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SPOT-5 Image of Shanghai

The above image is a segment extracted from a SPOT-5 full scene of 60 km × 60 km. It was created from merging 2.5-m resolution panchromatic data with 10-m resolution multispectral data.

The Earth From Afar: Image Review

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The Spanish Long-Lots in Southwestern United States

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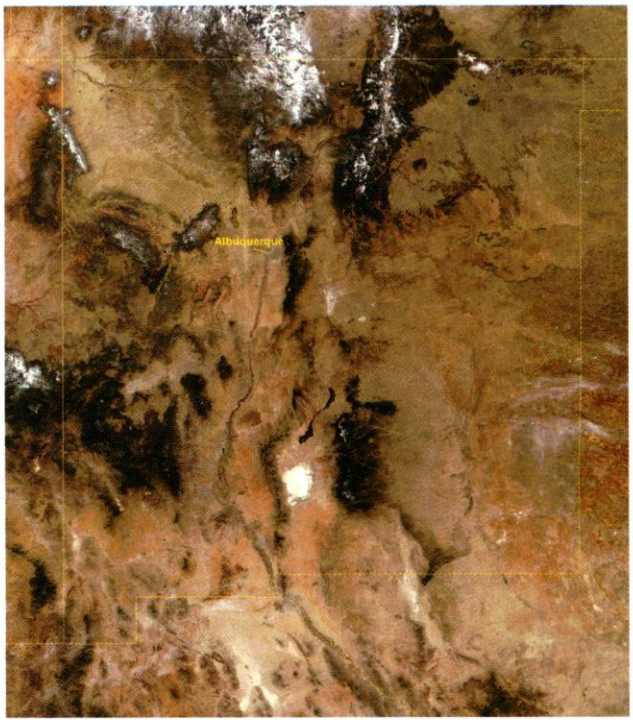
This image review centers on the Spanish long-lots found in northern New Mexico and south-central Colorado in the United States. More specifically, the review examines the development of long-lots in the Albuquerque area (Map) with attention being given to the community of Corrales. Present day satellite imagery illustrates the long-lot patterns but to understand these patterns one needs to know the history and logic for organizing the land in this manner.



Map New Mexico, US, taken January 3, 2003. Image provided by Jacques Descloritres, MODIS Land Rapid Response Team, NASA/GSFC.

Hispanic Period

In 1540, the Spanish entered the area known today as New Mexico. Francisco Vasquez de Coronado marched from Mexico with a large entourage in search of the mythical seven cities of Cibola. As they traversed the region from the Gulf of California to Kansas, they wintered in 1540 on the west bank of the Rio Grande, 20 miles north of Albuquerque. Although Coronado did not find his seven cities of gold, Spanish settlers started arriving in the Rio Grande Valley by the late 16th century. In 1598, the first Spanish capital of San Juan de los Caballeros was established at the Tewa Pueblo of Ohke, just north of present day Espanola. Twelve years later in 1610, Santa Fe was established with a central plaza and the Palace of Governors. The central plaza and the Palace of Governors still form the heart of the city. Also in 1610, Gaspar de Villagra published the first book about a geographic region in modern United States. It dealt with the founding of New Mexico. On the east coast of the United States, the first English settlement of Jamestown was just being established in 1607.

By 1626, the Spanish Inquisition reached the New Mexico region and created the seed for what some people call the first American Revolution. After several decades of harsh treatment by the Spanish and the Catholic Church, the various Indian Pueblos in the Rio Grande Valley joined forces, just

like the thirteen colonies in the late 18th century did against England, and brought about the Pueblo Indian Revolt in 1680. Spanish survivors fled to El Paso. After the revolt the pueblos did not maintain their newly formed confederation and were subjected to numerous raids by the Navajos, Apaches, and Comanches. By 1692, the pueblos were too weak to resist the return of the Spanish. Spain remained in control of the Southwest until 1821, when Mexico declared its independence from Spain.

Before the 1680 revolt, Spain's land policy in the Rio Grande Valley was based on *encomiendas* that were owned by companies. They involved large tracts of land but had few settlers. They were designed principally around raising livestock. The Spanish mainly received their basic food needs from surplus production of the Pueblo Indians. After the reconquest in 1692, Spain refocused its land policy to center on granting tracts of land to individuals or groups of settlers. It wanted to colonize the region with more settlers and establish self-sufficient settlements. These settlers were to be farmers that produced their own food. Initially, individual land grants, *sitios*, were provided, generally to people who were recognized for their special accomplishments for the Crown. For the most part these grants covered many thousands of acres and it was expected that the individuals receiving the grants would bring about the settlement of the land. By the mid-1700s, colony grants became the preferred method of distributing land and producing more settlements. These grants were given to groups of settlers who agreed to work the land and form colonies. These grants were also assigned to individual land developers who had to recruit settlers.

Colony grants normally consisted of three basic types of land conditions: bottomland near a river or stream, upland, and woodland. Settlers received access to each type. Bottomlands were often irrigated and used for forage and garden crops. The uplands were meadow areas used as common pasture lands, mainly for sheep. Woodlands were located in the higher elevations and provided wood for fuel and building materials. They might also be used for summer grazing and hunting. Not all grants had easy access to woodland areas.

Each settler and family was assigned a parcel of the bottomland. A parcel, called a *linea* or sometimes a *tripa*, consisted of stream frontage and ran perpendicular to the stream across the breadth of the stream's floodplain and beyond. A community irrigation ditch, *acequia*, was started upstream and paralleled the stream. Through gravity flow, water from the ditch was channeled to that section of the *linea* between the ditch and stream. A *mayordomos* would oversee the upkeep of the *acequia* and the amount of water each *linea* would receive. The width of a *linea* ranged from 50 to 300 *varas*; however, most *lineas* were 100 to 150 *varas* in width. A *vara* was thirty-three inches (85 cm). The width of a *linea* remained fairly constant throughout its length since the streams in this dry region did not meander extensively. The French long-lots in the lower Mississippi River Valley varied in width to compensate for the meandering of rivers. Also, these long-lots did not need access to water for irrigation but for transportation. The length of a Spanish *linea* was much greater than its width, resulting in a long-lot pattern. Some long-lots extended one mile (1.6 km) in length. Through inheritance, the long-lots were equally subdivided between a person's heirs. This process created narrower lots since each heir received a portion of the irrigated land.

The old Spanish influence on the Southwest, especially in northern New Mexico, remains strong even to the present time. Figure 1 illustrates the geographic distribution of two different Hispanic groups in the year 2000. The one map shows individuals of Mexican ancestry. These are people who trace their heritage to Mexico and are mainly first or second generation. They basically reside along the border with Mexico. The second map shows individuals who are classified by the Bureau of the Census under the generic term, "Other Hispanic." This term covers various Hispanic groups throughout different sections of the United States. In the Southwest, this term relates primarily to people who trace their ancestry back to when Spain controlled the region. They are concentrated in northern New Mexico, where Spain had its greatest influence. Albuquerque is located within this region.

Albuquerque

On April 23, 1706, Francisco Cuervo y Valdes, the Governor of New Mexico, petitioned the Spanish government to designate the Bosque Grande de San Francisco Xavier as a formal villa. A *bosque* is a forest or an area of thick vegetation along a river. By Spanish law thirty families were required to live in a place for it to be established as a villa. However, only 18 families resided in Bosque Grande. In his petition, Governor Cuervo fallaciously indicated that 35 families lived in the bosque. The person who reviewed the petition was Viceroy Francisco Fernandez de la Cueva, the Duke of Alburquerque. Cuervo recommended that the villa be called Alburquerque, a move that resulted in the petition being accepted and the villa of Alburquerque was formed. Years later the first "r" was dropped from the name and the city became Albuquerque.

Today, the original site of Albuquerque is called Old Town. It is located on a slight prominence on the flood plain of the Rio Grande. It was designed around a central plaza with a Catholic church situated on the north side of the plaza. The streets were narrow but arranged in a grid pattern. Other than the church the buildings were low level adobe structures. Around the plaza these buildings contained stores and other small businesses. The most desired residential sites were near the plaza, within easy walking distance of the stores and the center of activity.

In addition to the villa of Albuquerque, the Spanish settled other sections along the Rio Grande that were in close proximity to Albuquerque. These settlements were farming communities and organized using the long-lot system. As the years passed these places became part of the present day

Albuquerque metropolitan area and have shaped the city's morphology. Figure 2, a false color composite from Landsat 7, shows the concentration of the long-lots along the Rio Grande as it passes through the west side of the city.

In 1880 the railroad arrived in Albuquerque and changed the city's ethnic makeup and its land structure patterns. By 1885, Albuquerque's predominant population had become Anglo. It was not until the 1980s, a hundred years later, that the Anglo population surpassed the Hispanic population in Santa Fe. Figure 2 clearly reveals the Anglo landscape. The square city blocks on the east side of the city represent a continuation of the Public Land Survey and stand in sharp contrast to the Spanish long-lots. The integration of these two land systems has created transportation flow and land use issues. The grid street pattern associated with the Public Land Survey does not come together easily with the long-lot's linear street pattern. The long-lot's shape does not accommodate large scale commercial and industrial land use conditions found in the Anglo landscape.

Corrales

The community of Corrales, which is located on the west side of the Rio Grande, represents a good example of the Spanish long-lot system within the Albuquerque area. It was part of the old Alameda land grant. In 1710, after an attempt by the Spanish government to reinstate an Indian population in the Alameda Pueblo, a grant of the Alameda lands was given to Francisco Montes Vigil, a soldier in the Spanish army. Vigil sold his grant to Juan Gonzales in 1712 since he was not able to develop the land as required by Spanish law. Gonzales was the Alcalde Mayor of Albuquerque and had a large family. His descendants established Corrales. They followed the long-lot arrangement found in other areas of the Rio Grande Valley.

Corrales' early existence was precarious, but as the population grew, long, narrow farms extending from the river to the sand hills developed. The more fertile and irrigable land in the river bottom was used to raise chile, corn, beans, fruits and vegetables, while a large upland common pasture (55,000 acres) existed on the sandy mesa. No mountain woodlands were readily available but the bosque along the river provided wood for cooking and heating. In 1821, Mexico gained its independence from Spain and established trade with the United States. However, within twenty-five years the United States took control of New Mexico as a territory.

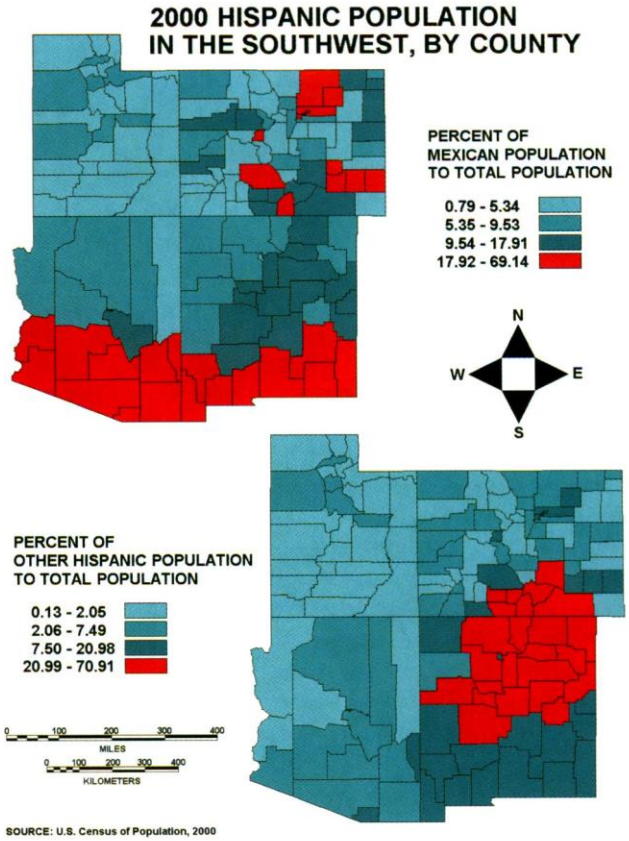


Figure 1 Hispanic Population in Southwestern United States, 2000.

Figure 2 False Color Landsat Composite, taken May 5, 2000.

Very little is known about Corrales during this period but the 1870 U.S. census identifies nine families with holdings of 600-1200 acres each. Four surnames - Gonzales, Montoya, Chavez, and Martin - account for all of these holdings.

In 1879 the Alary family moved to Corrales and obtained land from Don Diego Montoya. The following year the Alarys were growing grapes acquired from California. By 1900, the Alary farm became the Alary Wine Ranch. Other European farmers from France and Italy came to Corrales and for nearly 40 years Corrales was known for its vineyards and the making of wine. Another crop for which Corrales became well known was apples. By the late 1930s much of the land east of an old acequia that paralleled Corrales Road was covered with orchards.

In the 1880s, a large number of Anglos from eastern United States arrived in Albuquerque. Many of these people came for health reasons. They acquired land in the North Valley, including Corrales. At the same time recurrent floods and poor drainage had by 1920 raised the water table and forced alkali into the soil, especially in the lower sections of the long-lot parcels. With the productivity of the fields dropping many owners were interested in selling their land. Although the land was later drained and improved by the Middle Rio Grande Conservancy District in the 1930s and 1940s, interest had shifted from farming to building homes. Also, the new owners were not interested in grazing animals and in 1923-24, the grassy mesa west of the village, which had been held for over 200 years as common grazing land, was sold to Robert Thompson. Corrales had changed from being mainly Hispanic to being Anglo. However, the long-lot patterns remained well established.

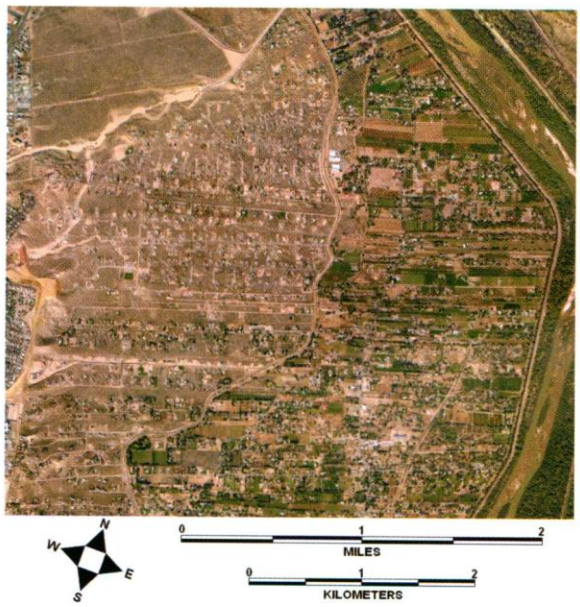


Figure 3 The Color Image of Corrales' Long-Lots, taken October 1999.

Figure 4 Main Acequia through Corrales.

Figure 3, a one-meter pixel resolution image, illustrates the current land use patterns. The Rio Grande with its immediate floodplain cuts diagonally across the eastern edge of the image. Meandering through the center of the image is the main *acequia*. Figure 4 provides a ground view of this *acequia*. The dirt path next to the acequia is used as a riding path and by the *mayordomos*. A major road parallels the *acequia* on the west side. A high density of mixed residential, small commercial shops, and farms exists on the long-lots between the *acequia* and the river. The landscape is much greener here due to irrigation. Where the long-lots stop on the west side of the image, the topography sharply increases to the top of the mesa that is covered by high density housing. The area between the mesa and the *acequia* was never heavily farmed since the irrigation water could not be directed up slope. The natural vegetation in this area is sagebrush but some trees have been introduced. A great many adobe style homes have been constructed here in recent years. Generally tall sagebrush surrounds the homes and separates them from neighboring homes. Few homes have green grass yards or trees. This condition stands in sharp contrast to the green, tree-covered areas on the other side of the *acequia*. Some homes are small urban ranches with small barns and corrals for horses. Figure 5 shows a typical road scene in this area. The road separates two former long-lots and runs up to the sandy mesa edge.

Figure 6, an aerial photograph, depicts in greater detail the mixed land use of homes and small farms that exists in the area between the acequia and the Rio Grande. One can detect orchards and small farm fields and a variety of housing patterns. Roads show the boundaries between the former long-lots that are now broken up into individual residential parcels. The size and shape of the long-lots make them not suitable for large track residential development. Areas that are larger in size and more squared off in shape are needed. This situation also holds true for large commercial development. Large shopping malls, even small shopping centers, are not found here. The long-lot type of development found in Corrales extends the full north-south length of the

Figure 5 Typical Long-Lot Road through Non-Irrigated Section of Corrales with Rio Rancho on mesa in background.

Rio Grande Valley through Albuquerque and represents a barrier to the westward growth of the Anglo settlement patterns.

Rio Rancho

In the early 1960's, a company called American Realty and Petroleum Company (AMREP) established a new planned community named Rio Rancho. AMREP acquired the 55,000 acres of common grazing land that was originally part of the Corrales settlement and later sold to Robert Thompson for ranching. In 1970 Rio Rancho had 500 families. During the 1970's AMREP acquired an additional 35,000 acres and platted the land for sale. By 1980, the community's population exceeded 10,000, and continued to increase to 35,000 by 1990, and 50,000 by 2000. Today, Rio Rancho is the fourth largest city in New Mexico. Originally, AMREP anticipated that the majority of the people moving to Rio Rancho would be retirees from the East and Midwest. The company strongly promoted the attractions of Rio Rancho to people mainly living in the large urban areas of the East and Midwest. However, many young families moved to the city and about eighty percent of the residents came from Albuquerque. Many people in Albuquerque were looking for a suburban environment. Figure 7 shows the western edge of the Corrales' long-lots and the eastern edge of the mesa, which used to be the common grazing area for the Corrales farmers but is now a portion of Rio Rancho. One can detect the typical suburban street patterns and spatial organization of land found on the edge of many American cities. Thus, the former common grazing land with its large size and polygonal shape has become suburbia. By not being laid out in long-lots, it was more suited for large scale residential, commercial, and industrial development than the land in Corrales and other sections along the Rio Grande within the Albuquerque metropolitan area.

Today, the Spanish long-lot pattern still exists on the

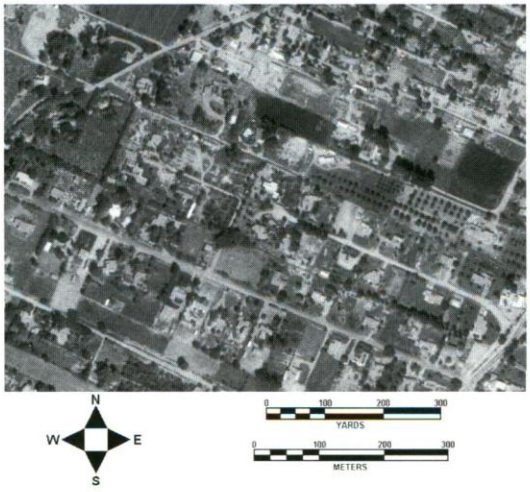


Figure 6 Aerial Photograph of Irrigated Section of Corrales, taken October 6, 1999.

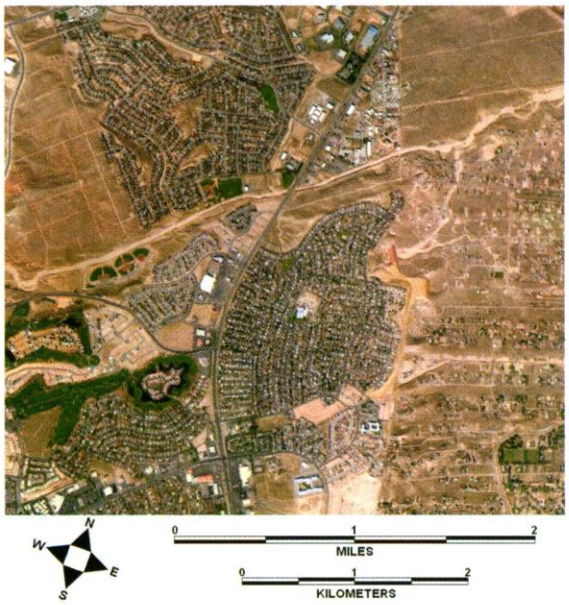


Figure 7 True Color Image of Rio Rancho and western edge of Corrales, taken October 1999.

landscape but its use is changing. In urban areas the land is shifting away from farming to residential use, and in the process, the lots are breaking up into smaller parcels that are more block-shaped than linear. In the rural areas, the small farms associated with the irrigated sections of the long-lots find it difficult to compete against large Anglo farms using pivotal irrigation. Many of these small farms are being sold to developers who are more interested in the water rights than the land.