

Drought and fire activity—what's climate change got to do with it?

August 22 2016, by Rebecca Fowler, Earth Institute, Columbia University



Park Williams coring a tree in the Gondar region of Ethiopia. Credit: Marcin Koprowski

It's mid-August and east of Los Angeles, the [Blue Cut fire](#) is burning

through the mountains of San Bernardino, California. So far it's blackened 30,000 acres and forced more than 80,000 people to evacuate their homes. Several days before, NASA announced that July 2016 was Earth's warmest month since record-keeping began in 1880; it appears that 2016 is likely to beat 2015 for the dubious distinction of being the hottest year on record. And late last week, [torrential downpours fell on southeastern Louisiana](#). The two-day storm resulted in twenty inches of rain, severe flooding and damage to an estimated 40,000 homes.

Weather and climate are suddenly competing with the Rio Olympics for headlines. And people want to know: Are these events caused by climate change?

In the Tree Ring Laboratory at Lamont-Doherty Earth Observatory, scientist Park Williams is combing through large climate datasets to help answer this question as it pertains to [droughts](#) and wildfires. Williams is a bioclimatologist who studies the causes and consequences of droughts from climatological and ecological perspectives, with a focus on the western United States.

To understand what produces drought conditions, Williams uses climate data and analyses to deconstruct droughts—looking at exactly how factors like precipitation and temperature, and atmospheric and ocean processes come together to cause [drought conditions](#) in a given region. Ecology comes into play when determining the consequences of droughts; for this work, Williams studies forests, forest use, tree rings and other [climate records](#) to figure out how forests respond to climate variability and how sensitive they are to water shortages.

Williams is one of the first recipients of a Center for Climate and Life Fellowship, which supports early-career researchers as they pursue fundamental questions about the impacts of climate change. He's using the funding provided by the Center for new research that examines the

influence of climate change on droughts and wildfires. His main goal is to try to dissect drought and its consequences into the parts that can be attributed to climate change and the parts that are related to natural variability or other random forces.

"Knowing how much of a role climate change plays, not only for the California drought, but for wildfires or changes in snowpack is really important for the future and directly relevant to how we as a society prepare," Williams said.



The 2003 Simi Valley Fire ravages a mountainside in Southern California's Simi Valley. Credit: U.S. Air Force/Senior Master Sgt. Dennis W. Goff

He is quick to point out that many people tend to see climate change as an all or nothing factor in [extreme weather events](#), believing that a drought is either caused by climate change or it's not. This is almost never the case—every extreme event has multiple causes. Temperature, atmospheric circulation patterns, precipitation, snow pack and soil moisture levels all play a role in drought.

[In prior work](#) focused on California, Williams [found droughts are heavily influenced by climate change](#), "so the dice are being loaded toward these events becoming more frequent and more extreme." If Williams is able to determine, for example, that random or natural influences are the main drivers of a large drought and that a very small fraction of it is caused by climate change, society may not need to put as many resources toward immediately preparing for similar or worse events to become the new normal. If the cause of a devastating drought is half climate change and half natural occurrence, we can assume that similar or more extreme events will become increasingly likely as the planet continues to warm, and more resources should be put toward preparing for them.

Making matters worse, humans influence droughts from above through greenhouse gas emissions, and from below by drawing down and removing ground water reserves. In a place like central California, where huge amounts of water have been removed from the ground, there's less water available to cheaply pull out and use for drinking, agriculture or fighting fires.

"This makes the human system less resilient to future droughts at the same time that climate change is making future droughts more likely and more intense," Williams said.

Determining the extent that events like droughts, floods and wildfires are caused by [climate change](#) or natural factors has the valuable application

of enabling society to know where risk lies, and how to prepare for such events to reduce loss of life and property.

Williams doesn't consider his work done once his research results are published in a scientific journal. He is enthusiastic about sharing his findings and ensuring that they are understandable and available to [policy makers](#), media and the public.

"My job as I see it is to serve as the eyes for society. I want to help people have a better, more educated vision," Williams said. "Policy doesn't get made if the public doesn't care. But it can't be made correctly if the policy makers don't have the right information."

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