

# UA study: Dangers of drought heightened

*Valley lifelines called less secure than thought*

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The Valley's long-term water supplies are less secure than once thought and more vulnerable to drought, according to a study released Thursday.

The study found that severe droughts reduced flows both on the upper Colorado River and Arizona's Salt and Verde rivers, weakening the state's most important water sources all at once. That challenges the long-held belief that Arizona could count on the Colorado as a reliable buffer when in-state rivers run low.

Researchers from the University of Arizona's Laboratory of Tree-Ring Research also found that extended droughts are common. The most recent drought in Arizona, which began in 1996, is one of the worst on record, but others of that magnitude have occurred at least eight other times since 1200. For Valley cities, the study's findings mean rethinking water resource plans to take into account a greater risk of drought. The effects of a drought will worsen as population and demand grow, exposing the region to possible shortages.

"Our thought that the Colorado River would be able to bail us out is not a safe assumption anymore," said Charlie Ester, manager of water resource operations for Salt River Project, which delivers water from the Salt and Verde rivers to Valley cities.

The study could prove valuable to Arizona as it negotiates with neighboring states over how to divide the Colorado River's flow during times of drought. Under existing agreements, the brunt of any shortfalls would hit Arizona, specifically the Central Arizona Project, which delivers river water to Phoenix and Tucson.

"I think this shows the key to management is cooperation among the basin states," Ester said.

The Salt and Verde rivers provide as much as one-third of the Valley's water supply; the Colorado River, through the CAP Canal, adds another one-third or more. The rest is groundwater, though many cities, such as Phoenix, rely more heavily on the three rivers.

Arizona's rivers and the Colorado both experienced severe drought over the past five years, but hydrologists believed that such a confluence of dry conditions was rare. Most experts thought if Arizona was dry, the Colorado would produce at least normal runoff.

To test that theory, the tree-ring lab examined more than 400 years of ring data from the Colorado River Basin, the Salt River Basin and the Verde River Basin. They used the data to reconstruct flows of the three rivers over that time period.

The researchers found that during extreme dry or wet periods, when the rivers were at their lowest or highest, conditions were almost always similar in Colorado and Arizona. Only two times in 444 years was one region extremely dry while the other was wet; in both years, Colorado was in drought while Arizona was wet.

"That really surprised us," said Katherine Hirschboeck, associate professor of climatology at UA. "We were expecting more of a balance."

In the UA study, severe drought was defined as river flow that was in the top or bottom 25 percent of long-term records. The study also broke out years that were in the top or bottom 10 percent, considered the most serious droughts.

Hirschboeck said the immense amount of storage on the Colorado River could offset some of the effects of a severe drought that affected the intermountain states, but that may not hold true as demand increases due to growth and decisions by states to fully use their allocations.

"The supplies will be increasingly strained over multiyear droughts," she said.

In addition to the frequency of extended dry periods, the study found regular "breaks" in a severe drought, wet years between a string of dry ones. SRP's Ester said that backs up his cautionary stance that the current drought may not be over, despite a wet winter that filled the reservoirs on the Salt and Verde rivers.

The next phase of this study will focus on the past 40 years, said David Meko, an associate research professor at UA. Researchers will drill new cores from trees on the Salt and Verde watersheds and examine them to see how well they reflect the river flow that was actually measured.

Most of the streamflow numbers used in the first phase were based on reconstructed data using only the tree-ring record.

Tree rings are wide during wet years, when they can draw moisture to grow, and narrower in dry years. In the driest years, researchers often find missing

tree rings.

Meko said it's likely that they will find a missing ring for 2002, which was the driest year on record in Arizona, based on precipitation records. The samples should also reflect the higher precipitation this past winter.

The second phase of the study should be completed in early 2007.

The findings of the entire study will be shared with federal, state and local agencies, including the U.S. Bureau of Reclamation, which oversees management of the Colorado River.

SRP and UA have briefed representatives of Valley cities and state agencies.