

HANDOUT 1: Early Users of Water in New Mexico

It is difficult to think about how we presently use water in New Mexico without first understanding the history of how we used it in the past.

Pueblo Communities' Early Use of Water

Nature in the Southwest is harsh. The early Native Americans had few choices - either they adapted to the conditions, or they moved to another region. The farming methods used by the early Pueblo Indians illustrate how Native Americans adapted to a limited supply of water.



The western Pueblo people - such as the Hopis in what is now Arizona and the Lagunas and Zunis in what is now western New Mexico - lived on mesas and in canyons. There were few streams, and those streams flowed for a limited time of the year.

Farming was a family affair. Each family planted their crops at the base of mesas. They sowed plants close together to prevent evaporation and to conserve water. When it rained, the run-off collected and flooded the crops. This **flood-water** method of farming was developed by these western Pueblo people.

The eastern Pueblo peoples - such as the San Juans, Santo Domingos, and Isletas - lived near the Rio Grande. Farming did not require as much labor for them as in the western Pueblos. Here the soil was better for farming and the water supply was more permanent. They learned it was possible to build canals and ditches to run the water out of the river and onto the fields. They terraced their farms to control the water's flow. This was an early system of irrigation existing along the banks of the Rio Grande.

Because farming required a great deal of labor, the whole community became involved in building, repairing, cleaning and using the water system. As a result, water was an important part of their religious ceremonies.

The Pueblos have preserved these early systems of water use which have existed for at least a thousand years and are still being used today. They have maintained their reverence for water as well. Water is still the "Life source, a gift of the Great Spirit." Because Pueblos were the first users of water in New Mexico, their water rights today remain separate from other Indian and non-Indian water rights. This unique status is recognized in law. Pueblo Indians have aboriginal rights or first claim to water. This is called in law the right of **prior appropriation**.

The Spanish Settlers' Early Use of Water

When the Spaniards came to settle in New Mexico in the early 1600's, they found plenty of land but little water. They knew water was necessary for their survival. They used water for farming, grazing livestock, and maintaining the family household. This scarcity of water was similar to conditions in their native Spain. They, therefore, brought to New Mexico their own ditch irrigation system and their legal system of water control.

For these reasons early Spanish settlers usually located their communities in river valleys. Their first task in establishing a new settlement, was to build the community irrigation ditches called **acequias**. These acequias were a combination of Spanish and Pueblo farming practices. They recognized the importance of these native irrigation systems already in place and adapted some of the practices of the Pueblo Indians.

The Spaniards called the main canal the **acequia madre (mother ditch)**. The acequia madre diverted (shifted) water from the river two or three miles upstream from the community. By gravity, water flowed in the acequia to where it was needed. The acequia madre delivered water to smaller canals. Ditches connected to the smaller canals carried the water to individual locations and delivered water for household use and for irrigation. Every resident had a right to use the water from the acequias. He also had the responsibility to keep the acequias clean and to obey the rules for their use.

The entire community of water users owned the acequias. Common ownership of the water system helped organize the community. The settlers elected a board of citizens to govern the acequia. They called these boards "associations." The associations were forms of government in the villages. New Mexico law still recognizes the authority of the associations to govern the acequias.

The acequia association hired a **mayordomo** to attend to the affairs of the acequia. The mayordomo had the authority to force residents to help repair the ditch and to help keep it clean. He fined anyone who failed to do his share of the work. The mayordomo was also in charge of the fair distribution of water. He decided when and how much water to deliver to any household or farm. He imposed other penalties, too. Failure to close a water gate properly resulted in a fine and responsibility for paying for repair or flood damage. Contaminating water was also punishable by a fine.

These systems of acequias are still in existence today. Many of the latest settlers have also adopted the acequia system. There are hundreds of acequias in the Rio Grande basin irrigating some 65,000 acres.

The 'Anglos', the Latest Settlers

Even before the area we know as New Mexico became a part of the United States in the mid 1800's, 'Anglos' had begun to come into New Mexico. (**Anglo is not a very accurate name because it is a term that refers to people who originally came from England. Many of the 'Anglos' were from France, Germany, Russia, Italy, etc. Some were Blacks. We will use the term here because historically it included everyone who was not Native American nor Hispanic.**)

The Anglos came as traders, fur-trappers, and early cattlemen. After the Civil War hundreds came to homestead under the new Homestead Act of 1863. This law gave 160 acres to a person who would settle on the land, make improvements' and farm. Water was crucial for their survival as well. New technology allowed wells to be dug to get at water below the surface of the land or ground water lying in aquifers. The invention of the windmill allowed wells to bring water to the surface. Some explored methods of dry land farming which relied strictly on rainfall and no water from the river system.

The coming of more people increased the demand for water. By 1880 water shortages had begun. In 1891 artesian ground water was discovered and put to use for agriculture. (**Water in artesian wells rises to the surface because of pressure from within the earth. No pumping is necessary**) Soon, however, ground water levels began to fall. A law passed in 1931 ended the drilling of artesian wells for irrigation.

Recent Developments in Water Use in New Mexico

In 1902 the United States Government authorized the building of dams on the Rio Grande and the Pecos River. These dams were to control floodwater and sedimentation as well as to store water for later use when it was drier. This water was for users downstream who also had rights to water for irrigation, towns and cities, and industry. The Pecos River Project was completed in 1907. Elephant Butte Dam was finished in 1916. For many years it remained the largest man-made lake in the world. It opened up new farmland in New Mexico and Texas.

The Jemez Canyon Dam was built in 1953. The Jemez River runs into the Rio Grande north of Bernalillo at Angostura. This dam catches floodwaters from the Jemez River when the downstream area of the Rio Grande cannot handle more water. The Abiquiu Dam located on the Chama River was completed in 1962. The last large projects - the San Juan-Chama Project and the Navajo Indian Irrigation Project - were started in 1962. Together they are the major surface water supply for the Navajo and Jicarilla Apache reservation as well as for electrical generation in the Four Corners Area. The water is also used for recreation, and some is sold to the city of Albuquerque. The Galisteo Dam was completed in 1970 and Cochiti Dam, one of the eleven largest earth dams in the world, was completed in 1975.



HANDOUT 2: New Mexico Water Law

Water law in New Mexico is based on Spanish and Mexican law. Our present laws to regulate water use began under Spanish colonial government and continued through the Mexican and American periods. Today, our water law is also influenced by the government of the United States. To make wise decisions about water in our state, we must consider our history and cultural heritage. A hasty decision might destroy some traditional ways of life in the state.

Water ownership

Who owns the water you drink or use daily to bathe, do laundry, irrigate lawns? Are there any legal limits to the amount of water an individual can use? If you live in a city or town, residents have common access to the local water system. As in colonial times, our community holds the water for the benefit of all. In colonial days, people worked to help maintain the water system. Today, we pay fees to our local government to do similar work for the community.

Spanish law decreed that water be available for the benefit of all residents in a particular community. The source of that water, however, was common to all inhabitants of the realm. Under Mexican law, rivers and streams belonged to the nation, but the right to use water belonged

to all inhabitants. Water was first used for household needs. The remainder could then be used for irrigation and watering stock.

Today, all of the surface and ground water sources of New Mexico belong to the state. The state holds the water as trustee for the people. No one individual owns the water, but persons may acquire a right to use water under state law. There are limits to the amount of water one may take from the system. A person may take only the amount of water he can put to a beneficial use, like household use and crop irrigation.

Prior appropriation

How does one acquire a right to use water? New Mexico law uses the principle "first in time, first in right," or prior appropriation. This principle is based on the idea that the state holds the sources of water for the public good; but, the citizens have a right to take and use the water itself.

Under the principle of **prior appropriation**, the first user (appropriator) in time has the first right to take the water he needs. That which is left may be taken by the next user, and so on, until the supply is gone. Early comers to the system have a better right. They can take as much water as they need and have a legal right to use. Late comers take whatever water is left, if any. Late comers may buy rights from earlier appropriators. The law creates a system of senior and junior water rights. A senior right takes full right. A junior right takes what remains. Perhaps an example would be helpful.

Joe is the first person to take water from a stream to irrigate his crop of beans. Because Joe is first in time, he has first right to use all the water he needs. One day later, Ramiro approaches the stream to irrigate his corn. Ramiro takes from the water Joe did not use. Ramiro is the second person in time and has the second right to use all the water he needs. Joe and Ramiro have established a priority right to use water from that stream.

A few years later, Sam comes to the stream. He is third in time. If there is any water left in the stream, Sam has a right to use it. Joe and Ramiro have a senior right; Sam has a junior right. During a drought, there may not be enough water to meet the demand. Joe takes his right. Ramiro takes his. Because of his junior right, Sam gets no water. Sam might make an offer to buy Joe or Ramiro's right.

Beneficial use

The law in our state requires a water user to make beneficial use of the water he takes from the system. Beneficial use provides the measure and the limit to a user's right. This means a user may take only the amount of water he can use for a lawful purpose. The use of that water must benefit the user in some way. At the same time, the use of the water must be consistent with the general public interest.

A water user in New Mexico may hold his right for as long as he uses the water. He may sell, will, or transfer his right to another person. A user may voluntarily give up his water right. He may also forfeit his right by abandonment; that is, he stops using water beneficially for four years. Then the water becomes available to others. The basic idea of prior appropriation is that if a user no longer needs the water, it can go to another person who will use it in a beneficial manner.

Allocating (*distributing*) water

At the turn of the century, the territorial legislature created the State Engineer Office. The State Engineer keeps track of all water rights in the state and prevents the gross misuse of water. The State Engineer measures the amount of water being used and decides whether there is a beneficial use.

The State Engineer Office approves all new appropriations and changes in water use. For example, he decides how much water can be set aside for cities or farming and how much to keep in storage. He decides whether a user can change the source of his supply from surface water to ground water. He decides how much water to send downstream to meet compact and treaty obligations.

The State Engineer Office is a powerful position in state government. The job, however, was much easier when there were fewer demands on the supply.

Interstate Compacts

The United States Constitution prohibits the states from making treaties with other nations. The states, however, may enter into agreements with each other. These agreements are called **compacts**. All compacts are approved by the U. S. Congress and signed by the President. Compacts are above state laws and state constitutions.

New Mexico is a party to nine interstate compacts. These compacts regulate water sources that cross state boundaries and are **between** or **inter-state**. They also provide ways to settle disputes among the parties. The following are some examples of New Mexico's interstate compacts:

The Colorado River Compact was entered into in 1922. It provides for fair division of water in the Colorado River system. It includes New Mexico, Arizona, California, Colorado, Nevada, Utah and Wyoming.

The Rio Grande Compact was formed in 1939. It includes Colorado, Texas, and New Mexico. It determines fair distribution of water from the Rio Grande system.

The Pecos River Compact is between Texas and New Mexico. It regulates the amount of water that must flow from the Pecos River into the Rio Grande.



Treaties

Water in New Mexico is also a player on the international scene. The Rio Grande and Colorado River flow through Mexico, too. There are several treaties between the United States and Mexico regulating water in these river systems. For example, in 1906 both countries signed the Rio Grande Convention Treaty. The treaty provides for fair division of water in the Rio Grande. It requires that the United States deliver to Mexico 60,000 acre-feet of water annually.

As you have seen, water law is complex. We have only briefly discussed a few of the key principles of law that affect and determine how we use our limited resources. Not only does water law span time, it also spans state and national borders.

Handout 3: New Mexico Water Use

The water supply

Water in New Mexico comes from two sources, surface water and ground water. As you will learn below, there is a limited supply of both.

Surface water comes from snow that gathers in the mountains during the winter and from the summer rainfall. Surface water flows in our rivers and streams. Some is held in lakes and reservoirs. Approximately 3.3 million acre-feet of water fall on New Mexico, annually. An acre foot is the amount of water it takes to cover one acre of land with one foot of water. An acre-foot contains 325,851 gallons of water. If you study the map on Map 2, you will see the river basins where surface water is located.

Approximately 5.7 million acre-feet of water flow in New Mexico rivers and streams during the year. The additional water comes from Colorado via the San Juan River and the Upper Rio Grande. Because of interstate compacts and treaties, 3.4 million acre feet belong to other states and to Mexico. The surface water available for use in New Mexico during an average year is 2.3 million acre-feet. We cannot expect the level of surface water to increase.

All of New Mexico's share of surface water is appropriated or allotted under our water rights laws. In wet years, extra water is stored in reservoirs for future use during drought years. Some reservoirs hold water only for flood control. The water must be released gradually to fulfill compact and treaty obligations.

Ground water is found in most parts of the state. It comes from underground reservoirs, or **aquifers** that are recharged by rain, snow, and river water seeping into the ground. There are 32 aquifers in New Mexico. Together, New Mexico's aquifers hold 20 billion acre-feet of water. Of those, 3 billion are fresh water and 1.4 billion are mildly saline (salty) water and still usable. The remaining 15.6 billion acre-feet are totally unusable. The water is either too saline or unreachable.

Ground water provides over one-half of the water used in New Mexico today. More than 90 percent of New Mexico's 1.5 million people get their household water from wells. We use this water for drinking, cooking, bathing, doing laundry, flushing toilets, washing cars, and irrigating lawns and other landscape.

Current water demand

We measure water use in terms of withdrawal and depletion. **Withdrawal** is the amount of water we take from our sources. In 1990, New Mexico withdrew 4,228,661 acre feet of surface and ground water. We did not use the entire withdrawal, however.

Some water returns to the rivers or streams or seeps back into the ground. This is called **return flow**. The return flow in 1990 was 1,591,033 acre-feet. This means that we depleted 2,637,627 acre-feet. **Depletion** is the water we have used that is no longer available. It evaporated, or was consumed by man, animal, or crops. In 1990 we depleted 62.4% of the withdrawal. The figures below show withdrawal, return flow, and depletion of both surface and ground water in 1990:

Surface water

withdrawal	2,253,812 acre-feet	52.3% of total withdrawal
return flow	1,053,076 acre-feet	
depletion	1,200,735 acre-feet	45.5% of total depletion

These figures illustrate that New Mexicans depend heavily on both surface and ground water. It may be surprising to learn that more than half of our annual depletion is ground water. Aquifers are very slow to recharge. Nature cannot replace the ground water as fast as we use it. Ground water levels are declining in many parts of the state.

Ground water

withdrawal	1,974,848 acre-feet	47.7% of total withdrawal
return flow	537,956 acre-feet	
depletion	1,436,892 acre-feet	54.5% of total depletion

Current water users

To get a better picture of water demand in New Mexico, we will examine current water users. Look at the categories listed below to identify the water users. The figures tell you how much water they use. The figures shown in bold are totals for the entire state of New Mexico. The surface and ground water figures apply only within the category where they are listed. These statistics are for 1990. They are from the State Engineer Office.

Agriculture

Withdrawal	3,376,427 acre-feet	78.8% of state total
surface water	1,839,325 acre-feet	54.5%
ground water	1,537,102 acre-feet	45.5%
Depletion	1,990,176 acre-feet	75.4% of state total
surface water	809,217 acre-feet	40.7%
ground water	1,180,959 acre-feet	59.3%

