

THE AMERICAN SOUTHWEST: ARE WE RUNNING DRY? COLORADO RIVER BASIN

Activity 5 The Delta

In a paper entitled "The Delta of the Colorado River" edited by David L. Alles, one of the world's first environmentalists is introduced.

"Before the dams were built, the Colorado River delta extended over two million acres, an area almost the size of Rhode Island, rich with nutrients brought downriver with tons of silt. In 1922, the conservationist Aldo Leopold and his brother explored the Colorado River delta by canoe. Leopold exulted in (all he saw) as his canoe wove through winding waterways and green lagoons. The two subsisted on quail and geese they harvested. Beaver, deer, and jaguar flourished, while shrimp and totoaba, migrated from the upper Gulf of California to spawn in the delta's brackish waters. Millions of waterfowl and shorebirds could be seen circling, then descending to feed and rest in the lagoons."

The following is a quote from Aldo Leopold's essay *The Green Lagoon* in his book *A Sand County Almanac* (1949). He writes of the Colorado River delta as it was then.

"Dawn on the Delta was whistled in by Gambel quail, which roosted in the mesquites overhanging camp. When the sun peeped over the Sierra Madre, it slanted across a hundred miles of lovely desolation, a vast flat bowl of wilderness rimmed by jagged peaks. On the map the Delta was bisected by the river, but in fact the river was nowhere and everywhere, for he could not decide which of a hundred green lagoons offered the most pleasant and least speedy path to the gulf."

"The still waters were of a deep emerald hue, colored by algae, I suppose, but no less green for all that. At each bend we saw egrets standing in the pools ahead, each white statue matched by its white reflection."

Wetlands are found throughout the United States. Wetlands are "in-between places that provide a transition between land and water. (They are a) precious ecological resource, hosting a varying combination of plants and animals...Wetland habitats contain the highest diversity of plants and animals, including endangered species, in many areas." (Myers 67) Around the world, in the United States, and in northern Mexico wetland habitats are being destroyed.

Early in the 20th century humans discovered they could control their environment in order to guarantee access to water by damming rivers. They would have reservoirs filled with enough water to support their ever-growing needs. In fact, since the passage of the Boulder Canyon Project Act in December 1928, which allowed for the construction of the Boulder (Hoover) Dam, the Imperial Dam, and the All American Canal, development along the Colorado River increased dramatically. Many of the wetlands along the Colorado River and at its mouth that once filtered and cleaned the water that passed through them have been substantially reduced or are simply gone.

Agricultural activities such as draining, diking, and plowing, account for about 85% of the destruction of wetland habitats. Further destruction occurs through the development process for subdivisions, shopping malls, business parks, and road construction. Dikes and levees along the Colorado River are built to divert floodwaters. Pollution has further impacted the wetlands, as have logging, mining, and grazing activities.

Wetlands are extraordinarily productive and biologically diverse ecosystems, home to a third of threatened and endangered species in the United States. In Yuma County, Arizona there are seven federally listed species and one candidate species, of which four utilize the native and riparian or aquatic habitats of the lower Colorado River. Habitat critical for the razorback sucker, a fish native to the region, was designated in 1994. Native cottonwood-willow forest habitats that provide habitat for the southwestern willow flycatcher and the yellow-billed cuckoo (a candidate for future listing) were once abundant along the lower Colorado River. The Yuma clapper rail is dependant upon the marshes found in the same region.

River and riparian habitats are extremely important in desert environments found in southwestern United States. The Colorado River delta is used as a key stopover habitat for migratory birds. The delta supports the largest known populations of the desert pupfish and the Yuma clapper rail, two endangered species. The importance of the delta has increased dramatically in recent years, but their destruction continues.

In the early 1900's in a valley just east of the city of Yuma in Yuma County, Arizona, the Wellton-Mohawk valley has been pulling water from the Colorado River to support its agricultural economy. By the 1940's, the Lower Basin states of California, Arizona, Nevada, and New Mexico were pulling far more water from the Colorado River than they were allotted. By this time Mexico was not receiving *their* allotment. The delta habitat that once covered approximately 2 million acres was reduced to about 500 acres. The river that once flowed freely into the Gulf of California was so depleted the gulf waters started to back up into the wetland areas of the delta. It was starved for water, any water!

The Wellton-Mohawk Irrigation District was established in the 1950's to divert approximately 400,000 acre-feet of Colorado River water each year to

irrigate their crops. By the time the already salty Colorado River combined with the saline soil of the Wellton-Mohawk farmlands a saline groundwater supply was created. As groundwater basins filled with water from the irrigated fields, salts are pushed to the surface. By the 1960's their crops were suffering, so they installed pumps to remove about 130,000 acre-feet of brackish groundwater each year from these basins. The pumps discharged this highly saline water back into the Colorado River just below the Morelos Dam, the last dam in the United States *before* the river reached the Mexican border. In this way Mexico was able to receive their full allotment as stated in the 1944 Water Treaty, although water quality was very poor due to the high saline content.

Now nearly 50 years later the continuous flow of this irrigation wastewater had the accidental side effect of reviving the Cienaga de Santa Clara, one of the most important desert wetlands in southwestern North America! At its lowest point the Cienaga was but 500 acres and *now it has grown to more than 15,000 acres.*

In the last 100 miles the Colorado River provides water for a half-million acres of farmland and 3.1 million people in northern Mexico. The water reaching this area was so saline the Mexican farmers were suffering. The 1944 Water Treaty not only distributed the water from the river, but it addressed the water's quality. So in 1973 President Nixon convened a committee composed of two representatives for each of the seven Basin states and Mexico to resolve the issue. They determined that Mexico was to receive their allotment of 1.5 million acre-feet per year of fresh water from the river and approximately 130,000 acre-feet of Wellton-Mohawk irrigation wastewater from Arizona that is now directed to the Cienaga de Santa Clara through a concrete-lined canal. This agreement also required that the water going to the Cienaga have salinity levels the same as the Colorado River at the Imperial Dam. That means that the United States must desalinate this water.

The Dilemma:

Presently the brackish water from the Wellton-Mohawk farmlands has restored, and now maintains, the vitality of the Cienaga de Santa Clara in the Colorado River delta at the mouth of the Colorado River. The 1944 Water Treaty provided for water to Mexico and the agreement in 1973 reinforced the need for desalination of that water. If the water from the Wellton-Mohawk farmlands is desalinated before going to the Cienaga, the 130,000 acre-feet of brackish water will be replaced by 55,000 acre-feet of extremely saline brine each year. This could mean the destruction of the Cienaga de Santa Clara habitat.

There are 3 groups that need to decide how to distribute and care for the river water:

1. Yuma County farmers need their allotment of water from the Colorado River.
2. Mexican farmers and municipalities need their allotment of water from the Colorado River to be as fresh as water above the Imperial Dam.
3. Environmentalists want to protect the Cienaga de Santa Clara as a healthy wetlands.

Objectives:

- Students will read an essay for information, taking notes as needed.
- Students will demonstrate their understanding of the needs on the lower Colorado River by creating a persuasive presentation.
- Students will work cooperatively to create a presentation using a variety of resources (as available) to argue for one position.
- Students will make a presentation to their peers.

Materials:

- Copies of the attached essay and Dilemma, one per student.
- Highlighter pens
- Variety of materials to be used for the presentation, for example poster board, butcher paper, colored pencils, markers, etc.
- Computers with PowerPoint, or other similar software, as available.
- Hydrometer and materials developed from previous activities.

Procedures:

1. Allow the students time to read the above essay. They should be encouraged to highlight their document to note important information, or take notes as appropriate.
2. Discuss as a class to ensure that all understand what has happened along the Lower Colorado River as presented in the essay. Ask questions such as:
 - What was the delta like before the dams were built?
 - What wildlife was found in the Cienaga?
 - Who draws water from the river? Do they take *only* their allotment or do they take more?
 - What has happened to the delta in the past 60 years?
 - How did the Cienaga come back to life and increase in size?
3. Divide the students into groups of not more than four.

4. To determine which group will be presenting which point of view, create strips of paper (1 for each group) with equal numbers of U.S. farmers, Mexican farmers, and Environmentalists. Allow each group to draw a strip.
5. Tell the students that they are responsible for making a presentation to their peers at the end of one week's time. This presentation will persuade the class that their point of view is the most important and give substantiating information.
6. Although much of the information needed has been presented in the movie The American Southwest: Are We Running Dry?, in the activities previously completed, and in the attached essay, you might consider allowing access to the computer, and have any books available that might be of use.
7. Set forth the expectations for this presentation such as:
 - length of time the presentation should be
 - visuals needed
 - responsibilities of each member in the group, and so on.
 - Stress that they are not simply presenting information but are trying to convince their peers that their point of view is the most important.