ACEQUIA CULTURE:

HISTORIC IRRIGATED LANDSCAPES OF NEW MEXICO

Cultura de las Acequias: Paisajes históricos en el regadío Nuevo Mexicano

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Abstract

The first Europeans who entered the upper Río Grande of northern New Spain in the sixteenth century encountered Pueblo Indians whose Anasazi ancestors were the first horticulturalists of the region by their use of water control systems. Due to Spanish colonization policies, new and more expansive settlements were to be located throughout the Camino Real following the Rio Grande and other tributaries into the high sierras. Water from snowmelt was essential to the establishment of communities in downstream valleys where pockets of arable land were located. The *hispano* settlers constructed irrigation works transforming the semi-arid landscape into agrosystems that have survived into modern times as examples of the millennial culture of water of Arab, Iranian and Saharan origin that reached the New World. These communal systems of irrigation perform many ecological services not only for human sustenance but for the extension of riparian corridors that provide oasis habitats for plant biodiversity and wildlife refuges. In modern times, however, the pressures of development, urbanization, commercialization of agriculture, and private water markets threaten to destabilize the acequia communities as they confront increased demand from municipalities, industry, and recreational users of water. For more than four centuries the *acequias de común* have survived other forces of change due to the solidarity of the irrigators in defense of their agrarian traditions. Their fate will depend on how successful they are in maintaining local control and discretionary authority over their commons ditches and how they are able to sustain the acequia culture in a dominant society where the commodity value of water often prevails over the community values in times of increased demand for the scarce water supply. This paper outlines the Iberian-Islamic origins of the acequia culture and how the irrigators plan to sustain their traditional way of life into future generations. Sharing of knowledge and the interchange of human values with other oasis cultures around the world may offer strategies for collective action to counter the common threats.

Key Words: acequias, irrigated agrosystems, culture of water, landscape ecology, Rio Grande, New Mexico

The community-based acequias in the State of New Mexico are the oldest water management institutions in the United States. These irrigated agrosystems date to the time of first European settlement by *españoles mexicano*s in the northern borderlands of *Nueva España* during the late sixteenth century with the first Juan de Oñate colony in 1598 and expanded after the De Vargas *reconquista* of 1692. At the time, the frontier provinces encompassed a vast semi-arid territory rich in natural and mineral resources but short on water supply. When Spanish c*onquistadores* conducted the first *entradas* into the *Río del Norte* (now the Río Grande/Río Bravo), they realized that the construction of irrigation works would be critical for the establishment of communities, whether presidios, missions, or civilian settlements of *gobiernos locales*.

Here the Rocky Mountain province of Colorado joins the great Chihuahuan desert from the south and the Llano Estacado from the plains of Texas on the east. Due to conditions of aridity, already familiar to Mediterranean dwellers, Spanish colonization policies required that officials of the crown, and settlers from the central valley of Mexico who accompanied them, must locate their communities in the vicinity of water resources essential to permanent occupation. Early exploration maps of the region designated the locations of and named not only perennial rivers, creeks and lakes, but also minute water features such as “tiny ponds, dry arroyos, muddy watering holes, and miniscule springs” (Meyer 1984, p. 77). The irrigation technology employed by the waves of settlers was gravity flow by way of earthen canals or acequias. The *pobladores c*onstructed acequias in all of the present day southwestern United States: Texas, New Mexico, Colorado, Arizona, and California. However, it was in *La Provincia del Nuevo México* that Spanish colonization policies were the most effective, particularly with regard to the establishment of civilian towns and agricultural colonies.

Like their Valencian, Murcian and Andalusian counterparts, the acequia irrigators continue to function as *comunidades de regantes* or “water democracies.” This means they are autonomous, and for the most part operate outside of government in terms of their internal affairs: they elect their own officers, establish rules, enforce them, and settle water disputes. Similar to the *herederos* (proprietors)

in the Spanish *huertas*, the irrigators of the New Mexico acequias all own lands irrigated by a principal canal. As a *comunidad de regantes*, they are in charge of their day-to-day governance, and collectively they maintain their irrigation works and finance repairs to their diversion structure when necessary.

Similar to the aboriginal peoples before them, the *hispano* irrigators revere water and treasure it as the lifeblood of the community, and from inception they have utilized water as the main structural factor in spatial and landscape modification. Without the aid of survey instruments or modern tools, centuries ago they engineered irrigation works superimposing *zanjas* or earthen ditches on the desert landscape all by collective human labor. The first step, as instructed by the Laws of the Indies (Ordenanzas of 1573) was to locate a bend in the river or another suitable feature to build the diversion structure from which to capture water and turn it into ditches on one or sometimes both banks of the natural watercourse. Constructed of locally available materials such as forest timbers, brush and rocks at the diversion point, these irrigation works defined the landscape and demarked the boundaries for irrigation off the main canal and its laterals for several miles downstream extending the riparian zone beyond the narrow confines of the natural channels. These technologies of construction and irrigation methods were replicated by the successive waves of settlers into the upper reaches of the Río Grande Basin fostering the growth of agrarian communities along the Camino Real from El Paso del Norte to Santa Fe and Taos and eventually the San Luis Valley of southern Colorado.

These new watercourses were made from human action, but the fluidity of water followed the contours and topography of the natural landscape imposing curved trajectories that permit gravity flow to deliver water onto the irrigable parcels of land. The result is an impressive mosaic in the "*paisaje de la acequia,*" a constructed artifact where water is the principal tool of landscape modification for human use and benefit, a process described more vividly as "*captura del agua*" or "*agua domesticada por la mano del hombre*." This modification produces a greenbelt extending the riparian zone of the river, creating a micro-climate oasis that sustains habitats for plant biodiversity and wildlife native to the region, while recharging the aquifer and returning surplus water to a desague channel for

reutilization by other stakeholders downstream. The *paisaje de la acequia*, in the context of New Mexico's agrosystem landscapes, includes the *presa*, *acequia madre*, *partidores*, *compuertas*, lateral or *sangrías* to the fields, *canoas* or aqueducts, flumes, pipes, culverts, and in some communities *ojitos* (springs), *tanques* (storage ponds), and terraces. In addition, there are structures or landmarks in the built environment associated with the irrigation history of acequia settlements: fences, corrals, barns and sheds, bridges, foot paths or *caminos* along the acequia, churches, *penitente moradas* (penitent chapels), as well as homesteads of vernacular architecture (Wilson and Kammer 1989).

The acequia greenbelts of the upper Río Grande are not the same as the exotic Saharan oasis of north Africa nor those found in the Arabian deserts of the middle east where date palms and desert gardens flourish in juxtaposition to the sea of dunes, rocks and arid lands surrounding the oasis islands. Instead the acequias of New Mexico represent agroecosystems more typical of semi-arid environments where rainfall is sparse and human control and domestication of watercourses is essential to make crops grow by means of irrigation, perhaps closer in similarity to the inner cold oases of Central Eurasia (The Oasis Project 2003). As in the cold desert oasis, water in the high altitudes of northern New Mexico sustains life for human, plant and animal species alike. The acequia watercourse itself creates micro-climates that humidify the landscape and temper the heat of the mid-day sun, conserve moisture in the soils for use by native and cultivated plants, and make the arid lands bloom (Lamadrid 2006). Within the riparian zone, the shaded oasis underneath the giant cottonwoods attracts and nourishes thickets of coyote willows along the lines of the *zanja* following the trajectory of the water in the ditch. Wild plums or *ciruelas* and *capulín* (chokecherries) also flourish serving as habitats for bird species such as the endangered southwestern willow flycatcher and the more common juncos. Alongside the ditch bank are wild asparagus plants and tree shrubs of *membrillo* or other fruit varieties. In stark contrast, the sandy dry arroyos above the acequia maintain only the hardiest of desert sagebrush plants such as the *chamisas* and cholla cactus, and still higher the juniper and piñon trees slope up into the foothills of the nearby forests. As aptly described by Lamadrid (2006), the

acequias of this region are “water carriers,” true to the origins of the word from ancient Islamic times.

In the higher elevations at around 7,000 to 8,000 feet, from the Taos Valley in New Mexico to the expansive San Luis Valley in southern Colorado, acequia farms and *ranchos* often consist of *extensiones*, or riparian long lots. This upper region of the Rio Grande is representative of high mountain snowmelt basins in other parts of the world where snowpack accumulations during the winter season contribute substantially to streamflows months later for irrigation purposes in the valley bottomlands. As compared by Peña (1998, p. 243), the topography and climate of these lands are similar to the high steppes and cold desert environments of central Asia. Rainfall precipitation in the spring and summer months is sporadic, but agrosystems are possible due to the run-off of additional precipitation as snow melt that originates in the alpine forests following seven months of winter. As land use patterns, the long lots are also akin to the upland Franco-Iberian agricultural traditions where each farmer owns a ribbon-like strip of narrow width lot with access to the natural resources in every biotic zone within a five to twenty miles distance in length. From the Taos to San Luis, this biogeographical landscape includes: piñon-juniper woodlands on the mesa tops and foothills for the gathering of fuel wood and building materials; dry land grass prairies for pasturing of livestock; riparian bottomlands for access to water, fish, cottonwoods and wetlands; and irrigated meadows for the planting of row crops, orchards and gardens (Peña 1998, p. 252).

The acequia watercourse remains as the most distinguishing feature of the typical village and its relationship to the surrounding landscape ecology: the force of the water shapes the edges of the varied terrain; it defines the natural and human-made boundaries in a mosaic of gradual transitions; it sets the limits to growth and allocates space for community development and the built environment; and it nourishes the plant and animal ecologic life within the spatial corridor. Increasingly, conservation biologists and other watershed scientists have been confirming local knowledge of the acequia farmers. For example, a recent field study by Fernald and his associates reports that the earthen acequias perform valuable hydrologic, riparian and agroecosystem functions: seepage from the ditch bed and banks maintain

wetted soil profiles that support riparian vegetation habitats for plant and wildlife diversity; the acequias recharge shallow groundwater along the floodplain corridor and affect return flows to the river source as subsurface flows; and flood irrigation is similar to overbank flooding by providing functions that resemble those of meandering and braided channels. Plants and trees that benefit from the "ecosystem services" of acequias include sedges, rushes and perennial grasses at the ground-level, willows and alder and other shrubs at midstory, and boxelders and tall cottonwoods in the overstory. When viewed adjacent to the cropping patterns of fruit trees and irrigated fields of alfalfa and vegetable gardens nearby, the expanded riparian corridor transforms the desert into a landscape for human, livestock and wildlife uses (Fernald, Baker and Guldan, in press).

During the twentieth century, water reclamation projects expanded the supply of available water for distribution across the myriad of stakeholders in New Mexico, Colorado and other western States. The era of large-scale water development, meant to harvest and channel water destined for urbanizing regions or to reclaim desert lands for agricultural production, is essentially over. Population growth continues at unprecedented rates in the region, placing stress on the land and the limited sources of water in terms of both quantity and quality. Water resources are now fully appropriated and beyond--to the point that "paper water" exceeds the real or otherwise existing "wet water."

In these new times of increased water demand, coupled with the occurrence of cyclical droughts evidenced once again in the last few years, the concept of water sharing arrangements or *repartimientos* practiced by the community acequia irrigators provide examples for the sustainable use of water resources into the twenty-first century. The permanency of these traditional water users associations, however, depends on how and if the solidarity of the irrigators can overcome the challenges of the water markets and the complex factors of accelerated development. The other stakeholders in the region believe they too have either historic claims or higher value needs for the scarce supply of water:

- Pueblo Indian Tribes claim and in fact hold aboriginal rights that are paramount and federally reserved;

- Municipalities face increased demands from growing populations at a time of reduced snowmelt and precipitation and for the first time are diverting Rio Grande surface water for domestic uses such as in the metropolitan area of Albuquerque;
- The industrial sector, for example, Intel's world renowned Río Rancho plant, asserts a priority for higher use values in order to fuel the economy and increase job growth in the metropolitan area;
- Commercial agriculture is the largest consumer of surface and ground water, and thus farmers dependent on water delivery by irrigation and conservancy districts resist the transfer of water for other purposes such as urban development;
- Recreational users want to be included in regional water allocation and management decisions to insure their continued access to streams and lakes for fishing, rafting, boating, and other water-based sports; and
- Environmentalists advocate minimum in-stream flows supplemented with water rights acquisitions for the protection of endangered fish and wildlife species such as the silvery minnow and the willow flycatcher.

Together, these very diverse and often competing values present the community acequias along the upper Río Grande and its tributaries with formidable challenges. The long term survival of the acequia culture may well depend on how the stakeholders, elected officials, policymakers and the public recognize the eco-cultural and heritage values of the acequia irrigation systems, and in particular how the acequia communities contribute to cultural tourism and economic development for the benefit of the State and all of its citizens. The campaign has already begun, as the acequia associations locally, in watershed regions, and statewide pursue strategies to increase social knowledge about the acequia culture while they also consolidate their powers as political subdivisions of the State and preserve their customary practices of local control and discretionary authority (Rivera and Glick 2003).

Origins of Irrigation in New Mexico

The history of irrigation in New Mexico is rooted in the prehispanic times of the American Southwest. Agriculture and small-scale irrigation of farmlands by indigenous peoples existed prior to the arrival of Spanish-Mexican settlers but were based largely on the natural cycles of floodwater farming and the control of water resources in the tributary creeks and streams. By contrast, the irrigation practices

imported by the colonizers were more widely extended and incorporated into the society as exemplified by the larger number of permanent diversions of stream flows regardless of capacity. Thus, anthropologists distinguish between the use of "water control systems" as practiced by the Indians and "irrigation" in the strict sense, amplified by the Hispanic colonists. The systematic transformation of valley bottomlands through irrigation by these European settlers established a culture of water as the dominant feature in the traditional irrigation practices in rural New Mexico, as documented in the terminology and institutions of irrigation.

Indigenous agricultural systems—prehispanic era, 1500 B.C. to 1540 A.D.

The first agriculturalists who employed water control systems were the Anasazis, a culture associated with the archeological sites at Mesa Verde (southwest Colorado) and Chaco Canyon (northwest New Mexico). Prior to 1500 B.C., the Anasazis were hunter-gatherers, but when confronted with population growth during the next millennium they needed a permanent source of food supply and in quantities sufficient for storage during times of drought. Gradually, as detailed by Vlasich (2005, p. 4), they began cultivating corn, squash and beans, transforming into horticulturalists by the first century A.D. Using digging sticks, they planted these crops on contoured terraces, grid-bordered gardens, and the canyon floors of the high desert landscape. Their water supply depended on natural precipitation and runoff from the mesa tops which they channeled to their small garden plots and fields by way of intricate systems of canals, diversion dams and headgates (Cordell 1984, p. 190).

Despite several centuries of agricultural subsistence, the Anasazis had to contend with a series of droughts starting in 1090 A.D. that along with other factors threatened their sedentary way of life. After the peak population period of 1100-1300 A.D., they began to abandon the Four Corners region and by 1400 A.D. had relocated to approximately thirty villages along the Río Grande Valley and some of its tributaries (Vlasich, p. 6). Here, the lower altitudes and the presence of more reliable sources of water made possible new settlements by the descendants of the Anasazis, the historic Pueblo Indians of New Mexico made up of Tewa, Tiwa and

Keresan tribes. The Anasazis were primarily floodwater farmers, but due to the availability of permanent streams, the Pueblos were able to utilize a combination of dry farming and irrigation especially in villages along or near the Río Grande (Vlasich, pp. 5-7).

Prior to the *entrada* of the Spanish *conquistadores* in 1540, the Tewa, Tiwa and Keresan tribes had already developed a variety of complex agricultural strategies in some of the valleys of the upper Río Grande. Field studies indicate that these Pueblo farmers invested a large amount of time and energy in the development of extensive networks of water harvesting and control in dispersed localities. As had been the case with the Anasazis, they captured flows during rainfall events by way of check dams (similar to the "*boqueras*" of Alicante, Spain). The Pueblo Indians also developed, for the first time, community systems of irrigation by diverting flows along arroyos, creeks and tributaries and channeling water by way of constructed ditches to cultivated fields of cotton, tobacco, melons, chiles, and large quantities of maize, beans and squash (Vlasich, pp. 14-16). When the *conquistadores* encountered these ditches, they marveled at the complexity of some of these systems while noting their resemblance to Spanish irrigation canals. In his account of the Antonio de Espejo expedition of 1582-1583, for example, Luxán wrote: "We found many irrigated cornfields with canals and dams, built as if by Spaniards" (Hammond and Rey 1966, p. 182).

Hispanic amplification of irrigation, 1598-1821

As a point of departure from the Anasazi and Puebloan experiences, the first European farmers did not limit their settlements to areas dependent on floodwater farming or diversions on the arroyos, creeks and smaller tributaries. The objectives of Spanish colonization--implemented by land concessions granted to successive waves of immigrants--required the utilization of much larger quantities of water and the establishment of permanent systems of irrigation by diverting major streams and rivers. For the systematic plowing and cultivation of valley bottomlands, the colonists constructed diversion dams along scores of existing watercourses, minor and large,

notably the works built for the domestication of irrigation water from the major rivers such as the Río Chama, Río Grande, Río Pecos and the Río de Mora.

The *pobladores* constructed waterworks for the diversion, channeling and distribution of water from rivers and streams: "*tomas de agua*," "*presas de derivación*, or dams, equivalents of the "*azudes*" known in the Iberian peninsula; "*tanques*" or reservoirs equivalent to the "*balsas*" or "*albercas*"; "*compuertas*" or headgates; *"partidores"* or partition structures on the bed of the ditch; "*acequia madres*" and "*sangrías*," these latter ones equivalent to the "*brazales*"; "*desagues*" or drains, equivalent to the "*escorredores*" or "*azarbes*"; and in some arroyo locations, "*canoas*" or aqueducts hand hewn from forest tree logs. Water circulating through the irrigation systems also permitted other uses, such as the use of acequia flows to power *molinos* or gristmills with horizontal waterwheels for flour production, a clear legacy of Iberian milling culture.

Those colonists who arrived from Spanish regions that were recipients of a rich and diverse culture of water with Islamic roots, such as Andalusía, Extremadura, the Castillas, Aragón and Valencia, applied their knowledge to the development of New Mexican irrigation. As noted by Martínez (1999), it was through the Spanish *conquistadores* and missionaries, descendants of the Christian conquerors of Islamic Al-Andalus of the Middle Ages, that the millennial culture of water of Arab, Iranian and Saharan origins reached the New World and transferred ancient irrigation technologies in water management. For establishment of Santa Fe, Nuevo México in 1610, the Spanish officials were also accompanied by Tlaxcalteca Indians from central Mexico, themselves expert irrigators and horticulturalists who doubled as farmer soldiers in alliance with the colonizers. Here the Tlaxcaltecas quickly built a mission church, dwellings, and an acequia on the south bank of the Río de Santa Fe to irrigate fields and grow crops needed for the fledgling capital city (Martínez-Saldaña 1998).

In the outlying rural jurisdictions, the *acequias de común* were constructed with equal speed and deliberation by the use of *mancomunidades*, voluntary associations of land grant petitioners, extended families, and other small groups of landowners who banded together to hand build the irrigation works. Together they

developed *arreglos* or informal agreements for the allocation, management and delivery of water in a manner that would be fair and equitable to all irrigators (Meyer 1999). This process was replicated throughout hundreds of Spanish colonies into the nineteenth century. At each locality, members within the community of landowners, beneficiaries of royal land grants, continued to maintain their systems through communal labor from one generation to the next, without much outside help or interference. Yearly, they collaborated in the "*limpia*" or cleaning of the acequia and in the repair of any damages, especially in the *presa* structure.

By custom, the opening of the *acequia madre* signaled the start of a new irrigation season and an occasion for celebration by the entire community. More than two centuries after the construction of the first Spanish ditch at the Oñate colony in 1598, Lieutenant Zebulon Pike of the United States Army observed this practice when he led an expedition into New Mexico in 1807. In his diary for March 7, he marveled at the communal labor and festivities associated with the spring cleaning and opening of the canal in Albuquerque, then a farming village on the eastern banks of the Río Grande:

> Both above and below Albuquerque the citizens were beginning to open the canals to let in the water of the river to fertilize the plains and fields…where we saw men, women and children of all ages and sexes at the joyful labor which was to crown with rich abundance their future harvest and insure them plenty for the ensuing year. Those scenes brought to my recollection the bright descriptions given by Savary of the opening of the canals of Egypt. (Pike, March 7, 1807)

Participation in the maintenance and upkeep of the local ditch was proportional to the size of land area under irrigation owned by the proprietors, locally known as *parciantes*. These landowner irrigators of Hispanic New Mexico still follow the nearly universal rule that governs many common property regimes, wherein each property owner must contribute to the maintenance of the communal system in direct proportion to the benefits he or she receives. The irrigators in these systems, significantly known as "*acequias de común*," agree to their mutual set of rules and regulations for the management of water supplies, elect their own officials, and implement their own justice in the resolution of conflicts that result from the distribution of water (in some cases, by mediation of "*hombres buenos*" or good men

in colonial times, such as those employed in the lower Río Segura of Murcia and Orihuela, Spain). The Hispanic roots of the ancient "*alcaldes de aguas*" (Spanish water managers), locally known in New Mexico as "*mayordomos*," is clear, as is their kinship to the "*acequieros*" of Islamic Spain, as described by Glick (1970).

Nineteenth and Twentieth Centuries

The nineteenth century was a period of major political change. In 1821, New Mexico became a part of an independent Republic of Mexico, only to be annexed by the United States in 1846-48 by military intervention and conquest. But these changes did not pose an immediate threat to the community acequias and their central role in agricultural production. For example, the first water laws adopted by the Territorial Assembly of New Mexico in 1851-52 under United States jurisdiction were the *Leyes de las Acequias*, published in Spanish, guaranteeing the priority of water use for irrigation and the application of existing *arreglos* or ditch rules for the operations and maintenance of the *acequias de común*:

> *Que ningún habitante de dicho Territorio tendrá derecho a construir finca alguna con perjuicio del regadío de las labores o siembras, como son molinos, u otras que impidan el curso de las aguas, pues el regadío de las siembras debe preferir a todos los demás*....
>
> *Que todos los asociados en una acequia de común, ya sean propietarios or arrendatarios de tierras, contribuyan a trabajar según la proporción de sus labores*....
>
> *Que de las acequias ya establecidas no se embaraze su curso*….
>
> *El arreglo de las acequias que ya están trabajadas quedará establecido tal como se hizo y permanece hasta hoy, y las prevenciones de este acto, serán vigentes y en observancia desde el día de su publicación*.

Until 1907, the community acequias maintained their hegemony in the control and utilization of surface waters. But in this particular year, the Territorial Assembly of New Mexico adopted a Water Code that declared surface water as a public domain, centralized the system of water administration, and diminished the sovereignty of the acequias. The Territorial Engineer took over the control of issuing permits for the diversion and use of surface waters. In 1912 the territory was granted statehood, paving the way for state and federal government intervention in the allocation and distribution of water supply through public agencies that sponsor water

development projects: the U. S. Bureau of Reclamation, a federal agency, and Water Conservancy Districts, authorized in state statutes. Thus, between 1928 and 1936, the seventy-two acequias that existed within the Middle Río Grande Valley (north and south of Albuquerque), the majority of them with their own diversion structures, were reduced by the Middle Río Grande Conservancy District (MRGCD) to depend on only three large dams outside the control of the acequias. The project--justified on the grounds that it would control flooding and also result in improved irrigation for commercial and small farms alike--trampled the historic rights of the *acequias de común* and instead granted vast administrative and taxation powers to the MRGCD to include responsibility for the distribution of water and canal maintenance (Rivera 1998, p. 215).

Nonetheless, the traditional, self-governed acequias continued to function in watersheds outside of the Middle Río Grande Valley. In modern times, however, they are confronted with major threats: the urbanization of acequia landscapes and pressures brought to bear on water, a limited resource, by other interests different from those of traditional irrigation. Recent decades have evidenced an increase in demand for water to support not only urban growth but also industrial uses, tourism, recreation, and the protection of endangered animal species. The value of water that is invested in agriculture cannot compete with productivity earned when water is used for some of these other purposes. In the context of growth, the *acequias de común* are viewed by competing stakeholders as strategic reserves for water transfers. The legal framework, in fact, favors the interference by stakeholders outside of local acequias. Current laws considers water, or water rights, as a public good that can be bought and sold in the market; at the same time, these laws do not recognize the collective rights of the communities, but instead those of the individual members who comprise it. The clash between the community value of water versus the commodity value permeates the discourse over the future of New Mexico's scarce water supply.

The Future of Irrigation Communities in New Mexico

As a group, the acequias are united in their stand against the unfettered water markets that threaten to increase transfers to "higher economic values" in the urban

and industrial sectors. They fear that water markets, if left unchecked, will dispossess rural communities of their water resources and limit their options for local economic development as areas of origin (New Mexico Acequia Association 2000, p. 2). Despite the gravity of the situation, there are still about one thousand community acequias in New Mexico and southern Colorado. And their resistance is not passive. The *parciantes* organize; they mobilize and protest against transfers. To sever water rights from the land is tantamount to extinguishing all life forms in the ecosystem: "*sin agua, la tierra no vale nada*" (without water, land is of no value). This conclusion helps to explain why applications to transfer water to uses outside the acequia communities are often protested with fierce intensity by the acequia irrigators.

To accomplish their goals, the communities replicate the structure of the state agencies, and they confederate in "acequia associations" at the watershed level, which permits them to negotiate on an equal footing. Currently, regional associations are active in numerous watersheds such as the Río Chama, Rio Santa Cruz, Río Gallinas, Río de Mora, Río Embudo, and in the Taos Valley, among others. The organizational strategy culminates in the New Mexico Acequia Association (NMAA) that convenes annually in a *Congreso de las Acequias*, where delegates from local acequias and regional associations meet to deliberate on statewide issues. A statewide acequia association has also been organized in Colorado, the Colorado Acequia Association (Hicks and Peña 2003).

The purposes of the NMAA, and regional associations at the watershed level, include the provision of legal (lawyers) and technical assistance (historians, sociologists, anthropologists, and specialists in regional planning) to the affiliated acequias, helping them to defend their ancestral water rights during water adjudication suits in the courts. The NMAA also reviews pending legislation, represents the member associations in meetings with state and federal agencies, advocates for the acequias at the state legislature, monitors public expenditures for water projects, and participates in the regional and state water planning processes.
Under the protection of collective organization, the *parciantes* initiate public campaigns defending their agrarian traditions while promoting their farm products such as organic crops and fruits irrigated with the pristine waters from the high

sierras. Organic farming and the production of heirloom crops continue on the rise as the *parciantes* demonstrate the cultivation of locally grown food as a way of preserving a land-based culture and heritage while at the same time promoting sustainability of resources and local food security. Recently, a consortium of acequia farmers of the Chimayó Valley have revitalized the production of a native chile variety long known for its singular flavor and appeal, and marketed as *"Chile de Chimayó."* The founders of the Chimayó Chile Project intend to make the growing of this traditional chile profitable once again in direct competition with the commercial and hybrid varieties produced in the Hatch Valley of southern New Mexico and in more far away places such as China (Ross 2006).

The *hispano* agrosystems continue to produce a wide range of crops of diverse origins from both the Old and New Worlds: Pueblo Indian and native land races for diverse field crops, and orchard fruits, vegetables, and some grains from Mediterranean Europe (Peña 1998, p. 242). These acequia products include: wheat, barley, oats, alfalfa and pasture grasses for livestock; and for human consumption, apples, pears, peaches, cherries, plums, apricots, nectarines, melons, chile, corn, white corn *chicos*, beans, *bolita beans,* squash, peas, garbanzos, *haba* beans, lentils, cabbage, lettuce, broccoli, tomatoes, cucumber, *calabacita Mexicana*, garlic, onion, *cilantro*, asparagus, potatoes, turnips, radish, carrots and more recently, artichokes (Peña 1998, p. 256; Santistevan 2003, p. 54).

To maintain their advantage in marketing of diverse agricultural products, the acequias actively support the maintenance of healthy watersheds in the forests and downstream valleys in order to maximize the supply of clean water, food fiber, forage, and biodiversity for plant and wildlife habitats (NMAA 2000, p. 7). In many watersheds, the acequias are the first diverters of snowmelt water, making them aware of the stewardship responsibilities they hold on behalf of downstream users, whether other acequia communities, Pueblo Indian Tribes, or the cities and towns. Their gravity flow system of irrigation, with no fossil fuel inputs, helps to maintain water quality. The San Antonio de Padua village outside of Albuquerque on the eastern slope of the Sandia Mountains, for example, boasts that its *ojito de agua* (spring) at Los Manzanares produces the "cleanest water in New Mexico." Water

from this natural spring has fed the acequia madre of the community since 1819 and still flows through apple orchards on terraced land and into a pond for release further downstream past the old plaza into grassy fields where remnants of agricultural activity are evident. Today, this pure water is used to irrigate small garden plots and for domestic purposes (Monk 1998, pp.6-7). The acequias are more than aware of the environmental benefits of gravity flow irrigation systems and their role as a keystone species. Their current and future plans include careful management of their land and water resources to enhance the ecology and the biodiversity values of the acequia landscape within their function as stewards of the watershed resources (NMAA, "*Agua, Cultura y Comunidad*: Acequia Action Plan for 2003," p. 10).

Organizational activities are fueled at the local level with informational bulletins, promotional flyers, meetings and special reunions, as well as community celebrations such as the *Acequia Festival*, organized annually by the Taos Valley Acequia Association and the ritual blessing of the *ojito* at San Antonio de Padua that includes a mass and *matachines* procession from the parish church to the spring well location. For capacity building purposes, the statewide NMAA organizes workshops in acequia governance and management. In recent years, they have conducted training of mayordomos and *parciantes* regarding: the powers of acequias; by-law changes to enhance local control; water sharing and pooling agreements across acequias; dispute settlements by use of *hombres buenos* adapted from earlier times; the recording of easement and property rights; record keeping and financial management; conserving food traditions and seed banking for heirloom crops; the importance of indigenous and local knowledge; organic farming techniques and marketing strategies; water banking, and other educational topics. More recently, the NMAA initiated *Sembrando Semillas*, where youth of the acequia villages learn about the seasonal agricultural practices and farming traditions passed on to them by a select group of *parciante* mentors: the youth clean ditches, plant gardens and document the local knowledge of the communities where they live (NMAA *El Parciante* 2006).

The future of the acequias may well reside in the manner and degree to which they are capable of maintaining their solidarity and collective action, and in the

establishment of strategic alliances with the environmental movement, historical preservation associations, foundations, private corporations with a sense of social responsibility, the scientific community, ecotourism industries, local planning boards, and tribal governments. As an example, in August of 1999 the Board of County Commissioners of Río Arriba County imposed a moratorium on the subdivision of irrigated agricultural land. This provided the county planning department time to develop a comprehensive study of cultivated lands (in practice, mostly lands irrigated by acequias), and to consider policy changes for the protection of acequias, irrigated agricultural land, and the quality of life in Río Arriba. Planners did not limit their input sessions to public hearings for at-large interests, but they visited the micro watersheds in the county where they convened workshops with the local residents. Their goal was to empower the communities to plan for their agricultural resources in terms of recommended land use regulations. After nine months of public meetings and special workshops, coupled with the gathering and analysis of agricultural conditions data, the county amended land use regulations and adopted new subdivision and zoning ordinances for the protection of acequia farmlands while allowing some residential development in the form of cluster housing for family members (Río Arriba Agricultural Conservation Study 2000).

The acequias support local and county ordinances to preserve agricultural lands. At the state level, they have recently succeeded in the lobbying for the adoption of other favorable legislation to enhance their powers and local control of acequia waters. In recent years, three state statutes have been enacted following campaigns orchestrated by the regional and statewide acequia associations. One law passed by the state legislature in 2003 allows local acequias to form water banks where *parciante* water rights can be deposited and reallocated temporarily to other acequia members while permitting the original *parciante* to retain the individual water rights. This water bank allows the acequia and the irrigator to avoid forfeiture for non-use or abandonment, as had been possible earlier. Pooling of these rights reinstates the customary practice of earlier times when acequia officials had the power to retain water rights in the local system and allocate to other or new members in times of available quantities or surplus waters. The modern statute grants

authority to the mayordomo to hold and distribute any water deposited in the water bank in a Reallocation Fund according to “traditional, accepted methods of managing the allocation.”

A second new law also returns powers once held by local acequias and their officers. Since after the enactment of the New Mexico Water Code in 1907, only the State Engineer has held authority to allocate surface waters under a permit issue system, to include the review and approval of any proposals to change the point of diversion or place or purpose of use based on water transfer applications submitted by individual holders of water rights. Under this centralized application system, the acequias were limited to either support or oppose the transfer in public hearings with testimony to support their positions. The State Engineer made the ultimate decision, and in the majority of cases approved the transfers, including transfers from the acequias for uses outside of the system such as for snowmaking at ski resorts. A new water transfer law adopted by the state legislature in 2003 returns local control to the acequia commissioners. If local acequias adopt a by-law specifying criteria and a process for transfer applications submitted to them by any of their members for changes in the use of a water right served by the acequia, they can now either approve or deny the transfers. Transfers can be denied if the acequia commission concludes that the proposed application would be detrimental to the acequia or its members.

In 2005, NMAA succeeded in the passage of another favorable acequia statute, this time updating procedures for prosecuting violations of laws for any interferences with easements and misuse of water. This statute revised and strengthened the ability of acequias to protect access to the right-of-way to allow for maintenance, use and improvements, and to increase the penalties in the event of violations. Individuals such as private property owners cannot cut, break, stop or otherwise interfere with any acequia or dam, nor can they take or use water, contrary to the orders of the mayordomo or the commission. Persons found in violation can be subject to misdemeanor fines or sentences in jail. In effect, the statute increased the penalties that had existed in earlier statutes. As before, the mayordomo is charged with prosecuting violations in the name of the state upon acquiring of such

knowledge, and failure to prosecute can result in the mayordomo's own prosecution and made subject to fines and jail imprisonment if convicted.

Conclusions

The *acequias de com*ún of New Mexico have survived as transplanted civil and social institutions since Spanish colonial times maintaining continuity of a water culture despite changes over three sovereigns, Spain, Mexico, and now the United States. The cohesion of the community of *parciantes*, a critical factor to survival of the acequias, has many cultural and political factors in its favor. The roots of the *hispano* irrigators in the lands of their ancestors motivate them to defend their water and acequias, and maintain their sense of place in the world. Their proverbial attachment to the land has been captured to perfection in the novel by John Nichols, *The Milagro Beanfield War*. By preserving their agrarian traditions, the *hispanos* of New Mexico and their neighbors in Colorado defend their "*país*," or homeland and thus preserve their cultural identity.

In global terms, these Iberian origin systems, themselves with Islamic roots, share a common past with the oases cultures of other continents, and together confront the challenges of survival in times of modern change and threats of water shortages to traditional ways of life. In the harsh environment of the desert and in other semi-arid regions, irrigated agrosystems were developed by mutual community labor that domesticated flowing rivers with diversion structures built to capture water: Hand crafted ditches were built out of the earth and rocky terrains in order to store, transport and distribute water to the gardens and fields for food production and human sustenance. Solidarity of the water communities and the interchange of human values with other similar agrarian communities around the world may serve as the platform for sustainable development of these common oases agrosystems.

Collective action and the sharing of social knowledge across the oceans once again may prove the critical factor for continuity of the culture of water. Like the Palmeral of Elche, the traditional oases communities of Iberian-Islamic heritage in other places and continents are themselves unique irrigated landscapes of universal significance and should be protected for their heritage values: "The Palmeral of

Elche offers profitable lessons on how to harmonize economic development and increase social welfare by preserving a superb and unique cultural landscape. These are valuable lessons for the future preservation of our common World Heritage" (Martínez 1999).

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