

Southwest drought can pack a hefty punch

BY STEPHANIE DOSTER

The bare slopes in Arizona's high country this winter said it all.

In the grip of one of the state's worst droughts on record, business for Arizona's ski resorts dried up with the weather for much of the 2005–06 season, financially squeezing the industry and some of its snow-dependent communities.

While the ski industry is one of the most visible victims of a dry spell that has taken hold of the Southwest, researchers at the University of Arizona (UA) say the drought likely will cost many millions of dollars if it persists, with the financial fallout extending to

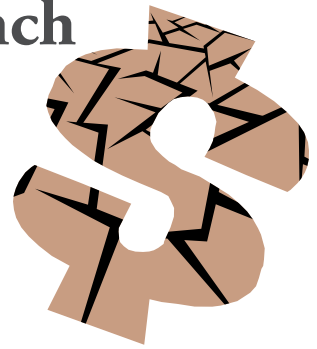
agriculture, tourism, recreation, fire suppression, and property values in the months ahead.

“Unlike a tornado, drought is not flashy or obvious,” said Gregg Garfin, program manager of the Climate Assessment for the Southwest (CLIMAS) project at UA. “It relentlessly wears away at us and impacts the natural amenities we value and the water supplies we depend on. Tallying drought impacts is like watching a building collapse, only in slow motion.”

Before rain and snow pushed through the region on March 11–12, prompting Arizona ski resorts to re-open briefly, some areas of the Southwest had logged a record-breaking dry stretch. The re-

cent precipitation provided a brief respite from drought and La Niña-induced dry conditions, and could

put a damper on the fire season, “but we still have a ways to go for even average streamflow,” Garfin said. Streamflow is the total amount of water that flows through river systems that helps replenish the water supply. La Niña, which developed late in the season, is a sustained cooling of sea surface temperatures in the eastern and central tropical Pacific Ocean and is associated with drier winters in the Southwest.



Pinning a dollar amount on the economic effects of drought can be difficult because researchers have to tease out climate variability from a number of other factors that play a role in the market, said George Frisvold, a professor in the UA Department of Agriculture and Resource Economics.

But Frisvold, a CLIMAS investigator, has shown that drought exacts a significant toll on revenue from nature-based tourism and water-recreation in the national parks in the Southwest, where roughly 26 million people annually converge to take advantage of the great outdoors, spending more than \$1.3 billion in the surrounding communities in the process.

In a recent study, Frisvold and UA graduate student Srinivasa Ponnaluru found that lake levels, which are tied to drought, influenced the number of visitors to lakes in the region, including Lake Powell in the Glen Canyon National Recreation Area straddling southern Utah and northern Arizona.

Putting the AZ drought plan into action

BY STEPHANIE DOSTER

Slumped prickly pear cacti in the desert lowlands. Shuttered ski slopes in the high country. Dead mesquite trees in the rangelands. And charred forest along the Mogollon Rim.

The one-two punch of warm temperatures and a record-breaking dry spell—coming roughly 10 years into a stubborn drought—is sapping life out of the environment in Arizona, while reviving threats of a busy wildfire season, dwindling water supplies, and economic losses in the state.

To better prepare Arizona for such a dry stretch, university researchers, public agencies, citizens, and other water users have been working together to transform the state drought plan into a living, breathing monitoring system that combines science with detailed information about how livestock, rangelands, forests, vegetation, and agriculture are faring, starting in Cochise County.

“The drought plan is being implemented. It’s not just sitting there gathering dust,” said Gregg Garfin, program manager for the Climate Assessment for the Southwest (CLIMAS) at the University of Arizona who helped create the monitoring system. “I really credit the Arizona Department of Water Resources and Gov. Janet Napolitano with keeping a focus on the situation.”

Arizona’s drought plan, approved in October 2004, outlines steps for responding to drought, assessing its toll, and preparing for future water shortages. The

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Southwest drought, continued

Between 1999 and 2003, the level of Lake Powell fell 78 feet, and the number of hikers, boaters, anglers, and others who typically visit the park plunged with the shoreline, Frisvold said.

While only a relatively small percentage of the entire Arizona economy, Frisvold points out, “this employment and spending is quite important to local, rural economies, and there’s the multiplier effect. You put money into the pockets of people who live there, and they turn around and spend it. You’re generating more income than the original dollar spent.”

The researchers estimated that the decline from the 1999 lake levels cost the park about 212,000 visitors in 2003, leading to a \$14 million reduction in local sales and a loss of about 300 jobs.

Drought-related wildfires also can pack an economic punch, beyond the obvious costs of battling the blazes. The Cerro Grande Fire in New Mexico, which began as a prescribed burn amid drought conditions in 2000, burned through 47,000 acres, cost nearly \$570 million in disaster expenses and claims, and displaced more than 400 families, according to the Federal Emergency Management Agency. Frisvold and Ponnaluru estimate that 66,000 fewer people visited Bandelier National Monument because of the fire.

Other wildfires that have erupted during drought years have proven staggeringly expensive: The combined estimated cost of wildfires that tore through Arizona between 2002 and 2004 is \$196.8 million.

Long term drought that kills native trees also can dampen property values, said Bonnie Colby, a professor in the UA Department of Agriculture and Resource Economics and CLIMAS investigator. In a study that looked at the quality of vegetation in Tucson’s washes, Colby found that homebuyers are willing to pay a 5 to 10 percent premium



Figure 1. Lake Powell with low water levels in November 2004. Credit: R. A. Taylor

for houses near “ribbons of green,” riparian areas lush with healthy, large trees like cottonwoods and mesquites.

Colby, who also studies how drought influences the market price of water, said cities sometimes turn to leasing water from farmers during extended dry spells, when demand and prices are higher. Some southwestern urban interests, which can include water providers, developers, multi-city water districts, golf courses, and other businesses, are negotiating to lease water from agricultural areas.

Leasing also has economic implications for farm communities and related agricultural jobs; it leaves less water for growing crops and reduced economic activities linked to crop production, she said.

Within the agriculture sector, livestock bears the brunt of the drought because ranchers depend on rangeland conditions to graze cattle, explained Brian Hurd, an assistant professor in Agricultural Economics and Agricultural Business at New Mexico State University.

“For the state and rural economies, the livestock and ranching sectors are going to be hit pretty good as far as I can tell.” Hurd said, adding that he has not crunched the numbers. “When a drought happens, it hits the range grass really hard and reduces the amount of stocking that can be done. That puts upward pressure on supplemental feeding operations, like bringing hay and alfalfa

out to the cattle. It gets expensive and it encourages ranchers to thin the herd.”

That creates a market surplus, which drives down the price of beef for ranchers. But once conditions improve and the ranchers want to replenish their stock, cattle are in short supply and more expensive, Frisvold said.

“So they are selling low and buying high,” Frisvold said. “The dynamics of that can really hit ranchers.”

Cities and farmers have been buffered a bit from the effects of drought because they can pull from ground water and river basins. But if the drought intensifies and temperatures climb, hauling water to rural communities, leasing water from farmers, and generating power through a reduced Colorado River could carry a hefty price tag, researchers say.

“Big changes are coming if we continue on this trajectory. We won’t be able to do business as usual,” Garfin said. “Drought is a wake-up call. We don’t want to hit the snooze button because if we’re living like we’re waiting for climate change to happen, when it happens it’s going to be too late. We have to pay attention and use our water and resources wisely.”

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Drought plan, continued

plan creates a five-tier drought monitoring system that ranges from normal to extreme conditions. It also establishes two state-level committees that report to the governor—the Interagency Coordinating Group and a science and data-oriented monitoring committee—and a number of local-level groups to help track conditions and coordinate drought response.

“The local groups are a big deal because the monitoring committee comes in with stream flow, temperature, and numbers,” said Garfin. “But now we get to hear from Arizona citizens that, yes, we’re having prickly pear that should be robust this time of year all dying. That is tangible evidence, that wouldn’t show up in climate data, that the drought is hurting us.”

As a co-chairman of the monitoring committee, Garfin helps assess the state’s drought strategy and brainstorm ways to improve it, and watches for signs of drought. Through his work in CLIMAS, Garfin also provides reservoir data and other information to the monthly drought status reports posted online and is involved in setting up the local groups.

Mike Crimmins, a climate science extension specialist with the UA Cooperative Extension, is helping to organize a pilot local group in Cochise County. He said it is his job to figure out how to systematically collect the information from the local groups, taking into account varying topographies and ecosystems, and apply it to the drought report.

“It has to have some connection back to people’s lives,” Crimmins said. “If the monitoring committee’s report doesn’t accurately reflect the information, it isn’t useful.”

The Cochise group, made up of local water providers, city and county managers, ranchers, concerned citizens, the

Cooperative Extension, and representatives from various state and federal agencies, has met several times since October and formed a steering committee to hash out how they will send a description of drought conditions in their area to the monitoring committee.

“This kind of well-organized local and county-level reporting of drought impacts and county-level coordination of drought response is a cutting-edge effort,” Garfin said. “Ideally, all 15 counties would be marching forward together, but realistically to have a pilot program up and running and learning from that as we move ahead to other counties is as good a situation as we can hope for.”

Given the current conditions, launching a working drought plan throughout the state can’t come a moment too soon. The dry spell has ratcheted much of Arizona up from abnormally dry to extreme drought status, the highest level in the alert system. In February, the lack of precipitation also sparked Gov. Napolitano to convene for the first time the new Interagency Coordinating Group to discuss how to deal with the parched conditions.

According to the National Weather Service, 2005 was the third warmest year in Tucson since record-keeping began in the city in 1894. And with a record-breaking dry stretch since last fall, forest and rangeland conditions have deteriorated to severe drought classification.

Only 0.79 inches of rain were recorded at the Tucson International Airport from September 2005 through April 2006. The Phoenix Sky Harbor Airport

had a record-setting 143 days without a trace of rain, a stretch that ended March 11. And the Flagstaff Airport recorded a mere 44.6 inches of snow during the winter season. The normal amount is around 108 inches.

“I think things are only going to get worse as time goes on” in terms of lack of precipitation, said Tony Haffer, a meteorologist with the National Weather Service in Phoenix who co-chairs the monitoring committee. “We really need to be looking seriously at what is facing us in the coming months and potentially years and organize ourselves to take advantage of the water we have in a more efficient way.”

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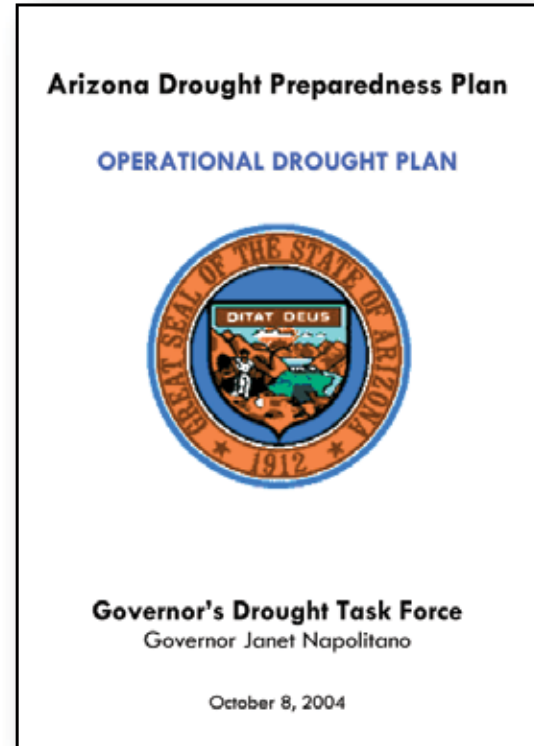


Figure 2. Arizona Drought Preparedness Plan, which is available for download at <http://www.azwater.gov>.

