Plenty of blame for California's drought

By Richard Goode

My grandfather used to tell the story of traveling from Bakersfield to San Francisco by boat as a boy in about 1910. First up the Tulare Lake, then up the San Joaquin River and through the Delta. In those days, water in California's San Joaquin Valley must have seemed inexhaustible.

Then, the lakes were drained and the rivers dammed; the valley floor was plowed and cities grew. Water was used at an ever-increasing rate. More and more wells were drilled and reservoirs built. There would be dry years and wet years. The water table dropped and wells went dry.

Last year, however, wells started going dry at an alarming rate. Residents in some areas have been without water for several months. The waiting list for a drilling rig to extend wells was up to a year. Today, up and down the San Joaquin Valley, signs along the freeway lament the water crisis. Everyone is ready to place blame, especially on the favorite whipping boys: Los Angeles and agriculture. But the truth is everyone is to blame and there are no easy solutions. California just doesn't have enough water to meet the demand. Hydrologists have been warning us since the 1970s that this was coming.

To understand the water crisis, you have to understand the structure of California and the San Joaquin Valley. The San Joaquin Valley is a broad basin that is bounded on the west by the Coast Range, which is mostly comprised of marine sediments, and on the east by the granitic Sierra Nevada. This basin is filled with layers of sediments that have washed down from the mountains over millions of years. These sediments are

saturated with water and vary in thickness from about 2,500 feet in the north to about 9,000 feet in the south.

In the south, where there was no outlet for the runoff, the vast Tulare Lake was formed. In years when water was in abundance, water overflowed the divide and into the San Joaquin River, which in turned flowed into the Sacramento-San Joaquin River Delta and then through the San Francisco Bay into the Pacific Ocean.

Before irrigation began in earnest in the 1930s as affordable pumps became available, much of the valley's farming relied on the winter rains for the crops, winter wheat, and other grains. The ability to pump water from the aquifer beneath the valley is a major reason the valley became one of the world's richest agriculture producing regions. Immense water projects allow California to store and transport surface water from the north, which generally receives more rain, to the dryer south. But even in wet years there is rarely enough surface water to meet the need. Groundwater is pumped to supply the difference between surface water availability and the demand for water.

California has been operating at a water deficit since at least the 1950s. Hydrologists estimate that on average 800,000 acre-feet per year are pumped from the aquifer annually. Last year alone, closer to 2 million acre-feet of water were pumped.

This tremendous withdrawal of groundwater has lowered the water table. As the water table drops, shallow wells that are normally sufficient to provide water go dry. The well must be drilled to a deeper level to provide access to the lowered water table.

The aquifer is usually recharged by runoff from the Sierra Nevada and, to a lesser extent, the Coast Range on the west. As the river water flowed into the valley, it soaked into the soil at the base of the mountains and made its way into the

aquifer. The damming of the rivers, while providing water storage, has removed this major source of recharge. As water is removed from the ground and not recharged, the clay layers in the ground begin to compact. This causes subsidence of the surface. A few miles southwest of Mendota, the ground has subsided by more than 30 feet since the 1920s. Last summer's pumping has accelerated the change, producing a subsidence rate of half an inch a month. Nearly all of this subsidence is permanent, thus reducing the capacity of the aquifer (and, ironically, making flooding worse in wet years).

With reduced snowpacks in the mountains during the winter, surface water is reduced and there is less water to share. This drying out is not just the present condition of the San Joaquin Valley; is the future of the American Southwest.

We have a bad habit of declaring a drought over when we receive several wet years in a row. But the damage of this drought is not reversible. Until we can recharge the groundwater at a rate equal to the withdrawal, California will be in a drought, no matter how much rain it receives. We may have already waited too long.

Richard Goode is a professor of geology at Porterville College and has lived in the San Joaquin Valley most of his life. His great-grandfather settled in the Ducor area in 1880. He wrote this for Zocalo Public Square.