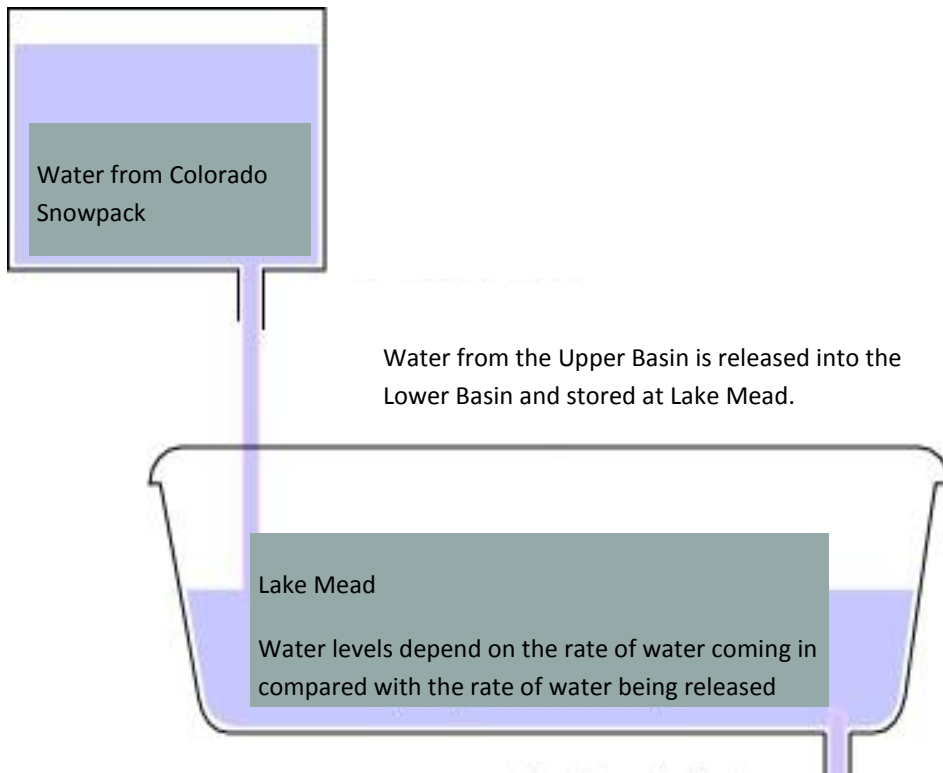


## SECTION II

From your results, you can see that a decrease in snowpack in the Colorado Rockies means less water in the river system. The Colorado has over a dozen different dams that help to regulate and store the flow of water, but the law of the river dictates how much each dam must release to users downstream. Less water in the system means less water coming into the reservoirs despite the fact that there are mandates on how much must be released. The result is lower water levels. Less snow in Colorado means drops in lake levels.

## Colorado River Basin



Hoover Dam acts as the drain plug in the tub allowing the reservoir to fill up. Water is released to California and Arizona for their water use and production of hydro-



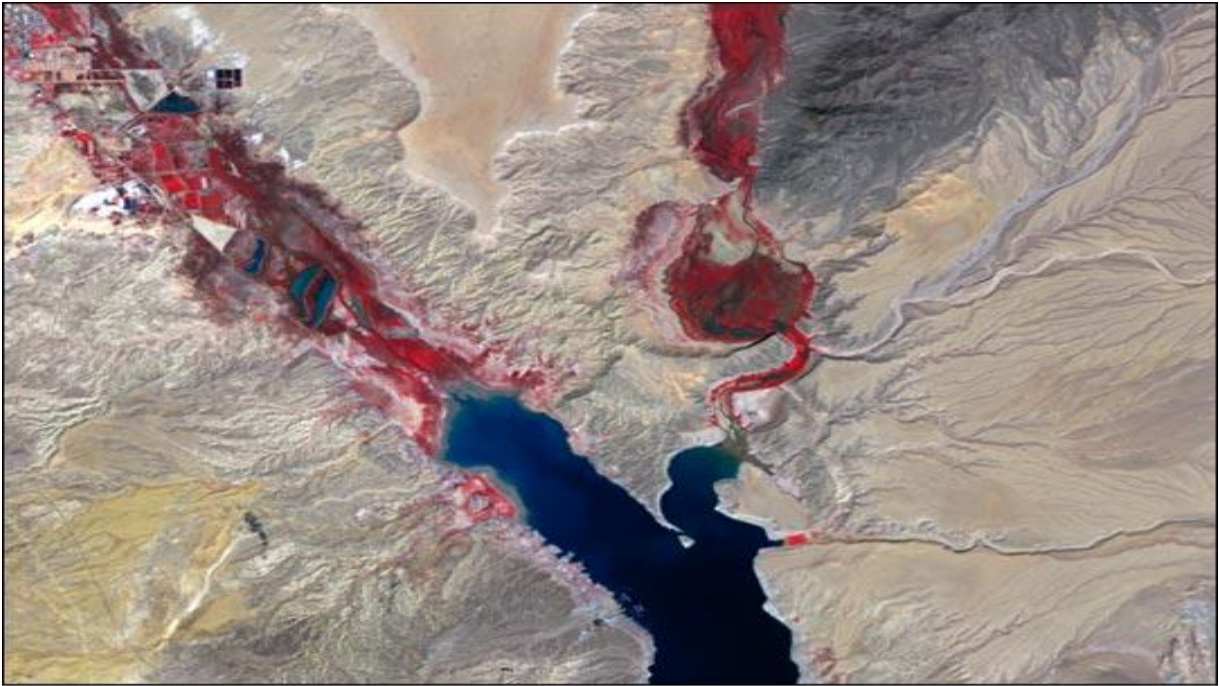
May 3, 2000



May 28, 2003

Lake Mead is the main indicator for the whole system. As the reservoir for the Lower Basin, its levels dictate how much needs to be released from the Upper Basin. Notice how Saddle Island and Black Island are no longer islands. You can also see that the notorious "bath tub ring" is now apparent in the satellite image of 2003, but not visible in the 2000 image.

Image available at: <http://earthobservatory.nasa.gov/Features/LakeMead/>



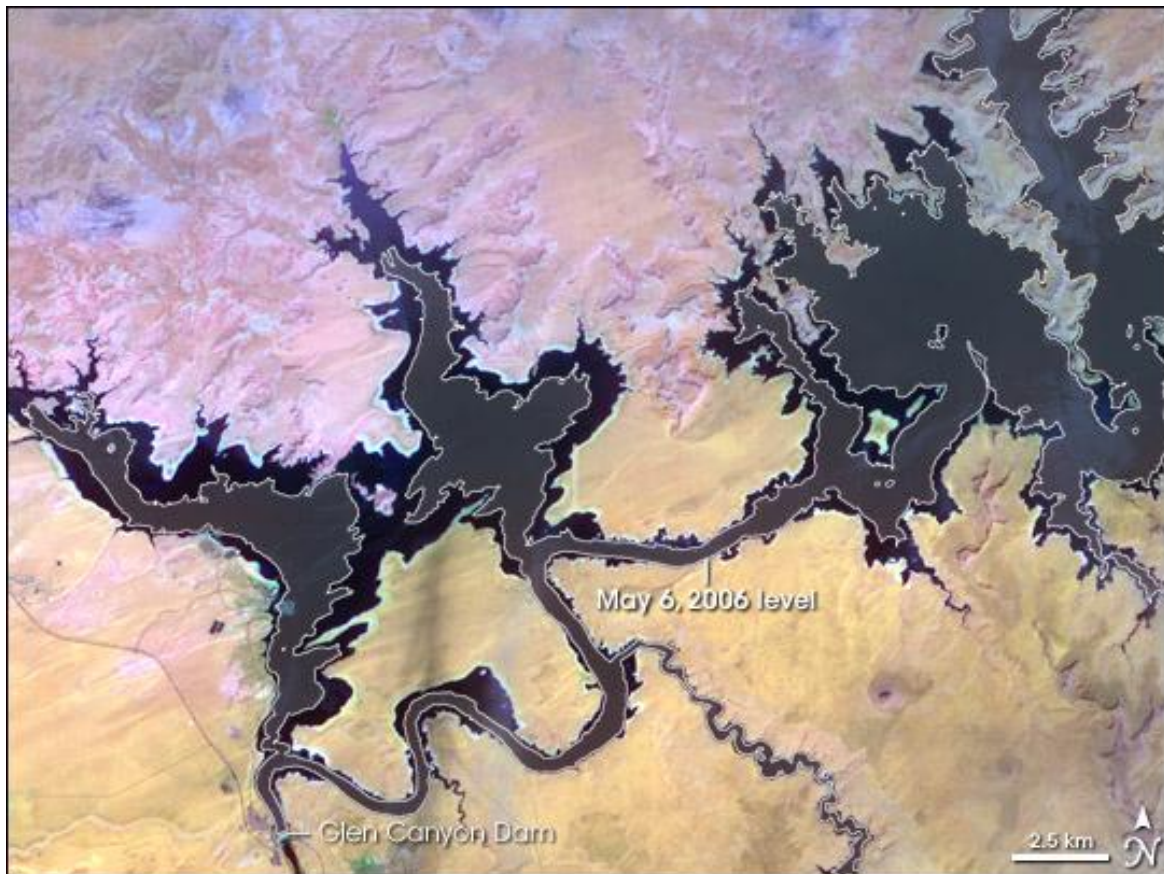
April 19, 2003



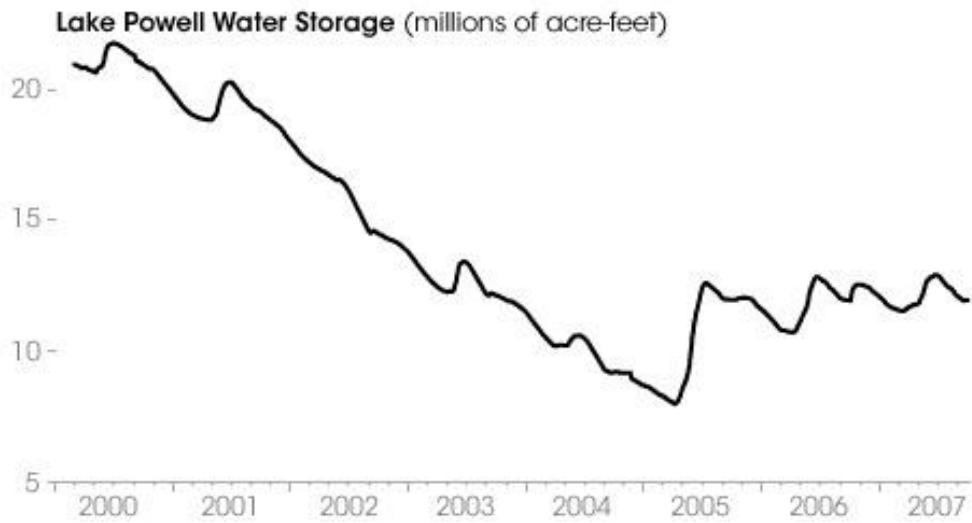
May 5, 2000

These images show a different region of Lake Mead during the same time periods as above. By looking at the reflectance of different wavelengths along the electromagnetic spectrum, we can see change in the landscape easier. In this image, NASA is using the near infrared part of the spectrum to make this image. Green vegetation shows up as bright red. You can see where the lake has receded leaving fertile, wet sediments that have been quickly colonized by plant communities.

Image available at: <http://earthobservatory.nasa.gov/IOTD/view.php?id=3556>



May 21, 2000



Here is an overlap of the drop in Lake Powell's level with a corresponding graph showing water storage. You can see that with less water coming in, but the demand for water staying high, the lake levels drop dramatically over a few short years.

Image available at: <http://earthobservatory.nasa.gov/IOTD/view.php?id=8132>

## ALLOCATIONS

Seeing that the water stored for our use is dropping, we need to next look at how that water is being used. The Colorado watershed covers 7 states and all seven are allocated a share of the water through the 1922 compact. The upper and lower basins get equal shares of the water, 7.5 MAFY each. Due to the decreased amount of water available a temporary agreement was reached in 2007. This 2007 interim drought agreement has it limited to 7.05 MAFY per basin until 2026. This assumes that the drought is a temporary condition or that a new agreement can be reached for the allocation of the water if this is in fact a new drier climate the region is now experiencing. The boundary between the basins is at Lee Ferry just below Glen Canyon Dam.

The table to the right shows each state's allocations. Each state's share of water reflects their state of development in 1922 when the original compact was negotiated. Notice that Nevada gets a mere fraction of the water. All of Nevada's allocation goes to the Las Vegas Valley for the municipal water supply. California gets the largest allocation for their agriculture and city centers and has been using over their allocated share (5 MAFY). Federal authorities have told California to come up with alternative sources to supplement their water supply to bring them back in compliance. Native American tribes are eligible for up to 1 MAFY but not all have claimed them, so others use their allotment. The Mexico allocation is part of an international treaty, so they do get their portion of the water; however, the water quality is degraded by the time it reaches the end of the river.

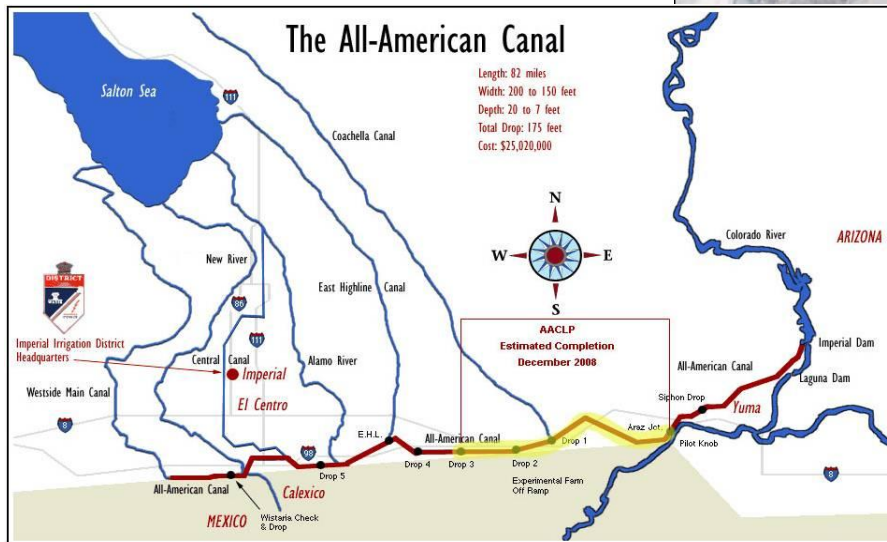
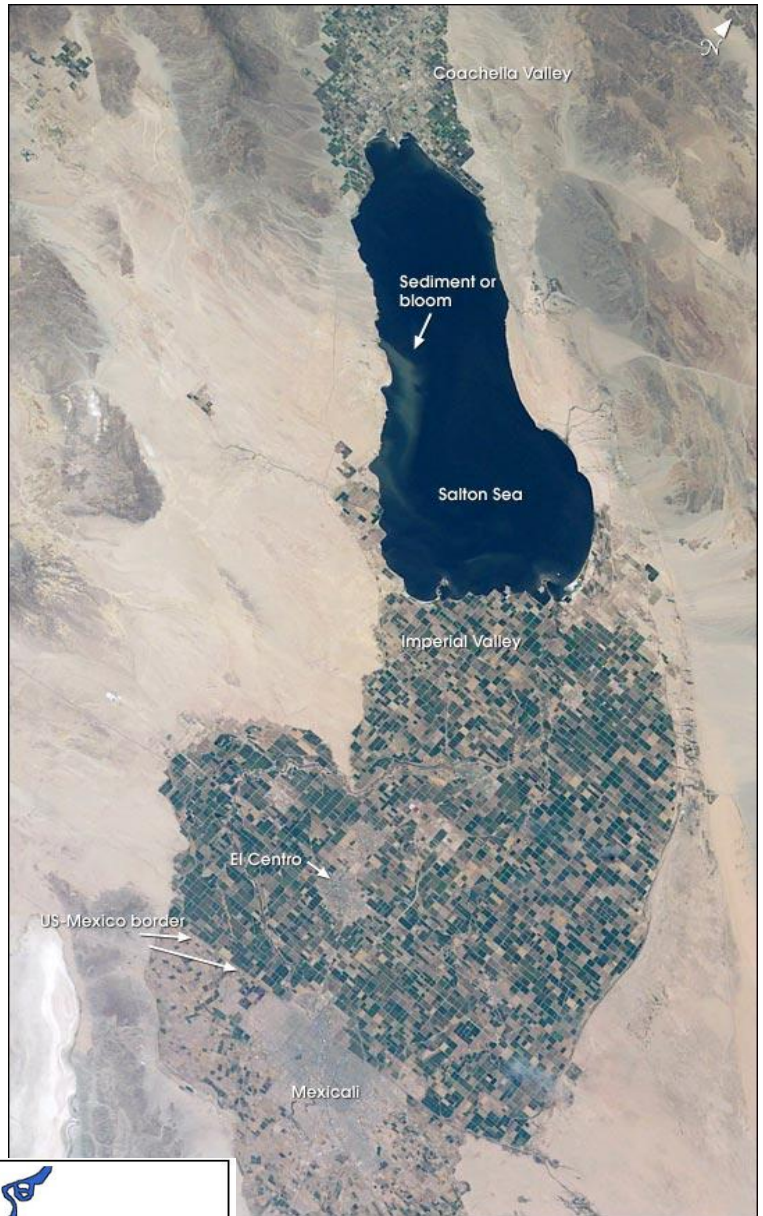


Allocation	Million Acre Feet Per Year (MAFY)
Upper Basin	7.5
Colorado	3.9
Utah	1.7
Wyoming	1.0
New Mexico	0.85
Lower Basin	7.5
Arizona	2.85
California	4.4
Nevada	0.3
Additional Allocations	
Mexico	1.5
Total	16.6

## AGRICULTURE

One of the primary uses of the Colorado River in the arid west is for agriculture. 63% of water used in Upper Basin is for agriculture. 80% of Arizona's allocation is used for irrigating agriculture, and almost California's entire portion is for growing crops in the Imperial Valley. The Imperial Valley and the Coachella Valley are some of the most productive agriculture areas in the world with nearly 500,000 acres being irrigated producing nearly \$1 billion in crops annually. One out of every three jobs in the valley is dependent on the agriculture industry. You can see in this true color image the contrast between the irrigated crops and the desolate desert surrounding them. Water diverted from the Colorado River is entirely responsible for this landscape. Even the Salton Sea is a historical artifact filled with flows from the river. Notice the change in vegetation that occurs at the border.

Since 1942, the valley has received its water through the 82-mile long All-American Canal that carries water from the Colorado River in Arizona along the Mexico-California border to the California agricultural valleys.



Satellite image available at:  
<http://earthobservatory.nasa.gov/>



This photo of the All American Canal was taken by the crew of expedition 18 aboard the International Space Station.

Notice that the All American Canal is mostly an earthen canal that is uncovered and flowing through a sandy desert. The inefficiencies of the canal mean that it loses water to high evaporation rates as well as seepage through the sandy soil. Mexican farmers would take advantage of this recharge to the groundwater system and pump it up to water their own crops on the Mexico side of the region. However, California noticed the amount of water they were losing and has since decided to line portions of the canal, effectively conserving that water available to them and decreasing the amount available to Mexican farmers.

## ASSIGNMENT

Your assignment for this part of the module is to learn about what is grown using Colorado River water. Search the internet, look at the produce and labels in your store, and research agricultural periodicals. What crops are grown in the Imperial Valley and other regions using the river's water? Who eats those crops or where are they shipped? Can you find these crops at your local store? How many people are fed with this water? You may not be able to find all the answers to these questions, but you should get an idea of the river's contribution to people as a food supply and an industry. How will a change in the amount of water available make a difference to you or other people? **Once you understand the extent of the impact, identify adaptation measures that can be taken to sustain agriculture in a drier climate. How is adapting to climate change different from mitigating climate change? Are any of the adaptation measures you identified also mitigation strategies?**

