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Native American and Mestizo Farming at La Junta de los Ríos

by Enrique R. Madrid

Archeological, historical, and ethnographic data create a picture of nearly a millenium of Native American and mestizo agricultural practices at La Junta de los Ríos, the junction of the Río Conchos with the Rio Grande.

Introduction

The lands of La Junta de los Ríos — the junction of the Río Conchos from Chihuahua and the Rio Grande or Río Bravo in the Texas Big Bend — have been home to farming peoples for many centuries. The origins of these farmers in the Late Prehistoric Period may rest with migratory Puebloan groups — more properly Jornada Mogollon — who settled La Junta about A.D. 1200 (Kelley 1986) and who were linked economically to the great trading center of Casas Grandes in northern Mexico and culturally to their New Mexico homelands. Alternatively, La Junta peoples may have been hunter-gatherers from the northern Mexico desert or the American Southern Plains who settled there and adopted certain aspects of Jornada Mogollon lifeways (Mallouf 1990). In either case, the occupation of their lands by the Spanish in the Historic Period created a mestizo people who have lived and farmed in the same river valleys up to the present day.

The Land and Climate

The La Junta landscape is dominated by eroded volcanic and limestone mountains that form the Presidio and Redford Bolsons. The bolsons are breached by the Río Conchos and Rio Grande, as well as by several important tributary streams (Groat 1972). The river floodplains, terraces, and nearby mountains were suitable for long-term occupation and included the establishment of fourteen historic Native American pueblos visited by Spanish explorers at various times (Applegate and Hanselka 1974). A Spanish expedition in 1582 estimated the population at La Junta to be ten thousand persons (Gómez 1990).

The climate has long been favorable for agriculturalists too. Before modern-day damming, the Río Conchos-Rio Grande system most likely had at least two highwater periods duing the year. Snowmelt from the Sierra Madre and Rocky Mountains typically reached La Junta in May or June (New Encyclopaedia Britannica 1986). A second peak tended to result from summer rains (e.g., Emory 1857).

High summer temperatures still create convectional storms above the mountains — the Sierra Rica, the Bofecillos, the Chinati, and the Sierra Grande — that sweep into the La Junta valleys (Cordell 1984). The Mexican monsoon provides more than 70% of the annual precipitation to West Texas and the Mexican Plateau from May to October (Martin 1970).

The critical importance of summer rains to late prehistoric farming cultures is clear: where they were lacking — as in areas of California and Nevada — aboriginal corn-bean-squash economies failed to evolve (Martin 1970). Beginning in A.D. 1200-1500 and continuing until the 1880s, the climate at La Junta fell into the generalized precipitation pattern of light to heavy summer rains which predominates in the western United States (Martin 1970). Because their survival was tied so closely to annual floods, and possessing a "concept of the periodicity of flooding" (Applegate 1992), as well as seeing life-giving rains form in the mountains, the La Junta natives must surely have been moved by powerful religious impulses (Jung 1963).

Prehistoric Farming

Farming — including that of floodplain agriculture — had spread over most of the southwestern United States by A.D. 900 (Martin 1970; Cordell 1984), but pending new archeological evidence, prehistoric agricultural practices at La Junta are at most enlightened conjecture. Until a few years ago, archeologists did not record agricultural features or collect paleobotanical data, so our knowledge is limited (Cordell 1984:182-185). Despite certain interpretive risks, historical and ethnographic data — bolstered by archeological findings — may be extrapolated into prehistory to arrive at verifiable hypotheses concerning human lifeways (Doolittle 1990; Cordell 1984; Binford 1983).

Constructed on or near arroyos, alluvial fans, and riverbanks, archeological sites of prehistoric farms are likely to have hidden features such as channels, dikes, dams, weirs, furrows, and terraces. However, physical evidence of such ephemeral constructions will be difficult to find because of the destruction wrought by erosion and the high rate of sedimentation in the river valley. Remote-sensing methods, aerial photo surveys, ground-scanning radar, pollen analyses, and soil cores from historic farms and from protected or buried sites may reveal farming techniques and the antiquity and variety of prehistoric cultigens (Lister and Lister 1984:145-162). The same geological and hydrological constraints that preconditioned desert farming may help to pinpoint such locations. Currently, the Río Conchos and the Rio Grande are at their lowest levels in history, thereby opening up heretofore ignored floodplain areas to scientific scrutiny (Kelley and Kelley 1990:6).

Native American cultures of the Greater Southwest — including northern Mexico and West Texas — possessed a repertoire of arid land farming methods that may have been known and used by the La Junta peoples. The Cochise culture planted at selected places, leaving to return later when the harvest was ready (Kopper 1986:52). The Anasazi made use of underground water, planting crops in dunes near hills or used earthworks or terraces on hill slopes to distribute floodwaters from small streams (Spencer 1977:275). The modern Hopi and Zuñi Indians dry farm their corn in washes using rain and groundwater (Spencer 1977:172; Officer 1971:50). Papago utilize flash-flood farms on alluvial fans, and they store surplus water in natural waterholes using dirt embankments (Spencer 1977:275). Brush dams, dikes, and ditches are used by the Papago to control rainfall and runoff (Cordell 1984:198-199). The Tarahumara practiced stream agriculture in the seventeenth century on river meanders. They also used springs for farming, building terraces on canyon slopes (Pennington 1963:47-48). The Navajo still plant corn in shallow pits to concentrate rainwater and to collect arroyo runoff (Kopper 1986:52-53). Shallow pits that serve a similiar function, called *posas,* are still a common sight in modern La Junta home gardens. The Mimbres Mogollon people dry farmed with subsurface water in their more arid southerly lands (Brody 1977:35). Jornada Mogollon farmers along the Rio Grande in Hudspeth County, Texas, might have planted fields using water from arroyo channels and flood irrigation in the river's lowlands (Betancourt 1981:37- 47).

Farming in the Historic Period

Spanish explorers of La Junta have left detailed records of aboriginal subsistence practices there. About 1535, when Alvar Núñez Cabeza de Vaca walked into the villages of La Junta , he was given beans, squashes, gourd-vessels, and corn that the Indians had brought into the area (Di Peso 1974:801; Hammond and Rey 1967:62). The inhabitants were waiting for the end of a two-year drought before they could plant their own corn fields (Favata and Hernandez 1993:101-102). The Indians cooked their pumpkins and other foods by a stone-boiling method as they reportedly had no pottery (Favata and Hernández 1993:102).

The Rodriguez-Chamuscado expedition reached La Junta in 1581 (Hickerson 1994:33). The Amotomanco nation they found farmed only small amounts of corn, but many pumpkins and beans (Castañeda 1976:160-161). The Espejo expedition of 1582 found the Otomoacos planting maize, beans, and calabashes along the Conchos

(Hammond and Rey 1967:56-58). The Abriaches nation harvested maize, vegetables, calabashes, and gourds (Hammond and Rey 1967: 58-61). The Indians of the largest pueblo, Santiago, were all farmers as they had many "damp islands and bays" along the river on which to plant, moving from their pueblos to jacales in their fields at harvest time (Hammond and Rey 1967:62).

Returning from New Mexico in August 1583, Espejo's men found the Río Conchos in full flood. They were fed ears of green corn — indicating a late summer harvest (Madrid 1994:17). They also feasted on raw and roasted calabashes, beans, and fishes (Hammond and Rey 1967:125-126).

A significant impact on farming lifeways was brought about by the Spanish missionaries. They returned to La Junta in 1629 and 1631 (Jordan 1978:71), and in 1660 and 1671 (Jones 1991:4). In 1683, the López-Mendoza entrada reported corn and wheat in cultivation (Hickerson 1994:133-134). The Chihuahua historian, Francisco R. Almada, however, credits the introduction of wheat and cotton to Friar Andrés Ramírez between 1700 and 1715 (Garcia n.d. 1985:1). By providing a winter crop, wheat essentially doubled the area's food supply (Bowden 1977:74), and it would have stimulated the expansion of irrigation systems (Officer 1971:50). Planting wheat in October after the late summer floods, the La Junta farmers would harvest it the following May (Madrid 1994:17).

In addition to founding missions, the Trasviña y Retis expedition of 1715 left iron (?) rings for making wheat flour sifters, as well as seeds of fruit trees, garbanzos, and lima beans for the missionaries to plant (Garcia n.d. 1985:7). With Catholicism came plows, iron tools, and Mexican and European cultigens such as chiles, watermelons, peas, peaches, onions, and fig and quince trees (Bowden 1977:71; Officer 1971:50).

Historic Period farming is described in the Report to the Viceroy at Mexico City from Captain Commander Joseph de Ydoiaga after an expedition to La Junta in 1747-48 (Madrid 1992). His expedition was one of three that converged on La Junta that winter (Madrid 1994:1). A farming technique that Ydoiaga described was temporal irrigation — *temporal* farming in Spanish — or collecting arroyo runoff in fields (Riley 1987:298; Doolittle 1990:91). But according to the Indians, such *temporal* farms in the desert arroyos were not as successful as the riverine farms (Madrid 1992:60).

Farming along the riverbanks may be termed "*humedad* farming." An *humedad* is a humid or moist place, a low basin on the floodplain with enough moisture left from receding floods or percolating downward through the soil to raise a crop. High water might drown a crop, while low water might cause its withering (Madrid 1994:9). A sandbar would qualify as an *humedad* (Riley 1987:298).

Humedad farming may be identified by several traits. It was carried out without artificial irrigation, instead using natural river overflows and field preparation, such as clearing, was done prior to river flooding. Fire was used to clear the fields of brush, grass, and harvest stubble; it was a type of slash-and-burn farming. Field fertility, however, depended upon silting from annual floods. Planting was then done after floodwaters had receded from the riverbanks. In addition, it was farmed without oxen or Spanish iron tools. It was precarious farming; subject to damage from river floods and fluctuations and it failed to fulfill the food needs of the La Junta Indians; hunting and gathering remained essential (Madrid 1992:82; Madrid 1994:9-11).

Eight pueblos visited bv Ydoiaga had *humedad* farms. Santa Cruz pueblo near La Junta had the most fertile and abundant fields, consisting of a half league of *humedades* which were more than enough to feed 322 persons (Madrid 1994:32). In spite of moderate flooding in 1747, corn, pumpkins, and vegetables were being planted in the pueblos. At San Christóbal a small corn crop would be supplemented with wheat. A very good crop would bring a year's supply of food plus a surplus for trading to the Apache (Madrid 1992:60). Ten to twelve bushels of corn per acre probably met the needs of La Junta farmers (Officer 1971:48).

The pueblos had spacious floodplains which might be farmed if irrigation systems could be constructed. But canal irrigation was impossible due to frequent and widespread flooding, instability of the river channels, sandy and loose soil of the banks, constant reworking of the floodplains, and the deposition of brushpiles by the rivers. The canals and dams reported in 1715 (Doolittle 1990:91; Applegate 1992:57) lay in ruin by mid-century. Following Doolittle, (1990:45-46, 72, 74, Fig. 3.16) early eighteenth century diversion dams here may have been simple ones made of brush, stakes, rocks, and dirt, or built of piled rocks on the slower and more shallow side channels or *brazos* rather than on the main river channel. The Indians, missionaries, and Spanish farmers had failed to secure them against the rivers' force. But as constructions they were much needed or the inhabitants would not have worked so hard to build them (Madrid 1992:92).

The floodplains and the lands for three-days' journey upstream on the Rio Grande were also choked with poor quality grasses. These grasses may have resulted from the creation of a "fire ecology" by the Indians, as their repeated burnings suppressed mesquites and shrubs and favored grass growth (Madrid 1994:10).

Application of Native American Farming Practices at Modern-day La Junta

Native American farming methods reported by Ydoiaga — with a few improvements — are still in use almost 250 years later in La Junta. Oral histories made with six area farmers and ranchers provide insight into early planting modes.

Today, the Municipio of Ojinaga has 1500 hectares of *temporal* farms under cultivation. The majority are *temporales de arroyo*. *Temporales de bajío* or *charco* (i.e., in rain-catchment basins) are very rare. *Humedad* farming (technically, *siembra en tierra avenida* or flood-silt farming) is still practiced at the villages of Pilares, Barrancos de Guadalupe, and Fresnos on the Rio Grande (Gómez Lerma 1994). *Humedad* farming was used near El Mulato downstream of La Junta until the Luis León Flood Control Dam was built on the Río Conchos in 1968 (Navarro Reynosa 1994; Porras Ruiz 1994).

Farming in *Temporales*

Information has been provided by Sr. Jesús José Carrasco of Rancho San Nicolás, Chihuahua, and Sr. Pedro Minjares Sánchez of Santa Teresa, Chihuahua. Sr. Carrasco began farming in *temporales* with his grandfather over thirty years ago when they used an iron planting stick called a *barra* to plant corn. Sr. Minjares is planting today in a *temporal* he has used for eight years (Fig. 1).

Figure 1. Sr. Pedro Minjares Sánchez on his temporal.

Both men selected a flat field in an alluvial fan formed by an arroyo or near a large arroyo whose flow could be controlled. They cleared the fan of brush and rocks, greasewood, and mesquites. Water spreaders or small check dams called *tapes*, *bordos*, or *estacados* were raised by Sr. Carrasco in his field. Made of earth, brush, and rocks, and held in place by wooden stakes, their function is to slow, spread, and retain flash-floodwaters to collect silt and to correspondingly level the field. The *estacados* are later raised into long low embankments called *bunds* to hold water for irrigation. Outlets at the ends move water into the adjacent section. The bunds are 20 meters (65.6 ft.) apart and are arranged perpendicular to the water flow. An *enramado* or low diversion dam built of loosely piled alternate courses of brush and rocks in an arroyo leads to a ditch entering the field. Should a flood become too violent, this brush dam is designed to collapse rather than to divert the waters into the field.

Instead, Sr. Minjares has built a *presita*, a small dam, or *estacado* to extend the arroyo flow from behind a small ridge into the center of an alluvial fan where his field lies. He has plowed four radiating low-bordered ditches, each ca.100 meters long (328 ft.), with a tractor and a border disc plow to catch the water and to funnel it into the fenced 1.5 hectare *temporal* (Fig. 2). He plans to plow and prepare the field, sow it with oats, and wait for rain in November. Sr. Carrasco waits until after a rain to plant corn, beans, pumpkins, and wheat.

Temporal farmers claim many advantages. The silt is rich, making it unnecessary to fertilize, while the soil is enriched with each rain. Insects and diseases are rare in the desert, and with rain, crop yields exceed those of riverbottom fields. Sr. Carrasco has harvested 15 sacks of beans (one metric ton or three-fourths of an American ton) from a 3 hectare farm (Fig. 3). Disadvantages include utter dependence on rain, and depredations by javelina, deer, and cattle. Only drought-resistant crops may be planted. Chiles, watermelons, and fruit trees must be watered from a spring. As a result, plant folk varieties or crop ecotypes (Nabhan 1989:71) adapted to *temporales* are to be found — in particular a dwarf corn variety named "Maíz Venadito" which produces regular-sized ears, uses very little water, and is ready for harvesting within three months.

Farming in *Humedades*

Humedad farming has been reported in the lower Rio Grande Valley in Texas from as early as 1828 until the late 1840s (Rubel 1966:27-28), and William H. Emory reported it at La Junta in 1852 (1857:89), where the practice continues today, though not in widespread usage. Mexican farmlands are now irrigated by the Toribio Ortega Diversion Dam built in 1974 and its modern canal system.

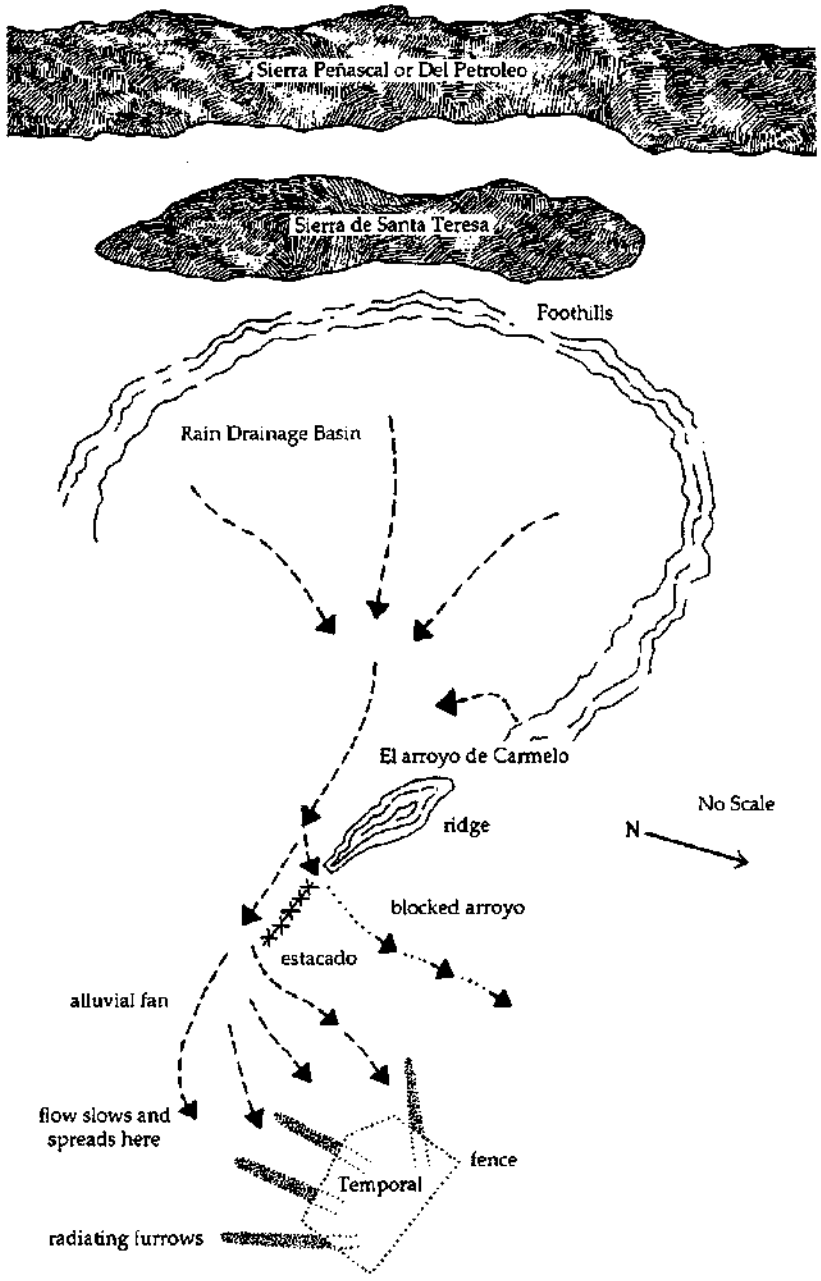

Figure 2. Temporal de Pedro Minjares Sánchez Sta. Teresa, Chihuahua.

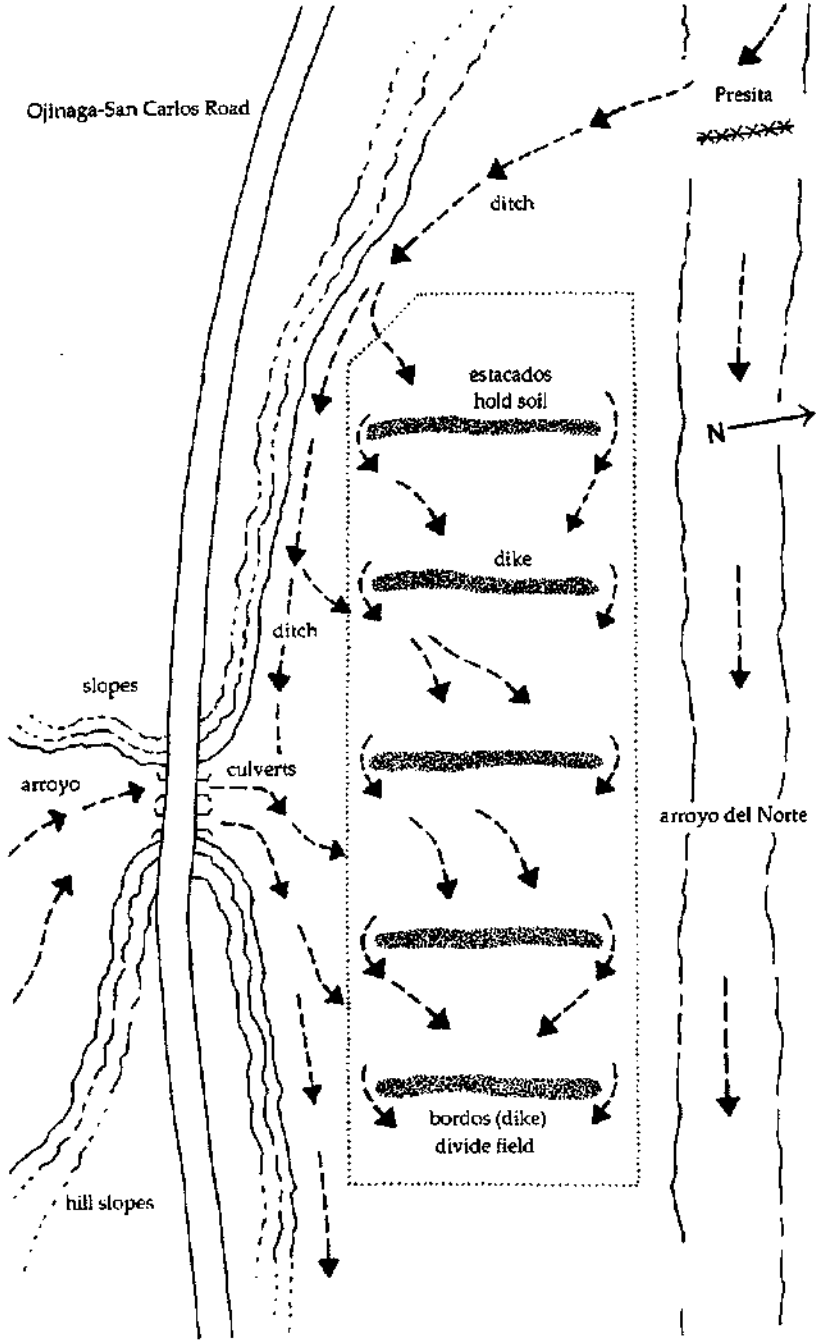

Figure 3. Temporal farmed by Jesús José Carrasco Rancho San Nicolás, Chihuahua.

Humedad farming has become an emergency measure to insure a small harvest when flooding ravages the riverbottom farms. It is also a form of "fortuitous farming" when floods open up extra land not normally irrigable by canals (Leyva Navarrete 1994).

Only wheat and corn are planted, although one farmer reported planting rye grass and alfalfa for pasture. The plants the Indians were reported to be growing — beans, pumpkins, and lentils — are not considered suitable for *humedad* farms. Nor do the farmers prepare the fields, instead being content to look for small clearings after a flood. A half-hectare field is considered to be large.

As the banks begin to dry after a September flood, a mule and a small middle buster plow may be used to prepare the soil and to cover the seed. If the soil is too muddy, the wheat is sown by throwing seed onto the drying ground, where it is then swept into the mud cracks with a broom of seepwillow branches. The moisture from a single flood is normally enough to produce a crop the following May. Corn may be planted by July with a pointed *barra* or *estaca* — with 3 or 4 kernels placed per hole and buried ca. 6.25 cm. (2.4 in.) deep. When the stalks are 20 in. (51.3 cm.) high, a 6 in. (15.4 cm.) dirt mound is pushed up against each plant with a hoe to provide support and to retain water — a practice still in use by the Tarahumara in their fields on the Upper Rio Conchos (Fontana 1979:71).

Taming the Río Conchos and the Rio Grande

A singular achievement of the La Junta farmers involved solving the problem that had bedeviled them for centuries — successful damming of the rivers for purposes of irrigation (Doolittle 1990:91). Around 1860, mestizo hydrologic technology in northern Mexico (Newcomb 1949:23), knowledge of timber construction in Spanish mines, and simple natural observations of the activities of native beavers by La Junta farmers (Leyva Navarrete 1994) may have influenced creation of the first successful wood and rock structures to dam the rivers. One scholar of La Junta genealogies has noted a population boom in the 1870s (Pérez 1994). This influx of people is likely due to the opening up of thousands of acres of farmland by the construction of these new dams.

Called simply *presas*, locally, they should technically be called *presas de burros y muertos,* or burro dams (Fig. 4). This river-damming technique lasted almost a century until the early 1950s when burro dams evolved into simpler, more efficient, easier-to-repair, and sturdier rock-fill dams. Burro dams were built on the Río Conchos near Coyame, at El Mesquite, and at Ojinaga, as well as on the Rio Grande at El Polvo, El Mulato, Vado de Piedra (Gómez Lerma 1994),

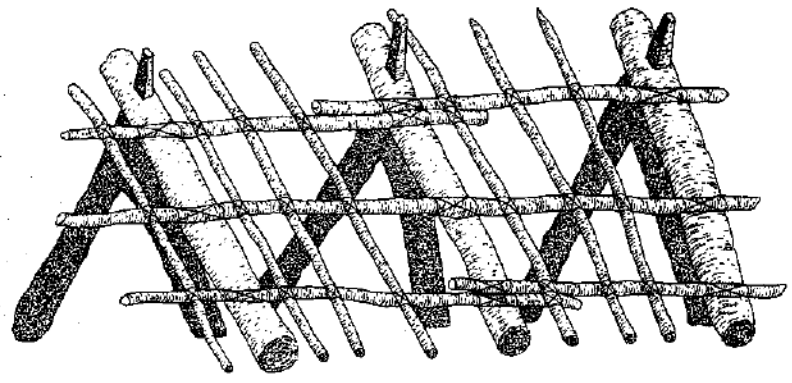

Figure 4. Burro Dam, 12 ft. high.

San Antonio del Bravo, and Barrancos de Guadalupe (Velásquez 1994).

The author interviewed six farmers who had helped to repair the dams and who knew the construction details. They didn't build the dams — their grandfathers and great-grandfathers did that — but the techniques and the materials they used were the same. Green cottonwood trees of proper size were cut and brought by wagon to the dam site. Depending on the height of the dam, tree trunks a meter thick and from 4 to 8 meters (13 to 26 ft.) long, and even thicker forked trees of equal length were also cut down. The trunk was joined to a forked tree with a mortise and through-tenon joint, and firmly wedged together to form a tripod as high as 5 meters (16.4 ft.). This timber tripod, looking like a donkey sitting on its haunches, was called a *burro* (Fig. 5). It was assembled on the riverbank, erected, and maneuvered into the flowing river by 10-30 men. Working underwater, they lifted the *burros* and set them in place — as many as it took to span the stream. The *burros* were aligned by a rope stretched across the river. Once in place, they were tied together with two horizontal members or *vigas* called *gualdas* (Fig. 6). Yucca fiber straps or ropes were used to tie the beams together. Vertical members called *palancas* were then attached to the *gualdas*. Flat, rectangular brush mats of seepwillow called *tapestes*, about 1.5 meters by 4 meters (4.9 by 13 ft.), were then placed on top of the *palancas* until the whole front of the dam was covered. The final step involved covering the entire dam front with stone and seepwillow branch bundles called *muertos* weighing up to 35 kg. (77 lbs.) each. After placement of thousands

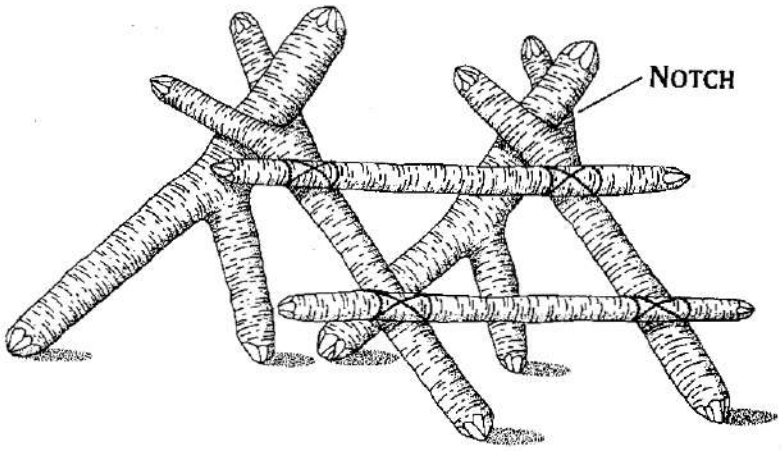

Figure 5. Burros for rock dams.

of *muertos*, the water would rise and flow into an irrigation canal to a depth of about 2 meters (6.6 ft.).

Some *muertos* — made of dirt, mud, gravel, and wheat straw — were called *angelitos*, and they too weighed over 36 kg. (80 lbs.). Each worker made about fifteen *muertos* a day, bringing them on donkeys or on four-man litters to the riverbank, where they were loaded into a *chalan*, ferried to the dam, and dumped into the water.

Figure 6. Sr. Sánchez demonstrates burro dam construction technique.

The dams were sturdy enough to divert the river's water, and a heavy flood could submerge them without harm, but they still needed frequent repairs. The legs or body of the *burro* might rot and break, or be chewed by beavers, or slump due to undermining by the current. Floods might break and carry off sections. Maintenance of the dam and the irrigation canal went on all year, even in winter. The work was organized by a *Sociedad de Agricultores*, that is, by the farmers themselves. The *Sociedad*'s officers called the men to work when needed, and each farmer supplied labor in exchange for the water he used throughout the year. A 24-hour period of irrigation meant six work-days of labor. The work was heavy and dangerous and women and children did not participate. Work groups for the different tasks were led by experienced men.

The farmers who were interviewed recalled long hours of working in the water with only beans, tortillas, and coffee for food and sotol liquor to keep them warm. They remembered the yelling and shouting as they scrambled over the dam and how as it accidentally gave way in the fast current, with an explosive crack it carried men and materials downriver. And they recalled having to start all over again, pulling the *muertos*, one by one, out of the river to be re-used. These farmers attribute their arthritis and rheumatism in their old age to the hours of work in the freezing water. But they raised their dams and kept them up, and they irrigated their fields and fed their families at La Junta de los Rios.

Appendix

Apache Agriculture at La Junta

Recent archeological findings suggest an Apache presence at La Junta by at least A.D. 1650 (Mallouf 1990:21). By 1747, the Apache were trading with the farming Indians at La Junta for horses, corn, and beans. Several Apache bands were living in the mountains nearby (Madrid 1992:51-52) and may have been planting in small gardens. Although Apache groups hunted bison and deer for food, they were also known to have practiced horticulture from prehistoric times, raising beans, corn, and pumpkins (Newcomb 1961:113; Office of the State Archeologist 1984:61-62). As Comanche pressure forced them into more arid regions of Texas and Mexico, the Apache there may have virtually abandoned the growing of crops and have begun to rely more on wild foods (Newcomb 1961:114). By the nineteenth century, some Apache depended on hunting and gathering with planting ranking third in importance as a means of subsistence (Driver 1970:60).

The Spanish made several attempts to settle Apache bands on reservations at La Junta, providing them lands, seeds, and even farmers to help plant (Moorhead 1975:244, 247-251, 259, 261). While they adopted certain traits of La Junta culture (Myers 1971:131), sedentism was not one of them. Spanish reservation experiments ended with the Apache's refusal to build homes and to

plant crops, and with their ultimate flight from the reservations around La Junta in the early nineteenth century.

References Cited

Applegate, Howard G.
1992 The Demography of La Junta de los Ríos del Norte y Conchos. *The Journal of Big Bend Studies* 4:43-73.

Applegate, Howard G. and C. Wayne Hanselka
1974 *La Junta de los Ríos Del Norte y Conchos*. Monogaph 41. Southwestern Studies. Texas Western Press, University of Texas at El Paso.

Betancourt, Julio
1981 Quitman Mountains of Southern Hudspeth County. In *Five Archeological Investigations in the Trans-Pecos Region of Texas*, pp. 27-82. Texas Antiquities Committee Permit Series 6. Texas Antiquities Committee, Austin.

Binford, Lewis R.
1983 *In Pursuit of the Past: Decoding the Archeological Record*. Thames and Hudson, Inc., New York.

Bowden, Charles
1977 *Killing the Hidden Waters*. University of Texas Press, Austin.

Brody, J. J.
1977 *Mimbres Painted Pottery*. The School of American Research. University of New Mexico Press, Albuquerque.

Carrasco, Jesús José
1994 Interview by author. 22 September, Ojinaga, Chihuahua.

Castañeda, Carlos E.
1976 *Our Catholic Heritage in Texas*, Volumes 1 and 2. Arno Press, New York.

Cordell, Linda S.
1984 *Prehistory of the Southwest*. Academic Press, Inc., Orlando, Florida.

Di Peso, Charles C.
1974 *Casas Grandes: A Fallen Trading Center of the Gran Chichimeca*. Volume III. Amerind Foundation, Inc., Series 9, Northland Press, Flagstaff.

Doolittle, William E.
1990 *Canal Irrigation in Prehistoric Mexico: The Sequence of Technological Change*. The University of Texas Press, Austin.

Driver, Harold E.
1970 *Indians of North America*. University of Chicago Press, Chicago.

Emory, William H., Major
1857 From Mouth of Devil's River to El Paso del Norte, 1853-1854. In *Report of the United States and Mexican Boundary Survey*, Volume 1, Part 1. Cornelius Wendell, Printer, Washington.

Favata, Martin A. and José B. Fernández (translators)
1993 *The Account: Alvar Núnez Cabeza de Vaca's Relatión*. Arte Publico Press, University of Houston.

Fontana, Bernard L.
1979 *Tarahumara: Where Night is the Day of the Moon*. Northland Press, Flagstaff, Arizona.

García, Homero.
n.d. *Información de Fco. R. Almada: Datos tomados por Homero García Gutiérrez de los archivos en la Escuela Secundaria Federal de Ciudad Ojinaga, Chihuahua, México*. Typed transcript. Enrique R. Madrid, personal papers, Redford, Texas.

García Carrasco, Viviano
1994 Conversation with author. 26 September. Presidio, Texas.

Gómez, Arthur R.
1990 *A Most Singular Country: A History of Occupation in the Big Bend*. Charles Redd Monographs in Western History 18. Brigham Young University, Salt Lake City.

Gómez, Lerma, Ing. Hector Manuel
1994 Conversation with author. 7 October. Ojinaga, Chihuahua.

Groat, Charles G.
1972 *Presidio Bolson, Trans-Pecos Texas and Adjacent Mexico: Geology of a Desert Basin Aquifer System*. Report of Investigations 76. Bureau of Economic Geology, University of Texas Press, Austin.

Hammond, George Peter and Agapito Rey (translators)
1967 *Expedition into New Mexico made by Antonio Espejo, 1582-1583*. Volume1. Quivera Society, Arno Press, New York.

Hickerson, Nancy Parrott
1994 *The Jumanos: Hunters and Traders of the South Plains*. University of Texas Press, Austin.

Jones, Oakah L.
1991 Settlements and Settlers at La Junta de los Rios, 1759-1822. *The Journal of Big Bend Studies* 3:43-70.

Jordán, Fernando
1978 *Crónica de un País Barbaro*. Centro Librero de la Prensa, S.A. de C.V., Chihuahua.

Jung, Carl G.
1963 *Memories, Dreams, Reflections*. Random House, Inc., New York.

Kelley, J. Charles
1986 *Jumano and Patarabueye: Relations at La Junta de los Rios*. Anthropological Papers 77, Museum of Anthropology, University of Michigan, Ann Arbor.

Kelley, J. Charles and Ellen Abbott Kelley
1990 *Presidio, Texas (Presidio County) Water Improvement Project, An Archaeological and Archival Survey and Appraisal*. Blue Mountain Consultants, Ft. Davis, Texas.

Kopper, Phillip
1986 *The Smithsonian Book of North American Indians Before the Coming of the Europeans*. Smithsonian Books, Washington, D.C.

Leyva, Navarrete, Trinidad
1994 Interview by author. 24 September. El Divisadero, Chihuahua.

Licón Pando, Esteban
1994 Interview by author. 24 September. Presidio, Texas.

Lister, Robert H. and Florence C. Lister
1984 *Chaco Canyon*. University of New Mexico Press, Albuquerque.

Madrid, Enrique R.
1992 *Expedition to La Junta de los Ríos, 1747-1748: Captain Commander Joseph de Ydoiaga's Report to the Viceroy of New Spain*. Office of the State Archeologist Special Report 33. Texas Historical Commission, Austin.

1994 *The Expedition of Captain Joseph de Ydoiaga to La Junta de los Ríos, 1747-48*. Paper presented at the 71st Annual Meeting of the West Texas Historical Association, Midland, Texas, April 8-9, 1994.

Mallouf, Robert J.
1990 *A Commentary on the Prehistory of Far Northeastern Chihuahua, The La Junta District, and the Cielo Complex*. Paper presented at the Segunda Congreso Historia Regional Comparada, Universidad Autonoma de Ciudad Juarez, Mexico.

Martin, Paul S.
1970 *The Last 10,000 Years: A Fossil Pollen Record of the American Southwest*. University of Arizona Press, Tucson.

Minjares Sánchez, Pedro
1994 Interview by author. 27 September. Santa Teresa, Chihuahua.

Moorhead, Max L.
1975 *The Presidio: Bastion of the Spanish Borderlands*. University of Oklahoma Press, Norman.

Myers, Sandra L.
1971 *The Lipan Apaches*. Indian Tribes of Texas. James Day, et. al. Texian Press, Waco.

Nabhan, Gary Paul
1989 *Enduring Seeds: Native American Agriculture and Wild Plant Conservation*. North Point Press, San Francisco.

Navarro Reynosa, Ing. Humberto
1994 Conversation with author. 7 October. Comisión Nacional del Agua Office. Ojinaga, Chihuahua.

New Encylopaedia Britannica
1986 *Rio Grande*. Volume 10, edited by Philip W. Goetz, pp. 83. 15th edition. Encylopaedia Britannica, Inc. Chicago.

Newcomb, W.W., Jr.
1949 *An Ethnographic Survey of Redford, Texas*. Unpublished manuscript. Enrique R. Madrid, private papers, Redford, Texas.

1961 *The Indians of Texas: From Prehistoric to Modern Times*. University of Texas Press, Austin.

Office of the State Archeologist
1984 *The Years of Exploration*. Living with the Texas Past Series 3. Office of the State Archeologist, Texas Historical Commission, Austin.

Officer, James E.
1971 Arid-lands Agriculture and the Indians of the American Southwest. In *Food, Fiber and the Arid Lands*, edited by William G. McGinnies, Bram J. Goldman, and Patricia Paylore, pp. 47-77. University of Arizona Press, Tucson.

Pennington, Campbell W.
1963 *The Tarahumara of Mexico: Their Environment and Material Culture*. University of Utah Press, Salt Lake City.

Pérez, Elisa Luján
1994 Telephone conversation with author 16 October.

Porras Ruiz, Alberto
1994 Interview by author. 5 October. Redford, Texas.

Riley, Carrol L.
1987 *The Frontier People*. University of New Mexico Press, Albuquerque.

Rubel, Arthur J.
1966 *Across the Tracks: Mexican-Americans in a Texas City*. Hogg Foundation for Mental Health. University of Texas Press, Austin and London.

Spencer, Robert F.
1977 *The Native Americans: Ethnology and Backgrounds of the North American Indians*. Second edition. Harper and Row Publishers, New York.

Velásquez, Leonardo
1994 Conversation with author. 31 October. Presidio, Texas.