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Albuquerque District

# News Release

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## Corps of Engineers Restores Historic Acequias

ACEQUIAS

*\*\* Note to the editor: Please consider the story that follows this release as a three part series \*\**

The U.S. Army Corps of Engineers is restoring and rehabilitating New Mexico's acequias. For centuries, Pueblo Indians and Spanish settlers dug ditches, or acequias, for agriculture. Today, the Corps of Engineers is now modernizing many of those same ditches to keep the tradition alive and the water flowing.

"It's the life blood of a community and without it the whole valley would disappear," said John Carangelo, Mayordomo, La Joya Acequia.

More than 1,000 acequias exist in New Mexico, mostly in the Northern part of the State. The irrigation ditches serve anywhere from watering crops and pasture land for cattle, to supplying garden plots and orchards. Restoring these simple water passages keeps life flowing in the valley, while at the same time preserving the historic and cultural traditions of its people.

To receive more information regarding Corps work on acequias, contact the U.S. Army Corps of Engineers Public Affairs office at (505) 342-3171, or visit the web and view the video news release at <http://www.spa.usace.army.mil>.

# Corps comes to aid of thirsty *acequia* communities

By Dave Harris, public affairs specialist

*Agua es la sangre de la tierra.* [Water is the earth's blood.] –Sylvia Rodriguez

Families thought nothing of re-using bathwater a generation ago.

Perhaps it was a throwback to history when in the often-parched flatland of what is now much of New Mexico, survival meant constantly thinking about elusive water.

Now the U.S. Army Corps of Engineers helps restore historic means of diverting and conveying water.

Seeking adequate water for agricultural, livestock and domestic uses dominated the concerns of farmers and families - where to find it, how to get it from one place to another and how to use it frugally and safely for multiple purposes.

Rarely could one access adequate water supplies alone. Getting usable water required alignment with neighbors who formed what may represent the oldest cooperative form of government in what is now the United States, resulting in many varieties of the “community ditch,” or acequias – pronounced ah-SAY-kee-us.

It is derived from the Arabic “as-saquiya,” (from the Moors in Iberia) and later the medieval Spanish word “cequia,” meaning a ditch or community irrigation canal that diverts water from rivers and streams, according to a January 2008 presentation and paper by archaeologists Greg Everhart and John Schelberg at the 41st Annual Conference on Historical and Underwater Archaeology in Albuquerque.

According to a 1987 Albuquerque District proposal, “Surface irrigation has been practiced in New Mexico and the Southwest since before recorded history. The earliest Spanish explorer, Coronado, in 1540, discovered the Pueblo Indians of the region practicing irrigation

and growing crops along the Rio Grande. Archeologists have dated ruins of irrigation system in the Chaco Canyon area and along the Rio Chama to as early as 1000 A.D and 1300 A.D., respectively.

“The first Spanish missionaries and settlers brought with them their forms of irrigation dating back to the Moorish period of the Middle Ages. From these two cultures evolved the community ditch or acequia organization that has endured to the present.

“These acequias systems were built to be used by the entire community and were the lifeblood of the area they encompassed....In 1851, the Territorial Legislature recognized acequias organizations as public entities and enacted laws governing their operation and management....

“An acequia organization must have three commissioners, which means a minimum of three landowners....This simple, cooperative form of organization remains intact today and serves not only as the basis for irrigation practices but also the focal point of community cohesion and cultural awareness, particularly in northern New Mexico.”

## Difficulties to overcome

“The major problem...is the system’s inability to furnish a sufficient supply of water to meet the needs of the irrigated acreage,” the Everhart-Schelberg paper said.

“There are three primary causes for this. These include a structurally deficient diversion dam, inadequate main delivery system, and inefficient on-farm application facilities. In addition, due to the sporadic nature of stream flows in New Mexico, many acequia systems are unable to meet the peak water demands of their land-users serviced in the hot, summer months; i.e., the irrigation water cannot be delivered in a timely manner, during the crops critical growing period.

“Therefore, the Corps’ primary objectives include the rehabilitation of the systems diversion structure, inlet works, sluicing system to reduce sedimentation problems, main delivery system and the on-farm delivery system.”

There are approximately 1,000 active acequias in New Mexico, the paper said. Many of the old acequias or portions thereof have been abandoned.

The historically open, earthen ditches have sediment problems whether derived from the diversion of river and stream waters or from upland surface water drainage that primarily comes from the brief but intense thunderstorms that can wash huge amounts of sediment into the ditches. Other problems are derived from the sandy, gravelly New Mexican soils, the Everhart-Schelberg paper said and cited Dr. Neal W. Ackerly, in his 1996 review of the historic significance of acequias systems: “In these more modern times, local irrigators have become increasingly concerned with the amount of the percolation losses which in some cases is as high as 20 to 30-percent.”

## Corps’ one-of-a-kind mission

The Corps’ Acequia Rehabilitation Program may be considered as a success in the fact that, in the past 20 years, the Corps assisted 68 individual acequias on approximately 75 acequia rehabilitation projects, expending \$24 million, the paper continues.

Through the generations, the customs and rituals associated with these traditional cultural properties forged strong bonds between the members of the villages, between the villages, and the environment codified by both tradition and the laws of three separate nations.

Citing Silvia Rodriguez, the paper said, “An interesting point made and a recurring theme for the past 150 years of New Mexican history was that there was only sufficient water for about one-half of the 40,000 arable acres in the Taos Valley. Water is probably the major limiting

environmental variable for all activity in New Mexico. All of the water, including the ground water, in the state belongs to someone. There is no water available unless it is purchased."

Albuquerque District, along with the New Mexico State Engineer's Office have collaborated and recently completed, for example, rehabilitation of the Labadie Ditch diversion on an unnamed stream in Guadalupe County.

Patty Phillips, project manager, said the district designs and constructs a variety of diversion or conveyance features – typically projects costing around \$50,000 to \$1.5 million and just now is going to construction under two authorities: Section 1113 of the Water Resources Development Act of 1986 and Section 215 of the Flood Control Act of 1968 gives the Corps authority to reimburse the state for design and construction.

## 'Historic' concrete and plastic?

The historic irrigation systems present conflicting challenges: How can workers preserve the historic character while enhancing the productivity of acequias? Leaks and other growing inefficiencies have had an unexpected benefit of providing ponds and moisture for vegetation and, thus, wildlife habitat.

The New Mexico Department of Fish and Game, for instance, identified adverse effects of the proposed Labadie project on the bigscale logperch. The Corps minimized the impact by specifying "best management practices" to contain sediment and uncured concrete during construction.

Concrete? Did the earliest settlers use concrete? How does that meet the objective of historic preservation?

The Everhart-Schelberg paper described low technology gravity-flow systems with dirt-walled canals, and stone/earthen/brush/tree diversion dams in the rivers. Wooden shovels were

used well into the 1800s; dirt was removed on rawhide drawn by animals or carried out on the backs of the workers. When possible, builders followed the natural path of rain and melting snow.

## Lazy goat pathfinders

On occasion, it said, several goats would be driven up the mountain and set free. They are said to be lazy and would choose the easiest way down the hill and the members would use that route for the acequia. The acequia range in length from 500 feet to over 10 miles long.

The traditional diversion structures used to move the water from the river to the ditch, Everhart-Schelberg said, were made of rock, brush, and trees and had to be repaired frequently....

“The workers have been variously described as a chain gang, a centipede, a shuffling line. During the irrigation season, the members must be ready to repair collapses in the walls, to remove obstructions in the channel, to repair breaches in the diversion dam, and to deal with pesky beavers and muskrats. Much of the digging is still done by people with shovels.”

Phillips explained the apparent contrast between historic maintenance and modern means of rehabilitation.

“From a historic standpoint, acequias are more than concrete and pipe,” she said. “We are making a difference for the acequia community and the agricultural land it supports, making the acequia more efficient. The youngsters aren’t staying in the communities and no one wants to work for such low wages. Putting in concrete and pipe still serves the acequia, because we still are helping to preserve the community. We do follow historic alignments the majority of the time. “

Once constructed, an acequias alignment very rarely changed, This was an age old Spanish rule and it was reiterated in the 1846 Kearny Code, “the course of ditches already established shall not be disturbed,” Everhart-Schelberg said.

## Adaptable wire baskets of rocks

In considering an effective construction technique that more resembles historical methods, Phillips described the use of Gabion baskets, wire baskets filled with rock.

According to Wikipedia, Gabion baskets have some advantages over loose riprap because of their modularity and ability to be stacked in various shapes. “They also have advantages over more rigid structures because they can conform to ground movement, dissipate energy from flowing water and drain freely. Their strength and effectiveness may increase with time in some cases, as silt and vegetation fill the interstitial voids and reinforce the structure.”

Sometimes in building a structure, the work involves diverting a river to one side to work in the dry, lay down fabric for concrete and use Gabion baskets filled with rock in a stepped feature. “It’s an inexpensive way to build a weir,” Phillips said. When one half is completed, workers move the river back and complete the other half of the structure.

While such a process hearkens back to more use of rock instead of working exclusively with concrete, she said, it’s more intensive. Sometimes the wire-enclosed baskets replace logs going “every which way”; the Gabion baskets are capped with concrete.

*There is nothing more to do on the ditch [from November] until  
March, and until then I can forget about it all, forget about  
whether there’s enough water or too much, about who’s not getting  
enough, about who’s taking too much, about beavers and muskrats and  
they at last can forget about me. Now winter can come...Yes, now*

*everything can freeze.* –Citing Crawford by Everhart-Schelberg

Addressing that concern, Phillips said, “We construct in the non-irrigation season, which is between the months of October and April.”

Clearly no component is original, Everhart-Schelberg said. Diversions disappear in floods, wooden gates and flumes disintegrate, ditches are cleaned and dug annually and become wider or longer or shorter, sidewalls collapse and must be rebuilt.

Nevertheless, their function has not changed since their original, ancient, construction; all of the rebuilding and digging are normal components of the system. The Albuquerque District’s efforts do not guarantee the eternal preservation of acequias, the paper said. At best is only prolongs their life.

Ackerly tried to address the difficulty of historical preservation with modern methods. For example, he said, “Concrete lining can be undertaken in ways that preserve the appearance of earthen ditches.”

Yet, he pointed out the short-term nature of such solutions as using spray-crete or adding “colors that soon fade.” He saw the possibility of preservation of “substituting metal or concrete for wood. However, all of these devices would have to be custom-built and the cost to acequias association members is likely to be prohibitive.”

He said, “It is unlikely that adequate substitutions for materials used in constructing division dams can be found. For example, it could be difficult to make concrete dams appear to be earthen dams or brush-and-rock dams.”

## Trends jeopardize historic communities

Ackerly sounded an alarm about the need for preservation and rehabilitation in light of disturbing trends toward large-scale farming, with its different irrigation needs and methods,



which have had the result that “an average of 141 farmers per year are getting out of irrigated farming,” threatening the livelihood of smaller communities or acequias associations.

In addition, he found that natives did less of the needed maintenance and that “much of the *fatiga* [the task of cleaning the ditch] is simply being hired out to one or two guys with a backhoe and the historical underpinnings of acequias system operations are eroding. It is quite possible that, in the long run, the declining importance of irrigated farming will lead to the disappearance of New Mexico’s acequias systems.”

Ackerly noted the trend toward urban living. “One problem is that many of these urban dwellers are not New Mexico natives, or even natives of the Southwest, and they have little appreciation or understanding of the role of acequias in our state....The combination of a poor understanding of the role of acequias in New Mexico’s history and potential competition for water between agricultural and M&I – municipal and industrial – users could easily translate into a loss of political support for traditional acequias systems.”

## Orchestrating myriad players

Right now the acequia program tracks 11 projects in different stages, Phillips said.

“We’ve had many challenges and gotten through them by communicating and figuring out best solutions.” Even though the program is unique in the Corps, she said from an engineering standpoint, “it’s not really that challenging.”

In addition to coordinating with communities and state officials, she credits a number of team members for successes: Ben Alanis, chief of General Engineering Branch, “who comes up with a lot of solutions,” and other district staff, such as Everhart and Alan CdeBaca, cost engineer. She also recognized the contributions of retired civil engineer Fermin Chavez and added that the cast is much bigger than those she named.

As a pianist herself, she sometimes spoke in musical terms. She said she sometimes needs to guard against or mute the stereotypical cacophony of “high and mighty” blaring, brassy overconfidence exhibited by some players in proposing solutions and “sometimes fellow employees or contractors don’t understand or appreciate where the acequias are coming from. But I found a construction company I like, to avoid situations that reflect badly on the Corps.”

She knows how to arrange and coax a crescendo of harmony. “I’ve talked to acequia members,” she said. “They are very happy getting the water. Irrigation that used to take all day now takes only six hours. Any day I can spend with the acequian community is a good day - listening to their concerns, helping them in dealing with Mother Nature, those are my best days.

“The people whom we’re helping are forever grateful and are extremely patient dealing with water conservation people, and they live in some really pretty parts of the state.”

Phillips said she dreams of some day taking an ensemble of Corps players to help an acequia community clean their ditch.

Whether or not she can recruit the necessary troupe, she’s confident of her ties with the audience – the people of the acequias.

“This program keeps us connected with the communities. It’s definitely an authority that is unique in the Corps. Those from other Corps organizations ask, ‘You do what?’”

She describes managing acequia projects “like being an orchestra conductor, having the woodwinds come in at just the right time, blending the strings and percussion and dealing with the prima donna pianists.”