
Babbage
Science and technology

Climate and conflict

Cloudy with a chance of war

Aug 6th 2013, 15:13 by E.X.

EARTH'S climate is changing, whether you like it or not. As it does, other changes—like rising sea levels or falling crop yields—follow. It is easy to see how this might lead to conflict. Competition for ever scarcer resources such as arable land and its bounty can turn ugly. As the price of food rises the poor, who spend more of their income on it, are hit more than the rich, exacerbating income inequality and leading to disaffection, resentment and, possibly, violence.



Whether any of this actually happens, though, has remained moot. Now Solomon Hsiang, of the University of California at Berkeley and his colleagues come to the perturbing conclusion that it does. As they report in *Science*, climate change does indeed stoke strife, from cross-border wars to homicide.

Dr Hsiang, then at Princeton University, could not perform the gold-standard of scientific research, a controlled experiment, for this would require altering the climate for one random sample of a population but not another, while keeping all other aspects of the samples' environment constant. So he and his team did the next best thing: they compared the same population to itself, at different times throughout history when most other things (social structure, geography, economy, and politics) were roughly the same, but climate and prevalence of conflict weren't.

And rather than start from scratch, they scoured the literature across a variety of disciplines,

from archaeology and history to psychology and economics, for studies which examined the effects of a changing climate on violence. Since studies which find a relationship are more likely to be reported than equally robust ones that do not, they also perused archives of working papers, some of which never appeared in a journal, perhaps because the authors, or a journal's editors, did not find the non-result interesting enough. They found hundreds of papers, looking at different eras (from 10,000BC to the present day), and linking various climatic variables (temperature, rainfall, occurrence of floods or drought, severity of storms and the like) to all manner of strife (violent crime, sectarian riots, civil war, as well as toppling rulers or the collapse of empires).

The researchers then whittled their haul down to those studies which compared the rate of change in some climate variable and in the prevalence of conflict. They did this because conflict variables—murder rates, say—are likely to be influenced by other factors, such as income distribution or population size. Comparing changes in trends rather than trends themselves let them tease out not just which of the factors affect homicidal tendencies, but also how big an effect each of them has.

Where possible the researchers reanalysed the original data to meet their criteria. This left them with 60 papers, including [Dr Hsiang's study](http://www.economist.com/node/21526787) (http://www.economist.com/node/21526787) from 2011 on how El Niño, a worldwide fluctuation in the climate, may provoke civil war as well as inclement weather, as well as 17 working papers, including some that found no relationship between climate and violence.

Finally, they performed a "meta-analysis" of the 32 papers that looked at periods after 1950. This method, commonly employed in epidemiological research, involves using statistical tools to treat data from sundry studies on a related topic as a single set (it requires, among other things, that values for the different investigated variables be translated onto a single, unified scale).

The results leave no room for doubt: higher temperatures and more extreme rainfall patterns (leading to drought or flood) really do coincide with an increased frequency of conflict for all types of violence. For once, the direction of causation seems clear-cut: temperature might conceivably lead to a civil war, but a civil war is unlikely to affect temperature (other than metaphorically).

Precisely how the chain of causation works remains unclear for now. But this should not obscure the fact that it does. Scientists only pinpointed how cigarettes lead to lung cancer decades after the first statistical evidence for the link emerged. If all smokers waited for more details about the mechanism before kicking the habit, many would probably not have lived to witness its discovery. Alas, getting people to act to limit global warming is harder than convincing them to

quit smoking.

Correction: We originally wrote that all 60 methodologically rigorous papers were included in the meta-analysis. In fact, the researchers only looked at the 32 papers for periods after 1950. We should also have said that Dr Hsiang conducted the research while still at Princeton University, before he moved to the University of California, Berkeley. Sorry on both counts.