good summary of these events, infamous in northern New Mexico, can be found in Meyer 1998: 71-90.

<sup>12</sup> For instance, NMAA resolution #97-2 (unpublished) declares that saved or banked water should be reserved for “traditional uses only.”

transfers of individual water rights from within the acequia users affect the historic *acequia de común* as a common property institution? One at a time, such transfers might not seem significant, especially if the amounts of the transfer are relatively minor and the total number of water rights remaining on an acequia continues to be large. However, there is likely to be a “tipping point” at which the integrity of the *acequia de común* becomes jeopardized and unstable.

But water right transfers are only a concrete manifestation of underlying issues that might cause *parciantes* to decide to sell or transfer those rights. In describing the problematic circumstances facing the acequias of the Rio Grande, it is possible to identify the following sources of instability:

1. At a **technical** or physical level, the gravity flow system of acequia irrigation requires a minimum amount of hydraulic head at the diversion point (*presa*) and headgate to “push” the water through the entire length of the canal. Restriction on the acequia’s ability to divert a sufficient amount of water from the river source can prevent the acequia from functioning efficiently (or at all). Transferred water rights may mean that proportionately less water can be diverted from the stream. Without recognition of an “acequia diversion right” that must not fall below a critical threshold, regardless of the amount of individual *parciantes*’ rights on the acequia, the ditch can fail simply as a physical mechanism for the delivery of water. As it becomes less reliable, members of the community are increasingly likely to be tempted to withdraw their support. (Of what use is a water right appurtenant to my land if I am unable to use it?)
2. In the arena of **governance**, proper and equitable management of the acequia requires that it be kept “whole.” As members of the system, the *parciantes* share equitably in the benefits and the costs of managing the system. This includes responsibility for the upkeep, maintenance, annual cleaning and repairs of their common property resources: the *presa* structure, headgates, culverts, and the main canal as a conveyance channel. *Mayordomos* have authority to refuse water to users who have failed to contribute labor (their own *fátiga* or that of *peónes* paid by them) or a cash payment, until they have made up their *delincuencia* (delinquency). But no penalty faces *parciantes* who are no longer irrigating, or who have transferred their rights, so free riding becomes more likely. When some of this capacity is lost to the system, the burden has to be shifted to the remaining irrigators, increasing their costs.
3. In terms of its **economic** value, following the argument above, as *parciantes* defect, the commons ditch loses a significant source of revenues needed to finance repairs and annual operating expenses, again shifting these costs to the remaining irrigators. The willingness of the *parciantes* to supply resources to the acequia institution is at least in part a function of the economic benefit they are able to derive from it. That cannot be the entire reason for their persistence, or else many acequias would not have survived during the last half of the twentieth century. Nonetheless, the combination of increasing costs and decreasing returns takes a severe toll. When economic returns over several years fail to justify the financial and labor inputs of the *parciantes*, their incentive to continue to farm is significantly reduced.
4. **Politically**, acequia associations are recognized in New Mexico statutes as political subdivisions of the state. This both reflects and contributes to a sense of their historic and continuing importance, and gives them substantial initial credibility with state legislators who

represent acequia communities. This external acknowledgement of the acequias’ legitimacy has enabled them to obtain funding yearly since 1988 for the “Acequia and Community Ditch Fund Act,” which has been used largely to finance historical, hydrological and legal assistance for acequias engaged in stream adjudications. Effective demand for this funding far exceeds the amount the legislature appropriates annually. Acequia lobbying has also been instrumental in blocking passage of legislation (such as “instream flow rights” and statewide water banking) that many acequia officials feel is threatening to their interests. However, as competition for water increases, some legislators (including the chairman of the legislature’s interim committee on rural economic development) have begun to question whether water code provisions that protect acequia *parciantes*’ water rights may be “outdated” and detrimental to “economic progress.”<sup>13</sup>

Perhaps more significantly, each acequia’s political influence depends first on the support of its own members. Not only does its functioning depend on sustained and active participation of all irrigators; if a substantial proportion of *parciantes* begins to view the acequia’s (i.e., the collective) interest as inimical to their own, the legitimacy of the institution will be called into question. This can erode the acequia’s capacity for self-government – its ability to establish common rules, make operational decisions, elect officers, and conduct proper oversight of acequia affairs.

5. The most potent source of instability, finally, may be the erosion of the **value system** that functioned to preserve the “acequia culture” – the consonance between *cultura* and *agricultura* – when northern New Mexico was relatively isolated from American popular and material culture. Although demographic patterns have not been well studied, it is clear from observation that many *parciantes* (and certainly most acequia officers) today are in their 50s or 60s (or older). Their children have made other choices in their own lives; they have jobs in town, and may have moved there. Or grown children may instead have moved their families into mobile homes onto their parents’ land (perhaps onto a field previously irrigated, putting the water rights to that land in jeopardy for nonuse). If they farm, they may pay little attention to the orders of the *mayordomo* or to the carefully worked-out system of rotations for irrigation; needing to go to work, they may open the headgate in the morning and close it when returning home in the evening. (They may get too much or too little water. They may flood their neighbor’s land; if they water too slowly, they will certainly be using the water inefficiently.)

Examples of the “erosion” of traditional practices are sufficiently widespread to cause concern that collective understandings about acequia rules – the reasons for the rules, their value to the collective enterprise, and the value of the enterprise itself – that undergird the acequia institution are in peril of being forgotten. Increasingly, newcomers are buying land and homes along the acequias. They may know little about the place they are coming to, and nothing of the culture. It remains to be seen what the effects of greater heterogeneity may be on the viability of the acequias. There are certainly a number of instances of new arrivals “adopting” the acequia culture, learning from the *abuelos* and *abuelas*, bringing welcome new blood to the operation of the acequia, and even taking on leadership roles as

---

<sup>13</sup> Comments of the chairman, Roman Maes, at a hearing of the interim legislative economic and rural development and telecommunications committee, July 31, 1999 in Santa Fe, attended by one of the authors.

*comisionados* and *mayordomos*. But this is a recent phenomenon, and its long-term impacts cannot yet be assessed.

Together, these five sources of destabilization can and may well interact, compounding the instability of the system. Research into other community property institutions has shown that appropriators of the resource in question need a minimum level of assurances that their collective action enterprise will continue to function as originally designed. That is to say, they must be able to expect that their obligations to the collective, and their rights, privileges and benefits will remain predictable into the future. If external, or sometimes internal, changes are introduced that threaten these basic institutional arrangements, then their incentives to continue investing in the enterprise diminish and the entire system can become destabilized. (Runge 1992; Yan Tang 1992) Whether the acequias of northern New Mexico can adapt to the magnitude and pace of the changes taking place around and within them, and how they might do so, are the final issues we will consider.

### 3. Implications for Policy and Research: Arenas of Acequia Action

This paper has raised questions about the conditions under which a longstanding common property institution made up of irrigators who have pooled their efforts to create both collective and individual benefits can continue to persist. The case of the *acequias de común* in northern New Mexico provides an example of a common property regime that has survived immense changes in its macro environment, retaining the collective rights that gave value to their founders' enterprise at the outset. We have seen that the acequias have been able to survive as long the *comuna* of irrigators was able both to retain effective control of the physical canal as a conveyance system and of the water resource itself. But can the institution remain viable in an age when its members confront an increasingly turbulent environment, in which their collective interest in a shared resource they had thought of as “the lifeblood of the community” must compete with a very different set of values? What strategies – internal and external – must the acequias adopt to remain sustainable in a fiercely competitive environment that treats water rights as a privately owned, marketable commodity? What allies do the acequias need? What public policies that would support their efforts (or at least not frustrate them) are feasible?

The answers to these questions are uncertain at this point. The acequias are a natural experiment in the sustainability of CPR institutions in the “free market” era. As acequia leaders and *parciantes* take action on several fronts, those concerned with the future of CPR arrangements may be able to learn from their experience. In the next stage, research should focus on the implications of alternative decisions about institutional arrangements for the continued vitality or decay of acequia communities. The following conclusions and suggestions only begin to point in this direction.

Ninety-three years have passed since New Mexico's Water Code was enacted. Yet it has only been in the last thirteen years (since the *El Paso* decision forced New Mexico to face up to the serious possibility of the export of its water out-of-state) that stream adjudications, as well as proposals to transfer water rights, have become serious business for acequias. During this time the acequias have organized on a regional (usually watershed) and statewide scale to respond to the forces from without and from within that threaten to destabilize them. Regional associations in Taos Valley and on the Río de Chama were formed in response to ongoing adjudication

activity. A statewide New Mexico Acequia Association (NMAA) was founded in 1988.<sup>14</sup> Since then these organizations have engaged in three major arenas of action. Activity in each of these arenas presents opportunities for research to understand better the factors affecting acequias’ sustainability as CPR institutions, and the lessons this may hold for other “old” commons in a new century.

### ***Water Rights Protections***

Most of the NMAA’s political and many of its educational efforts, as well as those of the regional associations, have focused on the issue of protecting acequia water rights. Through the early 1990s, much of this consisted of low-keyed lobbying of individual legislators from “acequia-friendly” districts. The objectives sought were limited: to block changes in the state’s water law (e.g., to prevent enactment of instream flow right legislation) or to seek funding for the Acequia and Community Ditch Fund Act. During this period the dominant strategy of the acequias was to “just say no,” and not to seek allies outside the legislature who might share their interests. Amendments to enact positive changes in the water statutes were distrusted initially because they could “open the door” to unfriendly changes. These efforts were largely reactive; they required no paid lobbyists, and they have worked.

As competition for water has intensified, a defensive strategy may be less successful, and the regional and statewide acequia leadership appears to recognize this reality. In the last three annual sessions of the New Mexico legislature, acequia representatives have made common cause with other rural interests and, to a limited extent, with at least one environmental organization. They have also developed a more “proactive” agenda of policy recommendations focusing on the importance of community control of water and the need for “area-of-origin protections” for rural communities.<sup>15</sup>

Research might be conducted with regard to the adequacy of the acequias’ action strategies and the policy responses that result. The acequias view the acequia (i.e. collective) water right as fundamental principle that requires protection to ensure their viability. Such protection may be strengthened by way of supporting policies that assure that the stream of benefits will continue to the *comuna* in proportion to their contributions of labor and participation. Policies (whether statutory or regulatory) that could provide such protection would address water right transfers, “area of origin” protections for acequia communities, the “diversion right” of the acequia, and acequia authority with respect to holding and leasing water rights. Policies with respect to transfers might include:

- recognition that water transfers in significant amounts (relative to each acequia) can destabilize the traditional and customary arrangements for water delivery, management and self-governance;

---

<sup>14</sup> Although this paper focuses on the acequias of the upper Rio Grande, where the greatest concentration of acequia communities is to be found, acequias are found on every major stream system in New Mexico, including the Pecos, the San Juan, the Canadian and the Gila rivers and their tributaries. The New Mexico Acequia Association is engaging in recruitment efforts to enroll member associations in all of these areas. (There are similarly organized acequias in the San Luis Valley in Colorado.)

<sup>15</sup> Testimony of Paula Garcia, New Mexico Acequia Association, to the interim legislative Economic and Rural Development and Telecommunications Committee. Santa Fe, July 31, 1999 (unpublished typescript, photocopied).

- recognition that the *acequia de comun* requires that it be kept whole and sustainable in order to perform as originally designed and intended;
- weighing the value and importance (in terms of public welfare) of traditional uses in evaluating proposed water right transfers, so that “higher economic value” does not override the integrity of traditional uses;
- taking into account the spillover effects of proposed transfers, including adverse economic, cultural and social impacts to the acequia and to the community against the claimed benefits;
- considering the communal, CPR rights of the acequia on a par with the rights of the rights of the individual(s) desiring to relinquish the water rights;
- requiring that approval of such transfers contain a stipulation showing how the acequia impacted by the transfer can remain whole after the transfer is implemented, including compensation or other remedies to mitigate adverse consequences. (See Jodha 1992 on CPR-friendly policies in dry region villages in India for a comparison.)

Whether such policies at the state level can stem the erosion of the CPR regimes of the acequias is an open question. However, it is clear that proposed state policies that will further encourage water right transfers and discourage conservation measures by acequias (by causing them to lose rights to the water conserved) could only be harmful. On the other hand, adoption of positive policies with respect to acequia survival may require a paradigm shift in the thinking of state legislators and water resource managers about the relative values of market efficiency and of ecological and community sustainability.

What is missing from the policy debate at this point is a positive alternative to the privatized water market approach to economic development. Such an alternative approach would articulate a vision and a program to demonstrate the value of the acequias as CPR institutions in creating an economically, ecologically and culturally sustainable model for rural community development in New Mexico. Supporting such an approach would require legislators and others to take non-market values into account and to use state authority to empower the acequias to maintain community control of water as a public welfare value.

### ***Sustainable Development***

Developing legislative support for such an approach may require some demonstration of its feasibility. One of the NMAA’s strategies, in cooperation with several other organizations concerned with sustainable development in rural New Mexico, is conducting regional workshops for acequias to provide education, technical assistance and information about financial resources that can help *parciantes* increase their productivity and boost incomes from farming. The strategy is based on the assumption that if irrigators can “add value” to their water rights by using them more productively on the land, and thus assure the continuation of benefits, they will be less inclined to want to sell those rights. Further, they will be more inclined to continue participating in the reciprocal arrangements that have enabled the acequia communities to survive until now.

This alternative approach can be described as one of “rural revitalization.” It suggests that the way to add value to water rights is to keep the land productively in agriculture, minimizing the threat of transfers to “higher value” uses. Maintenance of the acequias as CPR institutions would be a key element in creating a more diverse local economy. Agriculture would in all

likelihood continue to be the economic base of the for the community, but with a new orientation to diversified cash crops with higher values in the marketplace: organic vegetables, heirloom and native crop varieties, specialty produce for sale at municipal farmers’ markets, etc. Many acequia farmers have already begun to experiment with permaculture and other forms of sustainable agriculture suitable to the topography and climatic conditions of upland environments. They are regularly attending workshops and other events they believe will aid them in their search for more productive methods of acequia-based farming. Some of them have already applied these techniques on parcels as small as one or two acres to grow traditional row crops, heirloom land races, orchard and bramble crops, wine and table grapes, certified organic wheat (on the larger tracts), and other value-added products.

The acequia farms in the micro watersheds of the region are well positioned to supply the growing markets in the nearby cities with quality, organic vegetables and fruits, and other value-added specialty crops. The irrigated parcels have always been small-scale. Moreover, a tradition of intensive cropping already exists as does a preference for polyculture farming without the use of chemical fertilizers or pesticides. The traditional crop production methods have closely followed the requirements for the increased production of value-added and organic crops. Small-scale farming and production skills using appropriate technology have been passed on from one generation to the next. These include gravity flow irrigation techniques, pruning of fruit trees, canning and drying of various crops, food processing and packaging, and strategies for marketing at roadside stands, growers’ markets and through family-owned catering businesses. On the demand side, encouraging signs also exist. Consumers in the city, for example, desire regular, clean, natural, organic food products grown in close proximity to where they live and work. There is a high demand for fresh crops of all varieties, especially when consumers can verify that these crops have been grown organically and in pristine natural environments.<sup>16</sup>

Answers to research questions on the economic viability of acequia agriculture and its spillover effects in the community might be modeled in advance, but finally can only be determined empirically. Irrigation agriculture for subsistence alone is hardly likely to be sustainable, but can acequia-based farmers supply specialty markets with high-value crops and farm products consistently and at a level adequate to meet market demand? Will the reciprocal sharing arrangements so necessary to the functioning of the acequia carry over to creating efficiencies in the production, distribution and marketing of crops? Are the collective arrangements for sharing risk in the CPR regime of the acequia complementary to or inconsistent with private property-based farming activities?<sup>17</sup>

---

<sup>16</sup> New Mexico is one of the few states that directly encourages the production of organic crops through a state organic certification program administered by the state Organic Commodity Commission. By becoming certified the acequia-based farmers can open and compete in new markets without having to invest in capital intensive farming. The existing, small-scale farming resources, the infrastructure of gravity-flow irrigation, and the cultural tradition in the watersheds are more than adequate from which to build successful farm ventures. The base for successful organic farming and marketing is already present in the case of most families; expensive start-up costs for land acquisition, development, farm equipment purchase, and the use of fossil fuel-based machinery and other operating costs of commercial agriculture fortunately do not apply.

<sup>17</sup> There is some evidence from northern New Mexico that the answers to these questions may be positive. In the Costilla Valley, for instance, many farmers are growing organic wheat, harvesting it with a cooperatively-owned combine, and selling the entire harvest to a Santa Fe bakery.

Another set of research problems revolves around questions of measuring the value of non-market goods. Policies that discourage transfers of water rights (or raise transactions costs for such transfers) may be thought of as a subsidy to acequia irrigation designed to achieve some public value. How is the value of that subsidy to be measured? Should it be in terms of economic functions alone (employment, income, food supply, and wealth created)? Or should the metric also include the social and ecological benefits the subsidy produces? These certainly include community stability and health, maintenance of property values, flood control and drainage, aquifer recharge, maintenance and extension of riparian habitat, maintenance of cultural values, and promotion of local self-government. How are such “social efficiencies” to be weighed against the allocation efficiency of the water market?

### ***Protection or Revival of Culture***

The ultimate challenge to acequia users is to retain ownership of their ancestral water rights in the face of mounting pressures to sell or otherwise transfer water rights out of the community. Not only must they continue to put their water to beneficial use, to avoid forfeiture, but they must also increase production, raise incomes and generate economic returns sufficient enough to discourage sales and transfers. As we have seen, already some acequia associations experience difficulties when it comes time to clean or repair the ditch waterworks. Maintaining the system requires full and sustained participation from all *parciantes*, whether they farm or not.

The original institutional norms of the acequia culture were developed in situations of relative isolation and economic interdependence among people who, to a substantial degree, shared a common Hispanic, Roman Catholic background. Institutional arrangements involving reciprocal obligations and co-equal use rights in a created commons were essential to their survival and prosperity. The acequia *parciantes* crafted and adapted their rules-in-use over many generations, locally governing themselves and managing land and water sustainably while nominally “ruled” by three different nation-states.

During the latter half of the twentieth century, however, things changed. In the decades after World War II, population growth, social mobility and technology exposed young people in the formerly isolated villages of northern New Mexico to a popular culture that offered alternatives to the hard work of farming. Market forces gave a new, monetary meaning to the concept of water rights. These factors have influenced norms and altered *parciantes*’ understanding of the arrangements that determined their relationship to the acequia institution.

It is thus valid to ask whether the acequia as a CPR institution remains viable or whether it will become merely a curious, historic artifact in the twenty-first century. As a research question, the answer will again be established empirically. There is a great deal of anecdotal evidence that many who fled the mountain villages of *el norte* as young adults are returning to raise their own families. Are they returning to farming, or only seeking affordable housing? Many non-native transplants, coming to live on the land, buying or renting land with water rights, are joining them. The villages are filling up again. The population is now far more heterogeneous than before. Absent economic necessity, will they revive those norms of reciprocity that have made the acequias work? Is their quest mere nostalgic longing or a determination to participate in recreating a valued quality of life?

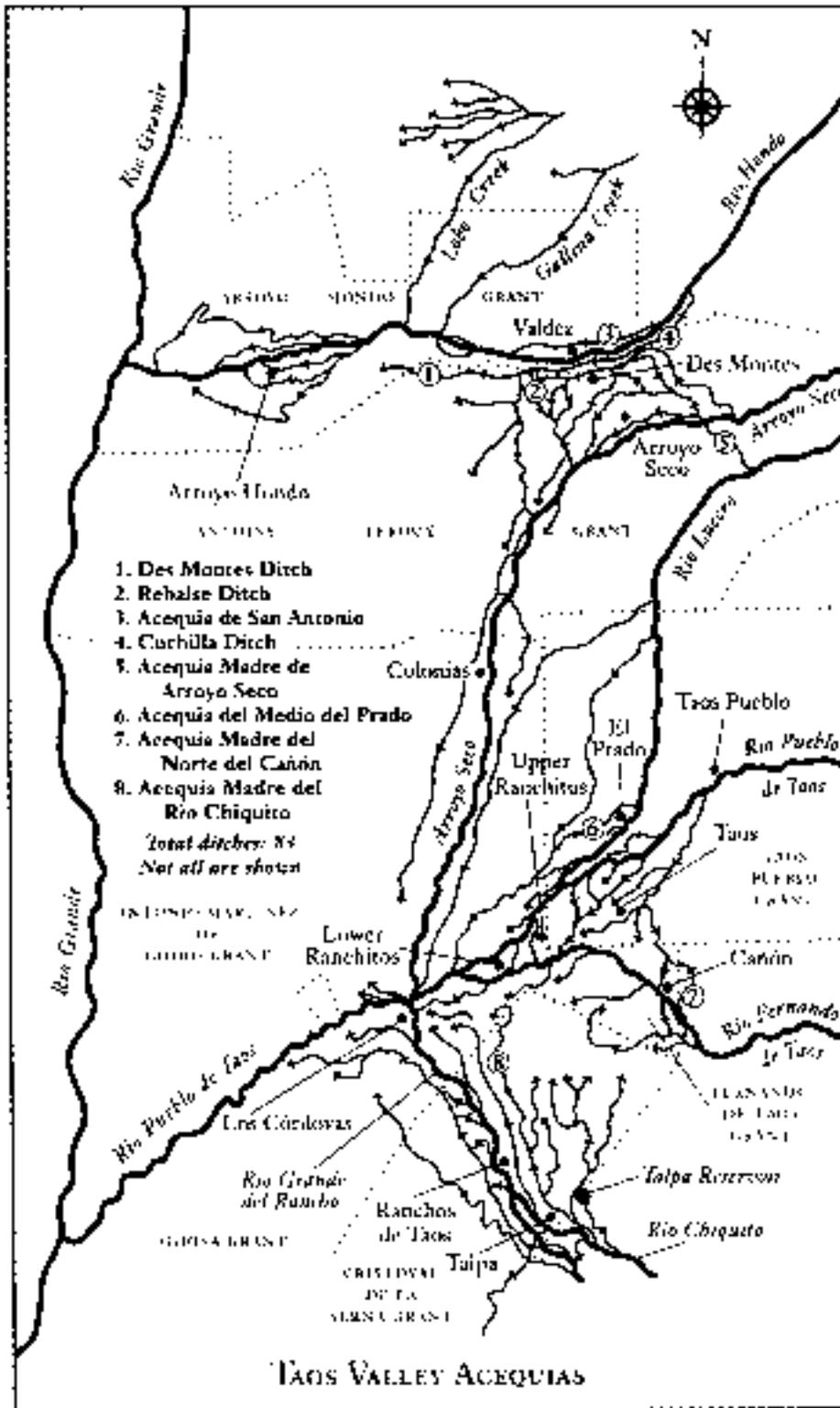
A collapse of the acequias as CPR institutions would be catastrophic to the communities the acequias inhabit, and because of the loss of spillover benefits they provide could be damaging to the “public welfare” of the state. (Rivera, 1996 and 1999) On the other hand,

although they cannot resurrect the past, today's *parciantes* have many incentives to learn from it in order to create new cultural, economic and ecological values of community which may enable the acequias to persist well into the foreseeable future.



 Approximate area of Northern NM acequias within the Rio Grande system.

Source: [www.nationalgeographic.com/xpeditions](http://www.nationalgeographic.com/xpeditions) © 1998 National Geographic Society.  
 Additional annotations by authors.



Taos Valley Acequias, Defendant's Exhibit 2, Customs and Traditions Hearings.

Source: Report of the Special Master, Frank B. Zinn (July 23, 1992)

Based on map provided by the Taos Valley Acequia Association.

## References

- Action Committee of the Middle Rio Grande Water Assembly. 1999. Middle Rio Grande Water Budget. Albuquerque, NM: Middle Rio Grande Water Assembly [unpublished report, duplicated].
- Bokum, Consuelo. 1996. "Implementing the Public Welfare Requirement in New Mexico's Water Code." *Natural Resources Journal* 36: 441, 443.
- Bokum, Consuelo. 1998. "Do we have any say in our water future?" *Dialogue* (1998, May): 6-8. Santa Fe, NM: New Mexico Water Dialogue.
- Box Amorós, Margarita. 1992. "El Regadío Medieval en España : epoca Arabe y conquista cristiana." In Olcina, A. Gil and A. Morales Gil, eds. *Hitos Históricos de los Regadíos Españoles*. Madrid: Ministerio de Agricultura, Pesca y Alimentación.
- Butzer, Karl W. et al. 1985. "Irrigation Agrosystems in Eastern Spain: Roman or Islamic origins?" *Annals of the Association of American Geographers* 75 (1985): 479-509.
- Castañer Martín, Rosa Maria. 1983. *Forma y Estructura del Léxico del Riego en Aragón, Navarra y Rioja*. Zaragoza, España: Diputacion Provincial, Institución Fernando el Católico.
- Crouch, Dora P., Daniel J. Garr, and Axel I. Mundigo. 1982. *Spanish City Planning in North America*. Cambridge, MA: MIT Press.
- Cutter, Charles R. 1995. *The Legal Culture of Northern New Spain, 1700-1810*. Albuquerque: University of New Mexico Press.
- Cutter, Donald and Iris Engstrand. 1996. *Quest for Empire: Spanish settlement in the Southwest*. Golden, CO: Fulcrum Publishing.
- Dobkins, Betty Eakle. 1959. *The Spanish Element in Texas Water Law*. Austin: Univ. of Texas Press.
- El Paso, City of, v. Reynolds*. 1983. 563 F. Supp. 379. (D.N.M.)
- Glick, Thomas F. 1995. *From Muslim Fortress to Christian Castle: social and cultural change in medieval Spain*. New York: St. Martin's Press.
- Glick, Thomas F., ed. 1970. *Irrigation and Society in Medieval Valencia*. Cambridge, MA, Harvard University Press.
- Gómez, Arthur R. 1990. *Espada Dam: a preliminary historical report*. San Antonio: National Park Service.
- Hammond, George P. and Agapito Rey, eds. 1953. *Don Juan de Oñate, Colonizer of New Mexico, 1595-1628*. I:17; 320-323; 346. Albuquerque, University of New Mexico Press.
- Hoffman-Dooley, Susanne. 1996. "Preventing Urban Thirst from Wilting Rural Economies: area-of-origin protection in the western United States." Albuquerque: University of New Mexico School of Law [unpublished paper].
- Jodha, N.S. 1992. Common Property Resources: a missing dimension of development strategies. Washington, D.C.: World Bank [Discussion Papers No. 169].
- Kiser, Larry L. and Elinor Ostrom. 1982. "The Three Worlds of Action: A Metatheoretical Synthesis of Institutional Approaches." In Ostrom, Elinor, ed. *Strategies of Political Inquiry*. Beverly Hills: Sage.
- Maass, Arthur and Raymond L. Anderson. 1978. *...and the Desert Shall Rejoice: conflict, growth and justice in arid environments*. Cambridge, MA: MIT Press.
- Meyer, Michael C. 1984. *Water in the Hispanic Southwest: a social and legal history, 1550-1850*. Tucson, AZ: University of Arizona Press.

- Meyer, Michael C. 1998. *The Contemporary Significance of the Treaty of Guadalupe Hidalgo to Land Use Issues in Northern New Mexico*. Taos, NM: Northern New Mexico Stockman's Association and the Institute of Hispanic American Culture.
- New Mexico Statutes Annotated [NMSA] 1978. [1998 edition.] Chapter 72 (Water Law); Chapter 73 (Special Districts). Michie.
- Ostrom, Elinor. 1990. *Governing the Commons: the evolution of institutions for collective action*. Cambridge, U.K.: Cambridge University Press.
- Ostrom, Elinor. 1998. "A Behavioral Approach to the Rational Choice Theory of Collective Action [Presidential address, APSA, 1997]." *American Political Science Review* 92: 1-22.
- Rio Grande - Rio Bravo Basin coalition. N.d. (1999). "Did you know that...?" Unpublished, photo offset.
- Rivera, José A. 1996. "Irrigation Communities of the Upper Río Grande Bioregion: sustainable resource use in a global context." *Natural Resources Journal* 36: 731-60.
- Rivera, José A. 1998. *Acequia Culture: water, land, and community in the Southwest*. Albuquerque, NM: University of New Mexico Press.
- Rivera, José A. 1999. "Water Democracies on the Upper Rio Grande, 1598-1998." In *Rio Grande Ecosystems: Linking Land, Water and People*. Ed. Finch, Deborah M. et al. Ogden, UT: U.S. Department of Agriculture Rocky Mountain Research Station.
- Runge, C. Ford. . 1992. "Common Property and Collective Action in Economic Development. In Bromley, Daniel W., ed. *Making the Commons Work: theory, practice and policy*. San Francisco: Institute for Contemporary Studies.
- Shupe, Steven J. and John Folk-Williams. 1988. *The Upper Rio Grande: a guide to decision-making*. Santa Fe, NM: Western Network. Pamphlet.
- Simmons, Mark. 1991. *The Last Conquistador: Juan de Oñate and the settling of the far southwest*. University of Oklahoma Press.
- Snow v. Abalos*. 1914. 18 N.M. 681, 140 P. 1044.
- State of New Mexico v. Eduardo Abeyta and Celsio Arellano et al.* 1969 (filed). Motion to adjudicate local or community customs of water diversion or allocation between and among acequias on the Rio Lucero and Arroyo Seco. 1991 (filed). United States District Court for the District of New Mexico. Nos. CIV-7896 SC and CIV-7939 SC.
- Tyler, Daniel. 1995. "The Spanish Colonial Legacy and the Role of Hispanic Custom in Defining New Mexico Land and Water Rights." *Colonial Latin American Historical Review* 4 (1995): 149-66.
- Wilson, Brian C. and Anthony A. Lucero. 1997. *Water use by categories in New Mexico counties and river basins, and irrigated acreage in 1995 [Technical Report 49]*. Santa Fe, NM: State Engineer Office.
- Wilson v. Denver*. 1998. 125 N.M. 308.
- Wozniak, Frank E. 1998. *Irrigation in the Rio Grande Valley, New Mexico: a study and annotated bibliography of the development of irrigation systems*. Fort Collins, CO: Rocky Mountain Research Station [USDA Forest Service].
- Yan Tang, Shui. 1992. *Institutions and Collective Action: self-governance in irrigation*. San Francisco: Institute for Contemporary Studies.