

# As Temperatures Rise, Empires Fall: Heat and Human Behavior

People really do behave worse in hot weather—and whole nations do too

By [Veronique Greenwood](#) | Aug. 02, 2013

The summer months, when temperatures soar and pedestrians flock to the shady side of the street, when even breathing seems to leave you sticky, is when violent crimes peak. It's a well-known pattern, and psychologists have published vast rafts of papers investigating whether the heat, rather than any other factor, like day length, or the kids being out of school, might be responsible. Though a clear causal effect remains elusive, the research has found that heat does appear to boost aggression, as anyone who's stood in a sweltering subway station with a bunch of surly looking fellow commuters can attest.



NASA / Getty Images

The link between environment and human behavior can be writ much larger too. For decades, archaeologists and historians have uncovered evidence that extreme weather events that cause crop failures can lead to unrest, uprisings, and downfalls—from Babylon to dynastic China to modern-day Africa—usually in concert with other factors. And in recent years, thanks perhaps to the looming specter of climate change, research into the connection between climate fluctuation and conflict has snowballed, with papers often looking at one particular geographic area, or one particular weather event.

That work has been both illuminating and incomplete. Can you really compare the effects of a drought in Ethiopia to a flood in Bangladesh to a hurricane in New Orleans—with their radically different cultures, populations and economies—much less make any connection to the person-to-person level of the psychology literature about how we behave when we're hot? What would be helpful would be a sort of grand unified theory of environment and behavior, something that holds true across every location, scale, and time, with the only constant being us. Now, a group of researchers at the University of California, Berkeley, may have developed one. After reanalyzing data from 60 existing studies using a new statistical method, they reported in this week's *Science* that they have found a consistent statistical yardstick, a way to link a particular degree of fluctuation from average temperature or rainfall to a particular percentage point change in human conflict—at the subway level and the national or even regional level.

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The body of knowledge on human aggression brought together under the umbrella of this study is immense, and varied—the studies hail from disciplines as diverse as archaeology, psychology, and economics, and each has its

own measures of everything from street violence to severity of civil war. So when Solomon Hsiang, a professor of public policy, Marshall Burke, a graduate student of agriculture and resource economics, and Edward Miguel, a professor of economics, first began to consider the possibility of looking for a general trend 18 months ago, they knew that whatever method they used to reanalyze the data would have to make such things comparable. “That was our main goal,” Burke says. “Can we bring together results from all these different disciplines that had not been aggregated before and put them on a common footing?”

The task was not easy, a little like collecting several dozen political science papers that look at how different governments in different countries were turned out of office—by coup, collapse or election—and trying to understand them all with a new and common denominator. “We essentially had to redo like 20 studies,” Hsiang says. Data suggesting that Chinese dynasties fell during drought—into the hopper to be recalculated. Data on whether aggression in baseball is linked to temperature, analyses of thousands of years of climate records correlated with conflict—ditto. Overall, they reanalyzed 45 datasets used across 60 studies, work by more than 190 scientists.

What they saw was that for each standard deviation towards warmer temperatures or more or less rainfall, conflict rose a predictable amount. For clashes between individuals or small groups—things like violent crime or gang wars—the increase was about 4%; for large conflicts, the number was 14%. Whether similar mechanisms were at work in all of these circumstances was not clear from the new study and was not even specifically addressed; the scales at which the conflicts play out are simply too different to suggest anything definitive. But in some cases, they may begin from a similar point source. Hsiang cites a laboratory study finding that in a hot simulator room, policemen are more likely to fire their guns when assaulted.

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“You can imagine, a lot of larger scale conflicts emerge because there’s some kind of dispute and the state has police officers trying to maintain order near a riot or a protest, and then things escalate because someone makes a very small mistake and fires a gun,” he says. “So the environment might be affecting how small scale conflicts escalate into larger conflicts.”

Not everyone agrees with the team’s conclusions. Halvard Buhaug, a professor of political science at the Norwegian University of Science and Technology, applauds the study’s goal of uniting the literature, but says that he believes that there’s more to be learned from paying attention to the large-scale direction of climate change than to standard deviations. He also notes that even with the old data newly reanalyzed, a third of the studies involving civil war don’t support the idea that climate was involved. “I think they conclude against their own evidence when they look at civil conflict and climate,” he says.

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The paper’s authors and Buhaug do agree that the next important step is to look more closely at the mechanisms at work at each of these levels. “We need to focus on some of those potentially important intermediate factors. It could be growth in the agricultural sector, or crops yields,” Buhaug says. “We need to focus more on how climate fluctuations impact economic growth, which could be another intermediate factor. And then there’s the black box that we haven’t really managed to do much with: how migration might work as an intermediate factor.”

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Going forward, the authors hope that other researchers will start including information about standard deviation and percent change more regularly in their analyses of climate and conflict, so the magnitude of their results can be compared with those in other studies. The rest of us, sweltering through late summer, will continue to look ahead to our warming future, hoping that we—and the people and nations around us—can keep our cool.

**(MORE ON THIS STUDY: [Hotter World Means Hotter Temperatures](#))**