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Future shock

Epic drought could strike again, scientists warn

By Stuart Leavenworth -- Bee Staff Writer - (Published December 22, 2002)

The ancient trees submerged beneath Lake Tahoe do not bode well for a state that loves its lush lawns, swimming pools and irrigated vegetables.

Those trees are remnants of epic droughts over the centuries -- droughts that lasted so long they caused Tahoe and other Sierra lakes to drop 20 feet or more, allowing forests to grow where there is now water.

Scientists say that century-long droughts, while unusual, are not just historical quirks. They could happen again. And that poses a nettlesome problem for California's water managers: Should they be preparing for a monster drought? Or is it just too unthinkable?

"It should be in the thinking somewhere," said Kelly Redmond, a climatologist with the Western Regional Climate Center in Reno. "Nothing has changed tremendously in the weather system's ability to gin up these longer droughts."

The hydrological equivalent of a meteor strike, an epic drought might seem like a remote worry, given the storms that have soaked the West Coast over the past week. As of Thursday, the recorded snowpack in the Sierra and other mountains was 139 percent of average for this time of year, providing the state with a drought buffer it didn't have two weeks ago.

Yet even if the wet weather continues, California remains extremely vulnerable in coming years to an extended dry spell, even one that lasts as little as four or five winters, according to numerous resource analysts.

Since its last drought, from 1987 to 1992, California has added 6 million people and tens of thousands of yards, orchards, golf courses and other businesses dependent on water. By all accounts, its developed water supply hasn't kept pace, and soon it may shrink drastically.

Earlier this month, the Imperial Irrigation District killed a long-negotiated water sale to San Diego that dramatized how quickly crises can erupt in the water world. State officials staked everything on that transaction so they could meet federal deadlines to wean California from the Colorado River. Now, that deal has imploded, and federal authorities threaten to reduce Southern California's urban water supply by a third.

Some water experts say the state should be wary of a "perfect storm," in which water cutbacks combine with natural drought and global warming to create unprecedented shortfalls.

"The picture doesn't look good," said Steve Hall, executive director of the California Association of Water Agencies.

"Since the last drought, we've added 6 million people. We have not added significant new supplies. During that time, we have reallocated somewhere between 1 million and 2 million acre-feet of water to the environment. That

is good for the environment, but it makes less water available to the rest of the system."

Not only is the state growing, said Hall, but families are moving into the drier, hotter portions of the state's inland valleys, buying large-lot homes that require more water for landscaping. Partly for that reason, per capita water use in California has risen to 200 gallons daily, up from 160 gallons during 1992, the final year of the last drought.

"The fact is, we don't use water very efficiently in California," said Peter Gleick, president of an Oakland-based think-tank, the Pacific Institute. "It is only during droughts that people start to pay attention to the proper use of water."

As Gleick notes, the early 1990s were a wake-up call for California, prompting water agencies and the state to make several contingencies.

Cities and farm districts have invested in underground storage basins and water trading arrangements. Two reservoirs have been built -- Los Vaqueros in Contra Costa County and Diamond Valley near Los Angeles. Coastal cities increasingly are taking treated wastewater and recycling it for parks and golf courses.

"Overall, I'd say our major urban areas are well prepared," said Jeanine Jones, drought preparedness manager for the state Department of Water Resources. Most cities, she said, have the financial resources to purchase water during a lasting drought.

Jones, however, says that all bets are off if California were to undergo a dry spell lasting more than six or seven years.

"You know those tree stumps in Lake Tahoe? They represent a dry period that lasted centuries," said Jones. "Obviously, we have developed in conditions that are much wetter than that."

Prior to 1994, scientists didn't put much stock in the notion that a drought -- loosely defined as several years of below-normal precipitation -- could last much longer than a decade in California.

That year, however, scientist Scott Stines published a study that knocked conventional wisdom on its ear.

Using radiocarbon dating and tree-ring analysis, Stines, a professor at California State University, Hayward, examined tree stumps at the bottom of Mono, Tenaya, Tahoe and other Sierra lakes. He concluded that these gnarled, water-logged stumps were holdovers from two extended droughts -- from about A.D. 900 to 1110, and from A.D. 1210 to 1350 -- when the lakes shrank to a fraction of their size.

Most researchers agree that, since the 1500s, the West's history has been marked by much shorter dry periods. Ongoing analysis of Central Valley oaks indicates that major droughts have occurred every century, usually lasting six to 15 years, said Redmond, one of the West's leading climatologists.

Still, there's a good chance the climate is transitioning into a drier phase, said Redmond. As of last week, the Colorado River was running at 15 percent of its normal flow, following three years of low rainfall.

"Conditions in the Southwest may be reverting back to where they were before all the growth of the last few decades," Redmond said. "That has people in the Rockies concerned, and California more concerned, because we are all drinking from the same straw."

In the past year, several studies on global warming have added to the worries. Last month, the Scripps Institute of Oceanography released a report predicting that, over the next 50 years, precipitation in the Sierra will consist more of rain than of snow.

With a diminished snowpack, say Scripps scientists, there will be less water in the Sacramento and San Joaquin

rivers during dry summer months -- when it's needed most -- and more during the winter, when flooding is already a problem.

Many cities and industries that depend on the Delta, a water source for 20 million Californians, are taking such forecasts seriously. Less runoff during the summer means the Delta would become more salty, with higher levels of contaminants.

"This is a huge issue," said Margaret Bruce, environmental programs director for the Silicon Valley Manufacturers Group. Santa Clara County gets more than half its water from the Delta, she said, and any worsening of quality means higher treatment costs for the area's high-tech companies.

Like business leaders elsewhere, those in the Bay Area still remember the last drought. At its height in 1991, 27 counties statewide declared emergencies, seven urban water districts ordered rationing, and San Joaquin Valley farmers stopped growing crops on 160,000 acres of land.

With two major rivers, the Sacramento region rode out those dry years and probably could do so again, experts say. But the same wouldn't be true for families moving into the Sierra foothills and remote parts of the coast. Such areas largely rely on water wells and unconnected to state and federal aqueducts.

"If I were to map the drought problem areas, I would draw circles from the Oregon border down to the north part of Sonoma County," said Jones, a DWR engineer. "I'd also include the Central Coast south of Monterey to San Luis Obispo and the Sierra foothills. That is where we have a lot of people who rely on unreliable groundwater."

Several variables will likely determine the severity of the next drought, said Jones and others. One is whether state and federal reservoirs are high when the dry spell hits. Another is whether the drought is localized in the Sierra, or spread across the Southwest.

In 1987, at the onslaught of the last drought, reservoirs were relatively flush, allowing most urban areas to make it through the first few years unaffected. In addition, the Colorado River was running high, providing an extra cushion to Southern California.

This year, several key reservoirs are low, such as Lake Oroville -- the bulwark of the state's water system -- which was at 38 percent of capacity Thursday, even after the recent storms. The Colorado, meanwhile, is running at a relative trickle.

To avoid severe shortfalls, nearly all water analysts say the state must invest in new infrastructure. But that is where the agreement ends.

Many farmers, worried about cities grabbing their water, want state and federal governments to build a new generation of big reservoirs. That notion is opposed by environmentalists, who say the money would be better spent on conservation.

Still others say the main focus should be on the Sacramento-San Joaquin Delta, where conflicts over endangered fisheries have made it hard to move water anywhere in the state. One proposal is to expand pumping plants near Tracy, so more water could be sent south into storage during periods when fish aren't around.

"We need a real water infrastructure bond, as early as 2004, to invest in new statewide and regional facilities. Once built, those will largely insulate us from serious water shortages," said Hall, who represents some of the state's most powerful water agencies.

One thing is for sure: When the next dry spell hits, water will skyrocket in value, making it even more marketable -- and contentious -- than it is now.

That means more wheeling and dealing; more schemes to ship water in ocean-going hefty bags; and more money being waved in the face of those who have water.

"Over the past decade, there has been a tremendous loosening of people's attitudes about water," said Brian Gray, a water law professor at Hastings College of Law. "We are likely to see a surge in water transfers when we move into the next drought."

[What the next drought could look like \(251k PDF\)](#)

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