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Rainfall variability and violence in rural Kenya: Investigating the effects of drought and the role of local institutions with survey data☆

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ABSTRACT

In the debate about possible linkages between global environmental change and violent conflict, the research is overwhelmingly based on analysis of aggregate data for administrative areas, towns or villages, and geographic grids. With some exceptions, researchers rarely examine social and political processes that might link climate anomalies and violence experiences at the scale of individuals or households. We remedy this shortcoming by analyzing survey data for 504 Kenyans living in three counties collected in November 2013. We probe respondents' attitudes concerning perceived precipitation irregularities and their beliefs and economic activities. We find that in areas with reported worsening drought conditions, inter-community dialogue between ethnic groups has a pacifying conditional influence on support for the use of violence. The presence of local official rules regulating natural resource use consistently has no effect on beliefs about using violence where droughts are reported. To reduce possible bias in the reporting of drought conditions, our statistical models are estimated with controls for changes in measured vegetation health over time in survey sample areas. The moderating effect of inter-community dialogue on attitudes about violence under circumstances of environmental stress points to the importance of social and political contexts in studying connections between environmental change and conflict.

1. A link between environmental change and violent conflict?

Substantial debate about the possible links between societal conflict and climate and/or environmental variability has been ongoing for over a decade with a significant uptick in the number of studies over the past several years. The consensus among scholars is that the relationship – where it emerges – is complex. Even in policy-related documents, the relationships are expected to take a variety of forms, and operate through a mixture of institutional and social mechanisms; these are, however, not usually tested empirically against the observed record of political instability in the developing world. For example, language included in the 2014 *Quadrennial Defense Review* (QDR) states:

> Climate change may exacerbate water scarcity and lead to sharp increases in food costs. The pressures caused by climate change will influence resources competition while placing additional burdens on economies, societies, and governance institutions around the world. These effects are threat multipliers that will aggravate stressors abroad such as poverty, environmental degradation, political instability and social tensions – conditions that can enable terrorist activity and other forms of violence (QDR 2014, 8).

The QDR, serving as an example of similar policy documents, conflates definitions of violence (including terrorism, but also others that are not defined) as well as the associated stressors (from "poverty" to "political instability"). This general conclusion about "threat multipliers" is also a main point in the latest IPCC

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Working Group II report of March 2014 (IPCC, 2014) and the recent report of the U.S. government-funded CNA Corporation Military Advisory Board (CNA, 2014).

Our goal in this study is to clarify some of the possible linkages between environmental/ecological variability, focusing on precipitation, and violent conflict, with a consideration toward the possibility that intervening and moderating societal influences might affect such a linkage. This is an overdue improvement upon well-known studies that propose causal associations (e.g. Hsiang et al., 2013), but that do not identify how or why the observed relationship exists. There are important methodological and data differences between our study and existing research; our contributions to the debate are not just technical or merely a matter of presenting different data. In addition to testing whether the direct relationship exists, we also investigate the manner in which the climate–violence link may be moderated by formal and informal institutions. In line with the efforts of Maystadt and Ecker (2014), who report that environmental change is associated with violent events in Somalia through deviations in the market price for livestock, we strive to understand the conditional explanation for the outcome rather than presenting a simple bivariate association between climate anomalies and conflict even with controls for other factors. De Juan (2015) similarly tests a migration mechanism for the link between environmental change and conflict in southern Sudan. Ide et al. (2014) argue that the associations between environmental stress and conflict in Kenya will operate through a suite of social conditions that define vulnerability.

In this paper, we present the results of a survey of 504 individuals in three rural Kenyan counties to test several specific propositions, elaborated below, about the nuances of any relationships between climate anomalies and violent conflict. Kenya is an ideal test case because the country has a number of qualities that facilitate generalization to other sub-Saharan African states. The country is in the international middle-range in terms of per capita GDP. Populations in Kenya rely on a multiplicity of livelihood strategies, which means that our conclusions will not be based substantially on a case dominated by either pastoralism or agriculture alone. Kenya also contains a variety of agro-ecological zones. Finally, kenya is relatively stable politically despite the presence of a large number of ethnic groups operating in an open multi-party political system; thus, it is not the case that our findings would be muddled by the many exogenous effects of large-scale civil war violence, which has plagued other nearby countries. Kenya's serious election violence in 2008 took place over six years ago and conflict related to the country's involvement in neighboring Somalia's instability is generally limited to the northeast, barring several terrorist attacks in and near Nairobi and Mombasa. The country has been the site of numerous previous studies linking violence and climate change (reviewed below) and our work thus complements both ethnographic and aggregate statistical work by reporting perspectives of *individuals* in the regions affected by climate change.

We specifically examine violent conflict in the following analysis. Our focus is attitudinal support for engaging in acts involving physical bodily harm or death. While contentious politics may exist between individuals, between small groups of individuals, and between either local and state government structures and individuals, we are most interested in the circumstances where these tensions increase support for overt physical violence that is distinct from protests, collective rallies, and other types of political expression.

2. Motivations for the research and specific propositions

Highly publicized studies in general science journals like *Nature* (Hsiang et al., 2011), *Science* (Hsiang et al., 2013), *Climatic Change* (Wischnath and Buhaug, 2014; Tol and Wagner, 2010), and *Proceedings of the National Academy of Science* (Burke et al., 2009; Buhaug, 2010; O'Loughlin et al., 2012, 2014a,b) have investigated the associations between climate anomalies and violence. Some findings in this body of research have been deemed sensitive to analytical techniques and have even been questioned in an ongoing set of empirical re-analyses and debate (most recently, Ciccone, 2011; O'Loughlin et al., 2014b; Buhaug et al., 2014). Numerous recent articles in the field of conflict studies on this topic have origins in a diverse set of disciplinary backgrounds ranging from development economics and political science to anthropology and political geography (e.g. Hendrix and Salehyan, 2012; Koubi et al., 2012; Bohlken and Sergenti, 2010; Theisen et al., 2012; Deligiannis, 2012; Ember et al., 2012; Witsenburg and Adano, 2009; Fjelde and von Uexkull, 2012; Theisen, 2012; Lecoutere et al., 2010; Bogale and Korf, 2007; Schilling et al., 2012; Raleigh and Kniveton, 2012; Maystadt et al., 2014; Detges, 2014; von Uexkull, 2014; Böhmelt et al., 2014). These studies report a range of findings, for example that drought leads to organized violence, that high temperatures raise the likelihood of conflict. In studies with a more direct link to environmental science, research has also shown that migration – often a coping strategy for communities affected by drought – can be an effective option for mitigating loss, but that the effect varies across communities and is contingent on the details of changes in the physical landscape and in institutional structures operating within and around communities facing the decision to temporarily relocate (Goldman and Riosmena, 2013; Kniveton et al., 2012; De Juan, 2015); population movements often lead to direct tensions between the original and newcomer community that may escalate to violence. Further emphasizing the contextual and highly locale-specific character of migration in several Ethiopian sites, Morrisey (2013) argues that the influences of environmental and ecological change on mobility decisions are complex and include considerations for physical safety from violence.

Much of the research on the topic of climate change and violence (we highlight exceptions below) is, however, missing a key component of the proposed causal storyline. Most studies on the issue are based on aggregated, or remotely measured, climatological and violent conflict incidents data that are joined to some geographical unit of analysis. Even studies carried out at fine spatial and temporal resolutions (now generally preferred by researchers) do not incorporate empirical measurements of the beliefs of *individuals* within the relevant social processes of the proposed climate–violence link. A major shift in political violence research in recent years is a focus on gathering large-N structured survey data characterizing those who participate in violence (whether as victims or perpetrators), the motivation being an understanding of the beliefs and attitudes of populations where conflict emanates (e.g. Lyall et al., 2013; Blair et al., 2013; Oyefusi, 2008). There are multiple direct and indirect paths through which violent attitudes can translate into observed violent behavior (see also Linke et al., 2015). There is a good chance that somebody who willingly admits to approval of violence would engage in violence of some kind under circumstances of social stress. Even if the link is indirect, a person who supports the use of violence might be much less likely to report rumors of violent activity in order to prevent it if stories of pending attacks are circulated by word of mouth. A person who openly supports the use of violence may even be willing to harbor or materially support people in the local area who engage in acts of violence, thus enabling violence perpetrated by others.

Our work follows others for sub-Saharan Africa who have asked survey respondents about willingness to join a rebel movement in the Niger delta (Oyefusi, 2008) or about participation in violent cattle-raiding in the Turkana-Pokot corridor region of northwestern Kenya (Schilling et al., 2012). Conflict does not erupt or emerge without perpetrators; others who have conducted fieldwork in studying environmental scarcity in sub-Saharan Africa have argued that it is "particularly relevant to look for behavioral