

8

History-Social
Science Standard
8.8.4.



Struggles with Water

California Education and the Environment Initiative

Approved by the California State Board of Education, 2010

The Education and the Environment Initiative Curriculum is a cooperative endeavor of the following entities:

California Environmental Protection Agency
California Natural Resources Agency
California State Board of Education
California Department of Education
Department of Resources Recycling and Recovery (CalRecycle)

Key Partners:

Special thanks to **Heal the Bay**, sponsor of the EEI law, for their partnership and participation in reviewing portions of the EEI curriculum.

Valuable assistance with maps, photos, videos and design was provided by the **National Geographic Society** under a contract with the State of California.

Office of Education and the Environment

1001 I Street • Sacramento, California 95814 • (916) 341-6769

<http://www.CaliforniaEEI.org>

© Copyright 2011 by the California Environmental Protection Agency

© 2013 Second Edition

All rights reserved.

This publication, or parts thereof, may not be used or reproduced without permission from the Office of Education and the Environment.

These materials may be reproduced by teachers for educational purposes.



Lesson 1 California and the Colorado

California Connections: California and the Colorado 2

Lesson 2 Heading West

U.S. Physical Features 6

Lesson 3 American Indians and Water Rights

Case Study: Fishing Rights in the Great Lakes 7

Case Study: Access to Irrigation Water in California 8

Case Study: The Battle for Blue Lake 9

Lesson 4 Comparing the Cases

None required for this lesson.

Lesson 5 The Colorado River Revisited

Technology and the Colorado River 10

California and the Colorado



The Colorado River travels through some of the hottest, driest, most rugged country in the nation. It begins in the Rocky Mountains and ends its journey in Mexico. Along the way, it flows through seven states. This river is a major source of water for the arid Southwest.

Urbanized Southern California historically has relied about 60% on imported water, with the Colorado River making up over half of the imported water. This important water source was unpredictable. Before the construction of modern dams, the river's flow could change within days from a trickle to a deluge that sent water and silt barreling down the riverbed. But today the flow in the main stem is closely controlled.

Now, as in the Past

Many American Indians relied on the Colorado River's natural ebb and flow. In California, the Kamia people took advantage of the river's floods to water their crops. When gold miners settled in California's Colorado River basin in the mid-1800s, they diverted river water to capture gold and to cultivate crops.



Aerial view of Colorado River

Then, in 1892, a developer named Charles Rockwood had a vision. He imagined building a canal to bring Colorado River water from the state's eastern edge into the heart of Southern California. This canal would turn some of the driest land in the United States into fertile fields for agriculture. All he needed was money.

An investor from Los Angeles, George Chaffey, provided \$150,000 for the project. In 1901, developers cut an opening into the river channel. This opening diverted a large part of the river to the low valley some called the "Valley of the Dead." To attract settlers, Rockwood changed the name to Imperial Valley. Within a year, 2,000 new people had settled there, and the town of Imperial was born. By 1904, 7,000 people were living in the Imperial Valley. The once-dry valley floor was now green with fruits, vegetables, and pasturelands. All of this was watered by the Colorado River.

California's "Water Grab"

At first, nobody complained about what people in California were doing with the river. For almost eight years, California



Colorado River canal, California

took as much water as it could from the Colorado. The law at the time said that the first person (or people) to "develop" a water source had more rights to the water than any users who came later. While California's population was booming, other areas in the southwest had fewer people and a lot less agriculture. But the Colorado River ran through six other states and another country. California did not add a single drop to its flow. Some people in the other states grew worried. If California established first

water rights to the Colorado, the other six states would never get their fair share of the water.

Leaders from all seven states (but not Mexico) met in 1922. Their goal was to come to an agreement about how to use the river fairly. They argued for 11 months before reaching a compromise. Their agreement, ratified by each state's Legislature and by Congress, is called the Colorado River Compact. It divides the Colorado River States into an Upper Basin

and a Lower Basin. The states in the Upper Basin are Arizona, Colorado, New Mexico, Utah, and Wyoming. The states in the Lower Basin are Arizona, California, Nevada, New Mexico, and Utah. (As defined in the compact, three states, Arizona, New Mexico, and Utah, each have land within both basins.) According to the Compact, the Upper Basin and the Lower Basin would receive the 7.5 million acre-feet of water, and the Lower Basin would further receive the right to an additional 1 million acre-feet of surplus water, when available.

Bumps in the Road

The canals in California that brought water to the Imperial Valley had burst several times. Croplands were flooded, and towns were destroyed. The Salton Sea was created between 1905 and 1907 when the Colorado River burst through irrigation controls and flooded the Salton Basin for a year and a half. For many years, California's government had asked the federal government to help build a dam to control the floodwaters of the Colorado. In 1928, the



Salton Sea, California

Boulder Canyon Project Act was passed. This act permitted the construction of a giant dam. The dam, completed in 1935, was called Hoover Dam. The act said California would get the majority of the Lower Basin's water. Arizona and Nevada, with fewer people and less development, were allocated less water. Once again, Mexico's rights to the Colorado were not considered.

The conflict over the Colorado's water did not end. Soon, Mexico wanted its share. People in Arizona and Nevada complained about how little they had been given

by the 1928 act. Fights broke out within California between agricultural groups and people in the cities of Southern California. Everyone wanted to use more water than was available. People in the Upper Basin states became anxious. They feared that if they did not start using more water, the Lower Basin states would win the rights to use all of it. The next few decades were marked by large projects in all seven states to develop the Colorado River. During this time, California had the right to use water not needed by Arizona and Nevada. In 2003, Arizona

and Nevada began using their full allocations.

By the 1970s, people were concerned with more than just the amount of water they were getting from the Colorado River. Water *quality* was an issue as well. Salt levels in the river had become dangerously high from water diversion, agricultural runoff, and discharges of saline groundwater from highly saline geologic formations in Colorado and Utah. When water evaporated from reservoirs, the problem became more obvious as salt built-up in agricultural fields. In 1974, the Colorado River Basin Salinity Control Act was passed. That act set limits on the amount of salt in the Colorado River water reaching Mexico.

A Fragile Ecosystem

Another issue was the health of the ecosystem. As water from the river was used or changed, the living things in and around the river were affected. The Endangered Species Act of 1973 made it illegal to threaten the environment of an endangered species. Some of the endangered species are part of the Colorado River watershed. As water projects were stopped

to protect these species, conflicts over water use became even more heated. In the 1980s, recreation on the Colorado River became more popular. Rafters and kayakers wanted access to the river's rapids and they added their voices to the many already competing for the river's water.

Colorado River water issues continue. The Colorado River Basin recently experienced an eight-year drought, during which system reservoir storage dropped to about 50% capacity. Drought conditions

have ended and reservoir storage is recovering. Cities in Nevada and Arizona have grown and are using more water. Today, California is actively searching for other sources of water and seeking ways of cutting back on the amount of water that the state's farmers, residents, and businesses use. The challenge in the near future will be to find a balance between water use and ecosystem health. Finding that balance is crucial for everyone in the Southwest, including the people of Mexico.



Hoover Dam, Nevada

U.S. Physical Features

Lesson 2



Case Study: Fishing Rights in the Great Lakes

Background—The cultural, economic, political, and legal factors that led to the conflict:

Hundreds of years ago, the Ojibwa Indians lived on the banks of Lake Superior in what is now Minnesota, Wisconsin, Michigan, and Canada. The lakes provided an important source of transportation and food for the Ojibwa. They were the first people in this region to harvest fish for food, using large canoes and nets. The Ojibwa respected the Great Lakes, and the lakes were important to their spiritual practice. The Ojibwa often held ceremonies and prayers for the great waters. As French and English explorers entered the region, the Ojibwa used fish for trade. Great Lakes fish quickly became an important food source for the European settlers, as well as for the Ojibwa.

As more settlers moved into the area, the U.S. government began purchasing land from the Ojibwa in exchange for small amounts of money or other trade items. Knowing that the Great Lakes were important to the livelihoods of the Indians, the U.S. government signed treaties that guaranteed the Ojibwa access to the lakes. The treaties allowed the Ojibwa to hunt and fish on the land they had “sold” to the government. These treaties ensured that future generations of Ojibwa would have access to the land and water.



Lake Superior, Minnesota

The Conflict:

The treaties between the Ojibwa and the U.S. government were signed before Michigan, Wisconsin, and Minnesota became states. When these areas joined the Union, new state laws were created that limited hunting and fishing. Everyone was expected to abide by the laws, even the Ojibwa. The states did not acknowledge the treaties between the federal government and the Ojibwa, who were no longer given rights to use or fish in the Great Lakes.

Influence on legal, economic, and political systems:

The Ojibwa decided to try to change the state laws regulating their fishing practices and access to the lakes. They filed court cases saying that the U.S. government was not abiding by the treaties it had made with the Ojibwa. Through a series of court cases, the federal government recognized that it was important to honor the original treaties. The federal government agreed that, in some cases, the Ojibwa should not be subject to control by state governments. New regulations were developed and agreed upon. The Ojibwa retained the right to fish, but they had to abide by state laws about how they fished and how many fish they kept.

Case Study: Access to Irrigation Water in California

Background—The cultural, economic, political, and legal factors that led to the conflict:

Before the arrival of Spanish explorers, California Indians lived and worked on the land. Water was important to their livelihood, as well as their culture. They used water to grow a few crops and placed great value on the resource. When the Spanish arrived, they had very different ideas about the importance of water. The Spanish believed that water should be used to improve economic conditions. They created missions in California to convert the American Indian populations to Christianity and used their labor to construct and operate the missions. Many of the missions created large farms. They sold the crops and brought in money, so the farms were important to the development of the economy of the region. Large-scale farms depended on irrigation to get adequate amounts of water for crops. The irrigation projects required the labor of large numbers of California Indians. In 1821, Mexico achieved independence from Spain, and California became part of Mexico. At this time, the emphasis was on a ranching economy.

The Conflict:

The new government encouraged both settlement and farming. The Mexican government began giving land to people who could farm it. This left out the California Indians, most of whom did not have the means to run large-scale farms. In a sense,



California Indians digging irrigation canals

the settlers owned both the land and the water. This created a conflict between the California Indians and the settlers. Because the California Indians did not own land, they did not have access to water.

Influence on legal, economic, and political systems:

Water was a means to achieving the goals of the Spanish missionaries and the Mexican government. Irrigation made it possible to increase crop productivity, so water took on great economic importance. In a practical sense, those who owned the land, owned the water. They could use it to improve their economic situations and to gain control of more resources. The California Indians generally were too poor to own land, and lost access to water as Spanish and Mexican settlement increased. This disparity remained an issue for nearly a century. Finally, in 1906, the U.S. Supreme Court issued a ruling that changed the lives of California Indians and other American Indians. The Court ruled that American Indians who had lost their land still had rights to the water. This ruling, called the Winters Doctrine, became the legal basis for determining Indian water rights in the 20th century.

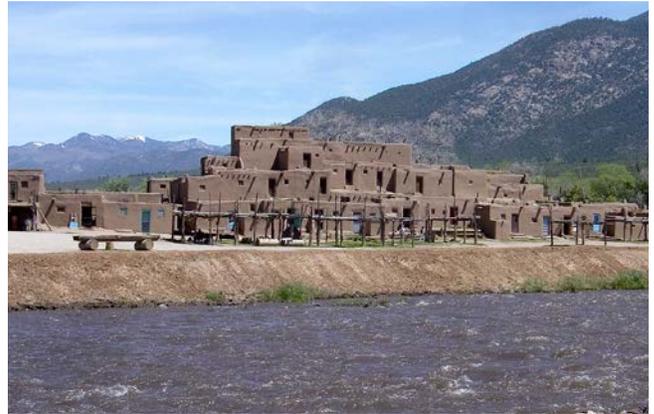
Case Study: The Battle for Blue Lake

Background—The cultural, economic, political, and legal factors that led to the conflict:

The Taos Pueblo have lived near Blue Lake in New Mexico for hundreds of years. Long before this region was a part of the United States, the Taos lived near Blue Lake and worshipped its sacred waters. They believe that their tribe members were created from the water of Blue Lake. At the end of each summer, the Taos have traditionally held a ceremony to celebrate the water. Blue Lake and the surrounding mountains are important to the culture, religion, and community of the tribe. When the U.S. government first acquired this land, the Taos still had access to the lake. In 1906, the U.S. government made Blue Lake and the mountain where it is located part of U.S. Forest Service lands. Many Taos approved of that action. Because more and more people were moving into the region, the U.S. Forest Service could protect this area for the Taos.

The Conflict:

The U.S. Forest Service observed that there were many valuable resources in the area around the lake. They decided the land should be managed for many uses. They allowed tourists to fish, boat, and swim in the lake. They also permitted logging, hunting, and grazing. These activities benefitted the U.S. Forest Service economically. As a result of these management decisions, the Taos lost their land and their sacred sites. The U.S. government saw that the



Taos Pueblo, New Mexico

economic possibilities of the land were more important than the cultural connections the tribe had with the land and the water.

Influence on legal, economic, or political systems:

The Taos wanted sovereignty over Blue Lake and lands, so they appealed to the U.S. government for help. They met with many government leaders to discuss the possibility of returning the land to the tribe. The Pueblo Land Act was passed in 1924. This law stated that the Taos should be given compensation for the land and Blue Lake. However the Taos did not want money; they wanted their land back. In 1951, the Indian Claims Commission—a group created to help settle conflicts between American Indians and the U.S. government—stated that the land had been unjustly taken from the Taos. In 1970, President Richard Nixon signed the Blue Lake Bill into law. That law returned to the Taos the land and water that was taken from them in 1906. Blue Lake now belongs to the Taos, and others are not allowed to go there. This has allowed the Taos to again live on the land and near the waters that are so sacred to them.

Technology and the Colorado River

Technology and Hydrologic Power

Before the Colorado River Compact, small-scale agricultural diversion dams were being built on the Colorado River. Leaders in states that were growing more slowly than California were nervous that California would get rights to a lot of the water from the Colorado River. This fear encouraged state leaders to create the Colorado River Compact, which divided the river's water among the seven states along the river. People have long used flowing water to generate power. In the early to mid-1900s, the U.S. government wanted to begin to use large quantities of water to generate electricity. The federal government began building large dams to generate energy and to control where and when river water flowed. These dams included Hoover Dam, Parker Dam, and Imperial Dam on the Colorado River. The dams gave California more access to Colorado River water. According to state law, those who first used water had rights to continue using it.

The dams generated a massive amount of energy. Since people and businesses pay for energy, the dams brought in money and added to the economy of the region. The dams also made it possible for people to move water to other places, especially large farms and cities. Farms and cities developed in areas that previously did not have enough water to support them. The dams also changed ecosystems. Upstream habitats were flooded; downstream habitats saw reduced flow. Holding water back from its natural flow changes the temperature of



Parker Dam, Colorado River

the water. In some places, the water becomes warmer. In other places, it becomes colder. Above the dam, where lakes are created, the water temperature increases because there is more surface area heated by the Sun. The flow of water above the dam is slowed. Below the dam, the effect is opposite. There is clear, cold water below the dam because the water moves more quickly and the sediments are held back by the dam. These effects change the habitats of plants, fish, insects, and other animals.

Technology and Irrigation

In the West, irrigation is very important. As dams were built and more water became available for use, farmers were able to increase the size of their cropland. Early on, farmers diverted water to their farms through ditches and canals. They periodically flooded the crops. Called "flood irrigation," this method was used because it required the least

technology. Farmers no longer had to pipe water directly to their crops. However, flood irrigation led to overwatering and water waste. As technology advanced, sprinkler systems and pumping systems became more readily available. Farmers could power sprinklers to water their crops. Sprinkler systems are not highly efficient, however, and much water is lost through evaporation. In a region where water is extremely limited, this inefficiency presents a problem. Scientists continue to develop new technologies that will decrease water usage and increase efficiency. With drip irrigation, small amounts of water are placed near the roots of crops, limiting the amount of water subject to evaporation. Farmers today are encouraged to use drip irrigation to save water.

Technology and Water Quality

The number of people using Colorado River water continues to increase. At the same time, the quality of the water is deteriorating. Pesticides used on large-scale farms could end up in runoff that drains into the river. Pesticides in the water could affect wildlife and humans downstream. Salinity (salt) levels



Workers in desalination plant, Yuma, Arizona

have also increased dramatically in the river. The increase in salinity is due to agricultural runoff and evaporation. As water evaporates, it leaves behind the salts, and the salinity of the remaining water increases. Salt gets into the groundwater by passing through very saline soil. Damage to crops due to high levels of salt affect the economy. Salinity problems cost about \$500 million each year in the United States.

In addition, the amount of water allocated to Mexico in the U.S.-Mexico Water Treaty of 1944, is not enough to preserve the Colorado River Delta. The delta was once a lush wetland that supported many plants and animals, as well as the economies of local Mexicans who live there. But water management practices in the United States and Mexico reduce the natural flow of water and important silt and nutrients to the delta in Mexico, which affects local ecosystems. In some areas, the water is so contaminated that it no longer supports life. In 1973, the United States passed the Endangered Species Act. This act affected water use along the Colorado River. A second law, passed in 1974, required control of the salt levels in the river. The U.S. government built a desalination plant in Yuma, Arizona, to decrease salinity levels. However, the plant has not operated because it has been possible to meet the act's salinity requirements without it. (Talks about building desalination plants are starting again.) Other projects capture water near farms before the water runs through the soil. These efforts have helped decrease the amount of water passing through saline soil. This approach is used in most states bordering the Colorado River and has been fairly effective at reducing the salinity of the water.



California STATE BOARD OF
EDUCATION

California Education and the Environment Initiative