

Epic Ancient Drought Grim News for West

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A 60-year drought struck the Colorado River during the 12th century, an epic dry period more persistent than any on record and one that suggests a similar megadrought could strike again with devastating consequences.

University of Arizona researchers found evidence of what they call the medieval drought in tree rings used to reconstruct the river's past. Reaching back to A.D. 762, the researchers drew a picture of a river with flows more vulnerable to dry periods than once thought.

What surprised the researchers most was this drought's staying power: For 25 years in the 1100s, the Colorado flowed an average of 15 percent below what is now considered normal. For 13 consecutive years in that period, the river failed to reach that normal level even once.

A recurrence of those conditions would likely drain the reservoirs that store water from the river for Arizona and six other Western states. A streak of just five consecutive below-normal years, from 2000 to 2004, emptied Lake Powell and Lake Mead of more than half of their supply.

"We didn't expect to see that severe a drought," said David Meko, an associate research professor at UA's Laboratory of Tree-Ring Research. "The individual years were not extremely dry by themselves. . . . It was year after year without having a real wet year."

The new study, which provides the longest record of the Colorado's historic flows, could also help other scientists predict the effects of climate change. A study earlier this year predicted that warmer temperatures could reduce runoff into the Colorado and other rivers significantly.

"This shows that we can have natural events like this regardless of whether there's greenhouse warming," Meko said. "I would expect climate change, if anything, would exacerbate the type of droughts we saw in the past, putting greater and greater stress on the environment."

The UA team collected samples from living and dead trees in both the upper and lower Colorado River basin. Some of the oldest samples actually dated to about 320 B.C., Meko said, but scientists focused on the time periods with the greatest array of samples.

Using cores from living trees, researchers can examine the rings, which tell the story of the surrounding environment. A thin ring means little growth occurred, which suggests drought; a wide ring means the tree collected enough moisture to grow more.

To delve deeper into the past, scientists examined remnant wood, some of which lingered in a forest for centuries after the tree itself died. The remnants still yield a remarkable trove of data.

"This is part of ongoing work to try to understand the climate system that creates these patterns," said Christopher A. Baisan, a UA senior research specialist. "You need the basic data about what happened before you can ask questions such as 'Why were there 60 years of low flow on the Colorado?' ."

Earlier tree-ring studies found serious droughts in the 16th century, both on the Colorado and on the Salt and Verde rivers in Arizona. Other research has suggested that severe droughts swept through the West during the 1100s, forcing entire populations to flee.

This study appears to confirm that the West turned viciously dry in the 12th century and with a persistence few thought possible.

"Seeing those big droughts was a real eye-opener," said Connie Woodhouse, an associate professor at UA and co-author of the study. "Other work in the western U.S. had indicated that period was one of widespread drought. Our question was, 'How did that look in the Colorado River basin?' ."

The length of the medieval dry periods and the lack of intervening wet years would push Western states nearer to crisis than the severity of the conditions. One wet year in the midst of numerous dry years can replace some of the lost reservoir storage. A wet winter in 2005 helped the West avert possible shortages at Lake Powell.

"Having those wet years can really help with recovery," Woodhouse said.

Finding evidence of a six-decade drought in the 12th century doesn't mean a six-decade drought will occur again, Woodhouse said, but the studies help create a record that adds context to actual observations. On the Colorado, those observations, produced by flow gauges, led state officials in the 1930s to believe the river was more robust than it turned out to be.

"The ironic thing about the gauge record is that the big droughts of the last 100 years are not much compared to the long record," Woodhouse said. "And the wet years of the early 1900s are pretty unusual."