

'Weather extremes fuel human conflicts, infectious diseases'

THURSDAY, 08 AUGUST 2013 00:00 BY CHUKWUMA MUANYA, WITH AGENCY REPORTS FEATURES - SCIENCE



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THE verdict is out: The rising cases of human conflicts, wars, and infectious diseases worldwide are being fuelled by extreme weather event that is climate change.



Two recent studies have confirmed how shifts in climate change causes spread of deadly infectious diseases and human conflicts.

According to a study published August 1 in journal Science by an international team of leading disease ecologists, climate change is affecting the spread of infectious diseases worldwide with serious impacts to human health and biodiversity conservation. They propose that modeling the way disease systems respond to climate variables could help public health officials and environmental managers predict and mitigate the spread of lethal diseases.

Where human health is concerned, there is not only the direct risk from pathogens like dengue, malaria and cholera, all of which are linked to warmer temperatures, but indirect risks from threats to agricultural systems and game species crucial for subsistence and cultural activities.

Another new study by researchers at the University of California, Berkeley, and Princeton University, United States, also published in Science concluded: "Shifts in climate are strongly linked to human violence around the world, with even relatively minor departures from normal temperature or rainfall substantially increasing the risk of conflict in ancient times or today."

The researchers report that small changes in temperature and rainfall substantially raise the risk of conflict of many types, from interpersonal spats - such as aggressive horn-honking by automobile drivers - to full-blown civil war and societal collapse. They reviewed data from 60 studies on environmental change and human aggression that spanned six continents and more than 12,000 years.

The researchers found that a temperature rise of one standard deviation - which, in the United States today, occurs when the average temperature for a given month is about 3° Celsius higher than usual - increases the frequency of interpersonal violence by four per cent, and the risk of intergroup conflict, such as civil war or rioting, by 14 per cent.

Floods and drought also have an effect, although it is smaller than that of temperature, the researchers report. And the effects are apparent worldwide, in developed and developing countries.

The results covered all major regions of the world and show similar patterns whether looking at data from Brazil, China, Germany, Somalia or the United States. By amassing more data than any prior study, the authors were able to show that the Earth's climate plays a more influential role in human affairs than previously thought.

The study data covers all major regions of the world and show similar patterns of conflict linked to climatic changes, such as increased drought or higher than average annual temperature. Examples include spikes in domestic violence in India and Australia; increased assaults and murders in the United States and Tanzania; ethnic violence in Europe and South Asia; land invasions in Brazil; police

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The new study could have critical implications for understanding the impact of future climate change on human societies, as many global climate models project global temperature increases of at least two degrees Celsius over the next half century. Refining the lens

Although there has been a virtual explosion in the number of scientific studies looking at how climatic impacts shape human conflict and violence, especially in recent years, the research stems from disparate research fields ranging from climatology, archaeology and economics to political science and psychology.

The latest study adopted a broad definition of conflict and used the latest research methods to re-evaluate what they found to be the most rigorous quantitative studies released since 1986 to examine aspects of climate such as rainfall, drought or temperature, and their associations with various forms of violence.

Meanwhile, the issue of climate change and disease has provoked intense debate over the past decade, particularly in the case of diseases that affect humans, according to the University of Georgia's Sonia Altizer, who is the study's lead author.

"For a lot of human diseases, responses to climate change depend on the wealth of nations, healthcare infrastructure and the ability to take mitigating measures against disease," said Altizer, an associate professor in the UGA Odum School of Ecology. "The climate signal, in many cases, is hard to tease apart from other factors like vector control and vaccine and drug availability."

Climate warming already is causing changes in diseases affecting wildlife and agricultural ecosystems, she said. "In many cases, we're seeing an increase in disease and parasitism. But the impact of climate change on these disease relationships depends on the physiology of the organisms involved, the location on the globe and the structure of ecological communities."

At the organism level, climate change can alter the physiology of both hosts and parasites. Some of the clearest examples are found in the Arctic, where temperatures are rising rapidly, resulting in faster developing parasites. A lungworm that affects muskoxen, for instance, can now be transmitted over a longer period each summer, making it a serious problem for the populations it infects.

To determine if a link between climate and conflict existed at multiple levels of social organisation, the UC Berkeley-Princeton researchers looked at whether evidence of a linkage was consistent within each of three broad categories of conflict:

- personal violence and crime such as murder, assault, rape, and domestic violence;
- intergroup violence and political instability, like civil wars, riots, ethnic violence, and land invasions; and,
- institutional breakdowns, such as abrupt and major changes in governing institutions or the collapse of entire civilisations.

They found that all three types of conflict exhibit systematic and large responses to changes in climate, with the effect on intergroup conflict being the most pronounced in percentage terms. The authors found that conflict responded most consistently to temperature, with all 27 out of 27 studies of modern societies finding a positive relationship between high temperatures and greater violence.

A central contribution of the study was to develop a method for comparing results around the world, because the nature of climatic events differs across locations. The authors' new approach was to convert climate changes into location specific units known to statisticians as standard deviations.

The researchers said that exactly why climate affects conflict and violence is the most pressing question for future related research.

"We're in the same position that medical researchers were in during the 1930s: they could find clear statistical evidence that smoking tobacco was a proximate cause of lung cancer, but they couldn't explain why until many years later. In the same way, we can show that climatic events cause conflict, but we can't yet exactly say why," they wrote.

"Currently, there are several hypotheses explaining why the climate might influence conflict. For example, we know that changes in climate shape prevailing economic conditions, particularly in agrarian economies, and studies suggest that people are more likely to take up arms when the economy deteriorates, perhaps in part to maintain their livelihoods."

While the study finds strong evidence that climatic events may be a cause of conflict, the researchers stressed that they are not claiming that climate is the only or primary cause of conflict, cautioning that conflict dynamics are complex and remain poorly understood.

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Also, future warming from fossil fuel burning could be more intense and longer-lasting than previously thought. This prediction emerges from a new study by Richard Zeebe at the University of Hawai'i who includes insights from episodes of climate change in the geologic past to inform projections of human-made future climate change. The study is published in the Proceedings of the National Academy of Sciences.

Humans keep adding large amounts of greenhouse gases to the atmosphere, among them carbon dioxide (CO₂), the most important human-made greenhouse gas. Over the past 250 years, human activities such as fossil fuel burning have raised the atmospheric CO₂ concentration by more than 40 per cent over its preindustrial level of 280 ppm (parts per million). In May 2013, the CO₂ concentration in Earth's atmosphere surpassed a milestone of 400 ppm for the first time in human history, a level that many scientists consider dangerous territory in terms of its impact on Earth's climate.

A global cooling calamity as depicted in the movie 'The Day After Tomorrow,' though, is very unlikely to be the result of climate change. The globe is likely to become warmer in the near future, and probably a lot warmer in the distant future. Now Zeebe, Professor of Oceanography in the School of Ocean and Earth Science and Technology at the University of Hawai'i at M^onoa, has examined humankind's long-term legacy of fossil fuel burning.

The study suggests that amplified and prolonged warming due to unabated fossil fuel burning raises the probability that large ice sheets such as the Greenland ice sheet will melt, leading to significant sea level rise.

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