Climate change may increase violence, study shows

By Elizabeth Landau, CNN
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When the Pacific Ocean altered rainfall patterns around the world, the subsequent climate shifts coincided with the fall of Mayan civilization, researchers said, occurring after the peak in A.D. 900. This is the Mayan temple complex at Tikal, Guatemala.

STORY HIGHLIGHTS

- Study: By 2050, risk of intergroup conflict will rise 50%
- Higher temperatures are associated with aggression
- Economic and psychological factors may play into this pattern

Climate change and human conflict

(CNN) -- It's a hot day; sweat soaks your forehead, and you just want to get back to your air-conditioned home, so of course you're going to be angry if the car in front of you doesn't move when the traffic light turns green. Honk! Honk!

When the temperature rises, so does aggression -- and that can lead to large-scale consequences, considering that climate change is turning up the heat over the entire planet.

A new study in the journal Science shows that shifts in climate historically have been associated with violent conflicts, among both individuals and groups, and that current warming patterns could significantly increase the abundance of human conflict by midcentury.
Researchers’ meta-analysis of 60 studies suggest that, consistent with links between conflict and climate shifts in the past, the risk of intergroup conflict around much of the planet would be amplified by 50% in 2050.

"It does change how we think about the value of avoiding climate change," said Solomon Hsiang, lead study author and researcher at the University of California, Berkeley. "It makes us think that avoiding climate change is actually something we should be willing to invest more in."

Future populations will hopefully also be able to figure out ways to adapt to these climate events, such that the predicted increase in violence will become less likely. Large-scale changes in technologies or political institutions may also alter the risk of violence in the future, Hsiang said.

**A brief history of climate change and violence**

Research on the topic of climate change and violence has been exploding onto the scene in recent years, study authors noted, with 78% of the studies included in this analysis having been published since 2009. Hsiang and colleagues incorporated research on civilizations dating back as far as 10,000 B.C. and across all major world regions.

Studies both in laboratory settings and of "natural" human situations have found a connection between heat and violence (PDF), the study said. Higher temperatures have been linked to both innocuous hostile behaviors, such as horn-honking while driving, and more serious behaviors such as domestic violence within households, assault and rape. Police officers are also more likely to use force at higher temperatures, studies have found.

Conflict is also associated with extreme rainfall, particularly in societies dependent on agriculture. Higher rates of personal violence are found in low-income settings, where agriculture income suffers from extremely wet or dry conditions.

The Mayan civilization appears to have collapsed during long periods of drought, Hsiang said. The same global climate event seems to have brought down the Tang dynasty in China -- in fact, according to Hsiang, most Chinese dynasties collapsed during dry spells.

The climate conditions that contributed to the decline of civilizations in both Central America and China look like an El Nino event, Hsiang said.

That directly relates to Hsiang's 2011 study in the journal Nature suggesting that the El Nino Southern Oscillation played a role in 21% of civil conflicts from 1950 to 2004. Evidence points to poorer countries of the tropics, such as Sudan and Rwanda, as being most affected in this way, whereas Australia did not have El Nino-related conflicts.

That's not to say that El Nino, a large movement of water in the Pacific Ocean that occurs about every four to five years, can be said to cause any given civil conflict. In fact, it’s impossible to prove that any particular war or act of violence is the direct result of climate change. There are certainly other factors that cause and insight violence of all kinds.
But Hsiang’s new study reinforces the idea that dramatic climate shifts increase the odds of violent conflict, as if loading a deck of cards in favor of this gruesome outcome.

Similarly, no individual hurricane or hot day in our time is definitively “caused” by human-induced climate change, but it does make extreme events such as last year’s Superstorm Sandy more likely, said J. Marshall Shepherd, president of the American Meteorological Society and professor at the University of Georgia.

**How much more violence, and why?**

When Hsiang and colleagues put together evidence from 190 researchers, they determined that intergroup conflict increases 14% and interpersonal violence increases 4% for each standard deviation in climate variables. For instance, in terms of temperature, one standard deviation is about halfway between what you would expect for an average year and a really hot year.

"If your local level of violence increased by 10 to 15%, you would probably notice that," Hsiang said.

Poorer populations have been shown in other studies to be more vulnerable to shifts in climate generally, consistent with findings that such shifts raise the risk of violence among them in a more substantial way. It is possible, however, that the definitions of conflict outcomes or measurement errors could have influenced these results, the study authors noted.

As discomforting the analysis may be, Thomas Homer-Dixon, political scientist at the Balsillie School of International Affairs in Waterloo, Ontario, sees Hsiang’s new study as strong overall. The conclusions are dramatic, he said, but the methods to compare various studies are sound.

What exactly explains these patterns concerning climate and violence? More research needs to be done on mechanisms, but scientists have some ideas based on available evidence.

Shifts in temperature and rainfall influence economic productivity and food prices, which may influence discontent and therefore riots. Climate changes can force the displacement of population, or urbanization, which may lead to clashes over resources.

There’s also the mental and physical responses to rising temperatures, which need further scientific investigation. "For instance, climatic events may alter individuals’ ability to reason and correctly interpret events, possibly leading to conflicts triggered by misunderstandings," the authors wrote.

**Implications of climate change and violence**

Research on this topic is making waves. A 2011 report, in which Shepherd participated, found that new national security challenges will arise for the U.S. Navy, Marine Corps and Coast Guard if even moderate trends in climate change continue.
"Military, security, and intelligence analysts are now engaged with the issue, and there’s a great deal of thought now being given to the long-term security implications of climate change," Homer-Dixon wrote in an e-mail. "There’s very little skepticism within these circles about the reality of climate change, nor about the potential risk climate change poses to national and international security."

The scientific community agrees that human activity -- namely burning coal, oil and natural gas -- has been driving a rapid rise of carbon dioxide levels in the atmosphere. This is analogous to turning the dial up on an electric blanket, says Jim Butler, a senior scientist at NOAA; it takes a little while to warm up, and even if we stop emitting carbon dioxide, temperatures would still rise for a decade or two.

Indirectly, analyses such as Hsiang’s can influence discussions about climate policy in general.

"If the world that these studies project will arrive in mid-century looks pretty unpleasant, then one obvious response is to be more serious about reducing greenhouse gas emissions," Homer-Dixon said.

It remains to be seen whether this research will indeed get policy makers hot and bothered enough to enact change.

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