

## Section III

The last section demonstrated the importance of the Colorado River water for agriculture. The amount of food produced and people employed because of the river cannot be understated. However, there are other users that compete with farmers for their share of the river water. As less water flows down the river, competition becomes fiercer. Is there anything more important than guaranteeing water for our food supply?

### Urban Growth in the Southwest

The Southwest has been one of the fastest growing regions in the United States over the past decade. Las Vegas and Phoenix have both experienced unprecedented growth. Other cities that are dependent on the river's water include Tucson, San Diego, and Denver – all of which are still growing.



Las Vegas Valley 1984 on left, 2009 on right. Look for landmarks to show where the city limits have grown (the airport, Red Rock Canyon, the playa at the top middle of the picture). Image available at [http://earthobservatory.nasa.gov/images/imagerecords/37000/37228/vegas\\_tm5\\_2009\\_lrg.jpg](http://earthobservatory.nasa.gov/images/imagerecords/37000/37228/vegas_tm5_2009_lrg.jpg)

In Colorado, 80% of the water is deposited on the west side of the Rockies, but 80% of the state's population is on the east side of the continental divide. This means that 22% of the Upper Basin water is moved over the divide to where the majority of the state's population resides. The competition over water between urban centers and agriculture is explained in the water supply video by the Colorado River District at [http://www.crwcd.org/page\\_315](http://www.crwcd.org/page_315).

Western water law is governed by the Law of Prior Appropriation. Another way of putting it is first in time, first in right or first come, first served. The history of the country is told by its farmers. The landscape was a checkerboard of crops before big urban centers were built with their exploded suburbs. This means that the first water rights in the area belonged to the farmers and are still held as part of grower's cooperatives. The fact that the municipal claims for water are newer means that in case of drought, they are susceptible to having their water cut off in order to assure that the farmers' claims are met. Realistically, the number of people in modern cities lends them more political clout should a legal battle over water rights ensue.

However, even without a legal battle, the competition between urban use and agricultural use has had impacts in other ways. The City of Los Angeles has taken to leasing water rights from farmers during drought years. They pay the farmers to not grow food, so that the city can use the water. There are also water speculation markets that are emerging. In anticipation of a demand for a bedroom community, developers will go around and buy up the water rights from farmers and then pay to pipe that water to a new location where they will build a new master community. Another way cities impact the demand for water is through their increased use of energy.

## Water's Role in Energy Production

More urban centers mean more of a demand for electricity. For the Upper Basin, that means more water used in extracting oil from the ground to be used for gas for cars or burned in plants for electricity. Most power plants use water as a coolant. The steam from the water is then pressurized and pushed through a turbine, which creates electricity. Whether it is a nuclear power, coal, oil, natural gas, or even thermal solar power plant, they all need water as part of the energy production process.

Coal plants also use water as part of the process to scrub pollutants out of the emissions. The water reacts with the particle in the smoke stacks and takes a percentage of nitrogen oxides and sulfur oxides out of the air. The plants can do this process without water, but it is more costly and less efficient. Coal plants are provide a feedback loop in the process. Since the coal plants also emit a lot of carbon dioxide in the smoke stacks, they are increasing the global temperature thus decreasing the snowpack of the Rockies and the water supply that they draw from in order to produce electricity from burning coal.

In the 2000's there were over 3800 MW of electricity production from burning coal that were planned as part of several different coal plants in Nevada, which already gets 50% of its power from in state coal plants. A 500 megawatt coal plant uses 2.2 billion gallons of water a year. Colorado currently receives 70% of its power from coal burning plants and has proposals for over 2000 MW of coal produced electricity planned to be built soon. New Mexico gets 90% of its power from coal and has plans for 1800 MW more. Utah gets 95% of its energy from coal-fired plants with plans for 750 MW more and Wyoming gets 96% of its power from coal with plans for 1400 MW more.

Alternatives to coal power production in the area include hydroelectric, solar thermal and photovoltaic arrays. While these are clean sources of power production that do not increase the impact of climate change in the area, both hydroelectric and solar thermal power plants have an ongoing demand for water.



This image shows the Navajo Generating Station just off the Colorado River near Page, Arizona.  
Image available at: <http://earthobservatory.nasa.gov/IOTD/view.php?id=3315>

## Assignment

Look up growth rates for urban centers in the Southwest. What have been the recent growth rates and the projected growth rates for Phoenix, Las Vegas, Denver, San Diego, others? What has been the growth rate and projected growth for energy demand for those areas? **Identify mitigation strategies that can help keep the impacts of climate change to a minimum while still providing for the energy demands of these urban centers? Can these strategies also be considered adaptation strategies for climate change as well? Explain your answer.**