

# Climate Change Poses Challenges to Food Security in the Southwest

By Britain Eakin

*This article was published in the Southwest Climate Change Network (SWCCN) on March 2. SWCCN focuses on climate-related issues pertinent to the Southwest region. SWCCN authors catalog and comment on news and science about climate change and related issues relevant to resource managers, utility providers, researchers, policy-makers, and other groups. Read more at <http://www.southwestclimatechange.org>.*

Most of us are familiar with the concept of peak oil, and even peak water. But peak chili peppers? In the southwestern U.S., where the prospects of warmer and drier days loom large, the idea of a dwindling supply of chilies might not be so far-fetched.

The “volume of water available for crop irrigation peaked in the mid-1970s,” and “the capacity for water to support cities, industry, agriculture, and ecosystems in the U.S. West is near its limit,” according to a recent report on the State of Southwestern Foodsheds.

Combine limited water with the potential effects of climate change (primarily drought and higher temperatures), and food security in the Southwest could face some serious challenges in the coming years. Farmers and families alike will feel the pangs of climate change where it hurts most – in higher prices. The USDA projects a continued trend of rising food prices that outpaces inflation. According to the U.S. Census Bureau 2010 report, Arizona and New Mexico already rank among the worst in the nation in terms of poverty and household food insecurity. This is not good news for southwestern agriculture.



*Agriculture plays a major role in the economy of the Southwest. The market value of agriculture products in Arizona and New Mexico tally more than \$US 3 and 2 billion, respectively, according to a report on the State of Southwestern Foodsheds.*

## Veggies in a deep freeze

So how will climate change impact agriculture in the Southwest? One significant aspect of climate change is its impact on the growing season, which in turn can change how agriculture manages irrigation water, according to Hilary Brinegar, a water and natural resource policy specialist with the New Mexico Department of Agriculture.

“You can experience earlier spring runoff than average, which can change the start and end of the growing season from year to year... and you can get more extreme weather events like drought, wind, fire and flood with climate change.” Vegetation patterns can also shift due to climate sensitivities, and may cause an increase in non-native species of vegetation and pests, she added.

Severe freezes like the one in mid-February could fall into the category of “more extreme weather events.” Most experts say the effects of the recent freeze on agriculture remain to be seen, particularly among pecans and onions. Yet farmers were fortunate the freezes came before most crops had been planted, said Stephanie Walker of New Mexico State University, adding that the prospect of more severe freezes would likely only influence the timing of when crops get planted. In relation to chilies, one of New Mexico’s most well-known agricultural crops, Walker said freezes might not be a bad thing.

“I don’t think freezes will hurt chili; in some cases it might actually help, because it could reduce winter insect pests. Those pests are used to the normal freezes we get, and bounce back quickly. But a severe freeze could cut down on pest populations

continued on page 4

## Food Security, continued



*Agriculture near Scottsdale, Arizona.*

somewhat, because it would take a little bit longer for them to get reestablished,” she said.

Craig Runyan, extension water resource specialist at New Mexico State University, thinks the freeze won't have any significant economic impact on agriculture, with the exception of pecan production. “There will probably be some damage to our pecan orchards, but we may not see it for two or three, maybe even four years because of the nature of freeze damage in deciduous trees—it doesn't show up right away,” Runyan said.

### **High and dry. And warm.**

Yet what worries Runyan more now is the drought in New Mexico. Since November of 2010, there has been virtually no precipitation in Las Cruces, New Mexico. “It

has not rained here. And where population is growing and demand for water is growing, you just don't know what to do. It's scary,” he said.

*Indeed, this year looks particularly bad for agriculture in New Mexico.*

“Normally southern New Mexico farmers start irrigating around March. But this year they are estimating that they won't start irrigating until later in the summer ... mostly due to low reservoir levels and poor snowpack conditions,” Brinegar said.

Farmers rely heavily upon snowmelt from the snow pack for irrigation. Snowmelt turns into runoff, which feeds rivers and reservoirs. At some point every year, water gets released from the reservoirs, which farmers can then divert to irrigate their

crops. When the runoff is good, farmers can start irrigating in the spring.

According to Brinegar, because of the poor snowpack conditions, the irrigation season is being pushed back this year until the peak demand for water occurs, which happens during the hottest and driest part of the summer, carrying with it economic implications.

“Because of the decreased amounts of surface water (in the reservoirs), farmers will have to pump groundwater to irrigate their crops, a practice that comes with a higher energy cost than diverting out of a river,” she said.

**continued on page 5**

## Food Security, continued

“This is going to cost the grower more, the market more... everyone will end up paying more,” said Runyan. Rising fuel costs will also drive up food prices. “The post-harvest cost of all food production involves a lot of transportation. It’s one of the driving factors in the cost of our food,” Runyan added.

The overall picture for the impacts of climate change in the Southwest indicates hotter and drier conditions, said Gregg Garfin, a researcher at the University of Arizona. Brinegar agreed, “We’re seeing this trend of moving into what is perhaps longer, more sustained drought. We’re at about the 12th year of a sustained drought ... so we could be looking at 20 more years of this,” she said.

Yet Garfin says the changes we could see are not necessarily straightforward and contain some contradictions. One of the most dramatic impacts could be the change in precipitation patterns.

“Studies at the University of Arizona show that El Niño winters might get wetter, but they will still be hotter,” Garfin said. The primary impact of this will manifest in relation to snowpack; more precipitation could come in the form of rain instead of snow.

“Snow is like a time-release capsule for water,” Garfin said. “What we want is to have water available during the time of year when we have the most demand for it, and that would be the summer. If snow is melting earlier, or more winter precipitation is coming as rain instead of snow, and therefore not being released more slowly, then we have a less reliable water supply,” he added. A less reliable water supply means farmers will increasingly rely upon ground water for agriculture.

What’s fairly certain is that the Southwest will see a reduction in winter and spring precipitation, Garfin said. Yet it remains unclear how summer and fall

precipitation patterns will differ. “There is a chance summer (monsoon) precipitation will increase, and there is a chance it will become more intense... where it rains down in heavier more intense bursts,” he said. Heavy, intense rainfall in short periods of time can flood agricultural fields and destroy crops. Moreover, this increases the chances of hail, which also can damage crops, Garfin said.

Another issue that could arise with drier winter and spring seasons is blowing dust, particularly in the windy months of April, May and June. “You can end up with big dust storms, and the crops literally get pelted with little sand particles – that can just ruin the crops,” Garfin added.

All of this could result in big economic losses for Arizona and New Mexico agriculture. The effects of people abandoning agriculture trickle through entire communities, from the folks that sell seed, fertilizer and farm equipment, to stores in small towns and rural areas, Garfin said.

### The future of food security

So how will all of this impact food security in the Southwest? That could very well depend on how climate change impacts the regions that export food to Arizona and New Mexico, particularly Mexico, California and South America, Garfin said. According to Peter Warshall’s essay in the State of Southwestern Foodsheds report, “Over 95 percent of the food grown within Arizona and New Mexico is exported beyond the boundaries of these two states. Likewise, over 97 percent of the food eaten by residents of Arizona and New Mexico is currently imported.”

Yet despite the seriousness of the issue of food security, Garfin also sees positives in some of these problems.

“We might see more community gardens, and people might become more inclined

to grow food locally,” he said. “We might also see more agricultural growers growing crops for local use rather than for export. In terms of urban areas, there’s a movement toward doing more rain-water harvesting, and vertical growing,” Garfin said.

Vertical growing pertains to multi-level indoor farms in urban areas that function as large-scale greenhouses, and could offer one possible solution to feeding growing urban populations. Vertical growing could cut down on the transportation costs of importing food, Garfin added.

Whatever the future holds, the State of Southwestern Foodsheds Report indicates that food insecurity will continue to worsen as the effects of climate change on agriculture advance “unless unprecedented measures are taken.” The report makes several recommendations targeted specifically to the Southwest, including reducing “the overproduction of certain commodity crops for exports” such as melons, lettuce and chilies; offering “incentives for farmers to grow a broader diversity of crops for local consumption;” increasing access to arable land; and utilizing “fallowed, publically-owned lands for local food production.” Additionally, the report advocates for urban food production, growth of less water-intensive crops, and greater consumption of locally grown foods.