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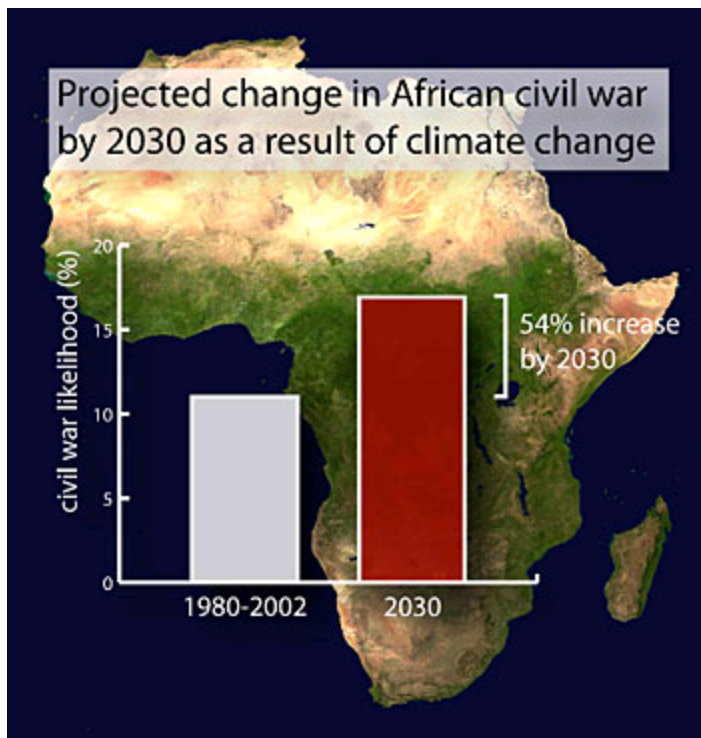
Farmers and pastoralists in a maize-growing region of Eastern Kenya. A new study finds that climate change could severely harm crop productivity and increase the likelihood that disadvantaged rural populations will take up arms. *(Marshall Burke photo)*

Climate change could boost incidence of civil war in Africa, study finds

By **Kathleen Maclay, Media Relations** | 23 November 2009

BERKELEY — Climate change could increase the likelihood of civil war in sub-Saharan Africa by over 50 percent within the next two decades, according to a new study led by a team of researchers at University of California, Berkeley, and published in today's (Monday, Nov. 23) online issue of the journal *Proceedings of the National Academy of Sciences* (PNAS).

The study, conducted by researchers at UC Berkeley as well as at Stanford University, New York University and Harvard University, provides the first quantitative evidence linking climate change and the risk of civil conflict. It concludes by urging accelerated support by African governments and foreign aid donors for new and/or expanded policies to assist with African adaptation to climate change.



The researchers found that the incidence of African civil war could increase roughly 55 percent by 2030, leading to 390,000 more battle deaths if future wars are as deadly as recent wars.

"Despite recent high-level statements suggesting that climate change could worsen the risk of civil conflict, until now we had little quantitative evidence linking the two," said Marshall Burke, the study's lead author and a graduate student at UC Berkeley's Department of Agricultural and Resource Economics. "Unfortunately, our study finds that climate change could increase the risk of African civil war by over 50 percent in 2030 relative to 1990, with huge potential costs to human livelihoods."

"We were definitely surprised that the linkages between temperature and recent conflict were so strong," said Edward Miguel, professor of economics at UC Berkeley and faculty director of UC Berkeley's Center for Evaluation for Global Action. "But the result makes sense. The large majority of the poor in most African countries depend on agriculture for their livelihoods, and their crops are quite sensitive to small changes in temperature. So when temperatures rise, the livelihoods of many in Africa suffer greatly, and the disadvantaged become more likely to take up arms."

Understanding the causes and consequences of civil strife in much of the African continent has been a major focus of the social sciences for decades, said Miguel, as monumental suffering has resulted from it. In the case of the Democratic Republic of Congo's, the International Rescue Committee estimates that at least 5.4 million people have died from fighting, hunger and disease during that country's ongoing civil unrest over the past 10 years.

In the study, the researchers first combined historical data on civil wars in sub-Saharan Africa with rainfall and temperature records across the continent. They found that between 1980 and 2002, civil wars were significantly more likely in warmer-than-average years, with a 1 degree Celsius increase in temperature in a given year raising the incidence of conflict across the continent by nearly 50 percent.



A child at a refugee camp in the Central African Republic is loaded with ammunition.

Building on this historical relationship between temperature and conflict, the researchers then used projections of future temperature and precipitation change to quantify future changes in the likelihood of African civil war. Based on climate projections from 20 global climate models, the researchers found that the incidence of African civil war could increase 55 percent by 2030, resulting in an additional 390,000 battle deaths if future wars are as deadly as recent ones.

All climate models project rising temperatures in coming decades, said David Lobell, study co-author and an assistant professor of environmental earth systems science at Stanford.

"On average, the models suggest that temperatures over the African continent will increase by a little over 1 degree Celsius by 2030," he added. "Given the strong historical relationship between temperature rise and conflict, this expected future rise in temperature is enough to cause big increases in the likelihood of conflict."

To confirm that this projection was not the result of large effects in just a few countries or due to overreliance on a particular climate model, the researchers recalculated future conflict projections using alternate data. "No matter what we tried - different historical climate data, different climate model projections, different subsets of the conflict data - we still found the same basic result," said Lobell.

It's easy to think of climate change as a long way off, said the researchers, but their study shows how sensitive many human systems are to small increases in temperature, and how fast the negative impacts of climate change could be felt.

"Our findings provide strong impetus to ramp up investments in African adaptation to climate change by such steps as developing crop varieties less sensitive to extreme heat and promoting insurance plans to help protect farmers from adverse effects of the hotter climate," said Burke.

Applying findings from this study could prove useful to policy makers at the upcoming Copenhagen negotiations in December in determining both the speed and magnitude of response to climate change, the authors said.

"If the sub-Saharan climate continues to warm and little is done to help its countries better adapt to high temperatures, the human costs are likely to be staggering," said Burke.