

## **LA Monitor:**

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Scientists: Heat helped drought kill pinyons

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People around Los Alamos are growing accustomed to an environment featuring dead trees, whether from the Cerro Grande Fire of 2000 that blackened the mountainside or the subsequent drought that browned the slopes of the canyons.

But scientists have taken a long look at what caused the death of millions of acres of pinon pines, not only around the Pajarito Plateau, but across the Southwest - and they have raised an ominous possibility.

Heat is a culprit, they have found, along with its accomplices, drought and bark beetles.

According to a team of 13 scientists from a number of research institutions, including Los Alamos National Laboratory, 40-80 percent of pinon trees across a 60,000 square-mile region died during first years of the current drought, more than in a slightly drier spell during the 1950s.

A paper, "Regional vegetation die-off in response to global-change-type drought," was distributed online earlier this week in the Proceedings of the National Academy of Sciences.

The research has sparked national attention, adding another piece of evidence to a troubled climate forecast.

"If temperatures continue to warm, vegetation die-off in response to future drought may be further amplified," the authors write. They say the regional event "may be a harbinger" of global climate changes elsewhere, aggravating the effects of drought patterns with increased temperature.

"The first result is the most obvious one," said Paul Rich, who led the LANL effort and analyzed satellite data in collaboration with scientists in a four-state area.

"There was a huge regional die-off in association with the drought."

At first glance, he said, everybody could see that bark beetles were causing the death of the trees.

Drought is one thing, but the heat may have made matters worse, leading to a further weakened state of the trees.

Randy Balice, another Los Alamos scientist, whose contribution was related to wildfire hazard assessment at the laboratory, spent six months analyzing climate data. He cautioned against over-simplification.

"You can't make connections between global warming and a single die-off event," he said.

But, as the team examined the phenomenon from several different angles, they came up with the same hypothesis.

"It's not drier; it's just warmer," Balice said.

David Breshears, formerly at Los Alamos and now a professor at the University of Arizona, was the lead author of the paper.

He was even more explicit about the connection between the pinon research and the larger issue of global warming, related to emissions from fossil fuels.

"We documented a massive forest die-off," he said, "and it is a concern because it's the type of thing we can expect more of with global warming."

Another co-author Clifton Meyer, a LANL ecologist who has been collecting data from the Mesita del Buey since 1982, said more long-term data is needed.

"The fact that we had to reconstruct the conditions of the previous drought, half a century ago, underscores the need for more data on our ecosystem," he said.

The research raises further questions for the future.

"When you have this big a die-off it's a turning point for the ecosystem and we don't know where it's going next," Rich said. "That depends on the weather."

Drier weather could lead to desertification, he said. If the weather is wetter, the trees may return, along with more invasive species; erosion may deepen and the carbon-storage capacity of the soil may change.

"In any case, we will see a changed Southwestern landscape for many years to come," Rich said.