

## CLIMATE CHANGE AND AFRICAN POLITICAL STABILITY PROGRAM

This paper is produced as part of the Strauss Center's program on Climate Change and African Political Stability (CCAPS). The program conducts research in three core areas, seeking to investigate where and how climate change poses threats to stability in Africa, identify strategies to support accountable and effective governance in Africa, and evaluate the effectiveness of international aid to help African societies adapt to climate change.

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# THE BREWING STORM?

CLIMATE CHANGE, RAINFALL, AND SOCIAL  
CONFLICT IN AFRICA

## Executive Summary

- Climate change is now a top agenda item for the global security community.
- In Africa, climate effects will be severe and capacity for mitigation and adaptation is low, which means that if climate change leads to conflict, Africa will likely be the first to suffer.
- Yet, understanding and responding to the threat of climate-driven instability in Africa requires a more nuanced definition of conflict: one that recognizes episodic unrest, riots, and demonstrations as well as interstate or civil war.
- Rainfall has a surprising influence on the prevalence of social conflict: the new Social Conflict in Africa Database reveals that in recent decades, conflict events have been more common in extremely wet and dry years than in years of normal rainfall.
- Furthermore, *violent* social conflict has been more common in extremely wet years than in extremely dry years.
- Climate forecasts indicate that future rainfall patterns in Africa will become more variable, with more extreme wet and dry years, raising the specter of an increase in social conflict.

## Rising Temperatures, Growing Threats

In 2010, for the first time ever, the U.S. Quadrennial Defense Review (QDR), the most prominent public statement of Department of Defense strategy and priorities, listed climate change as a critical threat to national security, stating “climate change could have significant geopolitical impacts around the world, contributing to poverty, environmental degradation, and the further weakening of fragile governments.”

Furthermore, warned the QDR, food and water scarcity, and mass migration out of affected areas, will increase the “burden to respond on civilian institutions and militaries around the world.”<sup>1</sup>

Climate change is squarely on the security agenda, both in the United States and abroad. Yet the climate-conflict link has remained hazy.

Other security agencies and authorities echo these concerns.

A 2010 UK Defence Ministry green paper forecasts that climate change will increase international instability and pose threats to British interests.<sup>2</sup> The Norwegian Nobel Committee awarded the 2007 Nobel Peace Prize to Al Gore and the Intergovernmental Panel on Climate Change (IPCC), on the premise that climate change can “fuel violence and conflict within and between states.”<sup>3</sup> United Nations Secretary General Ban Ki Moon has singled out climate change as one source of the ongoing Darfur conflict and warned that more climate conflicts will follow.<sup>4</sup>

If climate change does indeed lead to conflict over water and arable land, the people of Africa will likely suffer first and worst.

So climate change is squarely on the security agenda, both in the United States and abroad. Yet, how climate change will affect future conflict remains in the realm of conjecture.

Recent research has yielded little consensus on the connection between environmental factors and civil or international war, with some studies finding a relationship, while others find weak effects or none at all.<sup>5</sup>

This disagreement also applies to Africa—but if the climate-conflict link remains hazy, what is clear is that climate change effects in Africa are likely to be severe, the continent’s mitigation and adaptation capacity are low, and the population is particularly dependent on natural resources.

In sub-Saharan Africa, agriculture accounts for 34% of GDP and 64% of employment, but only 4% of Africa’s crop area is irrigated.<sup>6</sup> The IPCC reports that 25% of Africa’s population currently experiences high water stress and up to 600 million people will be at risk of increased water stress by 2050.<sup>7</sup>

If climate change *does* indeed lead to conflict over water and arable land, the people of Africa will likely suffer first and worst, even though they are least responsible for current and historic CO<sub>2</sub> emissions.

As Africa’s strategic significance rises due to its vast mineral resources and growth potential, Western policymakers may face increased economic, security, and ethical pressures to respond to conflicts on the continent.

## Mapping the Contours of Conflict in Africa

In this urgent context, the Strauss Center’s Program on Climate Change and African Political Stability (CCAPS) sought to develop a fact-based foundation for understanding the climate-conflict nexus.

To deepen knowledge of how past environmental events have affected patterns of conflict, researchers sifted through two decades’ worth of news archives to collect and analyze data on the full spectrum of social and political conflict in Africa.

The resulting Social Conflict in Africa Database (SCAD) contains over 6,000 distinct events from 1990 to 2009, including protests, riots, strikes, inter-communal violence, and other forms of unrest, with information on the location, timing, and magnitude of conflict events, as well as the actors involved, the issues of contention, and other variables.<sup>8</sup>

A key aim of this project was to remedy a critical flaw in current scholarship: an overly narrow definition of conflict and security.

**A key aim of this new social conflict database is to remedy a critical flaw in current scholarship: an overly narrow definition of conflict and security.**

Traditionally, the study of conflict has been dominated by a focus on international and civil war, where at least one of the combatants is a government.

Yet, interstate war has been extremely rare in Africa. (One notable exception is the Ethiopia-Eritrea conflict in

FIGURE 1

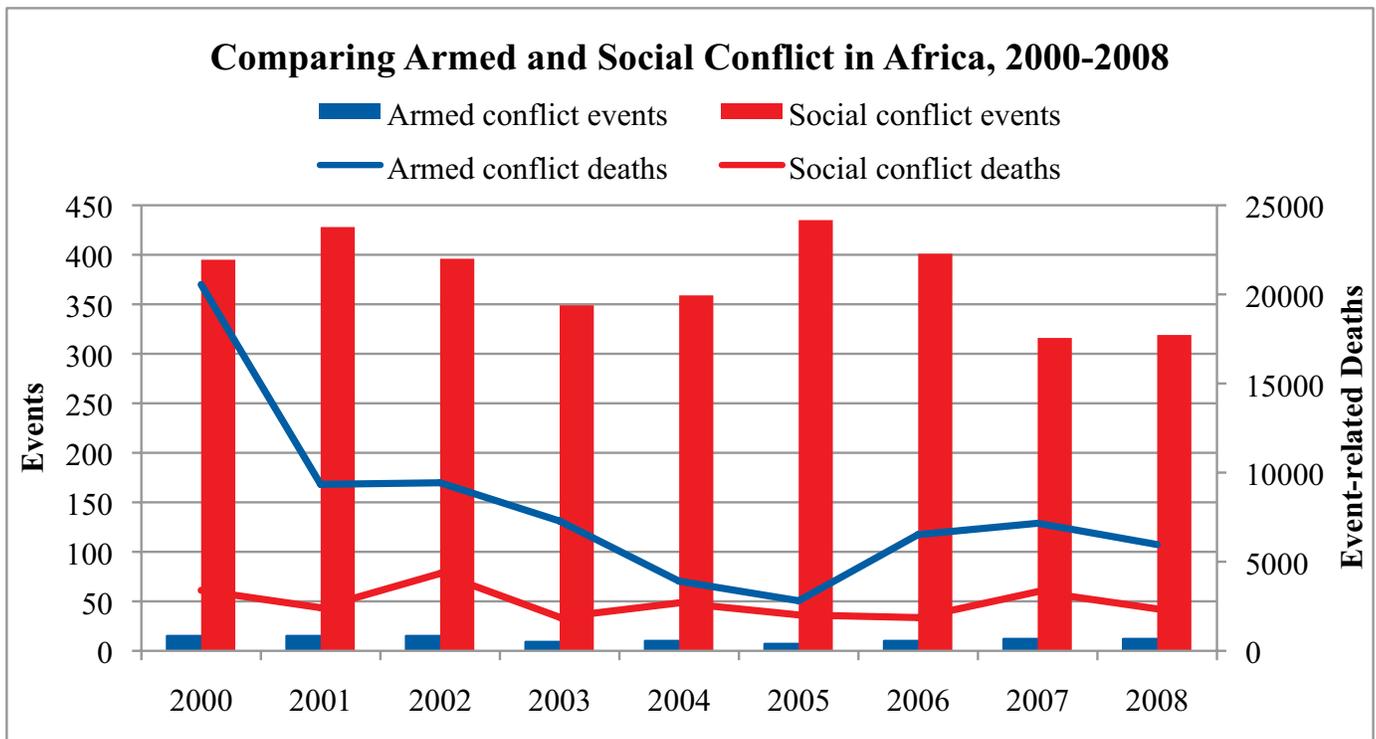


Figure 1. New data show that over the last two decades, social conflict in Africa has been more prevalent than armed conflict and has resulted in a significant number of fatalities.

FIGURE 2

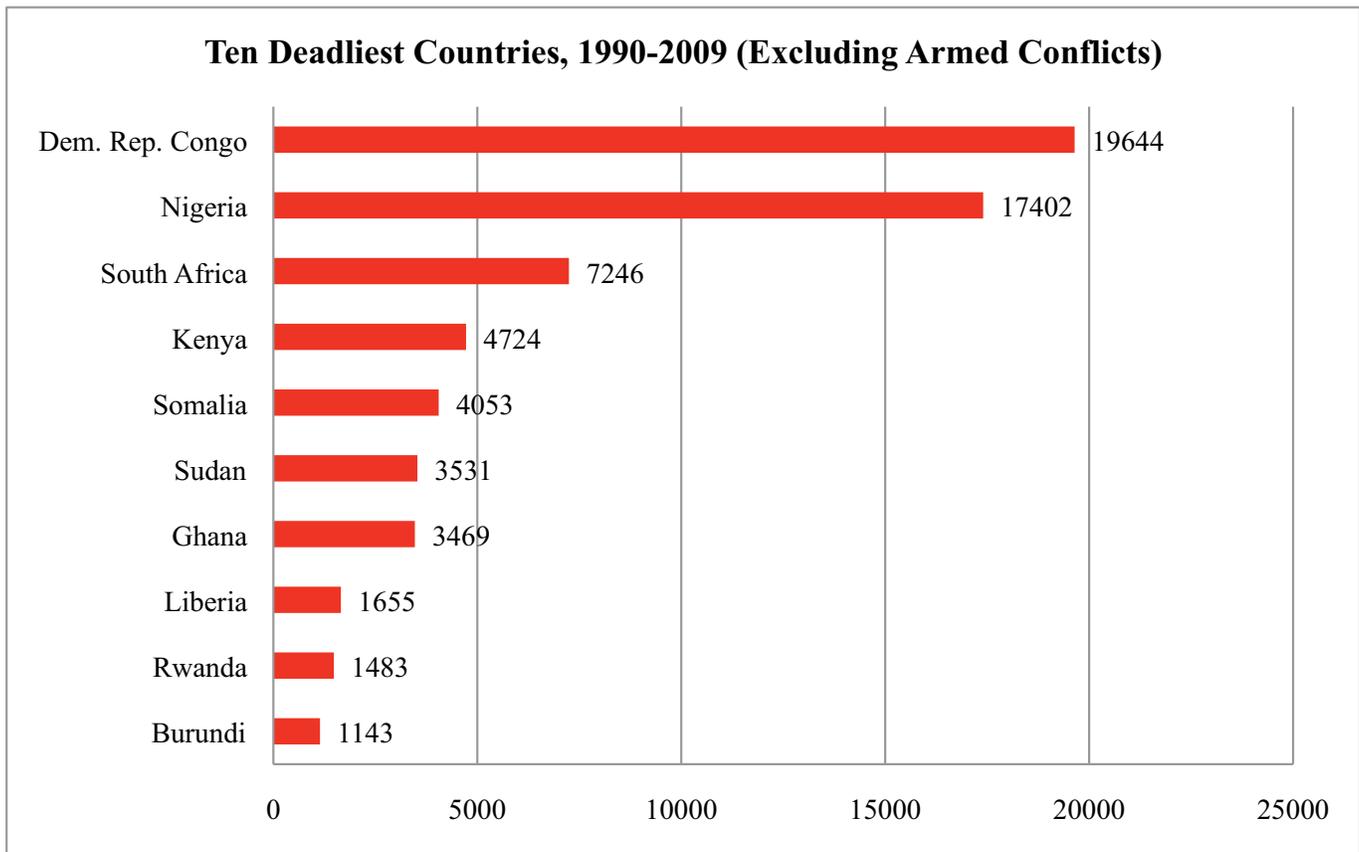


Figure 2. Social conflict events have resulted in a significant number of fatalities in Africa over the last twenty years, with the ten deadliest countries spread across the continent.

## Predicting, preventing, and responding to climate-fueled instability in Africa requires more than the traditionally narrow focus on armed conflict.

the late 1990s.) And while civil wars and insurgencies have occurred more often than warfare between states, they are still relatively uncommon given the high cost of mobilizing, financing, and equipping rebel armies.

Moreover, civil wars are predicated on people's belief that the central government is the most appropriate target of action. If conflict is about competition over scarce water and land, then attacking the government is only useful if the government effectively controls those resources or has the power to redistribute them within society—preconditions that are not met in many African states. Often, it is easier to take resources from a neighboring community than to challenge the state and its armed forces. And if a constituency is politically important, then peaceful opposition activities are often sufficient to secure the group's goals.

Given the above, it seems far from clear that competition over dwindling resources and scarce arable land will lead directly to interstate war or rebellion in Africa. More likely, one would expect that environmental stress will provoke economic downturns and food insecurity, which in turn

will spark episodic demonstrations, riots, labor unrest, and communal conflicts—and such conflicts may target not only governments but non-state actors too, such as tribal groups, private citizens, and corporations. If not addressed, these conflicts can contribute to long-term state fragility.

As the SCAD data show (Figure 1), social conflict is much more prevalent than armed conflict. During the 2000s, Africa experienced an average of twelve armed conflict events per year, but 378 social conflict events.<sup>9</sup>

Furthermore, when it comes to human security and political stability, these less traditional types of conflict can be extremely disruptive. While armed conflicts caused roughly triple the number of deaths in the 2000s,<sup>10</sup> social conflicts still accounted for more than 20,000 deaths, many of which came during very violent, politically destabilizing episodes.<sup>11</sup> Figure 2 shows the ten deadliest countries in Africa based on social conflict events.

**While it is clear that drought and resource scarcity spawn conflict, SCAD data show that violence is more common in wet years than in dry.**

For example, widespread ethnic rioting following the flawed 2007 elections in Kenya caused 800 to 1,500 deaths in that country. In Nigeria, Muslim-Christian violence in the city of Jos has claimed over 1,700 lives since 2001—including 500 in March of 2010. In the Democratic Republic of the Congo, conflict between Lendu farmers and Hema pastoralists in the province of Ituri has claimed well over 8,000 lives and led to the displacement of thousands more.

All these examples are linked, in one way or another, to competition over land for farming and for pasture.

Thus, predicting, preventing, and responding to climate-fueled instability in Africa requires more than the traditionally narrow focus on armed conflict, which emphasizes primarily military solutions. A broader understanding of conflict requires economic and diplomatic efforts to resolve social unrest and promote the peaceful resolution of disputes to prevent longer-term crises and state failure.

## Clouds of Conflict: The Impact of Rainfall

Effective prevention and response also requires a clear understanding of the impact of specific environmental stressors. To that end, the Social Conflict in Africa Database allows statistical analysis focusing on the relationship between conflict and one particular environmental factor: rainfall.

Why look at rainfall?

First, rainfall is a reliable measure of rural income and food security. Given the poor condition of irrigation systems throughout the continent, African agriculture is deeply dependent on rain, and extremely dry and wet years lower agricultural yields.

Second, unlike other environmental variables, such as soil erosion and water quality, rainfall is not directly affected by human behavior. This enhances the validity of causal arguments about climate change and social conflict.

Finally, while climate models are complex and human effects are difficult to foresee, the IPCC's forecasts are relatively reliable in their projections of future rainfall patterns in Africa, and these forecasts are being continually improved by natural scientists.

If hypotheses about climatic stressors and social conflict are correct, then unrest should be more prevalent in particularly dry years, when rural incomes are depressed and food and water are scarce, and also in particularly wet years, when flooding causes damage to crops.

SCAD's statistical models confirm this relationship (Figure 3). An extremely dry year—defined as occurring roughly once in 40 years—sees, on average, a 34% increase in the frequency of social conflict events.<sup>12</sup> An extremely

FIGURE 3

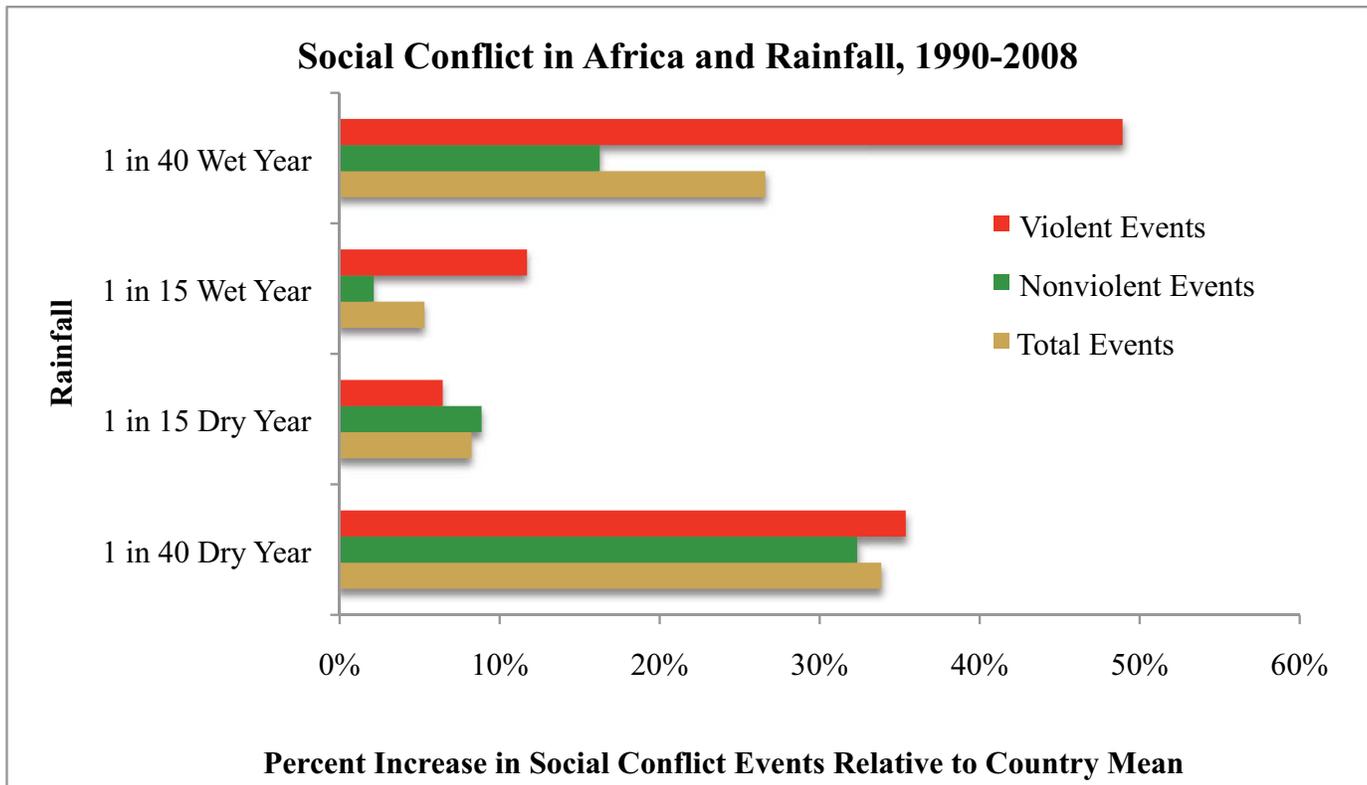


Figure 3. Rainfall has a surprising influence on the likelihood of social conflict. Data show that, in recent decades, violent events have been more common in extremely wet years than in extremely dry years.

wet year sees, on average, a 27% increase in social conflict.<sup>13</sup> In the aggregate, the environment-conflict link is validated. While this analysis is based on historical data, events in the past can inform our conjectures about the future, since shifting rainfall patterns are one likely consequence of climate change.

But a more careful examination of the data reveals a more complex picture.

The Social Conflict in Africa Database divides cases into *nonviolent* events, such as demonstrations and strikes, and *violent* ones, such as rioting and communal clashes. The data show that during extremely dry years, both violent and nonviolent events increase by roughly the same magnitude. During wet years, however, periods of high rainfall significantly increase the frequency of violent events, relative to nonviolent ones.

In other words, while it is clear that drought and resource

scarcity spawn conflict, SCAD data show that violence is more common in wet years than in dry.

Why this surprising result? This relationship could be due to damage to African economies after excessive rain. Or, there could be a paradox of plenty: violence is more prevalent when environmental conditions are *more* favorable, because resources are abundant and more economically valuable.

At a recent Climate Change and Security conference in Trondheim, Norway, researchers presented evidence that conflicts are often in response to resource abundance rather than scarcity.<sup>14</sup> For instance, patterns of tribal clashes over cattle in the Sahel suggest that raiding behavior increases during wet seasons when food and water are plentiful (see sidebar).

Put simply: if violence is a deliberate means of capturing resources, it may be a logical strategy only when there are resources to take.

## Cattle Raiding in East Africa

Many communities, particularly in semi-arid regions of Africa, depend on raising cattle for their livelihoods, and depend on the natural environment for their wellbeing. Poor rainfall can spell disaster as herds are depleted through thirst and inadequate grazing.

Yet, pastoral communities in countries such as Kenya, Uganda, Ethiopia and Sudan are often at the margins of society, with negligible government presence in remote areas to arbitrate disputes. Consequently, violence is often used to settle conflicts, and cattle raiding—while a longstanding practice—has become especially deadly in recent years.

In 2009 and 2010 in Southern Sudan, for example, various ethnic groups including the Dinka, Nuer, Murle, Mundari, and Shilluk tribes clashed over cattle, water, and grazing rights, resulting in hundreds of reported deaths. Such clashes threaten the tentative peace between North and South Sudan and pose a challenge to the stability of the South Sudanese government as it moves towards independence.

Contrary to popular belief, however, new research shows that cattle raids in East Africa are more likely to occur in wet years rather than during periods of drought and scarcity.<sup>15</sup> When rainfall is abundant, cattle have more access to water and grass for grazing, making them fatter and more profitable to steal; whereas drought-stricken herds are not as economically valuable. Moreover, dense vegetation makes it easier for raiding parties to conduct ambushes and to safely escape.

Therefore, governments in the region and international agencies must pay greater attention to not only helping pastoralists cope with drought, but also to shoring up alternate, peaceful means of settling disputes.

## Looking to the Future

Analyzing these historical patterns of social conflict in Africa, and the factors that contributed to their development, could prove useful in anticipating and alleviating—or even preempting—future conflict.

Drawing on precipitation projections from the IPCC, we can forecast future rainfall patterns, develop informed conjectures about the likelihood of social conflict, and better enable policymakers and practitioners to formulate effective responses.

The consensus positions of the IPCC with respect to rainfall across Africa indicate that northern and southern regions will become significantly dryer, while eastern Africa is forecast to become significantly wetter.

Moreover, rainfall will become clumpier, with more of it coming all at once—leading to flooding and runoff—with longer dry periods in between.

In other words, not only will mean levels of rainfall change, but their variance will too: extreme rainfall events may become much more common. If African economies are disrupted, and African societies face difficulties in adapting to change, the future may bring more social conflict to the continent.

Thus, it is imperative that policymakers focus on improving Africa's adaptive capacity. This involves improving water storage and irrigation systems, introducing new varieties of crops that are less sensitive to floods and droughts, and improving access to insurance markets. Knowing which regions are most likely to be adversely affected can help target such efforts where they are needed most.

Moreover, those concerned with security and stability in Africa can support the strengthening of political institutions and judicial systems to resolve disputes when they do arise—for the absence of war is not the presence of peace. Social conflict, which does not fit neatly into the armed conflict paradigm, can pose grave threats to political stability and human security. 🌍

## ENDNOTES

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- <sup>4</sup> Ban Ki Moon, "A Climate Culprit in Darfur," *Washington Post*, June 16, 2007.
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- <sup>8</sup> Cullen S. Hendrix and Idean Salehyan, *Social Conflict in Africa Database (SCAD)*, [www.scaddata.org](http://www.scaddata.org), accessed January 11, 2011.
- <sup>9</sup> Nils Petter Gleditsch et al., "Armed Conflict 1946-2001: A New Dataset." *Journal of Peace Research* 39, 5 (2002): 615-637.
- <sup>10</sup> Battle death data are calculated from Bethany Lacina and Nils Petter Gleditsch, "Monitoring Trends in Global Combat: A New Dataset of Battle Deaths," *European Journal of Population* 21, 2-3 (2005): 145-166.
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- <sup>12</sup> These calculations are based on standard deviations from mean rainfall.
- <sup>13</sup> For technical details, see Cullen S. Hendrix and Idean Salehyan, "After the Rain: Rainfall Variability, Hydro-Meteorological Disasters, and Social Conflict in Africa" (Paper presented at the Climate Change and Security Conference, Trondheim, Norway, June 21-24, 2010), <http://ssrn.com/abstract=1641312>.
- <sup>14</sup> For the conference website and papers see: <http://climsec.prio.no>.
- <sup>15</sup> Adano Wario Roba and Karen Witsenber, *Surviving Pastoral Decline: Pastoral Sedentarism, Natural Resource Management and Livelihood Diversification in the Marsabit District, Northern Kenya, Vol. II* (Amsterdam: University of Amsterdam, 2005). Patrick Meier, Doug Bond, and Joe Bond, "Environmental Influences on Pastoral Conflict in the Horn of Africa," *Political Geography* 26, 6 (2007): 716-735.

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