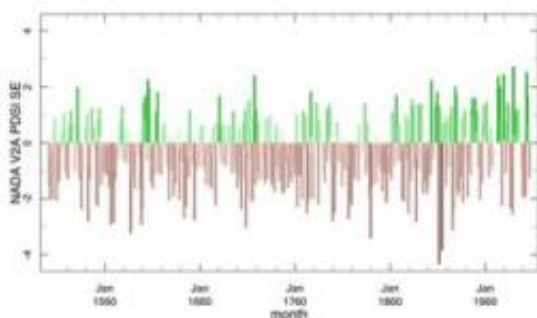


# 'Killer' Southeast drought low on scale, says study

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This represents the Southeast US rainfall reconstructed from tree rings between 16th-20th centuries. Credit: Richard Seager

A 2005-2007 dry spell in the southeastern United States destroyed billions of dollars of crops, drained municipal reservoirs and sparked legal wars among a half-dozen states—but the havoc came not from exceptional dryness but booming population and bad planning, says a new study.

Researchers from Columbia University's Lamont-Doherty Earth Observatory defied conventional wisdom about the drought by showing that it was mild compared to many others, and in fact no worse than one just a decade ago. According to the study, [climate change](#) has so far played no detectable role in the frequency or severity of droughts in the region, and its future effects there are uncertain; but droughts there are essentially unpredictable, and could strike again at any time. The study

appears in the October edition of the *Journal of Climate*.

"The drought that caused so much trouble was pathetically normal and short, far less than what the [climate system](#) is capable of generating," said lead author Richard Seager, a climate modeler at Lamont. "People were saying that this was a 100-year drought, but it was pretty run-of-the-mill. The problem is, in the last 10 years population has grown phenomenally, and hardly anyone, including the politicians, has been paying any attention."

Region wide, the drought ran from late 2005 to winter 2007-2008, though many areas in the south were still dry until last week, when the [weather](#) turned conclusively, and flooding killed at least eight people. During the height of the dry period, Atlanta's main reservoir sank more than 14 feet, usage restrictions were declared in many areas, and states became embroiled in lawsuits among themselves and with the federal government over use of water in rivers and reservoirs.

Seager and his coauthors Alexandrina Tzanova and Jennifer Nakamura put the period in context by comparing it with instrumental weather records from the last century and studies of tree-growth rings, which vary according to rainfall, for the last 1,000 years. These records show that far more severe, extended region-wide events came in 1555-1574, 1798-1826 and 1834-1861, with certain areas suffering beyond those times. The 1500s drought, which ran into the 1600s in some areas, has been linked by other studies to the destruction of early Spanish and English New World colonies, including Jamestown, Va., where 80 percent of settlers died in a short time. The 20th century turned out relatively wet, but the study showed that even a 1998-2002 drought was worse than that in 2005-2007.

The factor that has changed in the meantime is population. In 1990, Georgia, which uses a quarter of the region's water, had 6.5 million

people. By 2007, there were 9.5 million—up almost 50 percent in 17 years. The population is still ascending, driven largely by migration. However, little has been done to increase water storage or reduce consumption. There has been increased sewage discharge near water supplies, and vast tracts of land have been covered with impermeable roofs, roads and parking lots, which drain rainfall away rapidly instead of storing it.

Previous studies by Seager and colleagues have shown that droughts in the American Southwest and Great Plains states are controlled by cyclic changes in tropical Pacific Ocean sea-surface temperatures --the El Niño-Southern Oscillation cycle. This means that dry weather, which goes along with the cold phase of the cycle, can be predicted to some extent. However, in the current study, the scientists found only a weak correlation between Southeast weather and the tropical Pacific. Instead, says Seager, dry spells appear to be generated by random changes in regional atmospheric circulation. This means weather could dry up at any time.

Seager's studies also suggest that manmade warming is beginning to perturb precipitation patterns across the globe. As a result, he says, the Southwest may have already entered a period of long-term aridity. In contrast, global warming does not appear to have yet affected rainfall one way or the other in the Southeast. Most climate models project that higher temperatures will actually increase rainfall there—but as temperature rises, evaporation will also increase. At best, says Seager, the two effects may balance each other out; at worst, evaporation will prove stronger, and result in drier soils and reduced river flows in the long term. "Climate change should not be counted on to solve the Southeast's water woes, and is, in fact, as likely to make things worse as it is better," says the paper.

"It was a lot drier in the 19th century than it has been recently, but there

were so few people around, it didn't harm anyone," said Seager. "Now, we are building big urban centers that make us vulnerable to even slight downturns."

The Federal Emergency Management Agency estimated that national losses due to drought ran around \$8 billion a year in the 1990s, but they are probably higher now.

Mark Svoboda, a climatologist at the National Drought Mitigation Center at the University of Nebraska who was not involved in the research, said of the study's results: "This should be a wake-up call. If this is not the worst case scenario, what are we going to do when the worst-case scenario arrives?"

David Stahle, a tree-ring scientist at the University of Arkansas who made the link between 1500s-1600s droughts and the struggles of early Southeast colonies, said settlers then were particularly vulnerable because they had just arrived and lacked sufficient infrastructure or backup supplies. He called the Lamont study "a bedtime story with a moral for modern times."

"Are we returning to a period of sensitivity and danger like the colonists experienced?" said Stahle. "In a way, yes, it looks like we are."

More information: The paper, "[Drought](#) in the Southeastern United States: Causes, Variability Over the Last Millennium , and the Potential for Future Hydroclimate Change," is at: [www.ldeo.columbia.edu/res/div/...ger\\_etal\\_SE\\_2009.pdf](http://www.ldeo.columbia.edu/res/div/...ger_etal_SE_2009.pdf)

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