

**Basin Profile:** Central Valley of California

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**Water Scarcity Status:**

- The Valley currently faces serious water shortages, and the Central Valley Aquifer typically experiences an annual net loss in storage.
- Land subsidence has been a consequence of groundwater overdraft
- Within the Central Valley are one-sixth of the United States' irrigated land and about one-fifth of the nation's groundwater pumpage

**Basin Overview**

California, United States of America

Area: 51,800 square kilometers (20,000 square miles)

Climate: Mediterranean

Basin population: 7,000,000



*Figure 1. Map of Central Valley Aquifer location (US EPA, 2013)*

Located in the middle of the State of California, the Central Valley is surrounded by mountain ranges which form the borders of the valley: the Cascade Range, the Sierra Nevada, the Tehachapi Mountains, and the Coast Ranges. The average valley width is 50 miles (80 kilometers) and about 400 miles (644 kilometers) in length from the Tehachapi Mountains to near Redding. Within the borders of the valley, there are 1,512 miles (2,433 kilometers) in length of streams or rivers and 19,812 miles (32,000 kilometers) in length of constructed agricultural channels. The vast groundwater system in the Central Valley is the largest reservoir – natural or man-made – of water in the State of California. More impressively, the groundwater basin is the “second largest contiguous groundwater basin in the United States” (Great Valley, 2012).

The storage of groundwater relies primarily on recharge from precipitation, leakage from streams and surface-water bodies, and return flow from irrigated agriculture. To help increase the rate of recharge in the aquifer, groundwater recharge programs have targeted permeable earthen deposits in which to pump water back into the

ground during wet periods. Most rainfall occurs between months November through April. Water delivery systems operating since the 1970s have been very important to transporting water from the Sacramento Valley to the San Joaquin Valley. Dams, reservoirs, levees, canals, and pumps have been built to make water more thoroughly accessible.

The population in the Central Valley reached 6.5 million people in 2005. Major cities in the Central Valley include Fresno, Sacramento, Bakersfield, and Stockton with populations 494,665; 466,488; 347,483; and 291,707 respectively. The Central Valley population is growing rapidly creating further stress on a already over-burdened hydrologic system.

Responsibility for groundwater management was given to local counties and agencies by the State Legislature. Local governments have groundwater programs and ordinances to manage the groundwater within their borders. There is not a requirement for private wells to be metered. This has a tragedy of the commons effect. The groundwater is an under-regulated public entity vulnerable to being exhausted by individuals, counties, groups, and industries acting in their own self-interest. Local regulations have not done enough to halt depletion of the Central Valley Aquifer; however, collaboration between local agencies and groups, state agencies, federal agencies, the private sector, NGOs, and the civil society are making improvements in the right direction.

California is ranked as the number one agricultural producer in the United States. An estimated value of \$17 billion is harvested each year in the Central Valley, from more than 250 different crops. Cereal grains, hay, cotton, fresh and processing tomatoes, vegetables, citrus, tree fruits, nuts, table grapes, and wine grapes are among the most prevalent crops grown in the Central Valley. More than fifty percent of the United States fruits, nuts, and vegetables are produced in California. Most of the top ten agricultural counties in California are located in the Central Valley. Within the Central Valley are one-sixth of the United States' irrigated land and about one-fifth of the nation's groundwater pumpage. The agricultural industry is responsible for ten percent of employment in the Central Valley, a significant decrease from 20% five years earlier,. Preserving agriculture in the Central Valley is crucial to employment in the Central Valley, California's economy, and the nation's food supply.

## **Water Scarcity Impacts**

### Environmental Impacts

The Central Valley watershed provides critically important habitat for plants and animals. The Sacramento-San Joaquin Delta – at the outflow of the Central Valley's rivers – by itself is home to over 750 different animal and plant species, including the threatened and endangered Delta smelt, Chinook salmon and steelhead. The Delta is also responsible for providing drinking water for over 25 million people. There is evidence that water development projects in the Delta, such as the construction of dams, has led to saltwater intrusion during dry periods. The increased level of salts has major ecological impacts for fragile species who take refuge in the Central Valley. In the San Joaquin Valley region, only an estimated eight percent of historical wetland acreage still exists. The decline in environmental habitats has been detrimental to a once-flourishing and diverse ecosystem.

### Economic and Social Impacts

Land subsidence caused by groundwater overdraft can reduce the storage capacity of an underground aquifer, therefore impacting water availability. In the San Joaquin Basin, land subsidence exceeding one foot has occurred in over half of the region. Subsidence has caused "damage to buildings, aqueducts, well casings, bridges, and highways and has caused flooding" (Faunt, Groundwater Availability of the Central Valley Aquifer). Subsidence is being taken very seriously because the consequences are usually irreversible or extremely expensive to fix. The Department of Water Resources has applied several different methods of monitoring subsidence in the future. The way to prevent future subsidence is to curtail over-pumping of groundwater.

Another issue is the degradation of irrigated farmland. Evapotranspiration of water from crops tends to leave behind dissolved salts that make soils and local water supplies more saline. Excessively salinized water generally results in a smaller crop yield. If the return water from irrigation is not diluted, it can impact the concentrations of surface waters which can be extremely detrimental to the environment.

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